Liebert® ITA2

Installer/User Guide

15 - 20kVA, 50/60Hz, 208/220V, Three-Phase UPS
40kVA, 50/60Hz, 220/230/240V, Three-Phase UPS

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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.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE: This device complies with Part 15 of the FCC Rules.

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2 Product Description

The Vertiv™ Liebert® ITA2 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 Front Panel Components

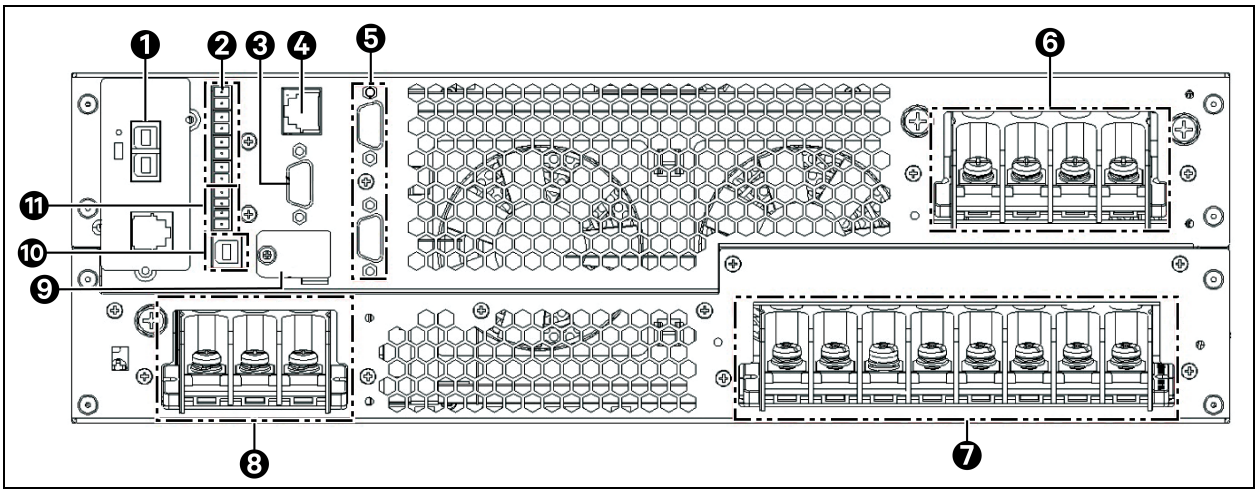
The front panel of the UPS provides ventilation holes and an operation/display panel with LED indicators and function keys.

Figure 2.1 Liebert® ITA2 UPS

Item	Description
1	LCD Panel. See Operation and Display Panel on page 43.
2	Run/Alarm indicator LEDs, see LED Indicators on page 44.
3	Function keys, see Operation and Display Panel on page 43.
4	Ventilation holes LCD panel.

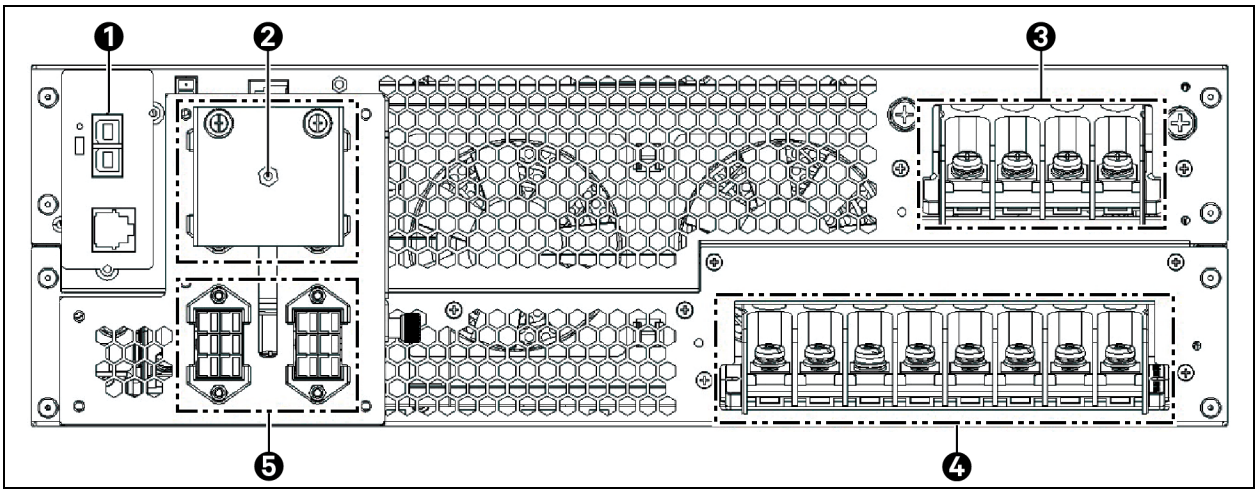
2.2 Rear Panel Components

Figure 2.2 UPS Rear Panel with Terminal Block Battery Connectors



Item	Description
1	Vertiv™ Liebert® IntelliSlot™ port (Default as UNITY card)
2	Dry contact port
3	RS 232 port
4	Reserved built-in Internet port (Internet function not available right now)
5	Parallel/LBS ports
6	AC output terminals
7	AC input terminals
8	Battery input terminals
9	Multi-function port
10	USB port
11	REPO port

Figure 2.3 UPS Rear Panel with Plug-n-Play Battery Connectors



Item	Description
1	Vertiv™ Liebert® IntelliSlot™ port
2	Li-ion battery connector ports
3	VRLA battery connector ports
4	AC input terminals
5	AC output terminals

NOTE: The Dry contact port, REPO port, Reserved built in internet port, RS232 port, Multi-function port and Parallel/LBS port are behind the Plug-n-Play battery junction box.

2.3 UPS States and Operating Modes

NOTE: See Table 4.2 on page 45, for description of the run indicator and alarm indicator LEDs mentioned in this section.

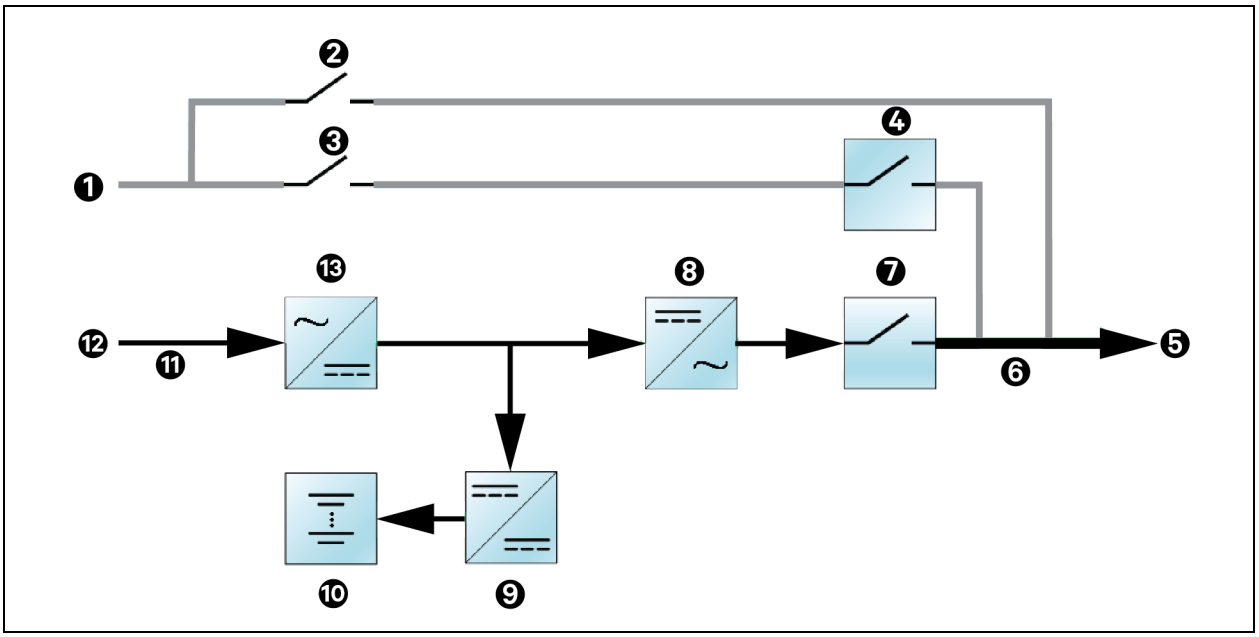
The UPS state and operation mode includes Normal mode, Bypass mode, Battery mode, ECO mode, Fault state Maintenance Bypass mode and Service mode. The operation schematic diagrams of Normal mode, Bypass mode, Battery mode, Maintenance Bypass mode and Service mode are shown in Figure 3.5 on page 19 to Figure 3.8 on page 25.

NOTE: Only when the UPS output maintenance bypass cabinet (MBC) is configured, the Maintenance Bypass mode is valid.

2.3.1 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 2.4 Normal Mode Operation

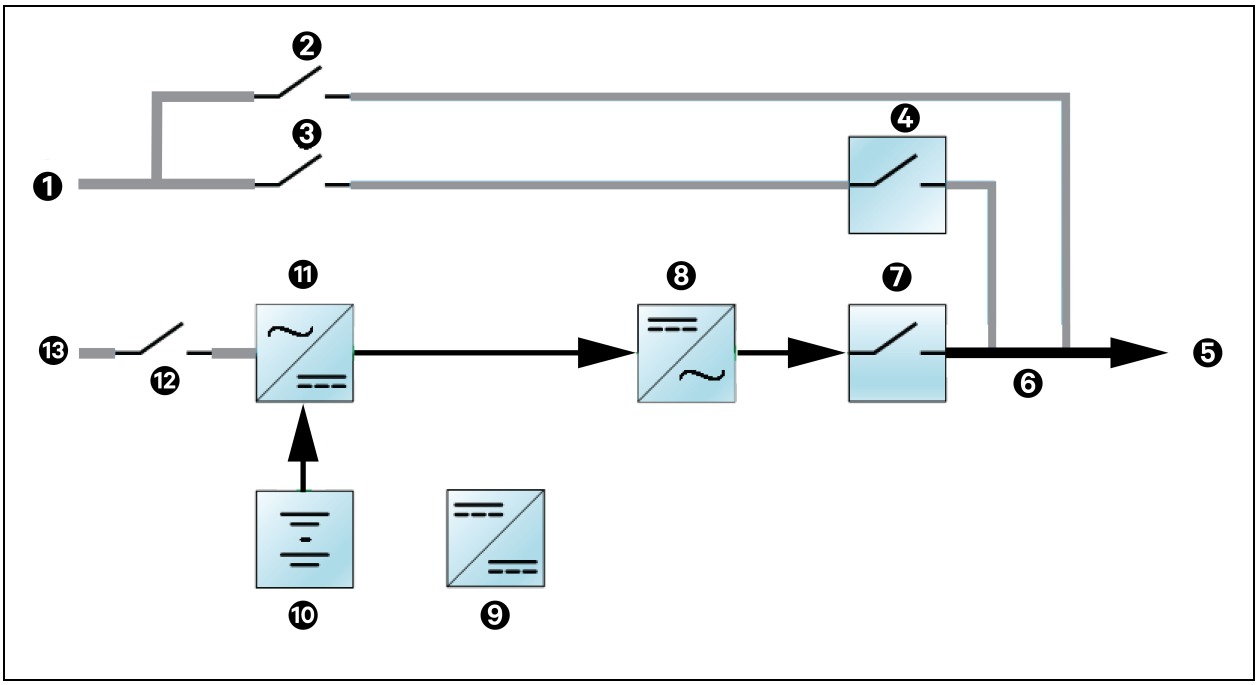


Item	Description
1	Bypass input
2	Maintenance bypass breaker (MBB)
3	Bypass input breaker (BIB)
4	Static switch
5	UPS output
6	Main output breaker (MOB)
7	Automatic inverter switch
8	Inverter
9	Battery charger
10	Battery
11	Rectifier input breaker (RIB)
12	Rectifier input
13	Rectifier

2.3.2 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 2.5 Battery Mode Operation

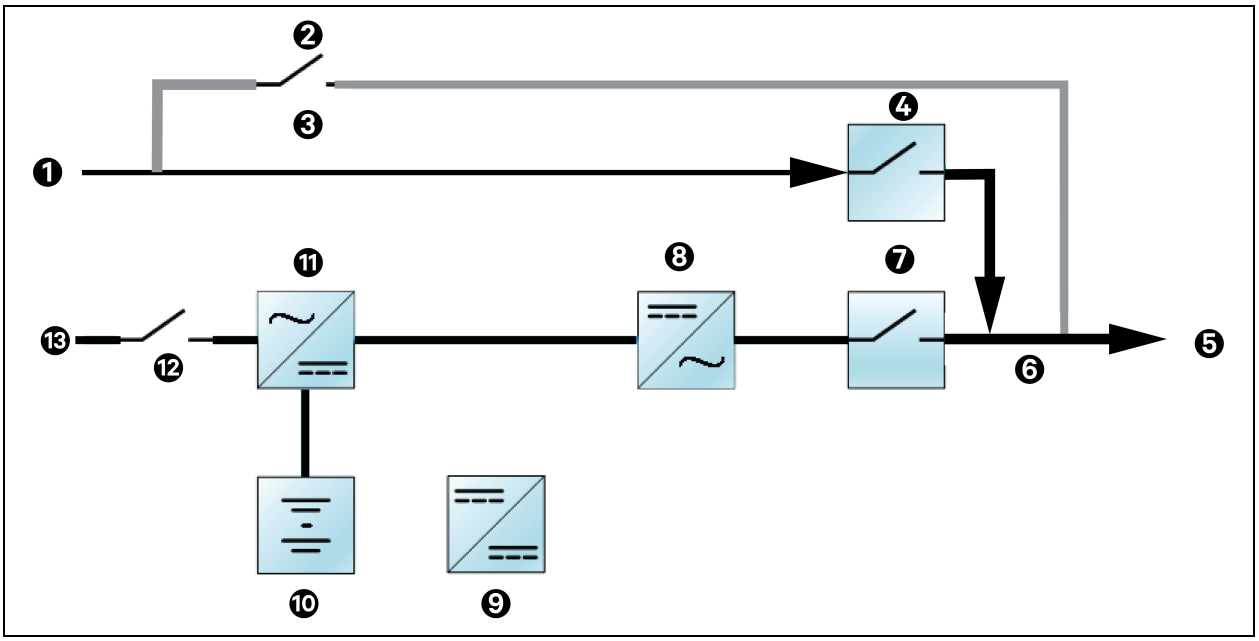


Item	Description
1	Bypass input
2	Maintenance bypass breaker (MBB)
3	Bypass input breaker (BIB)
4	Static switch
5	UPS output
6	Main output breaker (MOB)
7	Automatic inverter switch
8	Inverter
9	Battery charger
10	Battery
11	Rectifier
12	Rectifier input breaker (RIB)
13	Rectifier input

2.3.3 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 2.6 Bypass Mode Operation



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

2.3.4 Auto Restart Mode

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

2.3.5 Fault State

When the UPS is in Normal Mode and the inverter fails or UPS overtemperature occurs, operation transfers to Bypass Mode. When the UPS is in Battery Mode (with no bypass utility), and the inverter fails or overtemperature 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.

2.3.6 Start up on Bypass Mode

Default : Disabled. When the inverter is in the soft start stage, the bypass mode will not be automatically triggered.

Change the startup on bypass via Paramset or the LCD settings page to enable.

When the DC bus soft start is completed, the bypass mode will be automatically triggered. If the inverter can enter the soft start stage and the soft start is completed, the ups will automatically switch from bypass mode to normal mode.

When the DC bus soft start is completed, the bypass mode will be automatically triggered. If the inverter can not automatically enter the soft start phase, the ups will always operate in the bypass mode.

2.3.7 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.

The optional Vertiv™ Liebert® ITA2 maintenance bypass cabinet (MBC) is required for this mode. If your system includes a Liebert ITA2 MBC, refer to the *Liebert®* ITA2 MBC Installer/User Guide available on the product page at *www.Vertiv.com*.

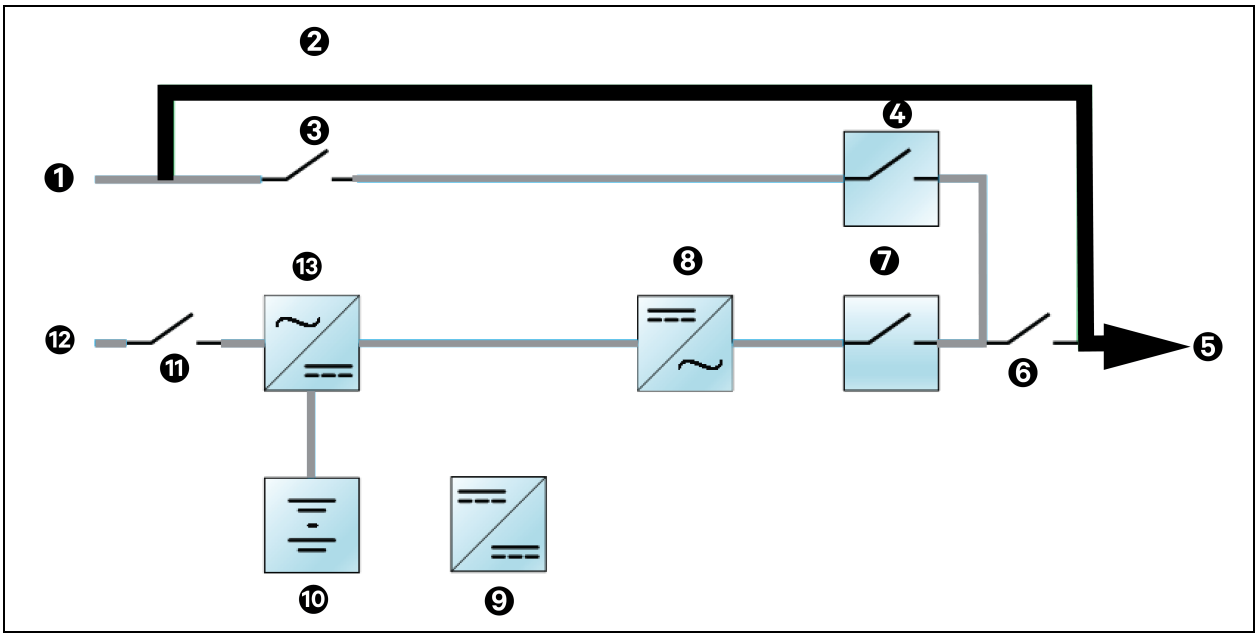
NOTICE

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 2.7 Maintenance Bypass Mode Operation



2.3.8 Service Mode

Used when it's required to launch PFC and INV in maintenance mode checking if the UPS works normally or not.

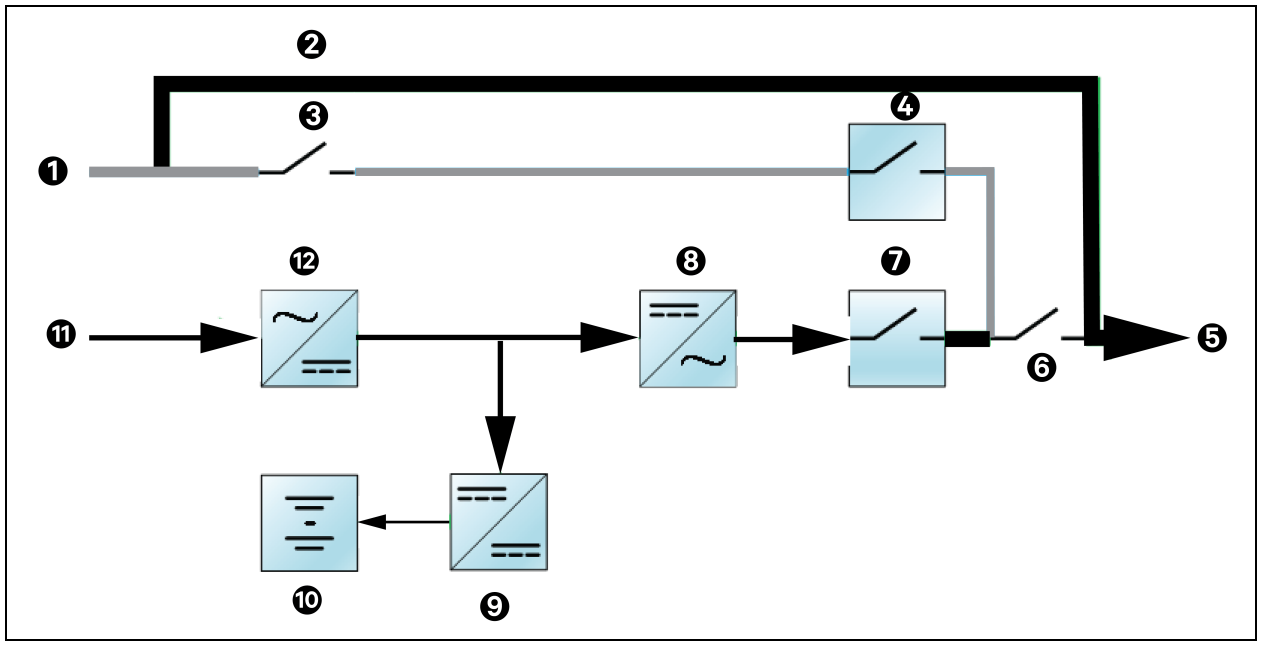
The optional Liebert® ITA2 maintenance bypass cabinet (MBC) is required for this mode. If your system includes a Liebert® ITA2 MBC, refer to the Liebert® ITA2 MBC Installer/User Guide available on the product page at www.Vertiv.com.

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.

Figure 2.8 Service Mode Operation



2.3.9 ECO Mode (For single configuration or 1+1 parallel configuration)

In ECO mode, the load is powered by bypass when the bypass voltage is normal, and the load is powered by inverter when the bypass voltage is abnormal. ECO mode is also called as an energy saving operation mode. For power equipment insensitive to power grid quality, use the ECO mode for power supply through bypass to reduce the power loss.

NOTE: In ECO mode, if the bypass fails or abnormal bypass voltage appears when the output is not overloaded, the UPS will transfer to Normal mode. However, if the bypass failure or abnormal bypass voltage appears when the output is overloaded, the UPS will not transfer to Normal mode, but shut down the bypass.

NOTE: In ECO mode, the efficiency of the UPS is up to 99%. for Vertiv™ Liebert® ITA2 40 kVA 400 V UPS and up to 98% for Vertiv™ Liebert® ITA2 20 kVA 208 V UPS.

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3 Installation

Installation must be performed by properly trained and qualified personnel. Do not start the UPS until after the installation is finished and the system is commissioned by an authorized engineer.

WARNING! Risk of electrical shock. Can cause property damage, injury, and death. The unit has several circuits that are energized with high DC and AC voltages. Check for voltage with both AC and DC voltmeters before making contact and before working within the UPS. Only properly trained and qualified personnel wearing appropriate, OSHA-approved personal protective equipment (PPE) should prepare for installation, install and maintain the equipment. When performing maintenance with any part of the equipment under power, service personnel and test equipment must stand on rubber mats.

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.

WARNING! Risk of heavy unit falling. Improper handling can cause equipment damage, injury, and death. Exercise extreme care when handling unit cabinets and rack-mounted units to avoid equipment damage or injury to personnel. The UPS weighs approximately 66.1 lb. (30 kg).

NOTE: The UPS can be connected to 3-phase, 5-wire (A, B, C, N, PE) TN, TT and IT AC power distribution system (IEC60364-3).

3.1 Pre-Installation Preparation

Before beginning the installation, consider the environmental requirements, service clearances and external protective devices for installing the equipment.

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 67.

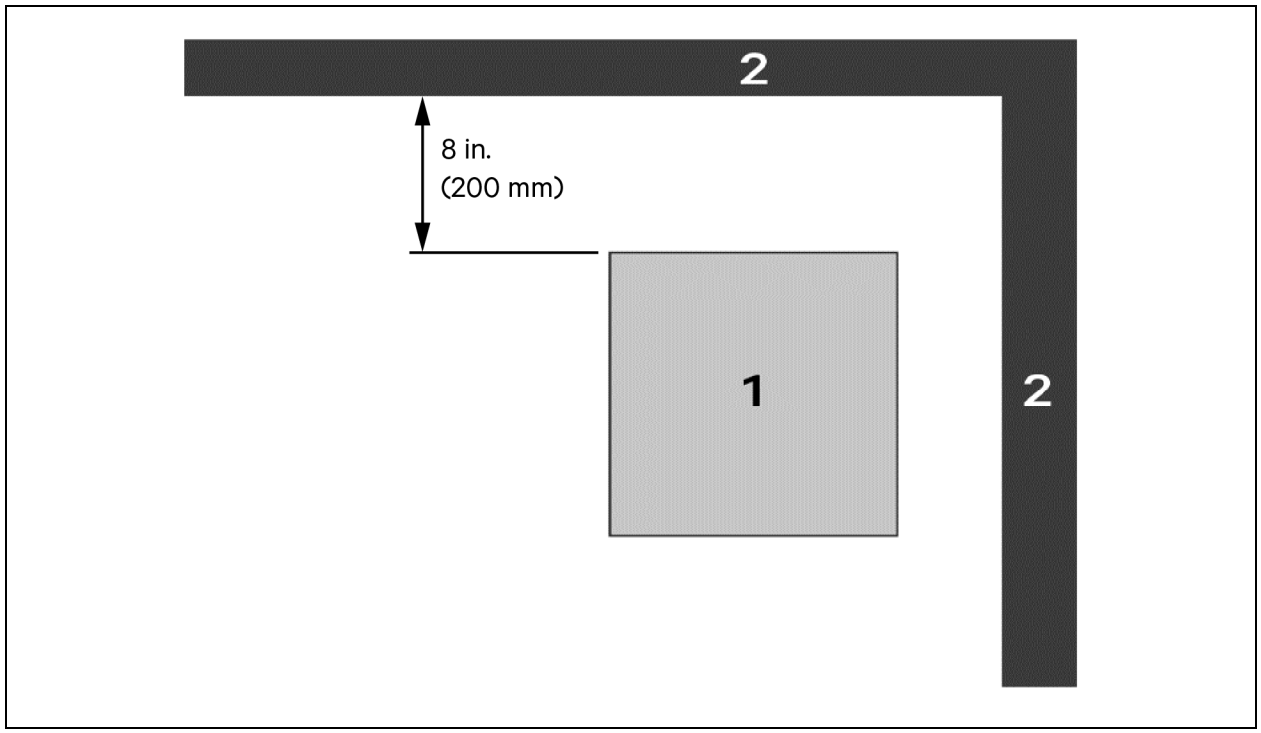
The environment must:

- Have convenient wiring.
- Have adequate access for operators.
- Be clean and well ventilated.
- Be free from water, heat source and flammable and explosive substances.
- Be free from dust, volatile gases and corrosive materials.
- Comply with local fire codes.

3.1.2 Installation Clearances

Internal fans provide forced air cooling for the UPS. Cooling air enters through the front panel and hot air is exhausted through the back. Maintain at least 8 in. (200 mm) in the front and rear of the UPS, see Figure 3.1 below.

Figure 3.1 Required Clearances



Item	Description
1	UPS (top view).
2	Wall or other solid surface.

3.1.3 Installation Tools

IMPORTANT! All tools used to install and maintain the Liebert® ITA2 UPS and equipment must be insulated.

The following tools are required to properly install your UPS:

- Torque Wrench
- Slotted screwdriver
- Multimeter
- Three (3) Phillips head screwdriver
- T10 Torx screwdriver

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 to 77 °F (20 °C to 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 the storage temperature:

- At 68 °F to 77 °F (20 °C to 25 °C): charge after 6 months in storage.
- At 78 °F to 86 °F (26 °C to 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 and 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 on the utility input power distribution terminals. Consider the current capacity of power cables and the system overload requirements in selection of the input protection and wiring, see Table 3.1 on page 21 and Table 3.2 on page 21.

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

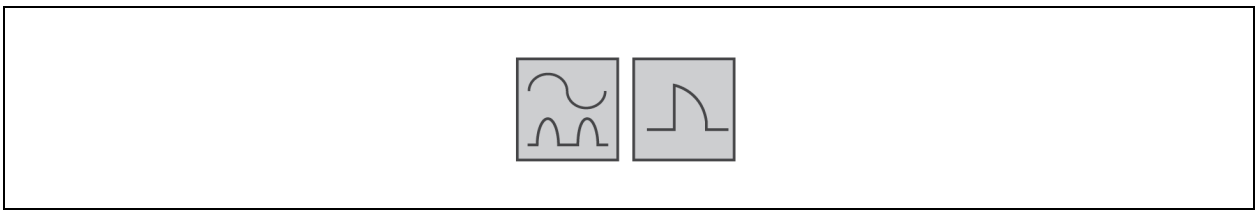
Back Feed Protection: The UPS includes back feed protection in the event of a fault to prevent conducting hazardous voltages upstream of the UPS when the supply has been removed from the UPS.

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: 0.3 A to 1 A.

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 3.2 below.

Figure 3.2 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. Vertiv recommends that you verify the sensitivity of each differential device of the upstream input power distribution and downstream power distribution (to load).

IMPORTANT! This device has a high leakage current to ground during phase loss, and a grounding connection must be made before connecting to the power supply.

Battery

The UPS includes an overcurrent protection device for the 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

WARNING! Risk of heavy unit falling. Improper handling can cause equipment damage, injury, and death. Exercise extreme care when handling unit cabinets and rack-mounted units to avoid equipment damage or injury to personnel. The UPS weighs approximately 66.1 lb. (30 kg).

During unpacking:

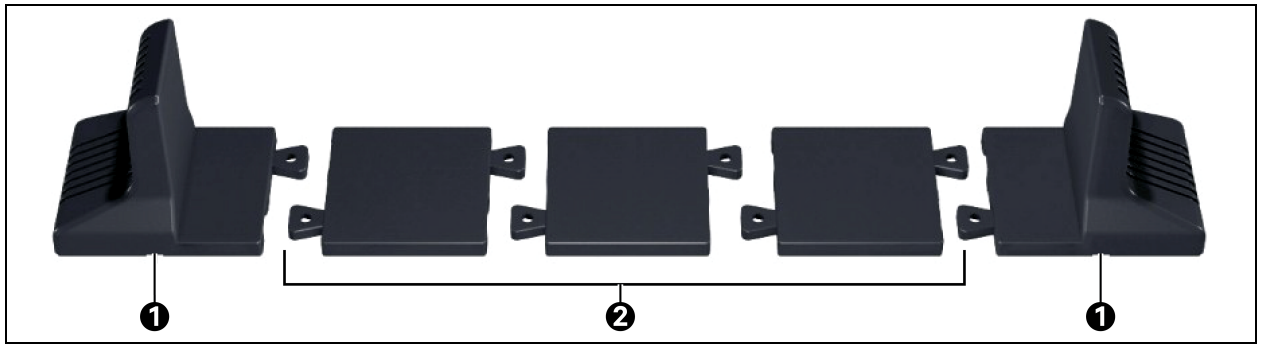
- Inspect the UPS for damage. If any damage is found, document and photograph the damages and notify your local Vertiv representative.
- Check the accessories and model numbers against the delivery list. If you find any problem, notify your local Vertiv representative immediately.

3.3 Tower Installation

NOTE: The UPS may be installed with a maintenance bypass cabinet (MBC) or battery cabinets. If so, install the MBC and battery cabinets before installing the UPS.

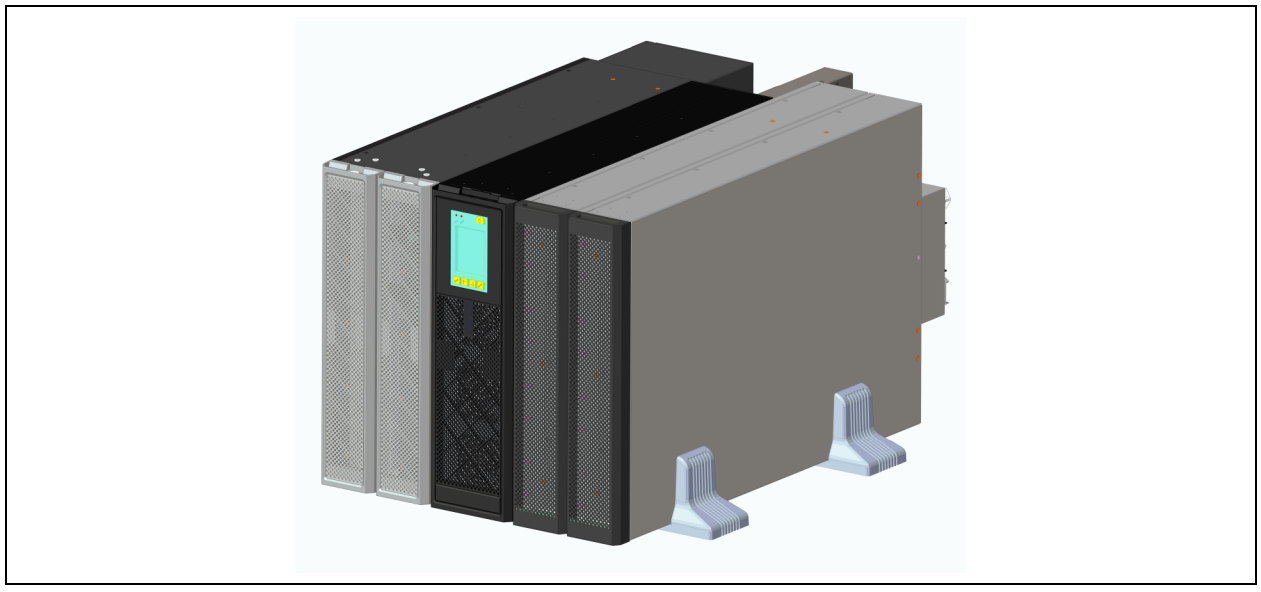
1. Take the support bases out of the accessories box.
2. If battery cabinets will be connected, take out the spacers that shipped with the battery cabinet.
3. If the MBC will be connected, take out the spacers shipped with the accessories.
4. Connect the spacers and the support bases as shown in Figure 3.3 below. Each tower assembly requires two support base/spacer assemblies, one in the front and one in the rear.
5. Place the UPS, battery cabinets and the MBC on the two support base assemblies.

Figure 3.3 Support Bases



Item	Description
1	Support bases
2	Spacers with connectors

Figure 3.4 Tower Mounted Vertiv™ Liebert® ITA2 UPS System with Battery Cabinets and MBC



3.4 Rack Installation

WARNING! Risk of improper transport can cause damage to the UPS, MBC, or battery cabinets. Never attempt to lift or move the UPS, MBC, or battery cabinets with the rack brackets. The brackets and screws are not meant to lift the units.

WARNING! Risk of improper installation can make the rack top heavy and cause a tipping hazard. The battery cabinets are heavier than the UPS. Vertiv recommends installing the battery cabinets as close to the bottom of the rack as possible to maintain a low center of gravity. Install the UPS above the battery cabinets. Install each unit on its own set of rack mount guide rails. The rail kit will support the weight of a single UPS, MBC, or battery cabinet.

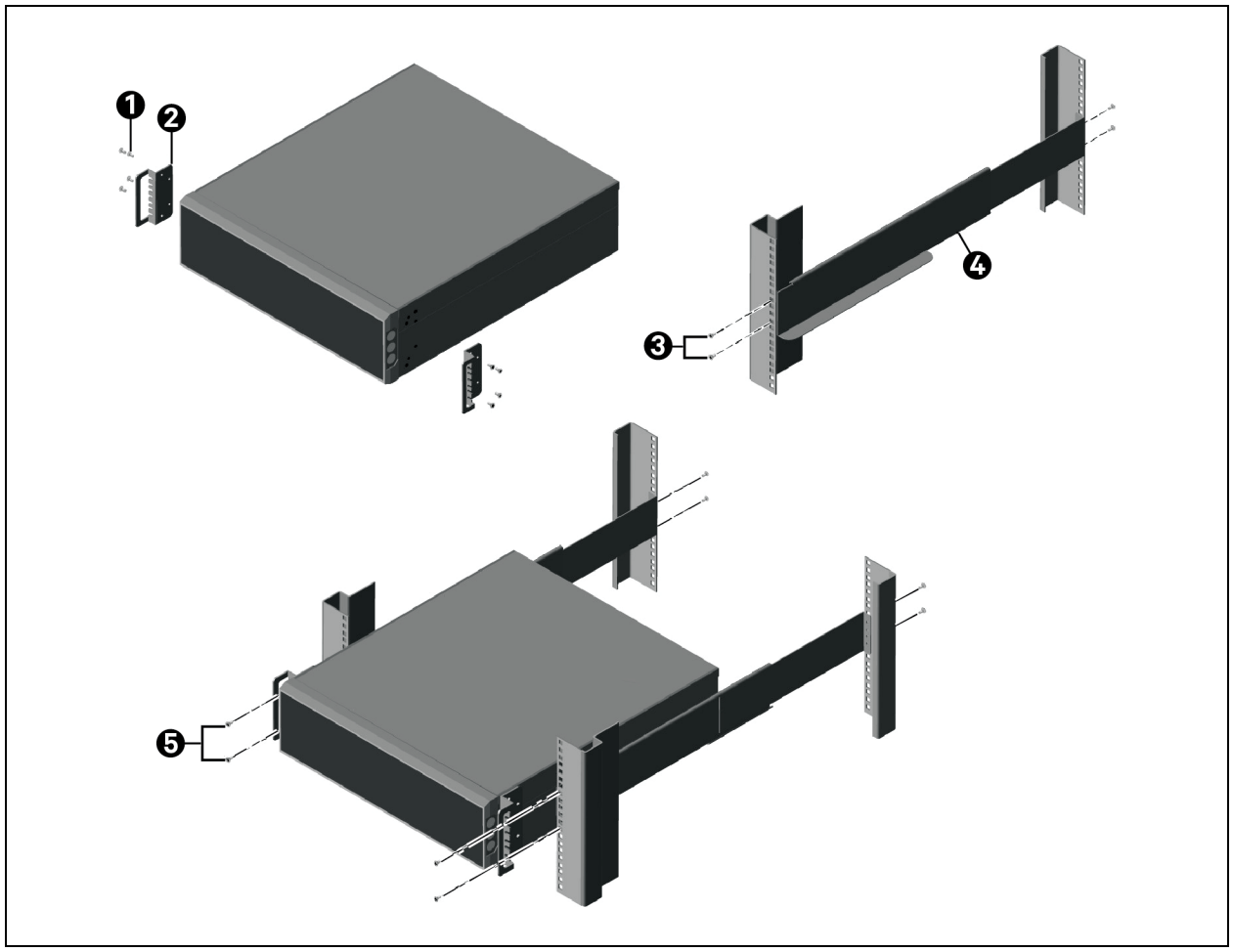
NOTE: The UPS may be installed with a maintenance bypass cabinet (MBC) or battery cabinets. If so, install the MBC and battery cabinets before installing the UPS.

To mount the unit in the rack:

NOTE: Install the battery cabinets from bottom to top to minimize tipping hazard.

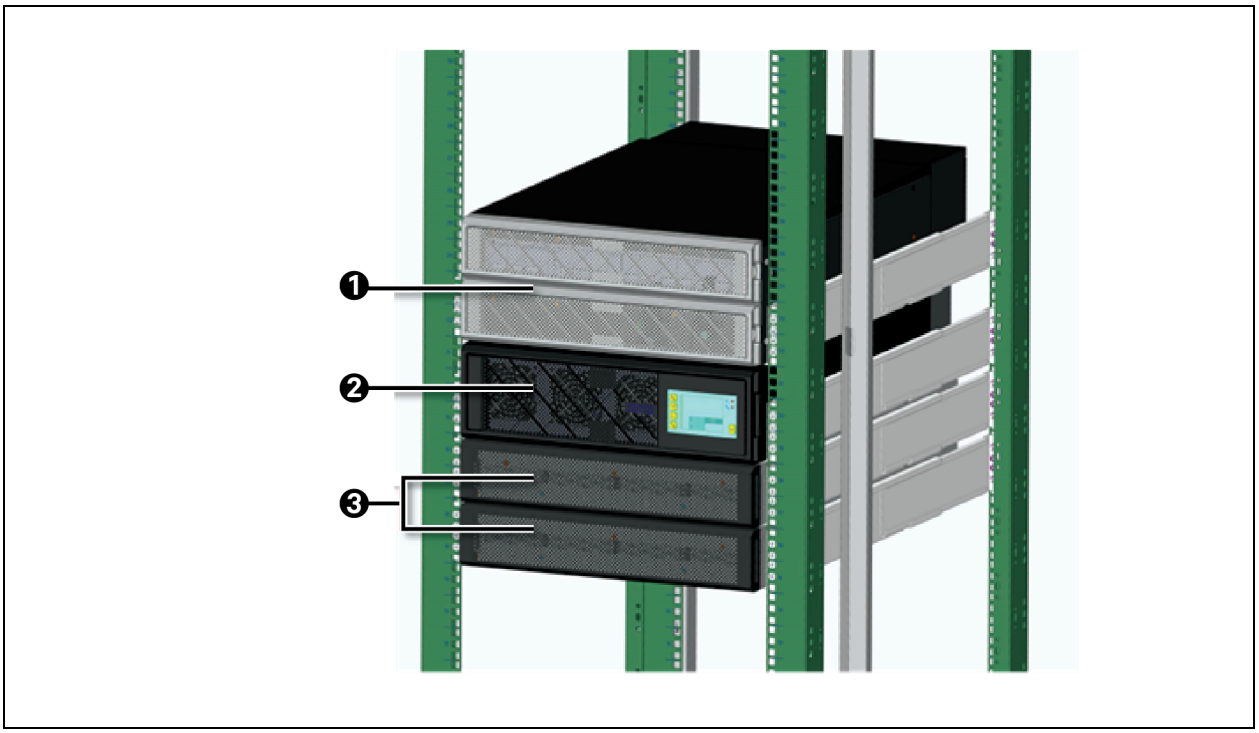
1. Referring to Figure 3.5 on the facing page, use four of the M4×10 screws on each bracket, and attach a bracket to each front corner.
2. Referring to Figure 3.5 on the facing page, mount the right and left guide rails for the UPS and each battery cabinet:
   - Adjust the length of each guide rail to the dimensions of the rack.
   - Align the install holes on the ends of the rail to the square holes in the rack, and use four of the provided screws, two on each end, to attach the rail to the rack.
3. Place the unit on the guide rails and push it completely into the rack along the guide rails.
4. Use M5x16 screws to secure the unit brackets to the rack, see Figure 3.5 on the facing page.

Figure 3.5 Guide Rail and Rack Bracket Installation



Item	Description
1	Bracket screw, four per bracket
2	Bracket, two
3	Rail screw, four per rail
4	Guide rail, one per side
5	Rack-mount screw, four per bracket

Figure 3.6 Rack Mounted Vertiv™ Liebert® ITA2 UPS System with Battery Cabinets and MBC



Item	Description
1	Liebert® ITA2 40 kVA MBC
2	Liebert® ITA2 20/40 kVA UPS
3	Liebert® ITA2 EBC

NOTE: When MBC and EBC are configurated together with UPS, please install the MBC above the UPS and install EBCs under UPS, refer to the Figure 3.6 above.

3.5 Connecting Power Cables

WARNING! Risk of electrical shock. Can cause property damage, injury and death. The unit has several circuits that are energized with high DC and AC voltages. Check for voltage with both AC and DC voltmeters before making contact and before working within the UPS. Only properly trained and qualified personnel wearing appropriate, OSHA-approved personal protective equipment (PPE) should prepare for installation, install and maintain the equipment. When performing maintenance with any part of the equipment under power, service personnel and test equipment must stand on rubber mats.

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 are listed in Table 3.1 below, and Table 3.2 below. The values are based upon an 86 °F (30 °C) ambient temperature.

The UPS has two modes of output power distribution, self distribution and via the optional power output distributer. These steps describe self distribution mode connections. The connections for maintenance bypass power distribution are included with the installation instructions for the Liebert® ITA2 MBC.

Table 3.1 Currents and Wire Size—UPS Rectifier Input

Unit Rating	Maximum Input Current	Recommended OPD	75 °C THW Copper Wire (phase) *Number of Cable per phase:1	75 °C THW Copper Wire (neutral) * Number of Cable:1	75 °C THW Copper Wire (Ground) * Number of Cable: 1	Recommended Torque
15 kVA 208 V	64 A	80 A	2 AWG	2 AWG	6 AWG	50 LB-IN
20 kVA 208 V	73 A	100 A	2 AWG	2 AWG	6 AWG	50 LB-IN
40 kVA 400 V	75 A	100 A	2 AWG	2 AWG	6 AWG	50 LB-IN

NOTE: The short circuit current of rectifier input breaker should be at least 10 kA.

Table 3.2 AC Currents and Wire Size—UPS Bypass Input* and Output

Unit Rating	Maximum Input Current	Recommended OPD	75 °C THW Copper Wire (phase)	75 °C THW Copper Wire (neutral)	75 °C THW Copper Wire (Ground)	Recommended Torque
15 kVA 208 V	41.7 A	63 A	2 AWG	2 AWG	6 AWG	50 LB-IN
20 kVA 208 V	55.6 A	80 A	2 AWG	2 AWG	6 AWG	50 LB-IN
40 kVA 400 V	60.6 A	80 A	2 AWG	2 AWG	6 AWG	50 LB-IN
NOTE: * Input sizes and values apply to dual source configuration.						

NOTE: The short circuit current of bypass input breaker and output breaker should be at least 10kA.

Table 3.3 Ring Terminal Part Numbers

	1/0 AWG (53.5 mm^2)	2AWG (33.6 mm^2)	6AWG (13.3 mm^2)
Part Number	MISUMI: CB60-6	WIZEON:GT35-6	McMaster-Carr: 7113K366
	KST: SQNBS60-6	KST: SQNBS38-6	Thomas & Betts: RE6-14

Table 3.4 Recommended Conduit Sizes

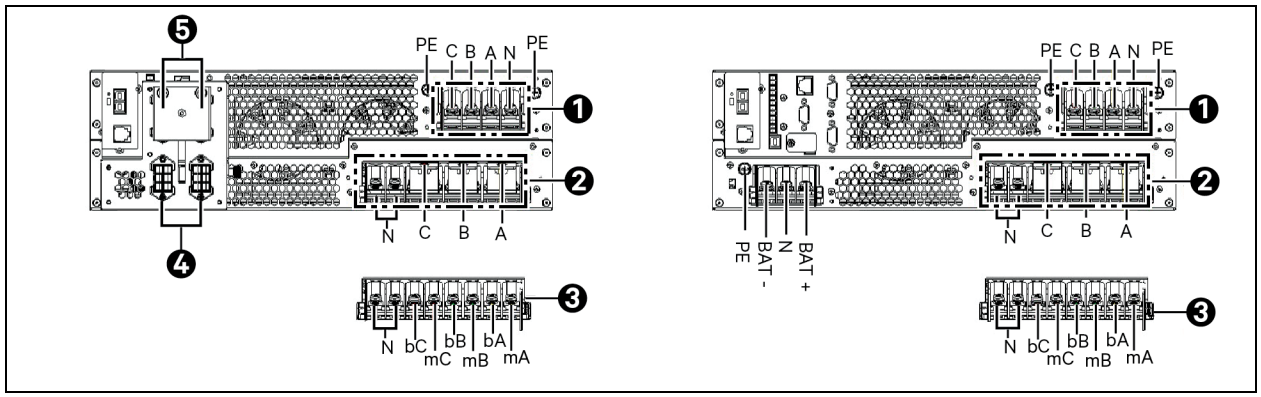
Unit Rating	Rectifier input	Bypass input	Output
15 kVA 208 V	2 in. (50 mm)	1.25 in. (31.75 mm)	1.25 in. (31.75 mm)
20 kVA 208 V			
40 kVA 400 V			

3.5.1 Connecting a Single Input Configuration

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.

1. Prepare for connection by removing the conduit box cover, opening knockout holes, and routing cables through the conduit.
2. Leave the shorting busbars in place on the UPS input terminal block.
3. Refer to the single input terminal block illustrated in Figure 3.7 on the facing page, and connect the cables from the upstream feeder panel:
   - Phase A to A
   - Phase B to B
   - Phase C to C
   - Neutral to N
   - Ground to PE (next to N of output terminal)
4. For output connections, refer to Figure 3.7 on the facing page, and connect the cables from the UPS to the downstream feeder panel on the panelboard main breaker:
   a. A to Phase A
   b. B to Phase B
   c. C to Phase C
   d. Neutral N to neutral bus
   e. Ground from PE (next to the C of output terminal) to the ground bus
5. Torque all customer side connections per recommendations in Table 3.1 on the previous page and Table 3.2 on the previous page.
6. Replace the conduit box cover and secure it.

Figure 3.7 Single and Dual Input Configuration Wiring Diagram (15 kVA)



Item	Description
1	Output terminal block
2	Single input terminal block
3	Dual input terminal block
4	Value Regulated Lead Acid (VRLA) batteries
5	Lithium ion

3.5.2 Connecting a Dual Input Configuration

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.

1. Prepare for connection by removing the conduit box cover, opening knockout holes, and routing cables through the conduit.
2. Remove the shorting busbars from the terminals labeled A, B, and C in Figure 3.7 above.
3. For the rectifier input, refer to the dual input terminal block in Figure 3.7 above, and connect the cables from the upstream feeder panel:
   - Phase A to mA
   - Phase B to mB
   - Phase C to mC
   - Neutral to N
   - Ground to PE (next to N of output terminal).

4. For the bypass input, refer to the dual input terminal block in Figure 3.7 on the previous page, and connect the cables from the upstream feeder panel:
   - Phase A to bA
   - Phase B to bB
   - Phase C to bC
   - Neutral to N
   - Ground to PE (next to the C of output terminal).

NOTE: The UPS has two output terminal block sections, always on and programmable/controllable. The always on connections are listed first, and the programmable connections are inside parentheses.

5. For output connections, refer to Figure 3.7 on the previous page, and connect the cables from the UPS to the downstream feeder panel on the panelboard main breaker:
   - A to Phase A
   - B to Phase B
   - C to Phase C
   - N to the neutral bus
   - Ground from PE (next to the C of output terminal) to the ground bus
6. Torque all customer side connections per recommendations in Table 3.1 on page 21 and Table 3.2 on page 21.
7. Replace the conduit box cover and secure it.

3.6 Connecting a Single Battery Cabinet System

Do not reverse the polarity of the battery cables.

3.6.1 Connecting the Cables

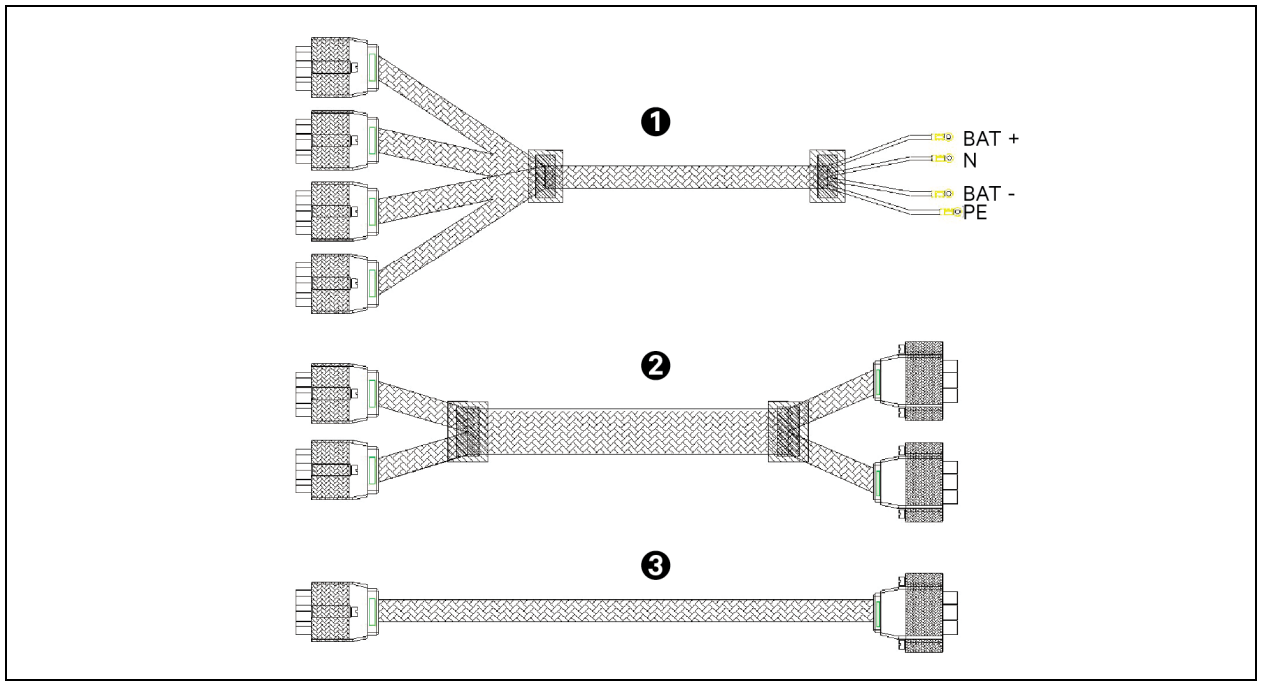
WARNING! Risk of electrical shock. Can cause property damage, injury and death. The unit has several circuits that are energized with high DC and AC voltages. Check for voltage with both AC and DC voltmeters before making contact and before working within the UPS. Only properly trained and qualified personnel wearing appropriate, OSHA-approved personal protective equipment (PPE) should prepare for installation, install and maintain the equipment. When performing maintenance with any part of the equipment under power, service personnel and test equipment must stand on rubber mats.

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.

WARNING! Risk of heavy unit falling. Improper handling can cause equipment damage, injury, and death. Exercise extreme care when handling unit cabinets and rack-mounted units to avoid equipment damage or injury to personnel. The UPS weighs approximately 66.1 lb. (30 kg).

The factory provided, UPS to battery power cable, see **Figure 3.8** below, connects to Connector A on both battery cabinets in a single/first battery string. The battery to battery power cable connects additional battery strings/cabinets, see Connecting Additional Battery Cabinet Systems on page 31.

Figure 3.8 Power Cables



Item	Description
1	UPS to battery cable (for ITA2 40 kVA 400 V UPS hard wired configurations)
2	Battery to battery cable (when the ITA2 20 kVA EBC is used for ITA2 40 kVA 400 V UPS)
3	Battery to battery cable which also could be used as UPS to battery Plug-n-play cable for ITA2 15 or 20 kVA 208 V UPS

To connect the Vertiv™ Liebert® ITA2 40 kVA 400 V UPS with terminal block connections to the battery cabinet system:

1. Make sure the battery breaker on the rear of the cabinet is open (Off).
2. Connect the ring terminals of the UPS to battery cable to the rear of the UPS.
   a. Connect the ground wire (PE) to the ground screw on the rear of the UPS.
   b. Place the battery cable ring lug on the terminal block then insert the screw and tighten to 50 lb-in. torque.
   c. Repeat Step step b for each terminal block connection: battery positive ternimal (+), battery neutral, and battery negative ternminal (–).
3. Depending on the type of battery cabinet, reference Figure 2.10, connect the other ends to Connector A on each of the battery cabinets in the string.
4. Connect the RJ 45 communication cable to the communication port on the UPS and the other end to Communication Port 1 on the first battery cabinet.
   - If connecting a 2U battery string, connect a cable between Comm Port 2 on the first cabinet, and Comm Port 1 on the second.
5. For a single battery string, close the battery output breaker(s).

– or –

If installing additional battery strings (two battery cabinets each), proceed to Connecting Additional Battery Cabinet Systems on page 31.

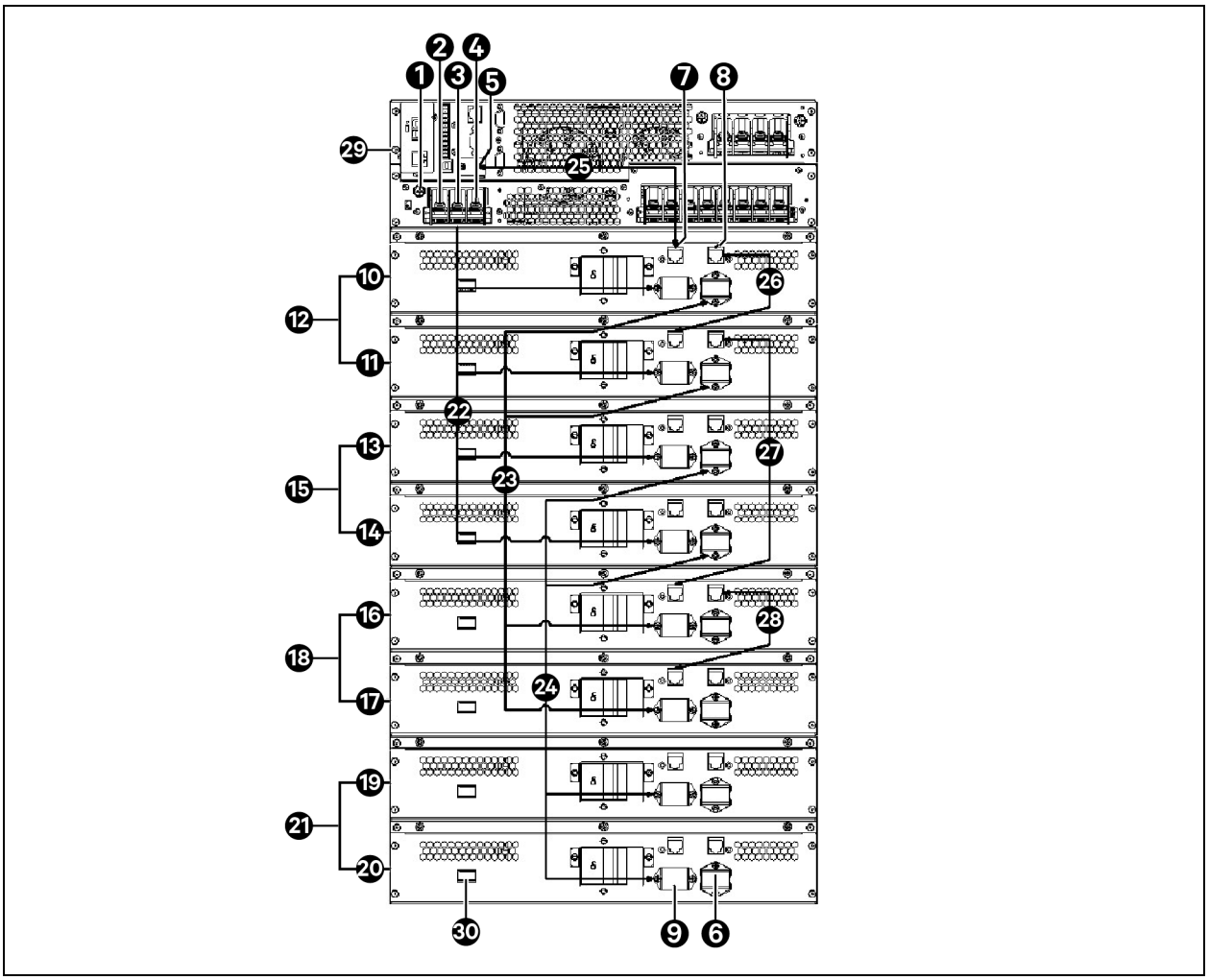
To connect the ITA2 15kVA/20kVA 208V UPS with plug-n-play connectors to the battery cabinet system:

1. Make sure the battery breaker on the rear of the cabinet is open (Off).
2. Using a cable provided with the battery cabinet, refer to **Figure 3.10** on page 29, and:
   - Connect the end labeled Port B to one of the connectors on the rear of the UPS and tighten the securing screws.
   - Connect the end labeled Port A to Connector A on the battery cabinet.
3. Repeat step 2 , for the second battery cabinet.
4. Using a communication cable with RJ 45 connectors, refer to **Figure 3.10** on page 29, and:
   - Connect one end to the multi-function port on the rear of the UPS.
   - Connect the other end to one of the RJ 45 communication ports on the first battery cabinet.
   - Connect another cable from the remaining RJ 45 communication port on the first battery cabinet to one of the ports on the second battery cabinet.
5. For a single battery string, close the battery output breakers.

   – or –

   If you are installing additional battery strings (two battery cabinets each), proceed to Connecting Additional Battery Cabinet Systems on page 31.

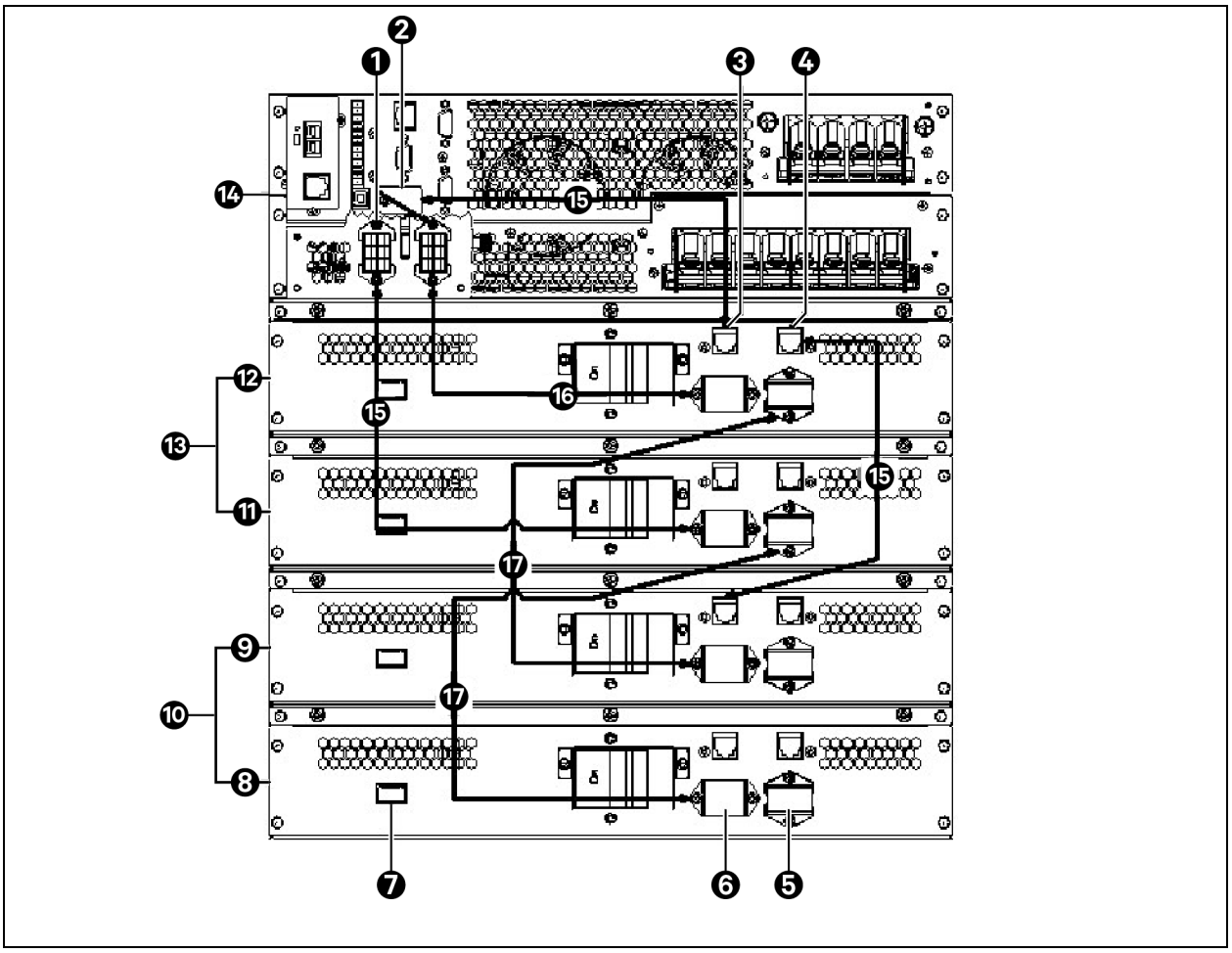
Figure 3.9 Cabling the ITA2 40kVA 400V UPS with battery Strings



Item	Description
1	Ground screw (PE)
2	BAT – (negative) connector
3	BAT N (neutral) connector
4	BAT + (positive) connector
5	Communication port connector (RJ-45)
6	Connector Port A
7	Communication port Connector 1
8	Communication port Connector 2
9	Connector Port B
10	Battery Cabinet 1

Item	Description
11	Battery Cabinet 2
12	Battery String 1 (Positive Side)
13	Battery Cabinet 3
14	Battery Cabinet 4
15	Battery String 2 (Negative Side)
16	Battery Cabinet 5
17	Battery Cabinet 6
18	Battery String 3(Paralleled Positive Side)
19	Battery Cabinet 7
20	Battery Cabinet 8
21	Battery String 4 (Paralleled Negative Side)
22	UPS to battery power cable, to Connector A on Battery Cabinets 1, 2, 3 and 4
23	Battery to battery power cable, from Port B of Battery Cabinet 1 and 2 to Port A of Battery 5 and 6.
24	Battery to battery power cable, from Port B of Battery Cabinet 3 and 4 to Port A of Battery 7 and 8.
25	Communication cable, UPS to Comm Port 1 on Battery Cabinet 1
26	Communication cable, Comm Port 2 on Battery Cabinet 1 to Comm Port 1 on Battery Cabinet 2
27	Communication cable, Comm Port 2 on Battery Cabinet 2 to Comm Port 1 on Battery Cabinet 5
28	Communication cable, Comm Port 2 on Battery Cabinet 5 to Comm Port 1 on Battery Cabinet 6
29	UPS
30	DIP switch (only available on 2U EBC)

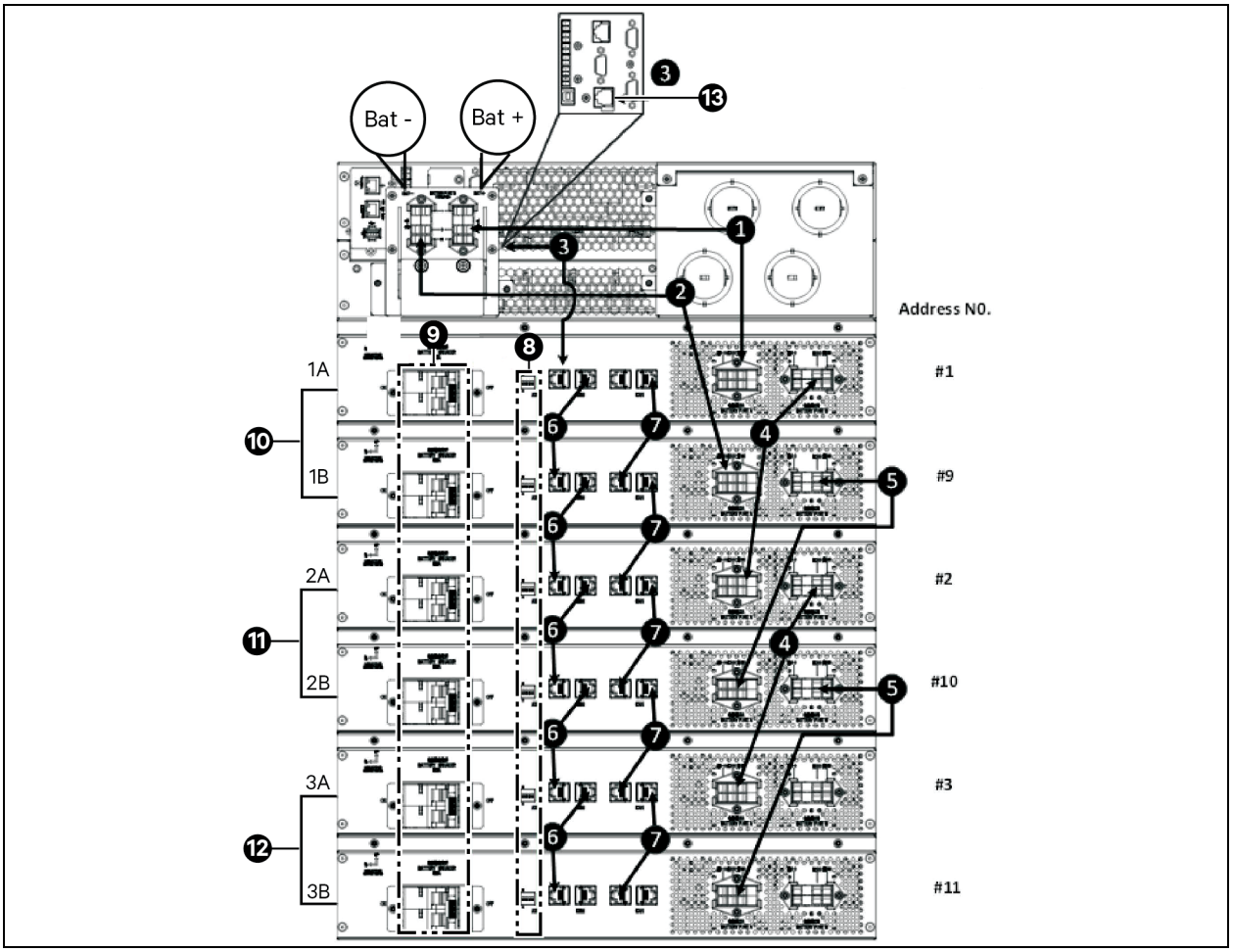
Figure 3.10 Cabling the ITA2 15 or 20 kVA UPS with Battery Strings



Item	Description
1	VRLA Battery cable connectors (Port B)
2	Multi-function connector (RJ-45)
3	Communication port connector (RJ-45)
4	Communication port connector (RJ-45)
5	Connector Port B
6	Connector Port A
7	DIP switch
8	Battery Cabinet 4
9	Battery Cabinet 3
10	Battery String 2
11	Battery Cabinet 2

Item	Description
12	Battery Cabinet 1
13	Battery String 1
14	UPS
15	Communication cable, UPS to communication port on Battery Cabinet 1 or between communication ports on each battery cabinet.
16	Power cable from Port B of UPS to Port A of Battery Cabinet 1 and 2
17	Power cable from Port B of Battery Cabinet 1 and 2 to Port A of Battery Cabinet 3 and 4

Figure 3.11 Cabling 2U Lithium Battery in Parallel



Item	Description
1	Battery Cable Connectors A
2	Battery Cable Connectors B
3	Communication port connector (RJ-45)
4	Battery cable from Connector B on Battery Cabinet 1 or 3 to Connector A on Battery Cabinet 3 or 5

Item	Description
5	Battery cable from Connector B on Battery Cabinet 2 or 4 to Connector A on Battery Cabinet 4 or 6
6	Communication cable between communication ports on each battery cabinet
7	Communication cable between CANBus ports on each battery cabinet.
8	DIP Switch (Address)
9	Breaker
10	String 1
11	String 2
12	String 3
13	The communication port on the UPS

3.7 Connecting Additional Battery Cabinet Systems

WARNING! Risk of electrical shock. Can cause property damage, injury and death. The unit has several circuits that are energized with high DC and AC voltages. Check for voltage with both AC and DC voltmeters before making contact and before working within the UPS. Only properly trained and qualified personnel wearing appropriate, OSHA-approved personal protective equipment (PPE) should prepare for installation, install and maintain the equipment. When performing maintenance with any part of the equipment under power, service personnel and test equipment must stand on rubber mats.

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.

WARNING! Risk of heavy unit falling. Improper handling can cause equipment damage, injury, and death. Exercise extreme care when handling unit cabinets and rack-mounted units to avoid equipment damage or injury to personnel. The UPS weighs approximately 66.1 lb. (30 kg). The battery cabinets weigh approximately 115 lb (52.2 kg)

The factory provided, battery to battery power cables, see Figure 3.8 on page 25, connect the battery strings in parallel to extend the backup time of the UPS. For 2U battery cabinets, you must adjust the DIP switch on the rear panel for each cabinet in the string.

To connect power cables:

1. Verify that the battery breakers are in the open (Off) position before connecting or disconnecting battery cables.

2. Depending on the type of battery cabinet and capacity of UPS, see Figure 3.9 on page 27, for 3U EBC with 40 kVA 400 V or Figure 3.10 on page 29, for 2U with 20 kVA 208 V UPS, and:
   - Connect one end of a battery to battery cable to Connector B on the first cabinet in the first string, and the other end to Connector A on the first cabinet in the additional string.
   - Connect one end of a battery to battery cable to Connector B on the second cabinet in the first string, and the other end to Connector A on the second cabinet in the additional string.
3. Verify that the connector colors align and press the cable in firmly to fully seat the connectors.
4. Tighten the captive screws on the extension cable to prevent the extension cable from loosening.
5. Connect an RJ-45 communication cable:
   - On 3U strings, to Communication Port 2 on the first cabinet in the first string, and the other end to Communication Port 1 on the first cabinet in the additional string.
   - On 2U strings, connect a communication cable to Communication Port 2 and Communication Port 1 between each battery cabinet.

NOTE: If using both 2U and 3U battery cabinets in a system, you must manually configure the number of connected battery strings via the display. The number of strings is not auto detected.

NOTE: In a mixed cabinet system, the communication cables allow temperature measurements. If your system is running on an older version of firmware, you may need to set the multifunction port to temperature to enable the measurements.

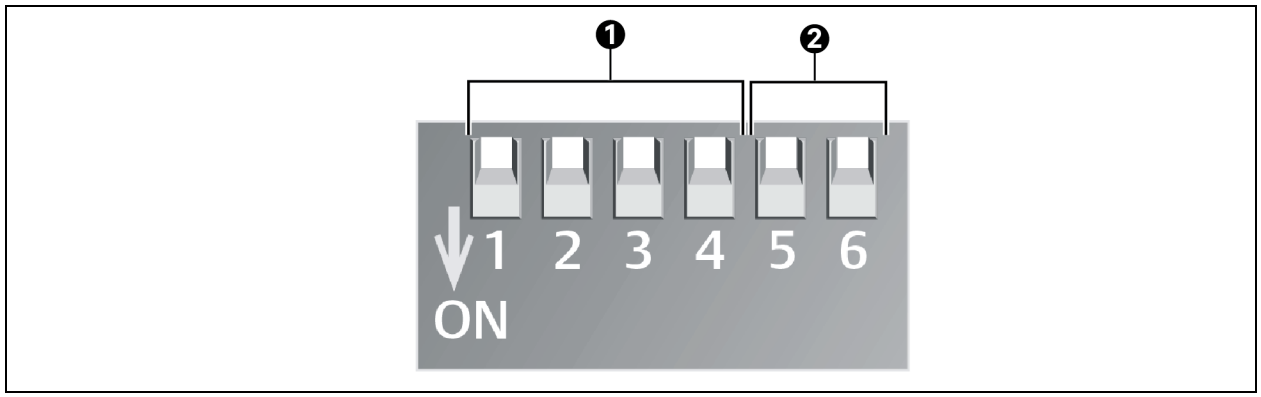
6. On 3U strings, close the battery output breakers.
   – or –
   On 2U strings, refer to Table 3.5 below, and Figure 3.12 on the facing page, and set the DIP switch on both cabinets in each additional string before closing the battery output breakes.

NOTE: The settings for String 1 are the factory default settings.

Table 3.5 DIP Switch Settings for 2U Battery Cabinet Strings

String	Cabinet	DIP Switch Position					
		Group				Num	
		1	2	3	4	5	6
1	A	Off	Off	Off	Off	Off	On
	B	Off	Off	Off	Off	On	Off
2	A	Off	Off	Off	Off	On	On
	B	Off	Off	Off	On	Off	Off
3	A	Off	Off	Off	On	Off	On
	B	Off	Off	Off	On	On	Off
4	A	Off	Off	Off	On	On	On
	B	Off	Off	On	Off	Off	Off
5	A	Off	Off	On	Off	Off	On
	B	Off	Off	On	Off	On	Off

Figure 3.12 DIP Switch on Rear Panel of 2U Battery Cabinet



Item	Description
1	Group
2	Number

Table 3.6 DIP Switch Settings for Lithium Battery Cabinet Strings

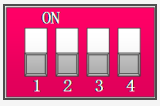
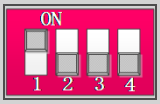
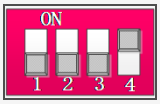
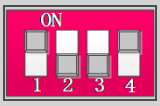
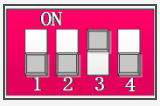
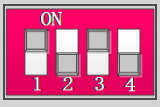
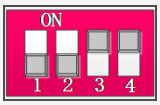
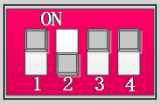
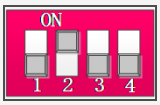
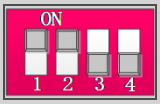
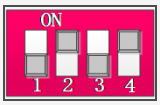
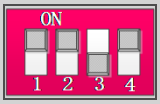
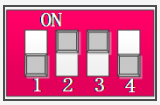
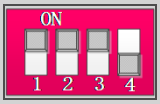
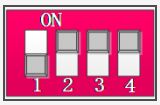
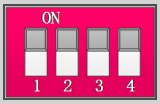
String No.	Cabinet No.	DIP Switch Position				Address No.	Example
		1	2	3	4		
1	A	OFF	OFF	OFF	OFF	#1	
	B	ON	OFF	OFF	OFF	#9	
2	A	OFF	OFF	OFF	ON	#2	
	B	ON	OFF	OFF	ON	#10	
3	A	OFF	OFF	ON	OFF	#3	
	B	ON	OFF	ON	OFF	#11	

Table 3.6 DIP Switch Settings for Lithium Battery Cabinet Strings (continued)

String No.	Cabinet No.	DIP Switch Position				Address No.	Example
		1	2	3	4		
4	A	OFF	OFF	ON	ON	#4	
	B	ON	OFF	ON	ON	#12	
5	A	OFF	ON	OFF	OFF	#5	
	B	ON	ON	OFF	OFF	#13	
6	A	OFF	ON	OFF	ON	#6	
	B	ON	ON	OFF	ON	#14	
7	A	OFF	ON	ON	OFF	#7	
	B	ON	ON	ON	OFF	#15	
8	A	OFF	ON	ON	ON	#8	
	B	ON	ON	ON	ON	#16	

3.8 Communication Connections

The communication ports include:

- Vertiv™ Liebert® IntelliSlot™ card port
- RS 232 port

- I/O, programmable dry contacts
- REPO port
- Serial port
- USB port
- Multi-function port
- Parallel ports

3.8.1 Vertiv™ Liebert® IntelliSlot Ports

The UPS has one Liebert® IntelliSlot port on the rear of the unit.

Table 3.7 below, describes the cards available. The instructions for configuring and using the cards are available at www.Vertiv.com.

Table 3.7 Liebert® IntelliSlot Communication Cards

Card	Description
Liebert® IS-UNITY-DP Card	Communicates with up to two third party platforms including SNMP, Modbus, BACnet and YDN23 protocols to network-connected Vertiv montoring/shutdown applications or third party shutdown software.
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 shutdown software. The card also accepts input signals to shut down the UPS during any operating mode.

3.8.2 REPO Connection

Table 3.8 below describes the pin out of the REPO port used for N.O. or N.C. connection.

Table 3.8 REPO Port Pin Descriptions

J14 Pin #	Pin Name	Description
9	+5 VDC	REPO Power Supply, 5 VDC, 100 mA
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

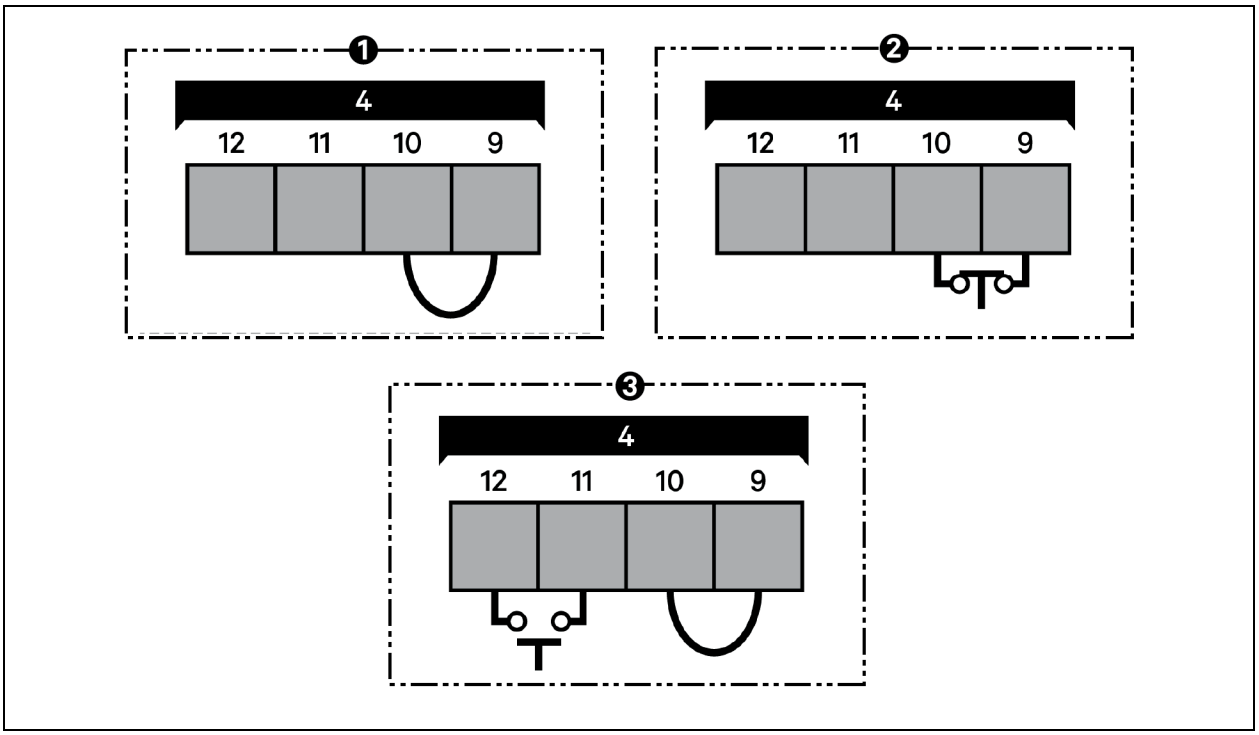
WARNING! Risk of electrical shock. Can cause equipment damage, injury and death. The EPO action of the UPS will shut down the rectifier, inverter and static bypass, but it does not disconnect input power to the UPS. To electrically isolate the UPS, disconnect the upstream input feeder breaker when generating the EPO.

Figure 2.2 on page 4, shows the location of the REPO connection on the UPS rear panel. Figure 3.13 on the next 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 to 22 AWG (0.82 mm^2 to 0.33 mm^2), and we recommend using 18 AWG copper, shielded signal cable.

Figure 3.13 REPO Connections Detail



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 5/REPO input. See Table 3.8 on the previous page, for the pin out details.

3.8.3 Dry Contact Connections

The UPS includes five dry contact ports described in Table 3.9 on the facing page. The location of the ports is shown in Figure 2.2 on page 4.

For Ports 1 to 4, the I/O dry contact port capacity is 125 VAC, 0.5 A; 30 VDC, 1 A.

Table 3.9 Dry Contact Ports and Pin Out

Port Number/Name	Pin Number	Pin Name	Description
1/Output Port 1	1	LOW_ BATTERY/ON_ BATTERY/ON_ BYPASS/UPS_ FAULT/Main back feed protection enabled	Default: LOW_BATTERY, can be set via the LCD settings page. User can choose dry contact as NO/NC. When NO (default) and there is an alarm active on the system, Pin 1 and Pin 2 are shorted. When NC and there is an alarm active on the system, Pin 1 and Pin 2 are open. If then user would like to change Dry contact function to main backfeed via Paramset or MCU, dry contact status can only be NO, user can not choose dry contact as NC due to main backfeed function design logic.
	2	GND	Ground
2/Output Port 2	3	LOW_ BATTERY/ON_ BATTERY/ON_ BYPASS/UPS_ FAULT/ Bypass back feed protection enabled	Default: UPS_FAULT, can be set via the LCD settings page. User can choose dry contact as NO/NC. When NO (default) and there is an alarm active on the system, Pin 3 and Pin 4 are shorted. When NC and there is an alarm active on the system, Pin 3 and Pin 4 are open. If then user would like to change Dry contact function to bypass backfeed via Paramset or MCU, dry contact status can only be NO, user can not choose dry contact as NC due to bypass backfeed function design logic.
	4	GND	Ground
3/Input Port 1	5	Battery Mode shutdown/Any mode shutdown (Remote Comms Shutdown)/ Maintain mode	Default: Maintain mode, can be set via the LCD settings page and dry contact is NO by default. User can not choose dry contact as NC. For Battery mode shut down and any mode shut-down, user can choose dry contact as NO/NC. When NO (default), Pin 5 and Pin 6 are shorted, the function is active. When NC, Pin 5 and Pin 6 are open, the function is active. When the Pin 5 and Pin 6 signal returns to the original state, the UPS will power on the inverter automatically.
	6	GND	Ground
4/Input Port 2	7	Battery mode shutdown/Any mode shutdown (Remote Comms Shutdown)/ Maintain mode	Default: Maintain mode, can be set via the LCD settings page and dry contact is NO by default, User can not choose dry contact as NC. For Battery mode shut down and Any mode shut-down, User can choose dry contact as NO/NC. when NO (default), Pin 7 and Pin 8 are shorted, the function is active. When NC, Pin 7 and Pin 8 are open, the function is active. When the Pin 7 and Pin 8 signal returns to the original state, the UPS will power on the inverter automatically.
	8	GND	Ground
5/REPO Input Port	9	+5V	REPO power supply, 5VDC 100 mA
	10	REPO Coil NC	NC, EPO activated when Pin 9 and Pin 10 are open.
	11	REPO Coil NO	Trigger REPO when Pin 11 and Pin 12 are closed.
	12	GND	REPO Ground

3.8.4 Connecting USB Communication Cables

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

3.9 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 3.10 DB 9F Pin Out Description

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

3.9.1 Connecting Multi-Function Port (RJ 45)

The multi-function port is a standard RJ 45 connection that supports Modbus/Jbus protocol, and on units with a terminal block battery connector, it connects Vertiv temperature and temperature/humidity sensors. When connecting 2U battery cabinets, you must use this port to automatically detect the number of battery strings and for temperature compensated charging. You can configure the port function using the Operation and Display panel.

3.10 Connecting Parallel Cables

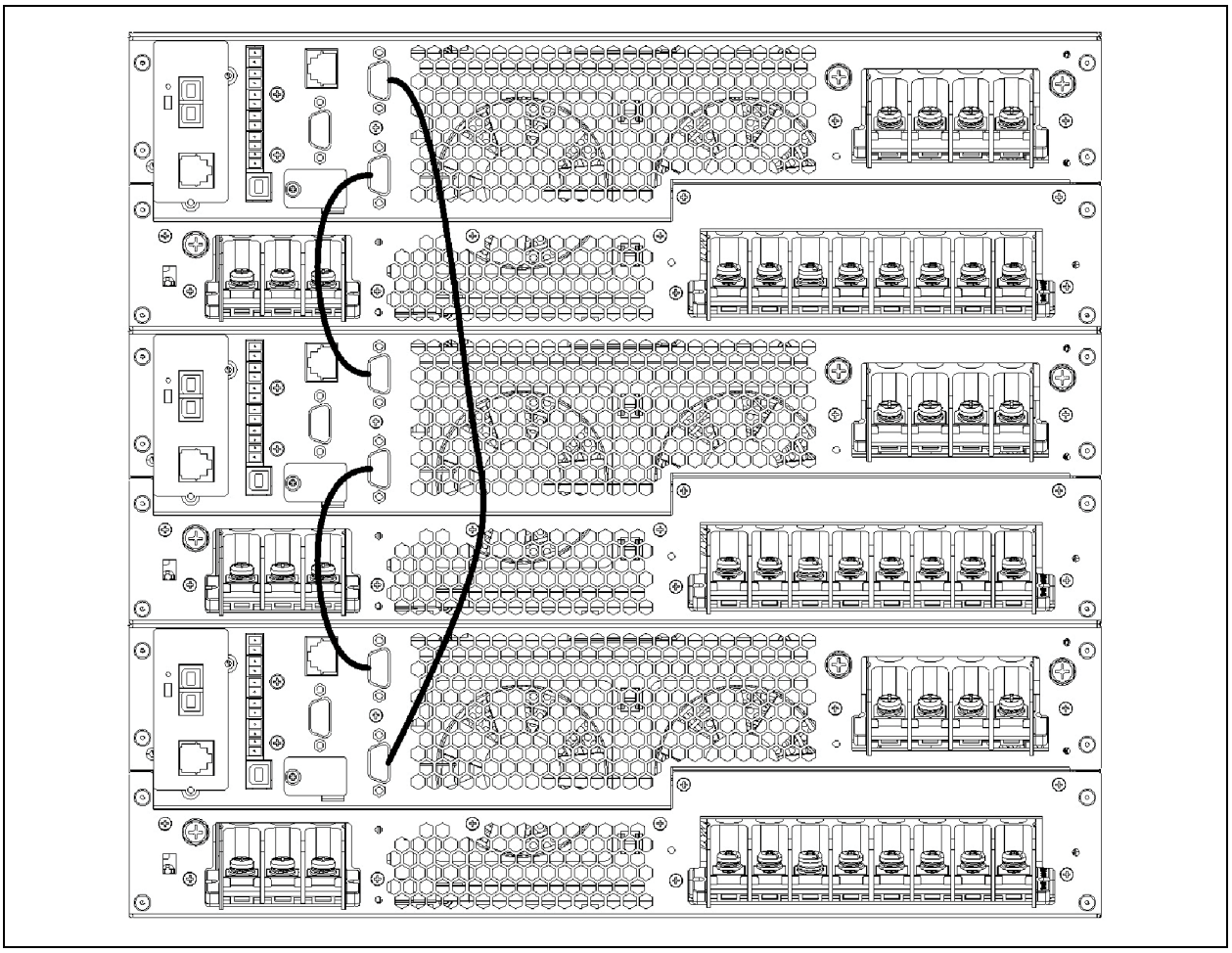
When 2 and above UPSs are configurated in the system, the parallel cables between UPSs should be connected.

There are two parallel communication ports, named as PARALLELED PORT 1 and PARALLELED PORT 2 at the rear of each UPS refer to the Rear Panel Components on page 4.

The following steps and Figure 3.14 on the facing page show the way to build the communication between 3 UPSs:

1. Connect the parallel cable from the PARALLEL PORT 2 of the 1st UPS to the PARALLELED PORT 1 of the 2nd UPS and
2. Connect the parallel cable from the PARALLEL PORT 2 of the 2nd UPS to the PARALLELED PORT 1 of the 3rd UPS.
3. Connect the parallel cable from the PARALLEL PORT 2 of the 3rd UPS back to the PARALLELED PORT 1 of the 1st UPS.
4. Tighten the screws on all parallel cables terminals.

Figure 3.14 Parallel cable wiring for 3 paralleled UPS



3.11 Connecting Shared Battery Cabinets for 2+1 system

Do not reverse the polarity of the battery cables.

3.11.1 Connecting the Cables

WARNING! Risk of electrical shock. Can cause property damage, injury and death. The unit has several circuits that are energized with high DC and AC voltages. Check for voltage with both AC and DC voltmeters before making contact and before working within the UPS. Only properly trained and qualified personnel wearing appropriate, OSHA-approved personal protective equipment (PPE) should prepare for installation, install and maintain the equipment. When performing maintenance with any part of the equipment under power, service personnel and test equipment must stand on rubber mats.

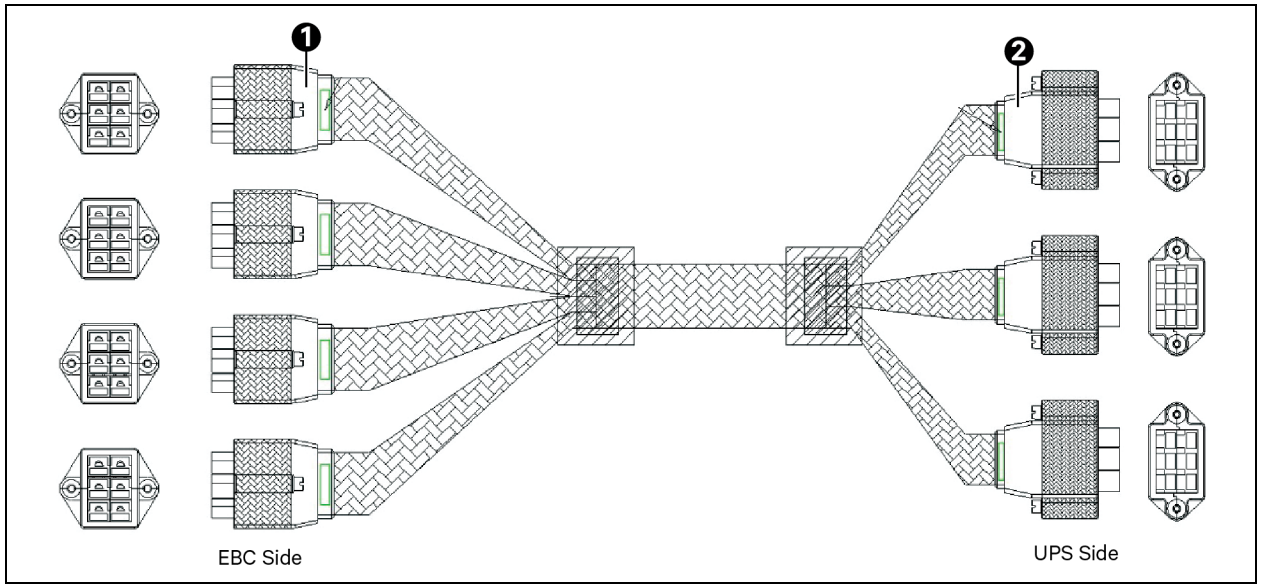
WARNING! Risk of electrical shock. Can cause equipment damage, injury and death. Before beginning installation, verify that all external overcurrent protection devices are open (Off), and that they are locked out and tagged appropriately to prevent activation during the installation. After the power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

WARNING! Risk of heavy unit falling. Improper handling can cause equipment damage, injury, and death. Exercise extreme care when handling unit cabinets and rack-mounted units to avoid equipment damage or injury to personnel. The UPS weighs approximately 66.1 lb. (30kg). The battery cabinets weigh approximately 115 lb (52.2 kg).

The factory provided UPS to battery battery share mode power cable, see Figure 3.15 below, provides a convenient way build power cable connection between UPS and VRLA EBC for 2+1 configuration system in battery share mode.

There are three (3) Port B connectors on one side which could connect to the plug and play battery junction box of Vertiv™ Liebert® ITA2 15 to 20 kVA 208 V UPS and there are four (4) Port A connectors on the other side which could connect to the VRLA EBC.

Figure 3.15 Battery share cable for 2+1 configuration



Item	Description
1	Port A
2	Port B

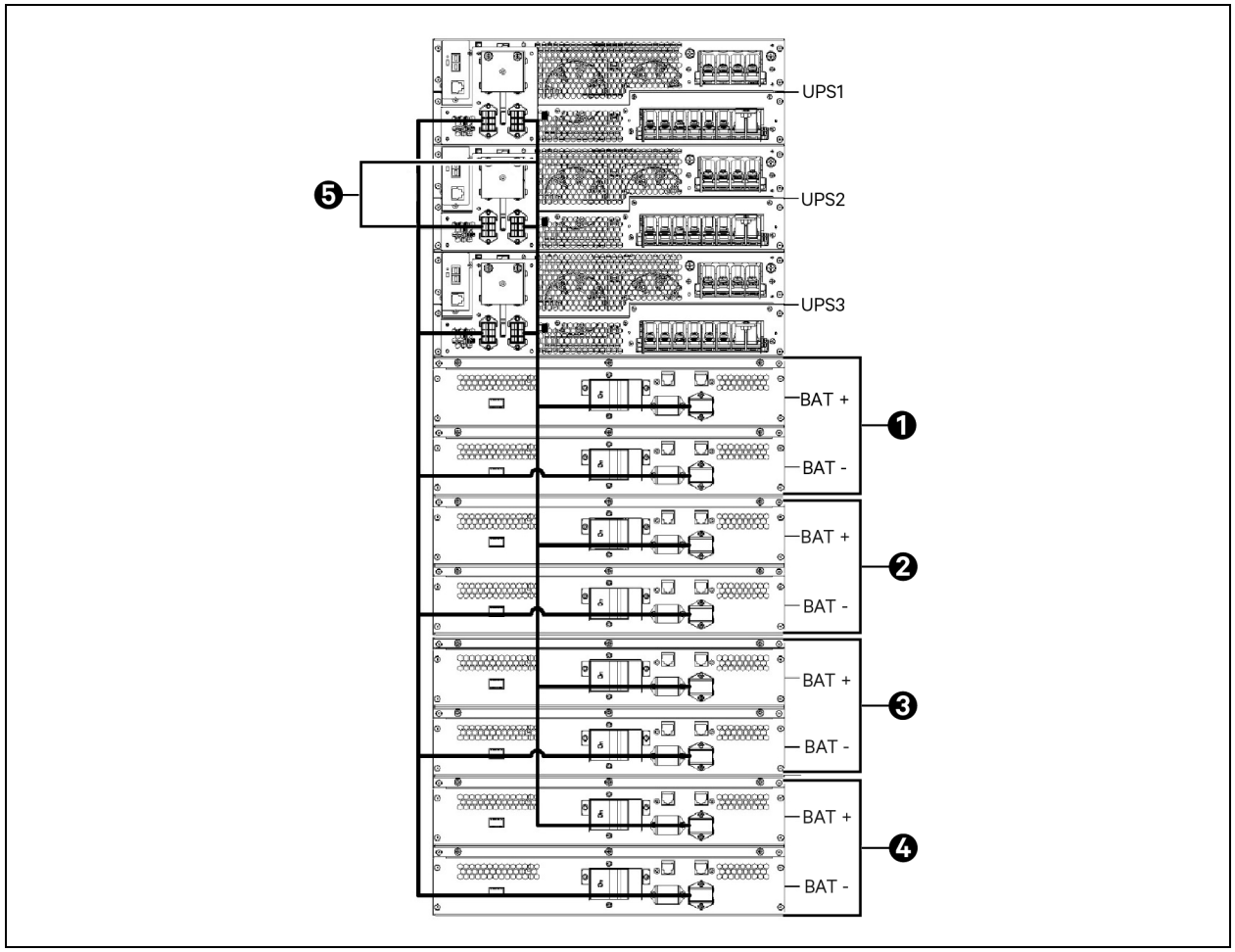
To connect the Vertiv™ Liebert® ITA2 15 kVA or 20 kVA 208 V UPS with plug-n-play connectors to the battery cabinet system:

1. Make sure the battery breaker on the rear of the cabinet is open (Off).
2. Using 1 pcs battery share cables, which should be purchased individually, refer to Figure 3.12.

- Connect 3 connectors, which end labeled Port B, to same side of the connectors on the rear of the 3 paralleled UPS individually and tighten the securing screws.
- Connect 4 connectors, which end labeled Port A, to Connector A on 4 VRLA battery cabinets individually.

3. Repeat step 2 to connect the other connectors on the rear of 3 paralleled UPS with other 4 VRLA battery cabinets.
4. The communication cable (ethernet cable) is not needed in battery share mode and have to set the parameters about EBC manually on HMI and the DIP of 2U VRLA EBC is not needed to change.
5. Close the battery output breakers.

Figure 3.16 Battery share mode wiring for 2+1 configuration



Item	Description
1	Battery string 1
2	Battery string 2
3	Battery string 3
4	Battery string 4
5	Battery share cables

Set below parameters of EBC on HMI manually before using:

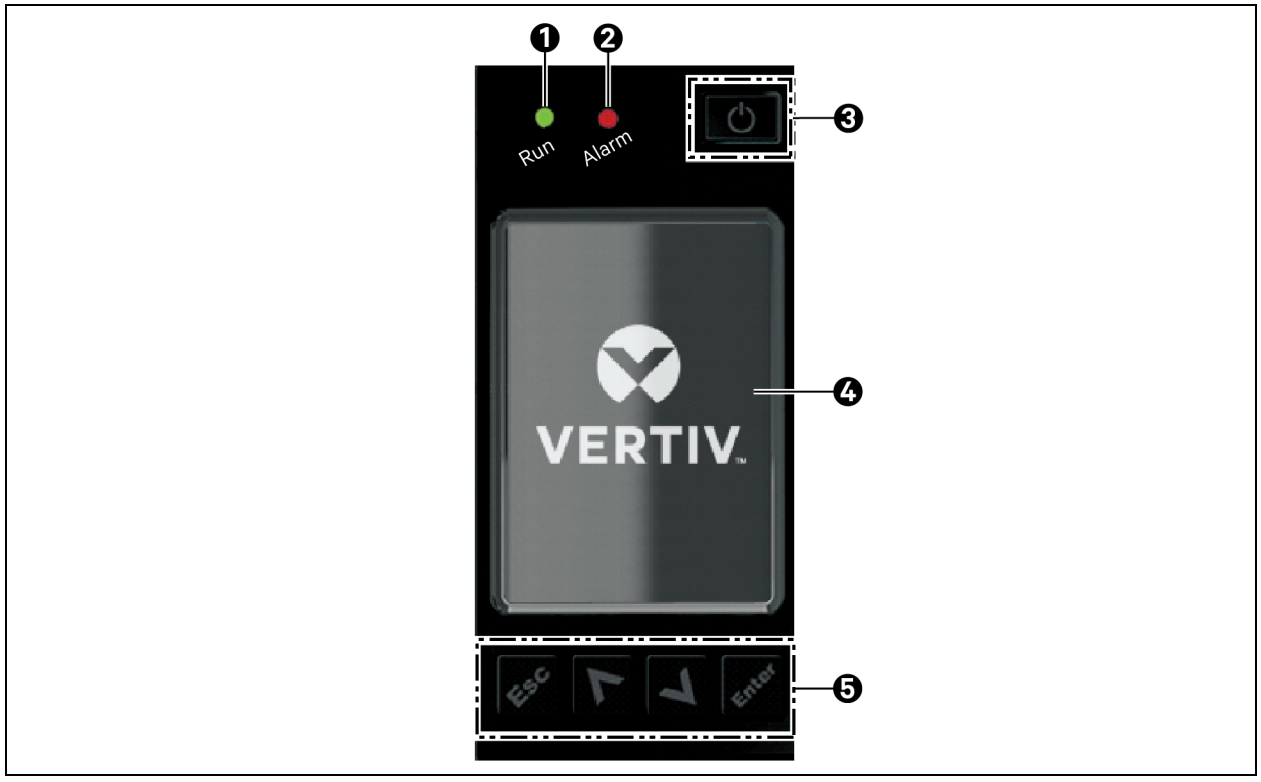
1. Ensure the REPO termianls is not connected on the rear of UPSs and the parallel communication cables are connected between UPS.
2. Power on 3 UPSs and set the following parameters in Battery page of HMI on one of UPS:
   - Set the Shared battery as *Enable*.
   - Set the Local battery AH as 18Ah when the 9Ah EBCs are used and battery string quantity is 2.
   - Set the Battery serials as 32.
3. Use the Sync Parallel Parameters function to update the above parameters to the other 2 UPS and double check the parameters are correct on the other 2 UPS.

Refer on LCD Menu and Screens on page 45 to get more detailed information about the operation on HMI.

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 4.1 UPS Front Panel Display



Item	Description
1	Run indicator
2	Alarm indicator
3	Power
4	LCD screen
5	Control keys

Table 4.1 Display Panel Button Functions and Descriptions

Button	Function	Description
Enter	Enter	Confirm or enter selection.
▲	Up	Move to previous page, increase value, move left.
▼	Down	Move to next page, decrease value, move right.
Esc	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 2 minutes, see Figure 4.2 below. If an alarm or fault occurs or if any button is pressed, the UPS flow screen displays.

Figure 4.2 LCD Screen Saver

4.1 LED Indicators

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

Table 4.2 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 operation. Table 4.3 below, describes the sounds and their meaning. To silence an alarm, see Silencing the Audible Alarm on page 59.

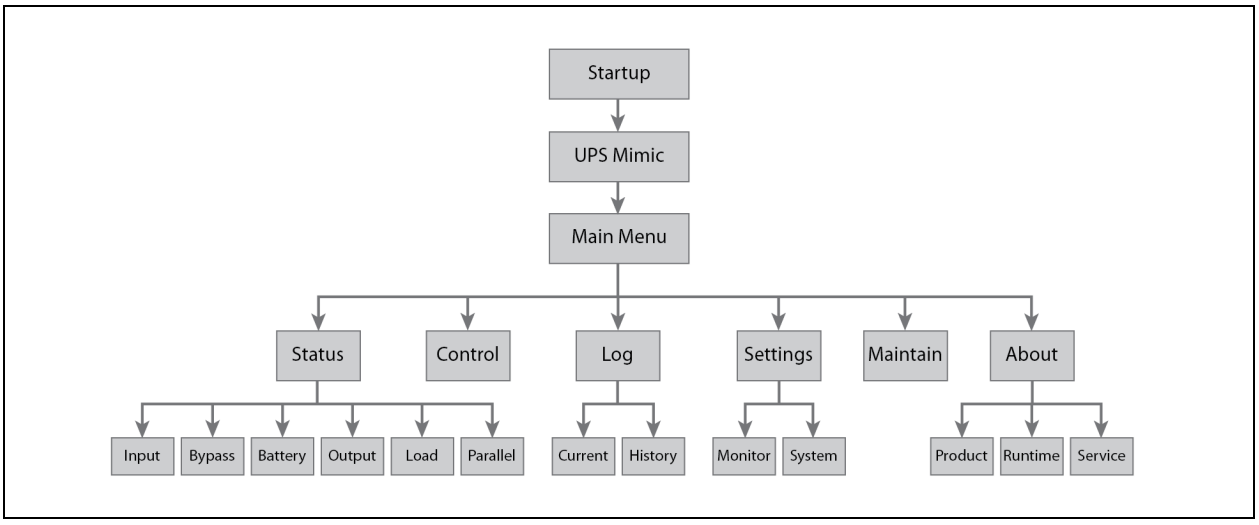
Table 4.3 Audible Alarm Descriptions

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 an 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.

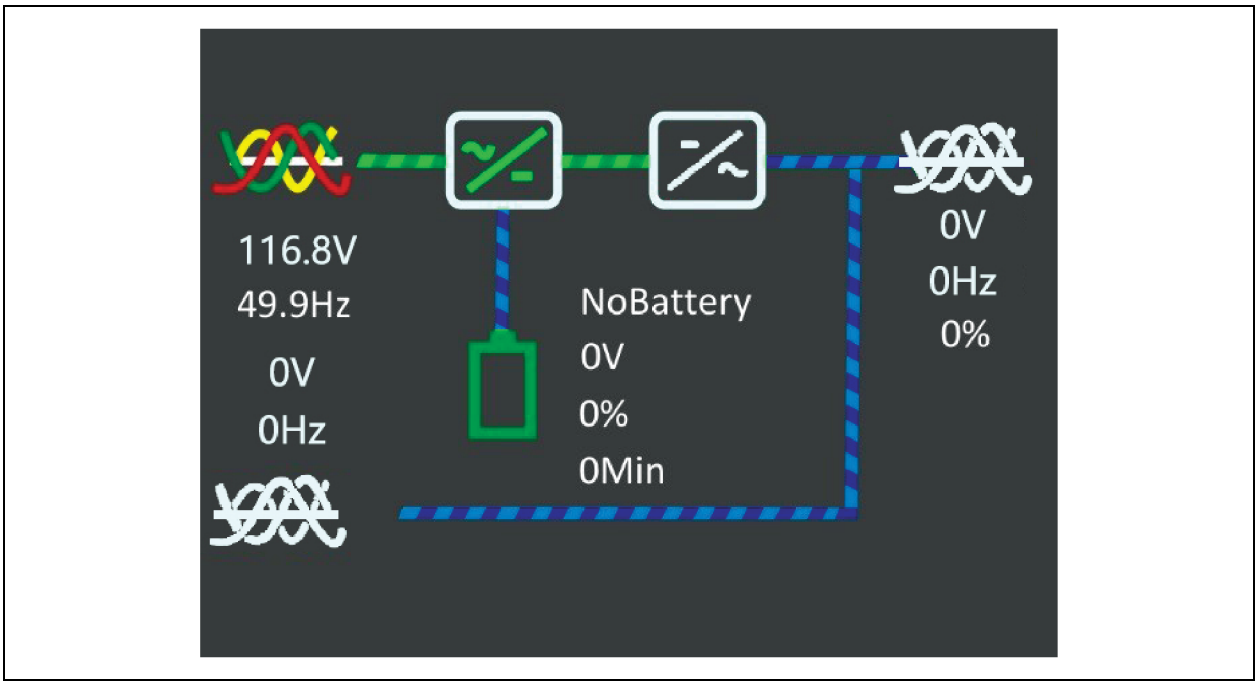
Figure 4.3 LCD Menu Structure



4.3.1 Startup and UPS Mimic Screens

At startup, the UPS executes a system test and displays the Vertiv logo screen for 10 to 15 seconds, shown in Figure 4.1 on page 43. After the test completes, an overview screen shows status information, the active (green) power path and the non-working power path (gray).

Figure 4.4 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 the UPS Mimic.

Figure 4.5 Main Menu

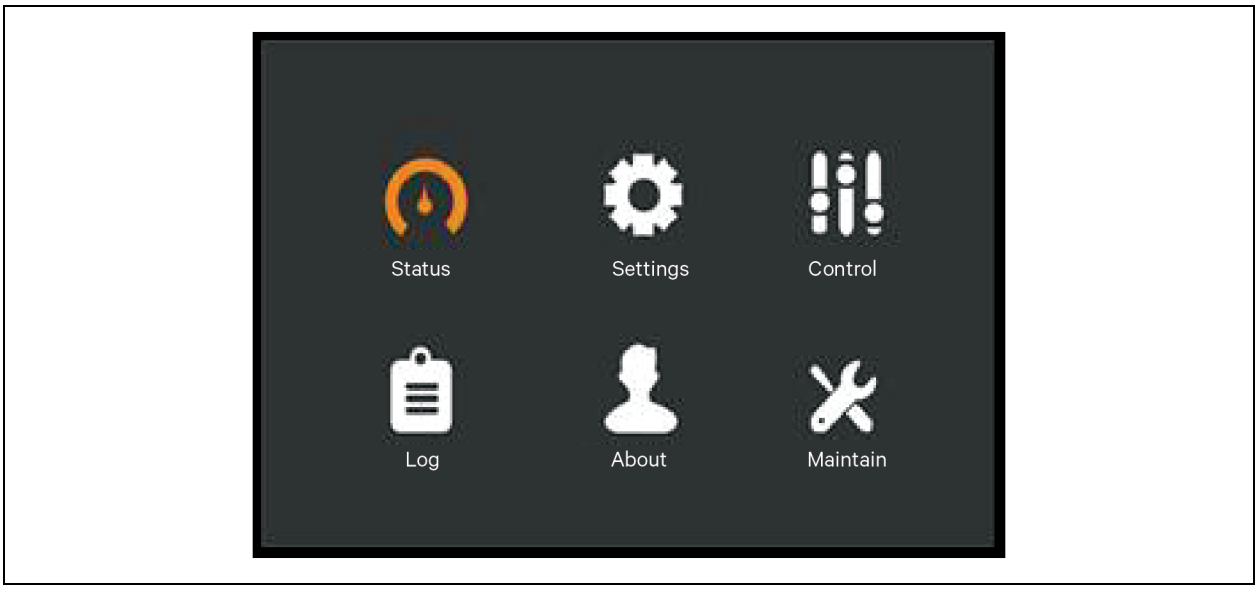


Table 4.4 Menu Options

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 page 49.
Log	Current alarms and event history, see Log Screen on page 50.
About	Product and network information, see About Page on page 51.
Maintain	Service only, proprietary, password protected page for use only by Vertiv 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.

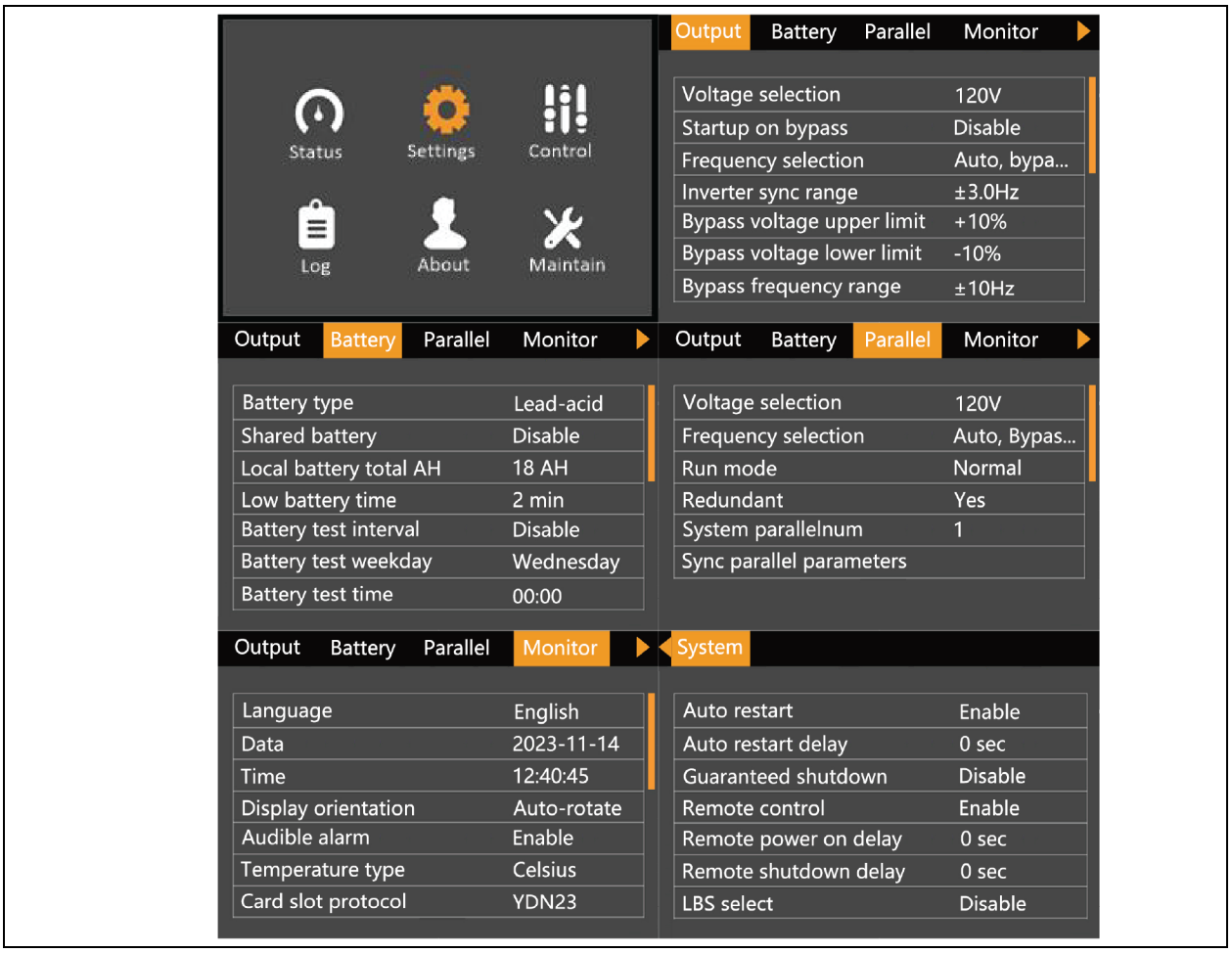
Figure 4.6 Status Screen Tabs

Settings Submenu

The Settings Screen consists of tabs that list UPS settings described inTable 4.5 on page 55.

NOTE: To adjust the settings, you must enter a password. See Editing Display and Operation Settings on page 52, for details on entering the password and editing the setting parameters.

Figure 4.7 Monitor and System Tabs on the Settings Submenu



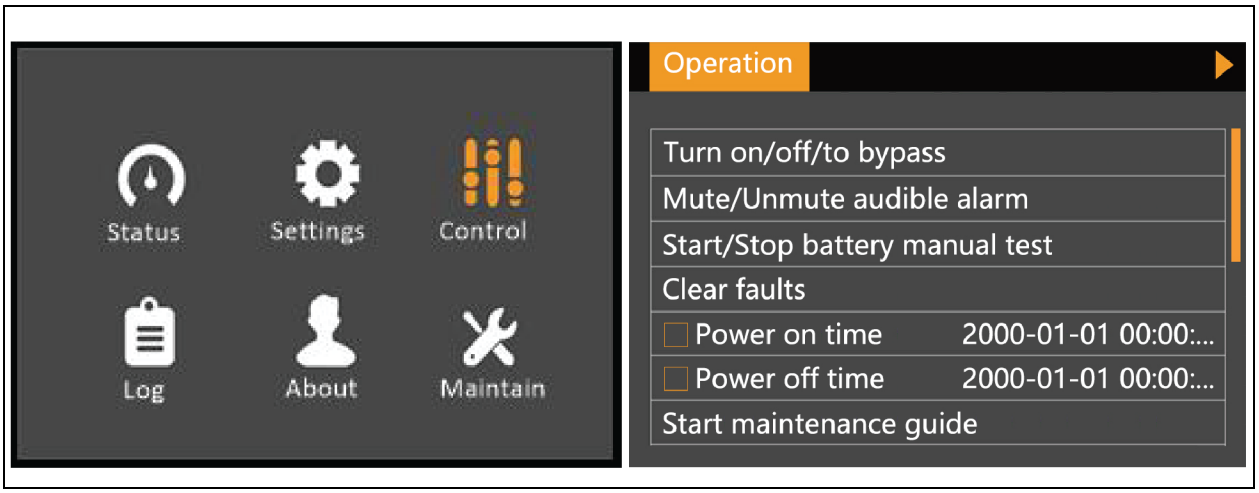
Control Screen

The Control Screen offers UPS control options.

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 4.8 Control Screen



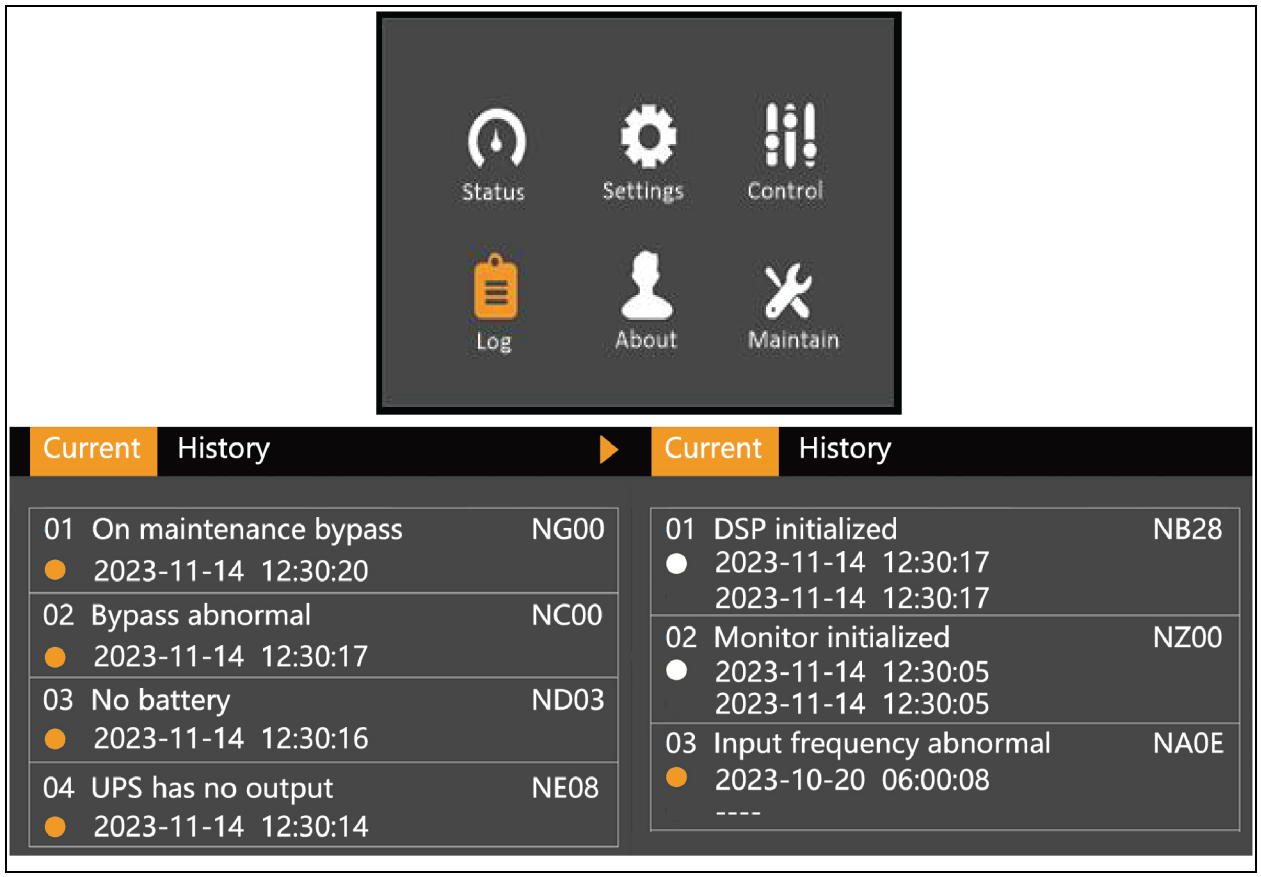
Log Screen

Log Screen tabs 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 4.9 Current and History Log Tabs



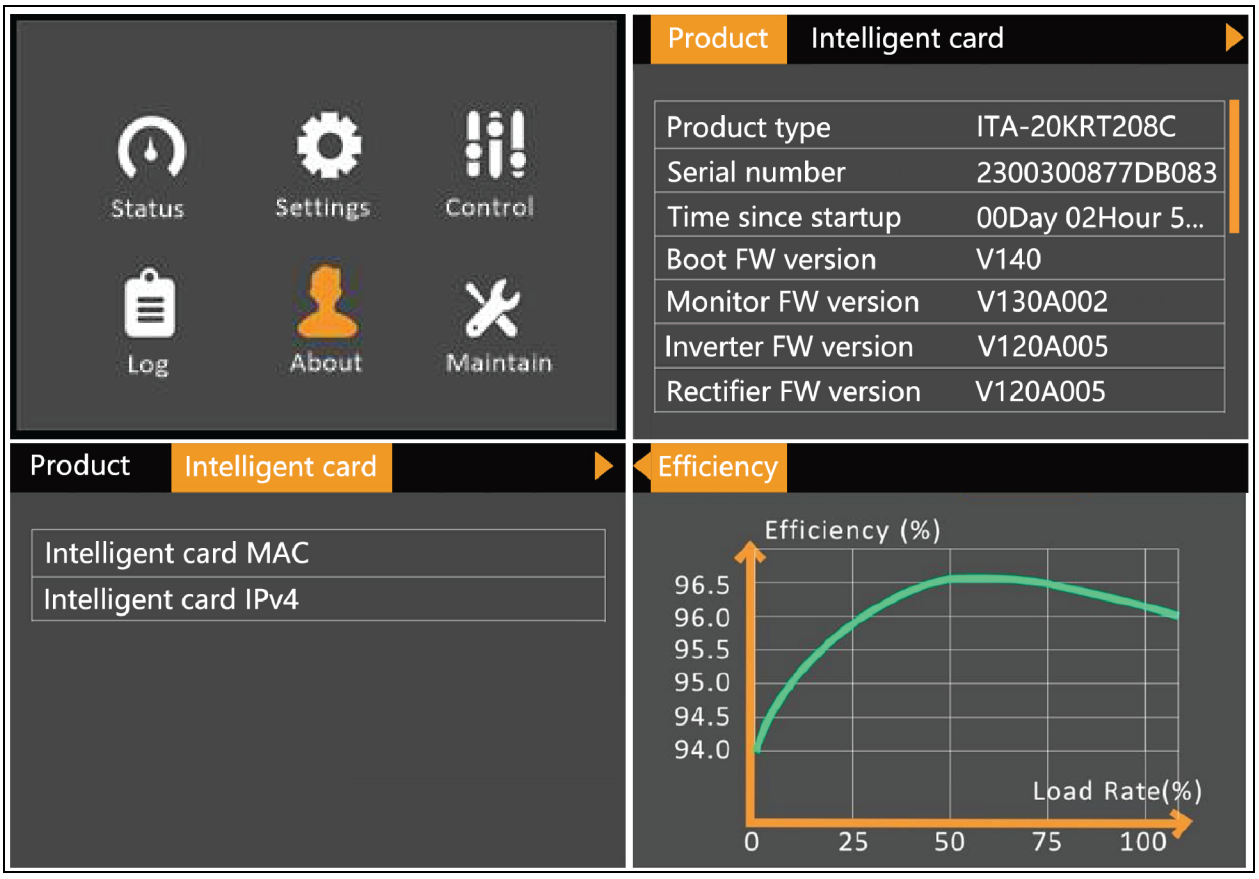
About Page

The About Page tabs 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. The options available are described in Table 4.5 on page 55.

Figure 4.10 About Screen Tabs



NOTE: The efficiency curve is only for reference.

4.4 Editing Display and Operation Settings

You may adjust the display settings and UPS configuration via the LCD. Table 4.5 on page 55, describes the settings. The display and operation settings are password projected. 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 56.

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 4.11 Password Prompt

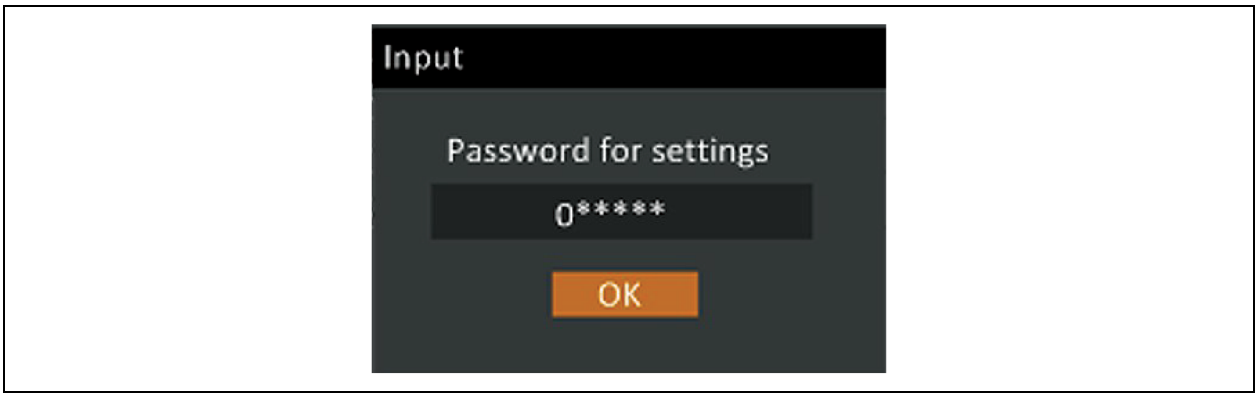


Table 4.5 Settings Available at the Display Panel

Tab	Settings	Parameter range		Default setting
		15 kVA 208 V and 20 kVA 208 V	40 kVA 400 V	
System	Auto restart	Disable, Enable		Enable
	Auto restart delay	0 to 999 seconds		0
	Guaranteed Shutdown	Disable, Enable		Disable
	Remote Control	Disable, Enable		Enable
	Remote Power ON delay	0 to 999 seconds		0
	Remote Shutdown delay	0 to 999 seconds		0
	LBS Select	Disable, Enable		Disable
	IT Earthing System	Disable, Enable		Disable
	Dry Contact 1 (Output)	Low battery, On bypass, On battery, UPS fault, Input back feed		Low battery
	Dry Contact 2 (Output)	Low battery, On bypass, On battery, UPS fault, bypass back feed		UPS fault
	Dry Contact 3 Input	Maintain mode, Any mode shutdown, Battery mode shutdown, Service mode, Charger disable mode		Maintain mode
	Dry Contact 4 Input	Maintain mode, Any mode shutdown, Battery mode shutdown, Service mode, Charger disable mode		Maintain mode

Table 4.5 Settings Available at the Display Panel (continued)

Tab	Settings	Parameter range		Default setting
		15 kVA 208 V and 20 kVA 208 V	40 kVA 400 V	
Output	Voltage Selection	120 V/127 V/Autodetect	220 V/230 V/240 V/ Autodetect	Autodetect
	Startup On Bypass	Disable, Enable		Disable
	Frequency Selection	Auto, Bypass Enable; Auto, Bypass Disable, 50Hz, Bypass Disable, 60Hz, Bypass Disable		Auto, Bypass Enable
	Inverter Sync Range	±0.5Hz, ±1.0Hz, ±2.0Hz, ±3.0Hz, ±4.0Hz, ±5.0Hz,		±3.0 Hz
	Bypass Voltage Upper Limit	+10%, +15%, +20%		+20% for 40 kVA +10% for 15 kVA and 20 kVA
	Bypass Voltage Lower Limit	-10%, -15%, -20%	-10%, -20%, -30%, -40%	-40% for 40 kVA -10% for 15 kVAand 20 kVA
	Bypass Frequency Range	±5.0Hz, ±10.0Hz		±10.0 Hz
	Run Mode	Normal, ECO Mode		Normal
	ECO Voltage Range (1)	±5%, ±10%, ±15%		±5%
	ECO Frequency Range	±1.0Hz, ±2.0Hz, ±3.0Hz		±3.0 Hz
	ECO Requalification Time	5, 15, and 30 minutes		5
	Rectifier Holdoff time	4 to 120 Sec		10 Sec
	Power conditioner mode	Disable, Enable		Disable
Parallel	Voltage Selection	120 V/127 V/Autodetect	220 V/230 V/240 V/Autodetect	Autodetect
	Frequency Selection	Auto, Bypass Enable, Auto, Bypass Disable, 50Hz, Bypass Disable, 60Hz, Bypass Disable		Auto, Bypass Enable
	Run Mode	Normal, ECO Mode		Normal
	Redundant	No, Yes		Yes
	System Parallel Number	1 to 4		1
	Sync Parallel Parameters	By HMI Interface Button		N/A

Table 4.5 Settings Available at the Display Panel (continued)

Tab	Settings	Parameter range		Default setting
		15 kVA 208 V and 20 kVA 208 V	40 kVA 400 V	
Battery	Battery Type	Lead-acid, Lithium-ion		Lead-acid
	External battery cabinet group No. (2)	Autodetect/0/1/2/3/4/5/6/7/8		Autodetect
	Shared Battery (3)	Disable, Enable		Disable
	Local Battery total AH (3)	7 to 3000 AH		18AH
	Low Battery Time	2 to 30 minutes		2
	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	MM:SS		00:00
	Battery Series (3)	24, 32	24/26/28/30/32/34/36/38/40	32
	Discharge Protect Time	1 to 4320 minutes		4320
	Charging current(C)	0.1, 0.2, 0.3, 0.4, 0.5		0.5
	Battery wake up	Disable, Enable		Enable
	Battery automatic cable detection	Disable, Enable		Enable
	Equalize Charge Enable	No, Yes		No
	Temperature Compensation	Disable, Enable		Enable
	Replace Battery	Prompt will reset battery parameters, Continue Yes/No		No
Monitor	Language	English, Chinese, German, French, Italian, Spanish, Polish, Dutch, Portuguese, Swedish, Turkish, Russian, Czech		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
	Temperature type	Celsius, Fahrenheit		Celsius
	Intellislot	Velocity, YDN23		Velocity
	UPS Comm Address	1 to 255		01
	Control Port Protocol	Modbus, Sensor		Sensor
	Modbus Address	1 to 128		1
	Change Settings Password	0 to 9, must be six digits in length		111111

NOTE: ECO options appear only in ECO Mode.

NOTE: ECO options are only Available when the battery type is Lithium-ion and Lead Acid.

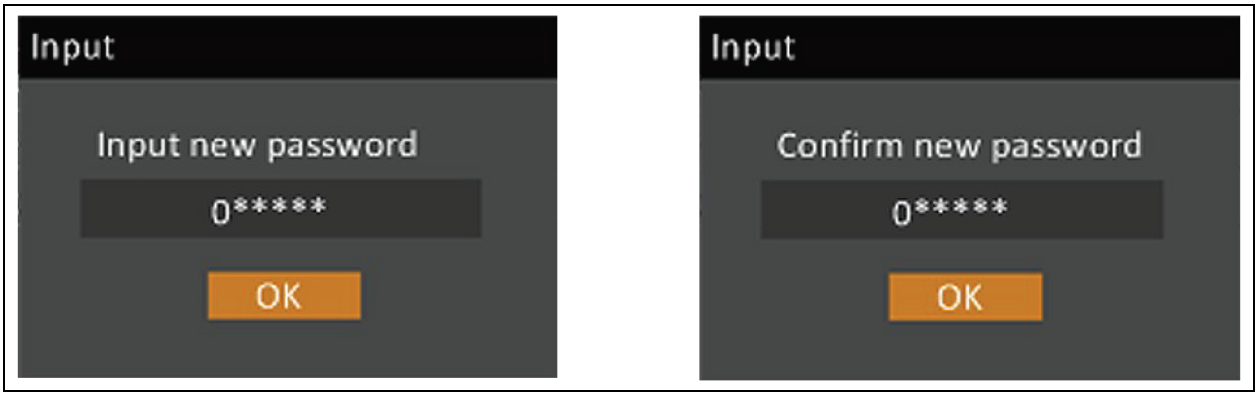
4.4.1 Changing the Password

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*, re enter the current password. The Input new password dialog opens, see Figure 4.12 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 4.12 New and Confirm Password Dialogs



4.4.2 Selecting the Display Language

The LCD will display text in English, Chinese, German, French, Italian, Spanish, Polish, Dutch, Portuguese, Swedish, Turkish, Russian, Czech.

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 on the front panel display, see Operation and Display Panel on page 43.

5.2 UPS Startup

Perform startup 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 startup 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 input (if wired as dual input).
2. Close all downstream breakers including distribution panel main breaker and/or branch circuit breakers.
3. If external battery cabinets are installed, close the EBC breaker.
4. If optional MBC are installed,
   a. Ensure that the maintenance bypass breaker (MBB) is open and the mechanical interlock of MBB is secured in the low position.
   b. Ensure the mechanical interlock of main output breaker (MOB) is secured in the high position and the MOB is closed.
   c. Close the Rectifier Input Breaker (RIB), Bypass Input Breaker (BIB).

   When the RIB and BIB breakers are closed, the UPS automatically begins the startup process and the boot up system checks, which take 20 to 30 seconds.
5. Before continuing to step 6, make any changes/customization to the UPS operating parameters for the installation or application, see Editing Operation and Display Panel on page 43.
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 UPS, see 5.2 above.

Figure 5.1 Turn on UPS

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 to bypass will be displayed; see Figure 5.2 below. Click *OK* and then Confirming this selection initiates a transfer to internal bypass operation.
  a. Use the up/down arrows to select *No* or *Yes*, or press *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 turn off the UPS will be displayed; see Figure 5.3 below.
  a. Use the up/down arrows to select *No* or *Yes*, or press *ESC* to cancel.
  b. Press *Enter* to confirm the action.

Figure 5.2 Turn to bypass when Bypass Power in Normal Range

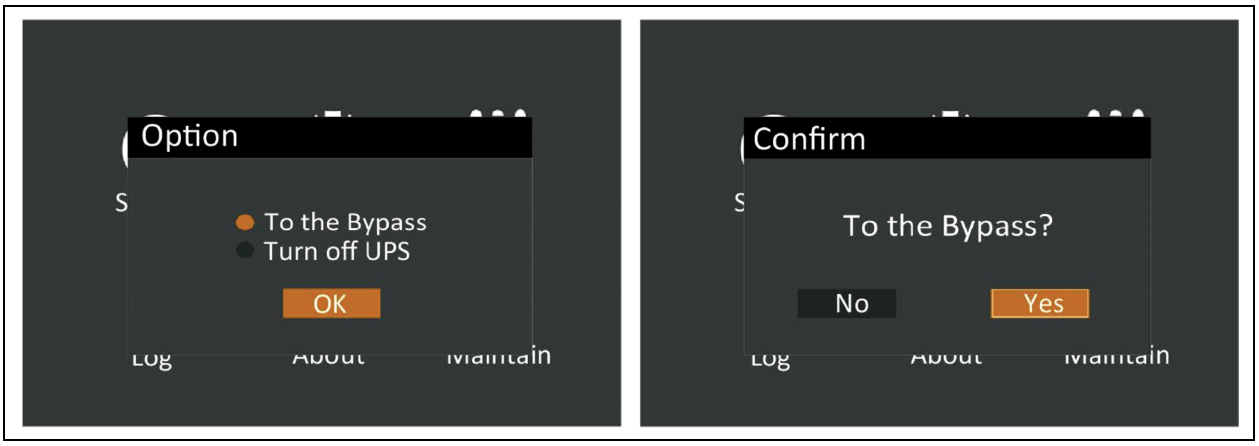

Figure 5.3 Turn off UPS when Bypass Power Outside Normal Range

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 options which named as Turn on UPS and Turn off UPS will be shown on the screen. Select the Turn on UPS and click *OK* to go into confirm page.
- Confirm your selection again by clicking 'Yes' as Figure 5.4 below to turn on UPS.

Figure 5.4 Turn on Local INV

5.5 Transferring from Normal Mode to Maintenance Bypass Mode

NOTE: Make sure the Vertiv™ Liebert® ITA2 40 kVA MBC is used in this system.

NOTE: The dry contact communication cable is connected between MBC and UPS.

NOTE: The function of dry contact 3 has been set as Maintenance Bypass mode on monitor.

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 will be displayed.
   a. Select *Turn to bypass*.
   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 of the unit to gain access to the maintenance bypass breaker (MBB).
2. Loosen the thumbscrew on the mechanical interlock on the MBB.
3. Slide the interlock and tighten the thumbscrew to secure the interlock in place.

4. Close the MBB.
5. Electrically isolate the UPS module from AC power input by opening the rectifier input breaker (RIB), bypass isolation breaker (BIB), and main output breaker (MOB). If external battery cabinets are installed, open the EBC breakers.

5.6 Transferring from Maintenance Bypass to Service Mode

NOTE: Make sure the Vertiv™ Liebert® ITA2 40 kVA MBC is used in this system.

NOTE: The dry contact communication cable is connected between MBC and UPS.

NOTE: The function of dry contact 3 has been set as Maintenance Bypass mode and the dry contact 4 has been set as Service mode.

Service mode is an operation mode between Maintenance mode and normal mode. On maintenance mode, the load is powered by external maintenance bypass, allowing to start up UPS for testing when output breaker is open.

The transfer procedure puts the UPS in Service Mode for safe servicing by a Vertiv service technician.

To transfer from maintenance bypass mode to service mode:

1. Make sure the system is in maintenance bypass mode.
2. Open the main output breaker (MOB) on MBC.
3. Loosen the thumbscrew on the mechanical interlock of the MOB.
4. Slide down the interlock and tighten the thumbscrew to secure the interlock in place.
5. The Service mode should be shown in Current log.

   After the above steps, this UPS is in service mode and technical engineer in site is free to turn on it and check if it works normal or not.

5.7 Transferring from Service Mode to Maintenance Bypass

NOTE: Make sure the Liebert® ITA2 40kVA MBC is used in this system.

NOTE: The dry contact communication cable is connected between MBC and UPS.

NOTE: The function of dry contact 3 has been set as Maintenance Bypass mode and the dry contact 4 has been set as Service mode.

To transfer from service mode to maintenance bypass mode:

1. Make sure the system is in Service mode.
2. Loosen the thumbscrew on the mechanical interlock of the MOB.
3. Slide up the interlock and tighten the thumbscrew to secure the interlock in place.
4. The Maintenance mode should disappear in Current log.
5. Close the MOB.

   After the above steps, this UPS is in maintenance bypass mode.

5.8 Transferring from Maintenance Bypass to Normal Mode

To transfer from Maintenance Bypass to normal operation:

1. Ensure that the mechanical interlock of MBB is still secured in the high position and the MBB is closed.
2. If external battery cabinets are installed, close the EBC breaker.
3. Close the rectifier input breaker (RIB), bypass input breaker (BIB).
   The UPS performs startup checks and begins operating in Internal Bypass Mode.
4. 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 60, for the steps.
5. Close the main output breaker (MOB) if it's opened.

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.

6. On the front of the UPS, open the maintenance bypass breaker (MBB).
7. Loosen the thumbscrew on the mechanical interlock on the MBB.
8. Slide the interlock and tighten the thumbscrew to secure the interlock in place.
9. Press and hold the POWER button for 2 seconds.
10. Select the operation *Turn on UPS*.
    a. Select *Turn on UPS*.
    b. Press *Enter* to confirm the action.
    c. Press *Enter* again.

5.9 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 35, for connection details.

Consult national and local wiring codes to determine if additional REPO is required for the external UPS rectifier and bypass feeds.

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6 Maintenance

WARNING! Risk of electrical shock. Can cause property damage, injury and death. The unit has several circuits that are energized with high DC and AC voltages. Check for voltage with both AC and DC voltmeters before making contact and before working within the UPS. Only properly trained and qualified personnel wearing appropriate, OSHA-approved personal protective equipment (PPE) should prepare for installation, install and maintain the equipment. When performing maintenance with any part of the equipment under power, service personnel and test equipment must stand on rubber mats.

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.

WARNING! Risk of heavy unit falling. Improper handling can cause equipment damage, injury, and death. Exercise extreme care when handling unit cabinets and rack-mounted units to avoid equipment damage or injury to personnel. The UPS weighs approximately 66.1 lb. (30 kg).

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 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 grounded. If it is 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 59 °F and 77 °F (15 °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 3 months when it has been stored at the specified ambient temperature, or 2 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 applicable 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 environmental 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 www.Vertiv.com/en-us/support/ for information about recycling the waste battery.

7 Specifications

Table 7.1 Specifications

Item	Description	15 kVA 208 V	20 kVA 208 V	40 kVA 400 V
Input 3-Phase, 4W+Gnd	Rated Voltage	208/220 VAC, 3-Phase, 4W+Gnd		380/400/415 VAC, 3-Phase, 4W+Gnd
	Voltage Range, VAC	96 V to 156 V with full load 70 V to 96 V linear decrease 70 V with half load		176 V to 288 V with full load 100 V to 176 V linear decrease 100 V with half load
	Rated Frequency, Hz	50/60		
	Frequency Range, Hz	40 to 70		
	Power Factor	≥0.99, at full load; ≥0.98, at half load		
Output 3-Phase, 4W+Gnd	Rated Power	15 kVA/15 kW	15 kVA/1 5kW 20 kVA/ 20kW	40 kVA/40 kW
	Voltage	208 VAC, 3-Phase, 4W + Gnd		230 VAC, 3-Phase, 4W+Gnd
	Frequency Synchronization Range	Rated frequency ±3 Hz. Configurable range: ±0.5 Hz ~ ±5 Hz		
	Frequency Track Rate	0.5 Hz/s. Configurable Range: 0.2/0.5/1 Hz/s (Single UPS), 0.2 Hz/s (Parallel System)		
	Rated Power Factor	1		
	Crest Factor	3:1		
	Voltage Harmonic Distortion	< 2% (linear load); < 5% (non-linear load)		
	Dynamic Response Recovery Time, ms	40		
	Overload Capacity	At 25 °C: 105% to 125%, 10 min; 125% to 150%, 1 min; 150% to 200%,5 s; >200%, 200 ms		
	Bypass Voltage	Upper Limit: +10%, +15%, +20%; Default +10% Lower Limit: -10%, -20%, -30%, -40%; Default -10%		Upper Limit: +10%, +15%, +20%; Default +20% Lower Limit: -10%, -20%, -30%, -40%; Default -40%
	AC-AC Efficiency	Up to 93%		Up to 96.5%
Battery	Type	- Sealed, Lead-Acid, Maintenance-Free - LFP Lithium Ion		- Sealed, Lead-Acid, Maintenance-Free
	Number of Cells	24, 32; Default 32		24, 26, 28, 30, 32, 34, 36, 38, 40; Default 32
	Rated Voltage, VDC	384		
	Maximum Charge Current, A	13		
Transfer Time	Utility to Battery, ms	0		
	Inverter to Bypass	Synchronous Transfer: ≤0 ms Asynchronous Transfer (default): ≤20 ms (40 ms, 60 ms, 80 ms, 100 ms and 120 ms are available)		
Noise, db		<63		
Panel Display Mode		Color LCD		
Safety		UL/CSA UL&cUL (UL 1778 5th Edition, CSA No.22.2 107.3)		

Table 7.1 Specifications (continued)

Item	Description	15 kVA 208 V	20 kVA 208 V	40 kVA 400 V
EMC	Conducted & Radiated Emissions	FCC Part 15, Class A		
Surge Protection		ANSI C62.41 Category A		
Protection Level		IP20		
Ambient Condition	Operating Temperature	32 °F to 122 °F (0 °C~ 50°C), automatic derating to 80% above 104°F (40°C)		
	Storage Temperature	No Battery: -40 ~ 158°F (-40 to +70°C); With Battery: -13 °F to 131 °F (-25 °C to +55°C)		
	Relative Humidity	5% RH to 95% RH, non-condensing		
	Altitude, ft. (m)	Sea Level to 10,000 ft. (3000 m) without derating		
Dimensions, W x D x H, in. (mm)	UPS	16.9 x 30.1 x 5.1 (430 x 765 x 130)		
	VRLA Battery Cabinet - ITA2-BCI0020K02 (Quantity of 2)	16.9 x 29.6 x 3.3 (430 x 751 x 85) per cabinet		
	2U Li-Ion Battery Cabinet - ITA2-BCI0020KL2 (Quantity of 2)	Net: 16.9 x 26.77 x 3.35 (430x680x85) per cabinet Shipping: 23.6x 31.5 x 12.8 (600x 800 x 327)		
	Single MBC	16.9 x 28.7 x 6.8 (430 x 730 x 173)		
	2+0 Parallel MBC	16.9 x 32.0x 15.5 (430 x 814 x 393)		
	2+1 Parallel MBC	16.9 x 32.0x 20.6 (430 x 814 x 523)		
Weight, lb. (kg)	UPS	Net: 66.1 (30) Shipping: 88.2 (42)		
	VRLA Battery Cabinet	Net: 115 (52.2) each Shipping: 306.4 (139)		
	2U Li-Ion Battery Cabinet	Net: 70.5 (32) Shipping: 229.3 (104)		
	Single MBC	Net: 52.2 (23.7) Shipping: 79.4 (36)		
	2+0 Parallel MBC	Net: 91.9 (41.7) Shipping: 136.7(62)		
	2+1 Parallel MBC	Net: 116.8 (53.0) Shipping: 175.1 (79.0)		

Table 7.2 Options

Option	Model	Description
maintenance bypass cabinet (MBC)	ITA-40kMBC41	Single MBC for 20kVA 208V/40kVA 400V UL UPS (4U)
	ITA-40kMBC42	1+1/2+0 Parallel MBC for 20kVA 208V/40kVA 400V UL UPS (9U)
	ITA-40kMBC43	2+1 Parallel MBC for 20 kVA 208 V/40 kVA 400 V UL UPS (12U)
Battery Cabinet	ITA2-BCI0020K02	(2U each cabinet) Battery cabinet with built-in 16 V to 12 V (9 Ah) batteries
	ITA2-BCI0020KL2	(2U each cabinet) Lithium Ion Battery Cabinet (12 Ah)
Battery Cable Kit	ITA2-BCI20K02L3	Replaceable cable that was supplied with the UPS for UPS to Battery cabinet connections 1 meter long
	ITA2-BCI20K02L4	UPS to Battery Cable Kit 2 meters long
	ITA2-BCI20K02L2	Battery to Battery Cable Kit, 1 meter long
	ITA2-BCI0020k02L1	Battery to Battery Cable Kit, 20 K 208 V UPS to VRLA EBC Cable kit, 0.75 meter long with magnetic ring
	ITA 40k00BCI01L1	40 kVA 400 V UPS-to-VRLA EBC Cable Kit, 1 meter long
	ITA 40k00BCI01L2	Battery to Battery Cable kit for 40 kVA 400 V UPS system, 1 meter long.
	ITA2-40KMBCSL5	ITA2 20 kVA/40 kVA MBC TO UPS Cord Set
	ITA2-40KMBCSL1	ITA2 20 kVA/40 kVA Single Input UPS/MBC Main in/out cord set
	ITA2-BCI40K02L1	ITA2 BATTERY SHARE CABLE KIT FOR 2+1 CONFIGURATION
Rack Mounting Kit	ITA2-RMKIT	Guide rail for rack installation; supplied with UPS; includes one left and one right guide rail and mounting hardware. The rails will support 150 lb. (68kg). The kit is compatible with various server cabinets, UPS's, battery cabinets and MBC's.
Communication Options	IS-RELAY	Vertiv™ Liebert® IntelliSlot™ Relay Card
	IS-UNITY-DP	Liebert® IntelliSlot™ Unity card for network communication
Ambient Temperature Sensor Kit	IRM-S01T	Ambient Temperature Sensor
Parallel Communication Cable (An N + 1 communication cable is required for each UPS in an N + 1 parallel system.)	ITA2-PARACBL1M	3 ft. (1m)
	ITA2-PARACBL3M	9.8 ft. (3m)
	ITA2-PARACBL4M	13 ft. (4m)
	ITA2-PARACBL10M	32.8 ft. (10m)

7.1 Standard Battery Backup Time with a Single UPS

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.

Table 7.3 Backup Time for 15 kVA or 15 kW VRLA Models in Minutes

Number of battery string	Load Level									
	15 kVA	13.5 kVA	12 kVA	10.5 kVA	9 kVA	7.5 kVA	6 kVA	4.5 kVA	3 kVA	1.5 kVA
2	8.5	10.0	11.5	14.0	17.5	22.5	31.0	44.5	70.5	153.5
3	15.0	17.5	21.0	25.0	31.0	39.5	51.5	71.0	110.5	246.0
4	23.0	26.5	31.0	37.0	45.0	55.5	71.5	98.0	157.5	338.5
5	31.0	36.0	41.5	49.0	58.5	71.5	92.0	127.5	205.0	431.0
6	39.5	45.0	52.0	60.5	72.0	88.0	112.0	159.0	252.5	523.5

Table 7.4 Backup Time for 20 kVA or 20 kW VRLA Models in Minutes

Number of battery string	Load Level									
	20 kVA	18 kVA	16 kVA	14 kVA	12 kVA	10 kVA	8 kVA	6 kVA	4 kVA	2 kVA
2	5.5	6.5	7.5	9.5	11.5	15.0	21.0	31.0	51.5	111.0
3	10.0	11.5	14.0	17.0	21.0	27.0	36.5	51.5	81.5	181.5
4	15.0	17.5	21.0	25.5	31.0	39.5	52.0	72.0	112.0	252.5
5	21.0	24.5	28.5	34.0	41.5	52.0	67.0	92.5	148.0	324.0
6	27.0	31.5	36.5	43.0	52.0	64.0	82.0	112.5	184.0	395.0

Table 7.5 Backup Time for 40 kVAor 40 kW VRLA Models in Minutes

Number of battery strings	Load Level									
	40 kVA	36 kVA	32 kVA	28 kVA	24 kVA	20 kVA	16 kVA	12 kVA	8 kVA	4 kVA
2	1.5	2.0	2.5	3.0	4.0	5.5	7.5	11.5	21.0	51.5
3	3.5	4.0	5.0	6.0	7.5	10.0	14.0	21.0	36.5	81.5
4	5.5	6.5	7.5	9.5	11.5	15.0	21.0	31.0	52.0	112.0
5	7.5	9.0	10.5	13.0	16.0	21.0	28.5	41.5	67.0	148.0
6	10.0	11.5	14.0	17.0	21.0	27.0	36.5	52.0	82.0	184.0
7	12.5	14.5	17.5	21.0	26.0	33.5	44.5	62.0	97.5	220.0
8	15.0	18.0	21.0	25.5	31.5	39.5	52.0	72.0	113.0	256.0
9	18.0	21.0	25.0	30.0	36.5	46.0	59.5	82.5	131.0	292.0
10	21.0	24.5	28.5	34.5	41.5	52.0	67.0	92.5	149.0	328.0

Table 7.6 Backup Time for 15 kVA or 15 kW 2U Lithium Models in Minutes

Battery String Qty	Load Level									
	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
	15 kW	13.5 kW	12 kW	10.5 kW	9 kW	7.5 kW	6 kW	4.5 kW	3 kW	1.5 kW
1	15	17	19	21	25	30	37	50	79	148
2	30	33	37	43	50	62	77	103	161	299
3	47	52	59	67	78	95	119	158	243	449
4	62	69	77	88	103	128	160	213	429	596
5	77	85	96	110	128	161	201	268	403	743
6	92	102	115	131	153	194	243	324	483	889
7	107	119	133	152	178	227	284	379	563	1036
8	122	135	152	174	203	260	325	434	643	1183

Table 7.7 Backup Time for 20 kVAor 20 kW 2U Lithium Models in Minutes

Battery String Qty	Load Level									
	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
	20 kW	18 kW	16 kW	14 kW	12 kW	10 kW	8 kW	6 kW	4 kW	2 kW
1	10	11	14	16	18	23	28	38	59	111
2	22	25	28	32	39	46	58	78	121	224
3	34	38	44	50	59	72	89	120	182	337
4	47	52	58	67	79	97	120	161	242	447
5	59	66	72	84	99	122	151	202	302	557
6	71	80	86	101	119	147	182	243	362	667
7	83	94	100	118	139	172	213	284	422	777
8	95	108	114	135	159	197	244	325	482	887

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Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2378

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

505 N Cleveland Ave

Westerville, OH 43082

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road, Wanchai

Hong Kong

India

Vertiv Headquarters

Plot C-20, Rd No. 19, Wagle Ind. Estate, Road No. 16 V

Wagle Industrial Estate, MIDC Thane (W), Maharashtra, India

+91 22 71975400

Appendix B: UPS Prompts and Alarms

B.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.
Please disconnect power, check output: 1 phase, 3 phase, then power UPS On	Appears when the output phase is changed. The system requires the user to power Off and check the cable connections, then power On the UPS again to guarantee the safety.

B.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
Any Mode Shutdown	When shutdown dry contact at battery mode is triggered, this event will be reported.	
Aux power fault	The auxiliary power supply voltage is out of range.	Contact Vertiv Technical Support
Battery Address Conflict	Two or more same addresses are set in system.	Check and maintain the battery address according to the user manual
Battery Address Set Wrong	DIP switches of one or more strings are set up upside down.	Power off the breaker of battery, check all battery addresses according to the user manual.
Battery Aged	The battery capacity is less than 25% of the initial capacity.	Replace battery
Battery CAN Connect Abnormal	The number of 485 communication nodes is greater than the number of CAN communication nodes.	Check Battery Cable Connections
Battery cabinet connect abnormal	The system detects more than six battery cabinets, then reports the battery cabinet connection is abnormal.	Properly connect the battery cabinets, remove extra.
Battery cabinet not connected	The battery cabinet group number is specified, but the communication cables are not connected.	Connect the battery cabinets.
Battery cabinet not detected	The battery cabinet is not connected to the system.	Connect the battery cabinets.
Battery Charge High Cell Temp	The temperature of the battery cell is greater than 60 °C while charging	Check UPS/Battery ambient condition is per User Manaul requirements. If problem persists, contact Vertiv Technical Support
Battery Charge Low Cell Temp	The temperature of the battery cell is less than 0 °C while charging	Check UPS/Battery ambient condition is per User Manaul requirements. If problem persists, contact Vertiv Technical Support
Battery Charge Overcurrent	Battery charging current is greater than 12 A for 1U 6 Ah. Battery charging current is greater than 20 A for 2U 12 Ah.	Contact Vertiv Technical Support
Battery Check		
Battery Communication Fail	The communication is failed between the lithium battery and the UPS	Check Communication Cable Connections
Battery Discharge High Cell Temp	The temperature of the battery cell is greater than 80 °C while discharging	Reduce battery temperature
Battery Discharge Low Cell Temp	The temperature of the battery cell is less than -20 °C while discharging	Increase battery temperature
Battery Discharge Overcurrent	Battery discharging current is greater than 90 A	Contact Vertiv Technical Support
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 High Cell Volt	The maximum battery cell voltage is greater than 3.8V	Contact Vertiv Technical Support

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

Alarm/Warning	Description	Action
Battery Internal Communication Abnormal	Battery Internal communication abnormal	Contact Vertiv Technical Support
Battery Low Cell Volt	The minimum battery cell voltage is less than 2.4 V and is discharging or The minimum battery cell voltage is less than 2.65 V and is charging	Return to Main Power
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.
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 Parallel Charge High Temp	The temperature of the battery parallel resistance is greater than 80 ℃	If alarm doesn't clear, contact Vertiv Technical Support.
Battery Parallel Conditions Dissatisfy	The parallel conditions are not met	If alarm doesn't clear, contact Vertiv™ Technical Support.
Battery Port Reverse	Battery port voltage is less than -95 V before power of battery is on	Check Battery Cable Connections
Battery reversed	The battery polarity is reversed.	Call a qualified electrician to verify the battery wiring or contact Vertiv Technical Support.
Battery SN Abnormal	Battery SN does not meet the code rule in the system	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 Series Set to 24-40	After configuring the internal communication and the battery series number is changed	None required.
Battery test failed	The battery capacity dropped below the threshold for the battery test.	Replace battery.
Battery test finished	The battery test has been finished.	None required.
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 voltage abnormal	The battery voltage is outside of normal operating parameters.	Contact Vertiv Technical Support.
Battery wake up manually	When "No Battery" alarm is present and the charger activates	None required.
Battery-to-Utility Transition	Power supply mode of this unit is changed from battery mode to mains mode	None required.
BMS Relay Invalid	The battery current detected is not 0 after power of battery is off	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.

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

Alarm/Warning	Description	Action
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 is 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 or battery and the UPS enclosure.	Contact Vertiv Technical Support.
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 Current Imbalance	Difference between rectifier minimum and maximum current is more than 10A	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 ground lost	Check that the PE line is well connected, and the alarm can be cleared on line.	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.

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

Alarm/Warning	Description	Action
Inverter fault	A fault in the UPS inverter has occurred and the load will transfer to bypass power if is 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 shut down.	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.
LBS Abnormal	When LBS function is enabled, effect level signal can't be detected in LBS bus	Check LBS cable connection
Load Off due to output short	The inverter or the bypass has a short circuit.	Verify the reason for the remote command, and then restart the UPS
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.
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.
Monitor Initialized	After power On, monitoring is initialized.	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 ContactVertiv Technical Support.
Operating on Inverter	UPS changes from standby or Bypass mode to Inverter	None required.
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.
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 phase No. set to 1	The output phase is changed from 3-phase to 1-phase.	Contact Vertiv Technical Support.
Output Pending	Triggered shutdown via dry contact signal	None required.
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.
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.

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

Alarm/Warning	Description	Action
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.
Replace Battery	User selects replace battery in the menu	None required.
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.
Safety Under Voltage	The minimum battery cell voltage is less than 1.55 V, or less than 2.65 V while charging	Contact Vertiv Technical Support.
Shutdown due to overtemp	Internal temperatures have exceeded threshold settings and the UPS has shut down.	Verify the ventilation openings are not block or Contact Vertiv Technical Support
Start Battery Cable Detection	User selects Battery Cable Detection from the menu	None required.
System fault	The UPS model identification is not correct for the firmware in the unit.	Contact Vertiv Technical Support.
System overload	The parallel system load exceeds the parallel system settings.	Verify the parallel system settings, remove unauthorized loads, or Contact Vertiv Technical Support.
Turn On programmable outlet	The programmable outlet status is changed from Turn Off to Turn On.	None required.
Turn Off programmable outlet	The programmable outlet status is changed from Turn Off to Turn On.	None required.
UPS out of service	In a parallel system, the UPS has been manually taken out of service for maintenance.	None required.
UPS has no Output	UPS has no output	If alarm doesn't clear when unit has an output, contact Vertiv Technical Support.
Version incompatible	The UPS firmware version between the control board and display are not compatible.	Contact Vertiv Technical Support.

Appendix C: UPS Dimensions

Figure A.1 ITA2 15 kVA /20 kVA 208 V UL UPS

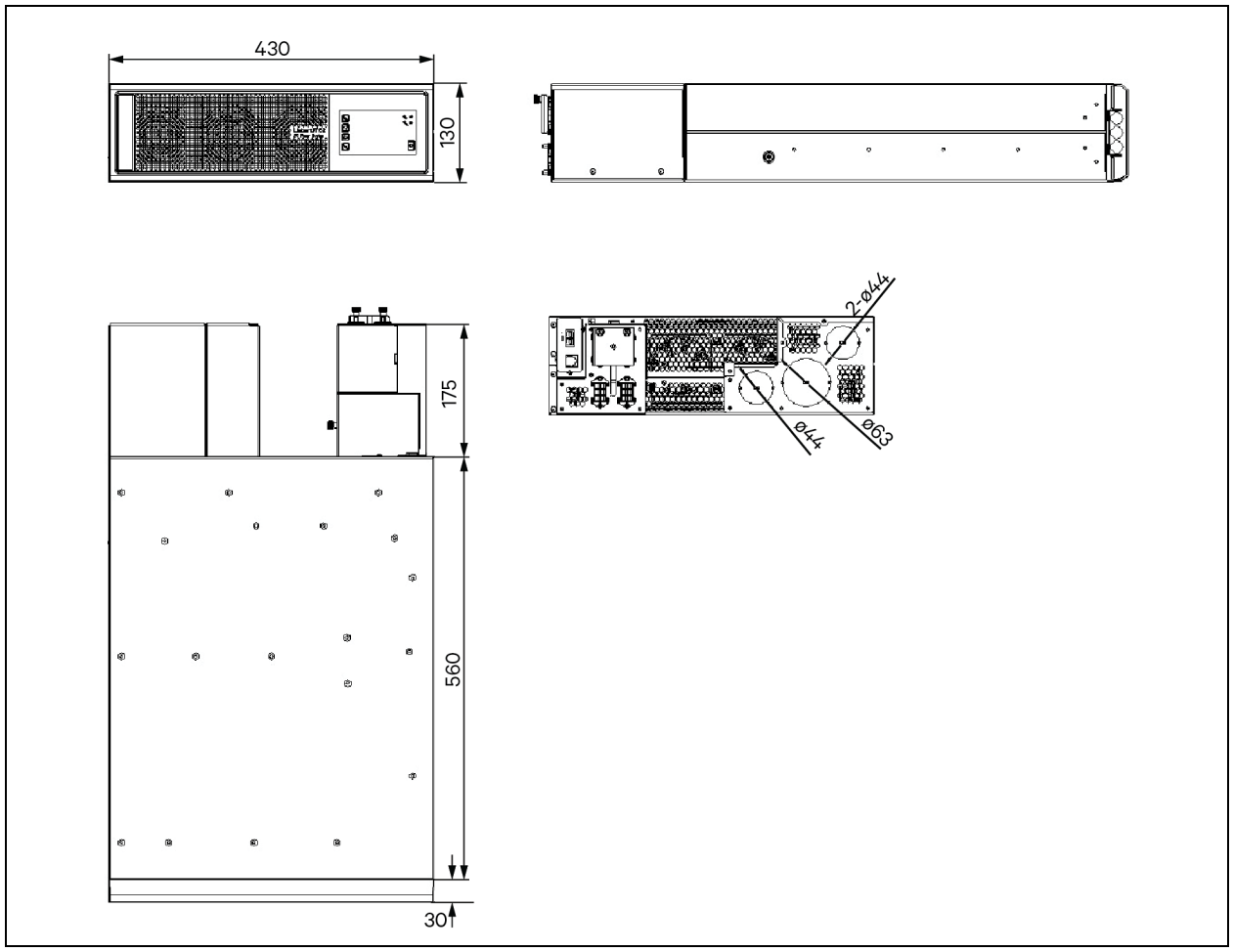
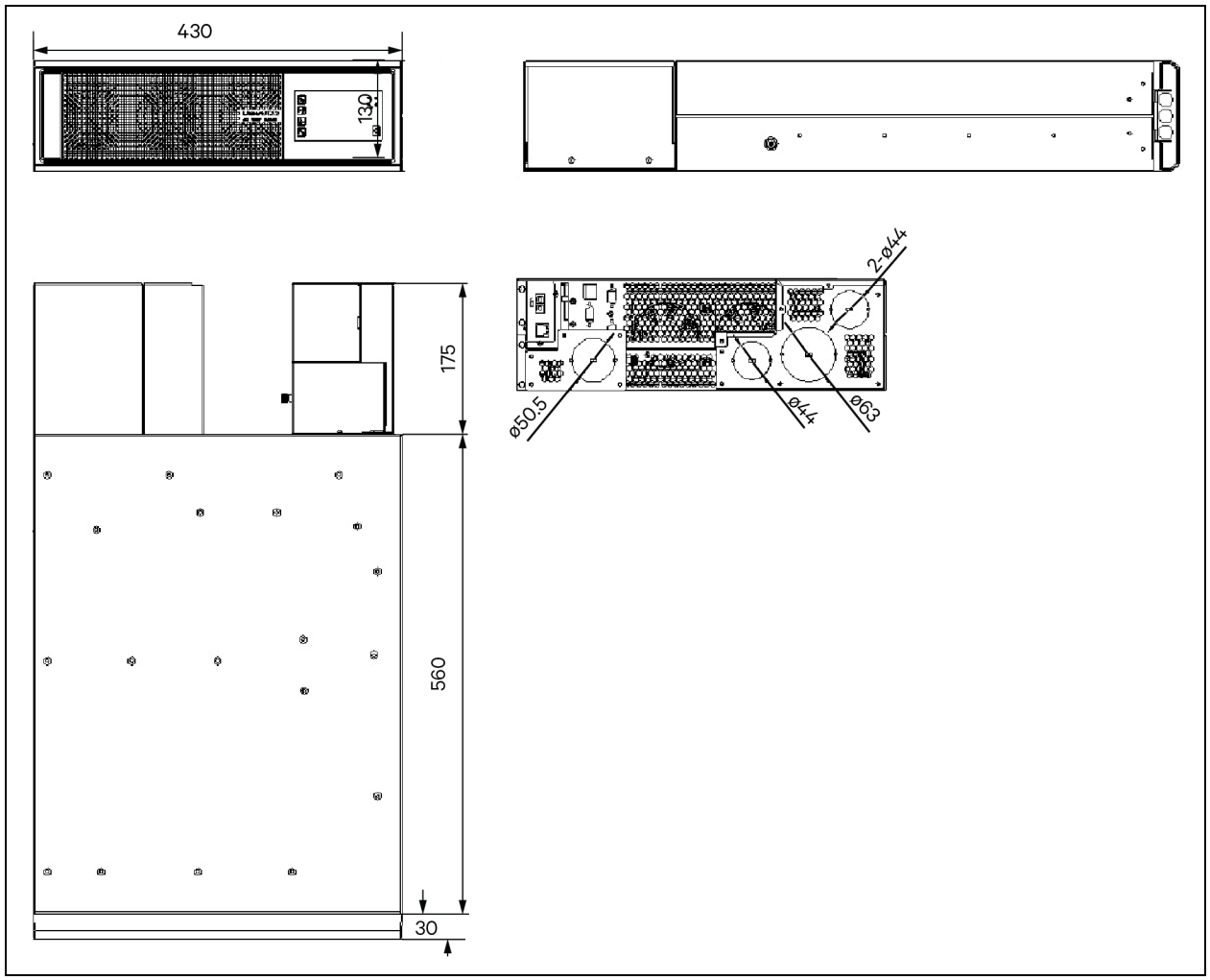


Figure A.2 ITA2 40 kVA /20 kVA 208 V UL UPS



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