



# Eaton 93PX

15–20 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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These are the original instructions.

# Contents

<b>1</b>	<b>How to read this manual</b>	<b>7</b>
1.1	Safety-related signs	7
1.2	Symbols and abbreviations	7
1.3	Conventions used in this document	9
1.4	Glossary	9
<b>2</b>	<b>Safety</b>	<b>11</b>
2.1	Safety instructions	11
2.2	Personnel safety	13
2.3	Audience	13
2.4	CE marking	14
2.5	User precautions	14
2.6	Environment	14
2.7	Symbols on the UPS and accessories	15
2.8	For more information	15
<b>3</b>	<b>Introduction to Eaton UPS</b>	<b>17</b>
3.1	About the Eaton UPS	17
3.2	Looking inside the UPS system	18
3.3	UPS operating modes	22
3.4	UPS features	24
3.4.1	Advanced Battery Management	24
<b>4</b>	<b>UPS installation preparation and unpacking</b>	<b>25</b>
4.1	UPS system interface wiring preparation	25
4.2	Precautions	25
4.3	Unpack and inspect the units	26
4.4	Mechanical installation	29
4.4.1	UPS installation	29
4.4.1.1	Rack installation	29
4.4.1.2	Tower installation	33
4.4.2	EBM installation	33
4.4.2.1	Rack installation	33
4.4.2.2	Tower installation	34
4.4.3	MBP installation	34
4.4.3.1	Rack installation	34
4.4.3.2	Tower installation	35
4.4.4	Parallel UPS installation	35
<b>5</b>	<b>UPS system installation</b>	<b>37</b>
5.1	Product safety	37
5.2	About UPS system installation	38
5.3	UPS system installation	39
5.3.1	UPS cables and connectors	39
5.3.1.1	UPS cables and connectors for CE	39

5.3.1.2	UPS cables and connectors for UL	41
5.3.2	MBP cables and connectors	42
5.3.3	Single UPS wiring	44
5.3.3.1	Configuration 3-3 (single feed, default UPS wiring configuration)	45
5.3.3.2	Configuration 3-3 (dual feed)	46
5.3.3.3	Configuration 3-1 (single feed)	47
5.3.3.4	Configuration 3-1 (dual feed)	48
5.3.3.5	Configuration 1-1 (single feed)	49
5.3.3.6	Configuration 1-1 (dual feed)	50
5.4	External battery module (EBM) wiring	51
5.5	Install a remote EPO switch	54
5.6	Single UPS MBP wiring	55
5.6.1	MBP20KIPDU wiring	56
5.6.1.1	Configuration 3-3 (single feed, default MBP wiring configuration)	59
5.6.1.2	Configuration 3-3 (dual feed)	60
5.6.1.3	Configuration 3-1 (single feed)	61
5.6.1.4	Configuration 3-1 (dual feed)	62
5.6.1.5	Configuration 1-1 (single feed)	63
5.6.1.6	Configuration 1-1 (dual feed)	64
5.6.2	MBP20KI wiring	65
5.7	Detection cable wiring	67
5.8	Parallel system installation	68
5.8.1	UPS cables and connectors	69
5.8.2	MBP cables and connectors	71
5.8.3	Parallel UPS wiring	73
5.8.4	Parallel UPS wiring with separate battery	75
5.8.5	Parallel UPS wiring with common battery	76
5.8.6	MBP20KIPARA wiring	77
5.8.6.1	Configuration 3-3 (single feed, default MBP wiring configuration)	81
5.8.6.2	Configuration 3-3 (dual feed)	83
5.8.6.3	Configuration 3-1 (single feed)	85
5.8.6.4	Configuration 3-1 (dual feed)	87
5.8.6.5	Configuration 1-1 (single feed)	89
5.8.6.6	Configuration 1-1 (dual feed)	91
<b>6</b>	<b>Communication interfaces</b>	<b>93</b>
6.1	Computer ports	93
6.2	Emergency Power-Off (EPO)	93
6.3	Dry in and Dry out	94
6.4	Modbus/BMS port and DIP switch	95
6.5	Intelligent cards	96
<b>7</b>	<b>UPS operating instructions</b>	<b>98</b>
7.1	About UPS operating instructions	98
7.2	UPS controls and indicators	98
7.2.1	Control panel	98



7.2.2	Touch screen	99
7.2.3	Guide page	100
7.2.4	Main page and pop-up page	102
7.2.5	Menu page	103
7.2.6	System events	104
7.2.6.1	View UPS real-time parameters	104
7.2.6.2	View or clear UPS history	106
7.2.7	System control	108
7.2.8	Settings	109
7.3	Signing in	113
7.4	System control instructions	114
7.4.1	UPS startup preparation	114
7.4.2	Starting the UPS in Power-on mode (default mode)	114
7.4.3	Starting the UPS on battery (without utility power)	114
7.4.4	Transfer from Power-on mode to Bypass mode	115
7.4.5	Transfer from Bypass mode to Line mode	115
7.4.6	Transfer from Bypass mode to Battery mode	115
7.4.7	Transfer from Bypass mode to Shutdown mode	115
7.4.8	Transfer from Line mode to Bypass mode	115
7.4.9	Transfer from Line mode to Battery mode	116
7.4.10	Transfer from Line mode to Battery test mode	116
7.4.11	Transfer from Line mode to High Efficiency mode	116
7.4.12	Transfer from Battery mode to Bypass mode	116
7.4.13	Transfer from Battery mode to Line mode	116
7.4.14	Transfer from Battery test mode to Line mode	116
7.4.15	Transfer from Battery test mode to Battery mode	116
7.4.16	Transfer from High Efficiency mode to Bypass mode	117
7.4.17	Transfer from High Efficiency mode to Line mode	117
7.4.18	Transfer from High Efficiency mode to Battery mode	117
7.4.19	Transfer from Fault mode to Bypass mode	117
7.4.20	Transfer from Fault mode to Shutdown mode	117
7.4.21	Transfer from any mode to Fault mode	117
7.4.22	UPS shutdown	117
7.4.23	UPS functions	118
7.4.24	Parallel UPS operations	119
7.4.24.1	Parallel UPS startup	119
7.4.24.2	Parallel UPS shutdown	119
7.4.24.3	Parallel UPS battery sharing	119
7.5	Use the Remote Emergency Power-off push-button	120
<b>8</b>	<b>UPS maintenance</b>	<b>121</b>
8.1	Important safety instructions	121
8.2	Preventive maintenance	122
8.3	Battery maintenance	122
8.4	Recycling the used UPS or batteries	123
8.5	UPS maintenance	124
8.6	Maintenance training	130

<b>9</b>	<b>Troubleshooting</b> .....	<b>131</b>
	9.1 About troubleshooting .....	131
	9.2 Alarms .....	131
<b>10</b>	<b>Technical data</b> .....	<b>136</b>
	10.1 About technical data .....	136
	10.2 Technical data .....	136
<b>11</b>	<b>Warranty</b> .....	<b>139</b>
	11.1 General information about warranty .....	139
	11.2 Whom to contact in case of Warranty .....	139
	<b>Index</b> .....	<b>140</b>

# 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**




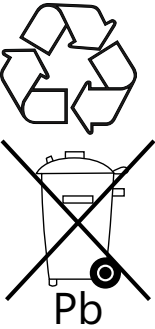
These symbols are used in warnings and notifications to indicate an action that should not be taken. The prohibited action symbols are shown below.

	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
AWG	American Wire Gauge
BOM	Bill of Materials
CE	Conformité Européenne (European Conformity) certification
CVCF	Constant Voltage/Constant Frequency

EBM	External Battery Module
EPO	Emergency Power-Off
ESS	Energy Saver System
HE	High Efficiency
MBP	Maintenance Bypass Module
MBS	Maintenance Bypass Switch
NC	Normally Closed
NO	Normally Open
RCD	Residual Current Device
SELV	Safety Extra-Low Voltage
TB	Terminal Block
UL	Underwriters Laboratories
UPM	Uninterruptible Power Module
UPS	Uninterruptible Power Supply
VRLA	Valve Regulated Lead Acid (battery)

# 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. 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 user 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 and conductive particles.

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



## 2.2 Personnel safety



### DANGER

**RISK OF VOLTAGE BACKFEED.** The system is powered by its own power source (batteries). Isolate the UPS and do a check for hazardous voltage upstream and downstream during lockout-tagout operation. The terminal blocks could be energized even when the UPS is disconnected from an AC power source.

- Discharge the BUS capacitor with a special tool or wait for five minutes. Make sure that the capacitor voltage is lower than 60 VDC.
- High leakage current. Make sure that there is a ground connection before connecting supply.



### WARNING

**RISK OF ELECTRIC SHOCK.** The battery circuit is not isolated from the AC input. Hazardous voltage could exist between the battery terminals and ground. Measure the voltage before touching.

Do not dispose of batteries in a fire or the batteries may explode.

A battery can present a risk of an electrical shock and high short-circuit current. Contact with any part of a grounded battery can result in an electric shock.

Obey these precautions when working on or around batteries:

- Disconnect the charging source and load before installing or maintaining the battery.
- Remove watches, rings, and other metal objects.
- Do not lay tools or metal parts on top of batteries or battery cabinets.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- 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.

## 2.3 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.

## 2.4 CE marking

The product has a CE marking in compliance with the following European directives:

- LVD Directive (Safety) 2014/35/EU
- EMC Directive 2014/30/EU
- RoHS Directive 2011/65/EU

Declarations of conformity with UPS harmonized standards and directives EN 62040-1 (Safety), EN 62040-2 (EMC) and EN 63000 (RoHS) are available at [www.eaton.eu](http://www.eaton.eu) or by contacting your nearest Eaton office or authorized partner.

## 2.5 User precautions

The only permitted user operations are:

- Startup and shutdown of the UPS, excluding the commissioning startup
- Use of the LCD control panel
- Use of optional connectivity modules and their software

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



## DANGER

Do not open any other screws in the unit than those holding the cover plates of the intelligent slots. Failure to recognize the electrical hazards can prove fatal.



## CAUTION

This is a product for commercial and industrial application in the second environment. Installation restrictions may apply or additional measures may be needed to prevent disturbances.

## 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 flammable gases, 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. In order to maximize internal battery service life time, the recommended operating temperature range is from +20 °C to +25 °C.



**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 Symbols on the UPS and accessories

The following are examples of symbols used on the UPS or its accessories. The symbols are used to alert you of important information.

	<p><b>RISK OF ELECTRIC SHOCK</b> Indicates that a risk of electric shock is present and the associated warning should be observed.</p>
	<p><b>CAUTION: REFER TO OPERATOR'S MANUAL</b> Refer to your operator's manual for additional information, such as important operating and maintenance instructions.</p>
	<p>This symbol indicates that you may not discard the UPS or the UPS batteries in the trash. This product involves sealed, lead-acid batteries and they must be disposed of properly. For more information, contact your local recycling / reuse or hazardous waste center.</p>
	<p>This symbol indicates that you may not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling / reuse or hazardous waste center.</p>

## 2.8 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® 93PX uninterruptible power system (UPS) protects your sensitive electronic equipment from the most common power problems, including power failures, power sags, power surges, brownouts, line noise, high voltage spikes, frequency variations, switching transients, and harmonic distortion. Power outages may occur unexpected, and the power quality will be erratic. These power problems have the potential to corrupt critical data, destroy unsaved work sessions, and damage hardware - causing hours of lost productivity and expensive repairs. With the Eaton UPS, you can safely eliminate the effects of power disturbances and guard the integrity of your equipment.

The Eaton UPS's unique benefits include:

- True online double-conversion technology with high power density, utility frequency independence, and generator compatibility.
- Selectable High Efficiency mode of operation.
- Standard communication options: one RS232 communication port, one USB communication port, one dry in port and dry out port.
- Optional connectivity cards with enhanced communication capabilities.
- Firmware that is easily upgradable without a service call.

The product family is introduced in the below table.

Catalog	Description	Model name	Certification
Power module	93PX 15 kW UPS	93PX15KiPM	CE and UL*
Power module	93PX 20 kW UPS	93PX20KiPM	CE and UL*
EBM	93PX EBM 2 x 240 VDC	93PXEbm480	CE
MBP	20 kW MBP	MBP20KI	CE
MBP	20 kW MBP with PDU	MBP20KIPDU	CE
MBP	2 x 20 kW parallel UPS MBP	MBP20KIPARA	CE

These products support dual input requirements, as well as the following input and output configurations:

- three phase input - single phase output (3-1) for CE
- three phase input - three phase output (3-3) for CE and UL\*
- single phase input - single phase output (1-1) for CE

**NOTE:** \*UL certification applies only to the three-phase input - three-phase output (3-3) configuration.

We recommend that you take the time to read this manual to take full advantage of the many features of your UPS.

Before installing the UPS, read and obey the safety instructions.

## 3.2 Looking inside the UPS system

In this user manual, *Single UPS MBP* refers to MBP20KI or MBP20KIPDU.

### UPS module

Figure 1. UPS module, front view

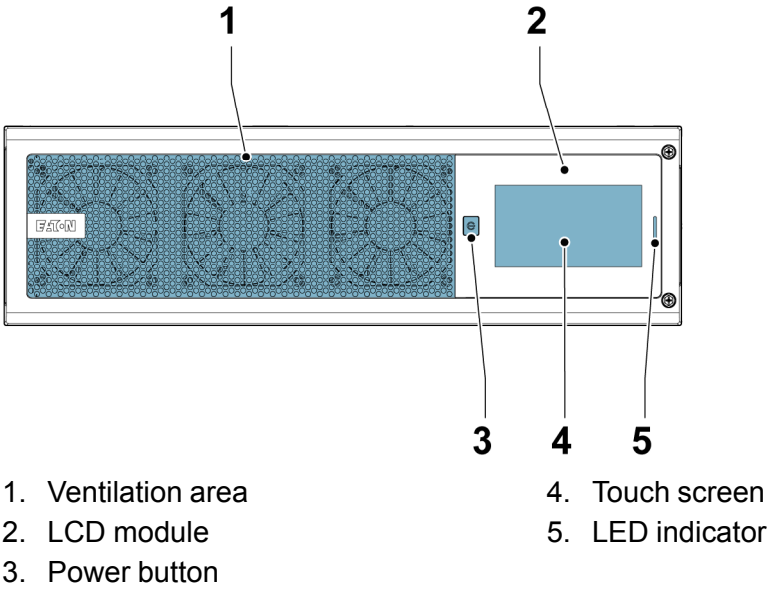
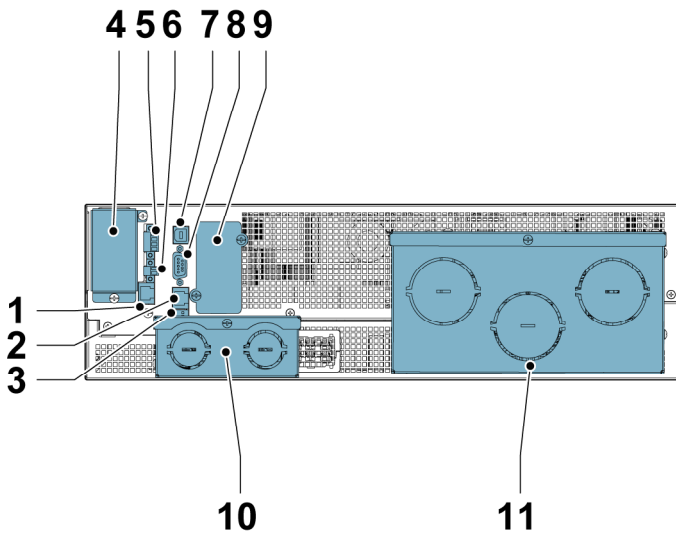


Figure 2. UPS module, rear view

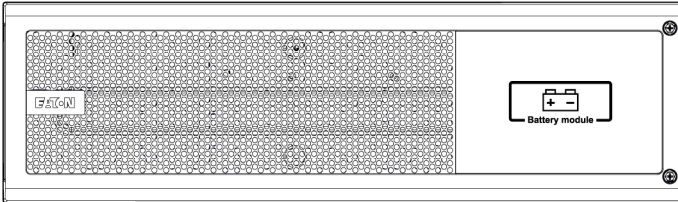


1. RJ45 port (detects EBM/MBP)
2. RJ45 port (Modbus/BMS)
3. DIP switch
4. Parallel port
5. Dry in/out port

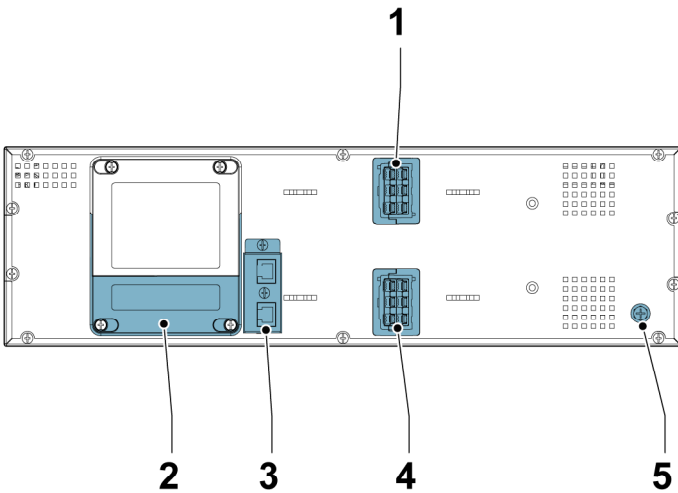
- 6. EPO port
- 7. USB port
- 8. RS232 port
- 9. Intelligent slot
- 10. Battery terminal ports
- 11. Input/output/bypass terminal ports

**External battery module (EBM)**

**Figure 3. External battery module (EBM), front view**



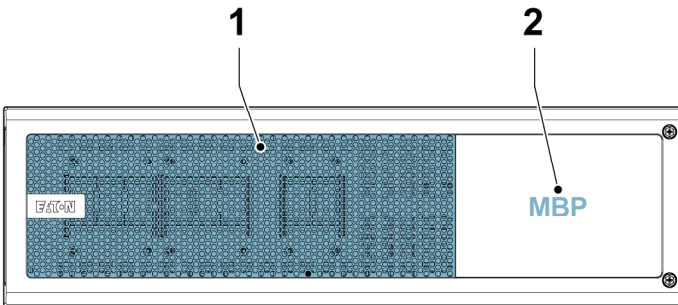
**Figure 4. External battery module (EBM), rear view**



- 1. Battery port 1
- 2. Fuse box
- 3. RJ45 port (detects EBM)
- 4. Battery port 2
- 5. Grounding screw

**Maintenance bypass module (MBP)**

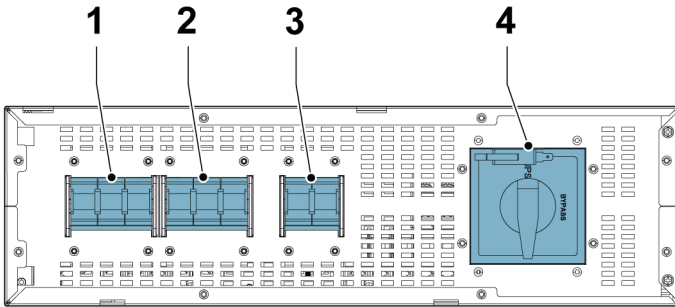
**Figure 5. Maintenance bypass module (MBP), front view**



- 1. Ventilation area
- 2. Maintenance Bypass label

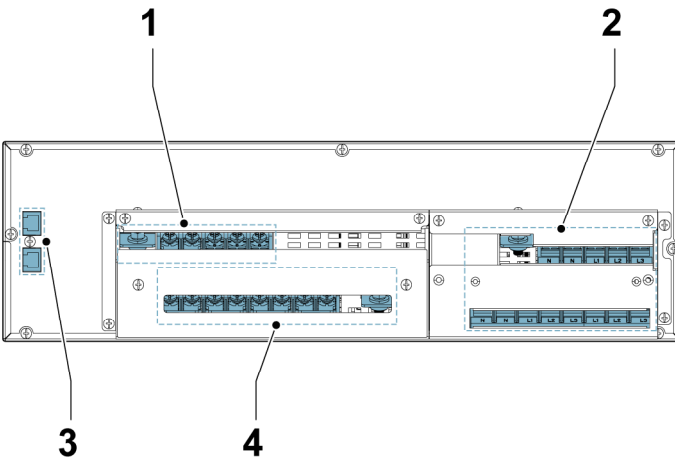
## MBP20KI

Figure 6. MBP20KI, front view



- 1. Input switch
- 2. Bypass switch
- 3. Neutral switch
- 4. Maintenance bypass switch

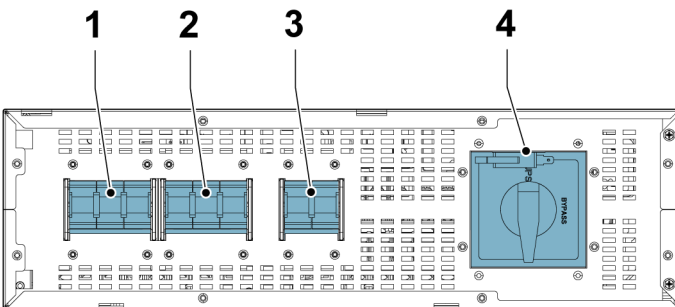
Figure 7. MBP20KI, rear view



- 1. AC output segment 1 (not programmable)
- 2. UPS ports
- 3. RJ45 ports (detect EBM/MBP)
- 4. AC input terminal ports

## MBP20KIPDU

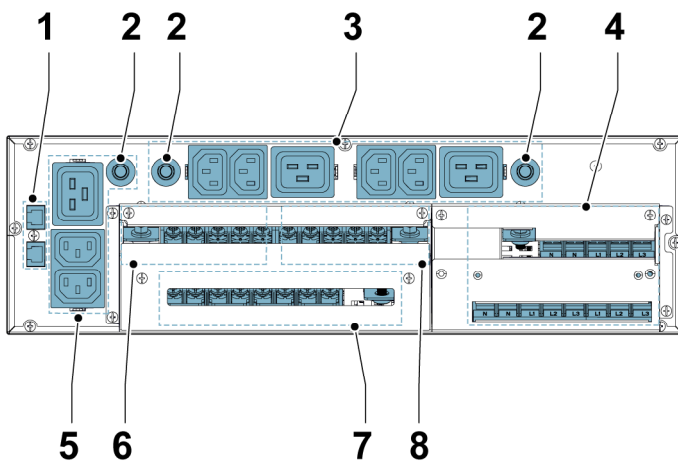
Figure 8. MBP20KIPDU, front view



- 1. Input switch
- 2. Bypass switch
- 3. Neutral switch
- 4. Maintenance bypass switch



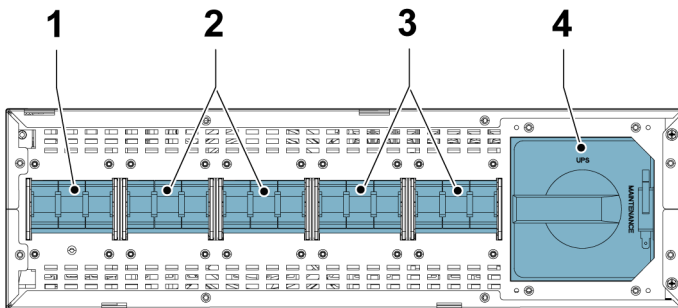
**Figure 9. MBP20KIPDU, rear view**



- |  |   |
|--|---|
| 1. RJ45 ports (detect EBM / MBP)                     | 6. AC output segment 1 (not programmable) |
| 2. Breakers for IEC output sockets                   | 7. AC input terminal ports                |
| 3. Load 2 with IEC output sockets (programmable)     | 8. AC output segment 2 (programmable)     |
| 4. UPS ports   |   |
| 5. Load 1 with IEC output sockets (not programmable) |   |

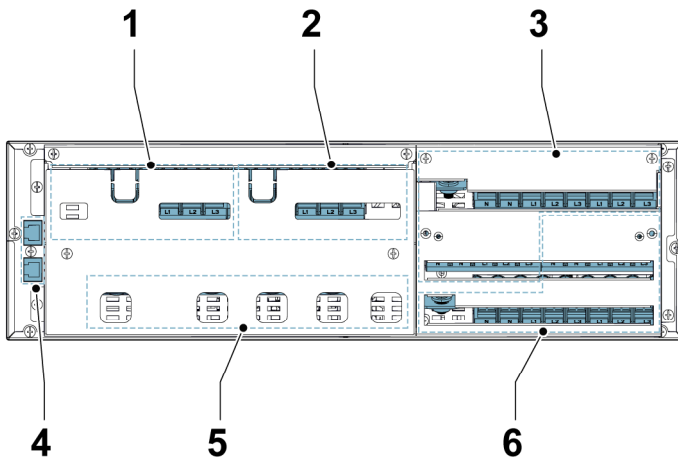
**MBP20KIPARA**

**Figure 10. MBP20KIPARA, front view**



- |                   |                              |
|-------------------|------------------------------|
| 1. Neutral switch | 3. Bypass switches           |
| 2. Input switches | 4. Maintenance bypass switch |

Figure 11. MBP20KIPARA, rear view



- 1. AC output segment 1 (not programmable)
- 2. AC output segment 2 (programmable)
- 3. UPS 2 ports
- 4. RJ45 ports (detect EBM/MBP)
- 5. AC input terminal ports
- 6. UPS 1 ports

### 3.3 UPS operating modes

Table 2. UPS operating modes

Operating mode	Description
<b>Normal operating modes</b>	
Line mode	Critical load is supplied by the inverter, which derives its power from utility AC power. The UPS load is protected. The batteries are charged according to a selected charging scheme. The UPS can be transferred to Line mode through the system control settings. The UPS transfers automatically to Line Mode after an automatic restart.
HE (High Efficiency) mode	Critical load is supplied directly by utility power through the bypass while the inverter is on. The UPS load is not protected. The batteries are charged if the battery charger is enabled. The UPS can be transferred to HE mode through the system control settings.
Energy Saver System (ESS) mode	Critical load is supported securely by utility power through the static bypass switch with double conversion available on-demand with typically less than a 2 ms transition time, should any abnormal condition be detected in the utility. Operating the UPS in ESS mode increases system efficiency up

Operating mode		Description
		to 99 %, allowing significant savings in energy losses without compromising system reliability.
<b>Other operating modes</b>		
Power-on mode		The UPS starts up in Power-on mode when it is connected to a power supply.
Bypass mode	Standby mode without output	Critical load is supplied directly by utility power through the bypass. The inverter is off and the UPS load is not protected. The batteries are charged according to a selected charging scheme. Pressing the UPS power button in Line mode, Battery mode, Battery test mode, or HE mode transfers the UPS to Bypass mode. Clearing a UPS fault by selecting <b>Reset fault</b> transfers the UPS to Bypass mode.
	Bypass mode with bypass output	
Battery mode		Critical load is supplied by the inverter, which derives its power from a DC power source and converts it into AC power. The UPS transfers to Battery mode when utility power is interrupted in Line mode, HE mode, or Battery test mode.
Battery test mode		Critical load is supplied by the inverter, which derived its power from a DC power source even if utility AC power is available. The Battery test mode is used to perform a battery discharge test, which can be executed either manually or automatically.
CVCF (Constant Voltage/Constant Frequency) mode		Critical load is supplied by the inverter, which derives its power from utility AC power. The UPS load is protected. The batteries are charged according to a selected charging scheme. Output frequency is constant (50 Hz or 60 Hz), and the unit does not synchronize the output frequency with the input frequency.
Fault mode		The UPS transfers to Fault mode if it detects a failure in the system. This is to prevent damage to the equipment and prevent injury to persons.
Shutdown mode		The unit saves the user settings and log information and, then, shuts down all power supplies. The UPS transfers to Shutdown mode if utility power is interrupted in Standby mode or if the UPS detects a failure in the system.

## 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.

# 4 UPS installation preparation and unpacking

## 4.1 UPS system interface wiring preparation

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

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

- The customer must provide all interface wiring.
- All signal inputs or remote features require an isolated normally-open contact or switch (rated at 24 VDC, 20 mA minimum) connected between the alarm input and common terminal. All control wiring and relay and switch contacts are customer-supplied. Use twisted-pair wires for each alarm input and common.
- The Remote EPO feature opens all switchgear in the UPS 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.
- Remote EPO wiring should 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 cannot exceed 150 meters.

## 4.2 Precautions

Read and understand the following guidelines before you unpack the units.

- The unit is heavy. Wear safety shoes and use a vacuum lifter preferentially for handling operations.
- All handling operations, such as unpacking, lifting, and rack installation, require a minimum of two people.
- Use the carrying straps to unpack the unit from the carton. Do not use the carrying straps for any other purposes.



### WARNING

Do not use the carrying straps to carry the unit around. The unit can slip from the straps and cause you injury and damage to the unit.

- The distance between the straps must not be more than 30 cm (12 in).
- Lift the unit carefully and keep it at low height.
- Keep the unit horizontal during unpacking.
- If the UPS stays de-energized for a long period of time and is stored in the correct storage temperature, it must be energized for a period of 24 hours at six-month intervals. For the correct storage temperatures, refer to *Section 10.2 Technical data*. Energizing the UPS recharges the battery and prevents possible damage to the unit.
- Make sure that your replacement battery modules are of the same number and type as the battery module that was originally installed in the UPS to maintain an identical level of performance and safety.



### CAUTION

This product can cause a DC current in the PE conductor. Where a residual current-operated protective device (RCD) is used for protection against electrical shock, only an RCD of Type B is allowed on the supply side of this product.

## 4.3 Unpack and inspect the units

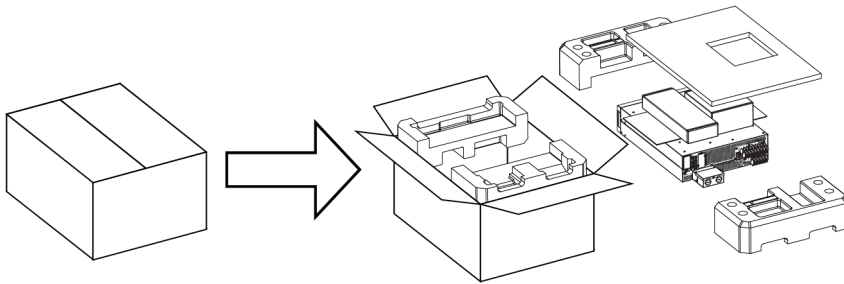
Carefully examine the outer package for obvious damage during handling. If any damage is found or any accessory is missing, contact your carrier or local Eaton representative immediately.



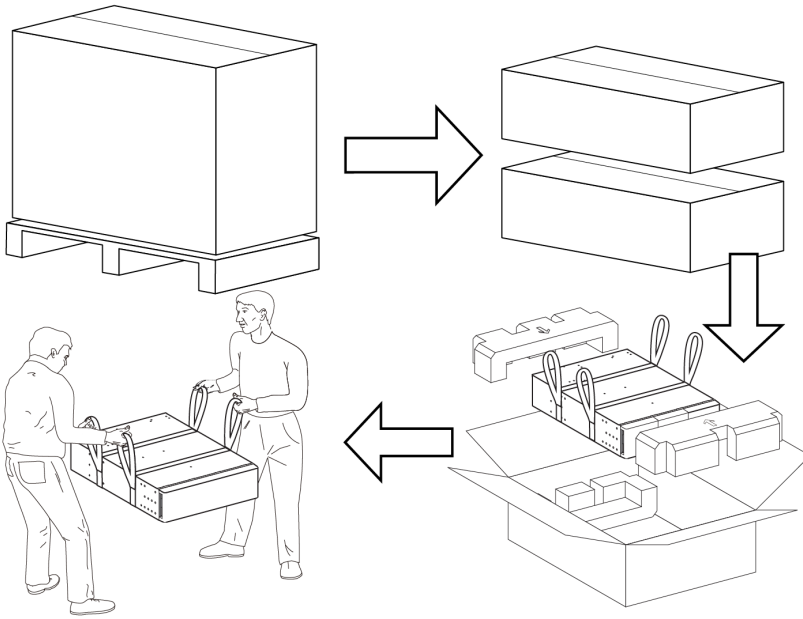
### CAUTION

Do not lift the module from the front or rear panel.

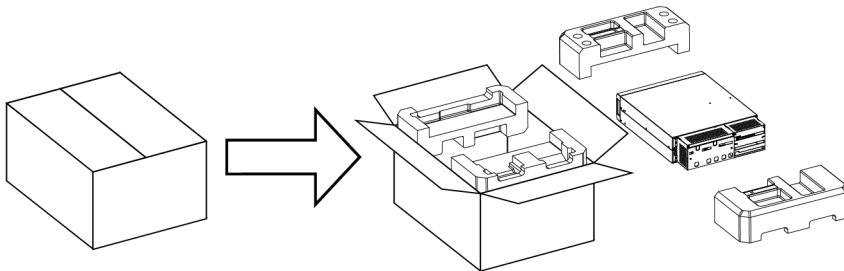
Figure 12. Unpacking the UPS module



**Figure 13. Unpacking the EBM (External battery module)**



**Figure 14. Unpacking the MBP (Maintenance bypass module)**



Examine the accessories and make sure that they are not damaged.

X = Included

O = Optional, not configured by default

- = Not available

**Table 3. UPS accessories**

UPS accessory	93PX15/20KiPM
USB cable	X
RS232 cable	O
Intelligent-card cable, including a card manual	O
Parallel cable, including a locker	X
Copper busbar, including a jumper cable	X

UPS accessory	93PX15/20KiPM
Tower feet	X
Rack ears	X
Rack rail kit	O
Screws	X
End-user license agreement	X
AC gland kit	X
DC gland kit	X
Terminal box	X
User Manual	X
Quick Guide	X

**Table 4. EBM accessories**

EBM accessory	93PXEBM480
EBM detection cable	X
EBM-to-UPS cable	X
EBM-to-EBM cable	X
Rack ears	X
Rack rail kit	O
Screws	X
Quick Start	X

**Table 5. MBP accessories**

MBP accessory	MBP20KI	MBP20KIPDU	MBP20KIPARA
MBP detection cable	X	X	X
UPS 1 cable	X	X	X
UPS 2 cable	-	-	X
Cable locker for IEC outlets	-	X	-
Copper busbar, including a configuration label	X	X	X
Rack ears	X	X	X
Rack rail kit	O	O	O
Screws	X	X	X



MBP accessory	MBP20KI	MBP20KIPDU	MBP20KIPARA
User Manual, included in this document	-	-	-
Quick Guide	X	X	X

**NOTE:** The packaging materials are reusable. Keep the packaging materials for future use.

## 4.4 Mechanical installation

This series support two installation configurations:

- Rack installation
- Tower installation

**NOTE:** To make sure that the airflow is sufficient, keep a free space of at least 500 mm around the front and rear panels of the module.

**NOTE:** Do not carry the modules from the front or rear panel during installation.

For the screw types and tightening torques used during the mechanical installation of the UPS, EBM, and MBP modules, refer to the below table.

**Table 6. Mechanical installation screw types and tightening torques**

Screw type	Tightening torque [Nm]
M3	0.8
M4	1.6
M5	3.0
M6	5.0

### 4.4.1 UPS installation

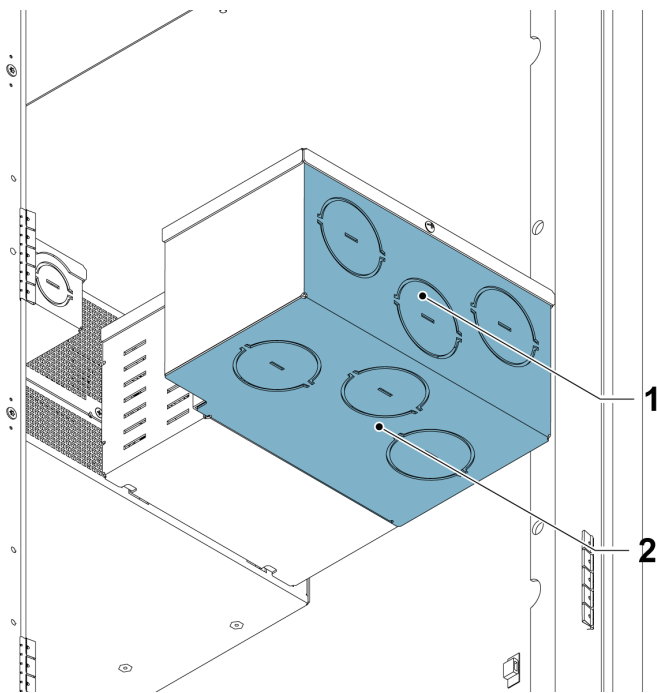
#### 4.4.1.1 Rack installation

The UPS is suitable for installation in a 19-inch standard rack cabinet. It is recommended that the minimum depth of the cabinet is 800 mm.

**NOTE:** If the UPS is installed with the MBP, the minimum depth of the rack cabinet is 1000 mm.

**NOTE:** If the depth of the rack cabinet is 800 mm, the cables must be installed from the bottom of the UPS.

**Figure 15. Rack installation cabling**



1. Rear cabling

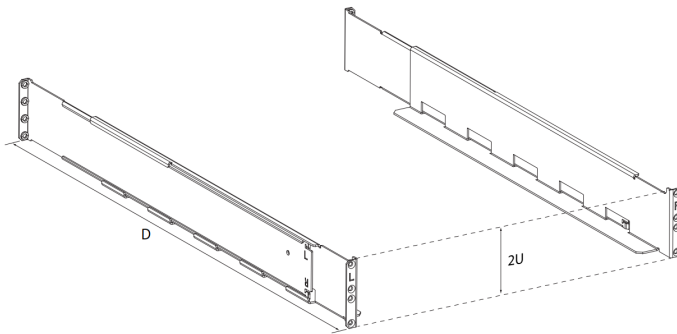
2. Bottom cabling

To install the UPS.

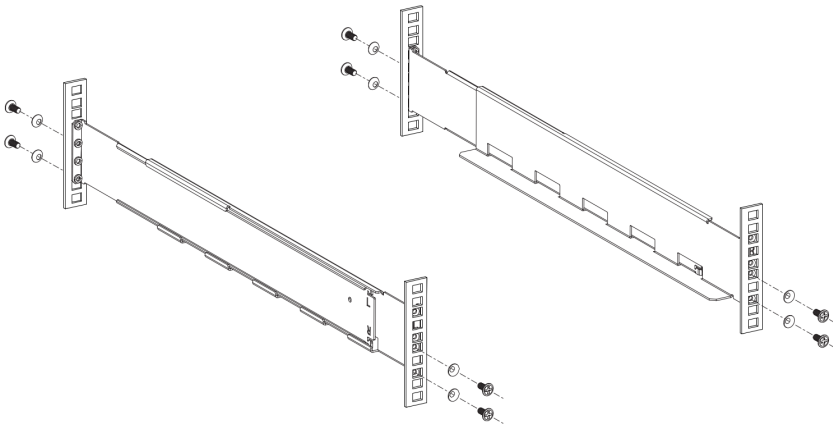
1. Install the rail kit.

The rail kit is 2U with M6 screw holes. The depth of the rail kit is 650–1050 mm.

*NOTE: This is an optional configuration.*

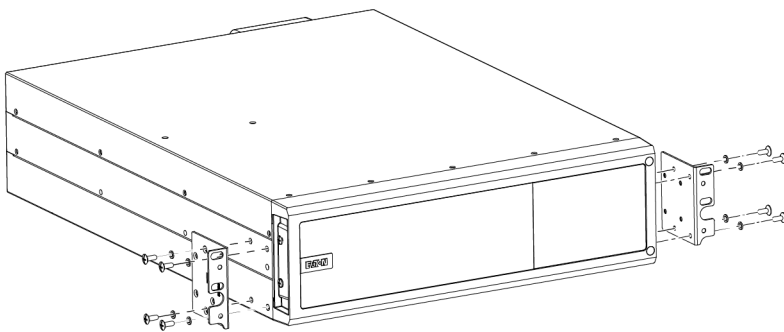


2. Attach the rail kit to the rack cabinet with 8 pieces of M6 screws and washers.

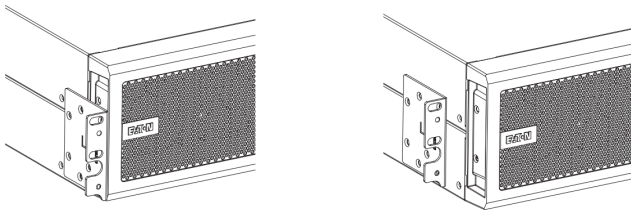


3. Install the rack ears.

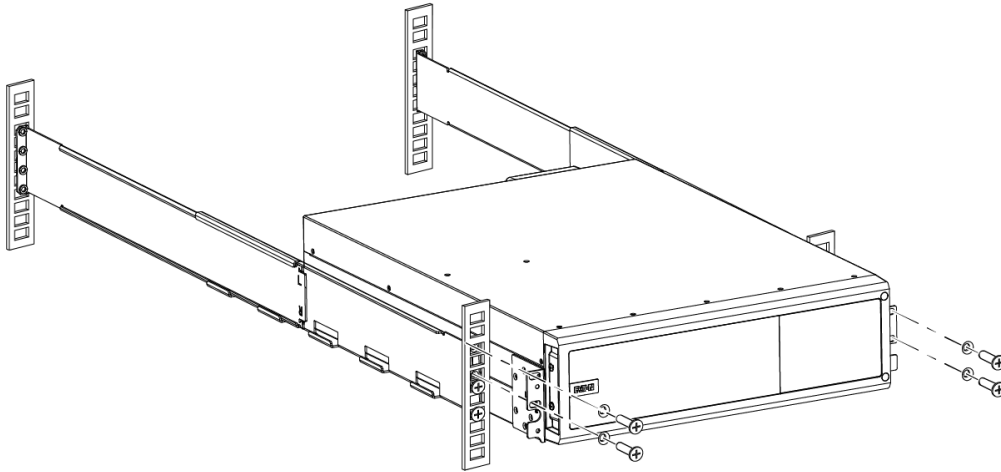
Attach the rack ears to the UPS with 8 pieces of M4 flat screws. Make sure that the rack ears are in the correct position.



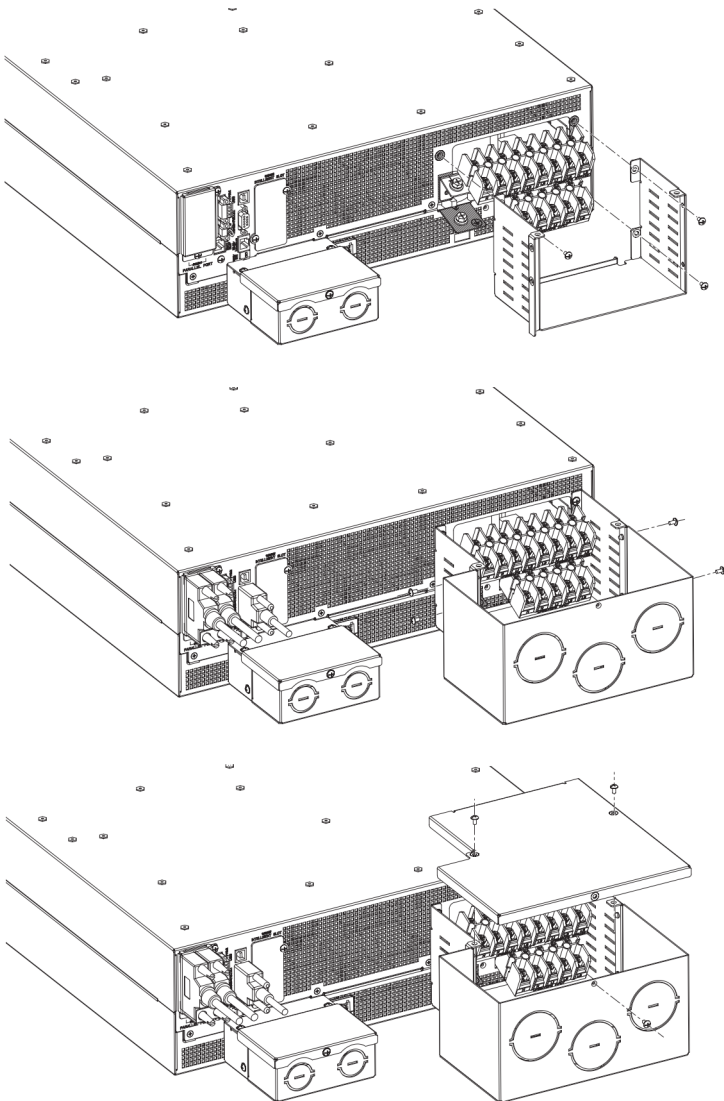
**NOTE:** This UPS provides optional installation positions for the rack ears to meet different installation depth requirements.



4. Put the UPS onto the rail kit and push it into position. Attach the UPS to the rack cabinet posts with 4 pieces of M5 screws and washers.



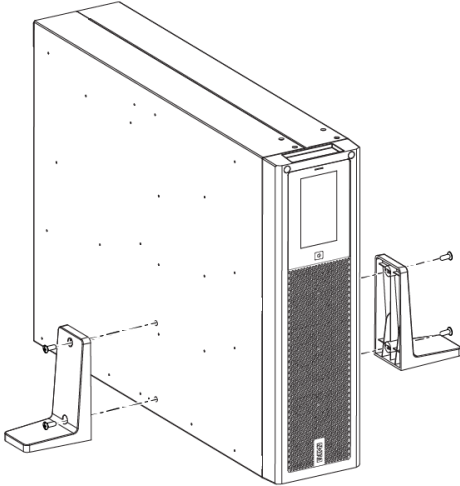
5. Install the AC terminal box with 10 pieces of M3 screws. The glands are in the UPS accessory kit.



### 4.4.1.2 Tower installation

To install the UPS.

1. Make sure that the LCD is at the top of the UPS.  
The LCD includes gravity sensors. As a result, the orientation of the display adjusts automatically.
2. Attach the tower feet to the UPS with 4 pieces of M4 screws.



### 4.4.2 EBM installation

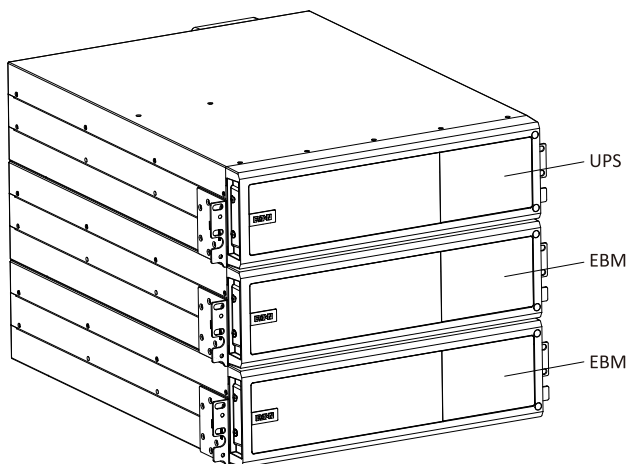
#### 4.4.2.1 Rack installation

To install the EBM, refer to *Section 4.4.1 UPS installation*. The installation procedure of the rack cabinet for the EBM is the same as for the UPS.

**NOTE:**

1. The EBM must be installed below the UPS, as shown in *Figure 16: Rack-mounted EBMs*.
2. The EBM contains two battery packs, each with a height of 3U. Therefore, a 6U installation space is required.
3. The EBM is heavy and requires more than two people to install.

**Figure 16. Rack-mounted EBMs**



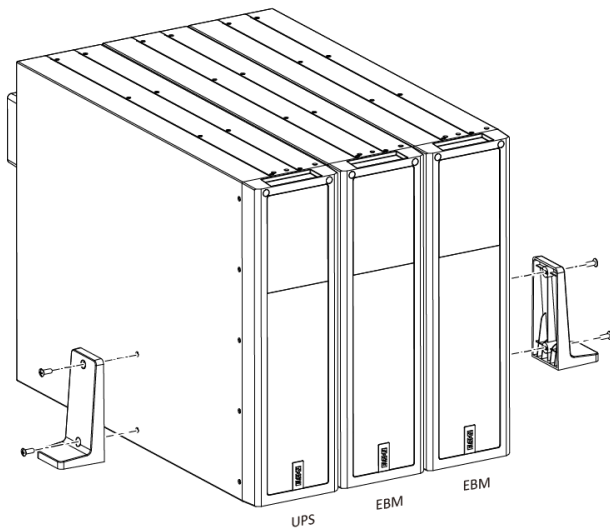
### 4.4.2.2 Tower installation

**NOTE:**

1. The EBM must be installed on the right side of the UPS.
2. The EBM contains two battery packs. As a result, the right side of the UPS must be kept empty.
3. The EBM is heavy and requires more than two people to install.

To install the EBM.

1. Put the EBM on the right side of the UPS and align it with the front panel of the UPS.
2. Attach one tower foot to the UPS and the other foot to the EBM with 4 pieces of M4 screws.  
The tower feet are in the UPS accessory kit.



### 4.4.3 MBP installation

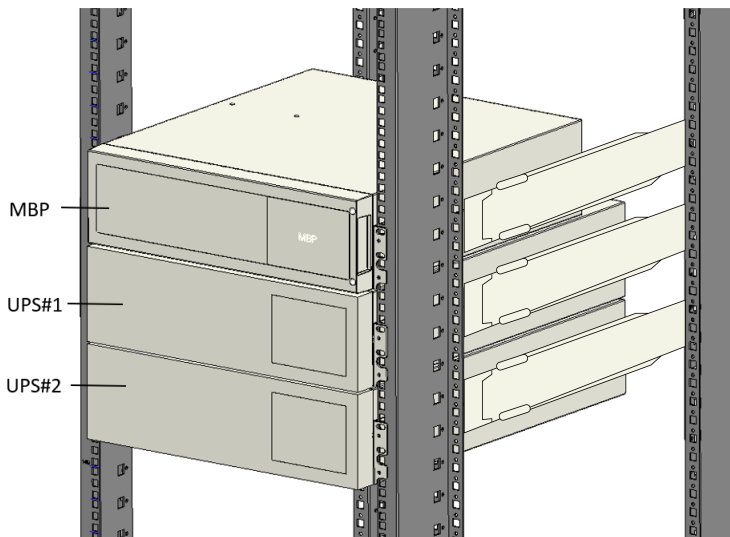
#### 4.4.3.1 Rack installation

To install the MBP, refer to *Section 4.4.1 UPS installation*. The installation procedure of the rack cabinet for the MBP is the same as for the UPS.

**NOTE:** The MBP is suitable for installation in a 19-inch standard rack cabinet. If the UPS is installed with the MBP, the minimum depth of the rack cabinet is 1000 mm.

When the MBP is installed together with the UPS and the EBM, put the MBP on the top of the UPS, as shown in *Figure 17: Rack-mounted MBP*.

**Figure 17. Rack-mounted MBP**

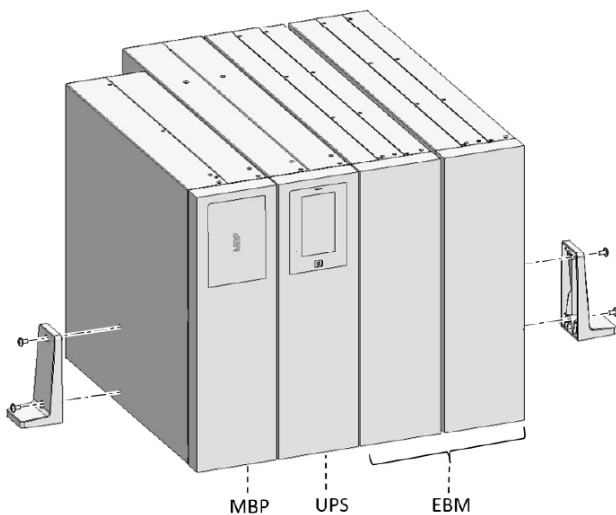


#### 4.4.3.2 Tower installation

When the MBP is installed together with the UPS and the EBM, the MBP must be on the left side of the UPS.

To install the MBP.

1. Put the MBP on the left side of the UPS and align it with the front panel of the UPS.
2. Attach one tower foot to the MBP and the other foot to the EBM with 4 pieces of M4 screws.  
The tower feet are in the UPS accessory kit.

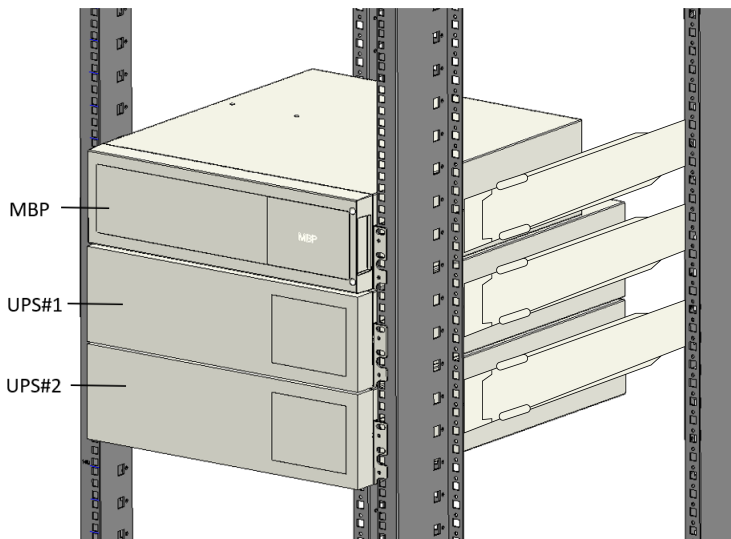


#### 4.4.4 Parallel UPS installation

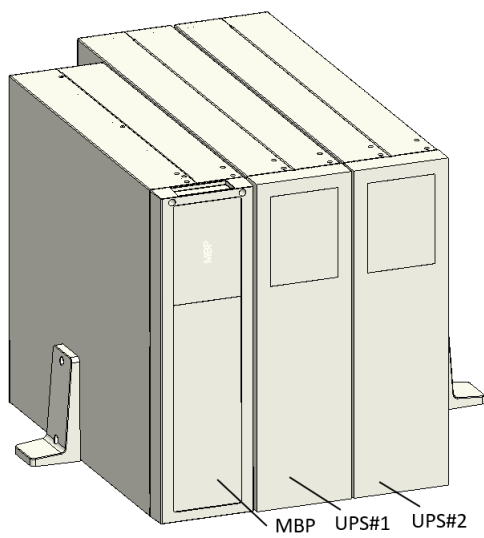
In a parallel system, the installation of the UPS is the same as that of a single UPS. For the instructions, refer to *Section 4.4 Mechanical installation*.

**NOTE:** If you configured a MBP20KIPARA, put it on the top of the UPSs in a rack-mounted parallel system, or on the left side of the UPSs in a tower-mounted parallel system. Refer to *Figures 18: Rack installation* and *19: Tower installation*.

**Figure 18. Rack installation**



**Figure 19. Tower installation**





# 5 UPS system installation

## 5.1 Product safety

The UPS connection instructions and operation described in the manual must be obeyed in the indicated order.

For PERMANENTLY CONNECTED EQUIPMENT, a readily accessible disconnect device must be incorporated in the building installation wiring for AC Input, AC Output and DC Input. If a disconnect device interrupts the neutral conductor, it must also simultaneously interrupt all other supply conductors of the same circuit.



### CAUTION

To reduce the risk of fire, connect only to a circuit provided with 80 amperes maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA70.

An AC contactor is used for backfeed protection and must comply with IEC 60947-1, IEC 60947-4-1, ANSI/UL 60947-1, ANSI/UL 60947-4-1, and IEC/EN 62040-1 (the creep age and clearance distances should meet the basic insulation requirements for pollution degree 2).

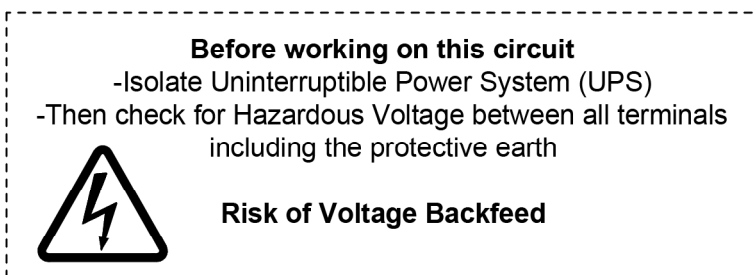
For UL, the type of AC contactors used as backfeed protection devices must be installed external to UPS per to this manual.



### CAUTION

An additional warning label, shown in *Figure 20: 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 the UPS input is connected through external isolators that, when opened, isolate the neutral. These warning labels can be obtained from your local service representative.

Figure 20. Warning label



- Battery cabinets that employ batteries with an HB case are not to be used in the data center as defined in the standard for the Protection of Information Technology Equipment, ANSI/NFPA 75”.

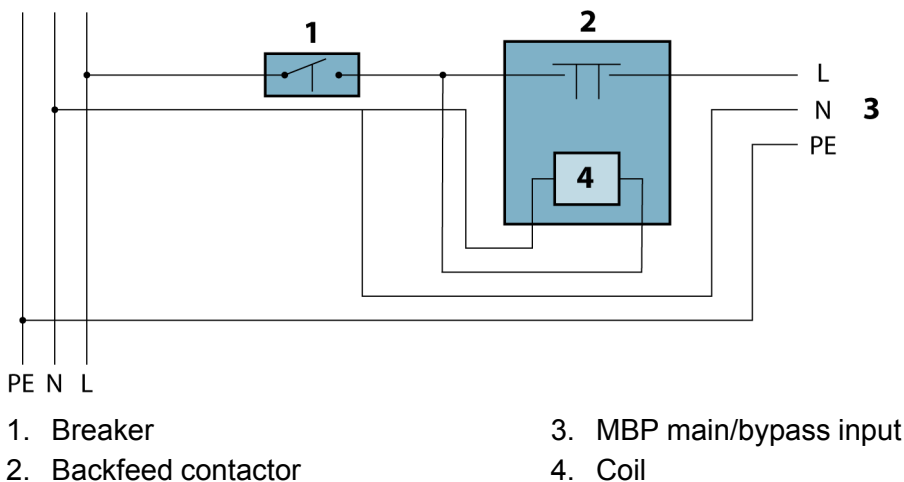
- Disconnection devices are provided by the service personnel for AC input, DC Input, and output circuits.
- Overcurrent protection devices are provided by others for the fixed output AC circuit.
- UPS with pressure terminal connectors for field wiring connections shall be followed installation manual, see *Section 5.2 About UPS system installation*.
- Obey the instructions in the installation manual for installing the tower standing brackets for tower stand position.
- Make sure that the indications on the rating plate correspond to your AC powered system and to the actual electrical consumption of all the equipment to be connected to the system.
- Keep the surrounding areas clean and free from excess moisture.
- Only qualified service personnel can open the UPS system.
- Do not block the ventilation grates of the system.
- Do not expose the system to direct sunlight or source of heat.
- Store the UPS system always in a dry place.
- The admissible storage temperature range is -25°C to +60°C without battery (-15°C to +40°C with battery).

## 5.2 About UPS system installation

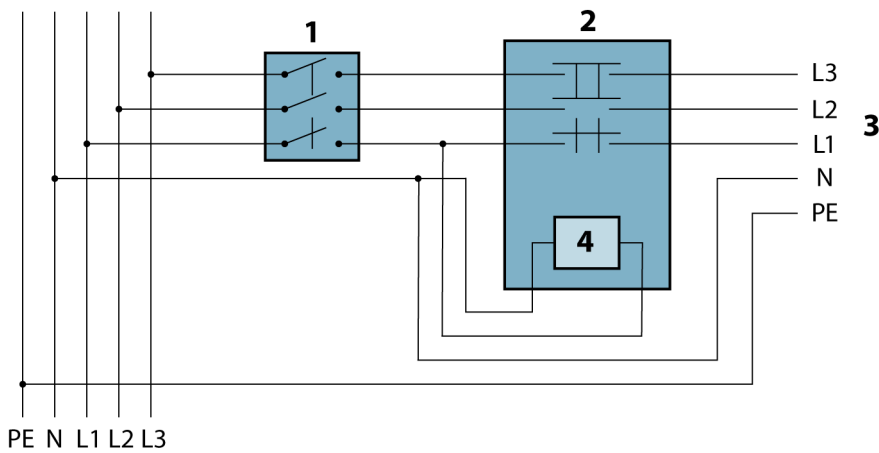
This section gives instructions on how to install the AC IN/OUT cable to the UPS and when the UPS is connected to the EBM.

Before you install the UPS, configure the upstream breaker and the backfeed contactor should to avoid power backfeed to the unit. Make sure that there is a “backfeed voltage danger” warning label on the backfeed contactor or device. Before you operate the UPS, make sure that the UPS input is cut off. Measure the voltage of the terminals to avoid high voltages. The backfeed contactor rating current must be greater than the UPS rating input current. For wiring diagrams of the UPS input, refer to *Figures 21: Single-phase system* and *22: Three-phase system*.

**Figure 21. Single-phase system**



**Figure 22. Three-phase system**



- 1. Breaker
- 2. Backfeed contactor
- 3. MBP main/bypass input
- 4. Coil

**NOTE:** Make sure that the contactor meets the safety requirements specified in IEC 62040-1, 4.8.102. If not all input poles are disconnected by the isolating device, the disconnecting contact of the isolating device needs to meet the distance requirements of reinforced insulation. The creepage distance must be 5.0 mm and the clearance must be 2.0 mm.

### 5.3 UPS system installation



**WARNING**

HIGH TOUCH CURRENT. GROUND CONNECTION ESSENTIAL BEFORE CONNECTING SUPPLY. As a result of the connected loads, high leakage current is possible. Ground connection is required for correct product operation. Do not check UPS operation by removing the ground connection.

#### 5.3.1 UPS cables and connectors

##### 5.3.1.1 UPS cables and connectors for CE

The wiring of the UPS installed in the EU market should adhere to the minimum conductor size for CE.

**Table 7. Minimum conductor size for CE (mm<sup>2</sup>)**

Model	Input/Output configuration	AC Input					AC Output			DC input (EBM)	
		Main input		Bypass input		Ground wire	L wire	N wire	Ground wire	+/- wire	Ground wire
		L wire	N wire	L wire	N wire						
93PX15KiPM	3-1	6	6	16	16	16	16	16	16	10	10
	3-3	6	6	6	6	6	6	6	6	10	10
	1-1	35	35	16	16	35	16	16	16	10	10

Model	Input/Output configuration	AC Input					AC Output			DC input (EBM)	
		Main input		Bypass input		Ground wire	L wire	N wire	Ground wire	+/- wire	Ground wire
		L wire	N wire	L wire	N wire						
93PX20KiPM	3-1	10	10	25	25	25	25	25	25	10	10
	3-3	10	10	10	10	10	10	10	10	10	10
	1-1	50	50	25	25	50	25	25	25	10	10

**NOTE:**

Select the larger cross-section conductor for the UPS input cable in a single-feed configuration.

**Table 8. Recommended input circuit breaker and contactor current specifications for CE**

Model	Input configuration	Breaker, D type [A]	Contactor [A]
93PX15KiPM	1-phase main input	125	≥125
	3-phase main input	63	≥63
	1-phase bypass input	100	≥100
	3-phase bypass input	40	≥40
93PX20KiPM	1-phase main input	160	≥160
	3-phase main input	63	≥63
	1-phase bypass input	125	≥125
	3-phase bypass input	63	≥63

**Table 9. Recommended output circuit breaker current specifications for CE**

Model	Output configuration	Breaker current [A]
93PX15KiPM	1-phase output	100
	3-phase output	40
93PX20KiPM	1-phase output	125
	3-phase output	63

**Table 10. Recommended DC circuit disconnect device specifications for UL and CE**

Model	Voltage [VDC]	Current [A]
93PX15KiPM	500	60
93PX20KiPM	500	80

**NOTE:** The diameter and the cross-section of the cable conductor depend on the rated power of the UPS. The above wire diameter is for user's reference only.

### 5.3.1.2 UPS cables and connectors for UL

The wiring of the UPS installed in the North American market should adhere to the minimum conductor size for UL and use copper cable rated for a minimum of 75 °C.

**Table 11. Tightening torques**

Wiring connection	Tightening torque	
	[lb-in]	[Nm]
Busbar	44.25	5.0
Bypass, main, output, and battery terminal block	17.71	2.0
Grounding screw	104.07	11.76

**Table 12. Minimum conductor size for UL (AWG)**

Model	Input/ Output configuration	AC Input					AC Output			DC input (EBM)	
		Main input		Bypass input		Ground wire	L wire	N wire	Ground wire	+/- wire	Ground wire
		L wire	N wire	L wire	N wire						
93PX15KiPM	3-3	8	6	8	6	8	8	6	8	8	10
93PX20KiPM	3-3	6	4	6	4	8	6	4	8	6	8

**NOTE:**

1. It is recommended that the UPS output cable length does not exceed 10 meters.
2. The default UPS input/output configuration is configuration 3-3 (single feed).
3. The neutral current can be 1.7 times the rated output phase current if the load is non-linear. Select a suitable neutral cable size.

**Table 13. Conductor size and ring terminal types**

Conductor cross-section (mm <sup>2</sup> )	Ring terminal type
6	KST RNB6-6
10	KST RNB6-10
16	KST RNB8-16
25	KST RNB8-25
35	KST RNB8-35
50	KST RNB8-50

**Table 14. Recommended input circuit breaker for UL**

Model	Input configuration	Current [A]
93PX15KiPM	3-phase main input	80
93PX20KiPM	3-phase bypass input	80

For UL, The AC contactors used as backfeed protection devices must be installed external to the UPS.

**Table 15. AC contactors**

Description	Type	Rating
ABB FRANCE (E312527)	A75-30	600 VAC, 105 A at 600 V three-phase, 15 HP for single-phase
TIANSHUI 213 ELECTRICAL APPARATUS CO LTD (E203071)	GSC1-6511	380 V-415 VAC, three-phase, 66 A 40 HP
TIANSHUI 213 ELECTRICAL APPARATUS CO LTD (E203071)	GSC1-8011	380 V-415 VAC, three-phase, 83 A 50 HP

**Table 16. Recommended output circuit breaker current specifications for UL**

Model	Output configuration	Current [A]	Standard
93PX15KiPM	3-phase output	40	UL 489
93PX20KiPM	3-phase output	60	UL 489

**Table 17. Recommended DC circuit disconnect device specifications for UL and CE**

Model	Voltage [VDC]	Current [A]
93PX15KiPM	500	60
93PX20KiPM	500	80

*NOTE:* The diameter and the cross-section of the cable conductor depend on the rated power of the UPS. The above wire diameter is for user's reference only.

### 5.3.2 MBP cables and connectors

Select the AC cable conductor for the MBP according to your UPS module.

If the MBP is installed with the 15 kVA UPS, refer to *Table 18: MBP wiring if installed with the 15 kVA UPS (cross-section of conductor, unit: mm<sup>2</sup>)*.

**Table 18. MBP wiring if installed with the 15 kVA UPS (cross-section of conductor, unit: mm<sup>2</sup>)**

MBP model	Input/Output configuration	Input					Output		
		Main input		Bypass input		Ground wire	L wire	N wire	Ground wire
		L wire	N wire	L wire	N wire				
MBP20KI MBP20KIPDU	3-1	6	6	16	16	16	16	16	16
	3-3	6	6	6	6	6	6	6	6
	1-1	35	35	16	16	35	16	16	16
MBP20KIPARA	3-1	16	16	50	50	50	50	50	50
	3-3	16	16	10	10	16	10	10	10
	1-1	95	95	50	50	95	50	50	50

If the MBP is installed with the 20 kVA UPS, refer to *Table 19: MBP wiring if installed with the 20 kVA UPS (cross-section of conductor, unit: mm<sup>2</sup>)*.

**Table 19. MBP wiring if installed with the 20 kVA UPS (cross-section of conductor, unit: mm<sup>2</sup>)**

MBP Model	Input/Output configuration	Input					Output		
		Main input		Bypass input		Ground wire	L wire	N wire	Ground wire
		L wire	N wire	L wire	N wire				
MBP20KI MBP20KIPDU	3-1	10	10	25	25	25	25	25	25
	3-3	10	10	10	10	10	10	10	10
	1-1	50	50	25	25	50	25	25	25
MBP20KIPARA	3-1	25	25	70	70	70	70	70	70
	3-3	25	25	16	16	25	16	16	16
	1-1	120	120	70	70	120	70	70	70

**NOTE:**

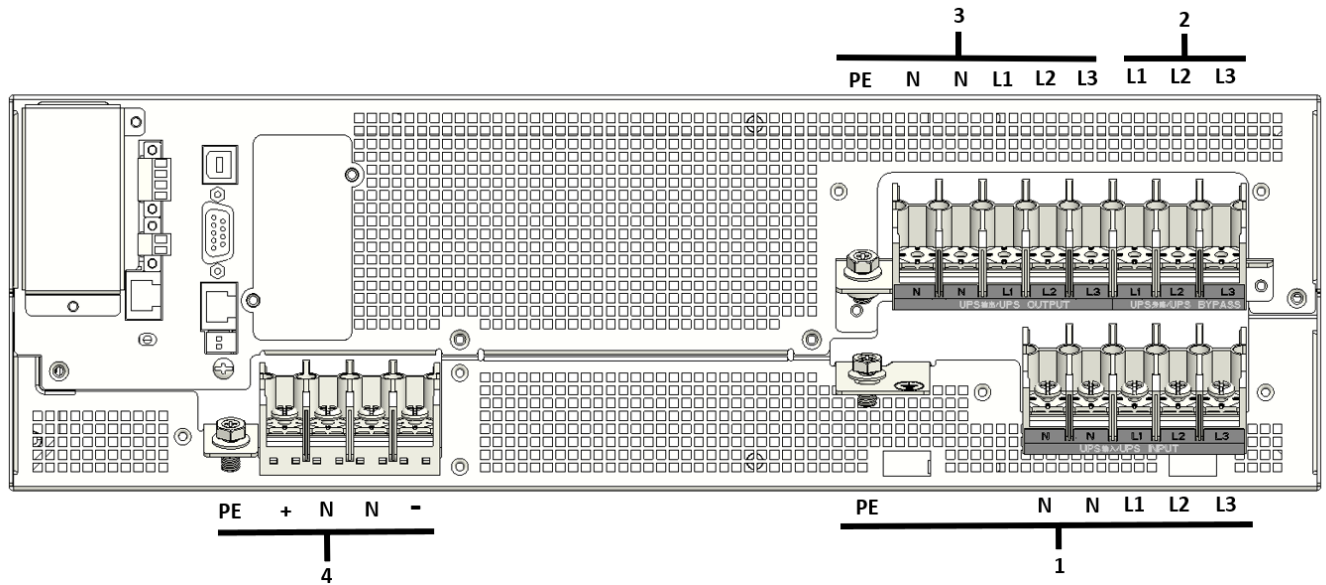
1. Select the larger cross-section conductor for the MBP AC input cable in a single-feed configuration.
2. It is recommended that the MBP output cable length does not exceed 10 meters.

**Table 20. Conductor size and ring terminal type**

Conductor cross-section (mm <sup>2</sup> )	Ring terminal type
6	DRNB6-6
10	DRNB6-10
16	DRNB8-16
25	DRNB8-25
35	DRNB8-35
50	DRNB8-50
70	DRNB8-70
95	DRNB8-95
120	DRNB8-120

### 5.3.3 Single UPS wiring

Figure 23. UPS terminal block (TB) layout



- 1. UPS input TB (PE/N/N/L1/L2/L3)
- 2. UPS bypass input TB (L1/L2/L3)
- 3. UPS output TB (PE/N/N/L1/L2/L3)
- 4. External battery TB (PE/+N/N/-)

There are six different wiring configurations for the UPS input/output.

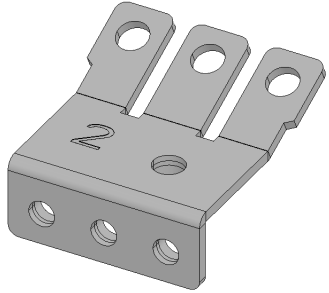

Select one configuration according to your requirements.

For the tools needed during the wiring procedure, refer to *Table 21: UPS wiring tools*. During the wiring procedure, remove only the top cover of the terminal block. Do not remove the terminal block box.

Table 21. UPS wiring tools

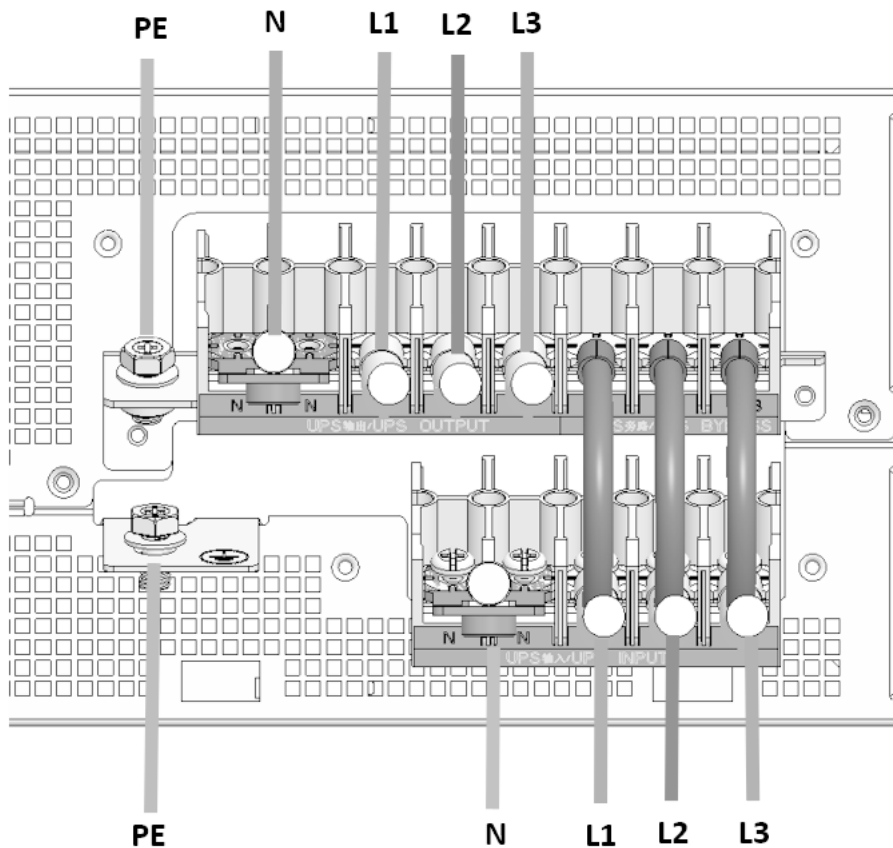
Tool	Tool number	Quantity	
Copper busbar	1	2	



Tool	Tool number	Quantity	
	2	3	
Jumper cable	N/A	3	

### 5.3.3.1 Configuration 3-3 (single feed, default UPS wiring configuration)

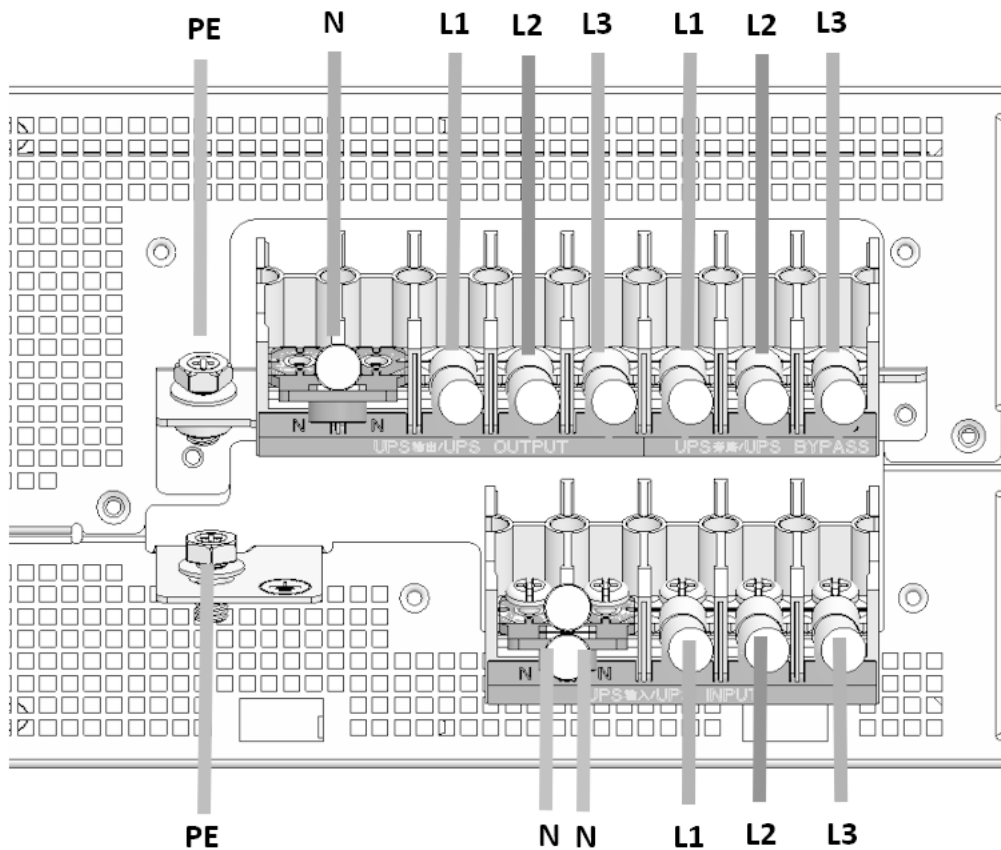
Figure 24. Configuration 3-3 (single feed, default UPS wiring configuration)



1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short UPS input terminal N/N with copper busbar 1.
  - c. Connect the AC cable.
  - d. Connect the AC cable (L1/L2/L3) and the jumper cable to UPS input terminal L1/L2/L3, next to each other.
  - e. Connect the jumper cable to UPS bypass terminal L1/L2/L3.
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short UPS output terminal N/N with busbar 1.
  - c. Connect the AC cable.
  - d. Connect the AC cable (L1/L2/L3) to UPS output terminal L1/L2/L3.

### 5.3.3.2 Configuration 3-3 (dual feed)

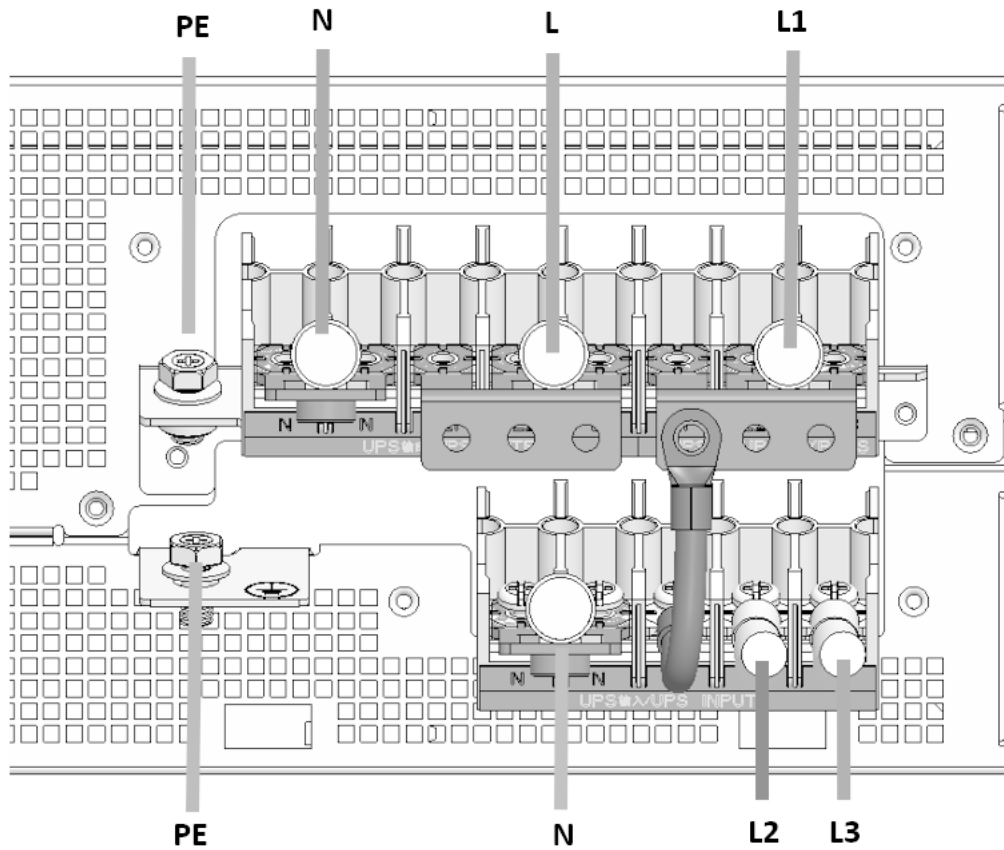
Figure 25. Configuration 3-3 (dual feed)



1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short UPS input terminal N/N with copper busbar 1.
  - c. Connect the AC main source cable and the bypass source cable (N) next to each other.
  - d. Connect the main source cable (L1/L2/L3) to UPS input terminal L1/L2/L3.
  - e. Connect the bypass source cable (L1/L2/L3) to UPS bypass terminal L1/L2/L3.
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short UPS output terminal N/N with busbar 1.
  - c. Connect the AC cable.
  - d. Connect the AC cable (L1/L2/L3) to UPS output terminal L1/L2/L3.

### 5.3.3.3 Configuration 3-1 (single feed)

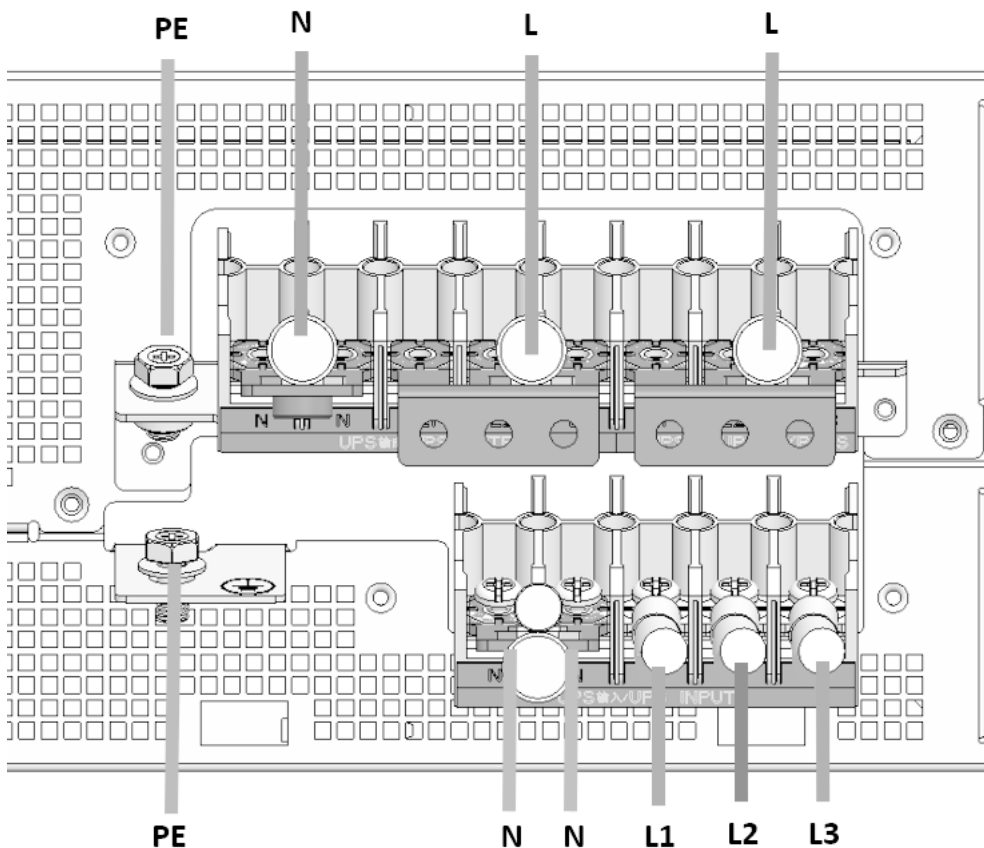
Figure 26. Configuration 3-1 (single feed)



1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short UPS input terminal N/N with copper busbar 1.
  - c. Connect the AC cable.
  - d. Connect the AC cable (L2/L3) to UPS input terminal L2/L3.
  - e. Connect the jumper cable to UPS input terminal L1 and copper busbar 2.
  - f. Short UPS bypass terminal L1/L2/L3 with busbar 2 and connect the AC cable (L1).
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short UPS output terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short UPS output terminal L1/L2/L3 with busbar 2 and connect the AC cable (L).

### 5.3.3.4 Configuration 3-1 (dual feed)

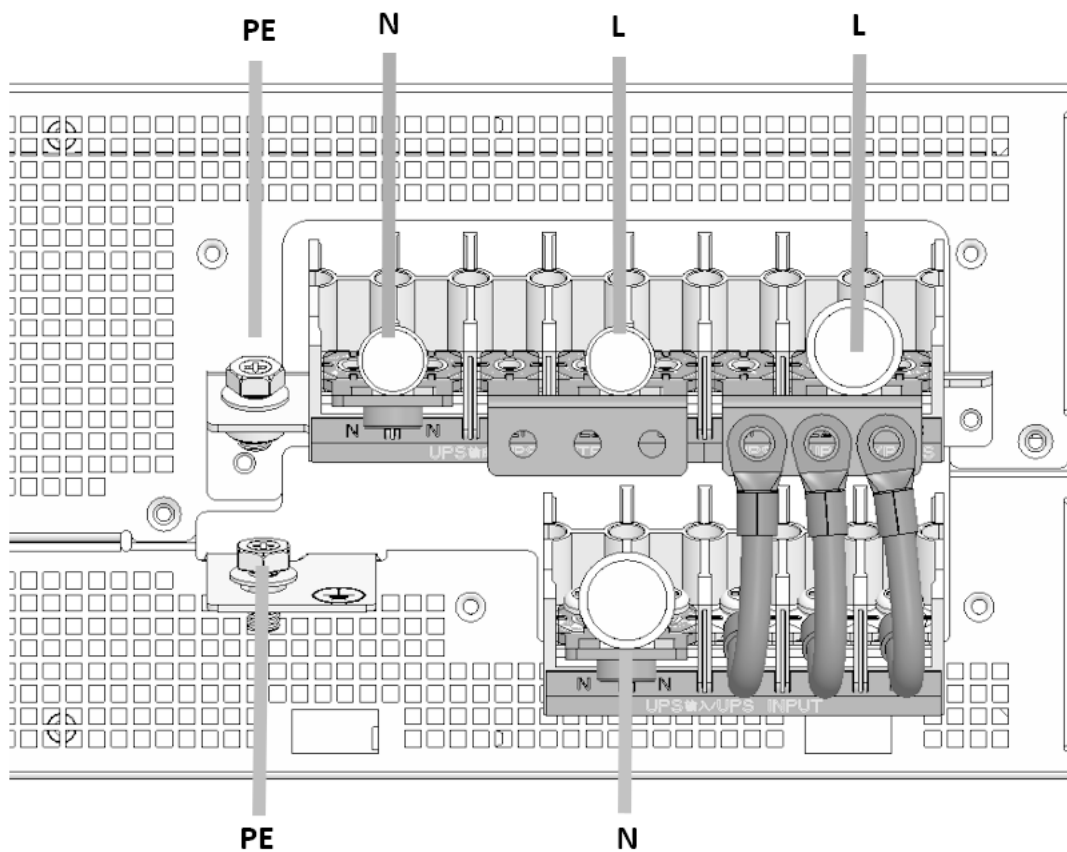
Figure 27. Configuration 3-1 (dual feed)



1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short UPS input terminal N/N with busbar 1.
  - c. Connect the AC main source cable and the bypass source cable (N) next to each other.
  - d. Connect the main source cable (L1/L2/L3) to UPS input terminal L1/L2/L3.
  - e. Short UPS bypass terminal L1/L2/L3 with busbar 2.
  - f. Connect the bypass source cable (L).
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short UPS output terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short UPS output terminal L1/L2/L3 with busbar 2.
  - e. Connect the AC cable (L).

### 5.3.3.5 Configuration 1-1 (single feed)

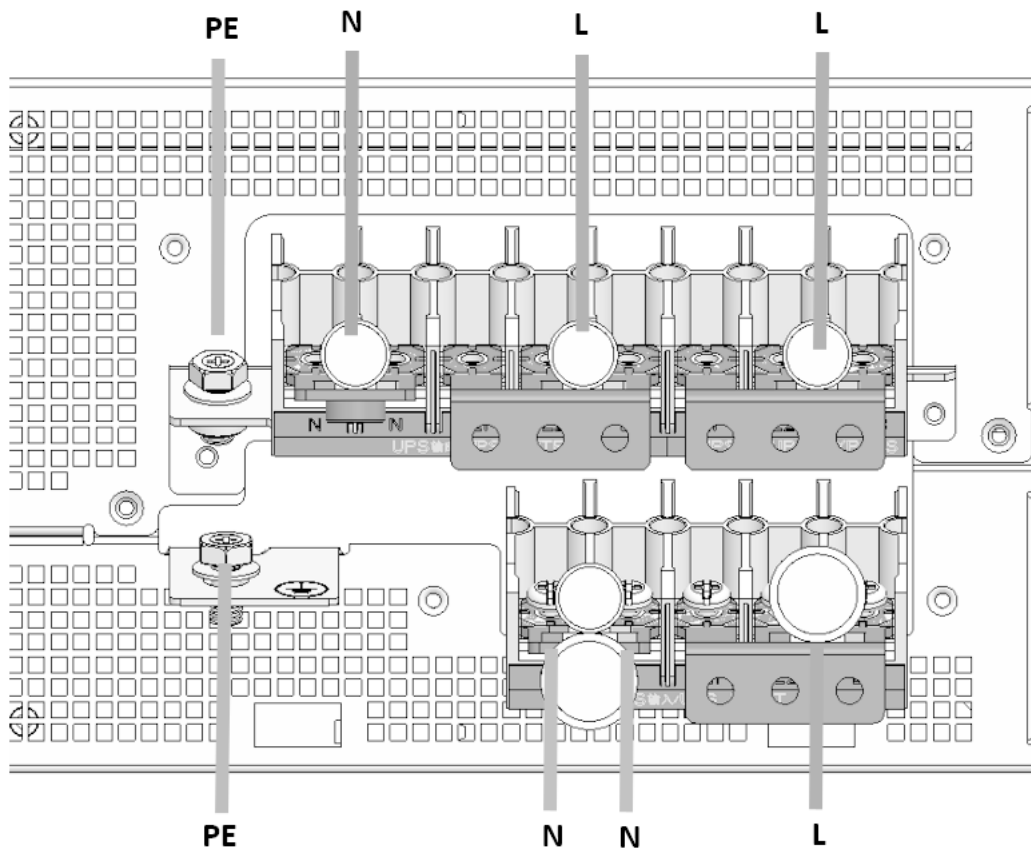
Figure 28. Configuration 1-1 (single feed)



1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short UPS input terminal (N/N) with busbar 1.
  - c. Connect the AC cable (N).
  - d. Connect the jumper cable to UPS input terminal L1/L2/L3 and busbar 2.
  - e. Short UPS bypass terminal L1/L2/L3 with busbar 2.
  - f. Connect the AC cable (L).
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short UPS output terminal (N/N) with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short UPS output terminal L1/L2/L3 with busbar 2.
  - e. Connect the AC cable (L).

### 5.3.3.6 Configuration 1-1 (dual feed)

Figure 29. Configuration 1-1 (dual feed)



1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short UPS input terminal N/N with busbar 1.
  - c. Connect the AC main source cable (N) and the bypass source cable (N) next to each other.
  - d. Short UPS input terminal L1/L2/L3 with busbar 2.
  - e. Connect the main source cable (L).
  - f. Short UPS bypass terminal L1/L2/L3 with busbar 2.
  - g. Connect the bypass source cable (L).
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short UPS output terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short UPS output terminal L1/L2/L3 with busbar 2.
  - e. Connect the AC cable (L).

## 5.4 External battery module (EBM) wiring

An external battery module (EBM) is an optional CE-certified UPS module that can give more DC power to the UPS.



### CAUTION

Make sure that the battery cable of the EBM is disconnected before you connect the battery terminals of the UPS.

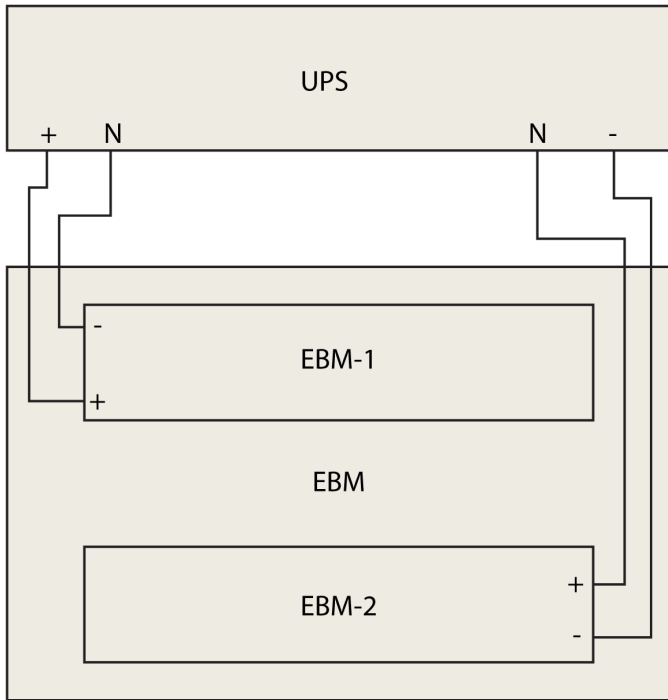
Make sure that the UPS is completely off before you connect or disconnect the EBM.

Before you connect the EBM, make sure that the number of battery sections and capacity are the same as in the LCD setting.

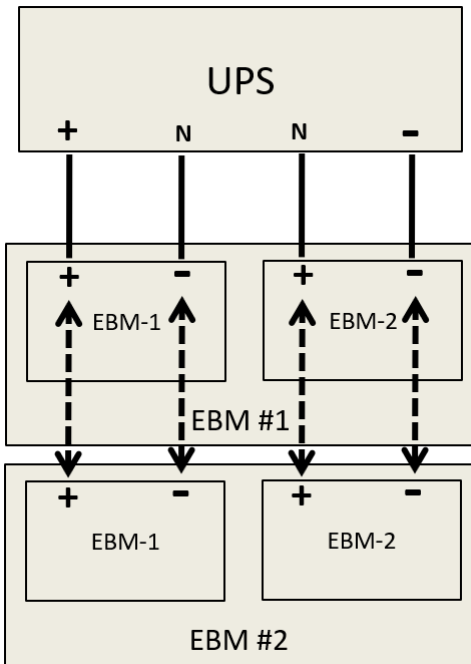
Do not reverse the polarity of the external battery.

The schematic diagrams of the EBM wiring configurations are presented in *Figures 30: Single-string EBM* and *31: Multi-string EBM*.

**Figure 30. Single-string EBM**



**Figure 31. Multi-string EBM**



Complete the battery cable installation of the UPS before you connect the battery cable of the EBM.

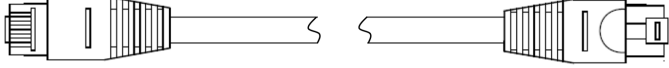
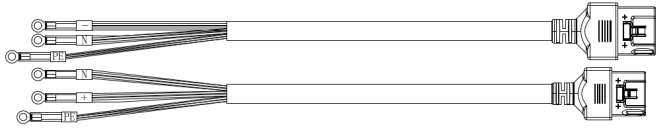



By default, the UPS includes 40 batteries, including 20 positive batteries for EBM 1 and 20 negative batteries for EBM 2.

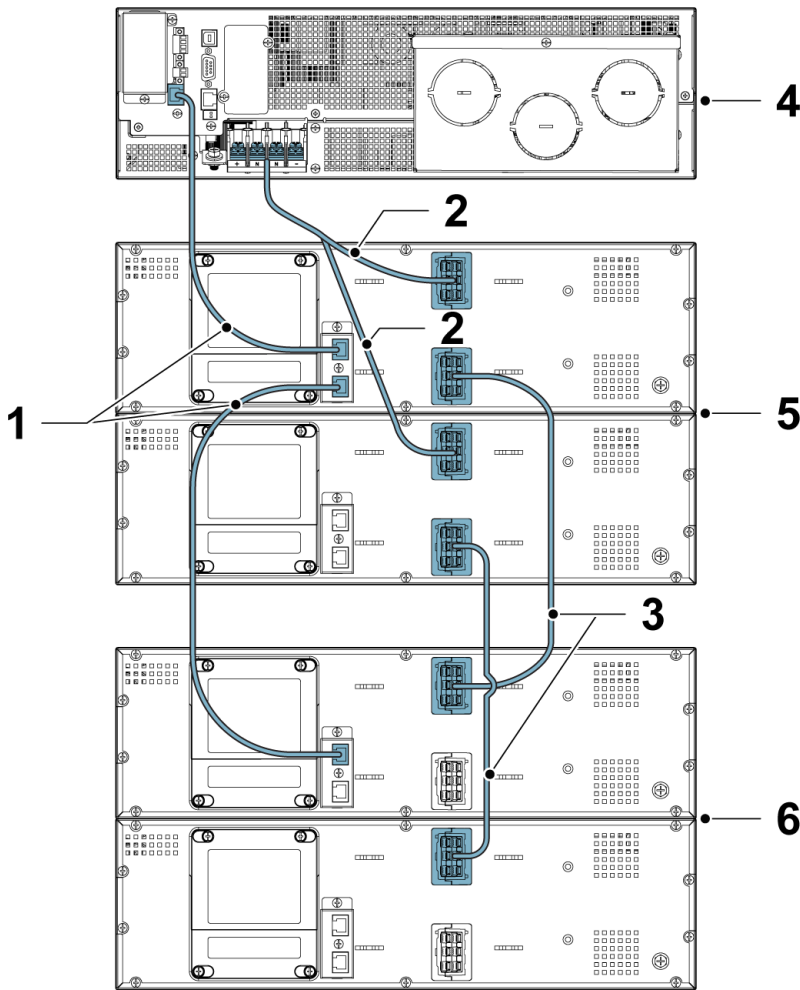
The UPS can have a maximum of six EBM strings. Each string contains two EBMs (Battery+/Battery-).

During the wiring procedure, remove only the top cover of the terminal block. Do not remove the terminal block box.

**Table 22. EBM cables**

Cable type	Quantity	Description	
EBM detection cable	1	Detects the EBM	
EBM-to-UPS cable	2	Connects the EBM to the UPS	
EBM-to-EBM cable	2	Connects the EBM to the EBM	

**Figure 32. Schematic diagram of the EBM-to-UPS wiring configuration**



- |                        |          |
|------------------------|----------|
| 1. EBM detection cable | 4. UPS   |
| 2. EBM-to-UPS cable    | 5. EBM 1 |
| 3. EBM-to-EBM cable    | 6. EBM 2 |

**NOTE:** If you install the UPS with a different type of EBM (customer-supplied EBM), refer to *Figure 32: Schematic diagram of the EBM-to-UPS wiring configuration* and *Section 5.3.1 UPS cables and connectors* to select a suitable cable size for connecting the battery.

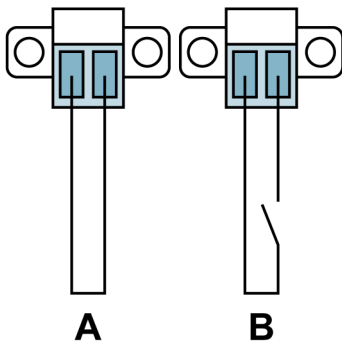
## 5.5 Install a remote EPO switch

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.

EPO is connected to the rear panel of the UPS, on connector EPO. For the location of the EPO connector, refer to *Figure 55: Emergency Power-Off (EPO) connector*. *Figure 33: Connections of the EPO switch* shows the NO and NC connections of the EPO switch.

EPO connector (front view):

**Figure 33. Connections of the EPO switch**



- A = Normally closed
- B = Normally open

**NOTE:** In a "normally-closed" (A) configuration a jumper cable is needed.

**Table 23. Remote EPO wire terminations**

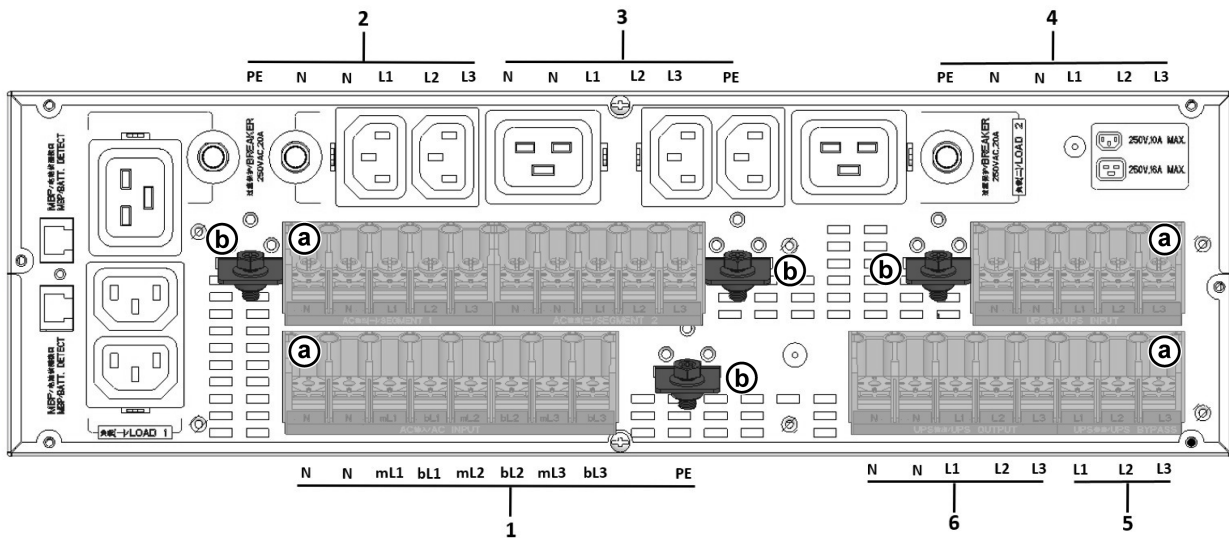
From remote EPO switch	To user interface terminal block EPO in the UPS	Remarks
Normally closed (A)	The jumper is short circuit.	The UPS operates in a normal operating mode.
Normally open (B)	The jumper is open circuit.	The UPS is in Fault mode and raises an EPO alarm.

## 5.6 Single UPS MBP wiring

Single UPS MBPs include the MBP20KI and MBP20KIPDU.

## 5.6.1 MBP20KIPDU wiring

Figure 34. MBP20KIPDU terminal block (TB) layout



- |    |  |   |   |
|----|--|---|---|
| 1. | AC input TB: N/N/mL1/ bL1/<br>mL2/bL2/ mL3/bL3/PE*       | a | Screw type: M5<br>Tightening torque: 17.71 lb-in (2.0 Nm) |
| 2. | AC segment 1 (not<br>programmable): PE/N/N/L1/<br>L2/ L3 | b | Screw type: M6<br>Tightening torque: 44.25 lb-in (5.0 Nm) |
| 3. | AC segment 2<br>(programmable): N/N/L1/L2/<br>L3/ PE     |   |   |
| 4. | UPS input TB: PE/N/N/L1/L2/<br>L3                        |   |   |
| 5. | UPS bypass TB: L1/L2/L3                                  |   |   |
| 6. | UPS output TB: N/N/L1/L2/L3                              |   |   |

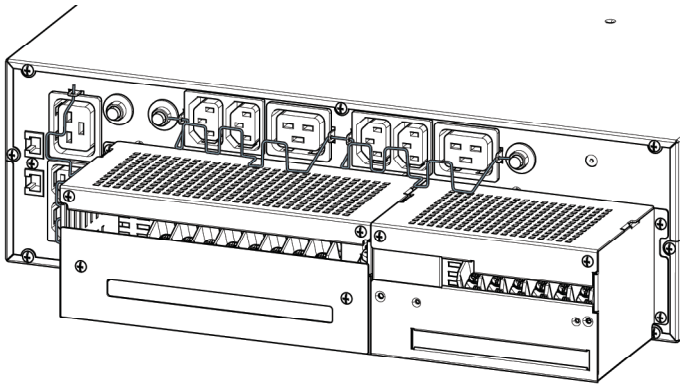
\* ) *m* refers to the main input, *b* refers to the bypass input.



### CAUTION

The MBP20KIPDU includes load 1 and load 2 with IEC output sockets. If you select these sockets as your loads, it is recommended that you install the cable locker (refer to *Figure 35: Cable locker*) to avoid an unexpected pulling force on the IEC cable, which could cause a failure in the system.

**Figure 35. Cable locker**

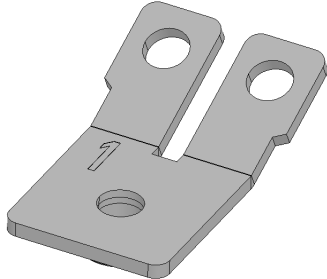
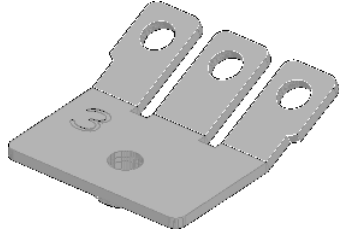
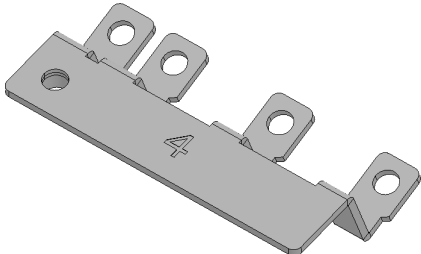


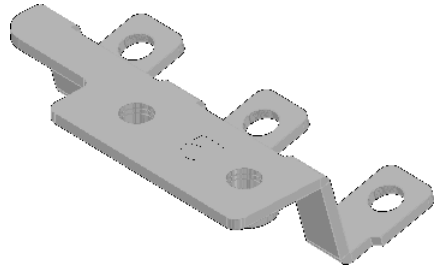
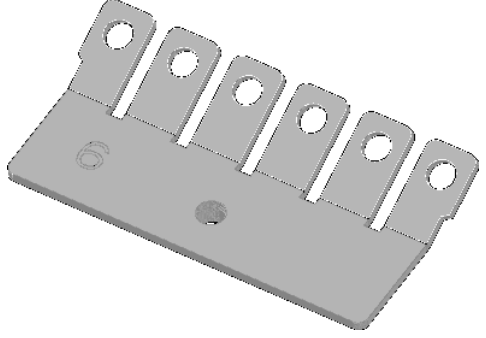
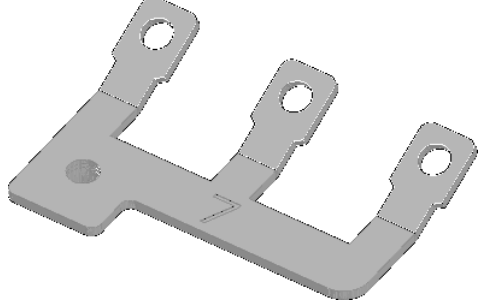

There are six different wiring configurations for the MBP input/output.

Select one configuration according to your requirements.

For the tools needed during the wiring procedure, refer to *Table 24: MBP wiring tools*. During the wiring procedure, remove only the top cover of the terminal block. Do not remove the terminal block box.

**Table 24. MBP wiring tools**

Tool	Tool number	Quantity	
Copper busbar	1	6	
	3	2	
	4	1	

Tool	Tool number	Quantity	
	5	1	
	6	1	
	7	1	
Configuration label	N/A	6	

**NOTE:**

Copper busbars 1, 3, 4, 5, and their related configuration labels are included in the BOM of the product. These copper busbars and configuration labels are needed for the following wiring configurations.

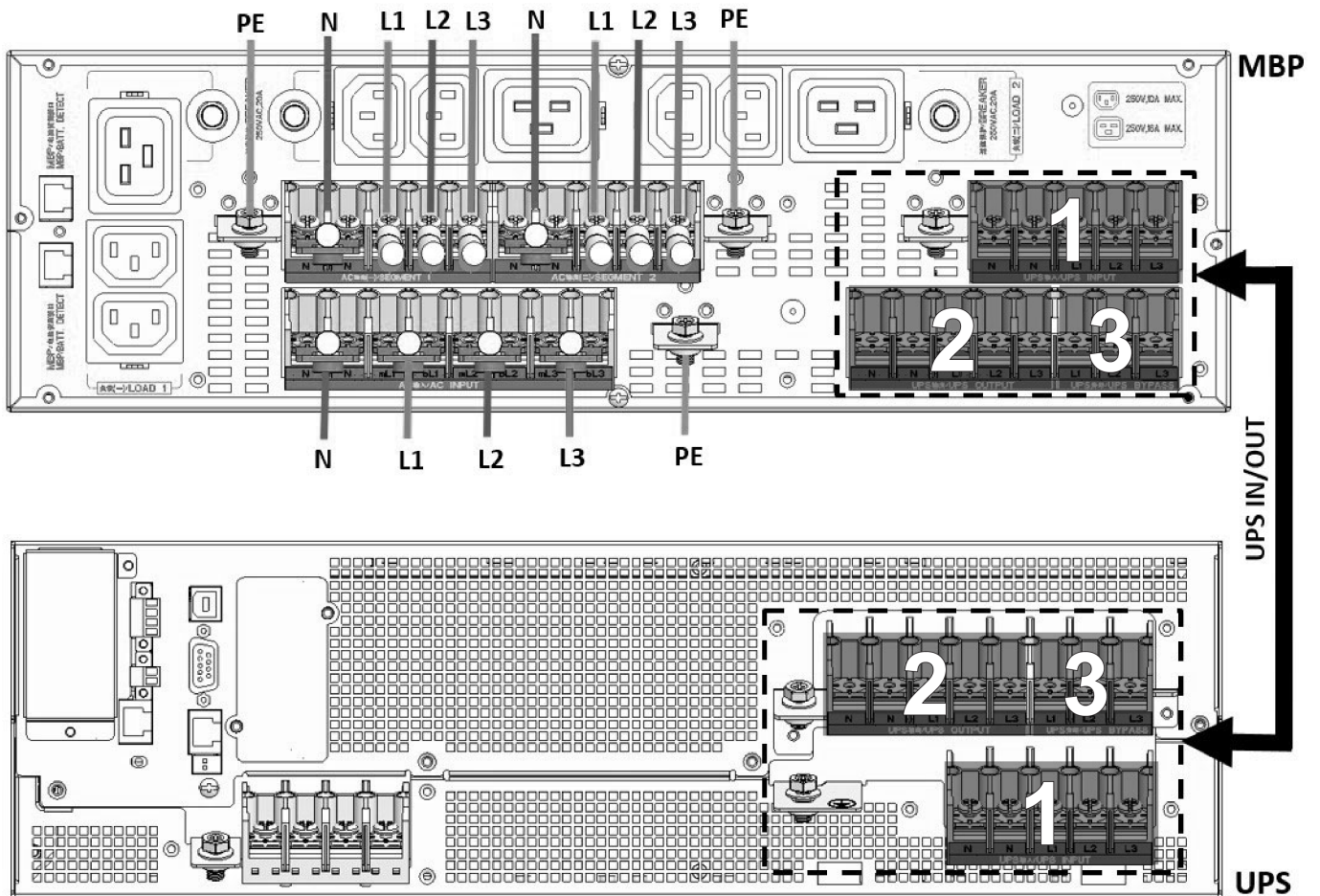
- 3-3 (single feed)
- 3-3 (dual feed)
- 3-1 (single feed)
- 3-1 (dual feed)

For copper busbars 6, 7, and their related configuration labels, contact your local service representative. These copper busbars and configuration labels are needed for the following wiring configurations.

- 1-1 (single feed)
- 1-1 (dual feed)

### 5.6.1.1 Configuration 3-3 (single feed, default MBP wiring configuration)

Figure 36. Configuration 3-3 (single feed, default MBP wiring configuration)



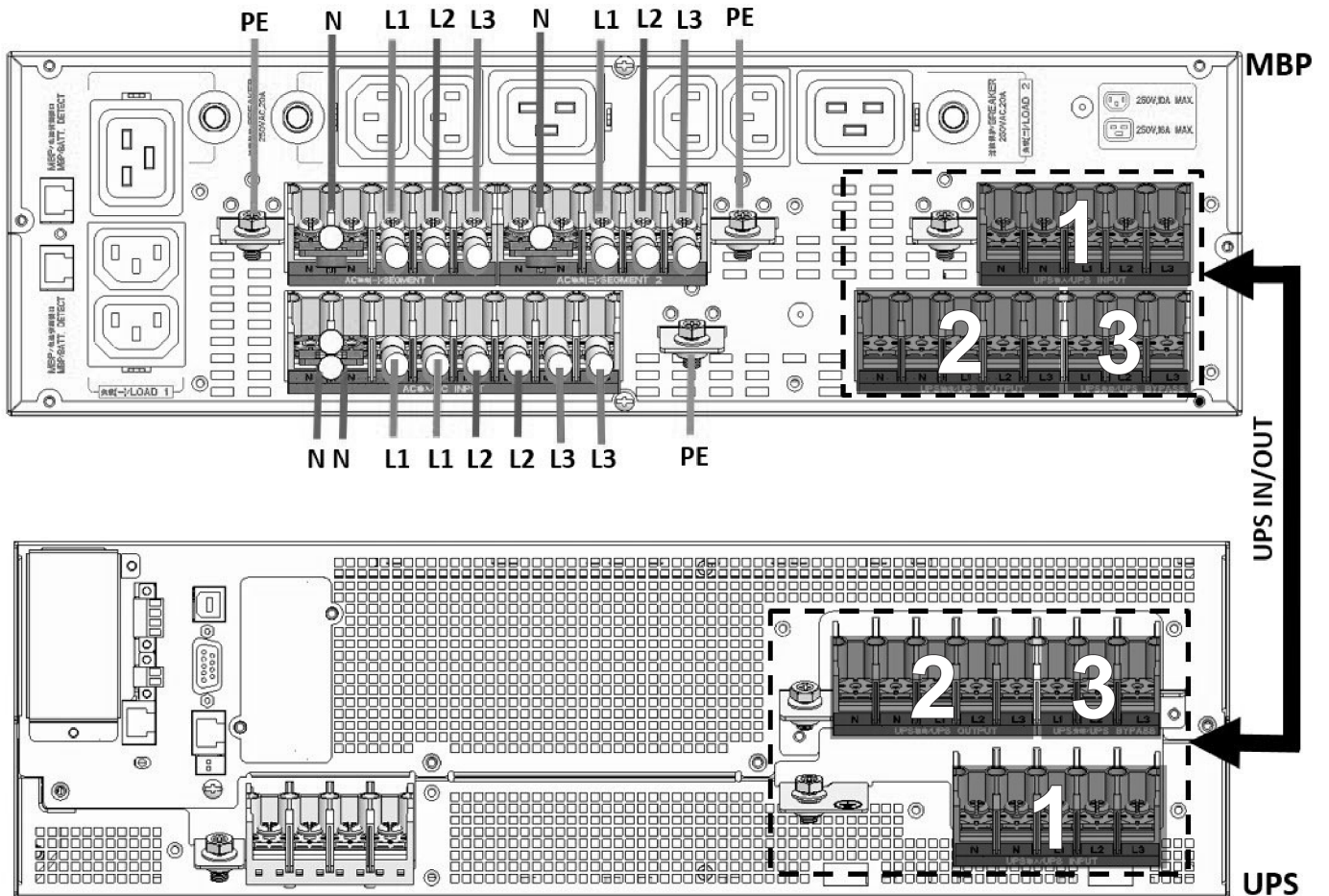
1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short AC input terminal mL1/bL1 with busbar 1.
  - e. Connect the AC cable (L1).
  - f. Short AC input terminal mL2/bL2 with busbar 1.
  - g. Connect the AC cable (L2).
  - h. Short AC input terminal mL3/bL3 with busbar 1.
  - i. Connect the AC cable (L3).
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Connect the AC cable (L1/L2/L3) to AC segment terminal L1/L2/L3.



3. Connect the MBP to the UPS.
  - a. Remove all the busbars from the UPS.
  - b. Connect the MBP to the UPS with the UPS 1 cable. The cable is in the MBP accessory kit.

### 5.6.1.2 Configuration 3-3 (dual feed)

Figure 37. Configuration 3-3 (dual feed)



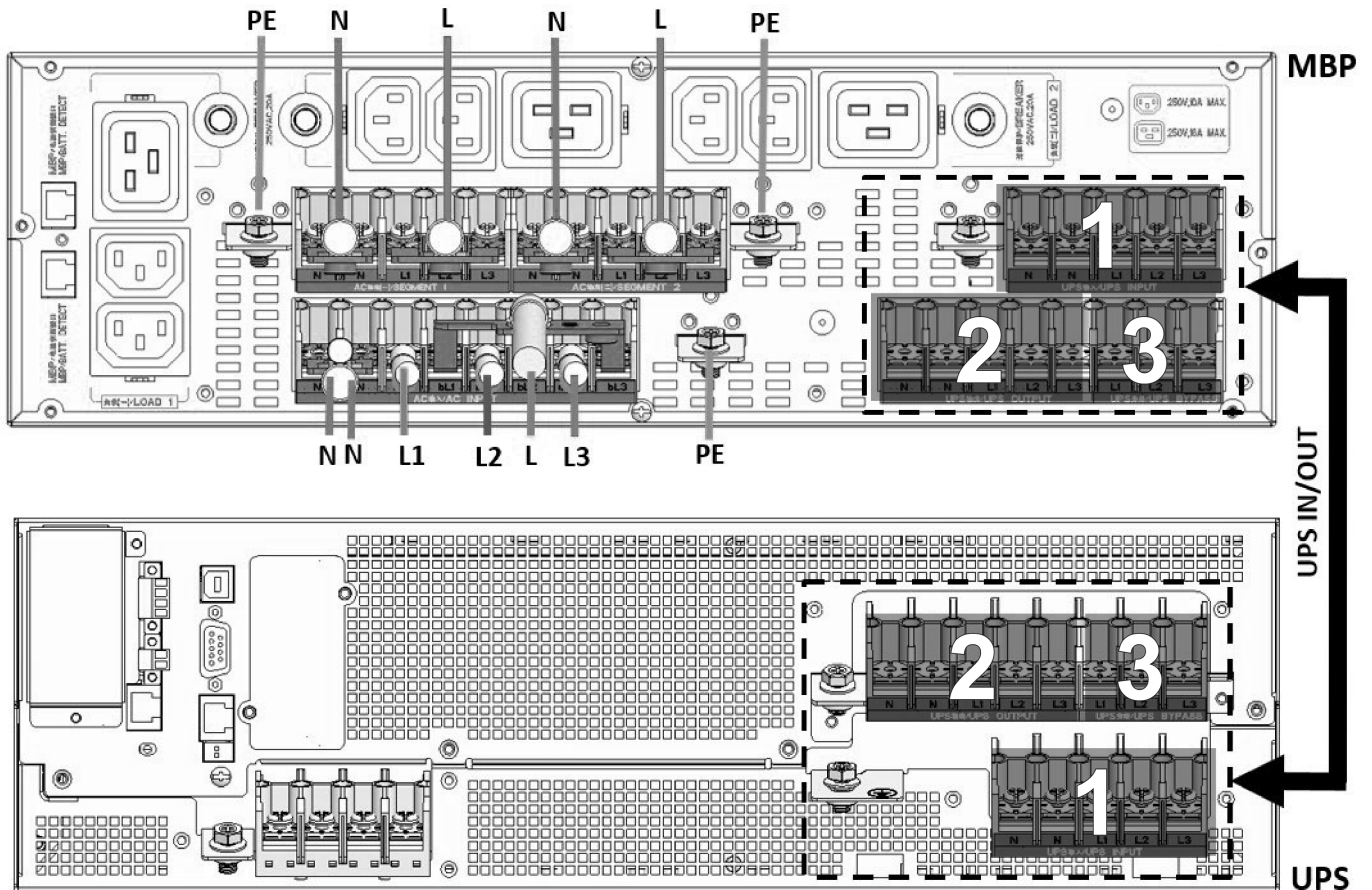
1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N with busbar 1.
  - c. Connect the AC cable (N) and the bypass source cable (N) next to each other.
  - d. Connect the main source cable (L1/L2/L3) to AC input terminal mL1/mL2/mL3.
  - e. Connect the bypass source cable (L1/L2/L3) to AC input terminal bL1/bL2/bL3.
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Connect the AC cable (L1/L2/L3) to AC segment terminal L1/L2/L3.



3. Connect the MBP to the UPS.
  - a. Remove all the busbars from the UPS.
  - b. Connect the MBP to the UPS with the UPS 1 cable. The cable is in the MBP accessory kit.

### 5.6.1.3 Configuration 3-1 (single feed)

Figure 38. Configuration 3-1 (single feed)

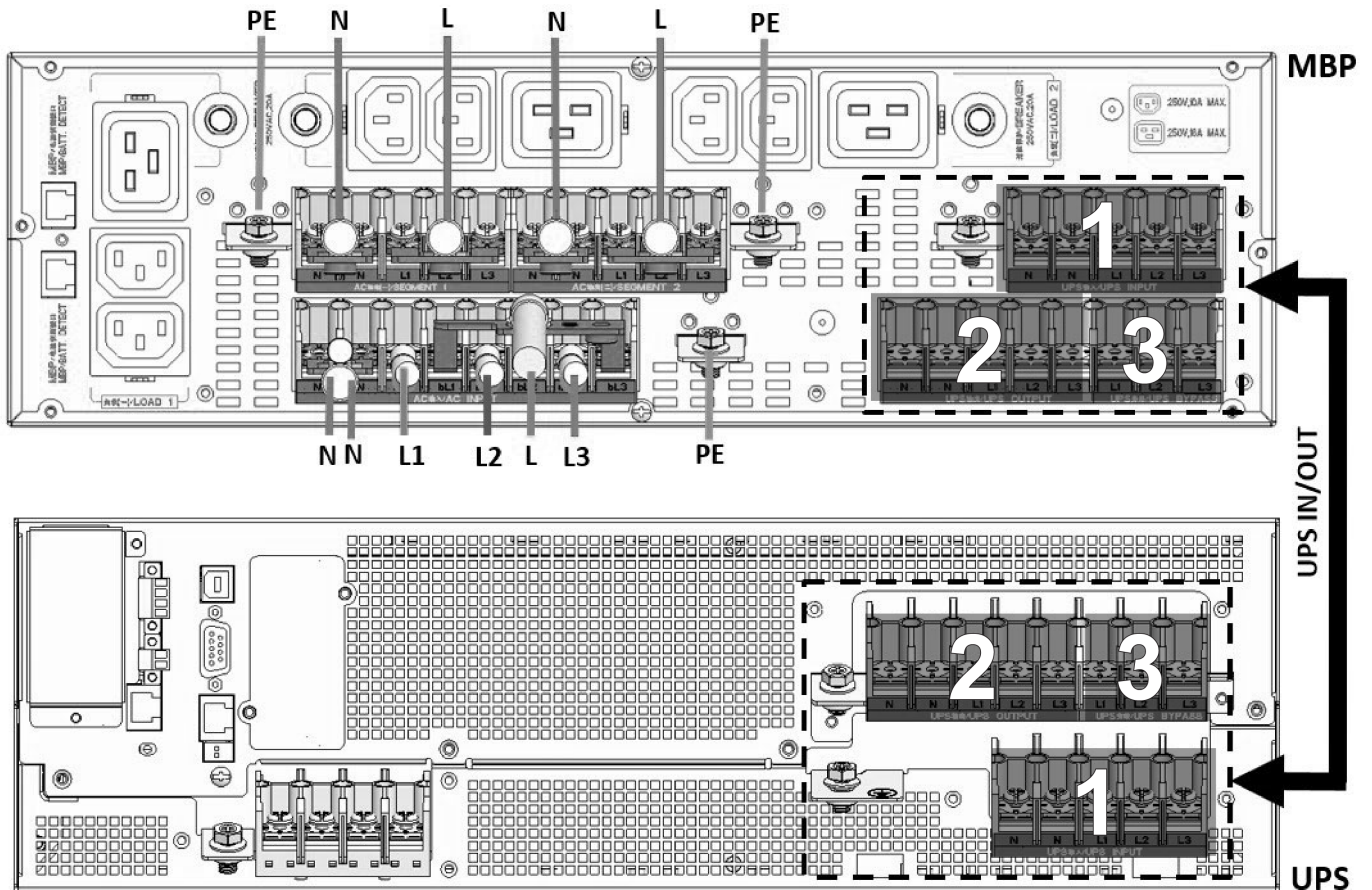


1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short AC input terminal mL1/bL1/bL2/bL3 with busbar 4.
  - e. Connect the AC cable (L1).
  - f. Connect the AC cable (L2/L3) to AC input terminal mL2/mL3.
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short AC segment terminal L1/L2/L3 with busbar 3.
  - e. Connect the AC cable (L).

3. Connect the MBP to the UPS.
  - a. Remove all the busbars from the UPS.
  - b. Connect the MBP to the UPS with the UPS 1 cable. The cable is in the MBP accessory kit.

#### 5.6.1.4 Configuration 3-1 (dual feed)

Figure 39. Configuration 3-1 (dual feed)

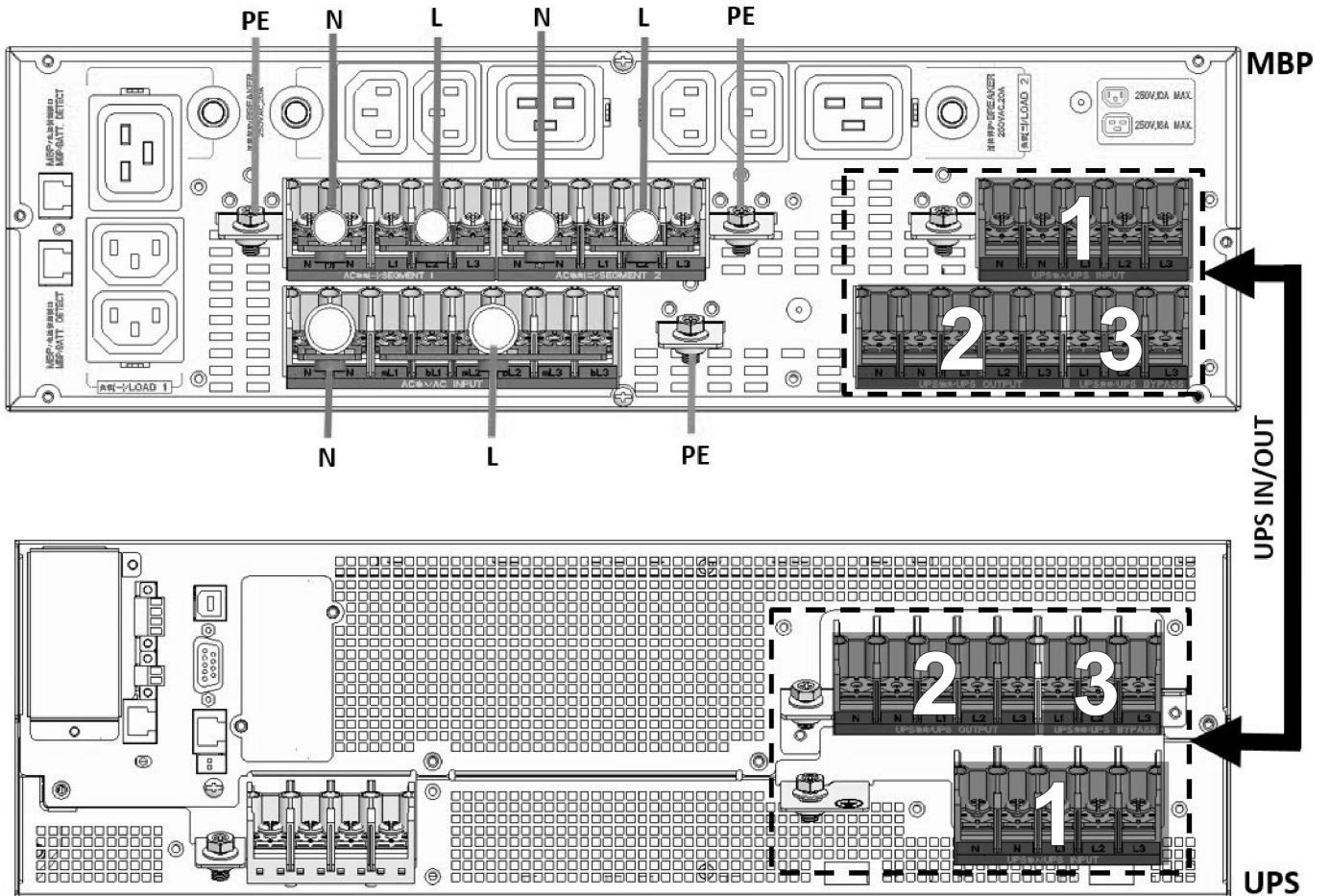


1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N with busbar 1.
  - c. Connect the AC main source cable (N) and the bypass source cable (N) next to each other.
  - d. Connect the main source cable (L1/L2/L3) to AC input terminal mL1/mL2/mL3.
  - e. Short AC input terminal bL1/bL2/bL3 with busbar 5.
  - f. Connect the bypass source cable (L).
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short AC segment terminal L1/L2/L3 with busbar 3.
  - e. Connect the AC cable (L).

3. Connect the MBP to the UPS.
  - a. Remove all the busbars from the UPS.
  - b. Connect the MBP to the UPS with the UPS 1 cable. The cable is in the MBP accessory kit.

### 5.6.1.5 Configuration 1-1 (single feed)

Figure 40. Configuration 1-1 (single feed)



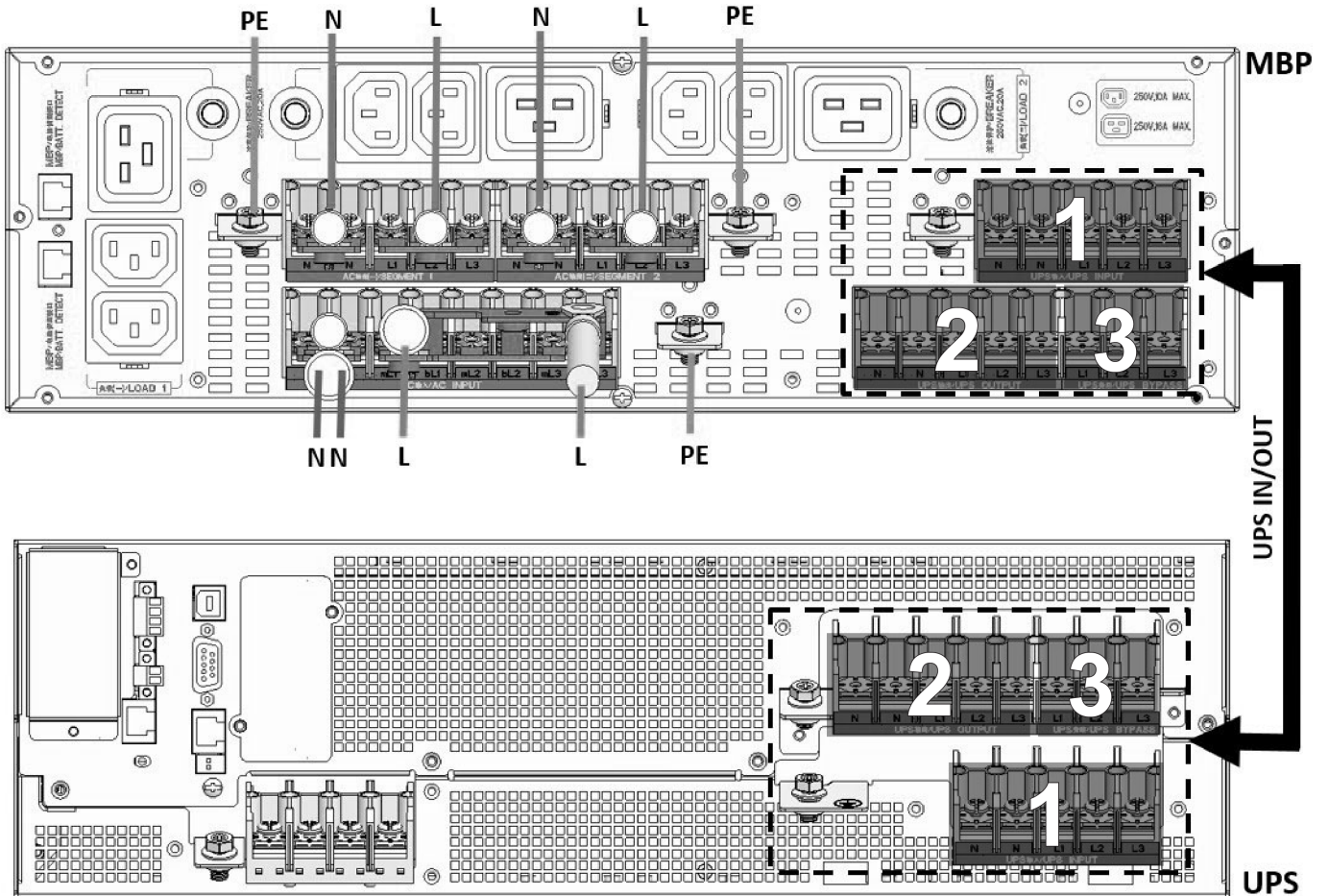
1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short AC input terminal mL1/bL1/mL2/bL2/mL3/bL3 with busbar 6.
  - e. Connect the AC cable (L).
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short AC segment terminal L1/L2/L3 with busbar 3.
  - e. Connect the AC cable (L).



3. Connect the MBP to the UPS.
  - a. Remove all the busbars from the UPS.
  - b. Connect the MBP to the UPS with the UPS 1 cable. The cable is in the MBP accessory kit.

### 5.6.1.6 Configuration 1-1 (dual feed)

Figure 41. Configuration 1-1 (dual feed)

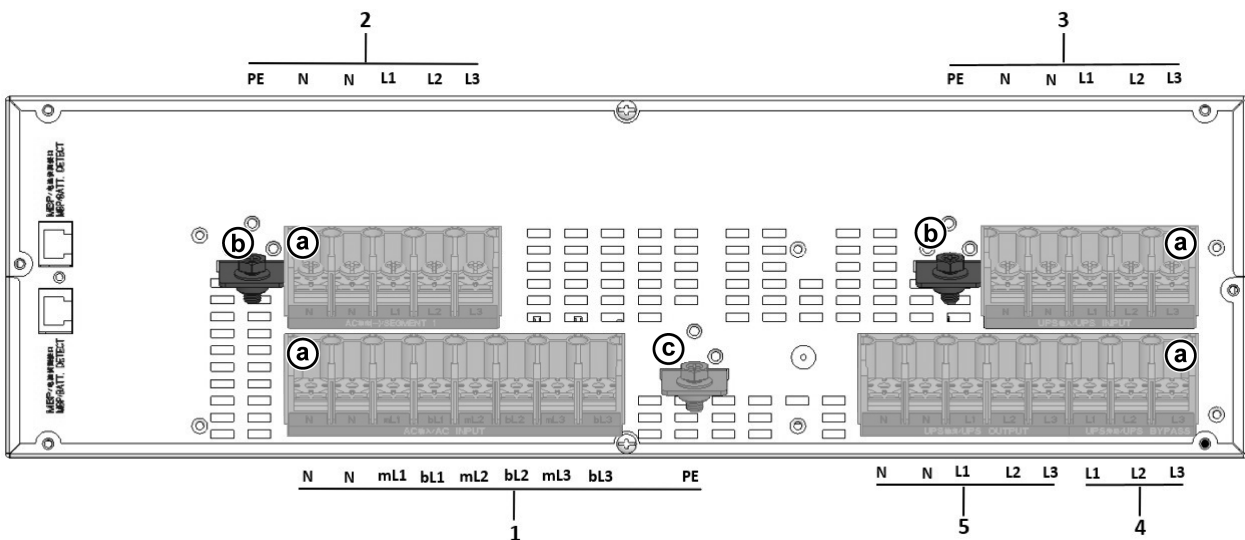


1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N with busbar 1.
  - c. Connect the AC main source cable (N) and the bypass source cable (N) next to each other.
  - d. Short AC input terminal mL1/mL2/mL3 with busbar 7.
  - e. Connect the main source cable (L).
  - f. Short AC input terminal bL1/bL2/bL3 with busbar 5.
  - g. Connect the bypass source cable (L).

2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N with busbar 1.
  - c. Connect the AC cable (N).
  - d. Short AC segment terminal L1/L2/L3 with busbar 3.
  - e. Connect the AC cable (L).
3. Connect the MBP to the UPS.
  - a. Remove all the busbars from the UPS.
  - b. Connect the MBP to the UPS with the UPS 1 cable. The cable is in the MBP accessory kit.

## 5.6.2 MBP20KI wiring

Figure 42. MBP20KI terminal block (TB) layout



- |    |  |   |  |
|----|--|---|--|
| 1. | AC input TB: N/N/mL1/ bL1/ mL2/bL2/ mL3/bL3/PE*    | a | Screw type: M5<br>Tightening torque: 17.71 lb-in (2.0 Nm)    |
| 2. | AC segment 1 (not programmable): PE/N/N/L1/ L2/ L3 | b | Screw type: M6<br>Tightening torque: 44.25 lb-in (5.0 Nm)    |
| 3. | UPS input TB: PE/N/N/L1/L2/ L3                     | c | Screw type: M8<br>Tightening torque: 104.07 lb-in (11.76 Nm) |
| 4. | UPS bypass TB: L1/L2/L3                            |   |  |
| 5. | UPS output TB: N/N/L1/L2/L3                        |   |  |

\* ) *m* refers to the main input, *b* refers to the bypass input.

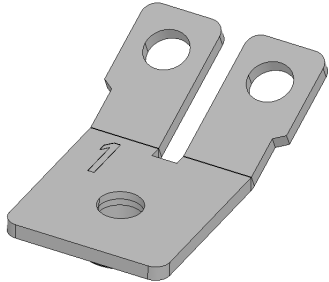
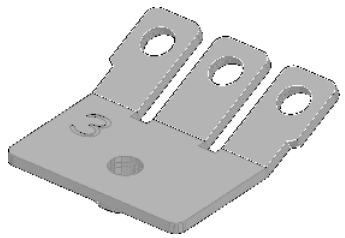
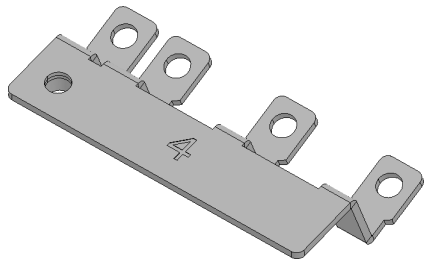
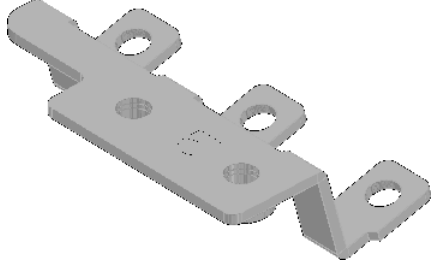
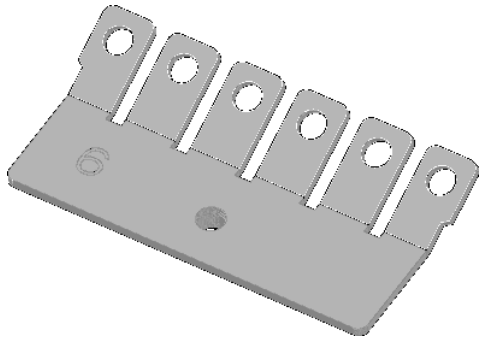
The MBP20KI has the same wiring procedure as the MBP20KIPDU. For the instructions, refer to 5.6.1 MBP20KIPDU wiring. The default MBP wiring configuration is configuration 3-3 (single feed).

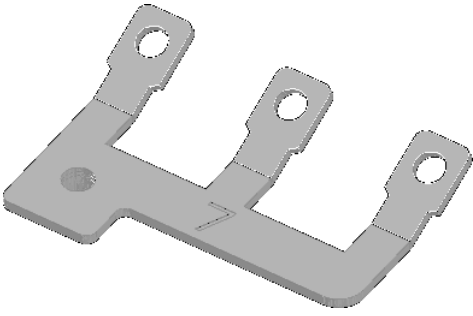

There are six different wiring configuration for the MBP input/output.

Select one configuration according to your requirements.

For the tools needed during the wiring procedure, refer to 25: *MBP wiring tools* . During the wiring procedure, remove only the top cover of the terminal block. Do not remove the terminal block box.

**Table 25. MBP wiring tools**

Tool	Tool number	Quantity	
Copper busbar	1	5	
	3	2	
	4	1	
	5	1	
	6	1	

Tool	Tool number	Quantity	
	7	1	
Configuration label	N/A	6	

**NOTE:**

Copper busbars 1, 3, 4, 5, and their related configuration labels are included in the BOM of the product. These copper busbars and configuration labels are needed for the following wiring configurations.

- 3-3 (single feed)
- 3-3 (dual feed)
- 3-1 (single feed)
- 3-1 (dual feed)

For copper busbars 6, 7, and their related configuration labels, contact your local service representative. These copper busbars and configuration labels are needed for the following wiring configurations.

- 1-1 (single feed)
- 1-1 (dual feed)

## 5.7 Detection cable wiring

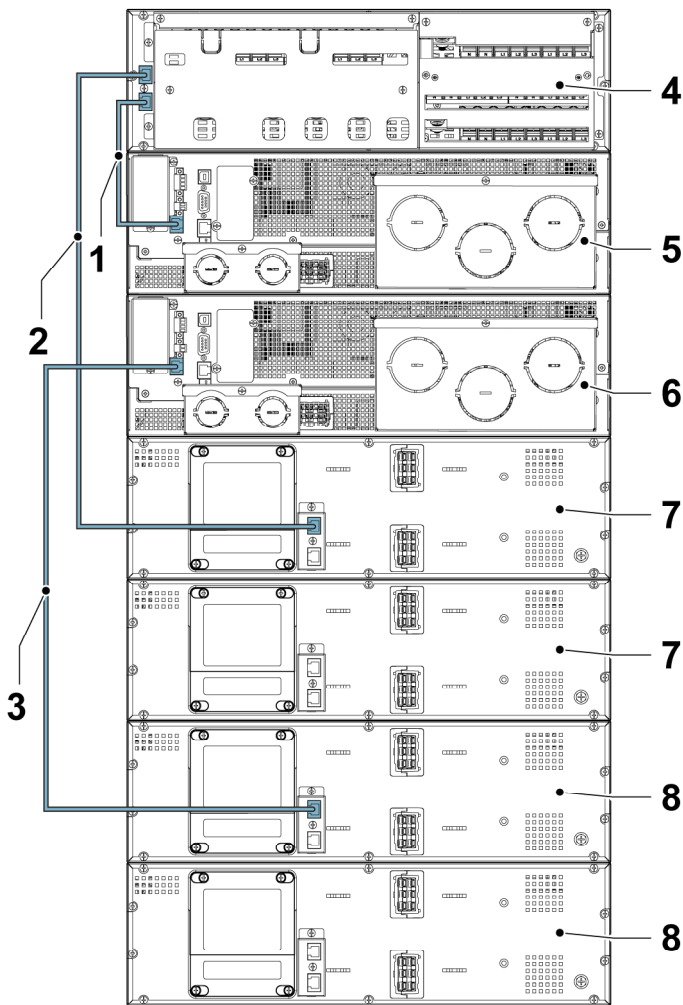
Before you install the detection cable, make sure that you completed the power wiring of the system.

**NOTE:**

For the instruction on how to connect the EBM to the UPS, refer to this user manual or the *Quick Start of the EBM*.

For the instructions on how to install the parallel cable signal between UPS 1 and UPS 2, refer to this user manual.

**Figure 43. Detection cable wiring configuration**



- |                               |          |
|-------------------------------|----------|
| 1. MBP detection cable        | 5. UPS 1 |
| 2. EBM-to-MBP detection cable | 6. UPS 2 |
| 3. EBM-to-UPS detection cable | 7. EBM 1 |
| 4. MBP                        | 8. EBM 2 |

To install the detection cables:

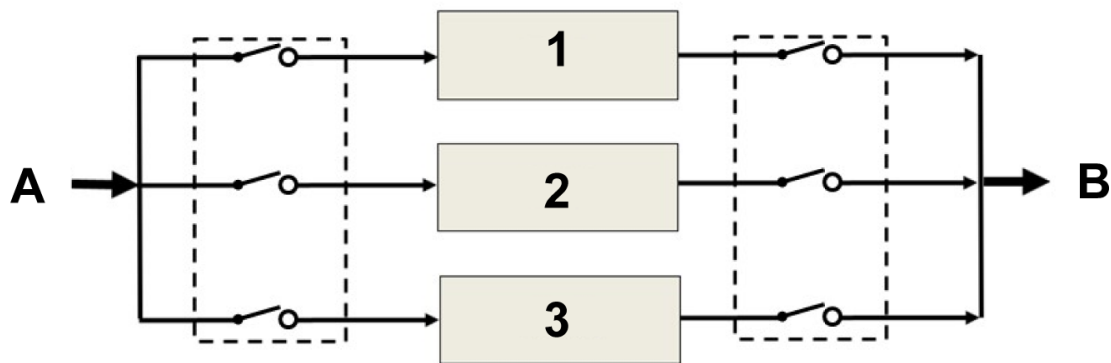
1. Connect the MBP to UPS 1 with the MBP detection cable.
2. Connect EBM 1 to the MBP with the EBM-to-MBP detection cable.
3. Connect EBM 2 to UPS 2 with the EBM-to-UPS detection cable.

## 5.8 Parallel system installation

A maximum of three UPSs can be installed in parallel to meet redundant configuration or expansion requirements.



Figure 44. Parallel system AC cable connection diagram



- |   |       |   |        |
|---|-------|---|--------|
| 1 | UPS 1 | A | AC in  |
| 2 | UPS 2 | B | AC out |
| 3 | UPS 3 |   |        |

**NOTE:** When two UPSs are in parallel, it is recommended to select the MBP20KIPARA as the external I/O power distribution for the parallel system.



**CAUTION**

**Wiring length requirement**

When the distance between the load and the parallel UPS is less than 10 meters, the length difference between the input/output lines between the UPSs in a parallel system is less than 20 %.

When the distance between the load and the parallel UPS is greater than 20 meters, the length difference between the input/output lines between the UPSs in a parallel system is less than 5 %.

Only qualified service personnel authorized by Eaton are allowed to install a parallel UPS system. Make sure that the parallel system is installed in a restricted area.

**5.8.1 UPS cables and connectors**

This section introduces the AC IN/OUT cables for the UPS installed in a parallel system.

**Table 26. Minimum conductor size for CE (mm<sup>2</sup>)**

Parallel system wiring												
Model	UPS quantity	Configuration	Main input		Bypass input		Ground wire	Output			Battery wire	Battery ground
			L wire	N wire	L wire	N wire		L wire	N wire	Ground wire		
93PX15-KIPM	2	3-1	16	16	50	50	50	50	50	50	25	25
		3-3	16	16	10	10	16	10	10	10	25	25
		1-1	95	95	50	50	95	50	50	50	25	25

Parallel system wiring												
Model	UPS quantity	Configuration	Main input		Bypass input		Ground wire	Output			Battery wire	Battery ground
			L wire	N wire	L wire	N wire		L wire	N wire	Ground wire		
	3	3-1	35	35	95	95	95	95	95	95	50	50
		3-3	35	35	16	16	35	16	16	16	50	50
		1-1	185	185	95	95	185	95	95	95	50	50
93PX20-KiPM	2	3-1	25	25	70	70	70	70	70	70	35	35
		3-3	25	25	16	16	25	16	16	16	35	35
		1-1	120	120	70	70	120	70	70	70	35	35
	3	3-1	50	50	150	150	150	150	150	150	70	70
		3-3	50	50	25	25	50	25	25	25	70	70
		1-1	240	240	150	150	240	150	150	150	70	70

**Table 27. Minimum conductor size for UL (AWG)**

Parallel system wiring												
Model	UPS quantity	Configuration	Main input		Bypass input		Ground wire	Output			Battery wire	Battery ground
			L wire	N wire	L wire	N wire		L wire	N wire	Ground wire		
93PX15-KiPM	2	3-3	3	3	4	4	6	4	4	4	4	6
	3	3-3	0	0	2	2	6	2	2	2	1	6
93PX20-KiPM	2	3-3	1	1	3	3	6	3	3	3	2	6
	3	3-3	000	000	0	0	6	0	0	0	00	6

**Table 28. Parallel system installed with the 20 kVA UPS (conductor cross-section, mm<sup>2</sup>)**

UPS quantity	Configuration	Main input		Bypass input		Ground wire	Output			Battery wire	Battery ground
		L wire	N wire	L wire	N wire		L wire	N wire	Ground wire		
2	3-1	25	25	70	70	70	70	70	70	35	35
	3-3 (CE)	25	25	16	16	25	16	16	16	35	35
	3-3 (NEC)	2#	2#	4#	4#	2#	4#	4#	4#	1#	1#
	1-1	120	120	70	70	120	70	70	70	35	35
3	3-1	50	50	150	150	150	150	150	150	70	70

UPS quantity	Configuration	Main input		Bypass input		Ground wire	Output			Battery wire	Battery ground
		L wire	N wire	L wire	N wire		L wire	N wire	Ground wire		
	3-3 (CE)	50	50	25	25	50	25	25	25	70	70
	3-3 (NEC)	0#	0#	2#	2#	0#	2#	2#	2#	000#	000#
	1-1	240	240	150	150	240	150	150	150	70	70

**NOTE:**

1. Select the larger cross-section conductor for the parallel system AC input cable in a single-feed configuration.
2. The neutral current can be 1.7 times the rated output phase current if the load is non-linear. Select a suitable neutral cable size.

### 5.8.2 MBP cables and connectors

This section introduces the AC IN/OUT cable connections for the MBP and the MBP cable connections to the UPS in a parallel system.

When installing and connecting the MBP, configure the circuit breaker and the feed protection contactor before connecting the MBP to prevent current feedback. Disconnect the MBP before operation and makes sure that there are no dangerous voltages in terminals. The rated current requirement of the feeder protection contactor is greater than the rated current of the MBP. For wiring diagrams, refer to *Figures 21: Single-phase system* and *22: Three-phase system*.

**NOTE:** Make sure that there is a “voltage feedback risk” warning label on the feeder protection contactor or similar feeder.

**NOTE:** Make sure that the contactor meets the safety requirements specified in IEC 62040-1, 4.8.102. If not all input poles are disconnected by the isolating device, the disconnecting contact of the isolating device needs to meet the distance requirements of reinforced insulation. The creepage distance must be 5.0 mm and the clearance must be 2.0 mm.

**Table 29. Recommended circuit breaker and contactor current specifications**

UPS	MBP model	Input configuration	Breaker, D type [A]	Contactor [A]
15 kVA	MBP20KI MBP20KIPDU	1-phase main input	125	≥125
		3-phase main input	63	≥63
		1-phase bypass input	100	≥100
		3-phase bypass input	40	≥40
		1-phase output	100	≥100
		3-phase output	40	≥40
	MBP20KIPARA	1-phase main input	230	≥230
		3-phase main input	80	≥80

UPS	MBP model	Input configuration	Breaker, D type [A]	Contactor [A]
		1-phase bypass input	160	≥160
		3-phase bypass input	63	≥63
		1-phase output	160	≥160
		3-phase output	63	≥63
20 kVA	MBP20KI MBP20KIPDU	1-phase main input	160	≥160
		3-phase main input	63	≥63
		1-phase bypass input	125	≥125
		3-phase bypass input	63	≥63
		1-phase output	125	≥125
		3-phase output	63	≥63
	MBP20KIPARA	1-phase main input	300	≥300
		3-phase main input	100	≥100
		1-phase bypass input	230	≥230
		3-phase bypass input	80	≥80
		1-phase output	230	≥230
		3-phase output	80	≥80

Select the AC cable conductor for the MBP according to your UPS module.

If the MBP is installed with the 15 kVA UPS, refer to *Table 30: MBP wiring if installed with the 15 kVA UPS (cross-section of conductor, mm<sup>2</sup>)*.

**Table 30. MBP wiring if installed with the 15 kVA UPS (cross-section of conductor, mm<sup>2</sup>)**

MBP Model	Input/ Output configura- tion	Input					Output		
		Main input		Bypass input		Ground wire	L wire	N wire	Ground wire
		L wire	N wire	L wire	N wire				
MBP20KI MBP20KIPDU	3-1	6	6	16	16	16	16	16	16
	3-3	6	6	6	6	6	6	6	6
	1-1	35	35	16	16	35	16	16	16
MBP20KIPARA	3-1	16	16	50	50	50	50	50	50
	3-3	16	16	10	10	16	10	10	10
	1-1	95	95	50	50	95	50	50	50

If the MBP is installed with the 20 kVA UPS, refer to *Table 31: MBP wiring if installed with the 20 kVA UPS (cross-section of conductor, mm<sup>2</sup>)*.

**Table 31. MBP wiring if installed with the 20 kVA UPS (cross-section of conductor, mm<sup>2</sup>)**

MBP Model	Input/Output configuration	Input					Output		
		Main input		Bypass input		Ground wire	L wire	N wire	Ground wire
		L wire	N wire	L wire	N wire				
MBP20KI MBP20KIPDU	3-1	10	10	25	25	25	25	25	25
	3-3	10	10	10	10	10	10	10	10
	1-1	50	50	25	25	50	25	25	25
MBP20KIPARA	3-1	25	25	70	70	70	70	70	70
	3-3	25	25	16	16	25	16	16	16
	1-1	120	120	70	70	120	70	70	70

**NOTE:**

1. Select the large cross-section conductor for the MBP AC input cable in the single source application.
2. It is recommended that the MBP output cable length does not exceed 10 m.

**Table 32. Conductor size and ring terminal types**

Conductor cross-section (mm <sup>2</sup> )	Ring terminal type
6	DRNB6-6
10	DRNB6-10
16	DRNB8-16
25	DRNB8-25
35	DRNB8-35
50	DRNB8-50
70	DRNB8-70
95	DRNB8-95
120	DRNB8-120

### 5.8.3 Parallel UPS wiring

Before you start, make sure that the power wiring of the parallel system is completed.

To connect the UPSs in a parallel system:

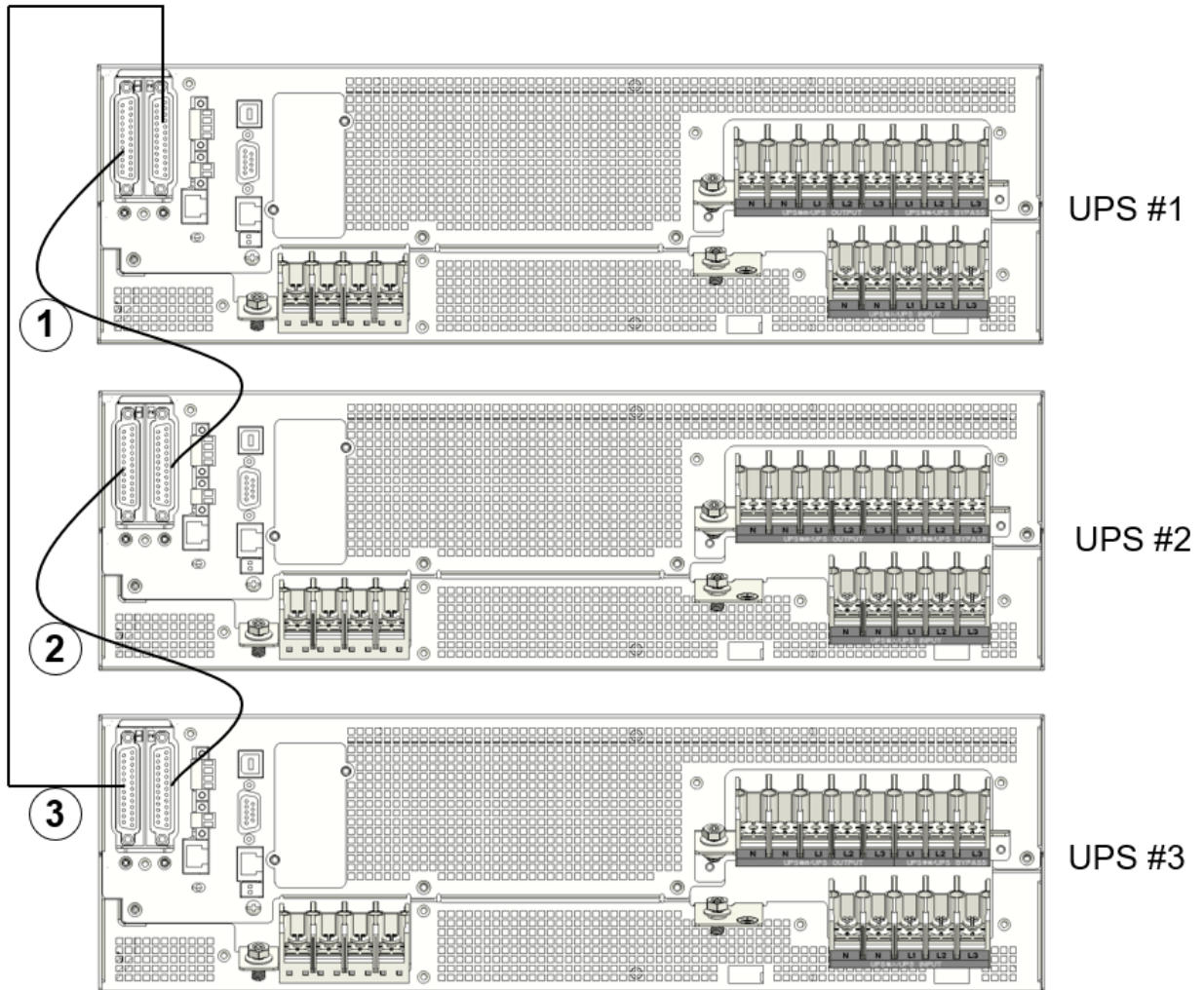
1. Remove the protective cover of the parallel ports.

2. Connect the parallel cable (25-pin) to the UPSs.



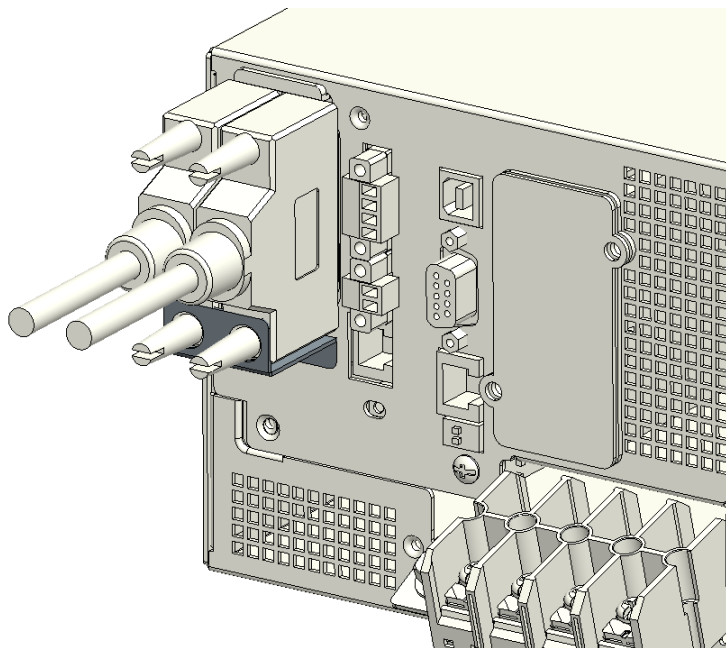
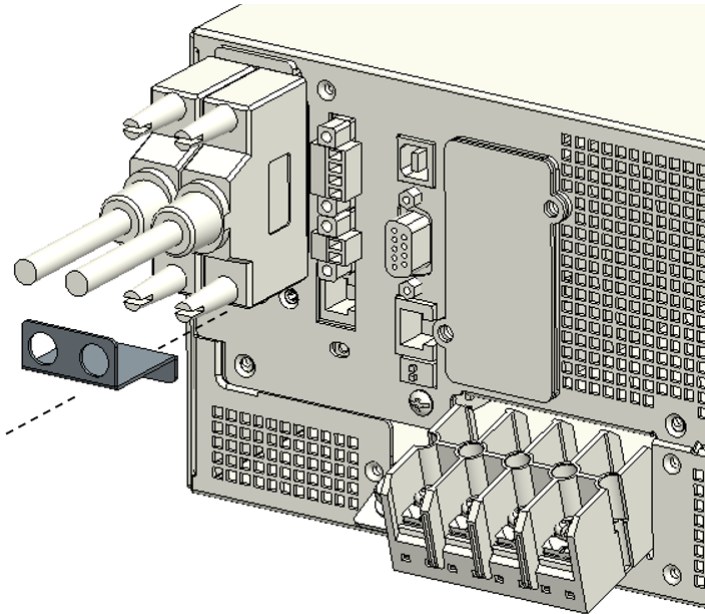
**CAUTION**

Use the parallel cable provided with the UPS to reduce the risk of damage to the parallel system. The parallel cable is in the UPS accessory kit.



3. After you connect the parallel cable, lock the cable with the parallel cable lock provided with the UPS. This is to avoid an unexpected pulling force on the parallel ports, which could cause a failure in the system.

The parallel cable lock is in the UPS accessory kit.

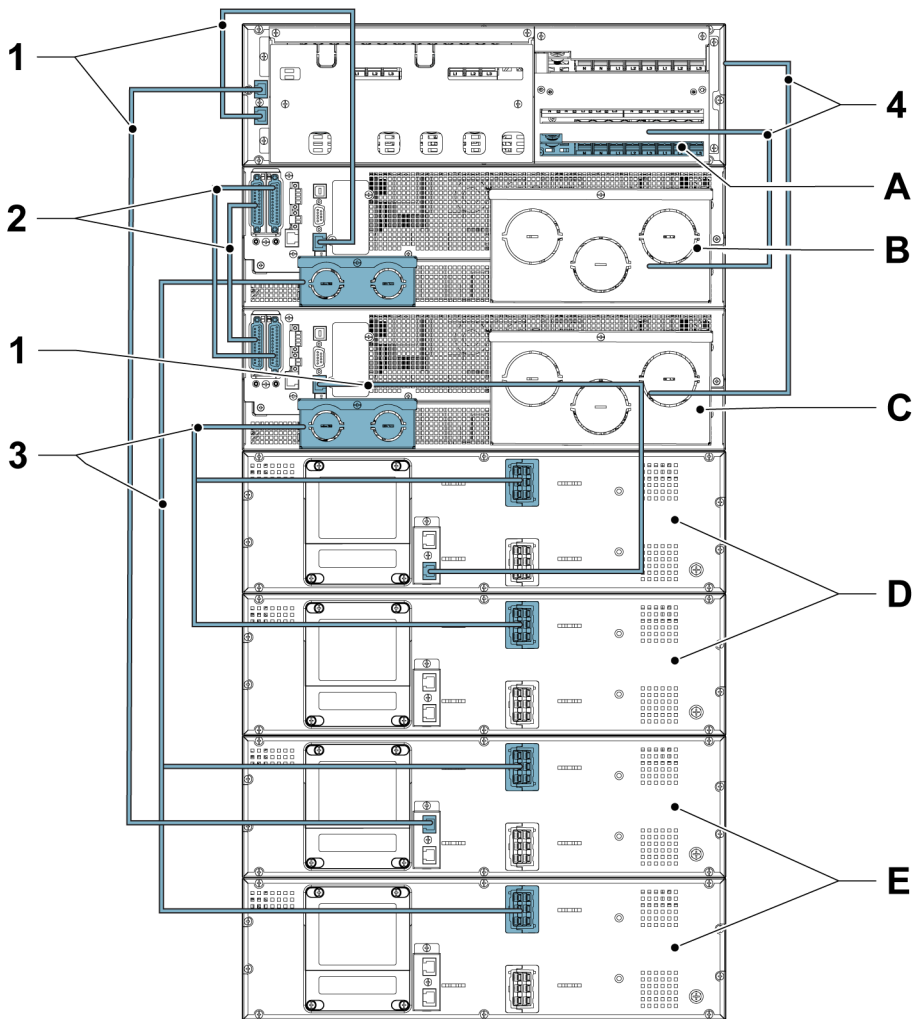


#### 5.8.4 Parallel UPS wiring with separate battery

To connect the UPSs, EBMs, and the MBP in a parallel system, refer to *Figure 45: Parallel UPS wiring with separate battery* for the wiring configuration.

**NOTE:** The MBP20KIPARA includes its own EBM detection cable.

**Figure 45. Parallel UPS wiring with separate battery**



- |    |                      |   |       |
|----|----------------------|---|-------|
| 1. | EBM detection cable  | A | MBP   |
| 2. | Parallel cable       | B | UPS 1 |
| 3. | EBM-to-UPS cable     | C | UPS 2 |
| 4. | AC connection cables | D | EBM 1 |
|    |                      | E | EBM 2 |

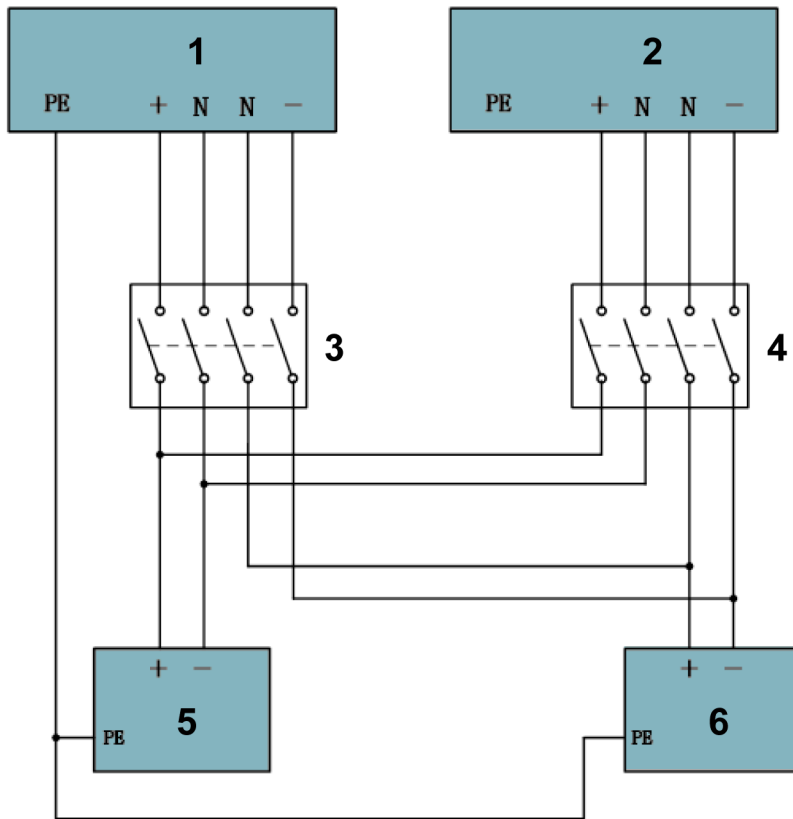
For the AC connections of the MBP, refer to *Section 5.6 Single UPS MBP wiring*.

### 5.8.5 Parallel UPS wiring with common battery

In a parallel system, you can install a common battery, that is, a customer-supplied battery for all UPSs. Refer to *Figure 46: Parallel UPS wiring with common battery*.



Figure 46. Parallel UPS wiring with common battery

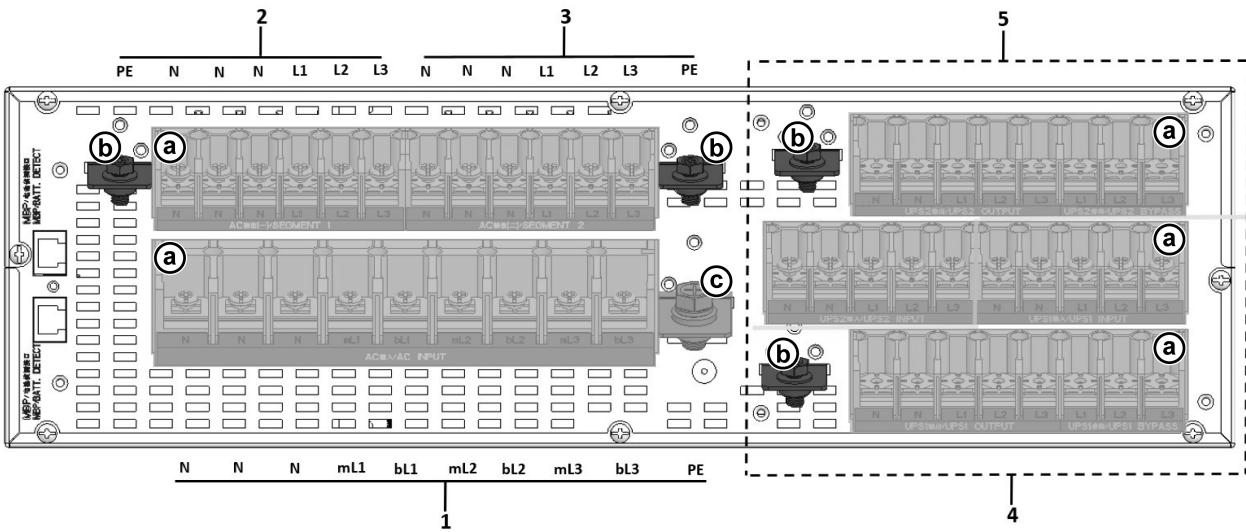


- |                 |                          |
|-----------------|--------------------------|
| 1. UPS 1        | 4. UPS 2 switch          |
| 2. UPS 2        | 5. Positive battery pack |
| 3. UPS 1 switch | 6. Negative battery pack |

### 5.8.6 MBP20KIPARA wiring

The Maintenance Bypass Module (MBP) is an optional module for the UPS. In a parallel system, it can be used to implement the maintenance bypass switching function. This function ensures that the output of the system is not affected during UPS maintenance. Refer to the *User Manual of the Maintenance Bypass Module* for details.

**Figure 47. MBP20KIPARA terminal block (TB) layout**



- |    |   |   |  |
|----|---|---|--|
| 1. | AC input TB: N/N/N/mL1/ bL1/ mL2/bL2/ mL3/bL3/PE*   | a | Screw type: M5<br>Tightening torque: 17.71 lb-in (2.0 Nm)    |
| 2. | AC segment 1 (not programmable): PE/N/N/N/L1/ L2/L3 | b | Screw type: M6<br>Tightening torque: 44.25 lb-in (5.0 Nm)    |
| 3. | AC segment 2 (programmable): N/N/N/L1/ L2/L3/PE     | c | Screw type: M8<br>Tightening torque: 104.07 lb-in (11.76 Nm) |
| 4. | UPS 1 TB ports                                      |   |  |
| 5. | UPS 2 TB ports                                      |   |  |

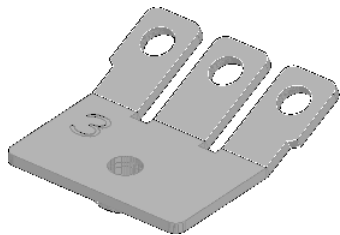
\* ) *m* refers to the main input, *b* refers to the bypass input.

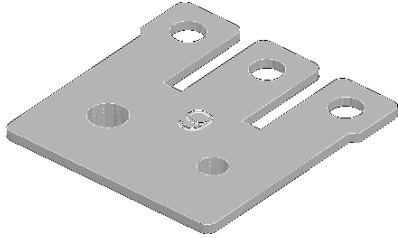
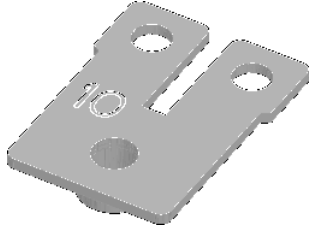
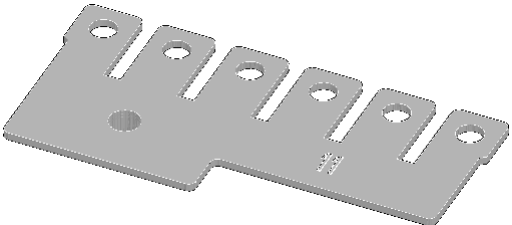
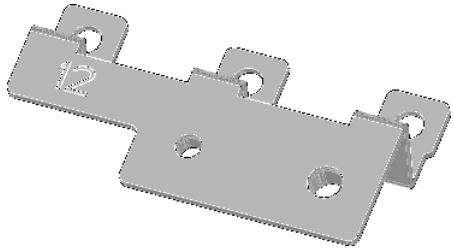
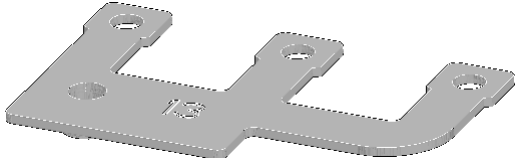
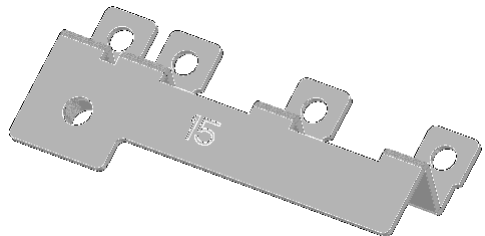
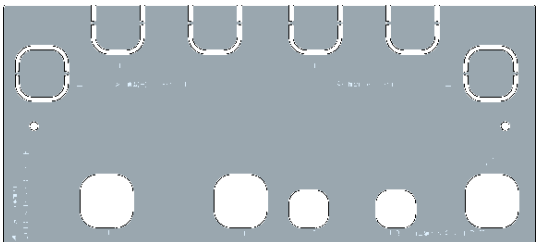
There are six different wiring configurations for the MBP input/output.

Select one configuration according to your requirements.

For the tools needed during the wiring procedure, refer to *Table 33: MBP wiring tools*. During the wiring procedure, remove only the top cover of the terminal block. Do not remove the terminal block box.

**Table 33. MBP wiring tools**

Tool	Tool number	Quantity	
Copper busbar	3	4	

Tool	Tool number	Quantity	
	9	1	
	10	3	
	11	1	
	12	1	
	13	1	
	15	1	
Configuration label	N/A	7	

**NOTE:**

Copper busbars 3, 9, 10, 12, 15, and their related configuration labels are included in the BOM of the product. These copper busbars and configuration labels are needed for the following wiring configurations.

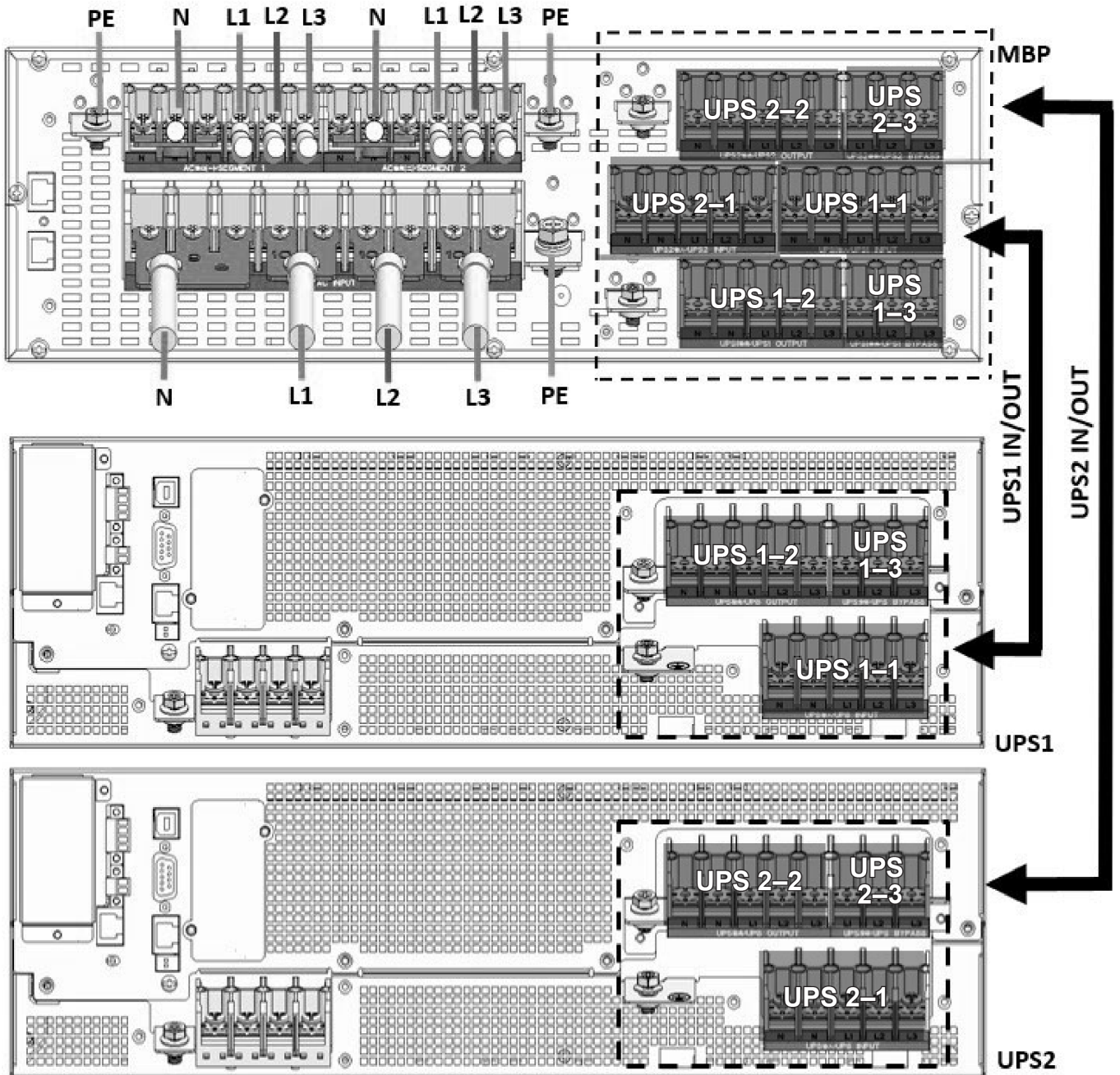
- 3-3 (single feed)
- 3-3 (dual feed)
- 3-1 (single feed)
- 3-1 (dual feed)

For copper busbars 11, 13, and their related configuration labels, contact your local service representative. These copper busbars and configuration labels are needed for the following wiring configurations.

- 1-1 (single feed)
- 1-1 (dual feed)

### 5.8.6.1 Configuration 3-3 (single feed, default MBP wiring configuration)

Figure 48. Configuration 3-3 (single feed, default MBP wiring configuration)

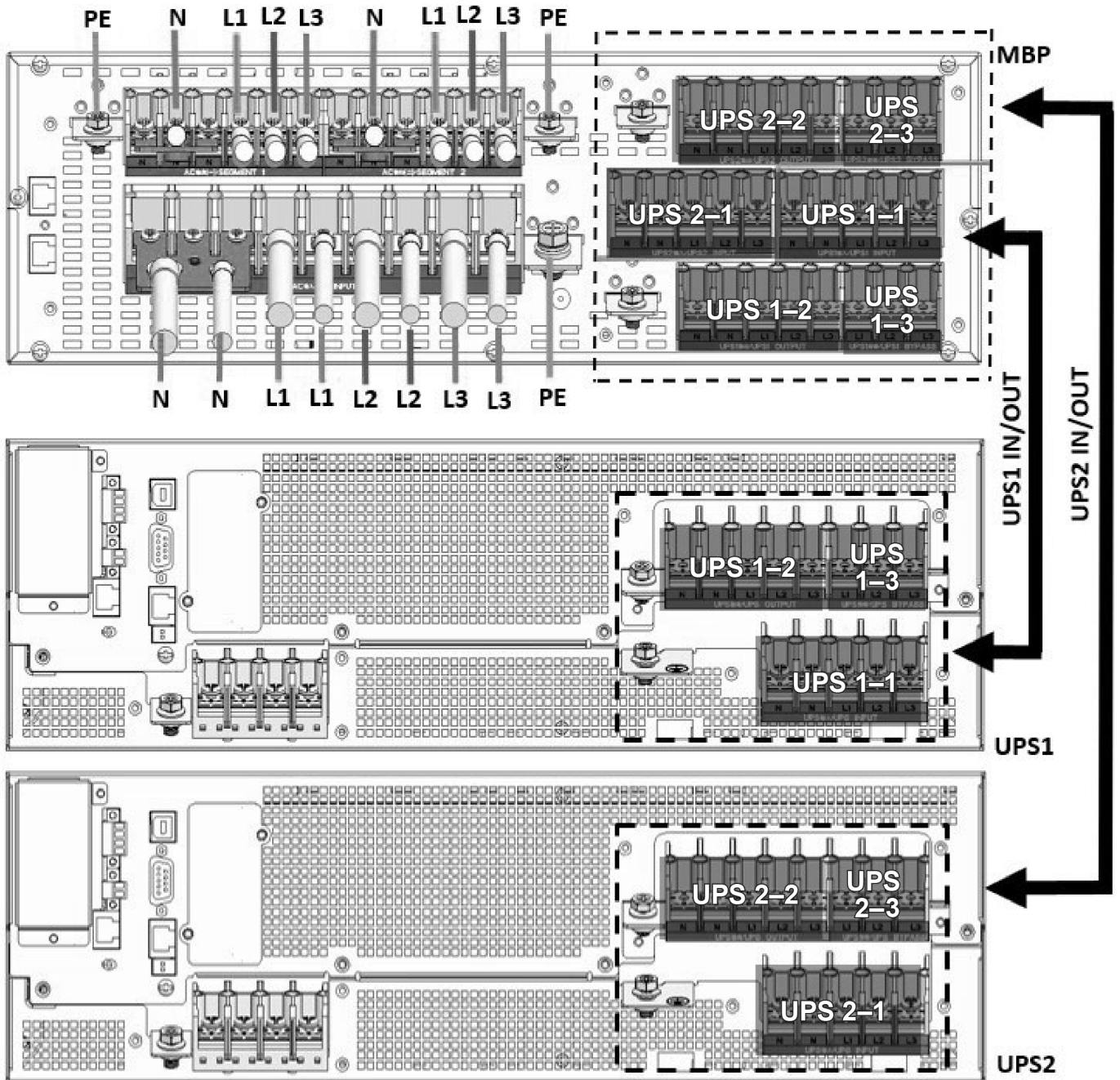


1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N/N with busbar 9.
  - c. Connect the AC cable (N).
  - d. Short AC input terminal mL1/bL1 with busbar 10.
  - e. Connect the AC cable (L1).
  - f. Short AC input terminal mL2/bL2 with busbar 10.
  - g. Connect the AC cable (L2).
  - h. Short AC input terminal mL3/bL3 with busbar 10.
  - i. Connect the AC cable (L3).
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N/N with busbar 3.
  - c. Connect the AC cable (N).
  - d. Connect the AC cable (L1/L2/L3) to AC segment terminal L1/L2/L3.
3. Connect the MBP to UPS 1 and UPS 2.
  - a. Remove all the busbars from the UPSs.
  - b. Connect the MBP to UPS 1 with the UPS 1 cable.
  - c. Connect MBP to the UPS 2 to with the UPS 2 cable.  
The cables are in the MBP accessory kit.



### 5.8.6.2 Configuration 3-3 (dual feed)

Figure 49. Configuration 3-3 (dual feed)



1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N/N with busbar 9.
  - c. Connect the AC main source cable (N) and the bypass source cable (N).
  - d. Connect the main source cable (L1/L2/L3) to AC input terminal bL1/bL2/bL3.

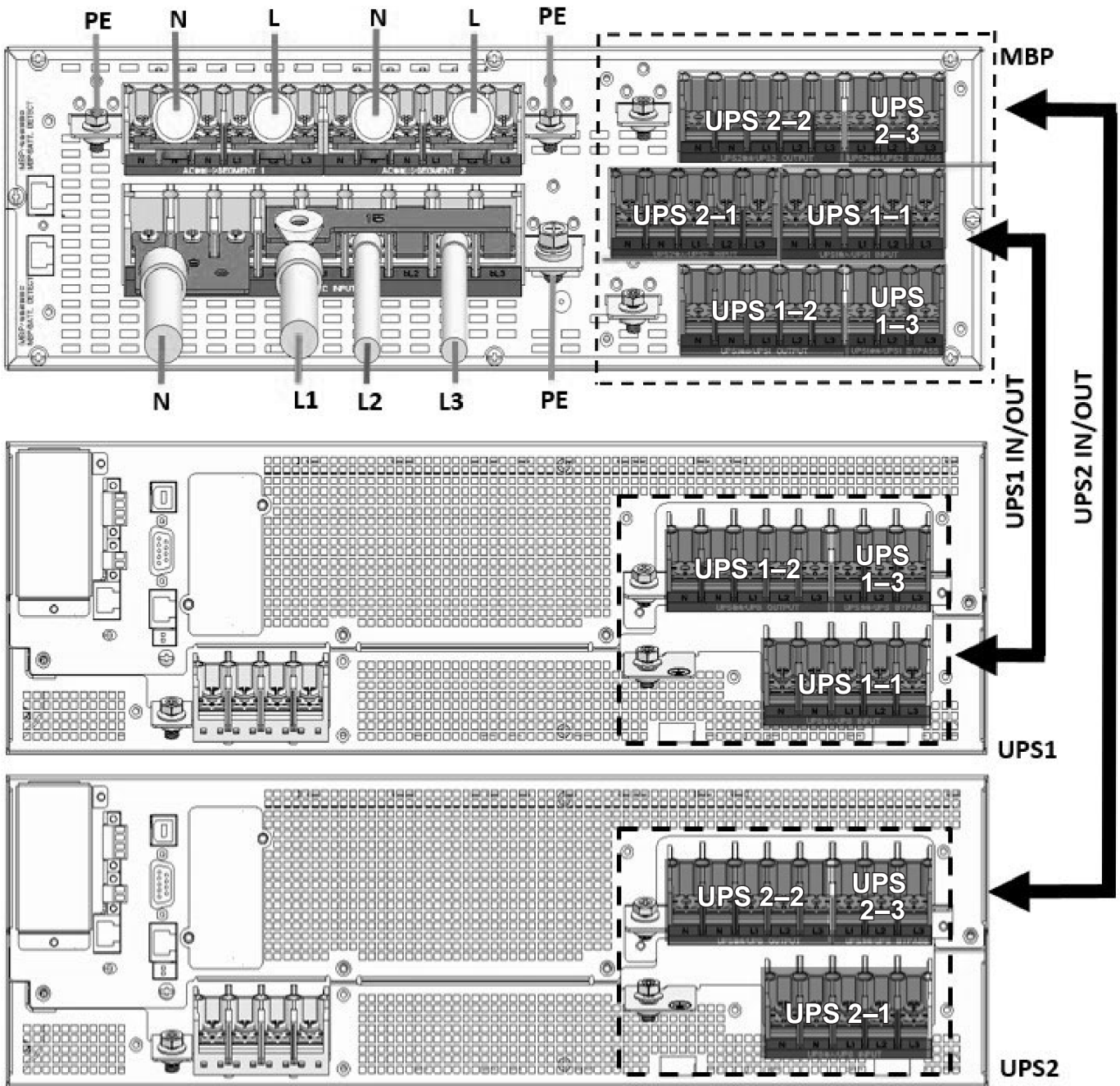
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N/N with busbar 3.
  - c. Connect the AC cable (N).
  - d. Connect the AC cable (L1/L2/L3) to AC segment terminal L1/L2/L3.
3. Connect the MBP to UPS 1 and UPS 2.
  - a. Remove all the busbars from the UPSs.
  - b. Connect the MBP to UPS 1 with the UPS 1 cable.
  - c. Connect the MBP to UPS 2 with the UPS 2 cable.

The cables are in the MBP accessory kit.



### 5.8.6.3 Configuration 3-1 (single feed)

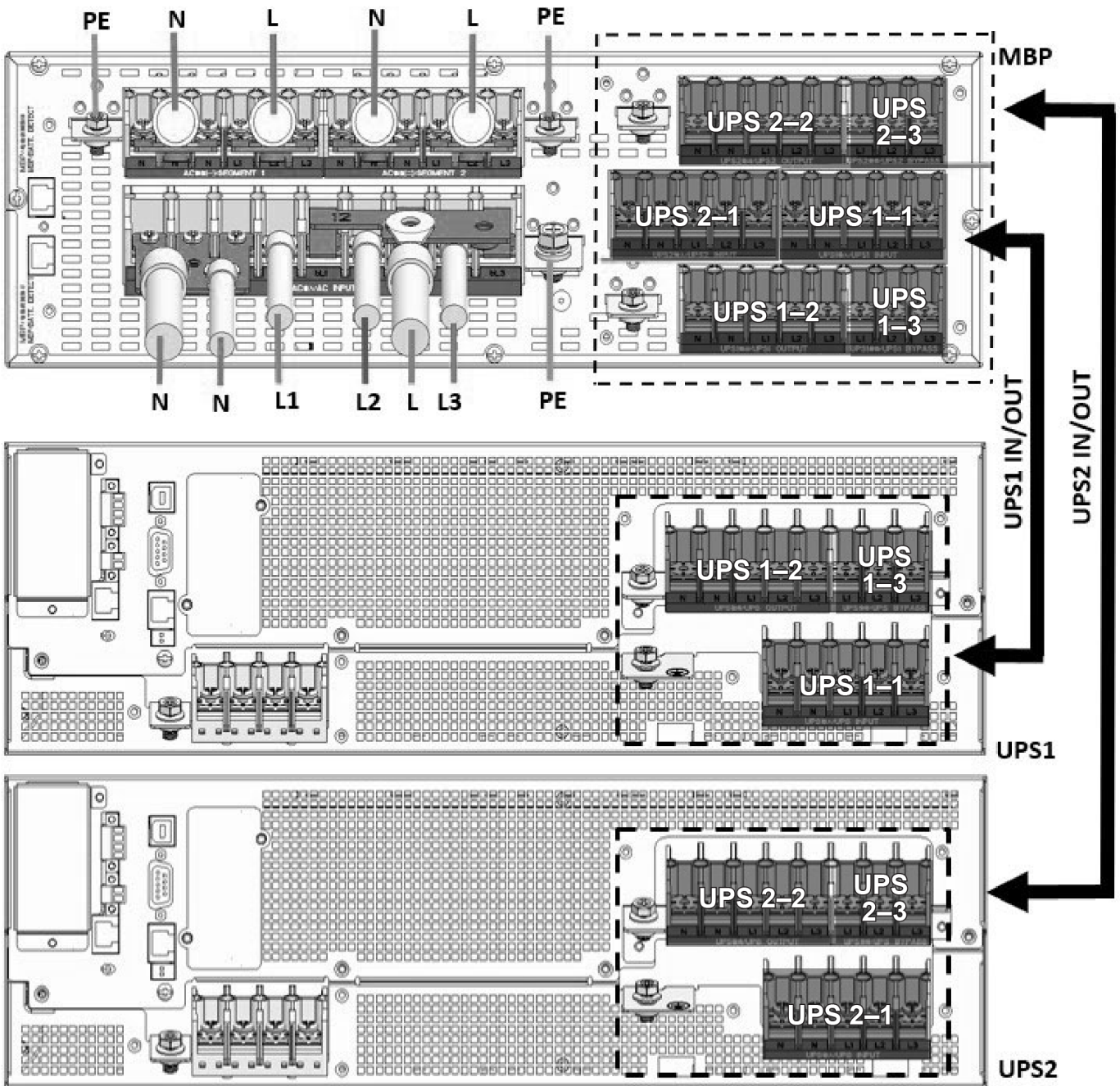
Figure 50. Configuration 3-1 (single feed)



1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N/N with busbar 9.
  - c. Connect the AC cable (N).
  - d. Short AC input terminal mL1/bL1/bL2/bL3 with busbar 15.
  - e. Connect the AC cable (L1).
  - f. Connect the AC cable (L2/L3) to AC input terminal mL2/mL3.
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N/N with busbar 3.
  - c. Connect the AC cable (N).
  - d. Short AC segment terminal L1/L2/L3 with busbar 3.
  - e. Connect the AC cable (L).
3. Connect the MBP to UPS 1 and UPS 2.
  - a. Remove all the busbars from the UPSs.
  - b. Connect the MBP to UPS 1 with the UPS 1 cable.
  - c. Connect the MBP to UPS 2 with the UPS 2 cable.  
The cables are in the MBP accessory kit.

### 5.8.6.4 Configuration 3-1 (dual feed)

Figure 51. Configuration 3-1 (dual feed)



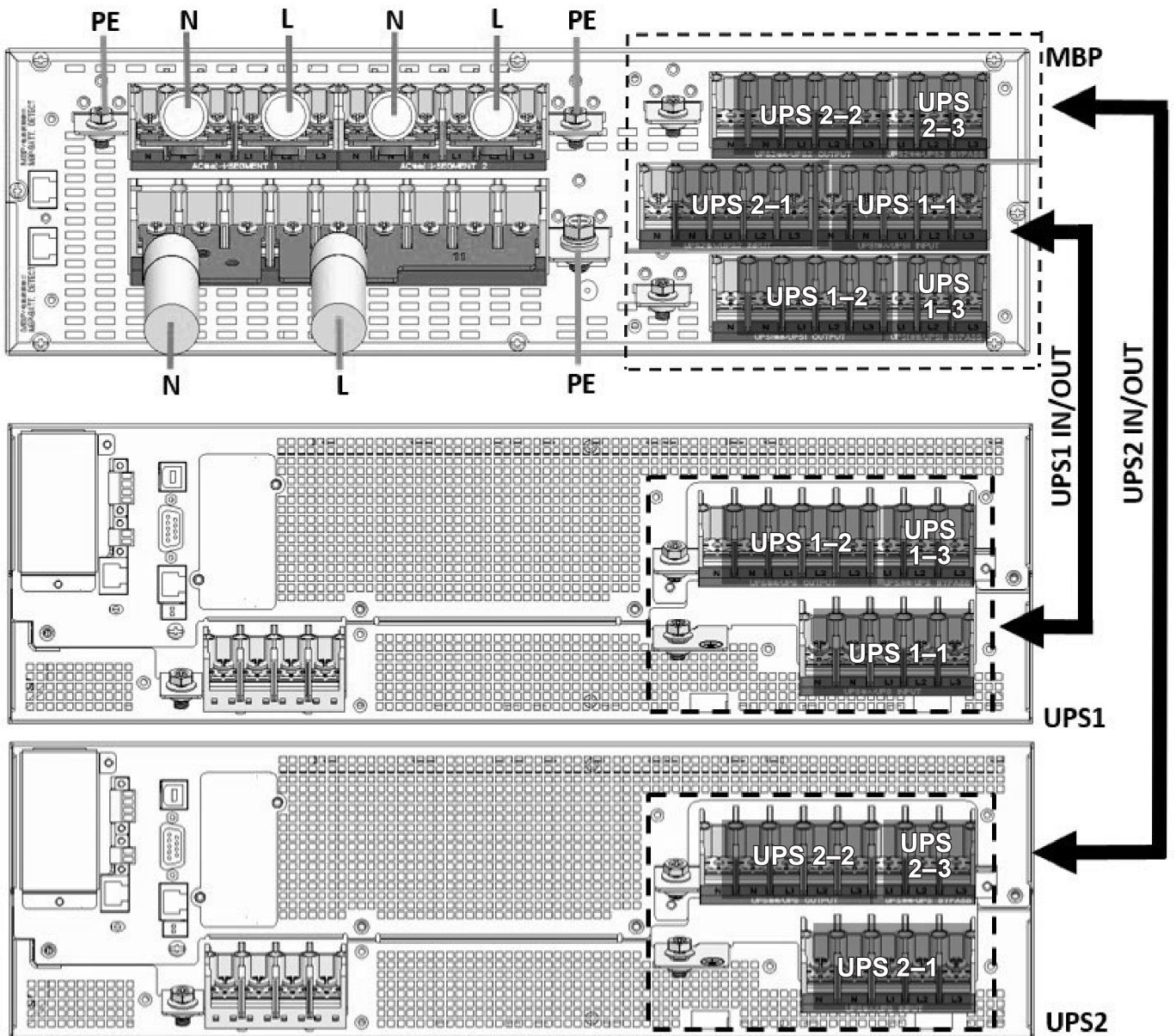
1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N/N with busbar 3.
  - c. Connect the AC main source cable (N) and the bypass source cable (N).
  - d. Connect the main source cable (L1/L2/L3) to AC input terminal mL1/mL2/mL3.
  - e. Short AC input terminal bL1/bL2/bL3 with busbar 12.
  - f. Connect the bypass source cable (L).
2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N/N with busbar 3.
  - c. Connect the AC cable (N).
  - d. Short AC segment terminal L1/L2/L3 with busbar 3.
  - e. Connect the AC cable (L).
3. Connect the MBP to UPS 1 and UPS 2.
  - a. Remove all the busbars from the UPSs.
  - b. Connect the MBP to UPS 1 with the UPS 1 cable.
  - c. Connect the MBP to UPS 2 with the UPS 2 cable.

The cables are in the MBP accessory kit.



### 5.8.6.5 Configuration 1-1 (single feed)

Figure 52. Configuration 1-1 (single feed)

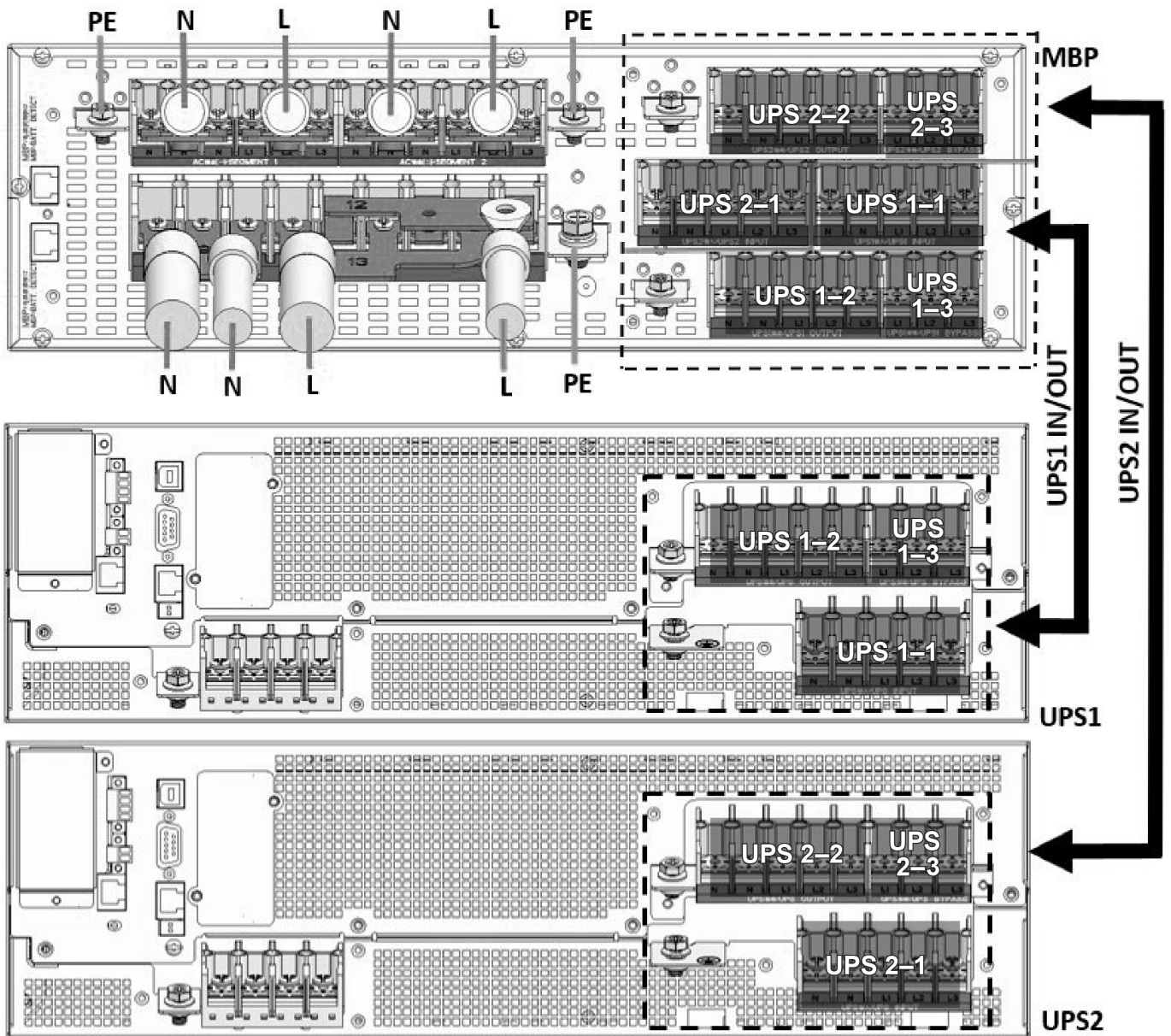


1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N/N with busbar 9.
  - c. Connect the AC cable (N).
  - d. Short AC input terminal mL1/bL1/mL2/bL2/mL3/bL3 with busbar 11.
  - e. Connect the AC cable (L).

2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N/N with busbar 3.
  - c. Connect the AC cable (N).
  - d. Short AC segment terminal L1/L2/L3 with busbar 3.
  - e. Connect the AC cable (L).
3. Connect the MBP to UPS 1 and UPS 2.
  - a. Remove all the busbars from the UPSs.
  - b. Connect the MBP to UPS 1 with the UPS 1 cable.
  - c. Connect the MBP to UPS 2 with the UPS 2 cable.  
The cables are in the MBP accessory kit.

### 5.8.6.6 Configuration 1-1 (dual feed)

Figure 53. Configuration 1-1 (dual feed)



1. Complete the input wiring procedure.
  - a. Connect the main ground cable (PE) to the chassis.
  - b. Short AC input terminal N/N/N with busbar 9.
  - c. Connect the AC main source cable (N) and the bypass source cable (N).
  - d. Short AC input terminal mL1/mL2/mL3 with busbar 13.
  - e. Connect the main source cable (L).
  - f. Short AC input terminal bL1/bL2/bL3 with busbar 12.
  - g. Connect the bypass source cable (L).

2. Complete the output wiring procedure.
  - a. Connect the ground cable (PE) to the chassis.
  - b. Short AC segment terminal N/N/N with busbar 3.
  - c. Connect the AC cable (N).
  - d. Short AC segment terminal L1/L2/L3 with busbar 3.
  - e. Connect the AC cable (L).
3. Connect the MBP to UPS 1 and UPS 2.
  - a. Remove all the busbars from the UPSs.
  - b. Connect the MBP to UPS 1 with the UPS 1 cable.
  - c. Connect the MBP to UPS 2 with the UPS 2 cable.

The cables are in the MBP accessory kit.



# 6 Communication interfaces

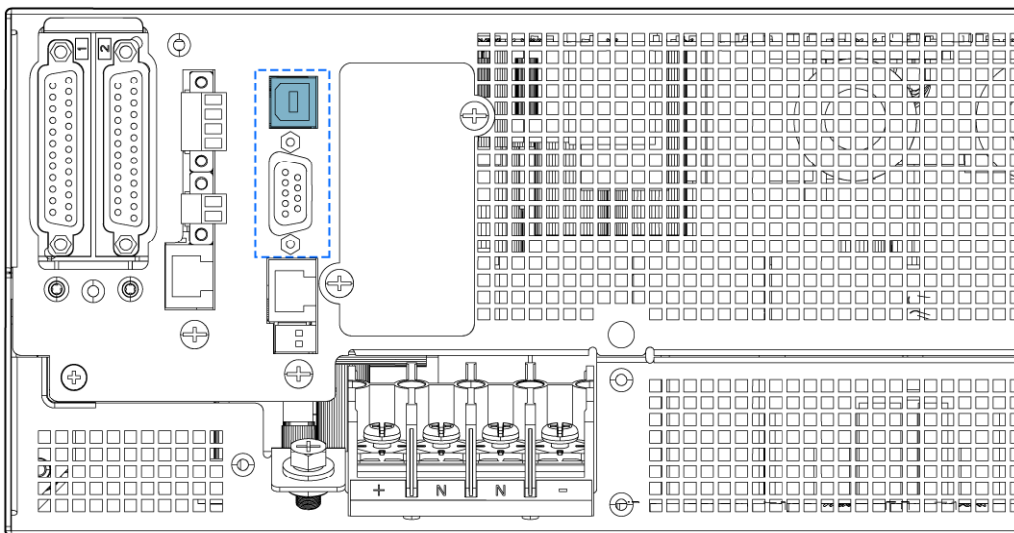
## 6.1 Computer ports

The UPS has USB and RS232 communication ports. Use the communication cable included in the UPS accessory kit for communication port connections.

The default parameters for the RS232 port communication are: 2400, 8, 1, 0 (baud rate 2400, 8 data bits, 1 stop bit, no parity).

If the USB and the RS232 are connected at the same time, connect the USB before you connect the RS232.

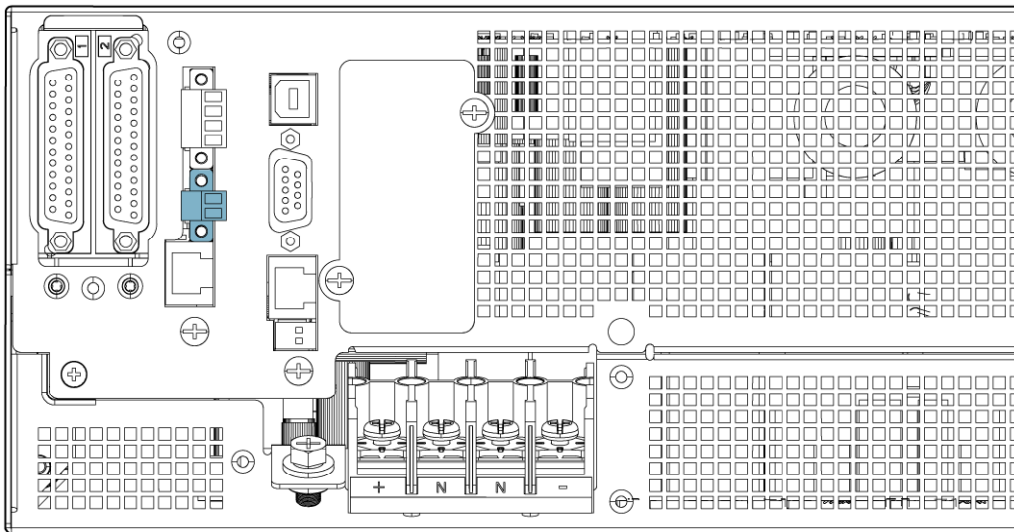
Figure 54. Computer ports



## 6.2 Emergency Power-Off (EPO)

The emergency power-off (EPO) connector is located on the rear panel of the UPS. Usually, the EPO connector is closed with a wire. Disconnecting the EPO cuts off the output of the UPS. As a result, the UPS performs an emergency shutdown, the red warning LED light goes on, and the UPS transfers to **Fault** mode.

**Figure 55. Emergency Power-Off (EPO) connector**



**WARNING**

This connector must only be connected to the SELV (Safety Extra-Low Voltage) circuits.

*NOTE:* The local ON/OFF control of the power button overrides the remote-control function.

For the instructions on how to install a remote EPO switch, refer to *Section 5.5 Install a remote EPO switch*.

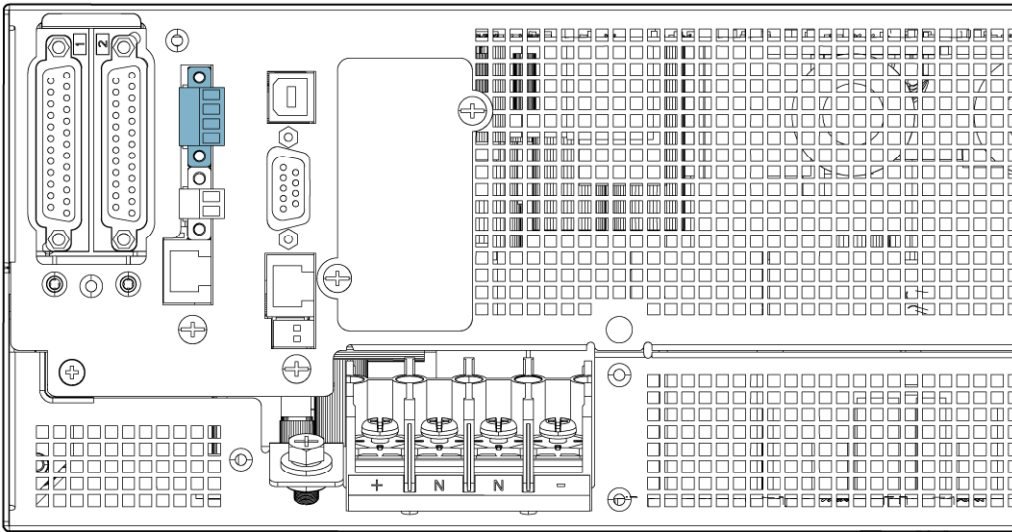
For the instructions on how to use the remote emergency power-off switch, refer to *Section 7.5 Use the Remote Emergency Power-off push-button*.

### 6.3 Dry in and Dry out

Dry in is an optical coupling input interface, which is connected to an external switch. After custom setting the dry contact input function, it can perform operations such as power-on and power-off.

Dry out is a relay output interface, which is usually closed. It can be used to indicate different UPS operating conditions such as a UPS overload, battery mode, low battery voltage, disconnected battery, and bypass output.

**Figure 56. Dry in and Dry out**



Refer to *Section 7.2.8 Settings* for Dry in and Dry out interface settings.

## 6.4 Modbus/BMS port and DIP switch

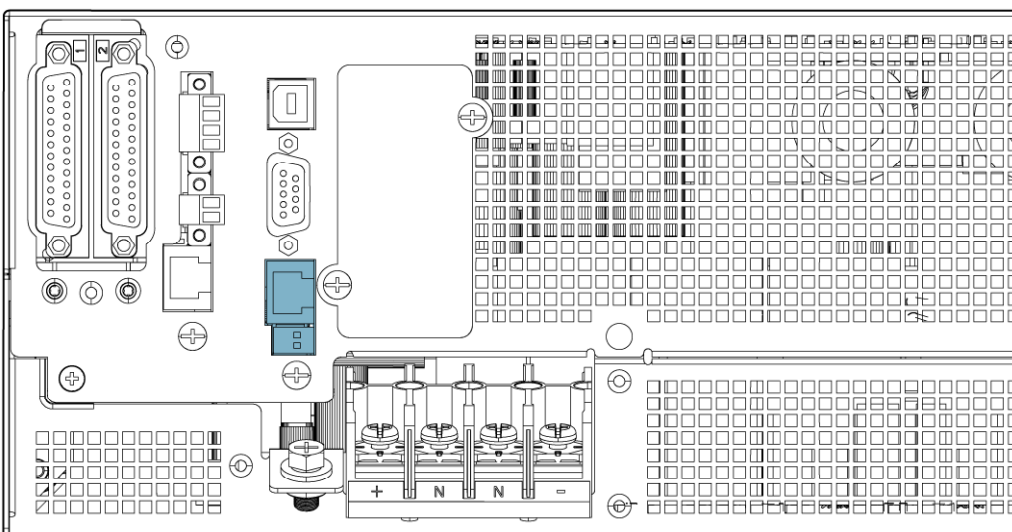
The Modbus/BMS port supports Modbus or lithium battery BMS communication.

The port defaults to Modbus, which can provide communication between a maximum of three UPSs. For the parallel connections, contact your local Eaton representative.

The DIP switch SW-2 is used to enable terminal resistance. By default, it is set to OFF. When the SW-2 switch is used as a terminal device, it is recommended to set it to ON.

When the port is used for lithium battery BMS communication, the DIP switch SW-1 is set to OFF by default, and needs to be turned ON when connecting the lithium battery pack.

**Figure 57. Modbus/BMS port and DIP switch**



## 6.5 Intelligent cards

The UPS intelligent slot supports hot swapping and is compatible with the following intelligent cards.

### Gigabit Network Card (Network-M3)

Figure 58. Gigabit Network Card (Network-M3)



The Gigabit Network Card provides a Gigabit Ethernet connection and enables secure UPS monitoring over HTTPS web browser interface, 10/100/1000 Mb/s, auto neg., HTTP 1.1, Log on events SNMP V1, SNMP V3, NTP, SMTP, DHCP, and email alarms. In addition, up to three Environmental Monitoring Probes can be attached to obtain humidity, temperature, smoke alarm, and security information.

### Gigabit Network Card (Network-M2)

Figure 59. Gigabit Network Card (Network-M2)



The Gigabit Network Card (Network-M2) provides a Gigabit Ethernet connection and enables secure UPS monitoring over HTTPS web browser interface, SNMP v1/v3 protocol, and email alarms. In addition, up to three Environmental Monitoring Probes can be attached to obtain humidity, temperature, smoke alarm, and security information.

## Industrial Gateway Card (INDGW-M2)

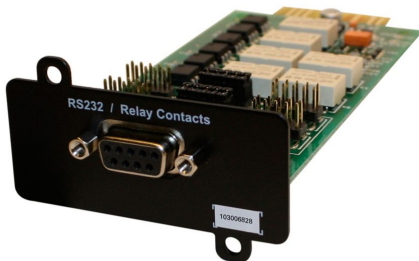
Figure 60. Industrial Gateway Card (INDGW-M2)



The Industrial Gateway Card (INDGW-M2) provides Modbus RTU and Modbus TCP communication support in addition to the same secure UPS monitoring, management, and sensor capability as the Gigabit Network card.

## Relay-MS card

Figure 61. Relay-MS card



The Relay MS-card provides isolated dry contact (Form-C) relay outputs for UPS status: Utility failure, Battery low, UPS alarm/OK, or no Bypass.

# 7 UPS operating instructions

## 7.1 About UPS operating instructions

This section describes how to operate the UPS.



### CAUTION

Before you operate the UPS, make sure that all the installation tasks are completed and a preliminary startup has been performed by qualified service personnel authorized by Eaton. The preliminary startup verifies all the electrical interconnections to make sure that the installation was successful and the system operates correctly.

Before you operate any of the controls, read these instructions and have a thorough understanding of the UPS operation.

The UPS is configured to operate with one of the following nominal voltages: 220, 230, or 240 VAC. Before you start to operate the UPS, confirm the UPS nominal voltage and frequency from the display by selecting **UPS Setting**→**Input/Output**. If the UPS needs to be operated with another voltage or frequency, contact your local Eaton office or Eaton authorized partner.

*NOTE:* The UPS is not a measuring device. All the displayed measurements are approximate values only.

## 7.2 UPS controls and indicators

### 7.2.1 Control panel

Figure 62. Control panel









1. Power button
2. Touch screen


3. LED indicator

**NOTE:** The control panel has two display modes: horizontal and vertical. The figures in this chapter illustrate the horizontal display mode.

**Table 34. Status indicator lights**

LED indicator	Status	Description
	Steady red	The UPS is in Fault mode.
	Flashing red	There is an active alarm in the UPS.
	Steady yellow	The UPS is in Battery mode.
	Flashing yellow	The UPS is in Bypass mode with output.
	Steady green	The UPS is in Line mode or High Efficiency mode.
	Light off	The UPS has no output. It is in Power-on mode, Shutdown mode, or Bypass mode without output.

**Table 35. Power button**

Power button	Function	Description
	Power on	Press the power button to start the UPS.
	Power off	When the UPS is operating, press the power button to open the shutdown window.
	Clear fault	When the UPS is in Fault mode, press the power button to open the clear fault window.

**Table 36. Buzzer functions**

Buzzer	Description
No beep sound	The UPS operates correctly.
One beep	Power-on sound
Beep every 2 minutes	The UPS operates in Bypass mode.
Beep every 10 seconds	The UPS operates in Battery mode.
Beep every second	The UPS operates in Battery mode and the battery is low, or there is another alarm.
Continuous beep	There is a failure in the system. The UPS does not operate correctly.

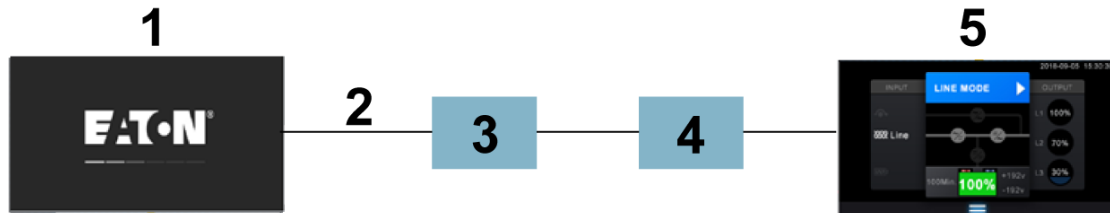
## 7.2.2 Touch screen

The UPS is equipped with a 4.3-inch 65K true color touch screen, graphical menu, and touch operation.

When you start the UPS, the LCD displays a start-up animation. After that, if using the UPS for the first time, a guide page opens for initial settings. Refer to *Section 7.2.3 Guide page*. After you configured the initial settings, the main page opens. Refer to *Section 7.2.4 Main page and pop-up page*.

Select the items on the touch screen by tapping.

**Figure 63. UPS start-up flow diagram**



- |  |  |
|--|--|
| 1. Start-up animation                  | 4. Date, time, and output voltage settings |
| 2. Guide page (the first UPS start-up) | 5. Main page                               |
| 3. Language and password settings      |  |

From the main page, you can access the operation menu and submenus. For more information, refer to *Section 7.2.5 Menu page*.

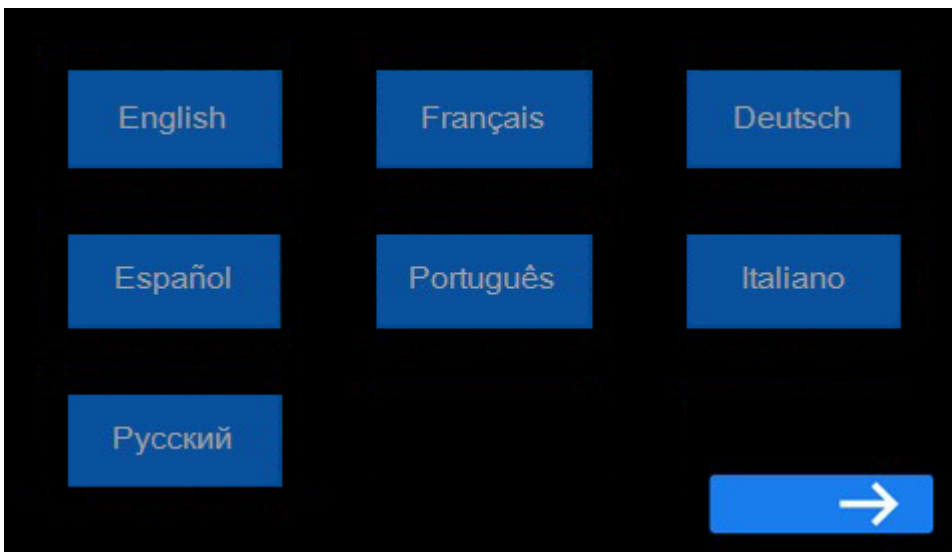
### 7.2.3 Guide page

When you use the product for the first time, the guide page opens after the start-up animation. It guides you to the initial settings, including language selection, password setting, time setting, and output voltage setting.

Select the user interface language. English is used as default.



**Figure 64. Language selection**



To set a password, tap on the password box and enter your four-digit password on the keypad on the right side of the screen after the cursor appears. The confirm password is the same as the setting password.

**Figure 65. Set password**

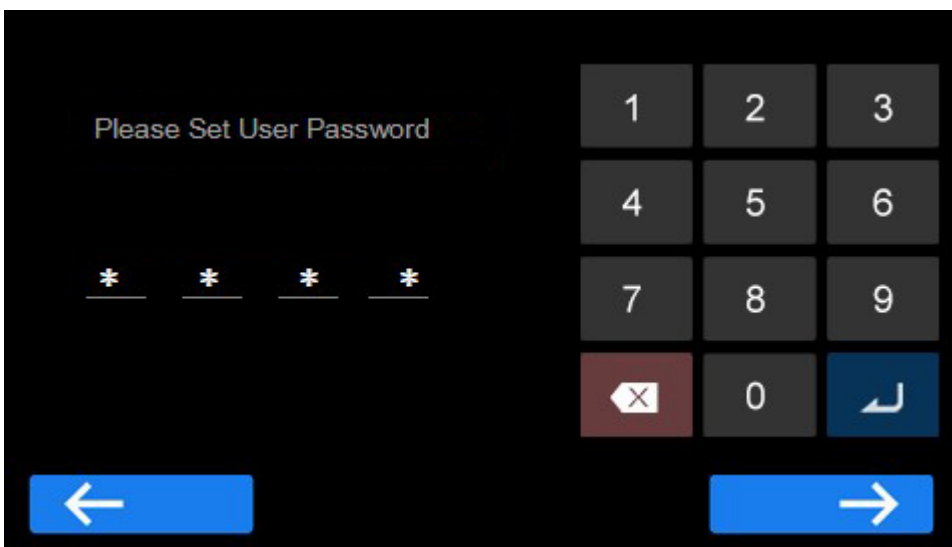
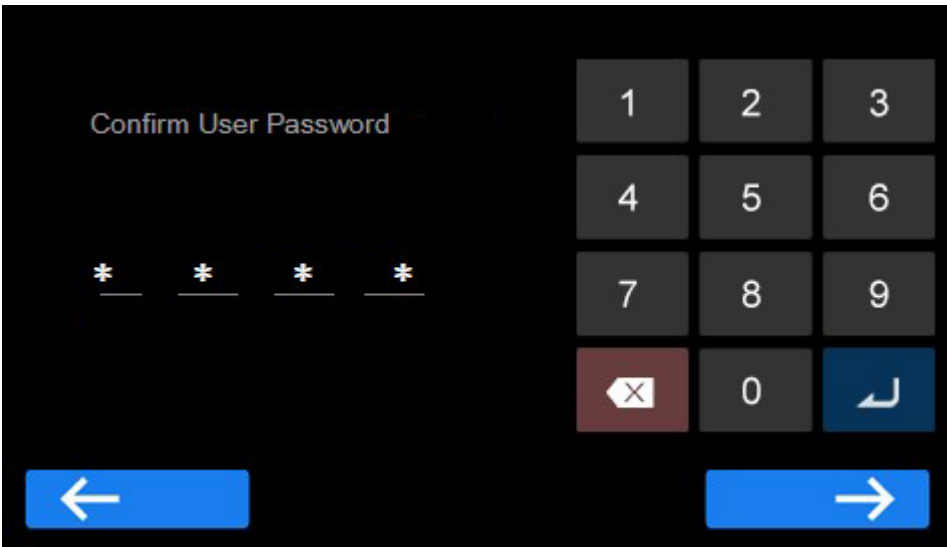


Figure 66. Confirm password

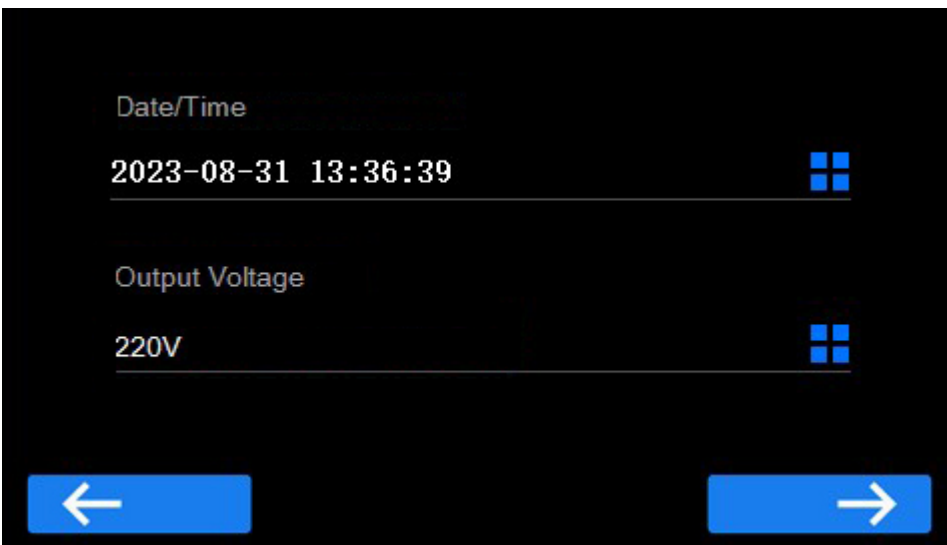


**NOTE:** Do not forget your password. You need your password later to access the menu and the settings. If you forget your password, contact your local service representative as soon as possible.

If password protection is not needed, you can turn it off in **Setting**→**Password**.

Be sure to set the time accurately in the UPS as all records of the UPS are referenced by time.

Figure 67. Set time and output voltage

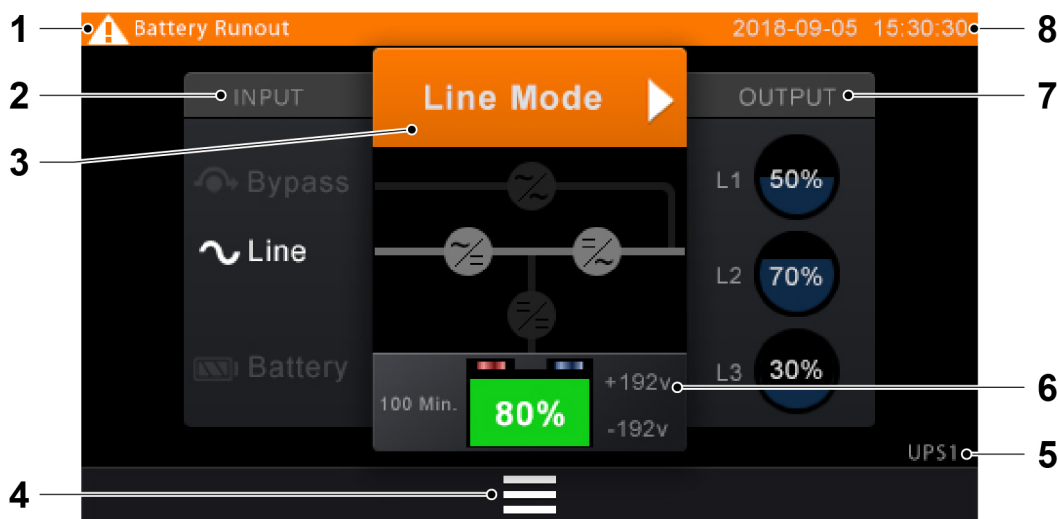


Examine the power usage of the critical equipment. Then, set the output voltage of the UPS.

#### 7.2.4 Main page and pop-up page

The main page shows information on the UPS status and operations.

Figure 68. Main page and pop-up page

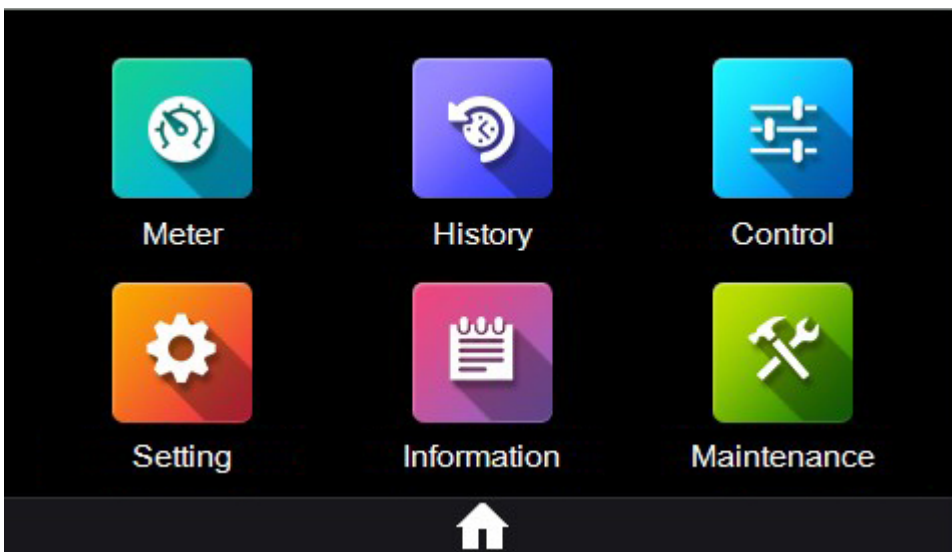


Number	Name	Description
1	Alarms and faults	Alarms and faults are displayed in the status bar. The status bar is blank when there are no alarms or faults to display.
2	Input information	There are three input status displays for bypass, line, and battery. The highlighted color represents the current input state.
3	System status	The system status is indicated as follows: <ul style="list-style-type: none"> <li>• Blue: the UPS operates correctly.</li> <li>• Orange: There is an active alarm.</li> <li>• Red: There is a failure in the system.</li> </ul> The text indicates the system operating mode. Tap to open a detailed system information pop-up page.
4	Menu	Tap this icon to go to the menu page, refer to <i>Section 7.2.5 Menu page</i> .
5	UPS number	The number of this UPS in the parallel system. Displayed as UPS1 only when this UPS is powered.
6	Battery Status	Displays battery information.
7	Output information	Displays output information.
8	Time	Displays the UPS system time. If it does not match the actual time, modify it in <b>Setting</b> → <b>General</b> → <b>Date/Time</b> .

### 7.2.5 Menu page

On the main page, tap on the **Menu** icon to enter the Menu page.

Figure 69. Menu page



On the menu page, tap on the corresponding icon to operate.

Table 37. Menu and submenus

Menu item	Password	Submenu items					
Meter							
History		Fault	Event	Clear			
Control	Control password	Battery Test	Manual Bypass	Single UPS Shutdown	Reset Fault	Restore	Battery Test (Parallel)
Setting	User password	General	Input	Output	Battery	Dry Contact	Password
Information							
Maintenance	Service password						

### Screen saver

- On any page, when there is no operation within 5 minutes, the LCD enters a screen saver mode. In this mode, touch the screen to relight the LCD. The LCD returns to the previous page.
- On any page, when there is no operation within 15 minutes, the LCD switches back to the main page.

You can enable or disable the screen saver function in the **Setting** menu. Refer to *Section 7.2.8 Settings*.

## 7.2.6 System events

### 7.2.6.1 View UPS real-time parameters

1. On the **Menu** page, tap the **Meters** icon to enter the real-time parameter page.

2. Tap the page flip icon to change the view between Bypass, Output, Line, and Load real-time parameters, or Battery, BUS Voltage, UPS temperature and Parallel Meters parameters.

This screenshot shows a mobile application interface with four data panels: Bypass, Output, Line, and Load. Each panel displays real-time parameters for three phases (L1, L2, L3). A blue vertical button with a downward arrow is on the right side of the Load panel. At the bottom, there is a navigation bar with a home icon on the left and a page flip icon on the right.

Bypass			Output			
L1	220 V	50 Hz	L1	220 V	50 Hz	30 A
L2	220 V	50 Hz	L2	220 V	50 Hz	30 A
L3	220 V	50 Hz	L3	220 V	50 Hz	30 A

Line			Load			
L1	220 V	50 Hz	L1	220 KV	50 KW	30 %
L2	220 V	50 Hz	L2	220 KV	50 KW	30 %
L3	220 V	50 Hz	L3	220 KV	50 KW	30 %

This screenshot shows a mobile application interface with four data panels: Battery, BUS Voltage, UPS Temperature, and Parallel Meters. The Battery panel shows detailed status information. The BUS Voltage panel shows two values (360v and 360v). The UPS Temperature panel shows 30°C. The Parallel Meters panel has a right-pointing arrow. A blue vertical button with an upward arrow is on the right side of the BUS Voltage panel. At the bottom, there is a navigation bar with a home icon on the left and a page flip icon on the right.

Battery		BUS Voltage	
EBM/AH	4Str	360v	360v
Status	+ Charging	UPS Temperature	
	- Charging		
Voltage	+ 230 V	30°C	
	- 230 V	Parallel Meters ▶	
Capacity	100%		
Remaining Time	120Min		

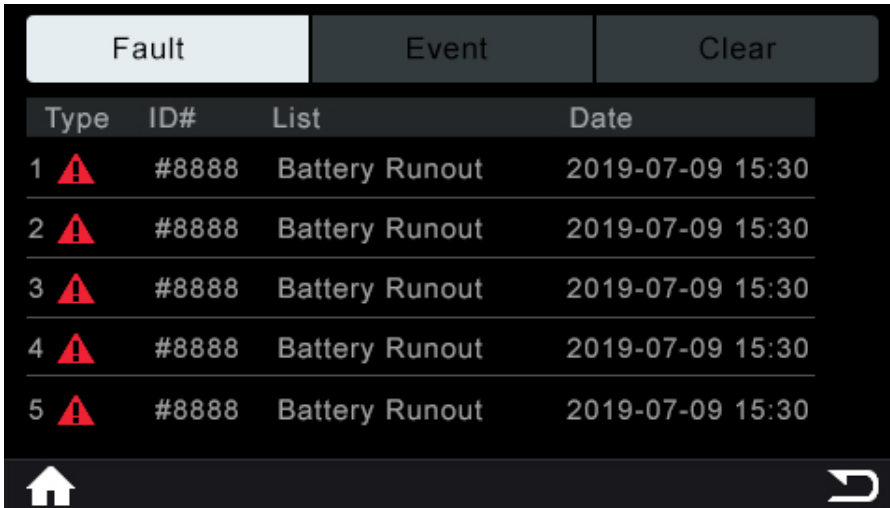
3. Tap on the arrow icon of the Parallel Meters parameter to view the running status of all UPS in the parallel system on one UPS.

Para UPS	Load	Battery	Mode	Status
UPS1	60% 60% 60%	90	Line	Normal
UPS2	60% 60% 60%	90	Line	Normal
UPS3	60% 60% 60%	90	Line	Normal

### 7.2.6.2 View or clear UPS history

1. Tap on the **History** icon on the menu page to enter the History page.

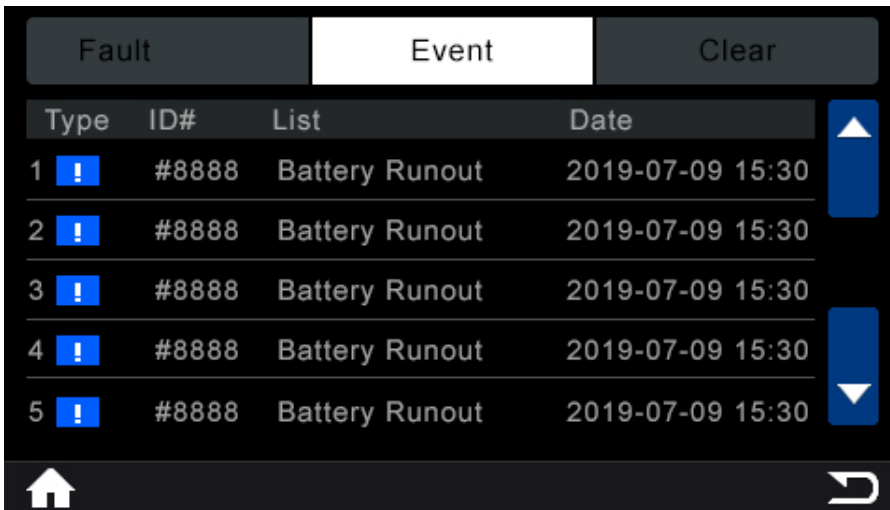
2. Select **Fault** or **Event** to view the list of occurrences.



The screenshot shows a mobile application interface with a dark background. At the top, there are three tabs: 'Fault' (selected), 'Event', and 'Clear'. Below the tabs is a table with four columns: 'Type', 'ID#', 'List', and 'Date'. The table contains five rows of data, each representing a 'Battery Runout' event. Each row starts with a red warning icon (a triangle with an exclamation mark) and the number 1 through 5. The ID# is #8888, the List is 'Battery Runout', and the Date is '2019-07-09 15:30'. At the bottom of the screen, there is a navigation bar with a home icon on the left and a refresh icon on the right.

Type	ID#	List	Date
1	#8888	Battery Runout	2019-07-09 15:30
2	#8888	Battery Runout	2019-07-09 15:30
3	#8888	Battery Runout	2019-07-09 15:30
4	#8888	Battery Runout	2019-07-09 15:30
5	#8888	Battery Runout	2019-07-09 15:30

The event or alarm list can be sorted according to the time of the occurrence. The color of the icon indicates the severity level. The maximum number of records is 100.



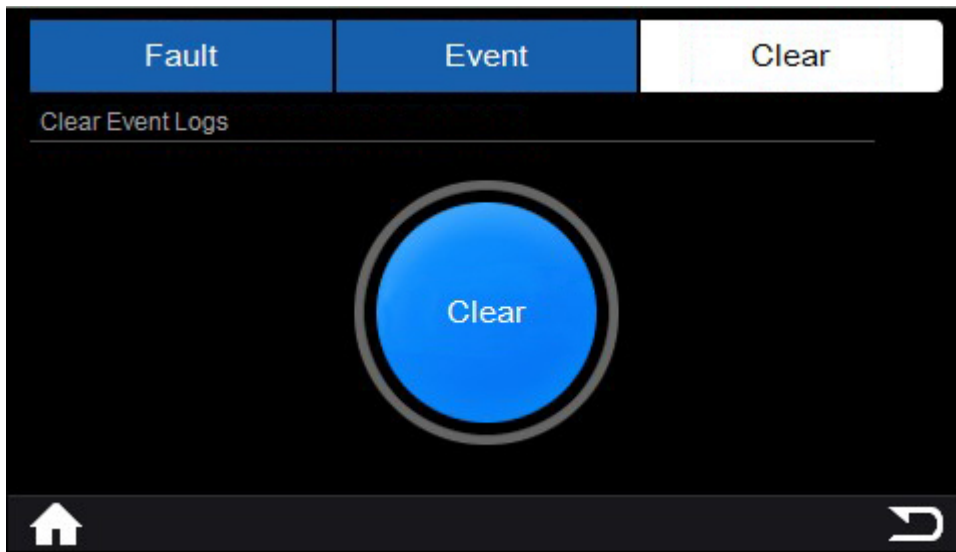
The screenshot shows the same mobile application interface as the previous one, but with the 'Event' tab selected. The table content is identical, showing five 'Battery Runout' events. On the right side of the table, there are two blue vertical buttons with white arrows: an upward-pointing arrow above the first two rows and a downward-pointing arrow below the last two rows, indicating that the list is scrollable. The navigation bar at the bottom remains the same.

Type	ID#	List	Date
1	#8888	Battery Runout	2019-07-09 15:30
2	#8888	Battery Runout	2019-07-09 15:30
3	#8888	Battery Runout	2019-07-09 15:30
4	#8888	Battery Runout	2019-07-09 15:30
5	#8888	Battery Runout	2019-07-09 15:30

3. To clear the records, select **Clear**.

4. Select **Clear** to clear all records.

*NOTE: Use the Clear function carefully.*

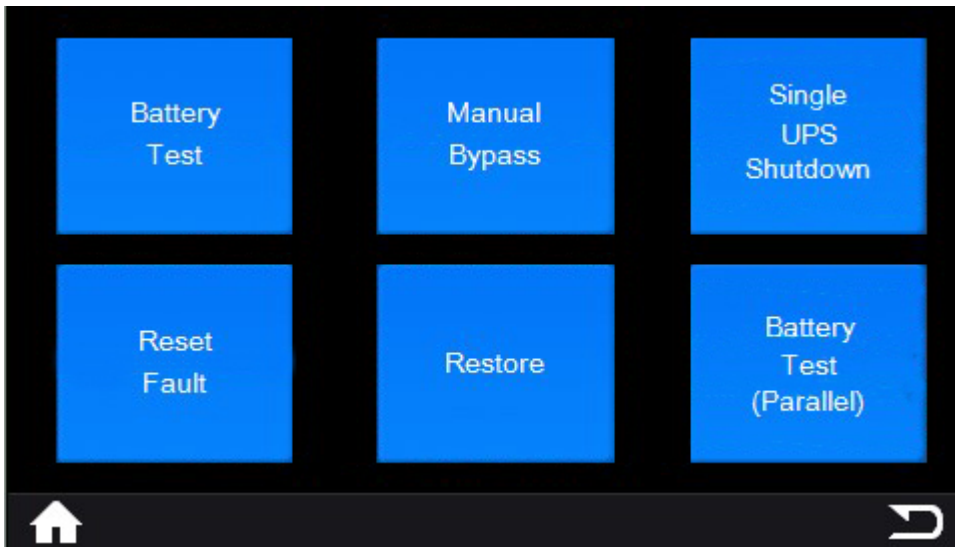


### 7.2.7 System control

1. Select **Control** on the **Menu** page to enter the Control page.



2. Enter your password when prompted. Refer to *Section 7.3 Signing in*.  
The control page opens.



3. Select the function by tapping.  
In a parallel system, there are six different types of control functions. In a single system, there are four control functions.

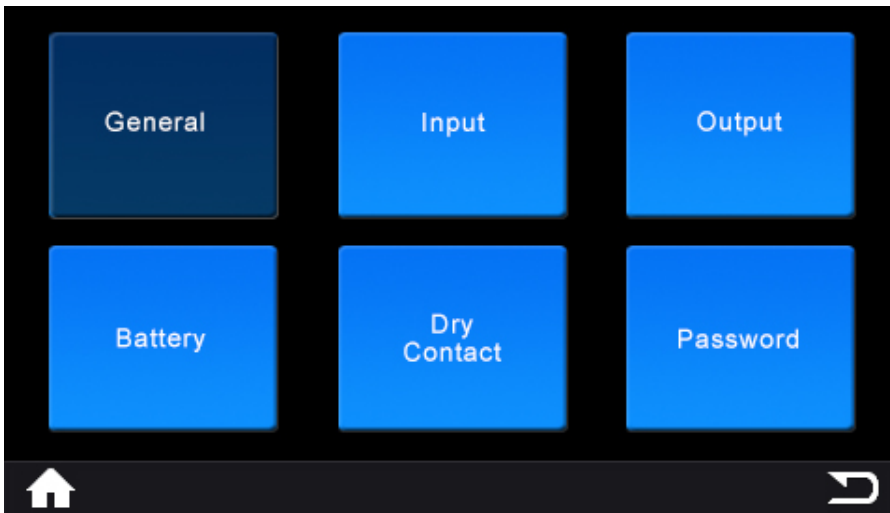
**Table 38. UPS control functions**

Control function	Description
Battery Test	Control the UPS for a manual battery test.
Manual Bypass	Manually force the UPS to enter or exit Bypass mode when conditions permit.
Single UPS Shutdown	Control the shutdown of this UPS, exit the parallel system.
Reset Fault	When the UPS is in Fault mode and there are alarms, cancel the fault and stop the alarm.
Restore	All settings of the control UPS are restored to the default factory settings. This function can only be executed in Bypass mode.
Battery Test (Parallel)	Control all UPSs for a manual battery test in a parallel system.

## 7.2.8 Settings

1. On the **Menu** page, select **Setting** to access the setting page.

2. Enter your password when prompted. Refer to *Section 7.3 Signing in*.  
The setting page opens.



3. Edit the settings as necessary, refer to *Table 39: Settings*.

**Table 39. Settings**

Subsetting	Setting item	Setting content	Default setting
General	Audible Alarm	[Enabled] [Disable]	[Enabled]
	Language	[English] [Français] [Deutsch] [Español] [Português] [Italiano] [Русский]	[English]
	Date/Time	YYYY-MM-DD HH:MM:SS	YYYY-MM-DD HH:MM:SS
	LCD Brightness	[0,100 %]	[100 %]
	LCD Saving Mode	[Enabled] [Disable]	[Enabled]
	Screen Rotation	[Auto Rotate] [Horizontal] [Vertical]	[Horizontal]
Input	Site Wiring Fault	[Enabled] [Disable]	[Disable]
	Bypass Voltage Lower Limit	xxx V (≥ 110 V)	176 V

Subsetting	Setting item	Setting content	Default setting
	Bypass Voltage High Limit	xxx V ( $\leq$ 276 V)	264 V
	Bypass Frequency Range	[5 %, 10 %]	[10 %]
	HE Voltage Low Limit	xxx V ( $\geq$ 110 V)	198 V
	HE Voltage High Limit	xxx V ( $\leq$ 276 V)	242 V
	HE Frequency range	[5 %, 10 %]	[5 %]
Output	UPS Mode	[Line mode] [High Efficiency mode] [CVCF Mode]	[Line mode]
	Output Voltage	[220 V] [230 V] [240 V]	[220 V]
	Output Frequency	[Auto Detection] [50 Hz] [60 Hz]	[Auto Detection]
	ESS Function	[Enabled] [Disable]	[Disable]
	Auto Bypass	[Enabled] [Disable]	[Enabled]
	Auto Restart	[Enabled] [Disable]	[Enabled]
	Clear SC Fault	[Enabled] [Disable]	[Disable]
	Overload Prealarm	[50 %, 105 %]	[105 %]
	Outlet Group 2	[Always On], [Priority Shutdown]	[Always On],
Battery	DC Start	[Enabled] [Disable]	[Enabled]
	Battery Auto Test	[Every ABM Cycle] [ Disable]	[Every ABM Cycle]
	Deep Discharge protection	[Enabled] [Disable]	[Enabled]
	Sleep mode	[Enabled] [Disable]	[Disable]

Subsetting	Setting item	Setting content	Default setting
	Low Bat Warning	[0 %, 100 %]	[0 %]
	Low Remind Time Warning	[0.59940 min]	[180 s]
	Restart Battery Level	[0 %, 100 %]	[0 %]
	Charge Current	[1 A – 13 A] To connect the external battery, refer to Step 4.	[2 A]
	External Battery Module	[Auto Detection] [Manual EBM Set] [Manual AH Set] [No Battery]	[Manual EBM Set]
Dry In/ Out	Dry In	[No Function] [Start UPS] [Remote Shut Down] [Maintenance Bypass]	[No Function]
	Dry Out	[Load Powered] [On Bat] [Low Bat] [No Battery] [Bypass] [UPS]	[Load Powered]
	Modbus Address	[1–255]	[1]
Password	Control Menu Password	[Enabled] [Disable]	[Enabled]
	Setting Menu Password	[Enabled] [Disable]	[Enabled]
	Change Password	****	

4. To connect the external battery, refer to *Tables 40: EBM charge current setting* and *41: Self-configured battery charge current setting* to set the charge current and the Ah value.

**Table 40. EBM charge current setting**

EBM string number	Battery number/Ah	Total Ah	Setting charge current [A]
1	1 x 2 x 20 / 9 Ah	9	1.8
2	2 x 2 x 20 / 9 Ah	18	3.6
3	3 x 2 x 20 / 9 Ah	27	5.4
4	4 x 2 x 20 / 9 Ah	36	7.2
5	5 x 2 x 20 / 9 Ah	45	9.0
6	6 x 2 x 20 / 9 Ah	54	10.8
1 string = 2 EBMs			

**Table 41. Self-configured battery charge current setting**

Battery Unit [Ah]	Battery number	Total Ah	Setting charge current [A]
18	2 x 20	18	4
26	2 x 20	26	6
38	2 x 20	38	8
65	2 x 20	65	13
100	2 x 20	100	13
120	2 x 20	120	13
150	2 x 20	150	13
200	2 x 20	200	13

## 7.3 Signing in

If the password is enabled in the UPS, you need to sign in when you enter the setting or control pages. The password protection is enabled by default.

If you enter the password incorrectly for three consecutive times within five minutes, the LCD switches back to the main page. Control and setting is locked for five minutes. Operation is not possible during this time.

If you want to cancel the password protection, go to **Setting**→**Password**.

## 7.4 System control instructions

### 7.4.1 UPS startup preparation



#### WARNING

Before you start up the UPS, make sure that the wiring is securely connected to the terminal block, otherwise there is a risk of electric shock.

Before startup:

- Make sure that the total UPS output load does not exceed the rated capacity of the UPS.
- Make sure that the wiring of the UPS input and output is correctly connected according to the required configuration. For the wiring configurations, refer to the User's and Installation Guide.
- Make sure that the UPS output device is not started.
- Make sure that the UPS is reliably connected to the battery.
- Connect the communication interfaces that need to be used.

### 7.4.2 Starting the UPS in Power-on mode (default mode)

1. Connect the UPS to the utility power.
  - The fan starts to rotate. The LCD displays the Eaton startup animation and enters the main page.
  - By default, Auto Bypass is enabled. As a result, the UPS transfers automatically to Bypass mode, and the system status displayed on the main page is *Bypass mode*.

#### NOTE:

If you want to cancel the **Bypass enable**, select **Setting**→**Output**→**Auto Bypass**.

- The default input/output configuration is three-input and three-out. If it is inconsistent with the actual wiring configuration, it must be changed to the actual wiring configuration.

**NOTE:** Changing the input/output configuration must be carried out by an authorized Eaton Customer Service Engineer or by other qualified service personnel authorized by Eaton.

2. Press the power button for more than one second.
  - The buzzer beeps and the UPS starts up. After a few seconds, the UPS enters Line mode.
  - If the utility power is abnormal, the UPS transfers to Battery mode. If the battery is not connected, the UPS can still start up. After the startup, an alarm is triggered due to a disconnected battery. If the utility power is abnormal, the UPS load is not protected.
  - The load is powered by the UPS and the LCD displays a charging sign indicating that the battery is charging.
3. Start up the output device.

### 7.4.3 Starting the UPS on battery (without utility power)

**NOTE:** When the UPS is connected to the battery, wait a minimum of 10 seconds before you press the power button.

The battery can be turned on or disabled. For details, refer to *Section 7.2.8 Settings*.

Make sure that all connections are correctly configured.

To start the UPS:

- Press the power button for more than one second. The fan starts to rotate and the LCD displays the start-up animation and enters the main page. *Standby mode* is displayed.
- If there is no operation, the LCD turns off after 10 seconds and the UPS is powered down.
- Press the power button for more than one second. As a result, the buzzer beeps and the UPS starts up. The UPS enters Battery mode after a few seconds.
- If the utility power is connected, the UPS transfers to Line mode and the output is uninterrupted.
- The UPS operates in Battery mode and the buzzer beeps for four seconds to remind that the battery is discharged. To clear the alarm, refer to *Section 7.2.8 Settings*.
- Since there is no utility power input, the input abnormal alarm is displayed on the LCD.

#### 7.4.4 Transfer from Power-on mode to Bypass mode

If Auto Bypass is enabled, the UPS transfers automatically to Bypass mode after startup, and the system status displayed on the main page is *Bypass mode*.

#### 7.4.5 Transfer from Bypass mode to Line mode

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

1. Make sure that the UPS is connected to the utility power.
2. Press the UPS power button for more than one second.

To transfer from Bypass mode to Line mode remotely, use the Gigabit Network Card or Industrial Gateway Card. For more information on the intelligent cards, refer to *Section 6.5 Intelligent cards*.

As a result, the system operates in Line mode, and the system status displayed is *Line mode*.

#### 7.4.6 Transfer from Bypass mode to Battery mode

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

1. Make sure that the UPS is connected to the battery.
2. Press the UPS power button for more than one second.

To transfer from Bypass mode to Battery mode remotely, use the Gigabit Network Card or Industrial Gateway Card. For more information on the intelligent cards, refer to *Section 6.5 Intelligent cards*.

As a result, the system operates in Line mode, and the system status displayed is *Line mode*.

#### 7.4.7 Transfer from Bypass mode to Shutdown mode

If the utility input becomes unavailable, the UPS shuts down automatically after 10 seconds.

#### 7.4.8 Transfer from Line mode to Bypass mode

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

1. Press the UPS power button for more than one second.  
A confirmation page appears.
2. To transfer the UPS to Bypass mode, select *Yes*. To cancel the process, select *No*.

To transfer the UPS to Bypass mode remotely, use the Gigabit Network Card or Industrial Gateway Card. For more information on the intelligent cards, refer to *Section 6.5 Intelligent cards*.

As a result, the system operates in Bypass mode, and the system status displayed is *Bypass mode*.

### 7.4.9 Transfer from Line mode to Battery mode

If the utility power is interrupted or any abnormal condition is detected in the utility, the UPS transfers automatically to Battery mode.

### 7.4.10 Transfer from Line mode to Battery test mode

Complete the following steps to transfer the load from Line mode to Battery test mode.

1. Go to **Menu**→**Control**.
2. Select **Battery Test** or **Battery Test (Parallel)**.  
To transfer from Line mode to Battery test mode remotely, use the Gigabit Network Card or Industrial Gateway Card. For more information on the intelligent cards, refer to *Section 6.5 Intelligent cards*.

After the battery test, the load transfers automatically back to Line mode.

### 7.4.11 Transfer from Line mode to High Efficiency mode

The UPS transfers from Line mode to High Efficiency (HE) mode automatically if the following conditions are met.

1. The UPS mode is HE mode. To change the mode, go to **Menu**→**Setting**→**Output**.
2. In Line mode, the HE mode voltage is within the specified limits for 10 seconds.

### 7.4.12 Transfer from Battery mode to Bypass mode

**NOTE:** In Battery mode, if the battery capacity or voltage is low, the UPS transfers automatically to Bypass mode.

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

1. Press the UPS power button for more than one second.  
A confirmation page appears.
2. To transfer the UPS to Bypass mode, select **Yes**. To cancel the process, select **No**.  
To transfer the UPS to Bypass mode remotely, use the Gigabit Network Card or Industrial Gateway Card. For more information on the intelligent cards, refer to *Section 6.5 Intelligent cards*.  
As a result, the system operates in Bypass mode, and the system status displayed is **Bypass mode**.

### 7.4.13 Transfer from Battery mode to Line mode

The UPS transfers automatically to Line mode when utility power becomes available.

### 7.4.14 Transfer from Battery test mode to Line mode

The UPS transfers from Battery test mode to Line mode if at least one of the following conditions is met.

- Battery test is completed or canceled.
- Battery voltage is low.
- There is a UPS overload.
- There is a charger fault.

### 7.4.15 Transfer from Battery test mode to Battery mode

During a battery test, the UPS transfers automatically to Battery mode when utility power becomes unavailable.



### 7.4.16 Transfer from High Efficiency mode to Bypass mode

Complete the following steps to transfer the load from High Efficiency mode to Bypass mode.

1. Press the UPS power button for more than one second.  
A confirmation page appears.
2. To transfer the UPS to Bypass mode, select **Yes**. To cancel the process, select **No**.  
To transfer the UPS to Bypass mode remotely, use the Gigabit Network Card or Industrial Gateway Card. For more information on the intelligent cards, refer to *Section 6.5 Intelligent cards*.

As a result, the system operates in Bypass mode, and the system status displayed is **Bypass mode**.

### 7.4.17 Transfer from High Efficiency mode to Line mode

The UPS transfers from High Efficiency mode to Line mode if the following conditions are met.

- The battery test is active.
- The utility power is within the specified Line mode voltage and frequency limits, but not within the specified HE mode voltage and frequency limits.

### 7.4.18 Transfer from High Efficiency mode to Battery mode

The UPS transfers from High Efficiency mode to Bypass mode automatically when utility power becomes unavailable.

### 7.4.19 Transfer from Fault mode to Bypass mode

The UPS transfers from Fault mode to Bypass mode if the following conditions are met.

- The fault is resolved or it disappears.
- The fault is cancelled. To cancel a fault, go to **Menu**→**Control**→**Reset Fault**.

### 7.4.20 Transfer from Fault mode to Shutdown mode

The UPS transfers from Fault mode to Shutdown mode when utility power is unavailable and the battery voltage is low.

### 7.4.21 Transfer from any mode to Fault mode

The UPS transfers to Fault mode automatically if the UPS is not operating correctly.

All active faults are displayed on the main page and on the **History** page.

### 7.4.22 UPS shutdown

1. To shut down the UPS, press the UPS power button for more than three seconds.  
A shutdown confirmation page opens on the display.
2. Tap **Confirm** to confirm the shutdown.



#### WARNING

The load is energized even when the UPS is shut down.

### 3. After the shutdown:

- If the UPS is connected to the utility power, the UPS operates in Bypass mode and the output stays powered.
  - If there is no need for the UPS output, disconnect the input utility power.
- In Battery mode, the UPS output is interrupted and the UPS transfers to Standby mode. After a few seconds, the UPS shuts down automatically.

## 7.4.23 UPS functions

### Operating modes

Operating mode	Break time [ms]	Output frequency	PF correction
Line mode	0	Follow the input within the allowed range	Yes
High Efficiency mode	10	Fully follow the input	No
ESS mode	2	Fully follow the input	No
CVCF mode	0	Fixed 50 Hz/60 Hz	Yes

### Automatically restart/Restart battery

If the battery is exhausted when the utility power is restored, the UPS enters Bypass mode and charges the battery. When the automatic restart function is enabled and the battery reaches the set restart battery power, the UPS automatically restarts.

If the restart battery is set to 0 % when the utility power is restored, the UPS automatically restarts.

### Short fault clearance function

If the Short fault clearance function is turned off during an output short circuit, the UPS enters Fault mode after 200 ms. The output is powered off until the short fault is confirmed.

If the Short fault clearance function is turned on, after 200 ms, the UPS keeps the rated current output for 10 seconds. If the short fault is cleared within 10 seconds, the UPS automatically returns to a normal operating mode, otherwise it enters Fault mode. If the UPS supplies power to multiple loads, this function can be turned on, and the fuse can be blown through the 10-second high-current output under a single-load short to ensure the power supply of other loads as soon as possible.

### Overload warning function

The UPS raises an alarm after exceeding 105 % of the rated power. However, when there are special requirements, the value can be reset. When the UPS load exceeds the set value, the UPS raises an alarm to remind the user to confirm whether there is abnormal power in the system.

### Battery deep discharge protection

When the Battery deep discharge protection is turned off, the battery low voltage warning point is set at 10.5 V/battery, and the battery discharge end point is set at 9.6 V/battery. When this function is turned on, the UPS will automatically calculate the actual discharge power and the actual EBM number of the battery (or the actual Ah number). Flexible adjustment of low-voltage warning points and discharge end points help to achieve deep battery discharge protection.

## Sleep mode

When Sleep mode is turned on, after the utility power is off in Bypass mode, the UPS does not shut down immediately but remains in Sleep mode for 60 minutes. During this process the communication, display, and other functions operate normally. When the UPS is used in an unattended or remote control scenario, it is recommended to set this mode on to enable remote operation without manual power-on.

### 7.4.24 Parallel UPS operations

General operation must obey the single UPS operation requirements.

#### 7.4.24.1 Parallel UPS startup

To start a parallel UPS system, complete one of the following steps.

1. To start a parallel UPS system connected to the utility power.
  - a. Press the power button of the master UPS (UPS 1) in the parallel system for more than one second.

As a result, all the UPSs in the system start at the same time and, then, transfer to the inverter mode.
  - b. If one of the UPSs in the parallel system is started to the inverter mode, the other UPSs stay connected to the utility power and transfer to the inverter mode automatically once they are started.
2. To start a parallel UPS system on battery power.
  - a. Press each UPS power button to establish the working power. Then, press any of the UPS power buttons for more than one second.

As a result, all the UPSs in the system start at the same time and transfer to Battery mode.
  - b. If one of the UPSs in the system is started to the inverter mode, press the UPS power button to establish the working power to the other UPSs. As a result, the other UPSs transfer automatically to the inverter mode.

#### 7.4.24.2 Parallel UPS shutdown

To shut down a single UPS, refer to *Section 7.4.22 UPS shutdown*.

To shut down a single UPS in a parallel system, refer to *Section 7.2.7 System control*.

To shut down a parallel UPS system, press the master UPS (UPS 1) power button for more than three seconds. As a result, all UPSs of the parallel system transfer to Bypass mode.

#### 7.4.24.3 Parallel UPS battery sharing

In a parallel UPS system, the UPSs can be set to the battery sharing mode. In the battery sharing mode, the UPSs are connected in parallel and use the same battery.



#### CAUTION

Only qualified service personnel are allowed to do installation and service work on batteries. Contact your local service representative for service.

**NOTE:**

In the battery sharing mode, make sure that the battery capacity meets all the parallel UPS full load requirements:

- When two UPSs in a parallel system are in the battery sharing mode, the battery > 18 Ah.
- When three UPSs in parallel system are in the battery sharing mode, the battery > 27 Ah.

If the battery capacity does not meet the above requirements, contact your local service representative to reduce the UPS load.

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

A UPS emergency power-off is initiated by the EPO push-button. In case of an emergency, you can use this push-button to control the UPS output. The EPO push-button de-energizes the critical load and powers down the UPS immediately without asking for verification. The UPS, including the static bypass switch, remains off until it is restarted.



### CAUTION

When the EPO push-button is activated, all power to the critical load is lost. Use this feature only in case of emergency.

**NOTE:** The following instructions are for the EPO push-button supplied by Eaton Corporation. If you are using a customer-supplied EPO 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 EPO push-button:

1. Press the EPO push-button.

As a result, the UPS performs an emergency shutdown, the red warning LED light goes on, the output is cut off, and the UPS transfers to Fault mode.



### WARNING

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

2. To return to normal operation after EPO, release the EPO push-button.
3. On the control panel, go to **Menu**→**Control** and select **Reset Fault**.  
As a result, the UPS transfer to Bypass mode.
4. To restart the UPS and continue normal operation, transfer the UPS to Line mode. For the instructions, refer to *Section 7.4.5 Transfer from Bypass mode to Line mode*.

# 8 UPS maintenance

## 8.1 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

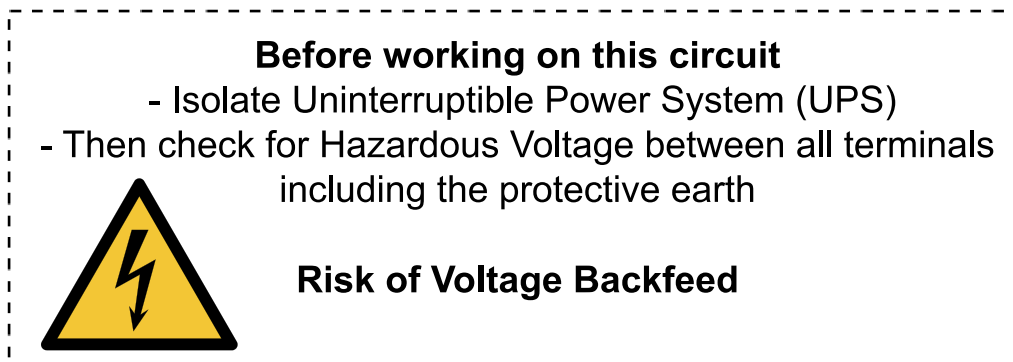
All service and maintenance work must be done only by service personnel qualified and authorized by Eaton.



### CAUTION

A warning label, shown in Figure 70: *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 70. 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.

## 8.2 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.

## 8.3 Battery maintenance



## CAUTION

Only authorized personnel are allowed to replace or do maintenance on the batteries. Contact your local service representative for battery maintenance.

The battery is an important part of the UPS system. Battery service life depends on the ambient temperature and the number of discharges. High temperatures and deep discharging decrease battery service life.

The UPS module does not contain a battery. It is recommended to use the standard EBM in this product series.

Obey the following precautions:

1. The battery is a sealed maintenance-free lead-acid battery. Connect the battery to the UPS and utility power. The battery is always charged regardless of whether the UPS is on or off. The UPS provides the overcharge and over-discharge protection function.
2. Battery ambient temperature should be maintained between 15 °C and 25 °C.

3. If the battery is not used for a long time, it is recommended to charge it every three months.
4. Under normal conditions of use, the battery is charged and discharged once every four to six months, and discharged to the battery after shutdown. When used in high-temperature environments, the battery is charged and discharged once every two months.
5. The continuous discharge time of the battery should not exceed 14 hours. Do not discharge at no load.
6. It is not recommended to replace individual batteries. Obey the instructions of the battery supplier when replacing batteries. Obey the principle of consistent quantity and consistent model.
7. Under normal conditions of use, battery service life is three to five years. If the battery is unserviceable, it must be replaced immediately. The battery must be replaced by qualified service personnel authorized by Eaton.

## 8.4 Recycling the used UPS or batteries



### WARNING

HIGH VOLTAGES.

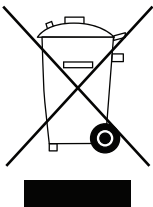
Only authorized personnel are allowed to do battery replacement. Contact your local service representative for battery replacement.

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

Do not discard waste from 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.

The following symbols indicate a product requiring special handling:

**Figure 71. WEEE symbol**



**Figure 72. Recycling batteries symbol**





## 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.

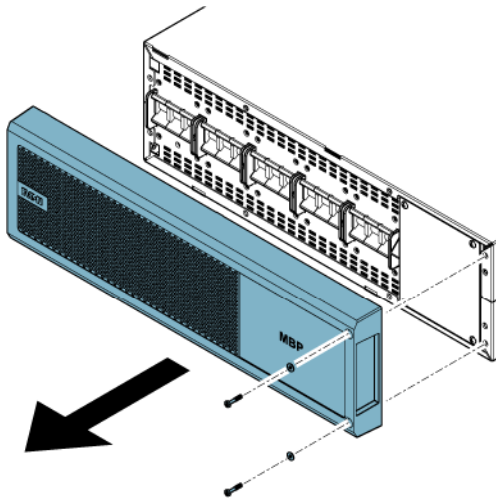
Do not discard unwanted batteries or battery materials in the public waste disposal system. Obey all applicable local regulations regarding the storage, handling, and disposal of batteries and battery materials.

## 8.5 UPS maintenance

To do maintenance on the UPS, complete the following steps to transfer the UPS from a normal operating mode to Maintenance Bypass mode.

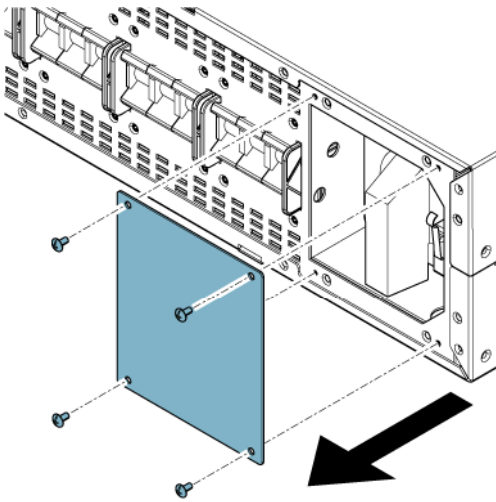
*NOTE:* If you configured an MBP, the load can be bypassed during maintenance. If you did not configure an MBP, the load must be down during maintenance.

1. Remove the screws from the front panel of the MBP and remove the front panel.

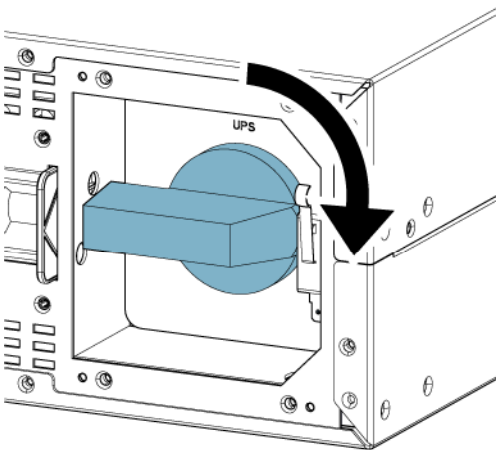




2. Remove the screws from the cover plate of the maintenance bypass switch (MBS). Then, remove the cover plate.



3. Complete one of the following steps.
- In case of MBP20KI or MBP20KIPDU, turn the handle of the MBS to the bypass position.
  - In case of MBP20KIPARA, turn the handle of the MBS to the maintenance position.  
As a result, the UPS transfers to Standby mode.



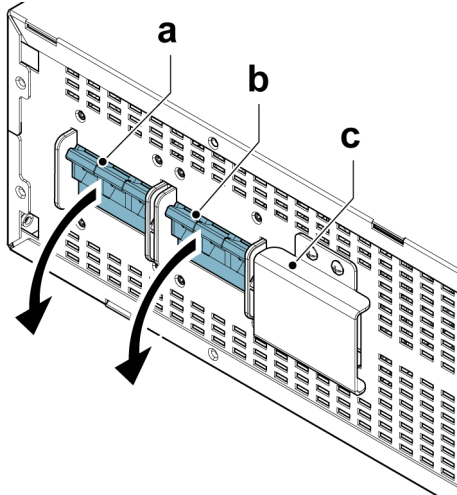
4. Complete one of the following steps.

- In case of MBP20KI or MBP20KIPDU, turn the input and bypass switches of the MBP to the OFF position.
- In case of MBP20KIPARA, turn the two input switches and the two bypass switches of the MBP to the OFF position.

Turn the switches to the OFF position in the following order:

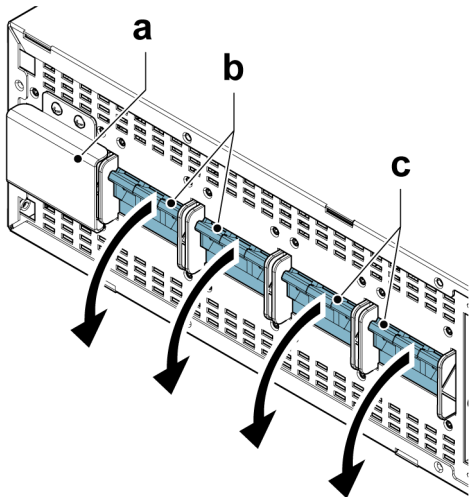
- a. UPS input switch or switches
- b. UPS bypass switch or switches

**Figure 73. Input, bypass, and neutral switches in the MBP20KI and the MBP20KIPDU**



- a Input switch
- b Bypass switch
- c Neutral switch

Figure 74. Input, bypass, and neutral switches in the MBP20KIPARA



- a Neutral switch
- b Input switches
- c Bypass switches

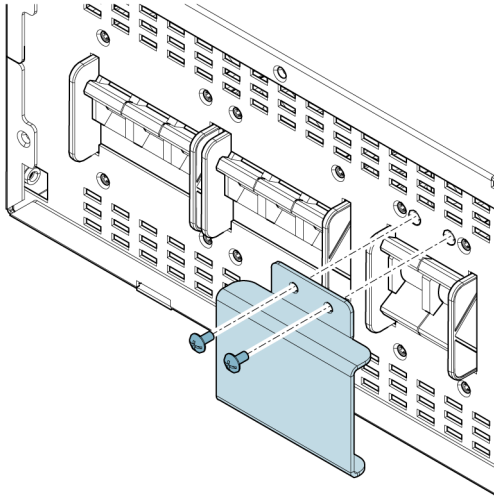


#### CAUTION

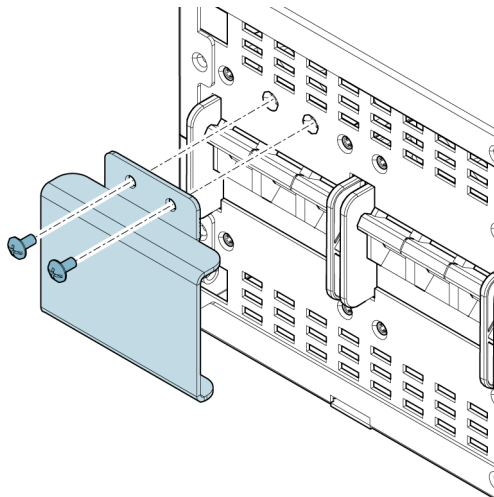
Make sure that you turned the maintenance bypass switch (MBS) to the bypass or maintenance position before you turn the neutral switch to the OFF position. If you turn the neutral switch to the OFF position before you turn the MBS to the bypass or maintenance position, it may cause damage to the load.

5. Remove the screws from the cover plate of the neutral switch. Then, remove the cover plate.

**Figure 75. Removing the cover plate of the neutral switch, MBP20KI and MBP20KIPDU**



**Figure 76. Removing the cover plate of the neutral switch, MBP20KIPARA**



6. Turn the neutral switch to the OFF position.
7. Disconnect all EBMs from the UPS and make sure that the UPS is completely off.

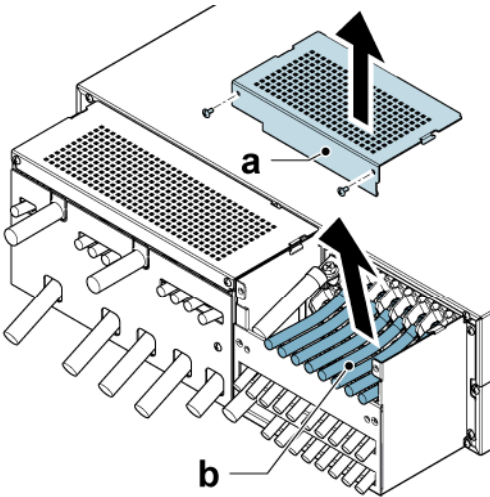
8. To remove the wiring between the MBP and the UPS:
  - a. Remove the screws from the top cover of the UPS ports in the MBP. Then, remove the top cover.



#### WARNING

Remove only the top cover of the UPS ports in the MBP.  
Do not remove the cover of the AC input/AC segment to avoid electric shock.

- b. Remove all the wiring between the MBP and the UPS.



9. Remove the UPS for maintenance.



#### WARNING

During the maintenance of the UPS, install the front panel to the MBP again to protect the maintenance bypass switch (MBS) from unexpected operation and to reduce the risk of electric shock.

10. After you did maintenance on the UPS, reconnect all the wiring between the MBP and the UPS.
11. Install the top cover of the UPS ports in the MBP.
12. To reconnect the EBMs to the UPS, refer to *Section 5.4 External battery module (EBM) wiring*.
13. To start the UPS, press the UPS power button.

After the start-up, the UPS transfers to Line mode.
14. Turn the neutral switch to the ON position.
15. Install the cover plate of the neutral switch.
16. Turn the bypass and input switches to the ON position in the following order:
  - a. UPS bypass switch or switches
  - b. UPS input switch or switches
17. Make sure that the UPS output is operating correctly. In case of a parallel UPS system, make sure that the outputs of both UPS 1 and UPS 2 are operating correctly.
18. Turn the handle of the MBS to the UPS position.
19. Install the cover plate of the MBS.
20. Install the front panel of the MBP.

## 8.6 Maintenance training

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

# 9 Troubleshooting

## 9.1 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

## 9.2 Alarms

Table 42. UPS alarms and faults

Alarm number	Alarm name	Possible cause	Solution
00E	Parallel line loss	The parallel connection is not operating correctly.	Make sure that the parallel connection is operating correctly.
00F	Parallel inconsistent	The parallel setting is inconsistent.	Examine the parallel setting. If the UPS still alarms, contact your local service representative.
004	Ambient temperature high	The ambient temperature is high.	Examine whether the ambient temperature exceeds 50 °C. If the ambient temperature is within the acceptable limits, but the UPS still alarms, contact your local service representative.
007	Internal fan fault	The fan is not operating correctly.	Contact your local service representative.
01B	Para. Male Cable Lost	The male cable connection is lost.	Examine the male cable connection of the parallel line.
01C	Para. Female Cable Lost	The female cable connection is lost.	Examine the female cable connection of the parallel line.
08B	Output Volt Unbalance	The output is unbalanced.	Contact your local service representative.
010	Main SPS fault	The internal power supply of the UPS is not operating correctly.	Contact your local service representative.
012	Bat In Different	The battery connection is different in the parallel mode.	Examine the battery connection.

Alarm number	Alarm name	Possible cause	Solution
017	Auxiliary SPS fault	The internal power supply of the UPS is not operating correctly.	Contact your local service representative.
018	Line In Different	The AC input is different in the parallel mode.	Examine the AC input.
019	Bypass In Different	The bypass connection is different in the parallel mode.	Examine the bypass connection.
10A	Line Volt Unbalance	The line voltage is unbalanced.	Contact your local service representative.
20D	By Wire Config Fail	Detection of bypass phase wiring is not compatible with the UPS setting.	Contact your local service representative.
20E	Bypass fan fault	The fan is not operating correctly.	Contact your local service representative.
20F	By Volt Unbalance	The bypass voltage is unbalanced.	Contact your local service representative.
63F	Positive battery is not connected	The battery is not connected.	Examine the battery and the battery cable. If the battery is damaged, it must be replaced immediately by qualified service personnel.
70C	Inverter voltage low	The inverter voltage is low.	Stop the UPS, remove all loads, and make sure that the load is not defective or short-circuit. Press the button to clear the alarm and restart. If this fails, contact your local service representative.
70D	Inverter voltage high	The inverter voltage is high.	
80D	Working mode fault	There is a working mode setting error.	Contact your local service representative.
80E	Power Overload Prealarm	There is an active power overload pre-alarm.	Reduce load power.
81F	L1 Overload Prealarm	There is an active L1 overload pre-alarm (R Phase).	Reduce L1 phase load power.
100	Bus soft start failed	Bus boost failure	Contact your local service representative.
106	Line Volt Loss	There is no line voltage.	Contact your local service representative.



Alarm number	Alarm name	Possible cause	Solution
107	Input Line Reversed	The Input L/N line is reversed.	Make sure that the input connection operates correctly.
		There is no ground connection.	Make sure that there is a ground connection.
120	N line loss	The N line is not connected.	Make sure that the N line connection operates correctly.
123	Line Wire Wrong	The AC phase number is incorrect. 1- or 2-phase loss on the 3-phase AC input.	Examine the AC input phase number and the AC cable connection.
124	Line Rotation Wrong	There is a phase rotation fault on the 3-phase input UPS, which could cause a failure in the UPS at transfer.	Examine the AC cable connection.
203	Bypass temperature high	Internal over temperature	Contact your local service representative.
207	Byb Device Fault	Bypass internal failure (relay stick, backfeed)	Contact your local service representative.
208	Bypass overload fault	The load exceeds the rated value.	Redistribute the load, remove the non-critical load, and make sure that the load is not defective.
211	Byb Wire Wrong	The bypass phase number is incorrect. 1- or 2-phase loss on the 3-phase bypass input.	Examine the bypass phase number and connection.
212	Byb Rotation Wrong	There is a bypass phase rotation fault on the 3-phase output UPS, which could cause a failure in the UPS at transfer.	Examine the bypass cable connection.
300	Positive Bus high	Positive bus voltage is high.	Contact your local service representative.
301	Negative Bus high	Negative bus voltage is high.	Contact your local service representative.
302	Positive Bus low	Positive bus voltage is low.	Contact your local service representative.
303	Negative Bus low	Negative bus voltage is low.	Contact your local service representative.
304	Bus imbalance	Bus imbalance	Contact your local service representative.

Alarm number	Alarm name	Possible cause	Solution
308	Bus short	Bus short	Contact your local service representative.
501	Charger temperature high	Internal over temperature	Contact your local service representative.
607	Bad Battery	The battery does not operate correctly. The battery needs to be replaced or is defective (ABM).	Contact your local service representative.
640	Positive battery number incorrect	The number of batteries is incorrect.	Contact your local service representative.
641	Positive battery low voltage	Battery voltage is low.	Examine the battery. If the battery is damaged, it must be replaced immediately by qualified service personnel.
642	Negative battery is not connected	The battery is not connected.	Examine the battery and the battery cable. If the battery is damaged, it must be replaced immediately by qualified service personnel.
643	Negative battery number incorrect	The number of batteries is incorrect.	Contact your local service representative.
644	Negative battery low voltage	Battery voltage is low.	Examine the battery. If the battery is damaged, it must be replaced immediately by qualified service personnel.
645	Positive charger fault	The UPS charger is not operating correctly.	Contact your local service representative.
646	Positive battery overcharge	Battery voltage is high.	Examine the battery and the charger. If the battery is damaged, it must be replaced immediately by qualified service personnel.
647	Negative charger fault	The UPS charger is not operating correctly.	Contact your local service representative.
648	Negative battery overcharge	Battery voltage is high.	Examine the battery and the charger. If the battery is damaged, it must be replaced immediately by qualified service personnel.

Alarm number	Alarm name	Possible cause	Solution
704	Inverter soft start fault	Inverter startup fault	Contact your local service representative.
705	Inverter overload fault	The load exceeds the rated value	Redistribute the load, remove the non-critical load, and make sure that the load is not defective.
706	Internal heat sink temperature high	Internal over temperature	Contact your local service representative.
805	Output short	Output short	Stop the UPS, remove all loads, and make sure that the load is not defective or short-circuit. Press the button to clear the alarm and restart. If this fails, contact your local service representative.
806	Emergency shutdown	Emergency shutdown	Examine the EPO terminal status.
810	Power Overload	Power overload > 105 %	Reduce load power.
811	Negative power	N/A	Contact your local service representative.
820	L2 Overload Prealarm	There is an active L2 overload pre-alarm (S Phase).	Reduce L2 phase load power.
821	L3 Overload Prealarm	There is an active L3 overload pre-alarm (T Phase).	Reduce L3 phase load power.
822	L1 Output short	Output short	Stop the UPS, remove all loads, and make sure that the load is not defective or short-circuit. Press the button to clear the alarm and restart. If this fails, contact your local service representative.
823	L2 Output short		
824	L3 Output short		
825	LCD FW Version Incompatible	The LCD FW version is incompatible.	Contact your local service representative.
900	Maintenance Bypass	The UPS is operating in Maintenance Bypass mode and the load is unprotected.	N/A

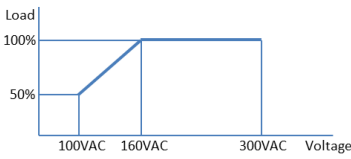
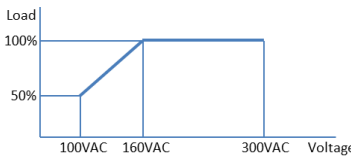
# 10 Technical data

## 10.1 About technical data

This section introduces the UPS input and output specifications, battery specifications, protective class, environmental specifications, used standards, and the dimensions and weights of the 93PX UPS.

## 10.2 Technical data

**Table 43. Technical data**

Model		93PX20KiPM	93PX15KiPM
Rated power		20 kVA/20 kW	15 kVA/15 kW
Power supply system		IT/TN/TT	
Rated frequency		50/60 Hz	
Input	Voltage range (phase voltage)	 92 VAC 30 % load	 92 VAC 40 % load
	Rated voltage (phase voltage)	220/230/240 VAC	
	Rated current	43 A (3-phase) 129 A (1- phase)	35 A (3-phase) 105 A (1-phase)
	Frequency	40–70 Hz	
Charging current		1–13 A, configurable (default 2 A)	
Output	Rated voltage (phase voltage)	220/230/240 VAC	
	Overload	105 % - 125 % load: 10 minutes transfer to Bypass 125 % - 150 % load: 30 seconds transfer to Bypass > 150 % load: 0.5 seconds transfer to Bypass	
	Output short circuit current capacity	76.6 A <sub>rms</sub> /180 ms. The maximum peak value is 110 A	
Transfer time Line <-> Battery		0 ms	
Transfer time Line <-> Bypass		0 ms	
<b>Battery</b>			

Model	93PX20KiPM	93PX15KiPM
Battery voltage	2 x 192 – 2 x 240 VDC, configurable (default 2 x 240 VDC)	
Battery number	2 x 16 – 2 x 20 pieces, configurable (default 2 x 20 pieces)	
<b>Protective class</b>		
IP rating	IP20	
Protective class	Protective class I	
Icc	10 kA	
<b>Environment</b>		
Ambient temperature range Eaton 93PX UPS and MBP	+0 °C ... +50 °C with 50 % derating above +40 °C	
Ambient temperature range Eaton 93PX EBM	+0 °C ... +40 °C	
Relative humidity	0 % - 95 % (non-condensing)	
Operating altitude	1,000 m (3,300 ft) without derating Up to 4,000 m with derating above 1,000 m	
Storage temperature range with battery	-15 °C ... +40 °C	
Storage temperature range without battery	-25 °C ... +60 °C	
<b>Directives and standards</b>		
Safety	IEC/EN 62040-1	
EMC	IEC/EN 62040-2	
Performance	IEC/EN 62040-3	

- Cable sizing is for 75 °C rated copper cables. The tightening torque is 13.3 lb-in (2.0 Nm).
- The minimum cross-section of the protective earthing conductor is 10 mm<sup>2</sup> (6 AWG).
- A total of six input/output configurations are included. The default configuration is configuration 3-3 (single feed).

**Table 44. Dimensions and weights**

Model	Part number	Size W x H x D [mm]	Net weight [kg]	Notes
93PX15KiPM	9106-52288	438 x 129 (3U) x 559*	24.8	
93PX20KiPM	9106-52289	438 x 129 (3U) x 559*	24.8	

Model	Part number	Size W x H x D [mm]	Net weight [kg]	Notes
93PXEBM480	9000-00461	438 x 129 (3U) x 559*	60.5 (121)	There are two EBMs per package. Both EBMs include 20 pieces of 9 Ah batteries.
MBP20KI	9001-2048	438 x 129 (3U) x 465	12.8	Single UPS MBP
MBP20KIPDU	9001-2049	438 x 129 (3U) x 465	13.6	Single UPS MBP
MBP20KIPARA	9001-2050	438 x 129 (3U) x 465	19.9	Parallel UPS MBP

\* ) Dimension D (559 mm) does not include the front panel.

# 11 Warranty

## 11.1 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.

## 11.2 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)

# Index

1+1 parallel MBP (standard version) wiring		
Configuration 1-1 (dual feed) .....	91	
Configuration 1-1 (single feed) .....	89	
Configuration 3-1 (dual feed) .....	87	
Configuration 3-1 (single feed) .....	85	
Configuration 3-3 (dual feed) .....	83	
Configuration 3-3 (single feed, default MBP wiring configuration) .....	81	
<b>A</b>		
About UPS system installation .....	38	
<b>C</b>		
Communication ports		
Computer ports .....	93	
Dry in and Dry out .....	94	
Emergency Power-Off (EPO) .....	93	
Intelligent cards .....	96	
Modbus/BMS port and DIP switch .....	95	
<b>E</b>		
EBM module installation		
Rack installation .....	33	
Tower installation .....	34	
<b>G</b>		
Glossary .....	9	
<b>I</b>		
Installation of parallel UPS		
MBP20KIPARA wiring .....	77	
Parallel system installation .....	68	
Parallel UPS installation .....	35	
Parallel UPS wiring .....	73	
Parallel UPS wiring with common battery .....	76	
Introduction to Eaton UPS		
About the Eaton UPS .....	17	
Looking inside the UPS system .....	18	
UPS features .....	24	
<b>L</b>		
Looking inside the UPS system		
UPS operating modes .....	22	
<b>M</b>		
MBP module installation		
Rack installation .....	34	
Tower installation .....	35	
Mechanical installation		
EBM installation .....	33	
MBP installation .....	34	
UPS installation .....	29	
<b>O</b>		
Operation		
Settings .....	109	
Operation interface		
Control panel .....	98	
Operation		
System control .....	108	
View or clear UPS history .....	106	
View UPS real-time parameters .....	104	
System control instructions .....	114	
Touch screen .....	99	
Guide page .....	100	
Main page and pop-up page .....	102	
Menu page .....	103	
<b>P</b>		
Parallel UPS operations		
Parallel UPS shutdown .....	119	
Parallel UPS startup .....	119	
<b>S</b>		
Safety		
Personnel safety .....	13	
Safety-related signs .....	7	
Safety instructions .....	11	
Audience .....	13	
CE marking .....	14	
Environment .....	14	
For more information .....	15	
Symbols on the UPS and accessories .....	15	
User precautions .....	14	
Single MBP (standard version) wiring		
Configuration 1-1 (dual feed) .....	64	
Configuration 1-1 (single feed) .....	63	
Configuration 3-1 (dual feed) .....	62	
Configuration 3-1 (single feed) .....	61	
Configuration 3-3 (dual feed) .....	60	
Configuration 3-3 (single feed, default MBP wiring configuration) .....	59	
Single UPS MBP wiring		
MBP20KI wiring .....	65	
MBP20KIPDU wiring .....	56	
System control functions		
Transfer from Fault mode to Shutdown mode .....	117	
System control instructions		
Parallel UPS operations .....	119	
Transfer from any mode to Fault mode .....	117	
Transfer from Battery mode to Bypass mode .....	116	
Transfer from Battery mode to Line mode .....	116	



Transfer from Battery test mode to Battery mode .....	116
Transfer from Battery test mode to Line mode .....	116
Transfer from Bypass mode to Battery mode .....	115
Transfer from Bypass mode to Line mode....	115
Transfer from Bypass mode to Shutdown mode .....	115
Transfer from Fault mode to Bypass mode ..	117
Transfer from High Efficiency mode to Battery mode .....	117
Transfer from High Efficiency mode to Bypass mode .....	117
Transfer from High Efficiency mode to Line mode .....	117
Transfer from Line mode to Battery mode ....	116
Transfer from Line mode to Battery test mode .....	116
Transfer from Line mode to Bypass mode....	115
Transfer from Line mode to High Efficiency mode .....	116
Transfer from Power-on mode to Bypass mode .....	115

## T

Technical data .....	136
About technical data .....	136
Troubleshooting	
About troubleshooting .....	131
Alarms .....	131

## U

UPS cables and connectors	
UPS cables and connectors for CE .....	39
UPS cables and connectors for UL.....	41
UPS features	
Advanced Battery Management.....	24
UPS input/output wiring	
MBP cables and connectors .....	42
Single UPS wiring .....	44
UPS cables and connectors .....	39
UPS installation and unpacking	
Mechanical installation.....	29
Precautions.....	25
Unpack and inspect the units.....	26
UPS installation plan and unpacking	
UPS system interface wiring preparation .....	25
UPS maintenance	
UPS maintenance .....	124
UPS maintenance	
Important safety instructions.....	121
Maintenance training .....	130
Preventive maintenance.....	122
Recycling the used UPS or batteries .....	123
UPS module installation	
Rack installation .....	29
Tower installation.....	33
UPS operating instructions	

About UPS operating instructions .....	98
Signing in.....	113
UPS controls and indicators	
System events .....	104
Use the Remote Emergency Power-off push-button .....	120
UPS operation	
Parallel UPS battery sharing.....	119
UPS startup	
Starting the UPS in Power-on mode (default mode).....	114
Startup preparation .....	114
UPS startup	
Starting the UPS on battery (without utility power) .....	114
UPS system installation	
Detection cable wiring.....	67
External battery module (EBM) wiring .....	51
Install a remote EPO switch.....	54
Product safety .....	37
Single UPS MBP wiring.....	55
UPS system installation .....	39

## W

Warranty .....	139
Wiring configurations	
Configuration 1-1 (dual feed) .....	50
Configuration 1-1 (single feed).....	49
Configuration 3-1 (dual feed) .....	48
Configuration 3-1 (single feed).....	47
Configuration 3-3 (dual feed) .....	46
Configuration 3-3 (single feed, default UPS wiring configuration).....	45
Wiring parallel UPS systems	
MBP cables and connectors .....	71
Parallel UPS wiring with separate battery .....	75
UPS cables and connectors .....	69



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