



Liebert[®] EXS

Installer/User Guide

10-kVA, 60-Hz, 208/220-V, Three-phase UPS

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Refer to local regulations and building codes relating to the application, installation, and operation of this product. The consulting engineer, installer, and/or end user is responsible for compliance with all applicable laws and regulations relation to the application, installation, and operation of this product.

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit <https://www.vertiv.com/en-us/support/> for additional assistance.

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1 Important Safety Information

IMPORTANT! This manual contains important safety instructions that must be followed during the installation and maintenance of the UPS and batteries. Read this manual thoroughly and the safety and regulatory information, available at <https://www.vertiv.com/ComplianceRegulatoryInfo>, before attempting to install, connect to supply, or operate this UPS.

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2 Product Description

The Vertiv™ Liebert® EXS uninterruptible power system (UPS) is an intelligent, online UPS with sine wave output. The UPS offers reliable, high-quality AC power to small-scale computer centers, networks, communication systems, automatic control systems, and similar sensitive electronic equipment.

2.1 Model Configurations

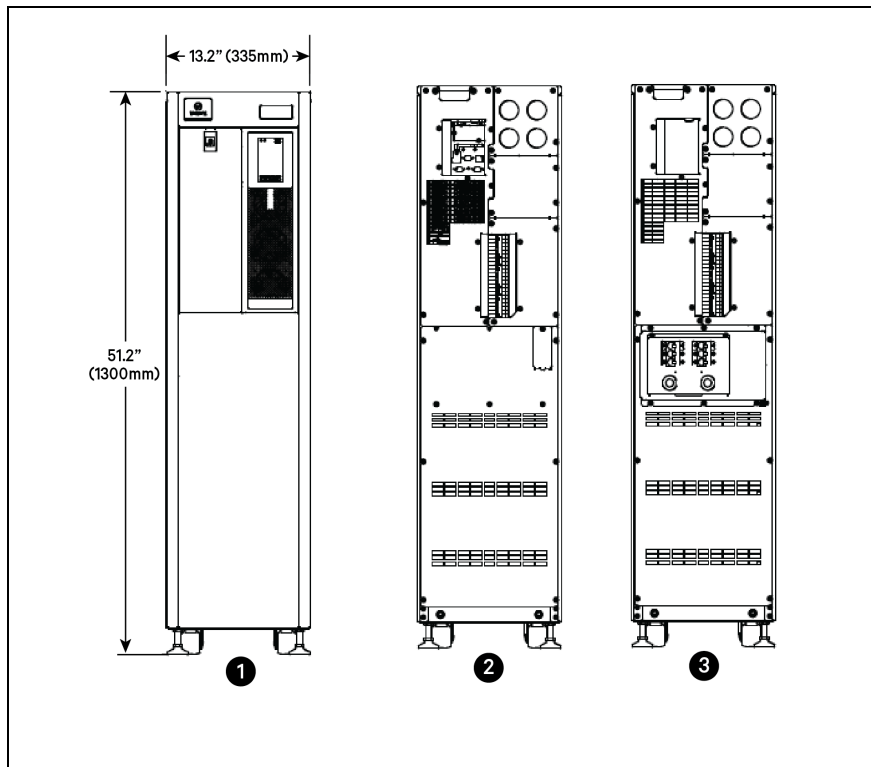
Table 1.1 Model Configurations

Model Rating	Input/Output
10 kVA - (208 and 220 V)	Single-input configuration (default), dual-input is field-configurable.
10 kVA - (208 and 220 V) with Battery Cabinet*	
*Optional battery cabinet can only be ordered with internal batteries that are factory-installed.	

2.2 Front-panel Components

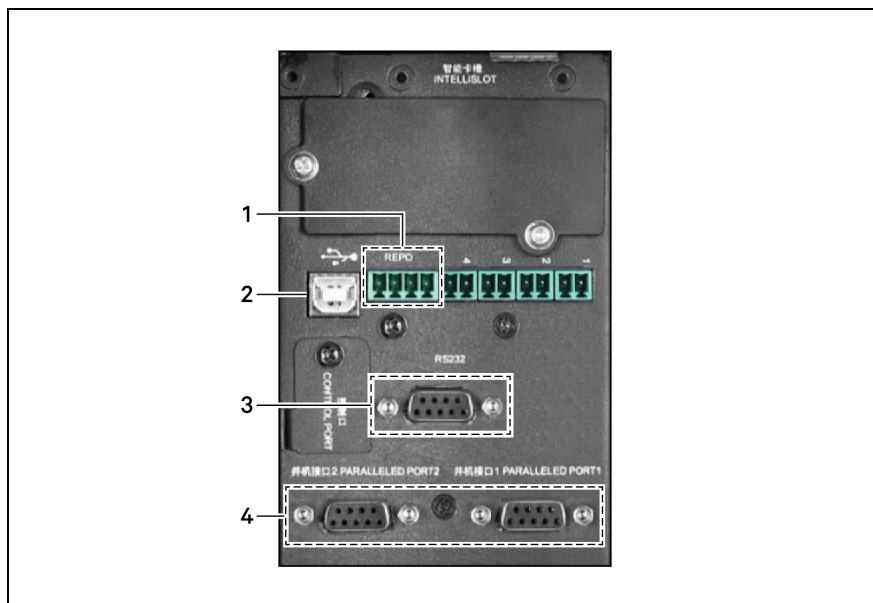
The outside front panel of the UPS provides ventilation holes and an operation/display panel with LED indicators and function keys. See [Operation and Display Panel](#) on page 25, for details about using the display panel.

Figure 1.1 UPS Front and Rear View



2.3 Rear-panel Components

Figure 1.2 Rear-panel Connectors



Item	Description
1	REPO port
2	USB port
3	RS-232 port
4	Parallel/LBS ports

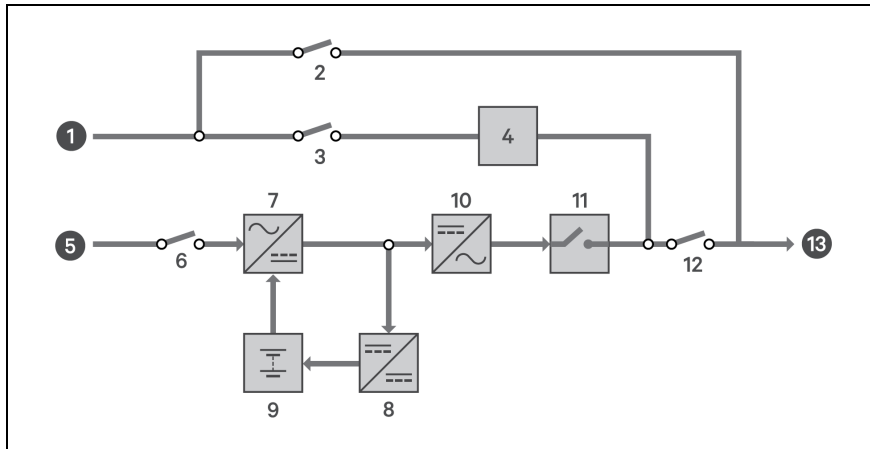
2.4 Major Internal Components and Operating Principle

The UPS is composed the components described in **Figure 1.3** on the next page . **Table 1.2** below , describes the operation of various circuits through the components.

Table 1.2 Major Component Operation

Component	Operation/Function
Transient Voltage Surge Suppression (TVSS) and EMI/RFI Filters	Provide surge protection. Filter electromagnetic interference (EMI) and radio frequency interference (RFI). Minimize any surges or interference present in the utility line and protect the sensitive equipment even when on internal bypass power.
Rectifier/Power Factor Correction (PFC) Circuit	In normal operation, converts utility AC power to regulated DC power for use by the inverter while ensuring that the wave shape of the input current used by the UPS is near ideal. Extracting this sine-wave input current ensures efficient use of utility power and reduces distortion reflected on the utility making cleaner power available to devices that are not protected by the UPS.
Inverter	In normal operation, inverts the DC output of the power-factor-correction circuit into precise, regulated sine-wave AC power. When utility power fails, the inverter receives energy from the batteries through the rectifier. In both Normal mode and Bypass mode, the UPS inverter remains on-line, generating clean, precise, regulated AC-output power.
DC-DC Charger	When the UPS is connected to utility power and the rectifier is operating, the battery charger regulates energy output from the rectifier/PFC to continuously recharge the batteries.
Static Bypass Switch	In the event of an output overload, over-temperature condition, or other failure, the switch automatically transfers connected equipment to bypass power.
Batteries	Up to 4 strings of long-life, valve-regulated, non-spillable, lead-acid batteries depending on back-up run-time requirements. See Table 7.3 on page 50 , for approximate run times. NOTE: To maintain battery design life, operate the UPS in an ambient temperature of 68°F to 77°F (20°C to 25°C).
Maintenance Bypass	Breaker electrically isolates the UPS and internal batteries for maintenance.

Figure 1.3 UPS Operating-principle



Item	Description
1	Bypass input
2	Maintenance-bypass breaker (MBB)
3	Bypass-input breaker (BIB)
4	Static switch
5	Rectifier input
6	Rectifier-input breaker (RIB)
7	Rectifier
8	Battery charger
9	Battery
10	Inverter
11	Automatic inverter switch
12	Maintenance-isolation breaker (MIB)
13	UPS output

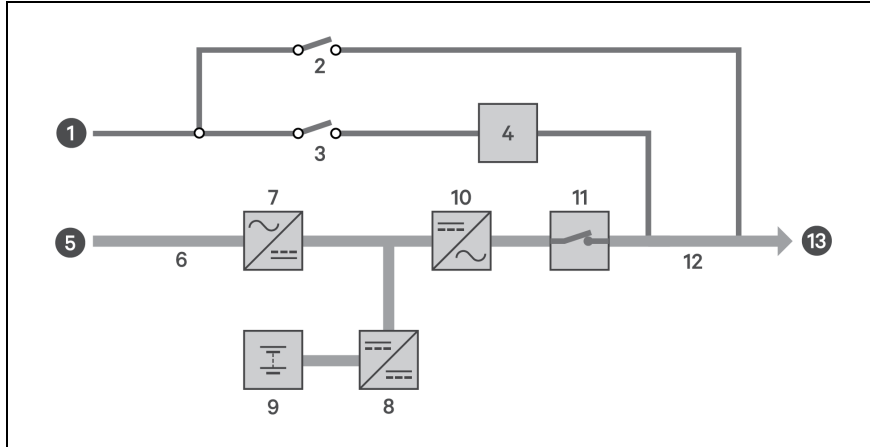
2.5 UPS States and Operating Modes

NOTE: See **Table 3.2** on page 26 , for description of the run-indicator and alarm-indicator LEDs mentioned in this section.

2.5.1 Normal Mode

Normal operation supplies clean, conditioned, sine-wave power to connected equipment from normal utility input. The battery charger charges the batteries. On the front-panel display, the run-indicator (green) is On, the alarm indicator is OFF, and the buzzer is silent.

Figure 1.4 Normal-mode Operation

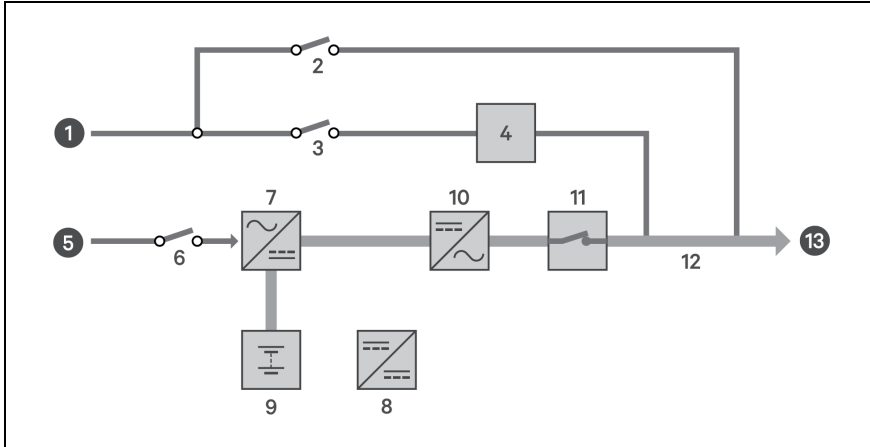


Item	Description
1	Bypass input
2	Maintenance-bypass breaker (MBB)
3	Bypass-input breaker (BIB)
4	Static switch
5	Rectifier input
6	Rectifier-input breaker (RIB)
7	Rectifier
8	Battery charger
9	Battery
10	Inverter
11	Automatic inverter switch
12	Maintenance-isolation breaker (MIB)
13	UPS output

2.5.2 Battery Mode

Battery mode supplies battery power to the load if utility power fails or if the utility voltage goes outside of the permissible range. On the front-panel display, the run indicator (green) is On, the alarm indicator (yellow) is On, and the buzzer beeps once each second. The LCD "Current" screen displays "On Battery."

Figure 1.5 Battery-mode Operation

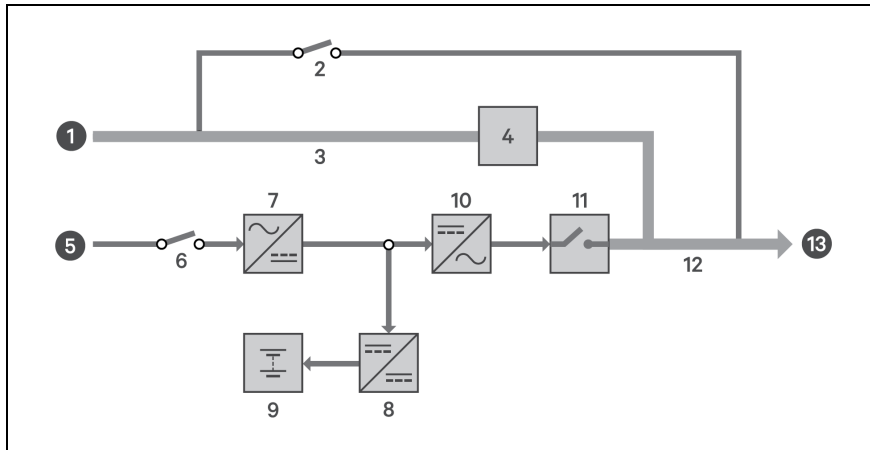


Item	Description
1	Bypass input
2	Maintenance-bypass breaker (MBB)
3	Bypass-input breaker (BIB)
4	Static switch
5	Rectifier input
6	Rectifier-input breaker (RIB)
7	Rectifier
8	Battery charger
9	Battery
10	Inverter
11	Automatic inverter switch
12	Maintenance-isolation breaker (MIB)
13	UPS output

2.5.3 Bypass Mode

Bypass mode supplies power to the load from the bypass source if an overload or fault occurs during normal operation. On the front-panel display, the run indicator (green) is On, the alarm indicator (yellow) is On, and the buzzer beeps once each second. The LCD "Current" screen displays "On Bypass."

Figure 1.6 Bypass-mode Operation



Item	Description
1	Bypass input
2	Maintenance-bypass breaker (MBB)
3	Bypass-input breaker (BIB)
4	Static switch
5	Rectifier input
6	Rectifier-input breaker (RIB)
7	Rectifier
8	Battery charger
9	Battery
10	Inverter
11	Automatic inverter switch
12	Maintenance-isolation breaker (MIB)
13	UPS output

2.5.4 Auto Restart Mode

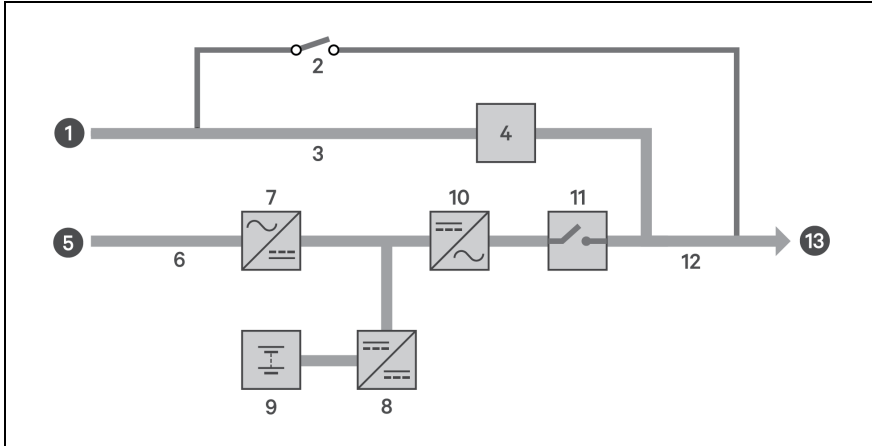
When enabled, which is the default setting, Auto Restart mode automatically re-starts the UPS after a shut-down that resulted from depleted batteries after an extended power outage. A built-in 10-second delay after utility power is restored allows other equipment to start first and stabilize before the UPS restarts.

2.5.5 Eco Mode—Single UPS

The UPS ships in Eco mode as the factory-default setting. Eco mode reduces power consumption and provides UPS efficiency approaching 99% by powering the load via bypass if the bypass voltage is normal or by powering the load via the inverter when the bypass voltage is outside the specified range.

NOTE: During Eco mode, if a bypass-failure or abnormal-bypass-voltage notification appears when the output is not overloaded, the UPS will transfer to Normal Mode. However, if a notification showing bypass failure or abnormal bypass voltage appears when the output is overloaded, the UPS will shut down the bypass.

Figure 1.7 Eco-mode Operation



Item	Description
1	Bypass input
2	Maintenance-bypass breaker (MBB)
3	Bypass-input breaker (BIB)
4	Static switch
5	Rectifier input
6	Rectifier-input breaker (RIB)
7	Rectifier
8	Battery charger
9	Battery
10	Inverter
11	Automatic inverter switch
12	Maintenance-isolation breaker (MIB)
13	UPS output

2.5.6 Fault State

When the UPS is in Normal mode and the inverter fails or UPS over-temperature occurs, operation transfers to Bypass mode. When the UPS is in Battery mode (with no bypass utility), and the inverter fails or over-temperature occurs, the UPS shuts down and stops output power. During a Fault state, the front-panel display alarm indicator (red) is On, the buzzer beeps continuously, and fault information displays on the LCD screen.

2.5.7 Maintenance Bypass Mode

Used when the UPS requires maintenance or repair, Maintenance-bypass-mode operation powers the connected equipment with utility power while electrically isolating the internal UPS components.

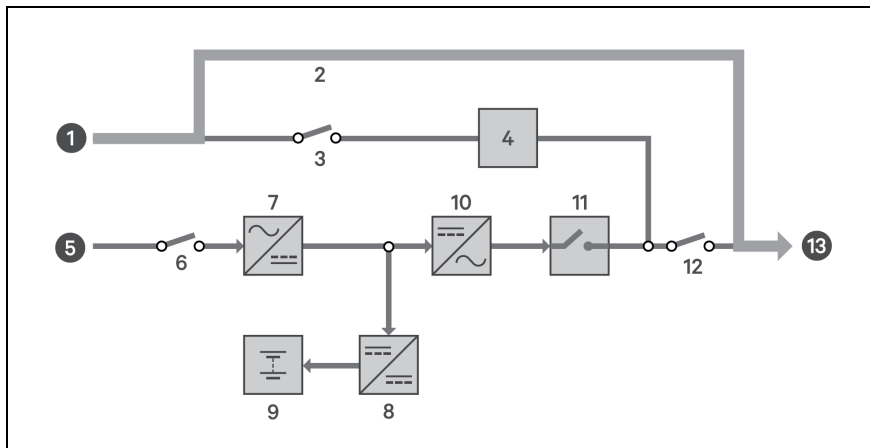
NOTICE

Risk of power interruption. Can damage the connected equipment.

If utility power fails or if its quality is out of range while the UPS is in Maintenance Bypass Mode, the UPS may shut down without notice and shut-off output power to the load.

NOTE: The UPS has no user-serviceable parts. If the UPS malfunctions and requires service, visit <http://www.Vertiv.com/en-us/support/> or contact your local Vertiv representative.

Figure 1.8 Maintenance-bypass Operation



Item	Description	Item	Description
1	Bypass input	8	Battery charger
2	Maintenance-bypass breaker (MBB)	9	Battery
3	Bypass-input breaker (BIB)	10	Inverter
4	Static switch	11	Automatic inverter switch
5	Rectifier input	12	Maintenance-isolation breaker (MIB)
6	Rectifier-input breaker (RIB)	13	UPS output
7	Rectifier		

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3 Installation and Commissioning

NOTE: These are general installation procedures and methods. Because each site is different, consider the site conditions and requirements when planning and conducting the installation.

3.1 Pre-installation Preparation

Before beginning the installation, consider the environmental requirements, service clearances, and external protective devices when planning the final location of the UPS system.

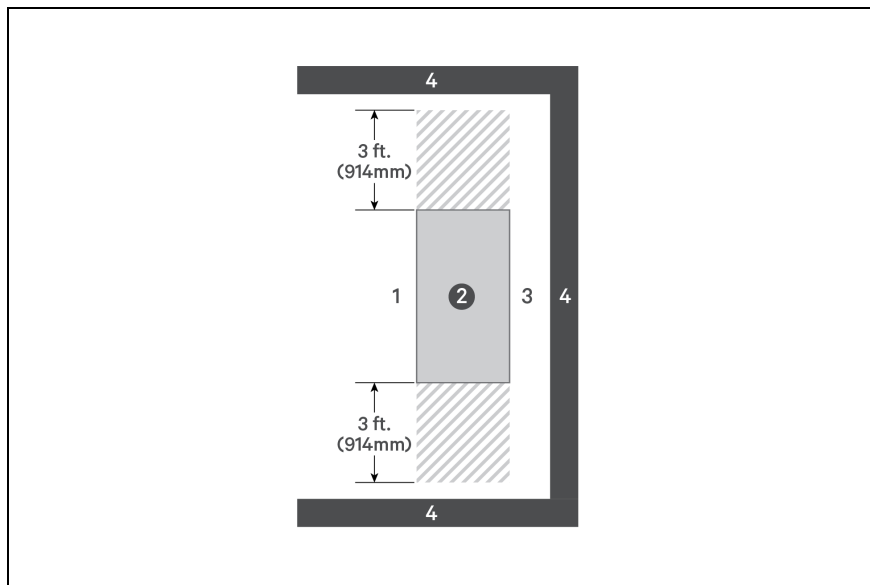
3.1.1 Environment of Installation Area

Install the UPS in a clean, well-ventilated environment with the ambient temperature within the specifications listed in [Specifications](#) on page 49 .

3.1.2 Clearance Required for Installation, Maintenance and Operation

Internal fans provide forced-air cooling for the UPS. Cooling air enters through the front panel and hot air is exhausted through the back. Per National Electric Code, at least 3 ft. (914 mm) clearance in the front and rear of the UPS is required for installation and maintenance, see [Figure 2.1](#) below . No side clearance is required. During operation, 8 in. (203 mm) rear clearance is required. Maintain at least 8 in. (203 mm)

Figure 2.1 Installation and Maintenance Clearances



Item	Description	Item	Description
1	No side clearance required.	3	No side clearance required.
2	UPS (top view).	4	Wall or other solid surface.

3.1.3 Installation Tools

The following tools are required to properly install your UPS:

- Pallet jack / Forklift
- Utility Knife
- 18-mm (23/32-in.) open wrench or adjustable wrench (Crescent wrench)
- 16-mm (5/8-in.) wrench or socket
- 13-mm (1/2-in.) wrench or socket
- 10-mm (3/8-in.) wrench or socket
- #1, #2, and #3 Phillips-head screwdrivers
- Torque wrench

3.1.4 Storage

If you do not install the UPS immediately, you must store it indoors and protect it from excessive moisture, heat, and other harsh conditions. Store the batteries in a dry, well-ventilated environment with a temperature range of 68°F ~ 77°F (20°C ~ 25°C).

NOTICE

Risk of failure to properly charge batteries can damage the batteries and void the warranty.

Batteries will lose charge during storage. Batteries must be recharged as recommended by the battery manufacturer every 3 to 6 months, depending on storage temperature:

- At 68-77°F (20-25°C): charge after 6 months in storage
- At 78-86°F (26-30°C): charge after 3 months in storage
- At 87°F or higher (31°C or higher): charge after 1 month in storage.

3.1.5 External Protective Devices

Circuit breakers or other external protective devices must be installed on the UPS input. The following sections provide general guidance for installation by properly-trained and qualified personnel.

Rectifier and Bypass-input Protection

Overcurrent Protection—Install an appropriate overcurrent protective device should on the utility input power distribution. Consider the current capacity of power cables and the system-overload requirements in selection of the input protection and wiring, see **Table 21** on page 18, and **Table 22** on page 18.

Dual-Input System Protection—In a dual-input system, install separate protective devices for the utility and bypass at the utility input power distribution.

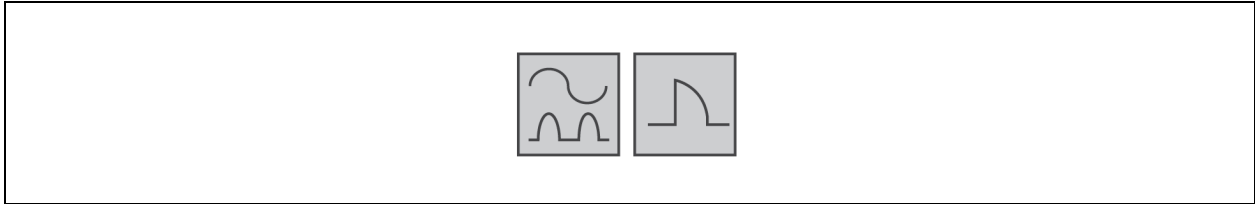
Utility/Bypass Back-Feed Protection—the UPS includes back-feed protection in the event of a fault.

Earth Leakage Current—the residual current detector (RCD) for the UPS upstream input power distribution should be:

- Sensitive to the DC unidirectional pulse (Level A) in the power distribution network
- Insensitive to the transient current pulse
- General sensitivity type, settable: 0.3A ~ 1A

The residual current circuit breaker (RCCB) must be sensitive to the DC unidirectional pulse (Level A) in the power distribution network, but insensitive to the transient current pulse, see **Figure 2.2** below .

Figure 2.2 RCCB symbols



When using the earth RCD in a split-bypass system, the RCD should be installed at the upstream input power distribution end to prevent false alarms. The earth leakage current fed by the RFI filter in the UPS ranges from 3.5 mA to 100 mA. We recommend that you verify the sensitivity of each differential device of the upstream input power distribution and downstream power distribution (to load).

Battery

The UPS includes an overcurrent-protection device for the internal battery.

UPS Output

The UPS includes output overcurrent protection in all modes of operation. If the customer-provided output-distribution panel is not within sight of the UPS, the distribution panel must include a main breaker.

3.2 Equipment Handling and Unpacking

Upon receipt, check the items received against the order and shipping manifest. If any parts are missing, contact your local Vertiv representative or visit <http://www.Vertiv.com/en-us/support/>.

The UPS ships on a pallet and is equipped with casters that permit two or more people to roll it off the pallet for installation. Move the palletted UPS as close as possible to the installation location before removing packing material or loosening shipping brackets.

NOTICE

The casters on the UPS are for moving short distances. Move the pallet as close as possible to the installation site before taking the UPS off the pallet. Plan the unloading procedure and route to the final location to minimize the distance that the UPS must be rolled on casters and to avoid large cracks and un-even flooring. Major shocks while moving the UPS over large cracks can loosen internal connections and otherwise damage the unit.



WARNING! Risk of moving heavy unit. Can cause property damage, injury and death. Ensure that any equipment that will be used to move the UPS has sufficient lifting capacity. **Table 7.2 on page 50, for weights. The UPS presents a tipping hazard. Do not tilt the UPS more than 15 degrees from vertical. The UPS is fitted with casters, take care to prevent movement when unbolting the equipment from its shipping pallet. Ensure adequate personnel and lifting equipment are available when taking the UPS off its shipping pallet.**



ADVERTISSEMENT! Le poids élevé de l'appareil peut entraîner des dommages matériels, des blessures et même la mort. Veillez à ce que les équipements utilisés pour déplacer le système EXS™ de Liebert® possèdent une capacité nominale suffisante. Reportez-vous au Tableau **Table 7.2 on page 50. Le système ASC présente un risque de renversement. N'inclinez pas le système ASC à plus de 15 degrés de la verticale. Comme le système ASC est équipé de roulettes, veillez à éviter les mouvements involontaires lorsque vous déboulonnez l'équipement de sa palette d'expédition. Veillez à ce qu'un personnel approprié et un dispositif de levage soient disponibles lorsque vous retirez le système ASC de la palette d'expédition.**

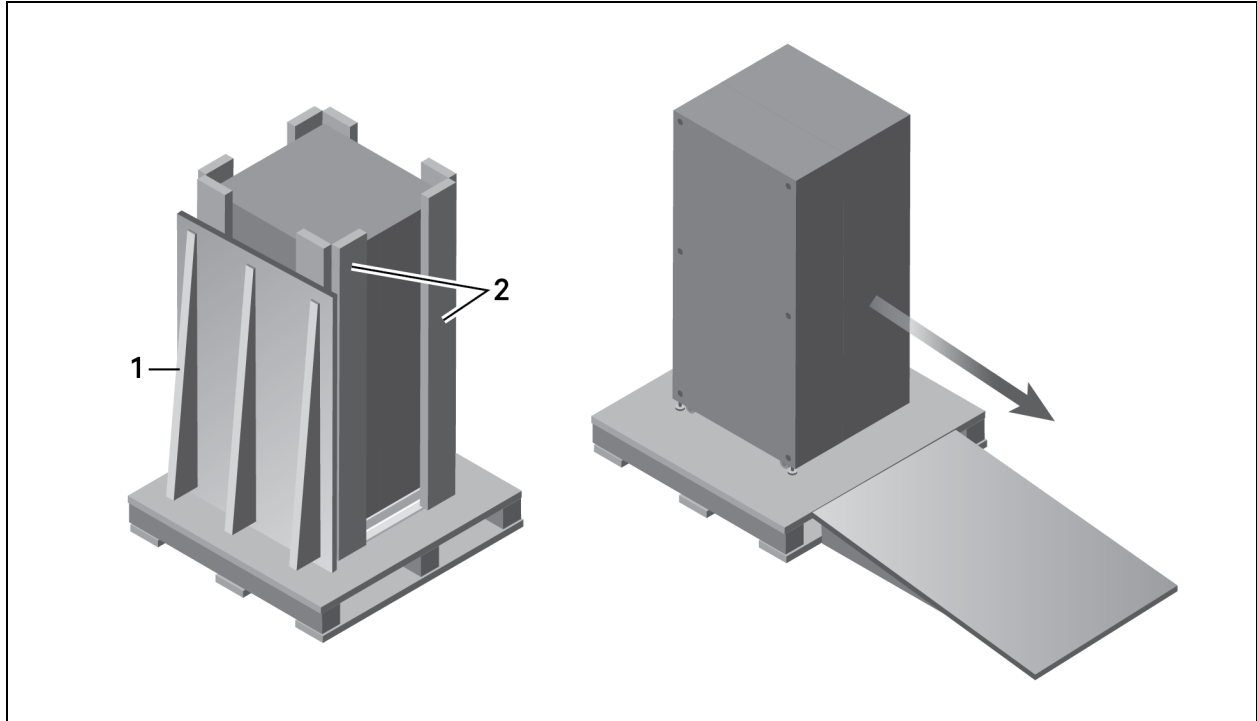
During unpacking:

- Inspect the UPS for damage. If you find any problem, file a damage claim with the carrier immediately and send a copy to Vertiv at:
 Attn: Traffic Department
 Vertiv Corporation
 1050 Dearborn Drive
 P.O. Box 29186
 Columbus, Ohio 43085 USA
- Check the accessories and model numbers against the delivery list. If you find any problem, notify your local Vertiv representative immediately.

3.2.1 Removing the UPS from the Shipping Pallet

1. Using a forklift, pallet jack, or other lifting device, move the packaged unit as close as practical to the intended installation location.
2. Remove the protective packing, see **Figure 2.3** below.

Figure 2.3 Protective Packaging and Ramp



Item	Description
1	Protective packaging
2	Ramp

3. Locate the included accessories in their packed location on top of the UPS, and set them aside.
4. Unbolt the shipping brackets from the pallet with a 16-mm (5/8-in.) wrench or socket:
 - Remove the front, lower panel from the UPS, and unbolt the front shipping bracket.
 - Unbolt the shipping bracket from the rear of the UPS.
 - Retain the brackets to secure the installed UPS to the floor, if required.
5. Raise the leveling feet so that they will not interfere with the ramp when moving the UPS.
6. Place the ramp onto the pallet at the front of the UPS, and gently roll the UPS down the ramp to the floor then into the installation position, see **Figure 2.3** above.
7. Lower the leveling feet to fix the UPS in the location.

3.3 Connecting Power Cables



WARNING! Risk of electrical shock. Can cause equipment damage, injury and death. Before beginning installation, verify that all external overcurrent protection devices are open (Off), and that they are locked-out and tagged appropriately to prevent activation during the installation. After the power cables are connected, the terminal block's protective cover must be reinstalled to remove the electric shock hazard.

When connecting input and output cables, follow national and local wiring regulations, take the environment into account, and refer to NFPA 70, Table 310-16. The recommended minimum cables and overcurrent protection is listed in **Table 2.1** below, and **Table 2.2** below, are based upon an 86°F (30°C) ambient temperature.

Table 2.1 Currents and Wire Size—UPS Rectifier Input

Maximum Current, Amps	Recommended OPD, Amp Trip	75°C THW	75°C THW	75°C THW	Recommended Torque
		Copper Wire (phase)	Copper Wire (neutral)	Copper Wire (Ground)	
		Number of Cables per Phase: 1	Number of Cables: 1	Number of Cables: 1	
37	50	6 AWG	6 AWG	10 AWG	3 nm (2.2 ft-lb)

Table 2.2 AC Currents and Wire Size—UPS Bypass Input* and Output

Maximum Current, Amps	Recommended OPD, Amp Trip	75°C THW	75°C THW	75°C THW	Recommended Torque
		Copper Wire (phase)	Copper Wire (neutral)	Copper Wire (Ground)	
		Number of Cables per Phase: 1	Number of Cables: 1	Number of Cables: 1	
28	40	8 AWG	8 AWG	10 AWG	3 nm (2.2 ft-lb)

* Bypass input for dual input configurations only.

Table 2.3 Ring-terminal Part Numbers

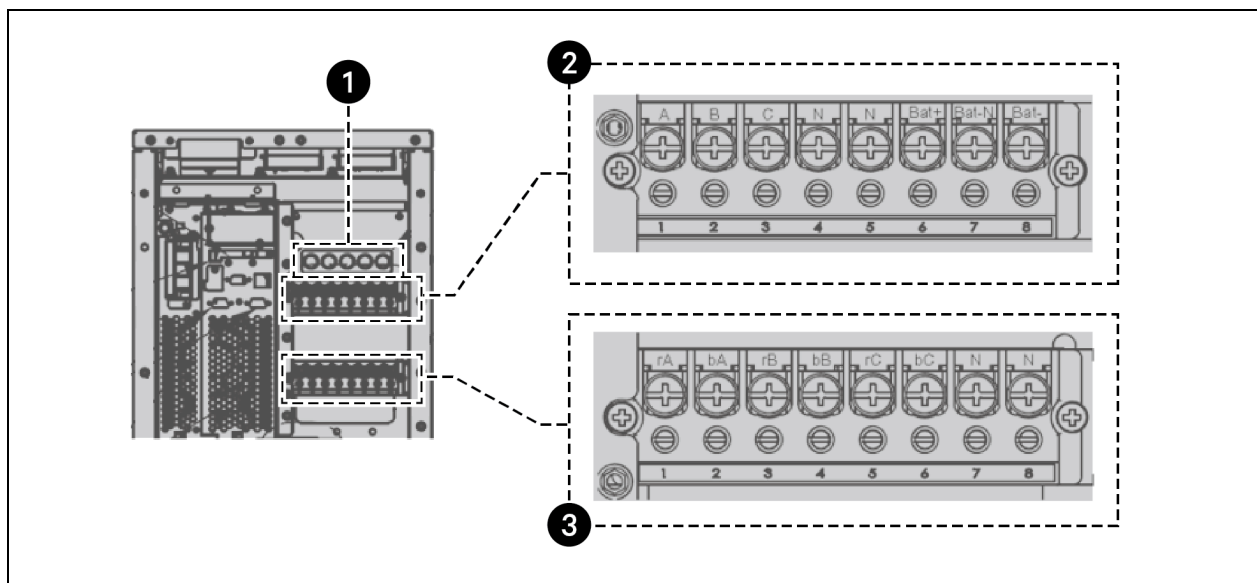
	AWG (mm ²)		
	10 (5.26)	8 (8.36)	6 (13.3)
Manufacturer Part #	McMaster-Carr: 7113K462	McMaster-Carr: 7113K444	McMaster-Carr: 7113K366
	Thomas & Betts: RC10-14	Thomas & Betts: RDV717	Thomas & Betts: RE6-14
	Tyco Electronics: 1577648-1	Tyco Electronics: 132331-1	—

3.3.1 Connecting I/O Cables—Single-input Configuration

- Prepare to connect the UPS power cables to the I/O terminal block on the UPS rear panel, see **Figure 2.4** on the facing page :
 - Remove the wiring access cover plate to gain access to the input and output terminal blocks.
 - Remove the conduit/cable entry area panel to punch holes for the conduit size needed, and attach the conduits to the rear of the conduit plate
- Leave the factory-installed shorting bus bars in place in the UPS input terminal block.
- Referring to **Figure 2.4** on the facing page, make the following UPS-input hard-wire cable connections from the upstream feeder panel to the UPS input terminal:
 - Phase A to jumper between 1-2 (rA-bA)
 - Phase B to jumper between 3-4 (rB-bB)
 - Phase C to jumper between 5-6 (rC-bC)

- Neutral to jumper between 7-8 (N-N)
 - Ground to ground bus bar (PE).
4. Referring to Figure 2.4 below, make the following UPS-output hard-wire cable connections from the UPS output terminal to the downstream distribution panel:
 - Phase A from terminal 1 to Phase A on panel-board main lug/breaker
 - Phase B from terminal 2 to Phase B on panel-board main lug/breaker
 - Phase C from terminal 3 to Phase C on panel-board main lug/breaker
 - Neutral from jumper between terminals 4-5 to neutral bus on downstream panel.
 - Ground from UPS ground bus bar (PE) to ground bus on downstream panel.
 5. Torque all customer-side connections per recommendations in **Table 2.1** on the previous page, and **Table 2.2** on the previous page
 6. Replace the wiring access cover plate and secure it.

Figure 2.4 Single- and Dual-input Configuration Wiring Diagram



Item	Description
1	Ground busbar
2	AC-output terminals
3	AC-input terminals

3.3.2 Connecting I/O Cables—Dual-input Configuration

Dual input configuration for the UPS requires that both input feeds be from the same solid N-G bonded source.

1. Prepare to connect the UPS power cables to the I/O terminal block on the UPS rear panel, see **Figure 2.4** above :
 - Remove the wiring access cover plate to gain access to the input and output terminal blocks.
 - Remove the conduit/cable entry area panel to punch holes for the conduit size needed, and attach the conduits to the rear of the conduit plate.
2. Remove the factory-installed shorting bus bars in place in the UPS input terminal block.

3. Referring to **Figure 24** on the previous page, make the following UPS rectifier-input hard-wire cable connections from the upstream feeder panel to the UPS input terminal:
 - Phase A to terminal 1 (rA)
 - Phase B to terminal 3 (rB)
 - Phase C to terminal 5 (rC)
 - Neutral to terminal 7 (N)
 - Ground to UPS ground bus bar (PE).
4. Referring to **Figure 24** on the previous page, make the following UPS bypass-input hard-wire cable connections from the upstream feeder panel to the UPS input terminal:
 - Phase A to terminal 2 (bA)
 - Phase B to terminal 4 (bB)
 - Phase C to terminal 6 (bC)
 - Neutral to terminal 8 (N)
 - Ground to UPS ground bus bar (PE).
5. Referring to **Figure 24** on the previous page, make the following UPS - output hard-wire connections from the UPS output terminal to the downstream distribution pane:
 - Phase A from terminal 1 to Phase A on panel-board main lug/breaker
 - Phase B from terminal 2 to Phase B on panel-board main lug/breaker
 - Phase C from terminal 3 to Phase C on panel-board main lug/breaker
 - Neutral from jumper between terminals 4-5 to neutral bus on downstream panel.
 - Ground from UPS ground bus bar (PE) to ground bus on downstream panel.
6. Torque all customer side connections per recommendations in **Table 21** on page 18, and **Table 22** on page 18
7. Replace the wiring access cover plate and secure it.

3.4 Communication Connections

The communication ports include:

- Two Vertiv™ Liebert® IntelliSlot™ card ports
- RS-232 port
- REPO port
- USB port

3.4.1 Liebert® IntelliSlot™ Ports

The UPS has two IntelliSlot ports on the front of the unit. The IntelliSlot and USB ports may be used simultaneously.

We recommend that you route the communication cable for the IntelliSlot ports from the rear of the UPS through the built-in wiring pass-through to connect to the installed cards.

If included, the cards are factory-installed in the ports. **Table 2.4** below, describes the cards available. The instructions for configuring and using the cards are available at www.vertiv.com.

Table 2.4 IntelliSlot Communication Cards

Card	Description
Liebert® IS-UNITY-LIFE™ Card	Communicates with Vertiv LIFE Services remote monitoring.
Liebert® IS-UNITY-SNMP™ Card	Communicates via SNMP protocol to Vertiv monitoring/shut-down applications or any third-party network management system.
Liebert® IS-UNITY-DP™ Card	Communicates with up-to two third-party platforms including SNMP, Modbus, BACnet, and YDN-23 protocols to network-connected Vertiv monitoring/shut-down applications or third-party shut-down software.
Liebert® IS-485EXI™ Card	Communicates with Vertiv SiteScan monitoring system.
Liebert® IS-Relay Card	Provides dry-contact alarm information, including signals for: On Battery, On Bypass, Low Battery, Summary Alarm, UPS Fault and On UPS for communication to a remote-monitoring system or network-connected Vertiv or third-party shut-down software. The card also accepts input signals to shut-down the UPS during any operating mode.

3.4.2 REPO Connection

Table 2.5 below, describes the pin-out of the REPO port, J14, used for N.O. or N.C. connection.

Table 2.5 REPO port (J14) Pin Descriptions

J14 Pin #	Pin Name	Description
9	+5VDC	REPO Power Supply, 5 VDC, 100mA
10	REPO Coil N.C.	Normally Closed circuit, EPO is activated when Pin 9 – Pin 10 is opened
11	REPO Coil N.O.	Normally Open circuit, EPO is activated when Pin 11 – Pin 12 is closed
12	GND	REPO Circuit Ground



WARNING! Risk of electrical shock. Can cause equipment damage, injury and death. The EPO action of the UPS will shut down the rectifier, inverter and static bypass, but it does not disconnect input power to the UPS. To electrically isolate the UPS, an interface with the external REPO circuit must be field-supplied to allow disconnecting the UPS input feeder breaker to remove all sources of power to the UPS and connected equipment to comply with national and local wiring codes and regulations



ADVERTISSEMENT! Risque de décharge électrique pouvant causer des dommages matériels, des blessures, et même la mort. L'action EPO de l'onduleur arrêtera le redresseur, l'onduleur et le bypass statique, mais il ne déconnectera pas la puissance d'entrée de l'onduleur. Pour isoler électriquement l'onduleur, une interface avec le circuit de repo externe doit être fournie sur le terrain pour permettre la déconnexion du disjoncteur d'entrée de l'onduleur afin d'éliminer toutes les sources d'alimentation de l'onduleur et de l'équipement connecté pour se conformer aux codes de câblage nationaux et locaux et Règlements

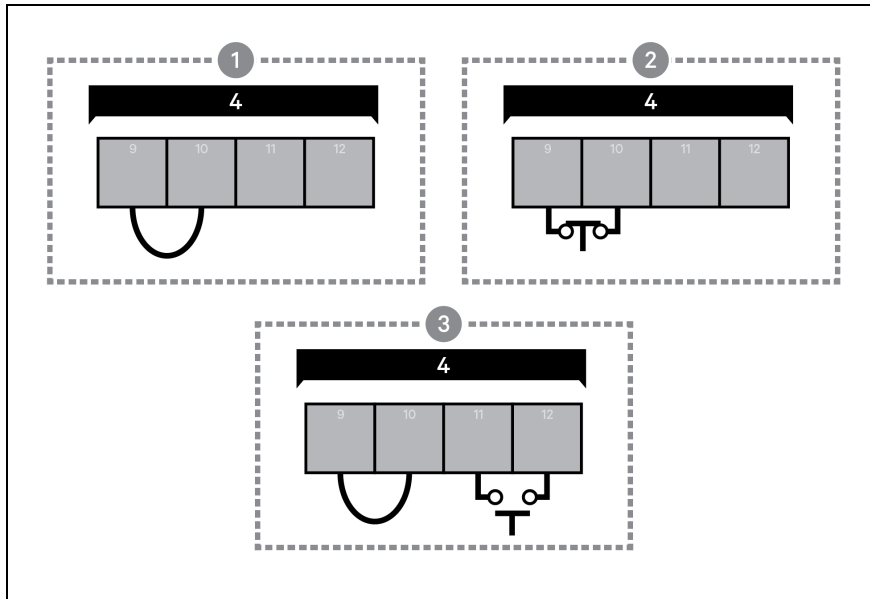
Figure 4.1 on page 37 shows the location of the REPO connection inside the UPS front panel. **Figure 2.5** on the facing page shows the connection details.

If a REPO connection is not required for the UPS, the factory-installed jumper between Pin 9 and Pin 10 must remain installed for the UPS to operate.

NOTE: The terminal-block wire range is 18 AWG ~ 33 AWG (0.82 mm² ~ 0.33 mm²), and we recommend using 18-AWG copper, shielded, signal cable. If the REPO will trip an external, electronically-controlled circuit breaker, you must reset the breaker before starting the UPS after the REPO is activated.

NOTE: We recommend that you route the wiring for the REPO connection from the rear of the UPS through the built-in wiring pass-through to connect to the REPO port.

Figure 2.5 REPO-connection on J14



Item	Description
1	No REPO connection—factory-supplied jumper must remain installed.
2	Normally-closed (N.C.) connection—remove factory-supplied jumper and wire pins 2 and 4 to a remote switch.
3	Normally-open (N.O.) connection—factory-supplied jumper must remain installed.
4	Port J14. See Table 25 on the previous page, for the pinout details.

3.4.3 Connecting USB Communication Cables

The UPS includes a standard, USB Type-B port is provided to connect to a computer or network server. The protocol is USB HID for Power Devices.

3.5 Connecting Serial-port Communication Cables

To connect the serial port communication cable, connect one end of the DB-9 serial-port communication cable to the DB-9 serial port on the rear panel of the UPS. Connect the other end to the computer's DB-9 port. The port uses the RS-232 protocol.

Table 2.6 DB9F Pinout Description

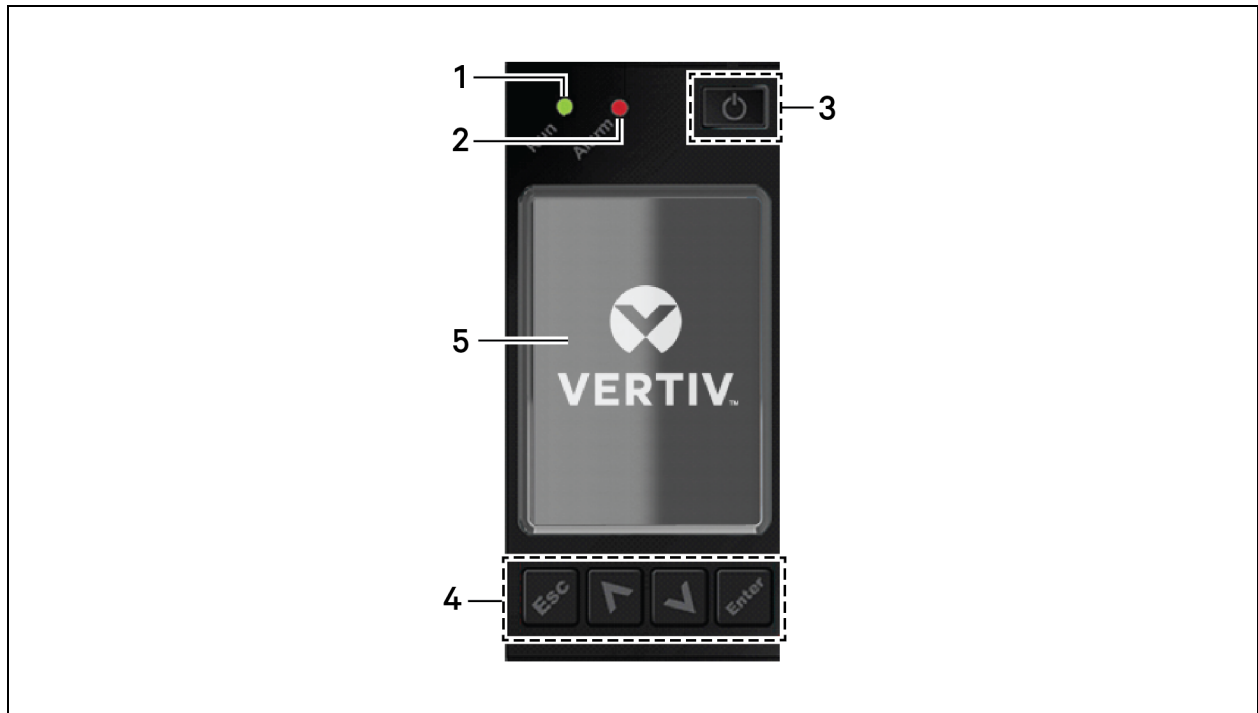
Pin No.	Function
2	TX (Send data)
3	RX (Receive data)
5	Common

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4 Operation and Display Panel

The operation/display panel includes LED indicators, function keys, and an LCD interface to configure and control UPS operation.

Figure 3.1 UPS Front-panel Display



Item	Description
1	Run indicator LED, see LED Indicators on the next page .
2	Alarm indicator LED, see LED Indicators on the next page .
3	Power button, see Table 3.1 below .
4	Menu keys, see Table 3.1 below .
5	LCD panel.

Table 3.1 Display-panel Button Functions and Descriptions






Button	Function	Description
	Enter	Confirm or enter selection.
	Up	Move to previous page, increase value, move left.
	Down	Move to next page, decrease value, move right.

Table 3.1 Display-panel Button Functions and Descriptions (continued)

Button	Function	Description
	Escape	Go back.
	Power	Power-on the UPS, power-off the UPS, transfer to Bypass Mode.

NOTE: While the UPS is operating, the LCD will dim and display a screen saver if there is no active alarm or user interaction for two minutes, see **Figure 3.2** below . If an alarm or fault occurs or if any button is pressed, the UPS-flow screen displays.

Figure 3.2 LCD Screen Saver

4.1 LED Indicators

The LEDs on the front-panel display indicate operation and alarm statuses of the UPS.

Table 3.2 LED Functions

Indicator	LED color	LED state	Indicates:
Run indicator	Green	On	UPS has output
		Blinking	Inverter is starting
		Off	UPS has no output
Alarm indicator	Yellow	On	Alarm occurs
	Red	On	Fault occurs
	N/A	Off	No alarm, no fault

4.2 Audible Alarm (Buzzer)

An audible alarm accompanies various events during UPS operations. **Table 3.3** below, describes the sounds and their meaning. To silence an alarm, see [Silencing the Audible Alarm](#) on page 37.

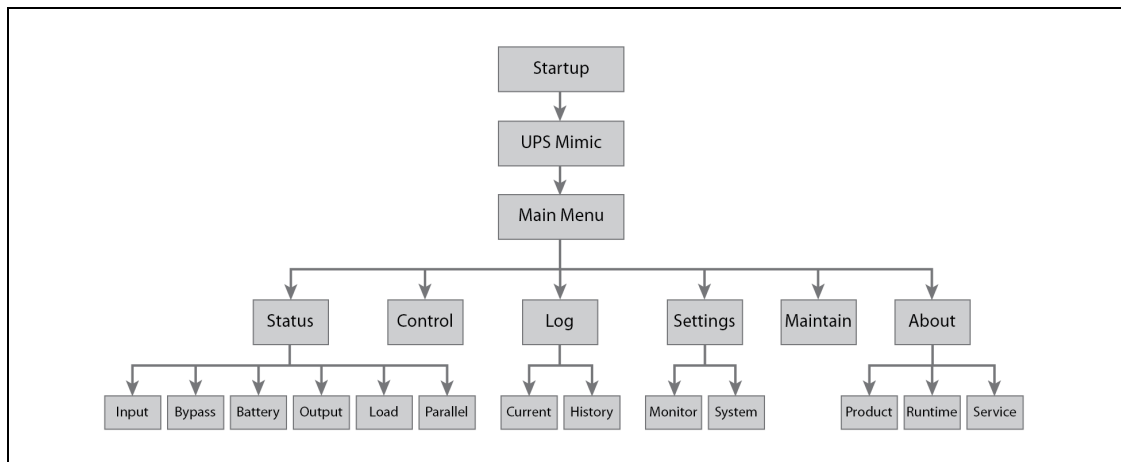
Table 3.3 Audible-alarm Descriptions

Sound	Indicates:
Continuous beep	Generated when a UPS fault appears, such as a fuse or hardware failure.
One beep every 0.5 seconds	Generated when a UPS critical alarm appears, such as on inverter overload.
One beep every 1 second	Generated when a UPS critical alarm appears, such as on battery low voltage.
One beep every 3.3 seconds	Generated when a UPS general alarm appears.

4.3 LCD Menu and Screens

The menu-driven LCD user interface lets you browse the UPS status, view operating parameters, customize settings, control operation, and view alarm/event history. Use the function keys to navigate through the menu, and view statuses or select settings in the screens.

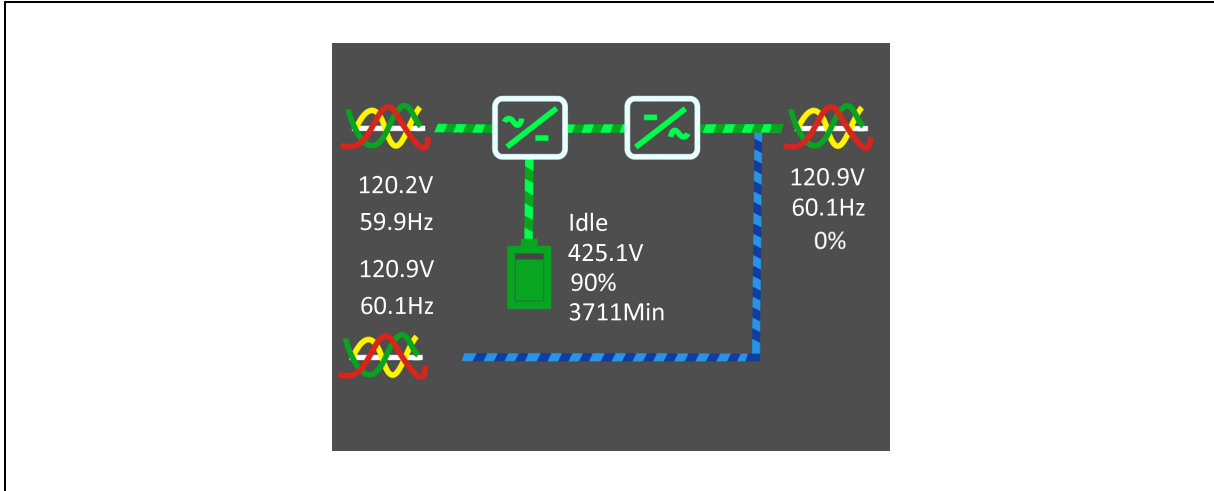
Figure 3.3 LCD Menu Structure



4.3.1 Start-up and UPS Mimic Screens

At start-up, the UPS executes a system test and displays the Vertiv logo screen for 10 to 15 seconds, shown in **Figure 3.1** on page 25 . After the test completes, an overview screen shows status information, the active (green) power path, and the non-working power path (gray), see **Figure 3.4** below .

Figure 3.4 UPS Mimic Screen



4.3.2 Main Menu

To access the main menu, press **Enter** while at the UPS Mimic screen. Use the Up/Down buttons to select the submenu options, and press **Enter** to open the submenu. Press **ESC** to return to UPS Mimic.

Figure 3.5 Main Menu

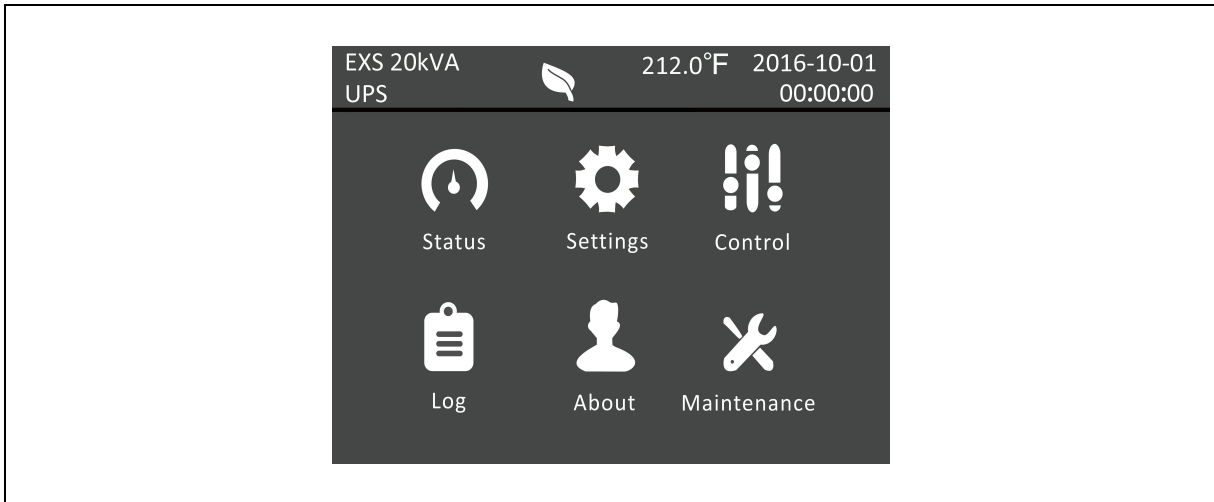


Table 3.4 Menu Options

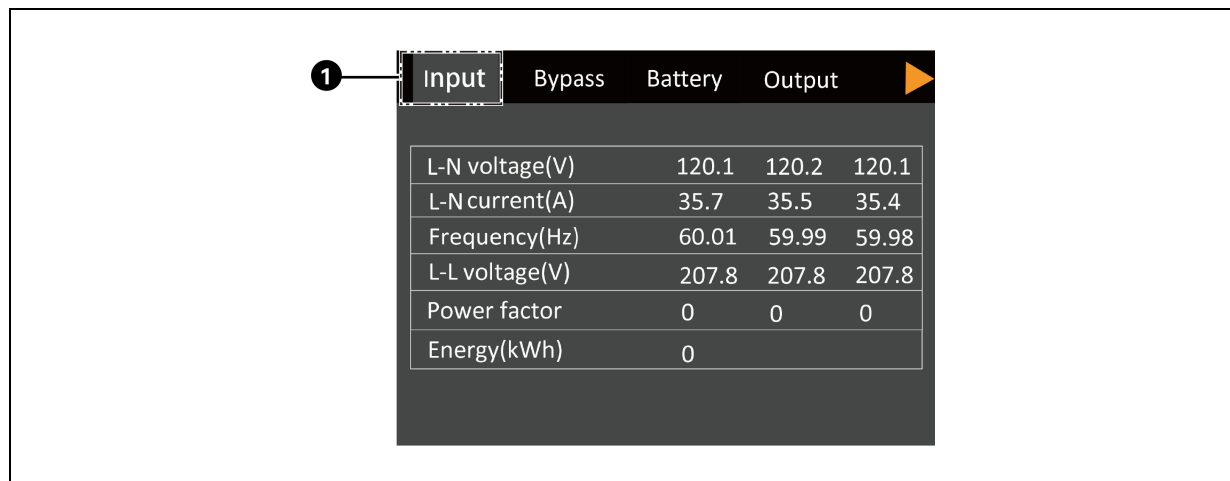
Submenu	Description
Status	Voltage, current, frequency, and parameters for UPS components, see Status Screen below .
Settings	Display and system parameter settings, see Settings Submenu on the next page .
Control	UPS controls, see Control Screen on the next page .
Log	Current alarms and event history, see Log Screen on page 31 .
About	Product and network information, see About Page on page 31 .
Maintain	Service-only, proprietary-password-protected page for use only by Vertiv service representatives.

Status Screen

The status screen displays voltages, currents, frequencies, and parameters on individual tabs for input, bypass, battery, output, and load status.

To view the UPS status information:

1. At the main menu, select the Status icon, and press **Enter**.
2. Use the arrow buttons to move the cursor left/right and select a tab, then press **Enter** to display the status information for the selected tab.

Figure 3.6 Status-screen tabs

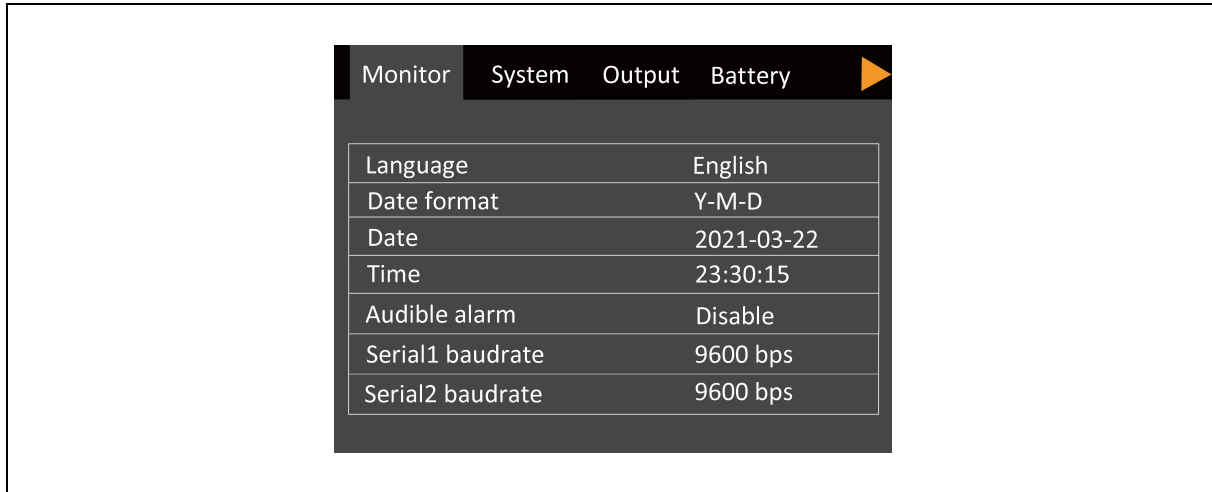
Item	Description
1	Screen tabs with Input tab selected.

Settings Submenu

The settings screen consists of tabs that list UPS settings described in **Table 3.5** on page 32.

NOTE: To adjust the settings, you must enter a password. See **Editing Display and Operation Settings** on page 32, for details on entering the password and editing the setting parameters.

Figure 3.7 Monitor and System tabs on the Settings Submenu



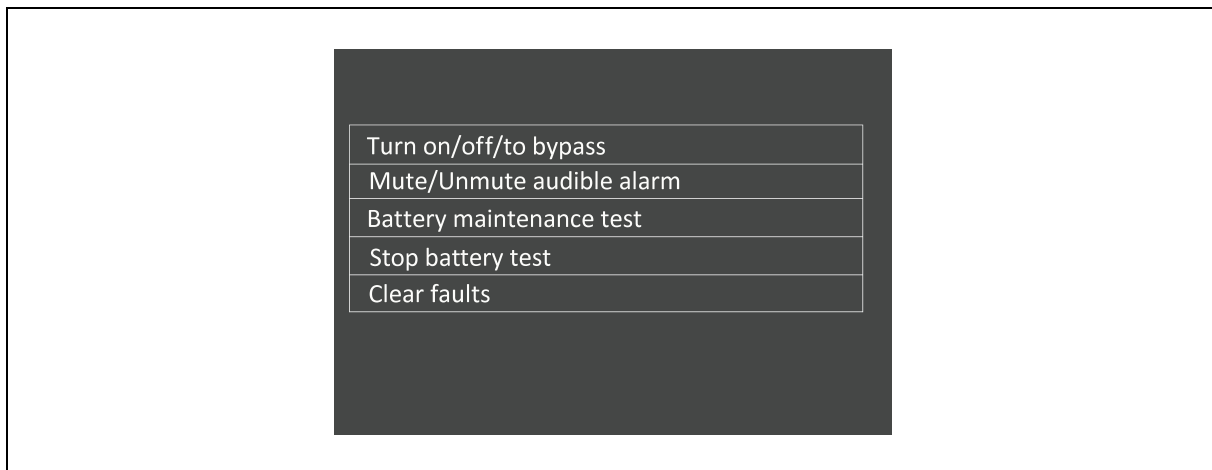
Control Screen

The Control screen offers UPS-control options. **Figure 3.8** below, shows an example.

To adjust the UPS controls:

1. At the main menu, select the Control icon, and press **Enter**.
2. Use the arrow buttons to move the cursor to the option, then press **Enter** to selected the control.

Figure 3.8 Control Screen



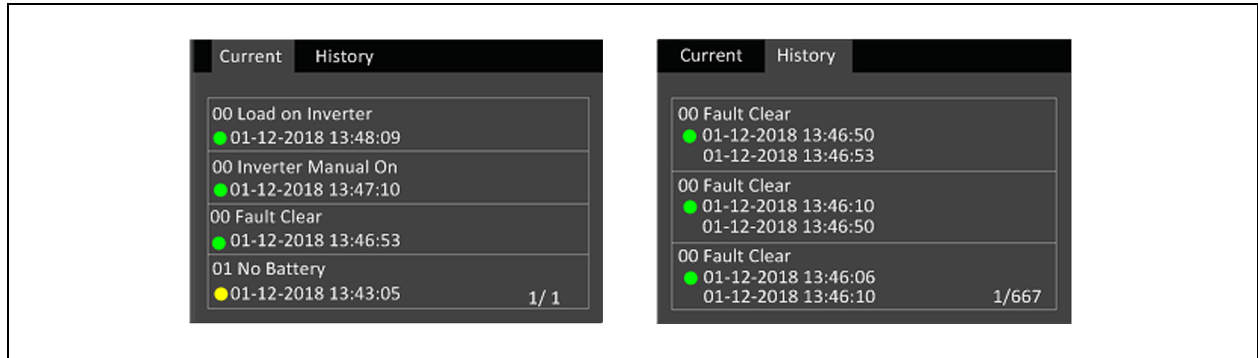
Log Screen

The Log Screen offers tabs that list the current alarms and the alarm/event history.

To view the logs:

1. At the main menu, select the Log icon, and press **Enter**.
2. Use the arrow buttons to move the cursor left/right and select a tab, then press **Enter** to display the log for the selected tab.

Figure 3.9 Current and History Log Tabs



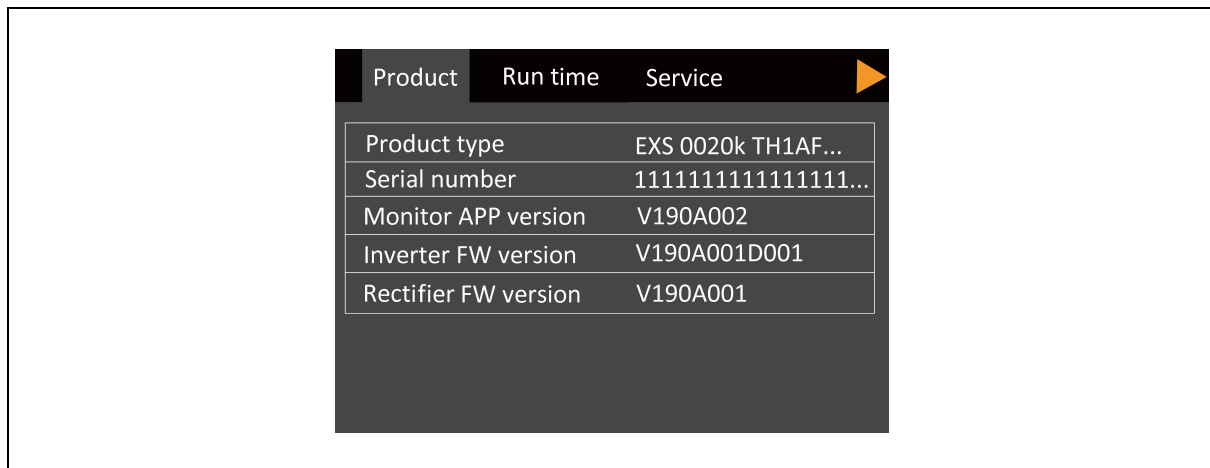
About Page

The About screen offers tabs that list information about the product and the network.

To view the product and network information

1. At the main menu, select the Settings icon, and press **Enter**.
2. Use the arrow buttons to move the cursor left/right and select a tab, then press **Enter** to display the information for the selected tab.

Figure 3.10 About Screen Tabs



4.4 Editing Display and Operation Settings

You may adjust the display settings and UPS configuration via the LCD. **Table 3.5** below, describes the settings. The display and operation settings are password protected. The default password is 111111 (six ones).

NOTE: We recommend that you change the password to protect your system and equipment and record the new password and store it in an accessible location for later retrieval. See [Changing the Password](#) on page 34 .

To enter the password:

1. Press the up-arrow button to change the digit, then press the down-arrow button to move to the next digit.
2. Repeat to select each digit, and press **Enter** to submit the password.

Figure 3.11 Password Prompt

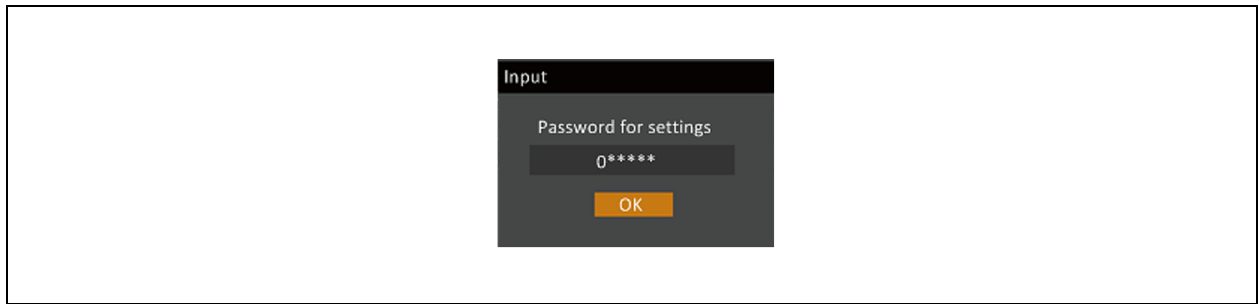


Table 3.5 Settings Available at the Display Panel

Tab	Settings	Parameter range	Default setting
System	Auto restart	Disable, Enable	Enable
	Auto restart delay	0 - 999 seconds	10
	Guaranteed Shutdown	Disable, Enable	Disable
	Remote Control	Disable, Enable	Enable
	Remote Power ON delay	0 - 999 seconds	0
	Remote Shutdown delay	0 - 999 seconds	0
	IT Earthing System	Disable, Enable	Disable
	Dry Contact3 Input	Maintain mode, Any mode shutdown, Battery mode shutdown	Maintain mode
Dry Contact4 Input	Maintain mode, Any mode shutdown, Battery mode shutdown	Maintain mode	

Table 3.5 Settings Available at the Display Panel (continued)

Tab	Settings	Parameter range	Default setting
Output	Voltage Selection	208/120V, 220/127V	208/120V
	Startup On Bypass	Disable, Enable	Disable
	Frequency Selection	Auto w/ Bypass Enable, Auto w/ Bypass Disable, 50Hz w/ Bypass Disable, 60Hz w/ Bypass Disable	Auto w/ Bypass Enable
	Inverter Sync Range	±0.5Hz, ±1.0Hz, ±2.0Hz, ±3.0Hz, ±4.0Hz, ±5.0Hz,	±3.0Hz
	Bypass Voltage Upper Limit	+10%	+10%
	Bypass Voltage Lower Limit	-10%, -15%, -20%	-10%
	Bypass Frequency Range	±5.0Hz, ±10.0Hz	±10.0Hz
	Run Mode	Normal, ECO Mode	Normal
	ECO Voltage Range NOTE: ECO options appear only when in ECO mode	±10%	±10%
	ECO Frequency Range	±1.0Hz, ±2.0Hz, ±3.0Hz	±3.0Hz
	ECO Requalification Time	5, 15, 30 minutes	5
Battery	Shared Battery	Disable, Enable	Disable
	Local Battery total AH	9 - 36	9
	Low Battery Time	2 - 30 minutes	2
	Battery Replaced Time	YYYY-MM-DD HH:MM:SS	2000-01-01 00:00:00
	Battery Test Interval	Disable, 8, 12, 16, 20, 26 weeks	Disable
	Battery Test Weekday	Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday	Wednesday
	Battery Test Time	HH:MM:SS	00:00:00
	Battery Series	24, 32	32
	Discharge Protect Time	1 - 4320 minutes	4320
	Equalize Charge Enable	No, Yes	No
	Temperature Compensation	Disable, Enable	Enable
Replace Battery	By HMI Interface Button	N/A	
Monitor	Language	English, Chinese, French, Portuguese, Spanish	English
	Date	YYYY-MM-DD	2016-10-01
	Time	HH:MM:SS	00:00:00
	Display Orientation	Auto rotate, Horizontal, Vertical	Auto Rotate
	Audible Alarm	Disable, Enable	Enable
	UPS Comm Address	01	01
	Control Port Protocol	Modbus, Sensor	Sensor
	Modbus Address	1 - 128	1
Change Settings Password	0 - 9, must be six digits in length	111111	

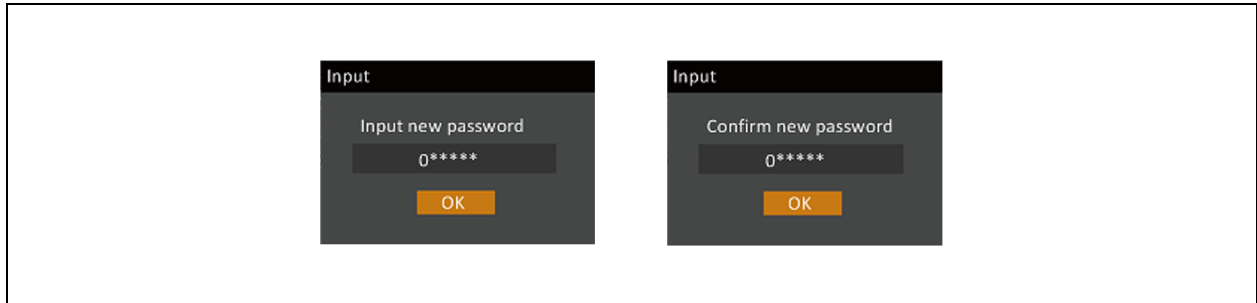
4.4.1 Changing the Password

The default password is 111111 (six ones). You must use the current password to change the password.

NOTE: We recommend that you change the password from the default to protect your system and equipment. Record the new password and store it in an accessible location for later retrieval.

1. At the main menu, select the Settings icon, and press **Enter**.
2. At the password prompt, use the up-arrow to select the first digit, press the down-arrow to move to the next digit, repeat for each digit, then press **Enter** to access the settings.
3. Use the arrow buttons to select the Monitor tab, then press **Enter**.
4. Use the down arrow to highlight *Change Settings Password*, press **Enter**, and re-enter the current password. **The Input new password dialog opens, see Figure 3.12 below .**
5. Enter the new password, then confirm the new password.
A confirmation dialog opens to indicate a successful password change.
6. Press ESC to return to the settings or main menu.

Figure 3.12 New and Confirm Password dialogs



4.4.2 Selecting the Display Language

The LCD is multilingual. The available languages are English, French, Portuguese, Spanish, Chinese, Czech, Dutch, German, Italian, Polish, Russian, Swedish, and Turkish.

To change the language:

1. At the main menu, select the Settings icon, and press **Enter**.
2. At the password prompt, use the up-arrow to select the first digit, press the down-arrow to move to the next digit, repeat for each digit, then press **Enter** to access the settings.
3. Use the arrow buttons to select the Monitor tab, then press **Enter**.
4. Use the down arrow to highlight *Language*, then press **Enter**.
5. Use the up/down arrows to select the language, then press **Enter**. All the LCD elements display in the selected language.

4.4.3 Setting the Date and Time

To adjust the date and time:

1. At the main menu, select the Settings icon, and press **Enter**.
2. At the password prompt, use the up-arrow to select the first digit, press the down-arrow to move to the next digit, repeat for each digit, then press **Enter** to access the settings.
3. Use the arrow buttons to select the Monitor tab, then press **Enter**.

4. Use the down arrow to highlight *Date* or *Time*, then press **Enter**.
5. Use the up/down arrows to select the date/time, then press **Enter to confirm**.

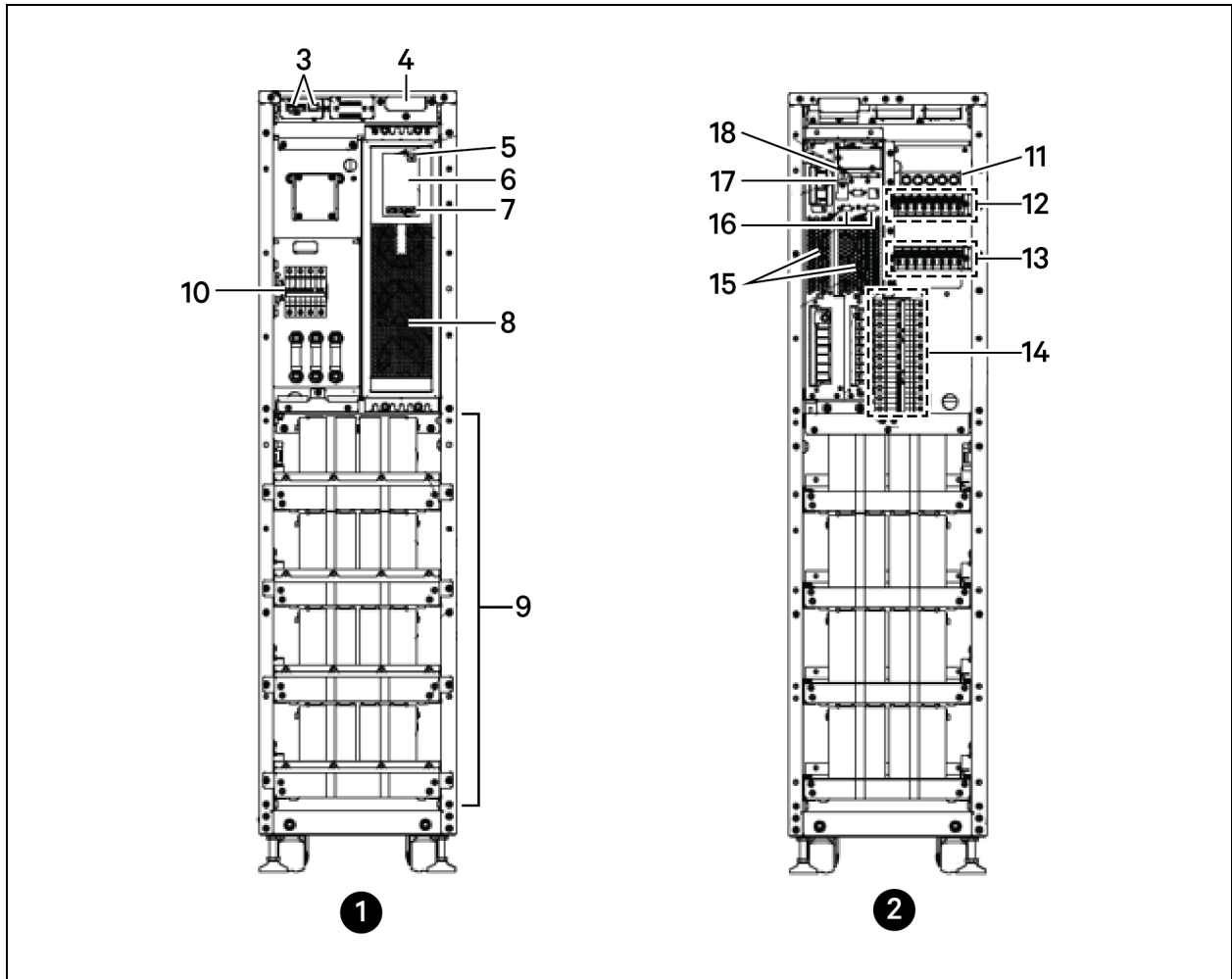
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5 Operating the UPS

5.1 Silencing the Audible Alarm

If the audible alarm is enabled, it may sound during UPS operation. To silence the alarm, press and hold the ESC button for 3 seconds. The button is located on the front-panel display, see [Operation and Display Panel](#) on page 25 .

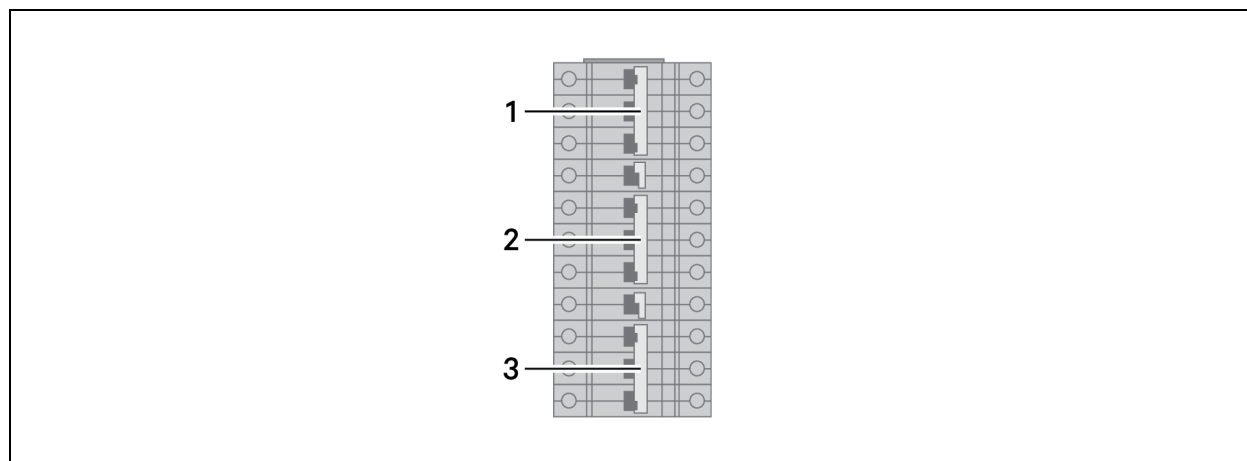
Figure 4.1 UPS Front and Rear View with Covers Removed



Item	Description
1	Front view
2	Rear view
3	IntelliSlot ports
4	Wiring channel (from rear)
5	LED indicators
6	Operation/Display panel

Item	Description
7	Function buttons
8	Ventilation holes
9	Batteries
10	MBB (maintenance-bypass breaker)
11	Ground busbar
12	AC-output terminals
13	AC-input terminals
14	Breakers, see Figure 4.2 below .
15	Ventilation holes
16	Parallel/LBS port
17	USB port
18	REPO ports

Figure 4.2 Rear-panel Breaker Layout



Item	Description
1	MIB (output breaker)
2	RIB (rectifier-input breaker)
3	BIB (bypass-input breaker)

5.2 UPS Start-up

Perform start-up only after the UPS installation is complete, all UPS wiring is complete, and all exterior access panels that were removed for installation are replaced on the UPS.

The start-up procedure starts the UPS in Normal Mode providing clean and protected AC power to the connected equipment.

To start the UPS:

1. Close the upstream feeder breakers for the UPS rectifier and bypass (if wired as dual input).
2. Close all downstream breakers including distribution-panel main breaker and/or branch circuit breakers. If optional PODs are installed, verify that all distribution breakers on the PODs are closed.
3. Ensure that the UPS maintenance bypass breaker (MBB) on the front of the UPS is OPEN and the mechanical interlock is secured in the lower position (near the breaker handle), see **5** on page 37 .
4. Close the rectifier-input breaker (RIB), bypass-input breaker (BIB), and maintenance-isolation breaker (MIB) on the rear of the UPS, see **5** on page 37 , and **Figure 4.2** on the previous page .

NOTE: The MIB is also the main output breaker of the UPS.

When the RIB and BIB breakers are closed, the UPS automatically begins the start-up process and the boot-up system checks, which take approximately 20-30 seconds

5. Before continuing to step 6 , make any changes/customization to the UPS operating parameters for the installation or application, see [Editing Display and Operation Settings](#) on page 32 .
6. After the system checks complete and/or operating parameters are set, press the power button at the front-panel display, then use the up/down arrow buttons to confirm *Turn on local INV*, see **Figure 4.3** below .

Figure 4.3 Turn on local INV



5.3 Transferring from Normal (Inverter) to Bypass Mode

NOTE: When the UPS is in Bypass mode, the load is not protected. It is powered directly by utility power.

To transfer to the internal bypass/turn-off when the UPS is in Normal mode:

Press and hold the power button for 2 seconds.

- If the bypass power is within normal operating range, the option to turn-off the local inverter displays, see **Figure 4.4** below . Confirming this selection initiates a transfer to internal bypass operation.
 - a. Use the up/down arrows to select no or yes, or press the **ESC** to cancel.
 - b. Press **Enter** to confirm the action.
 - c. Press **Enter** again.
- If the bypass power is outside normal operating range, the option to shut-down output displays, see **Figure 4.5** below .
 - a. Use the up/down arrows to select no or yes, or press the **ESC** to cancel.
 - b. Press **Enter** to confirm the action.

Figure 4.4 Turn off inv—Bypass power in normal range

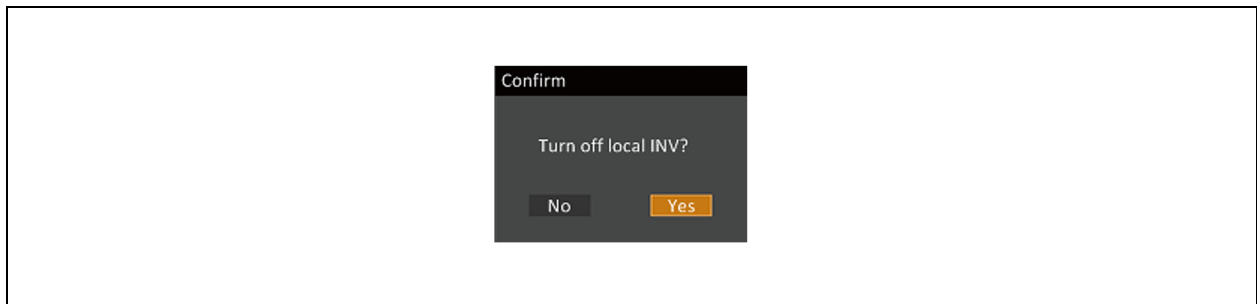


Figure 4.5 Output shutdown—Bypass power outside normal range



5.4 Transferring from Bypass to Normal (Inverter) Mode

To transfer to the inverter (normal operation) or turn on the UPS when the UPS is on internal bypass mode:

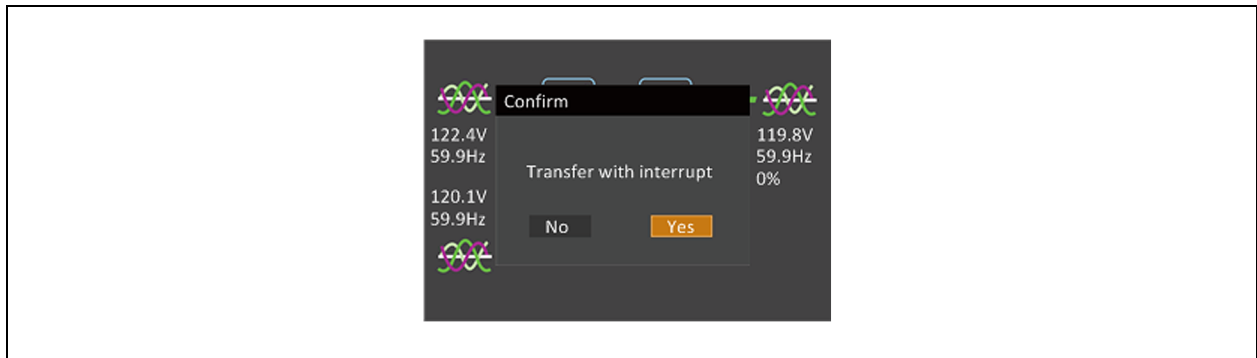
Press and hold the power button for 2 seconds.

- If the UPS is configured for normal operation, the option to turn-on the local inverter displays, see **Figure 4.6** below .
 - a. Use the up/down arrows to select no or yes, or press the **ESC** to cancel.
 - b. Press **Enter** to confirm the action.
 - c. Press **Enter** again.
- If the "Bypass unable to trace" alarm occurs, the option to transfer with interrupt displays, see **Figure 4.7** below .
 - a. Use the up/down arrows to select no or yes, or press the **ESC** to cancel.
 - b. Press **Enter** to confirm the action.

Figure 4.6 Turn on local INV



Figure 4.7 Transfer with interrupt



5.5 Transferring to Maintenance-bypass Mode

The transfer procedure puts the UPS in maintenance-bypass mode for safe servicing by a Vertiv service technician.

To transfer from normal operation to maintenance-bypass mode:

1. Press and hold the power button for 2 seconds.
 - If the bypass power is within normal operating range, the option to go to bypass displays.
 - a. Select *Turn off local INV.*
 - b. Press **Enter** to confirm the action.
 - c. Press **Enter** again.
 - If the bypass power is outside normal operating range, the only option is to turn-off the UPS .
2. Pull down on the slide latch on the front-left panel of the unit to gain access to the Maintenance Bypass Breaker (MBB), refer to [on page 37](#) , and **5** on page 37 .
3. Set this panel aside or lay it gently on top the UPS to avoid scratching the panel or top of the UPS.
4. Loosen the thumb screw on the mechanical interlock on the MBB.
5. Slide the interlock up and tighten the thumb screw to secure the interlock in place.
6. Close the MBB.
7. Electrically isolate the UPS module from AC-power Input by moving to the rear of the UPS and opening the Rectifier Input Breaker (RIB), Bypass Isolation Breaker (BIB), and Maintenance Isolation Breaker (MIB). If external battery cabinets are installed, open the EBC breaker(s).

5.6 Transferring from Maintenance-bypass to Normal Mode

To transfer from maintenance bypass to normal operations:

1. Ensure that the mechanical interlock is still secured in the unlocked position.
2. On the rear of the UPS, close the rectifier input breaker (RIB), bypass input breaker (BIB), and maintenance isolation breaker (MIB), see [Operating the UPS](#) on page 37 .
The UPS performs start-up checks and begins operating in internal bypass mode.
3. Verify that the UPS is operating in internal bypass mode before proceeding.
 - If the unit is not in Bypass mode, see [Transferring from Normal \(Inverter\) to Bypass Mode](#) on page 40 , for the steps.

NOTICE

Risk of improper operation. Failure to have the UPS operating on internal bypass and performing the next step will result in loss of all output power to the connected equipment.

4. On the front of the UPS, open the maintenance bypass breaker (MBB)
5. Loosen the thumb screw on the mechanical interlock on the MBB
6. Slide the interlock down and tighten the thumb screw to secure the interlock in place.
7. Press and hold the “POWER” button for 2 seconds.
8. Select the operation Turn on UPS
 - a. Select *Turn on UPS.*
 - b. Press **Enter** to confirm the action.
 - c. Press **Enter** again.
9. Locate the front-left panel set aside or on top the UPS, and replace it on the UPS.

5.7 Remote Emergency Power-off (REPO)

The UPS is equipped with a remote emergency power-off (REPO) connector for normally-open (N.O.) or normally-closed (N.C.) systems. See [REPO Connection](#) on page 22 , for connection details.

To comply with national and local wiring codes and regulations, field-supplied interface with the external REPO circuit is required to disconnect the UPS input-feed breaker and remove all sources of power to the UPS and connected equipment.

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6 Maintenance

6.1 Cleaning the UPS

Clean the UPS periodically, especially the ventilation holes, to ensure free air flow inside the UPS. If necessary, clean the UPS with a vacuum cleaner or wipe with a dry cloth. Confirm that the ventilation holes are unobstructed.

6.2 Routine Maintenance

There are no user serviceable parts in the UPS. Attempting to service the unit yourself can void the warranty.

Any routine maintenance other than cleaning, must be performed by a Vertiv service technician. Visit <http://www.Vertiv.com/en-us/support/>, or contact your Vertiv representative.

Battery Safety

If the battery kit is damaged in any way or shows signs of leakage, contact Vertiv technical support immediately. Handle, transport, and recycle batteries in accordance with local regulations.



WARNING! Risk of electrical shock. Can cause personal injury and death. When connected together, battery-terminal voltage is potentially lethal. Be constantly aware that the battery system contains high DC and AC voltages. Check for the presence of voltage using DC and AC voltmeters before making contact with terminals.



CAUTION: Do not dispose of the battery in a fire. The battery may explode. Do not open or damage the battery. Released electrolyte is harmful to skin and eyes. If electrolyte comes into contact with the skin, wash the affected area immediately with plenty of clean water and get medical attention.

A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:

- Remove watches, rings and other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Determine if the battery is inadvertently grounded. If it is inadvertently grounded, remove the source of the ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if grounds are removed during installation and maintenance (applicable to a UPS and a remote battery supply not having a grounded supply circuit).

The UPS is equipped with long-life, sealed, valve-regulated lead-acid batteries (VRLA), also known as “maintenance-free” batteries. The battery life depends upon the operating ambient temperature of the UPS system. To prolong battery life:

- Keep the ambient temperature between 68°F and 77°F (20°C and 25°C)
- Prevent long low current discharges
- Charge the battery for at least 8 hours if the battery hasn't been charged for three months when it has been stored at the specified ambient temperature, or two months when it has been stored at high ambient temperature

The waste lead-acid battery is dangerous waste material. Its storage, transportation, usage, and disposal must follow national and local laws and other criteria about dangerous waste material and waste battery pollution prevention.

Per the related regulations, recycle the waste lead-acid battery. Other disposal methods are prohibited. Disposing of the waste lead-acid battery in a landfill or other waste dump can result in serious environment pollution and violates national and local laws.

Vertiv has a service network and recycle system to assist in complying with laws governing waste battery disposal. Visit <http://www.Vertiv.com/en-us/support/> for information about recycling the waste battery.

7 Optional Accessories

Table 6.1 Options List

Option	Part Number	Description
Parallel Communication Cable	ITA2-PARACBL1M	Parallel communication cable, 3 feet (1 meter) long
	ITA2-PARACBL3M	Parallel communication cable, 9.8 feet (3 meters) long
	ITA2-PARACBL4M	Parallel communication cable, 13 feet (4 meters) long
	ITA2-PARACBL10M	Parallel communication cable, 32.8 feet (10 meters) long

NOTE: One (1) parallel communication cable is required for each UPS in the parallel system.

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8 Specifications

Table 7.1 Specifications

Item	Description	Liebert® EXS Model
		10 kVA/kW
Input	Rated Voltage	208/120VAC or 220/127VAC; 3 Phase, 4W+Gnd
	Voltage Range	96-144VAC (L-N)
	Rated Frequency	60 Hz
	Frequency Range	40-70Hz
	Power Factor	≥0.99 at full load; ≥0.98 at half load
	Current Distortion THDi	≤5%
Output	Rated Power	10kVA / 10kW
	Voltage	208/120VAC or 220/127VAC; 3 Phase, 4W+Gnd
	Frequency Synchronization Range	Rated Frequency ±3Hz; Selectable range±0.5Hz to ±5Hz
	Slew Rate	0.5Hz/s; Selectable 0.2Hz/s, 0.5Hz/s, 1.0Hz/s
	Rated Power Factor	1.0 (Unity)
	Load Power Factor Range	0.5 lagging to 0.5 leading
	Load Crest Factor	3:1
	Voltage Distortion THDv	≤4% linear load; ≤5% non-linear load
	Transient Voltage Response	±5% for 0%-100%-0% load steps
	Transient Recovery Time	To within ±1% of nominal in 60ms
	Overload Capabilities	100%-105% continuous
		105%-125% 5 minutes then transfer to bypass
		125%-150% 1 minute then transfer to bypass >150% 200ms then transfer to bypass
	AC-AC Efficiency	Up to 93.4% online mode, 99% ECO mode
Bypass Voltage Range	±10% default, -15%, -20% user selectable	
Transfer Time (utility to battery)	0ms	
Transfer Time (inverter to bypass)	Synchronous transfers: 0ms	
	Asynchronous transfers: ≤20ms (default); 40/60/80/100/200ms user selectable	
Battery	Standard Type	Sealed Valve Regulated Lead Acid (VRLA)
	Number Cells per string	192 default
	Open Cell Voltage	384 VDC
	Charge Current (maximum)	3.5A
Environmental	Operating Temperature	32°F to 122°F (0°C to 50°C); Derating required above 104°F (40°C)

Table 7.1 Specifications (continued)

Item	Description	Liebert® EXS Model	
		10 kVA/kW	
Safety		68°F to 77°F (20°C to 25°C) for optimum battery life	
	Storage Temperature	5°F to 131°F (-25°C to 55°C)	
	Relative Humidity	0-95% non-condensing	
	Operating Altitude	Sea level to 10,000 ft (3,000m) without derating	
	Audible Noise	<60dBA maximum measured at 39 inches (1 meter)	
	Protection Level	IP20	
	Agency	cULus (UL 1778 5th Edition, CSA No.22.2 107.3);	
	EMC	FCC Part 15, Class A; IEC/EN62040-2 Class A	
	Harmonic	IEC/EN61000-3-12	
	Surge	ANSI C62.41, 6kV/20ohms; IEC/EN-61000-4-5, Level 4 (4kV) (line to earth), Level 3 (2kV) (line to line)	

Table 7.2 Physical Specifications

	UPS with 1 Battery String	UPS with 2 Battery Strings	UPS with 3 Battery Strings	UPS with 4 Battery Strings
Dimensions, W x D x H inches (mm)				
Unit	13.2 x 25.6 x 51.2 (335 x 650 x 1300)		22.7 x 25.6 x 51.2 (576 x 650 x 1300)	
Shipping	16 x 30 x 60 (406.4 x 762 x 1524)		36 x 48 x 60 (914.4 x 1219.2 x 1524)	
Weight, lbs (kg)				
Unit	437 (198.2)	627 (284.4)	893 (405.1)	1,093 (495.8)
Shipping	487 (220.9)	677 (307.1)	1,011 (458.6)	1,211 (549.3)
Color	Black-Gray (RAL 7021)			

Table 7.3 Battery Run Time in Minutes—10-kVA Models

Battery-string Qty.	Load Level											
	100%	90%	80%	75%	70%	60%	50%	40%	30%	25%	20%	10%
	10kW	9kW	8kW	7.5kW	7kW	6kW	5kW	4kW	3kW	2.5kW	2kW	1kW
1	6	7	9	10	12	15	18	23	34	38	50	106
2	18	20	23	25	28	34	38	50	73	90	107	189
3	30	34	36	38	40	50	66	81	107	129	150	306
4	38	41	50	54	62	73	91	107	140	156	190	328

Run times shown are approximate. They are based on new, fully-charged batteries at a temperature of 77°F (25°C) with 100% resistive UPS loading. Different loading will change the actual run times. Run times listed may vary by ±5% due to manufacturing variances of the batteries.

Appendices

Appendix A: UPS Prompts and Alarms

A.1 Prompt Window

A prompt window is displayed during the operation of the system to alert you to certain conditions and/or to require confirmation of a command or other operation.

Table A.1 UPS Prompts

Prompt	Description
System setting is different, please check	Appears only for a parallel system when the parallel setting parameters are different
Cannot set this on-line, please shut down output	Appears when attempting to change important output settings (such as voltage and frequency) while the UPS inverter is supplying output power
Incorrect password, please input again	Appears when an incorrect settings password was entered
Password changed OK	Appears when the settings password was successfully changed
Fail to change password, please try again	Appears when the confirmation password did not match when attempting to change the settings password
Operation failed, condition is not met	Appears when the user attempts to execute an operation (such as initiate a manual battery test), but the conditions are not met to execute the operation
The time cannot be earlier than system time	Appears when attempting to set the Turn On Delay or Turn Off Delay time and it is earlier than the system time
Turn on failed, condition is not met	Appears when the power button is pressed when the LCD is in the "Control" menu section

A.2 Alarms, Faults, and Warnings

A warning or alarm or fault can be displayed during the operation of the system to alert you to certain conditions and/or to require action or other operation.

Table A.2 UPS Alarm and Warning Messages

Alarm/Warning	Description	Action
Aux power fault	The auxiliary power supply voltage is out of range	Contact Vertiv Technical Support
Battery aged	The battery capacity is less than 25% of the initial capacity	Replace battery
Battery EOD	The battery has reached End Of Discharge due to a prolonged utility power outage and depletion of all battery power	Check the upstream input breaker(s) to ensure they are closed and wait for input power to return or Contact Vertiv Technical Support
Battery low pre-warning	This alarm occurs when the battery reaches the low battery setting and is near the end of battery power	Check the upstream input breaker(s) to ensure they are closed and/or orderly shut down connected equipment

Table A.2 UPS Alarm and Warning Messages (continued)

Alarm/Warning	Description	Action
Battery mode	The UPS is operating on battery power	Check the upstream input breaker(s) to ensure they are closed
Battery overtemp	The battery temperature has exceeded the threshold setting	Verify the ventilation openings are not block or Contact Vertiv Technical Support
Battery reversed	The battery polarity is reversed	Call a qualified electrician to verify the battery wiring or Contact Vertiv Technical Support
Battery series not qualified	The battery detected does not match the setting parameter	Call a qualified electrician to verify the battery wiring or Contact Vertiv Technical Support
Battery test failed	The battery capacity dropped below the threshold for the battery test	Replace battery
Battery test started	The battery test has been started either by automatic or manual initiation	None required
Battery test stopped	The battery test has been stopped either by completion or manual initiation	None required
Battery to utility transition	The load is powered by bypass (utility) power due to depletion of battery power or battery failure	Check the upstream input breaker(s) to ensure they are closed and wait for input power to return or Contact Vertiv Technical Support
Battery voltage abnormal	The battery voltage is outside of normal operating parameters	Contact Vertiv Technical Support
Bypass abnormal	The bypass input voltage or frequency exceeds normal operating range	Check the upstream bypass input breaker(s) to ensure they are closed
Bypass abnormal in ECO mode	The bypass input voltage or frequency exceeds normal operating range; the UPS is operating in online or battery mode	Check the upstream bypass input breaker(s) to ensure they are closed
Bypass back-feed	A bypass short circuit has been detected while in battery mode	Contact Vertiv Technical Support
Bypass disabled	This alarm will be generated if in the settings menu, if the output frequency is set to Auto, BypDisa or 50 Hz, BypDisa or 60 Hz, BypDisa	None required or change setting to Auto, BypEna
Bypass mode	The UPS is operating on bypass power	Check UPS display for other alarms or Contact Vertiv Technical Support
Bypass over current	The connected equipment has exceeded the bypass ratings.	Verify the connected load and disconnect any unauthorized equipment or check if load is properly balanced
Bypass phase reversed	The AC bypass input phase rotation is reversed in a single module system system.	Call a qualified electrician to verify the input phase rotation or Contact Vertiv Technical Support
Charger fault	The charger output voltage is abnormal and the charger has been turned off	Contact Vertiv Technical Support
Communication fail	An internal communication problem has been detected	Contact Vertiv Technical Support
DC bus abnormal	A DC bus fault has occurred and the load will transfer to bypass power if available	Contact Vertiv Technical Support
DC/DC fault	A failure of the DC/DC charger has been detected	Contact Vertiv Technical Support
Electric leak alarm	The UPS has detected a short between the DC bus	Contact Vertiv Technical Support

Table A.2 UPS Alarm and Warning Messages (continued)

Alarm/Warning	Description	Action
	or battery and the UPS enclosure	
EOD turn off	The UPS inverter is OFF due to depletion of battery power	Check the upstream input breaker(s) to ensure they are closed and wait for input power to return
Fan fault	At least one cooling fan has failed or is not operating with proper air flow	Contact Vertiv Technical Support
Faults cleared	All faults have been cleared by manual initiation from the display	None required
Guaranteed shutdown	The UPS output has been shut down to recycle output power after the low battery pre-warning was issued	None required
Input abnormal	The rectifier and charger are OFF due to input voltage or frequency exceeding normal operating range	Check the upstream input breaker(s) to ensure they are closed
Input back-feed	A rectifier short circuit has been detected while in battery mode	Contact Vertiv Technical Support
Input neutral lost	The UPS has detected that the input neutral conductor is missing or has been disconnected	Call a qualified electrician to verify the input neutral connection or Contact Vertiv Technical Support
Input PE lost	The UPS has detected that the input ground conductor (PE) is missing or has been disconnected	Call a qualified electrician to verify the input ground connection or Contact Vertiv Technical Support
Input phase reversed	The AC rectifier input phase rotation is reversed.	Call a qualified electrician to verify the input phase rotation or Contact Vertiv Technical Support
Inverter fault	A fault in the UPS inverter has occurred and the load will transfer to bypass power if available	Contact Vertiv Technical Support
Inverter overload	The connected equipment has exceeded the inverter ratings. The load will transfer to bypass power if available, otherwise it will shutdown	Verify the connected load and disconnect any unauthorized equipment or check if load is properly balanced
Inverter relay welded	The inverter relay has shorted.	Contact Vertiv Technical Support
Load off due to shut down on battery	The UPS received a command to shut down while on battery power	Verify the reason for the remote command and then restart the UPS
Local parallel setting async	Parallel settings are different	None required
Local settings sync OK	In a parallel system, the local UPS parameters have been synchronized with the other units in the system	None required
Manual power ON	The UPS was manually turned ON from the display	None required
Manual shut off	The UPS was manually turned OFF from the display	None required
Manual shutdown	The UPS was manually turned OFF from the display	None required
No battery	Either no battery is connected or the battery connections have become loose or disconnected	Call a qualified electrician to verify the battery wiring or Contact Vertiv Technical Support
On maintenance bypass	The dry contact on the maintenance bypass is activated and inverter power is inhibited	Check the MBB breaker or Contact Vertiv Technical Support
Output disabled	The UPS is in standby and the UPS received a command to shutdown	Verify the reason for the remote command and then restart the UPS

Table A.2 UPS Alarm and Warning Messages (continued)

Alarm/Warning	Description	Action
Output LPE short	The UPS has detected a short between the output and the UPS enclosure	Contact Vertiv Technical Support
Output OFF due to overload & bypass abnormal	The UPS output power has been shut down due to output overload and bypass power was not available due to outside of operational parameters	Verify the connected load and disconnect any unauthorized equipment or check if load is properly balanced
Output off, voltage is not zero	An output voltage is still being detected when the UPS output is OFF	Contact Vertiv Technical Support
Output short	An output short circuit has been detected	Remove all loads, restart the UPS, then turn loads on one at a time to locate the failed equipment
Parallel cable connection abnormal	The parallel communication cables are loose or improperly connected	Verify the parallel communication cable connections
Parallel comm fault	The local UPS and its configuration settings are different than the other units in the system or the parallel address conflicts with others in the system	Verify the parallel system settings of all unit's match
Parallel No. abnormal	The UPS has detected a different number of units in the parallel system than what is programmed on the setting screen.	Verify that the parallel unit number on the settings screens is the same as the number of UPS unit in the system and that the parallel cables are connected properly
Rectifier fault	A failure of the rectifier has been detected	Contact Vertiv Technical Support
Rectifier overload	The output power of the rectifier exceeds its rating limits	Contact Vertiv Technical Support
Remote power OFF	The UPS received a command to turn OFF the output	None required
Remote power ON	The UPS received a command to turn ON the output	None required
Remote shut down	The UPS received a command to shut down in any mode of operation	Verify the reason for the remote command and then restart the UPS
REPO	UPS has shut down due to activation of the REPO circuit	Check REPO circuit to reset it and manually restart the UPS
Restore factory defaults	The UPS was manually initiated to reset all settings to the factory defaults from the display	None required
Shutdown due to overtemp	Internal temperatures have exceeded threshold settings and the UPS has shutdown	Verify the ventilation openings are not block or Contact Vertiv Technical Support
System fault	The UPS model identification is not correct for the firmware in the unit	Contact Vertiv Technical Support
System low battery prewarning	In a parallel system, all units have reached the low battery set point	Check the upstream input breaker(s) of all units to ensure they are closed and/or orderly shutdown connected equipment
System overload	The parallel system load exceeds the parallel system settings	Verify the parallel system settings, remove unauthorized loads, or Contact Vertiv Technical Support
System overtemp	Internal temperatures have exceeded threshold settings	Verify the ventilation openings are not block or Contact Vertiv Technical Support
System parallel setting async	Parallel settings are different	Verify the parallel settings in each unit to ensure they are the same or Contact Vertiv Technical Support

Table A.2 UPS Alarm and Warning Messages (continued)

Alarm/Warning	Description	Action
System parallel settings start sync	The Sync Parallel Parameters command was manually initiated from the display	None required
System settings sync OK	In a parallel system, all the UPS in the system have been synchronized	None required
System warning	In a parallel system, the output frequency of the units is not synchronized	Shut down all UPS units and restart the system or Contact VertivTechnical Support
UPS out of service	In a parallel system, the UPS has been manually taken out of service for maintenance	None required
Version incompatible	The UPS firmware version between the control board and display are not compatible	Contact VertivTechnical Support

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