



Liebert® ITA2 10 kVA to 20 kVA UPS

User Manual

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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

Personnel Safety

1. This product must be installed and commissioned by professional engineers of the manufacturer or its authorized agent. Failure to observe this could result in product malfunction or personnel safety risk.
2. Take the time to read this product manual and the safety precaution thoroughly before installing and commissioning this product. Failure to observe this could result in product malfunction or personnel safety risk.
3. This product is not intended for life support equipment applications.
4. Never dispose of the battery of this product in a fire, as it may explode and jeopardize personnel safety when exposed to flame.

Product Safety

1. If this product will be stored or remains de-energized for a long period, it must be placed in a dry and clean environment within specified temperature range.
2. This product should be used in an appropriate operating environment. For details, refer to the section on the environmental requirement in this manual.
3. This product is not designed for application in an environment:
 - Where the temperature and relative humidity are outside the specifications
 - Subject to vibrations or shocks
 - Where conductive dust, corrosive gases, salts, or flammable gases are present
 - Near heat sources or strong electromagnetic interferences

NOTE: Always observe the following safety symbols!



WARNING! Risk of electric shock. Can cause equipment damage, injury, or death. Observe all cautions and warnings in this manual. Failure to do so may result in serious injury or death. Refer all UPS and battery service to properly trained and qualified service personnel. Do not attempt to service this product yourself. Opening or removing the cover may expose you to lethal voltages within this unit even when it is apparently not operating, and the input wiring is disconnected from the electrical source. Never work alone.



CAUTION: Risk of electric shock. Can cause equipment damage, injury, or death.

IMPORTANT! Used to advise the user to carefully read and observe this unit though it may not cause damage. This manual contains the information concerning the installation and operation of Vertiv™ Liebert® ITA2 10 kVA to 20 kVA UPS (hereinafter referred to as UPS). Read this manual carefully prior to installation. To reduce the chance of accident, read the safety precautions very carefully before operation. The 'Caution, Note, Warning' in this user manual and on the product do not represent all the safety points to be observed, and are only supplement to various safety points. Therefore, the installation and operation personnel must receive strict training and master the correct operations and all the safety points before operation. When operating Vertiv products, the operation personnel must observe the safety rules in the industry, the general safety points, and special safety instructions provided by Vertiv.



WARNING! The UPS must be installed, commissioned and serviced by engineers designated by Vertiv or by Vertiv representative. Failure to observe this could result in personnel safety risk, UPS malfunction and invalidation of warranty. The UPS has been designed for commercial and industrial use only. Additional measures to control/reduce the radio interference must be taken for residential use as this is a Class C2 UPS product.



WARNING! Backfeed Protection: Before operating the circuit, isolate the UPS first and then check the dangerous voltage between the ports, and earth.



WARNING! When the UPS is operating, do not touch directly or through any wet object to avoid risk of shock due to high voltage.

Conformity and Standards

The UPS complies with 2014/35/EU (LVD), 2014/30/EU (EMC), 2011/65/EU (RoHS) and the following product standards for UPS:

- IEC/EN 62040-1/AS 62040-1: General and safety requirements for UPS
- IEC/EN 62040-2/AS 62040-2: Class C2 compliant
- IEC/EN 62040-3/AS 62040-3 (VFI SS 111): Performance requirements and test methods

The UPS installation should follow the above instructions and use the accessories specified by manufacturer.

Notes to the CE and UKCA Declarations of Conformity

This product conforms to the following European directives and UK Regulations:

2014/35/EU

Directive of the council for adapting the legal regulations of member states on electrical equipment for use within specific voltage limits.

Electrical Equipment (Safety) Regulations: 2016

Regulations implemented according to EU Directive (2014/35/EU) on electrical equipment designed for use within specific voltage limits approved on the GB market.

2014/30/EU

Directive of the council for adapting the legal regulations of member states on electromagnetic compatibility.

Electromagnetic Compatibility Regulations: 2016

Regulations concerning the aspects of electromagnetic compatibility approved on the GB market.

Conformity is established through compliance with the following standards:

- IEC/EN/BS 62040-1:2008+A1:2013
- IEC/EN/BS 62040-2:2018

Additional information regarding adherence to these directives and regulations is included in the appendices NSR and EMC to the Declarations of Conformity. If needed, the Declarations of Conformity can be requested by Vertiv.

2011/65/EU

Directive of the council for adapting the legal regulations of member states on the restriction of the use of certain hazardous substances that can be used in the manufacture of electrical and electronic equipment.

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012.

The restriction of the use of certain hazardous substances that can be used in the manufacture of electrical and electronic equipment approved on the GB market.



CAUTION: When the UPS is operating, some parts have high voltage, therefore, contacting them directly or through moist objects will result in fatal risk.



WARNING! Before moving or rewiring the UPS, disconnect mains input power and the battery and make sure that the UPS is completely shut down to avoid electric shock due to high voltage. Liquid or other irrelevant external objects are prohibited inside the UPS. In case of a fire, use a dry chemical fire extinguisher or heptafluoropropane gas fire extinguishing system. Do not use a foam fire extinguisher to extinguish the fire, it will cause electric shock. The output neutral line of the UPS is from the input, after the neutral line is suspended by the upstream protection devices, the output neutral line will be unconnected. To prevent the radio frequency of output cables from disturbing other electric equipment, it is recommended to use the UPS output cable with the length less than 10 m. When used in light industrial environment, it is recommended to add nickel-zinc magnetic ring to the output cable and battery cable to reduce electromagnetic emission.



WARNING! High leakage current. Grounding is essential before connecting the input power (AC mains and battery included). Earth leakage current (ranges from 3.5 mA to 100 mA). Transient and steady-state earth leakage currents, which may occur when starting the equipment, should be considered when selecting instantaneous residual current circuit breaker (RCCB) or residual current detector (RCD). Note that the earth leakage current of the UPS will be carried by RCCB or RCD. This equipment must be earthed in accordance with the local electrical codes.



WARNING! When selecting the UPS system upstream distribution protection equipment, ensure that it complies with the local electric regulations. The specified upstream breakers are required to obtain the conditional short-circuit current rating, I_{cc} at 10 kA symmetrical RMS. The specified upstream breakers should comply with an IEC 60947 series standard.



WARNING! Battery high voltage. All the physical service and maintenance of the battery are performed by the trained technicians.

Operation on the battery will result in electric shock and high short-circuit current, therefore, before operating the battery, the following should be observed:

1. Remove the watches, rings and other metal objects.
2. Use the tools with insulation handle.
3. Wear/use proper PPE (rubber gloves and shoes).
4. Avoid placing the tools and metal objects on the battery surface.
5. Disconnect the charge power supply before connecting or disconnecting the battery terminals.
6. Check whether the battery is earthed accidentally, if yes, please disconnect the earthing. Contacting any earth battery parts will result in electric shock. Therefore, make sure that the battery is not earthed during installation and maintenance.
7. Follow battery related precautions provided by the manufacturer the details of the precautions to be observed when working on, or in the vicinity of the batteries. Always follow these precautions implicitly at all times.
8. Pay attention to the recommendations concerning local environmental conditions and the provision of protective clothing, first aid and fire-fighting facilities.

User Serviceable Components

1. The UPS contains no user-serviceable parts. Do not remove the cover. Removing the cover may result in electric shock and will invalidate any implied warranty.
2. The UPS meets the safety requirements completely in operator access area. Only service personnel can contact with the hazardous voltage inside the UPS. However, the risk of contacting these voltages is minimized because the components with hazardous voltage may be contacted only by using a tool to remove the protective cover. No risk will exist if you follow the general norms and in accordance with the procedures recommended in this manual on equipment operation.

The Manual describes the following devices:

Product	Model
20 kVA	ITA-20k00AL3A02E00
15 kVA	ITA-15k00AL3A02E00
10 kVA	ITA-10k00AL3A02E00

2 Product Introduction

The Vertiv™ Liebert® ITA2 10 kVA to 20 kVA UPS (UPS for short) is an intelligent online UPS system with sine wave output developed by Vertiv Tech Co., Ltd. The UPS offers reliable and high-quality AC power to the precision instrument.

The UPS can be installed using two methods depending on the end user requirement. The UPS supplies AC power to small scale computer centers, network, communication system, automatic control system and precision instrument.

This chapter introduces the features, model configurations, appearance and components, operating principle, UPS state and operation mode, and specifications of the UPS.

2.1 Features

The UPS features include:

- Output power factor is 1, which enhances the UPS load capacity.
- On-line double conversion efficiency is up to 96.5% and ECO efficiency is up to 99%, that provides more efficient end user experience.
- Decreased product size by 30% as compared to previous generation occupies little space, and makes it easy to handle and assemble simple handling and assembly.
- 3U thickness. Tower installation and rack installation are optional to meet different installation requirements
- Capable of parallel connection to achieve up to 3+1 parallel redundant power.
- High-frequency double conversion topology structure, with high input power factor, wide input voltage range, and output immune to grid interference, makes adaptable to areas with unstable mains supply.
- Full digital control platform and hardware design platform, makes the UPS adaptable to worse unstable mains supply and load impact.
- Support 24, 26, 28, 30, 32, 34, 36, 38, 40 block batteries, the long backup model has a built-in large power charger with 13 A charging capacity to provide fast charging.
- Innovative design of the layout and the whole process greatly promote the reliability of the UPS; pass 1000h high temperature humidity durability experiment test.
- Operation and display panel with colorful LCD show the UPS operation state and operating parameters. The LCD display will change according to the layout of the model.
- Capable of ECO power supply mode and smart sleep mode, which helps to save energy to the maximum extent.

2.2 Model Configurations

The model configurations are shown in **Table 2.1** below.

Table 2.1 Model Configurations

Model		Product	Description
20 kVA	ITA-20k00AL3A02E00	Liebert® ITA2 20 kVA UPS	/
15 kVA	ITA-15k00AL3A02E00	Liebert® ITA2 15 kVA UPS	/
10 kVA	ITA-10k00AL3A02E00	Liebert® ITA2 10 kVA UPS	/

Table 2.2 Models Output

Model	Input	Output	Note
20 kVA	Three phase	Single phase	Common input configuration (default), split bypass configuration
	Three phase	Three phase	Common input configuration (default), split bypass configuration
15 kVA	Three phase	Single phase	Common input configuration (default), split bypass configuration
		Three phase	
10 kVA	Three phase	Single phase	Common input configuration (default), split bypass configuration
		Three phase	

2.3 Appearance and Components

2.3.1 Appearance

The general of the UPS is shown in **Figure 2.1** below.

Figure 2.1 Appearance of UPS

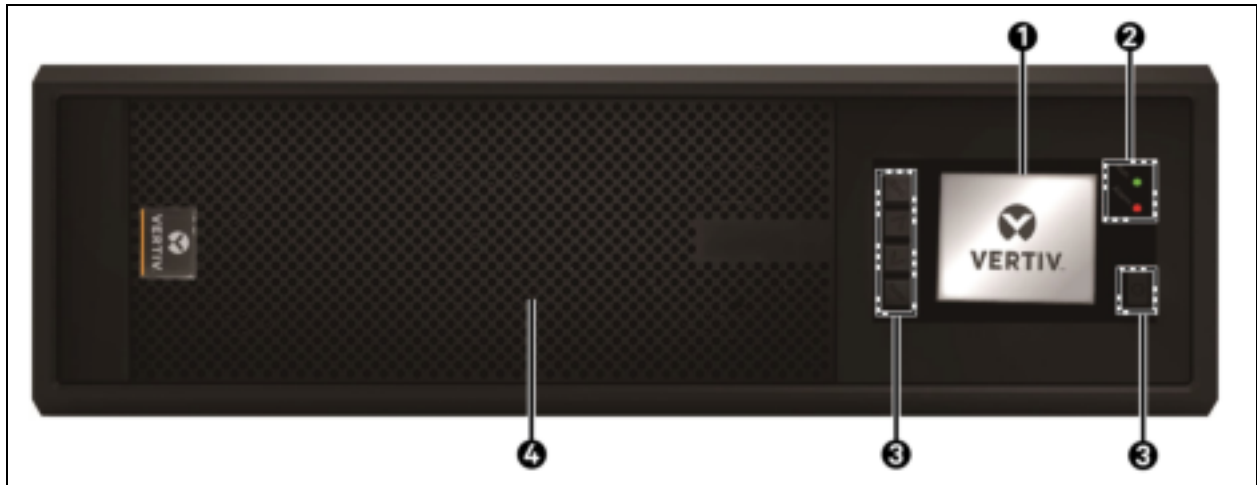


2.3.2 Components

Front Panel

As shown in **Figure 2.2** below, the UPS front panel of the UPS has ventilation holes, operation and display panel, LED indicators and functional keys.

Figure 2.2 UPS Front Panel

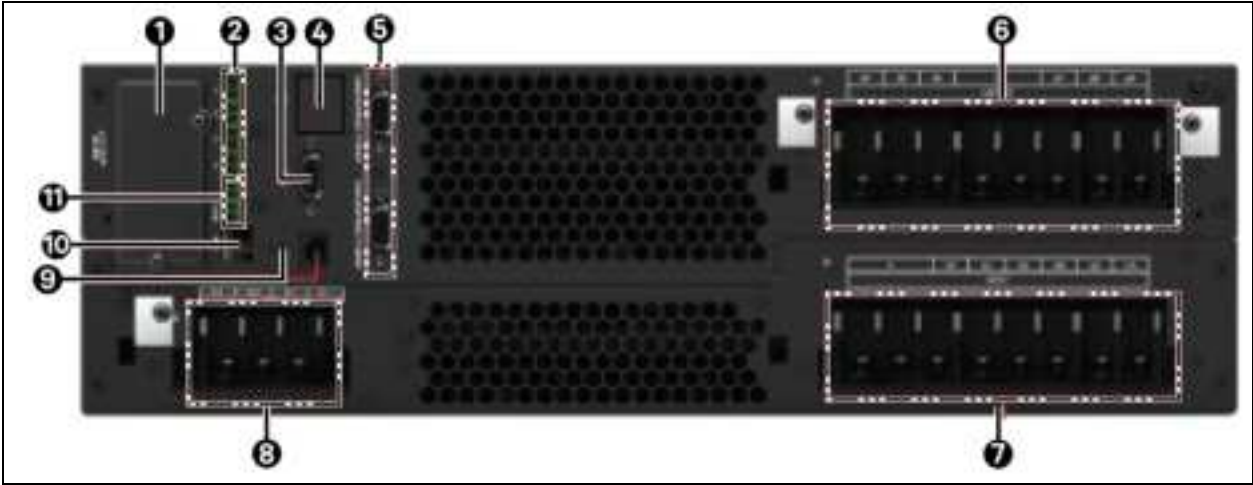


Item	Description
1	Operator and display panel
2	LED indicators
3	Function keys
4	Ventilation holes

Rear Panel

As shown in **Figure 2.3** below, the rear panel of the UPS has parallel/LBS ports, dry contact port, I/O terminal block, battery terminal block, Intellislot port, USB port, RS232 port, REPO port and multifunction port.

Figure 2.3 UPS Rear Panel

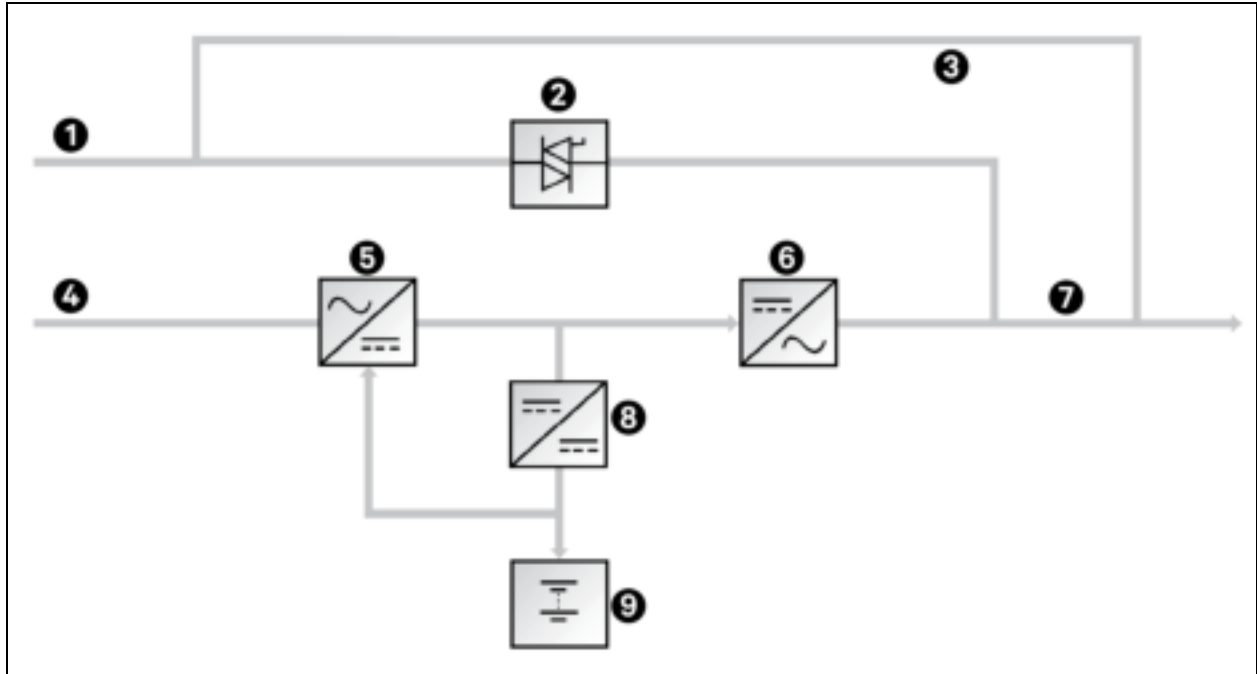


Item	Description
1	Vertiv™ Liebert® Intellislot™ port
2	Dry contact port
3	RS232 port
4	Ethernet port (not used)
5	Parallel/LBS port
6	AC output port
7	AC input port
8	Battery input port
9	Multifunction port
10	USB port
11	REPO port

2.4 Operating Principle

The operating principle of the UPS is shown in **Figure 2.4** below.

Figure 2.4 UPS Operating Principle



Item	Description	Item	Description
1	Bypass input	6	Inverter
2	Static switch	7	UPS output
3	Maintenance bypass	8	Charger
4	Mains input	9	Battery
5	Rectifier/PFC		

1. The UPS composed of mains input (main and bypass), rectifier/PFC, charger, inverter, bypass, battery, DSP controller, and output.
2. When the mains input is normal, the rectifier will start, and the charger will charge the battery string. Before turning ON the UPS, the output voltage is bypass voltage, and the mains supplies power to the load through the bypass. After turning ON the UPS, the electronic transfer switch connects the inverter output to the load, and the mains supplies DC power to the inverter through the rectifier/PFC circuit. The inverter then converts DC power into pure sine wave AC power, and supplies the AC power to the load through the electronic transfer switch.
3. When the mains input is abnormal, the rectifier/PFC circuit boosts the battery voltage and supplies it to the inverter. The inverter then converts it into pure sine wave AC power, and supplies the AC power to the load through the electronic transfer switch.
4. After the mains returns to normal state, the UPS will automatically transfer from Battery mode to Normal mode, the mains supplies DC power to the inverter through the rectifier/PFC circuit, and then the electronic transfer switch supplies AC power to the load.

2.5 UPS State and Operation Mode

For the LED indicators introduced in this section, refer to [LED Indicators](#) on page 64.

The UPS state and operation mode include: Normal mode, Bypass mode, Battery mode, ECO mode, Fault state and Maintenance Bypass mode. The operation schematic diagrams of Normal mode, Bypass mode, Battery mode and Maintenance Bypass mode are shown in **Figure 2.5** below to **Figure 2.8** on page 13.

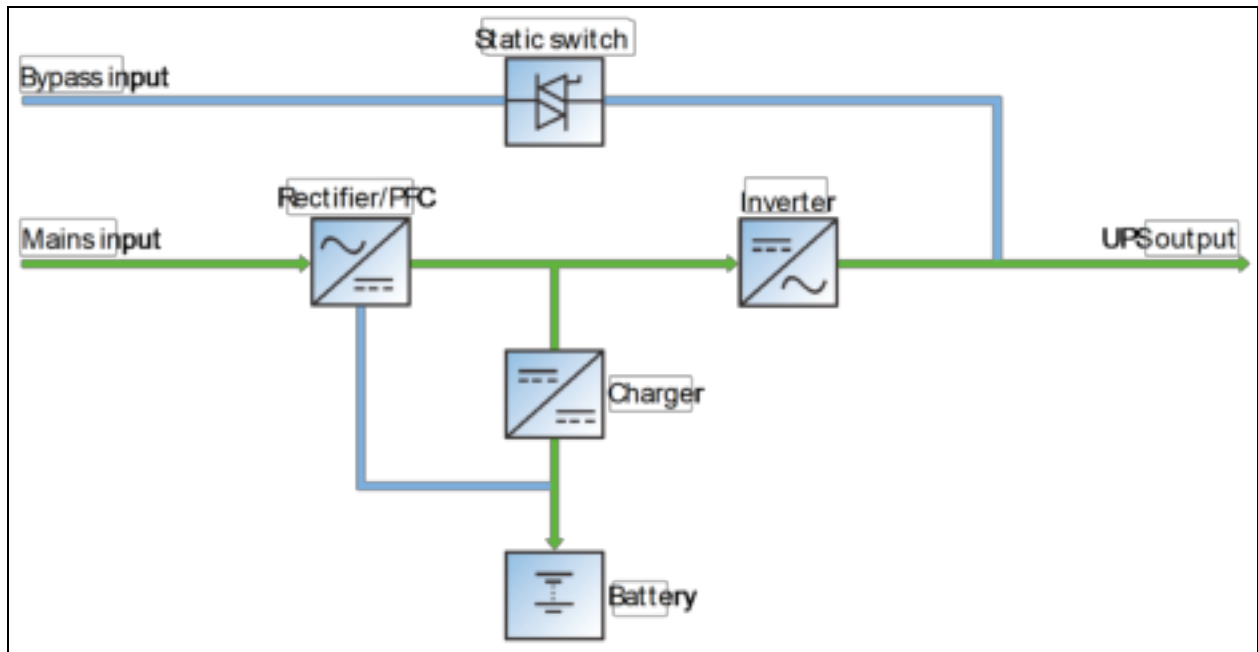
NOTE: Only when the UPS output power distribution unit (POD) is configured, the Maintenance Bypass mode is valid.

2.5.1 Normal Mode

When the mains input is normal, the load is supplied with voltage-stabilizing and frequency-stabilizing power by the mains after processing of the rectifier and the inverter, and meanwhile, the charger is charging the battery. The operation mode is Normal mode.

In Normal mode, the run indicator (green) is on, the alarm indicator is off, and the buzzer is silent.

Figure 2.5 Normal Mode

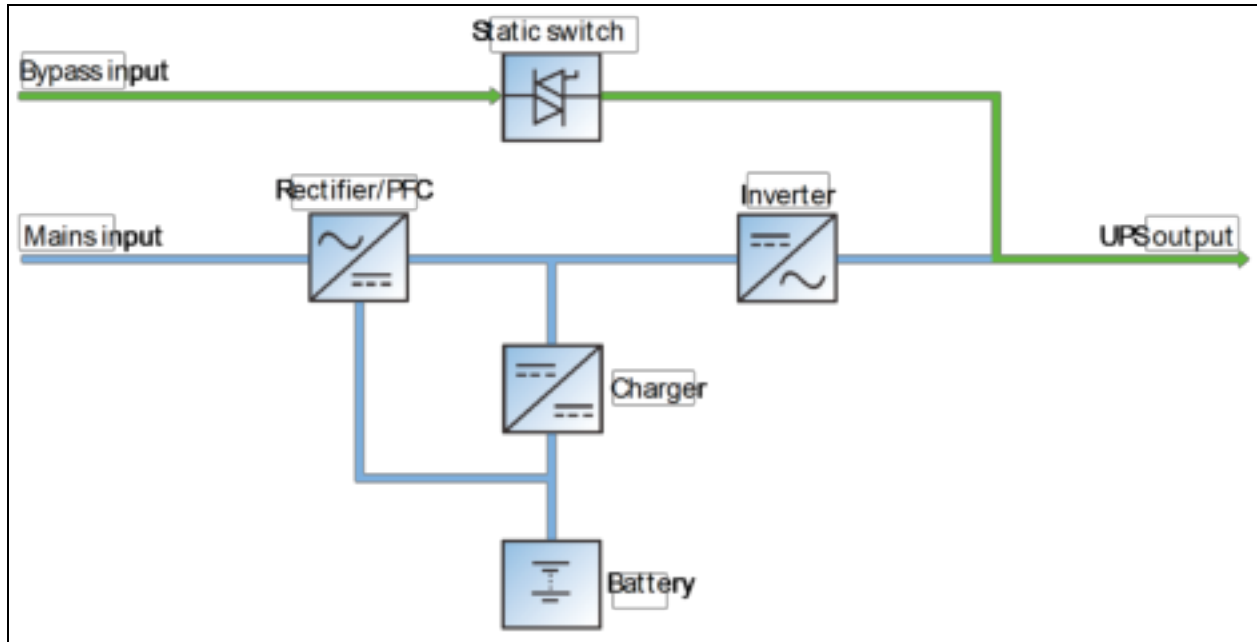


2.5.2 Bypass Mode

If the overload overtime, inverter or rectifier fails during the UPS operation in Normal mode, the UPS will transfer to Bypass mode, that is, the load is powered by the bypass source, which comes directly from the mains input. If the rectifier is normal, the internal charger will charge the battery.

In Bypass mode, the run indicator (green) is on, alarm indicator (yellow) is on, and the buzzer beeps every second. The 'Current' page in LCD will display 'On Bypass'.

Figure 2.6 Bypass Mode

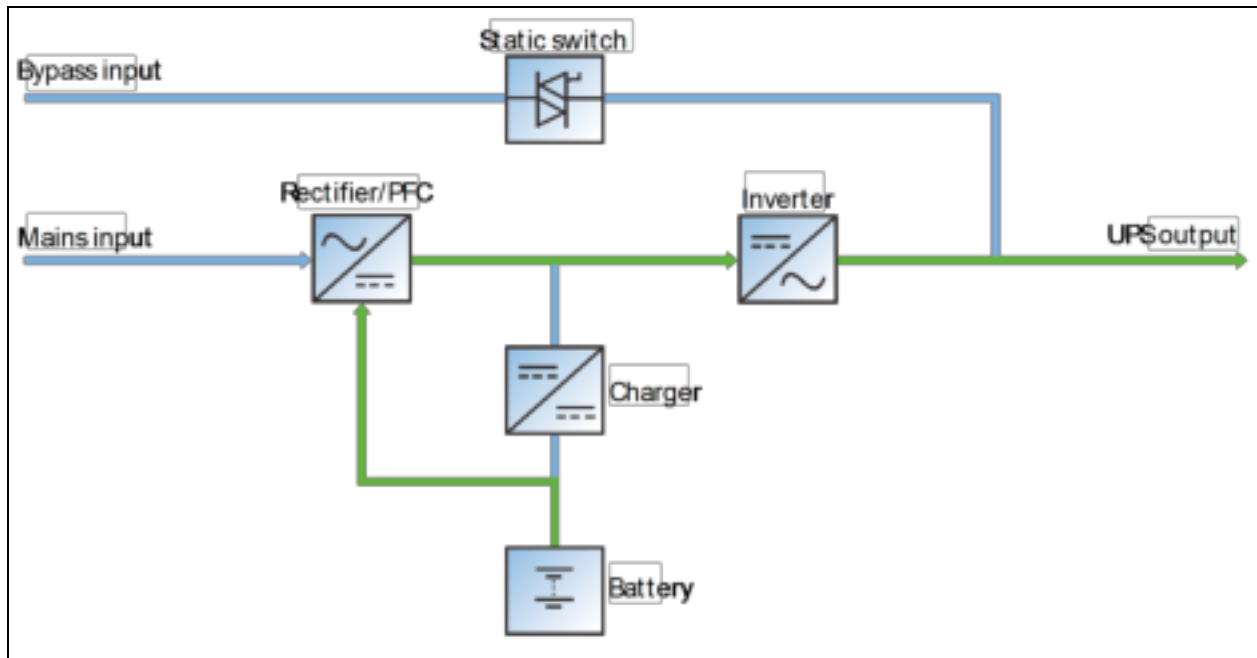


NOTE: In case of mains failure or mains voltage out of range in Bypass mode, the UPS will shut down and stop the output.

2.5.3 Battery Mode

Upon mains failure or voltage out of range, the rectifier and internal charger will stop, and the battery will supply power to the load through the inverter. In Battery mode, the run indicator (green) is on, alarm indicator (yellow) is on, and the buzzer beeps every second. The 'Current' page in LCD will display 'On Battery'.

Figure 2.7 Battery Mode



NOTE: Usually the battery has been fully charged before delivering to the customer. However, transportation and storage will inevitably cause some capacity loss. Therefore, it is advised to charge the battery for eight hours before putting the UPS into operation for the first time, to ensure the adequate backup time for battery.

NOTE: The battery cold start function can also be used to start the UPS from the Battery (charged) mode upon mains failure. Therefore, the battery power can be used independently for improving the system availability to some extent.

2.5.4 ECO Mode (for Single UPS with External Battery Only)

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%.

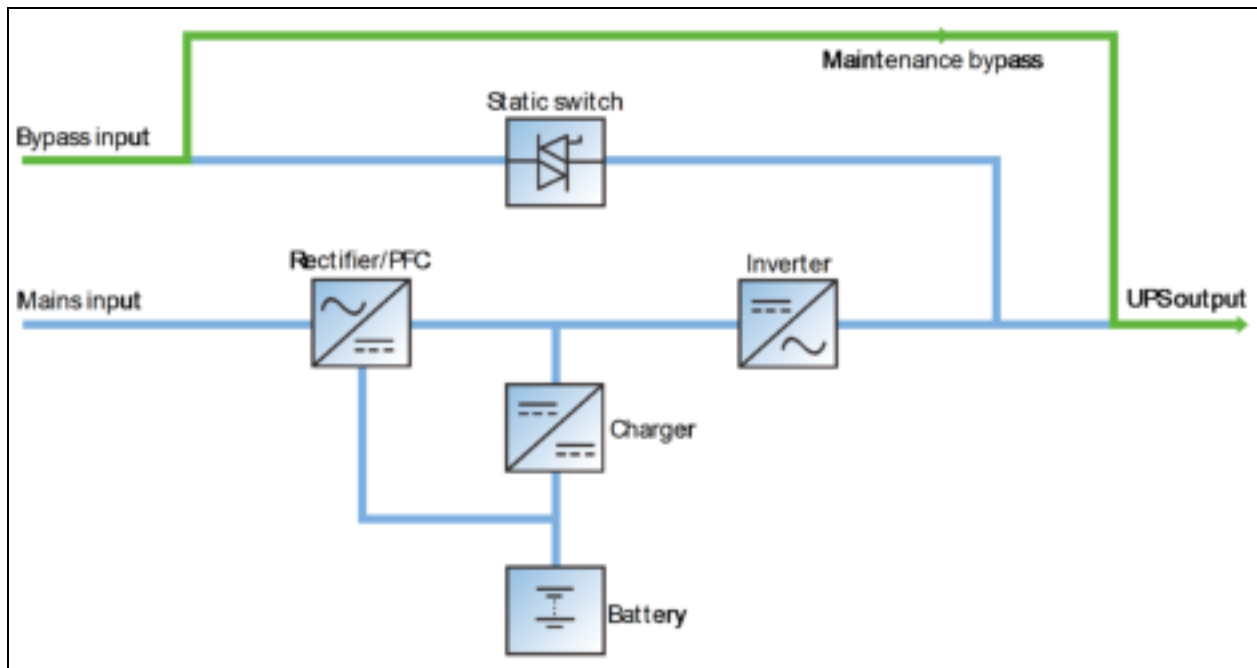
2.5.5 Fault State

In Normal mode, the UPS will transfer to Bypass mode if the inverter failure or UPS over-temperature appears. In Battery mode (with no bypass mains), the UPS will shut down and stop the output if the inverter failure or UPS over-temperature appears. In UPS Fault state, the alarm indicator (red) will be solid on, the buzzer will keep beeping, and the corresponding fault information will be displayed on LCD.

2.5.6 Maintenance Bypass Mode

If maintenance or repair for UPS is required, switch the load to the Maintenance Bypass through maintenance bypass MCB, to ensure that the power to the load is not interrupted during maintenance and repair of UPS. The maintenance bypass MCB is located on the front panel of the POD, and the capacity meets the requirements of 1+1 load capacities. For more information on POD, see Vertiv™ Liebert® ITA2 10 kVA to 20 kVA UPS Power Output Distribution Unit User Manual.

Figure 2.8 Maintenance Bypass Mode



NOTE: When the UPS has malfunctions and can not working normally, contact the nearest Vertiv branch office or local service center. It is prohibited to repair the UPS by yourself, otherwise the personnel injury and damage to the equipment will occur.

2.6 Specifications

Table 2.3 Specification

Item		Specification 20 kVA
Input	Rated voltage	380/400/415 VAC
	Voltage range	176 VAC to 288 VAC, at full load 100 VAC to 176 VAC, linear derating 100 VAC, at half load
	Rated frequency	50 Hz
	Frequency range	40 Hz to 70 Hz
	Power factor	≥0.99, at full load; ≥0.98, at half load
Bypass	Rated power	20 kW
	Voltage	220/230/240 VAC (single phase output) 380/400/415 VAC (three phase output)
	Frequency synchronization range	Rated frequency ±3 Hz. Configurable range: ±0.5 Hz to ±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
Output	Crest factor	3:1
	Voltage harmonic distortion	Single UPS: 2% (0-100% linear load), 5% (0-100% non-linear load) Parallel UPS: 3% (0-100% linear load), 8% (0-100% non-linear load)
	Dynamic response recovery time	40 Milliseconds
	Overload capacity	At 25 °C: 105% to 125%, 5 Minutes; 125% to 150%, 1 Minute; 150%, 200 Milliseconds
	Bypass voltage	Upper limit: +10%, +15% or +20%; default: +20% Lower limit: -10%, -20%, -30% or -40%; default: -40%
	Mains efficiency	Up to 96%
Battery	Type	Sealed, lead-acid, maintenance-free battery
	Cell No.	24, 32 and 40, 32 by default
	Rated voltage	288 VDC to 480 VDC
	Charge current	≤13 A (Extended back-up model)
Transfer time	Mains--Battery	0 Millisecond
	Inverter--Bypass	Synchronous transfer: ≤0 Millisecond Asynchronous transfer (default): ≤20 , 40, 60, 80, 100 and 200 Milliseconds also available
Noise		<58 dB
Panel display mode		Color LCD
Safety		IEC/EN/BS62040-1+A1:2013
EMC	Conduction emission	IEC/EN/BS62040-2:2006
	Current harmonics	IEC/EN61000-3-12

Table 2.3 Specification (continued)

Item		Specification 20 kVA
Environmental aspects		IEC/EN/BS 62040-4
Surge protection		IEC/EN-61000-4-5, withstand level 4 (4 kV) (live line to earth), level 3 (2 kV) (between live lines); ANSI C62.41, 6 kV/2 Ohms
Protection level		IP20
Ambient conditions	Operating temperature	0 °C to 50 °C (32 °F to 122 °F) (0.7 derating at temperatures above 50 °C (122 °F))
	Storage temperature	-40 °C to +70 °C (-40 °F to 158 °F) (battery excluded); -25 °C to +55 °C (-13 °F to 131 °F) (battery included)
	Relative humidity	5% RH to 95% RH, non-condensing
	Altitude	≤3000 m (9842.52 ft.); derating at altitudes above 3000 m (9842.52 ft.)
Dimensions, W x D x H mm (in.)	With front panel and junction box	430 x 600 x 130 (16.93 x 23.62 x 5.12)
Weight	Net weight kg (lbs.)	23.5 (51.81)
	Gross weight kg (lbs.)	41 (90.39)

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3 Single UPS Installation and Commissioning

This chapter gives information about the installation and commissioning of the single UPS, as each site has its peculiarity, so Install the UPS according to the actual conditions of the site.



WARNING! The UPS should be installed by a qualified engineer only according to the information contained in this chapter. If any problem is found, contact to the Vertiv authorized service center immediately.
The UPS should not be powered on without approval of the commissioning engineer.
For other equipment which is not mentioned in this manual, the detailed information about mechanical installation and electrical installation are delivered with the equipment.

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

3.1 Unpacking Instructions

The UPS is delivered in the wooden box and has to be unpacked on the site. See below for unpacking instructions:

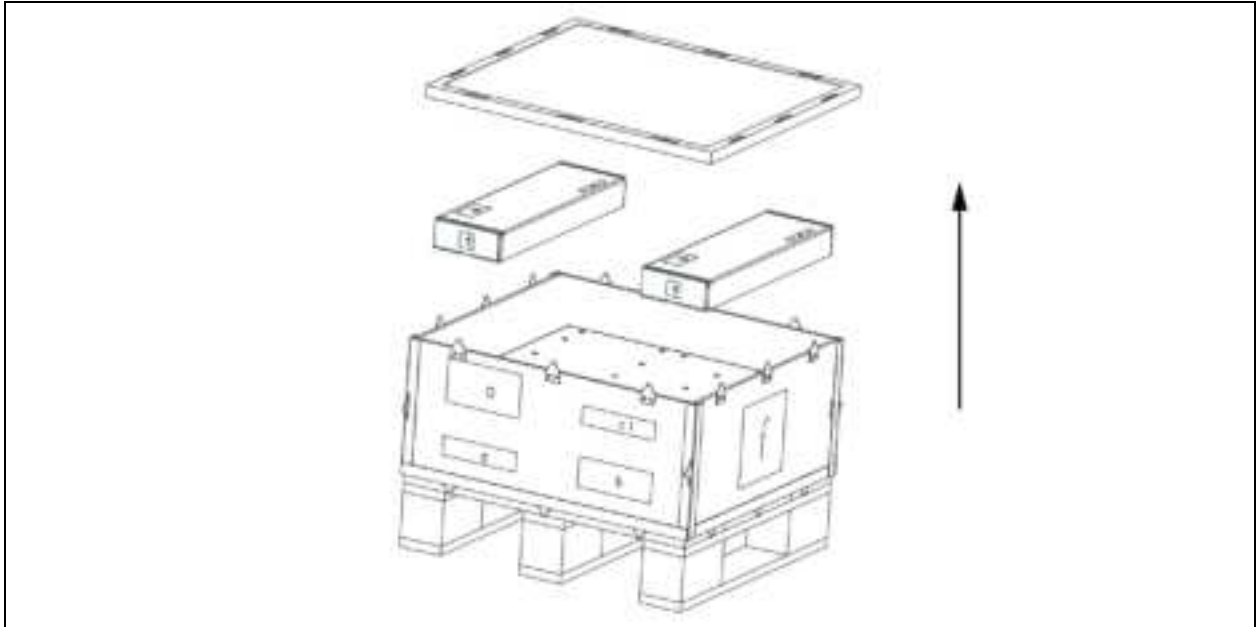
1. Remove the *side panels and top cover*.
Use a *hammer or straight screwdriver* to straighten the connection hook that connects the side panels to the top cover, see **Figure 3.1** below.

Figure 3.1 Straightening the Hook



2. Dismantle the *cover plate of the cardboard box*, and remove the *UPS*, as shown in **Figure 3.2** below.

Figure 3.2 Unpacking Cardboard Box



Check the following items:

1. Visually inspect the *UPS and battery* for any transportation damage. In case of any damage, notify the carrier immediately.
2. Check the *accessories and models* against the delivery list. If any problem is found, notify the dealer immediately.

NOTE: In case of damages to the package such as (dirty battery terminal, terminal erosion, rust, or enclosure crack, deformation or liquid leakage) replace it with a new battery. Otherwise, battery capacity reduction, electric leakage or fire may be caused.

3.2 UPS Movement



WARNING! Do not move the UPS through the brackets.

Move the UPS cabinet manually or with the forklift.

NOTE: The battery is very heavy. Use proper method to move and lift the battery, so to prevent any damage to human beings or to the battery terminal. Severe damage to the battery may cause fire.

3.3 Installation Preparation

3.3.1 Location

For extended life of the UPS, the location of installation should meet the following criteria:

- Convenient wiring
- Adequate operator access area
- Good ventilation to meet the heat dissipation requirements
- Free from corrosive gases, (such as sulfur dioxide)
- Free from excessive moisture or heat source
- Free from excessive dust
- Compliance with fire-fighting requirements
- Operating temperature is in compliance with the specifications

3.3.2 Environmental Requirement

UPS Room

The UPS is designed for indoor installation, which should be installed in a clean and well ventilated environment, ensuring ambient temperature within the specifications.

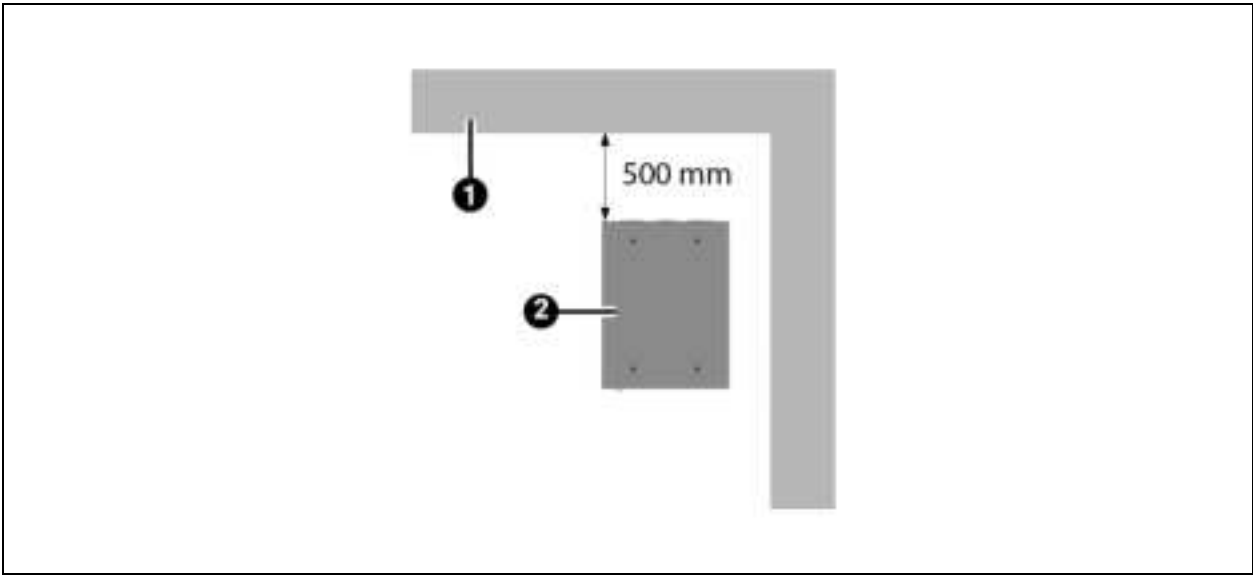
The internal fans provide forced air cooling for the UPS. Cool air enters the UPS through the ventilation holes on the front panel, and exhausts the hot air through the back ventilation holes. Maintain at least 200 mm (7.87 in.) clearances between the front, rear of the UPS and the wall or adjacent equipment see **Figure 3.3** on the next page, to avoid obstructing the UPS ventilation and heat dissipation. Failure to maintain the minimum distance may lead to raise the internal temperature that will ultimately shorten the UPS life.

NOTE: Increase in the temperature or inappropriate ventilation will raise the internal temperature leading to shortening of UPS shelf life.

If necessary, air conditioning is recommended to control the temperature and humidity around the UPS unit. An air filter should be used in a dusty environment where the UPS is to be operated.

Space Reserved

Figure 3.3 Installation Clearances (Top View of Rack Installation)



Item	Description
1	Wall
2	Cabinet

NOTE: The UPS should be installed only on the concrete surface or other non-flammable surfaces. As shown in **Figure 3.3** above, the ideal clearance between the rear panel of the cabinet and the wall is 500 mm (19.69 in.). See **Figure 3.3** above. But a minimum of 200 mm (7.87 in.) is must for maintenance clearance should be 200 mm (7.87 in.), it needs to be considered according to the actual situation for the sake of maintenance convenience.

Battery Room

A small amount of hydrogen and oxygen will be generated during the battery charging, therefore, ensure that the fresh air ventilation of battery installation environment meets the EN50272-2001 requirements.

The battery ambient temperature should keep constant, as it is the main factor to affect the battery capacity and life. The battery standard operating temperature is 20 °C (68 °F), operation above this temperature will shorten the battery life, and operation below this temperature will reduce the battery capacity. If the average operation temperature of the battery rises from 20 °C to 30 °C (68 °F to 86 °F), the battery life will be reduced by 50%, if the operation temperature of the battery exceeds 40 °C (104 °F), the battery life will be decreased exponentially. In general, the allowed ambient temperature of the battery is 15 °C to 25 °C (59 °F to 77 °F). The battery should be kept away from heat and ventilation holes.

When the UPS uses an external battery, install a battery protective device (such as fuse or circuit breaker) in areas near the battery, and use the shortest wiring distance for the connection between the protective device and the battery.

Storage Environment

If the UPS is not installed immediately, Vertiv recommends using plastic bags to prevent dust and other corrosive substances from entering the UPS, and the UPS must be stored indoor to protect from the excessive moisture or over-temperature environment. The recommended storage temperature is 20 °C to 25 °C (68 °F to 77 °F), and the storage humidity is 45% to 70% RH. The battery requires dry environment and low temperature, well-ventilated environment for storage.



WARNING! Battery Hazards: During the battery storage, the battery must be periodically charged according to the battery instructions. While charging the battery, connect the UPS to the mains temporarily to charge and activate the battery.

3.3.3 Installation Tools



WARNING! For the sake of safety, the installation tools under live operation must be insulated. The recommended tools should be used, see **Table 3.1** below for reference only, follow the actual requirement for on-site installation and connection.

Table 3.1 Tools

Name	Tool	Name	Tool	Name	Tool	Name	Tool
Electric hand drill		Insulating tape		Cable tie		Adjustable wrench	
Slotted screwdriver		Crimping plier		Insulating gloves		Cross head screwdriver	
Stepladder		Insulated torque wrench		Heat shrinkable tube		Forklift	
Drill		Multimeter		Torque screwdriver		Wire cutting plier	
Claw hammer		Electrician knife		Clip-on ammeter		Diagonal cutting plier	
Insulating shoes				Antistatic gloves			

3.4 External Protective Devices

The circuit breakers or other protective devices must be installed at the external of the UPS. This section provides general guidance for qualified installation engineer. The qualified installation engineer should be aware of the local wiring regulations and other related information.

3.4.1 Rectifier and Bypass Input

Overcurrent

The appropriate overcurrent protective device should be installed on the mains input power distribution, and the current capacity of power cable and the system overload requirements should be considered in installation, see **Table 3.2** on page 33. For thermomagnetic circuit breakers, see **Table 3.4** on page 35.

Split Bypass

When the system uses split bypass, separate protective devices should be installed for the mains and bypass at the mains input power distribution.

Main/Bypass Backfeed Protection

The UPS has main/bypass feedback protection function.

Feedback Protection

When the battery mode and the mains are not available, or affected by a malfunction, a portion of the UPS voltage or energy may be fed back to one or more of the input terminals, either directly, or via the leakage path. To reduce the risk of electric shock caused by feedback, the UPS is equipped with internal back-feed protection; it is important to note that, when activated, this function will interrupt the power supply to the customer's load. To guarantee a continuous supply of power to the load, we have also introduced a back-feed function at the POD input; this function is controlled by a UPS dry output contact, and operates according to the following principle.

Operating principle

Mains back-feed

Figure 1 shows the wiring diagram between the single POD and the UPS; the main circuit relay and the dry contact are highlighted in RED in this Figure. The internal UPS sensor detects back-feed at the mains input terminals; Dry Contact 1 is closed. Since the dry output contact is connected to the POD internal relay A coil terminals via the back-feed protection cable, the coil is energized (12 V - COM), and the relay contact is closed. The relay A contact controls the UPS main input shunt trip coil (L - N), so that it, in turn, is energized when the contact is closed. When the shunt trip coil is energized, it triggers the UPS mains input CB, thus interrupting the back-feed path and guaranteeing the protection. In this way, the bypass can continue to supply power to the load even in the presence of mains back-feed.

Bypass back-feed

The bypass relay and dry contact are highlighted in GREEN in the Figure. The internal UPS sensor detects back-feed at the bypass input terminals; UPS Dry Output Contact 2 is closed. Since the dry output contact is connected to the POD internal relay B coil terminals via the back-feed protection cable, the coil is energized (12 V - COM), and the relay contact is closed. The relay B contact controls the UPS bypass input shunt trip coil (L - N), so that it, in turn, is energized when the contact is closed. When the shunt trip coil is energized, it triggers the UPS bypass input CB, thus interrupting the back-feed path and guaranteeing the protection. In this way, the mains can continue to supply power to the load even in the presence of bypass back-feed. **Figure 3.4** below shows the wiring diagram between 1+1 parallel POD and two UPS. The back-feed protection principle in this configuration is the same as that for the single POD, the only difference being the number of CB and the back-feed protection cable, which is not shown in detail in this case.

NOTE: The POD internal relays A, B, and the 12 V voltage generator circuit are included on the same internal control board; the position shown in Figure is purely indicative. The attachment is the specification of the internal shunt trip and the internal control board.

Figure 3.4 Connecting the One POD and UPS

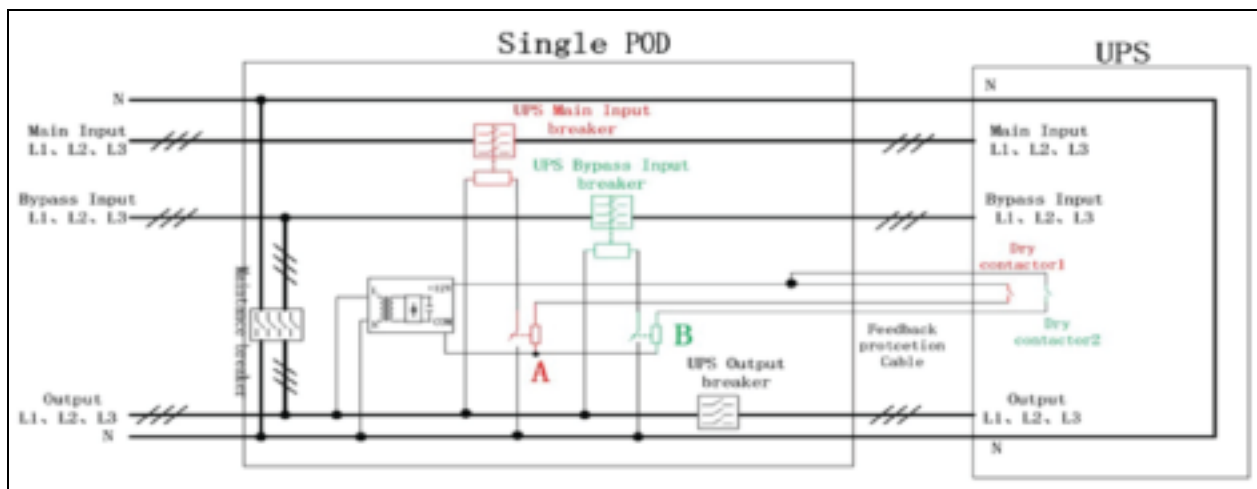
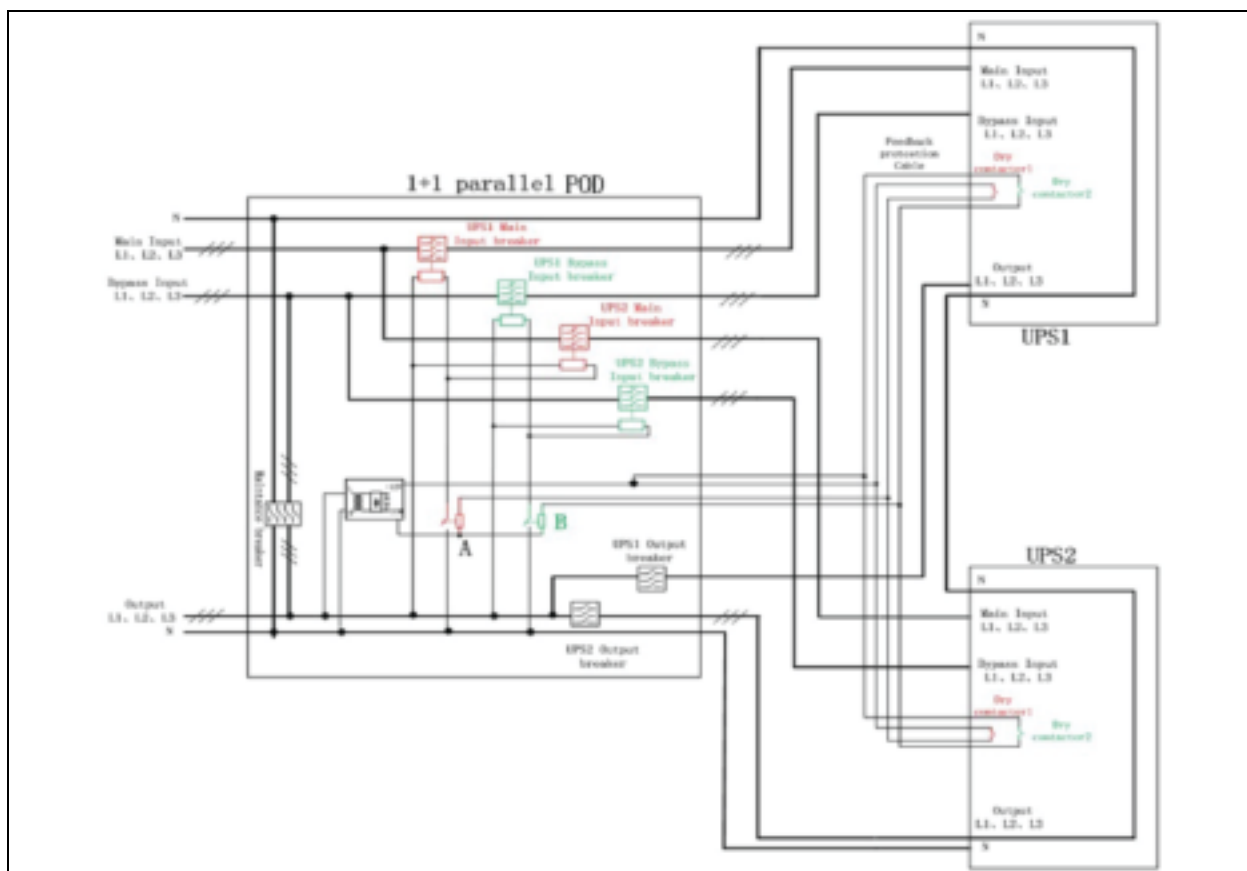


Figure 3.5 Connecting 1+1 parallel POD and Two UPS

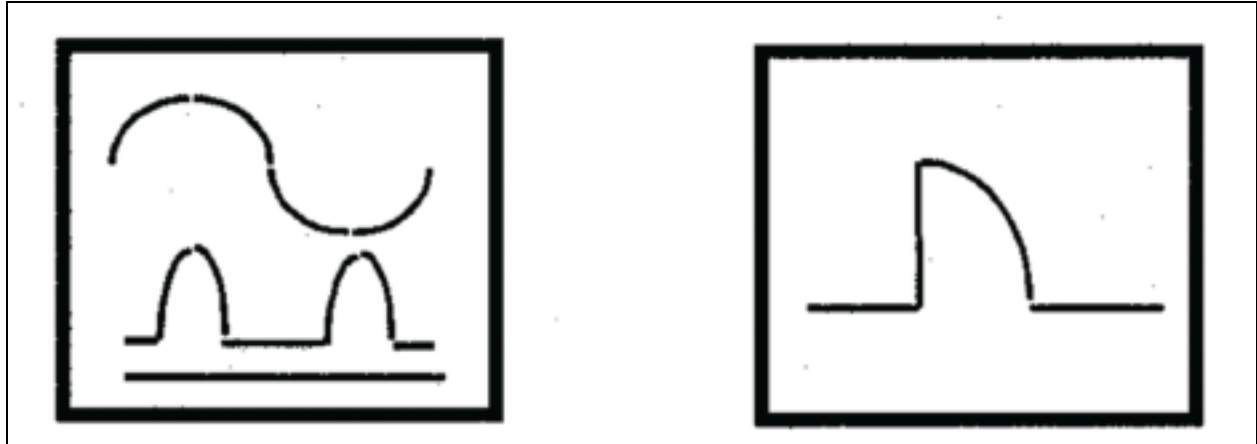


Earth Leakage Current

The residual current detector (RCD) for the UPS upstream input power distribution should be:

- Sensitive to the DC unidirectional pulse (level A) in 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 power distribution network, but insensitive to the transient current pulse, as shown in **Figure 3.6** on the facing page respectively.

Figure 3.6 RCCB Symbols

When using the earth RCD in split-bypass system or parallel system, the RCD should be located at the upstream input power distribution end to avoid generating the false alarm.

The earth leakage current fed by the RFI filter in the UPS ranges from 3.5 mA to 100 mA. It is recommended to confirm the sensitivity of each differential device of the upstream input power distribution and downstream power distribution (to load).

3.4.2 Battery Input

For the ease of UPS installation, the battery is generally installed on the specially designed battery rack or in the battery room. The external battery cabinet should provide DC compatible circuit breakers to provide the overcurrent protection for the UPS and its batteries, the protective device specification is shown in **Table 3.4** on page 35. This circuit breaker should be located as close as possible to the battery connecting terminal, and keep the wiring distance minimum between the power and signal cables connected to the UPS.

3.4.3 UPS Output

The protective device must be installed for the UPS output power distribution. The protective device specification is shown in **Table 3.4** on page 35.

3.5 Mechanical Installation

Two installation modes are available:

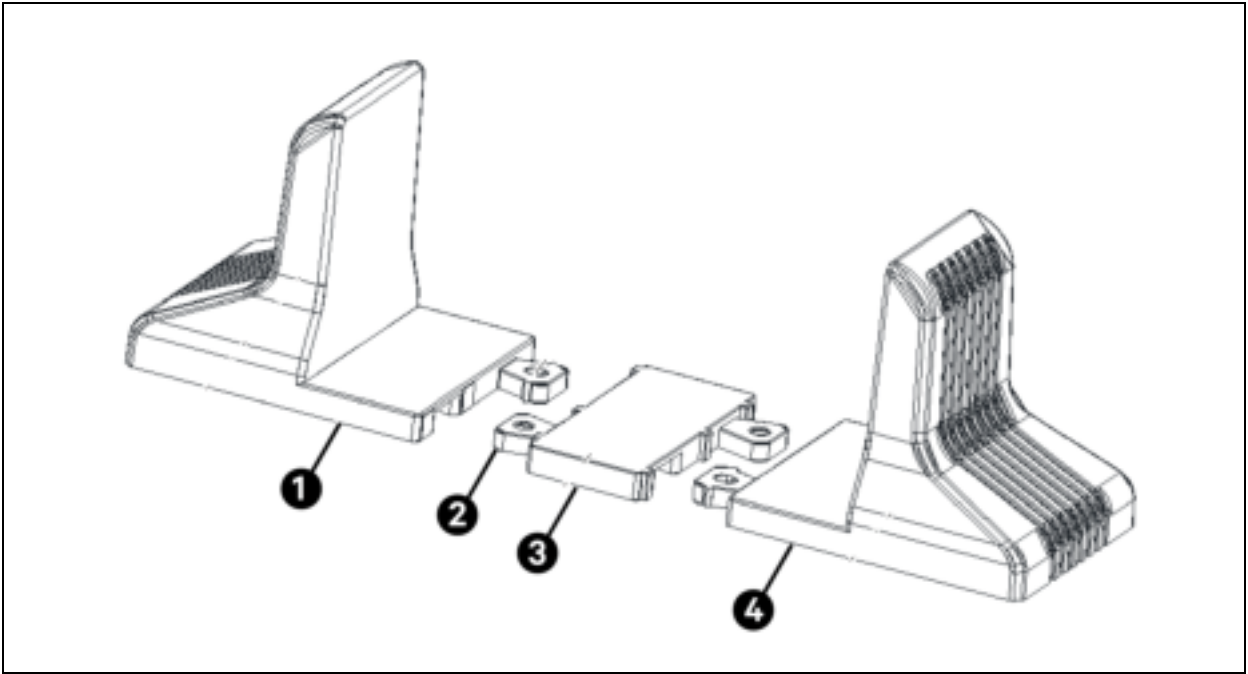
- 1. Tower installation
- 2. Rack installation

Select an appropriate installation mode according to the actual conditions.

3.5.1 Tower Installation

- 1. Take out the *support bases* from the accessories, assemble two support bases and a support base extension (accessory) together through the fastenings, as shown in **Figure 3.7** below, and put them onto the flat installation table.

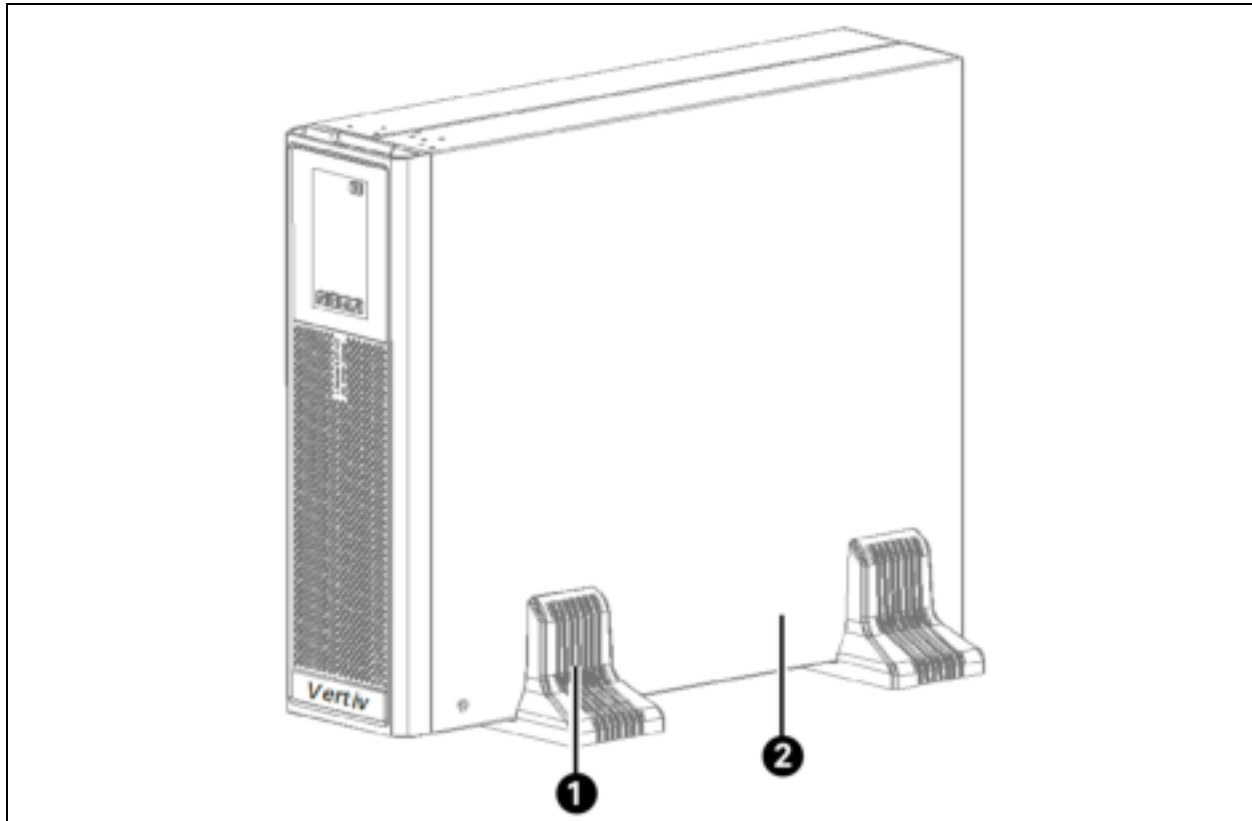
Figure 3.7 Connecting the Support Base with Support Base Extension



Item	Description
1	Support Base
2	Fastening
3	Support Base Extension
4	Support Base

2. Place the UPS on the support bases and support base extensions, as shown in **Figure 3.8** below.

Figure 3.8 UPS Installation Complete



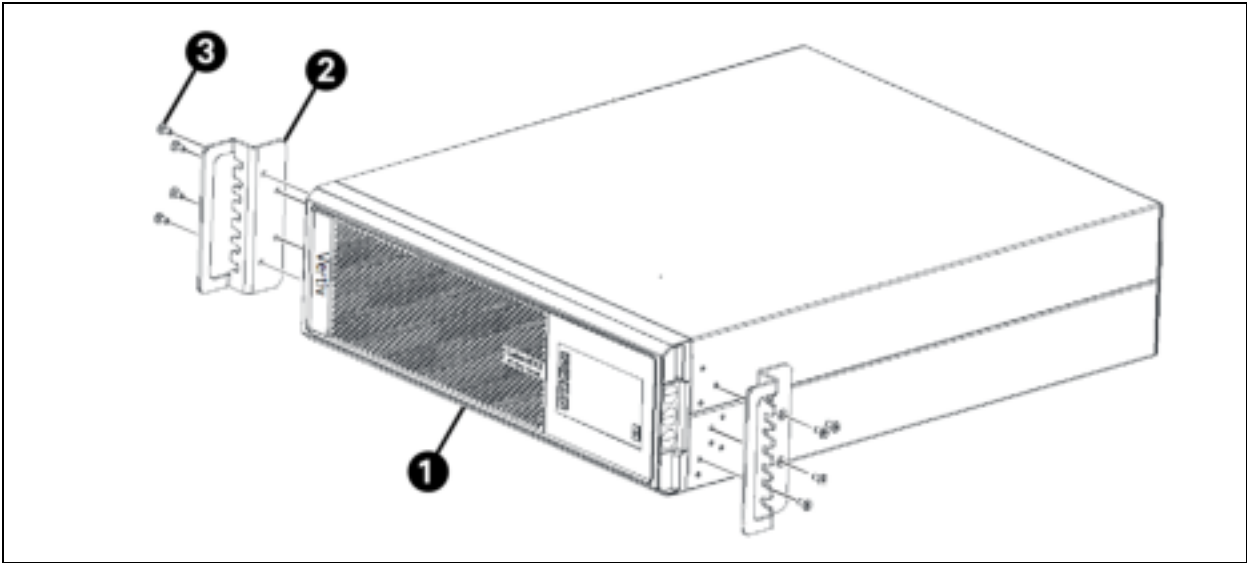
Item	Description
1	Support Base
2	UPS

3.5.2 Rack Installation

Installation procedures for UPS

- 1. Use *eight M4 × 10 screws* to secure two brackets (accessories) respectively on both sides of the UPS front panel, as shown in **Figure 3.9** below.

Figure 3.9 Installing Brackets



Item	Description
1	UPS
2	Bracket (2 Pcs)
3	Screw (8 Pcs)

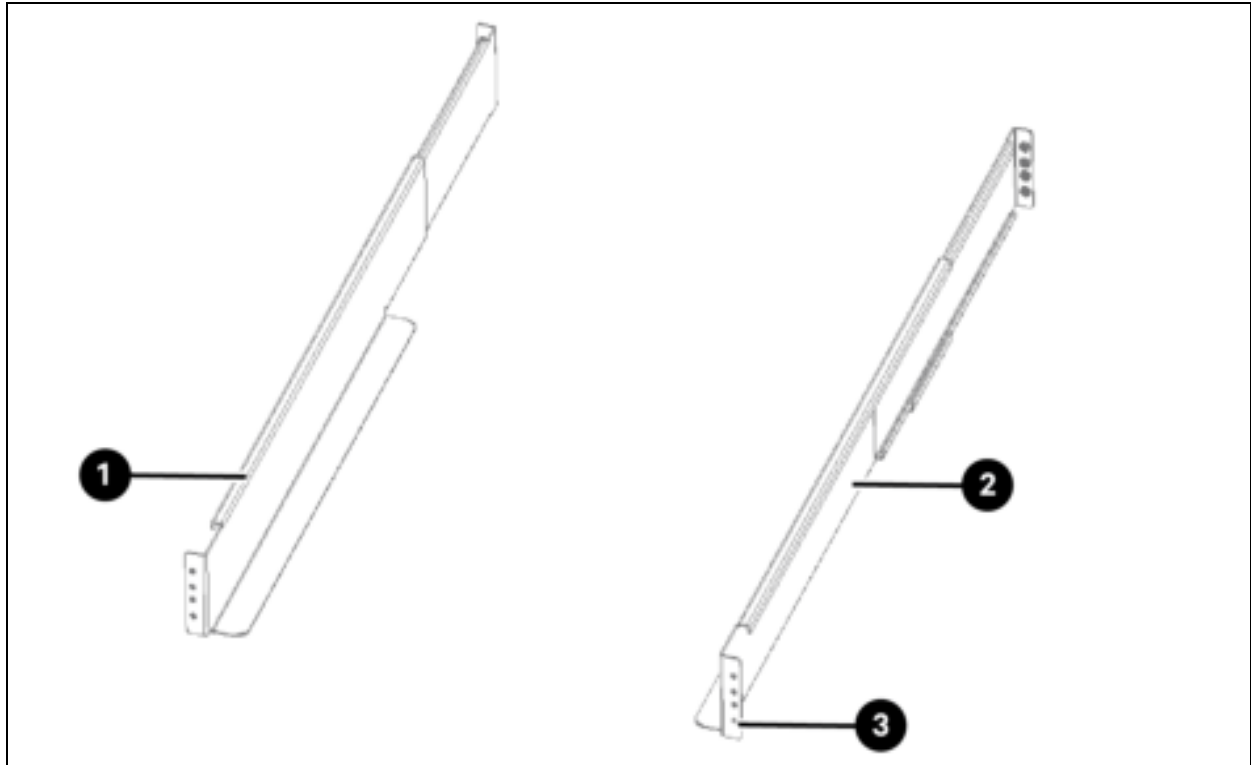
NOTE: Do not move the UPS through the brackets.

- 2. Install the *guide rails*.
Use guide rails while choosing Vertiv™ Liebert® ITA2 10 kVA to 20 kVA UPS series UPS and its options, and opt for the rack installation.

The installation procedure for the guide rails is as follows:

- a. Take out the *guide rails* (one left guide rail and one right guide rail), guide rail screws and panel screws from the package, Identify the left guide rail and right guide rail according to **Figure 3.10** below, and confirm its retractable function respectively.

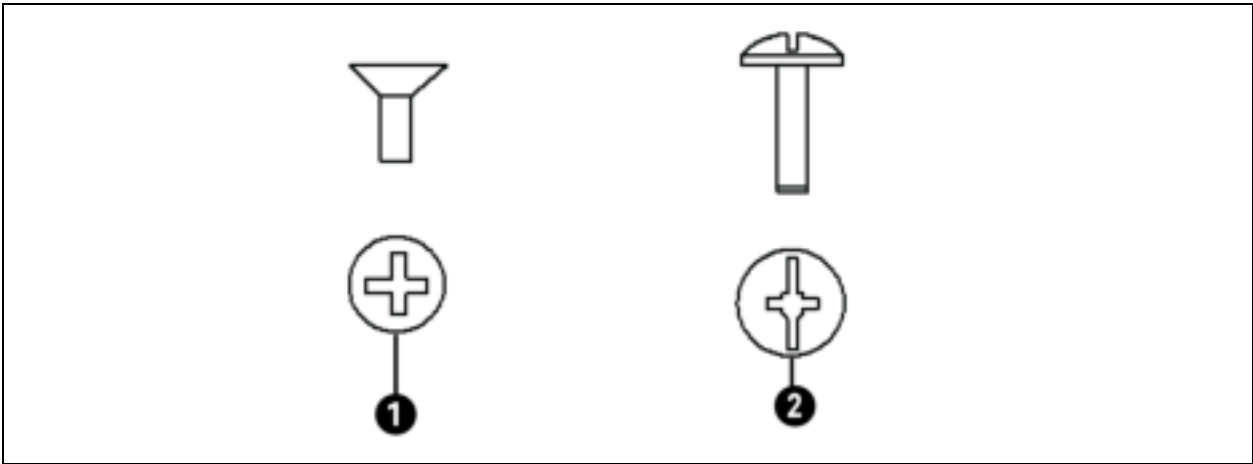
Figure 3.10 Appearance of the Guide Rail



Item	Description
1	Left Guide Rail
2	Right Guide Rail
3	Installation Hole (4 Pcs)

The guide rail screw is shown in **Figure 3.11** below.

Figure 3.11 Appearance of the Guide Rail Screw

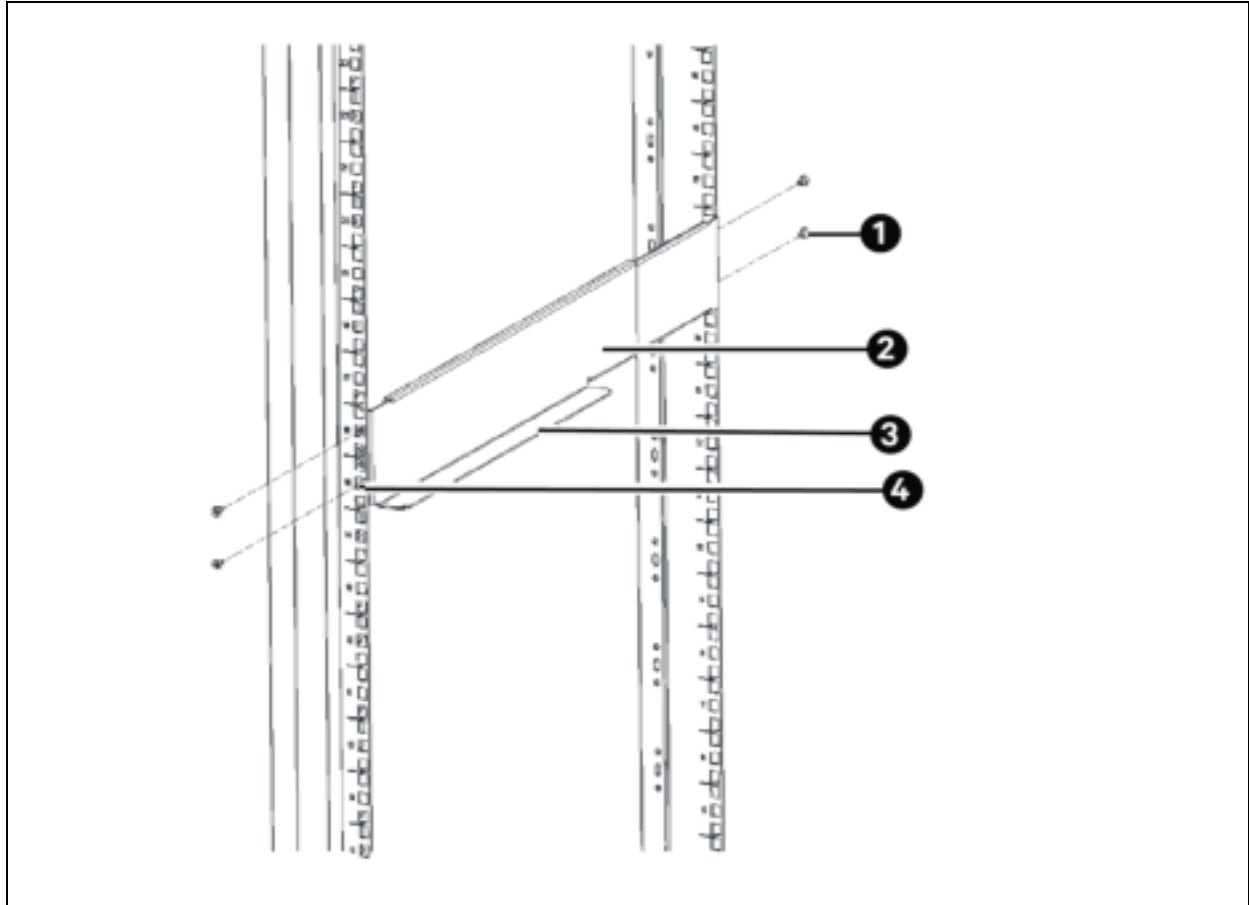


Item	Description
1	Guide Rail Screw
2	Panel Screw

- b. Adjust the *length of the guide rail* according to the dimensions of the rack.

- c. Align the *installation holes* of the guide rail with the square holes of the rack, fix the guide rail onto the rack through the guide rail screws (totally eight), each left guide rail and right guide rail need four guide rail screws, as shown in **Figure 3.12** below.

Figure 3.12 Installing the Guide Rail



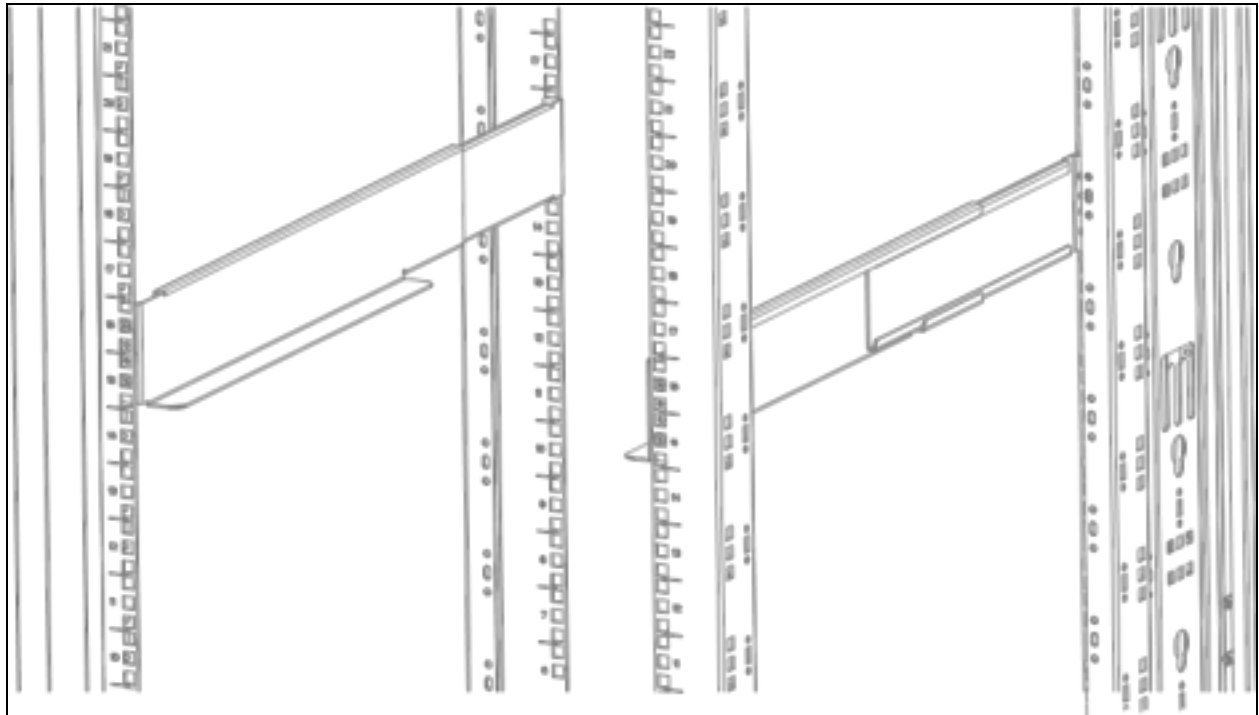
Item	Description
1	Guide Rail Screw (4 Pcs)
2	Guide Rail
3	Guide Rail Holder
4	Square Hole

NOTE: The guide rail holder must be close to the front of the rack.

NOTE: Any end of one guide rail has four installation holes see **Figure 3.10** on page 29, do not use the two installation holes in the middle when fixing the guide rail. It is recommended to use the top and bottom installation hole (from top to bottom, installation hole 1 and installation hole 4).

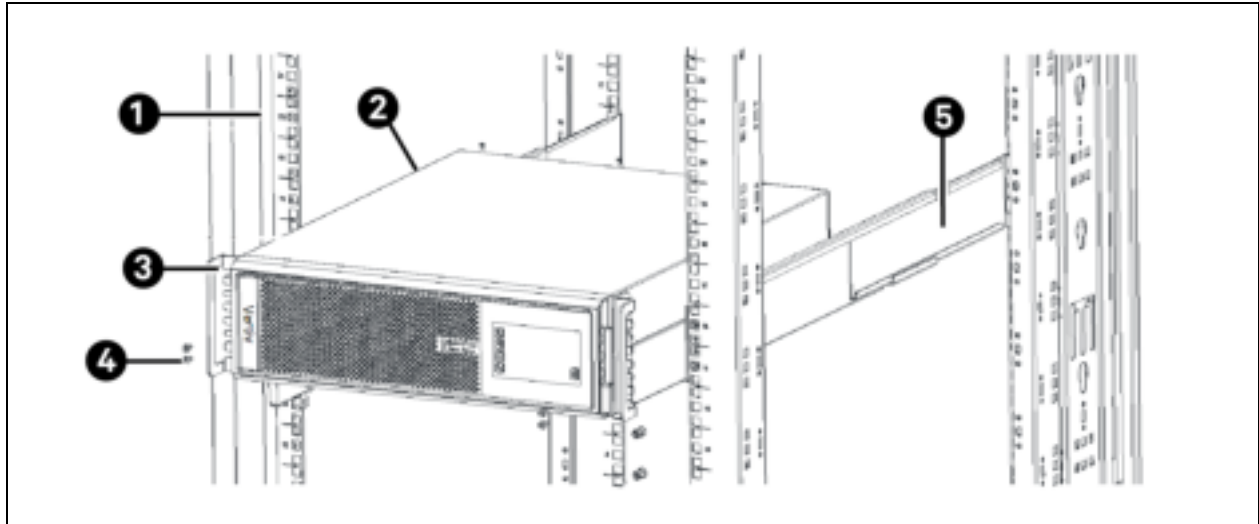
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3 Single UPS Installation and Commissioning



- Place the *UPS* on the guide rails in the rack, and push it completely into the rack. Use four M6 × 16 screws to fix the UPS in the rack through the brackets, as shown in **Figure 3.14** below.

Figure 3.14 Installing the UPS



Item	Description
1	Rack
2	UPS
3	Bracket
4	Screw (4 pcs)
5	Guide Rail

3.6 Connecting Power Cables

Input/Output cables and battery cables are required for connection. When connecting the cables, follow the local wiring regulations, consider the environment condition into account, and refer to Table 3B of IEC60950-1.

The maximum current in different operating modes is listed in **Table 3.2** below, the recommended minimum cable CSA is listed in **Table 3.3** on the next page. Select the appropriate cables according to **Table 3.2** below and **Table 3.3** on the next page.

Table 3.2 Maximum Steady State AC and DC Current

UPS Rated Power (kVA)	Rated Current (A)						
	Maximum Input Phase Current ^{1,2}			Maximum Output Phase Current ²			Maximum Battery Discharging Current (A)
	220 V	230 V	240 V	220 V	230 V	240 V	
20 (3-in 3-out)	44	43	42	31	30	29	58
20 (3-in 1-out)	44	43	42	91	88	85	58
15 (3-in 3-out)	41	39	37	23	22	21	44

Table 3.2 Maximum Steady State AC and DC Current (continued)

UPS Rated Power (kVA)	Rated Current (A)						
	Maximum Input Phase Current ^{1 2}			Maximum Output Phase Current ²			Maximum Battery Discharging Current (A)
	220 V	230 V	240 V	220 V	230 V	240 V	
15 (3-in 1-out)	41	39	37	69	67	66	44
10 (3-in 3-out)	32	30	29	16	15	14	30
10 (3-in 1-out)	32	30	29	46	45	44	30

NOTE: When the battery cables are selected, the maximum allowable voltage drop is 4 VDC according to the current value shown in this table. Do not ring the cables to avoid increasing the electromagnetic interference (EMI).

NOTE: The input mains current of the rectifier and the bypass.

NOTE: Nonlinear load (switch mode power) affects the neutral cable design of the output and the bypass. The neutral cable current may exceed the rated phase current, up to 1.732 times as large as the rated current.

Table 3.3 Single UPS Cable CSA (Unit: mm², Ambient Temperature: 25 °C (77 °F))

Model	Input	Output	Bypass	Neutral cable	PE	Battery	Battery PE
20 kVA (3-in 3-out)	10	10	10	10	10	10	10
20 kVA (3-in 1-out)	10	25	25	25	25	10	10
15 kVA (3-in 3-out)	10	2.5	2.5	10	10	10	10
15 kVA (3-in 1-out)	10	16	16	16	16	10	10
10 kVA (3-in 3-out)	4	1.5	1.5	4	4	4	4
10 kVA (3-in 1-out)	4	10	10	10	10	4	4

CSA (Unit: mm ²)	Terminal Type
4	OT4-6
6	OT6-6
10	RNBS8-6
16	RNBS14-6
25	RNBS22-6

The recommended Input/Output MCB capability of the UPS is listed in **Table 3.4** on the facing page; select the MCBs according to your requirements.

NOTE: The UPS is high leakage current equipment, it is not recommended to use the MCB with leakage current protection.

NOTE: The specified upstream breakers below are required to obtain the conditional short-circuit current rating, ICC at 10 kA symmetrical RMS. The specified upstream breakers should comply with an IEC 60947 series standard.

Table 3.4 UPS I/O MCB Selection

Model	Input Interface	Recommended Input External MCB Capacity	Battery MCB	Output Interface	Recommended Output External MCB Capacity
20 kVA (3-in 3-out)	Terminal block	63 A/C (mains) 63 A/C (bypass)	80 A	Terminal block	63 A/C
20 kVA (3-in 1-out)	Terminal block	63 A/C (mains) 125 A/C (bypass)	80 A	Terminal block	125 A/C
15 kVA (3-in 3-out)	Terminal block	63 A/C (mains) 63 A/C (bypass)	80 A	Terminal block	63 A/C
15 kVA (3-in 1-out)	Terminal block	63 A/C (mains) 100 A/C (bypass)	80 A	Terminal block	100 A/C
10 kVA (3-in 3-out)	Terminal block	32 A/C (mains) 32 A/C (bypass)	40 A	Terminal block	32 A/C
10 kVA (3-in 1-out)	Terminal block	32 A/C (mains) 63 A/C (bypass)	40 A	Terminal block	63 A/C

NOTE: The 3-in 3-out bypass MCB is used to connect the bypass input upon split-bypass configuration. The main MCB can be used only upon common input configuration.

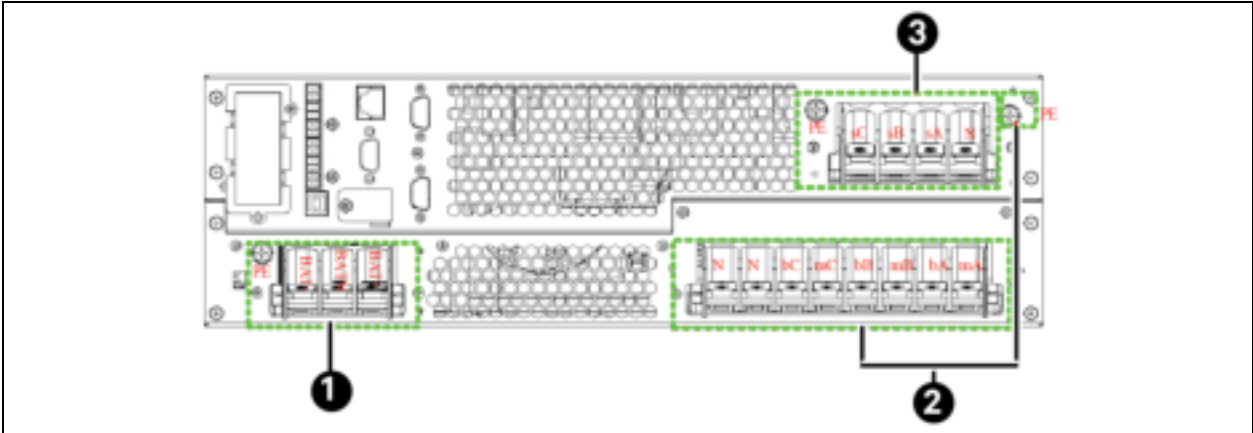
NOTE: The battery CB should use the 250 VDC or above.

NOTE: The output short circuit current: $I_{RMS} = 410.85 \text{ A}$ $I_{peak} = 830 \text{ A}$ to 1000 A, duration time: 162 milliseconds.

3.6.1 Connecting Input/Output Cables

The power cables of the UPS should be connected through the I/O terminal block located on the UPS rear panel. As shown in Figure 3.15 below.

Figure 3.15 Terminals Layout of the I/O Terminal Block



Item	Description
1	Battery terminals
2	Input terminals (mains and bypass)
3	Output terminals

Notes to Figure:

- **Output terminals:** Mains input terminals: sA, sB, sC; Programmable input live wire terminals: pA, pB, pC; Output PE terminal: PE; Common N: N.
- **Input terminals:** Mains input terminals: mA, mB, mC; Bypass input terminals: bA, bB, bC; Common N: N; Input PE terminal: PE
- **Battery terminals:** BAT+, BATN, BAT-; Battery PE Terminal: PE
- The Shorting copper bar of the 3-in 3-out (common input) is linked before delivery.

NOTE: After the power cables connection, the protective cover board of the Input/Output terminal block must be reinstalled to avoid electric shock.

NOTE: The aperture of the wire guard ring on the junction box needs to be cut according to the size of the wire diameter, to meet the IP20 requirements.

NOTE: The recommended specification of the waterproof cable gland for the junction box is M50 x 1.5, and the outer diameter of the nut should be ≤55 mm (2.17 in.).

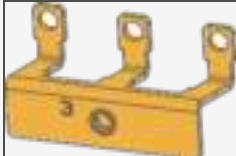
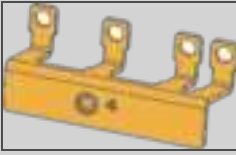
Power Distribution Mode

There are two modes for UPS power distribution: using the single power output distribution unit (POD, optional) provided by Vertiv, self-distribution.

20 kVA UPS

The I/O cable connections are divided into four types, according to the user's requirements: 3-in 3-out, common input configuration (factory default), 3-in 3-out, split-bypass configuration, 3-in 1-out, common input configuration, 3-in 1-out, split-bypass configuration.

According to user's requirements, the Input/O cable connections are divided into two types: 3-in 3-out, common input configuration (factory default), 3-n 3-out, split-bypass configuration.

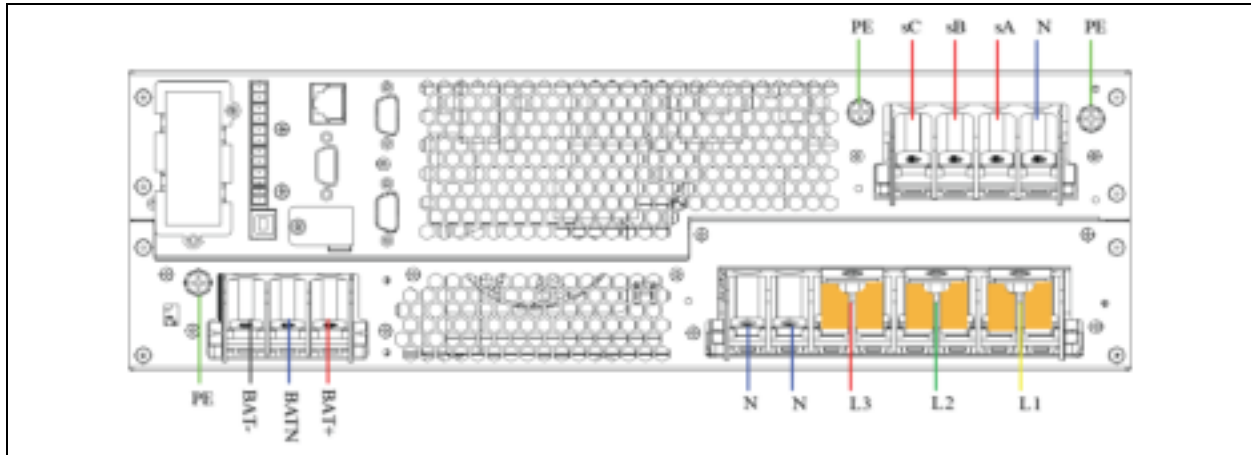
Bypass Copper Shorting Bar	Drawings
1#2 PIN copper bar	
2#3PIN copper bar	
3#3PIN copper bar	
4#4PIN copper bar	
5#2PIN copper bar	

The I/O cable connection procedures of the self-distribution for the four types are as follows:

1. 3-in 3-out, common input configuration
 - a. Before delivery, short connect mA and bA, mB and bB, mC and bC of the I/O terminal block of the UPS using the three shorting copper bars 1 respectively.
 - b. Connect the mains input live wires (L1, L2, L3), input N line and input PE line respectively to the I/O terminal block (mA, mB, mC, N and PE terminals) on the UPS.
 - c. Connect the standard output live cables (phase-A, phase-B and phase-C) to the output terminals sA, sB and sC, respectively. Connect the programmable output live cables (phase-A, phase-B and phase-C) to the output terminals pA, pB and pC, respectively. Connect the output N line and output PE line to the output N and PE terminals, respectively. As shown in **Figure 3.16** on the next page.

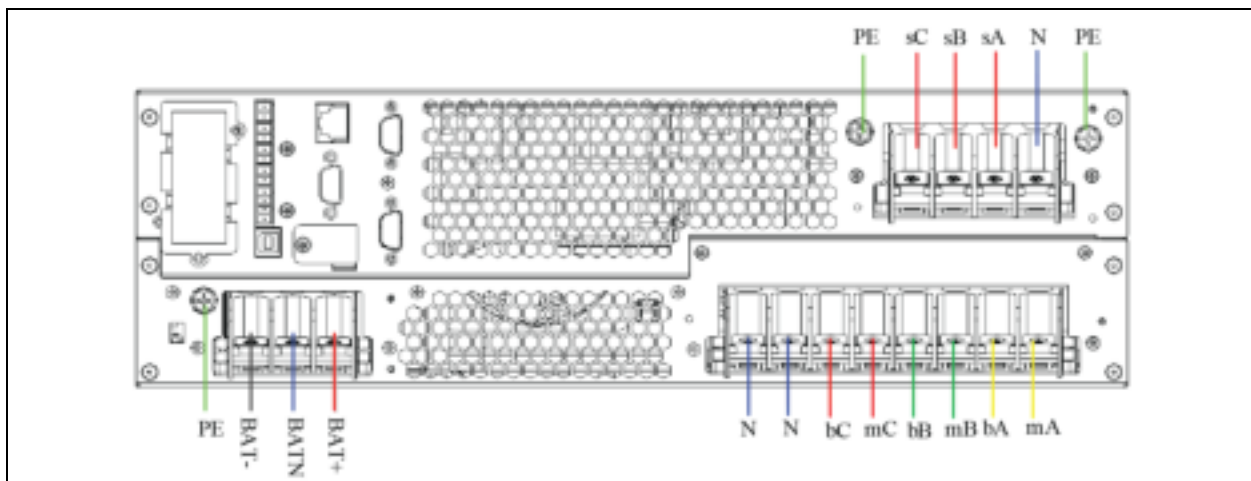
- d. As shown in **Figure 3.16** below, route the positive battery cable, N battery cable, negative battery cable through the cable hole on the junction box, then connect them to the BAT +, BAT N, and BAT - terminals, respectively, as well as the PE cable, and tighten the retaining screws.

Figure 3.16 Wiring Diagram (3-in 3-Out, Common Input Configuration)



2. 3-in 3-out, split-bypass configuration as shown in **Figure 3.17** below
- Remove the three shorting copper bars 1 installed before delivery.
 - Connect the input live wires (phase-A, phase-B and phase-C), input N line and input PE line respectively to the I/O terminal block (mA, mB, mC, N and PE terminals) of the UPS. Connect the bypass input live wires (phase-A, phase-B, phase-C and N) respectively to the input terminals bA, bB, bC and N.
 - Connect the standard output live wires (phase-A, phase-B and phase-C) respectively to the output terminals sA, sB and sC. Connect the output N line and output PE line respectively to the output terminals N and PE. As shown in **Figure 3.17** below.
 - As shown in **Figure 3.17** below, lead the battery positive cable, battery N cable and battery negative cable through the cable hole of the junction box, then respectively connect them to BAT +, BAT N, BAT - and PE, then fasten the fixing screws.

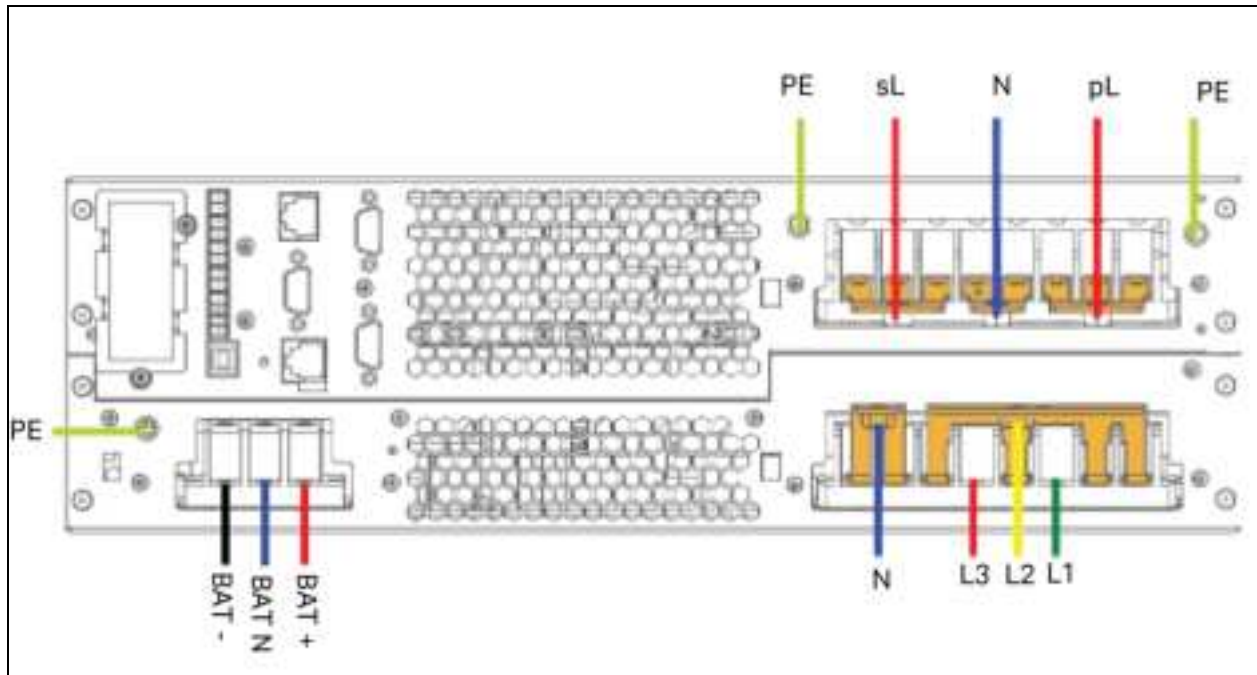
Figure 3.17 Wiring Diagram (3-in 3-out, Split-Bypass Configuration)



3. 3-in 1-out, common input configuration

- Remove the three copper shorting bars 1 installed before delivery.
- Use the copper shorting bar 4 to connect the input terminals (bA, bB, bC, mA), and the copper shorting bar 1 to connect the input terminal N. Use the copper shorting bar 2 to connect the output terminals (sA, sB, sC, pA, pB, pC), and the copper shorting bar 5 to connect the output terminal N.
- Connect the mains input phase-A live cable (L1) to the copper shorting bar 4 (bA, bB, bC, mA), connect the input N line to the copper shorting bar 1 (N), and connect the input phase-B and phase-C live cables (L2, L3) to the input terminals (mB, mC), then connect the input PE line to the PE terminal.

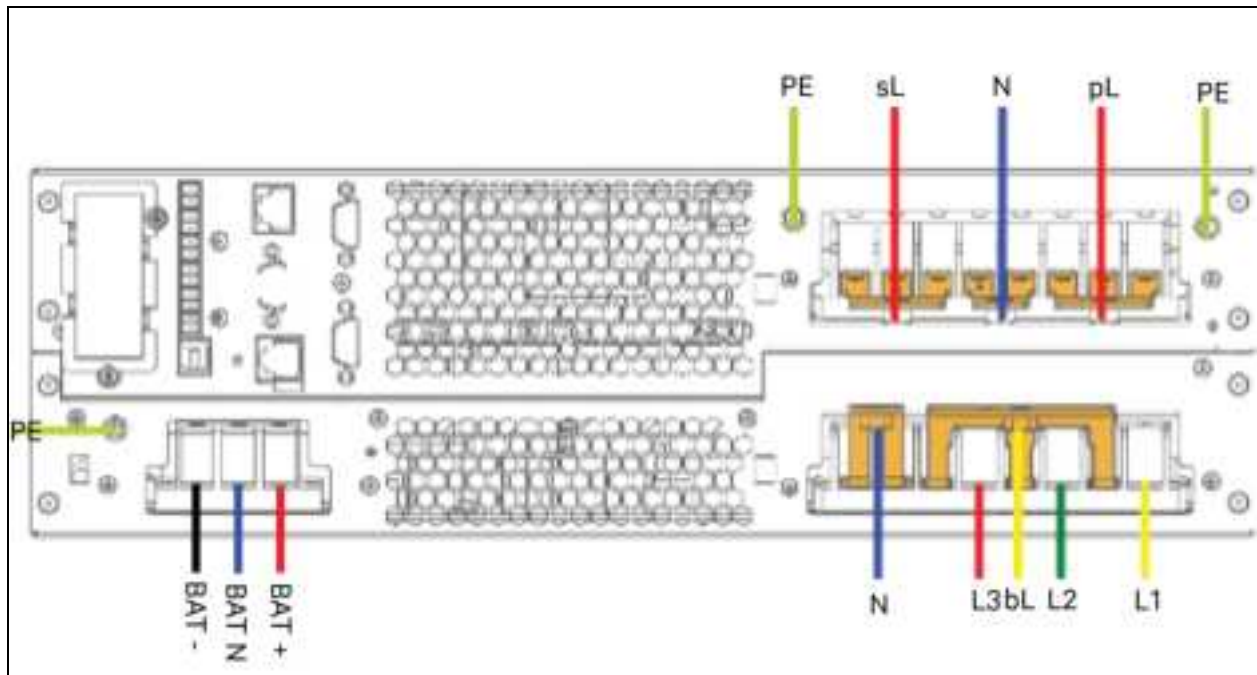
Figure 3.18 Wiring Diagram (3-in 1-out, Common Input Configuration)



4. 3-in 1-out, split-bypass configuration

- Remove the three copper shorting bars 1 installed before delivery.
- Use the copper shorting bar 3 to connect the input terminals (bA, bB, bC), and the copper shorting bar 1 to connect the input terminal N. Use the copper shorting bar 2 to connect the output terminals (sA, sB, sC, pA, pB, pC), and the copper shorting bar 5 to connect the output terminal N.
- Connect the bypass input live cable (bL) to the copper shorting bar 3 (bA, bB, bC), connect the bypass input N line to the copper shorting bar 1 (N), and connect the mains input live cables (L1, L2, L3) to the input terminals (mA, mB, mC), then connect the mains input N line to copper shorting bar 1, then connect the input PE line to the PE terminal.
- Connect the standard output live cable (sL) to the copper shorting bar 2 (sA, sB and sC). Connect the programmable output live cable (pL) to the copper shorting bar 2 (pA, pB and pC). Connect the output N line and output PE line to the output N and PE terminals, respectively. As shown in **Figure 3.19** on the next page.

Figure 3.19 Wiring Diagram (3-in 1-out, Split-bypass Configuration)



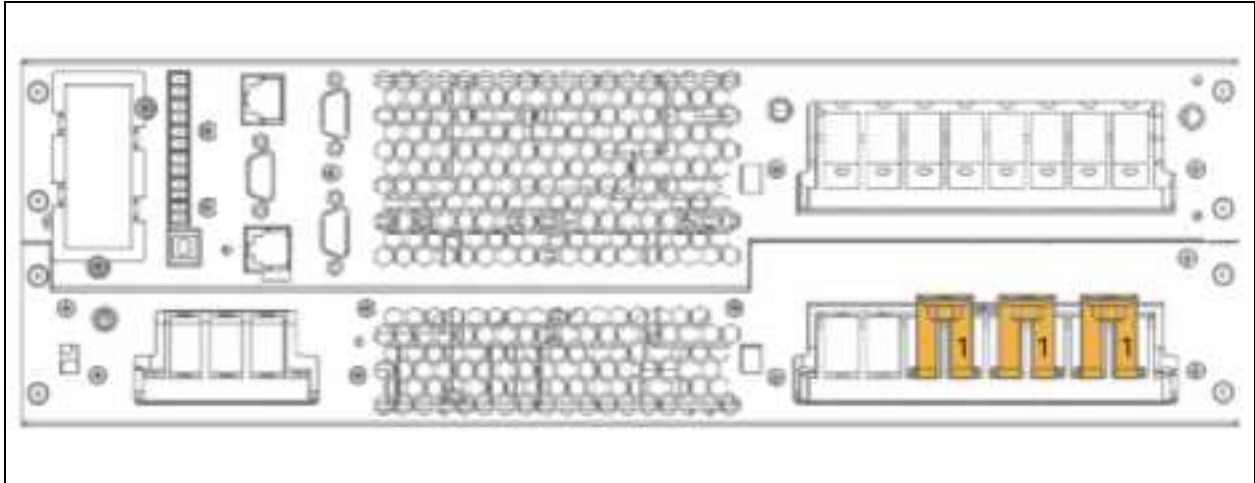
- As shown in **Figure 3.19** above, route the positive battery cable, N battery cable, negative battery cable through the cable hole on the junction box, then connect them to the BAT+, BAT N, and BAT- terminals, respectively, as well as the PE cable, and tighten the retaining screws.



WARNING! The following wiring will change the power distribution mode, please adhere scrupulously to the procedures described below.

5. From 3-in 1-out to 3-in 3-out

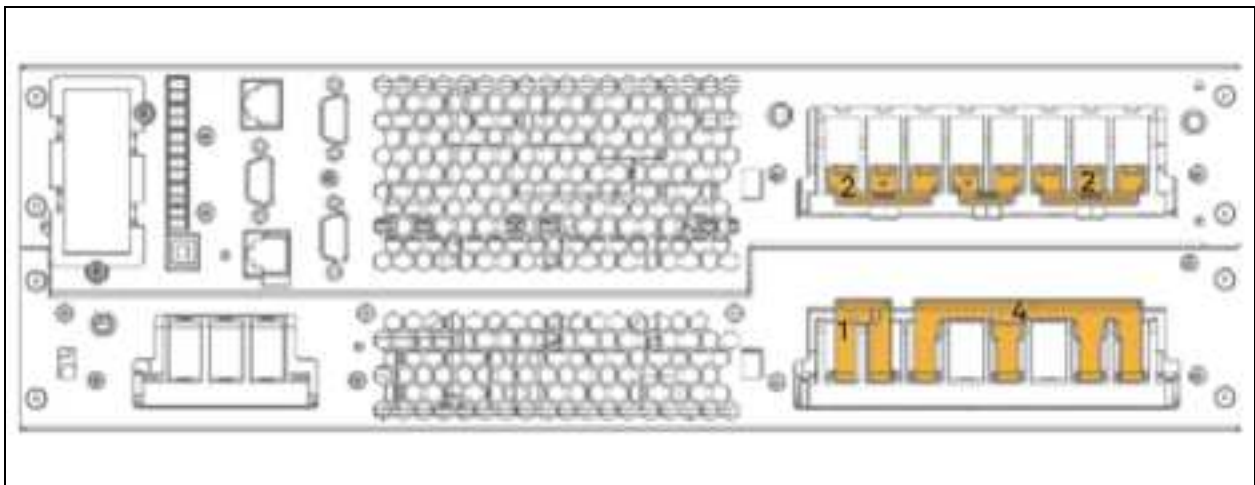
- Remove all the 3-in 1-out system copper shorting bars. Install the copper shorting bar 1 (there are no copper shorting bars in the case of the 3-in 3-out, split-bypass configuration), see **Figure 3.20** below. Connect all the cables.

Figure 3.20 Changing Power Distribution Mode

- Remove the EPO jumpers from the REPO dry contact port.
- Switch the system on. Set the system to '3phase' by selecting ENTER -> 'Settings' (default password: 111111) -> 'Output' -> 'Output phase No.', and then switch the system off completely and switch it on again, access the above menu again to verify that the setting is valid.
- Switch the system off completely, replace the EPO jumpers on the REPO dry contact port, and disconnect the main input cables.

6. From 3-in 3-out to 3-in 1-out

- Remove all the three copper shorting bars 1 (3-in 3-out, common input configuration) that were installed before delivery; then install the copper shorting bars (1, 2, 4, 5), see **Figure 3.21** below. Connect all the cables.

Figure 3.21 Changing Power Distribution Mode

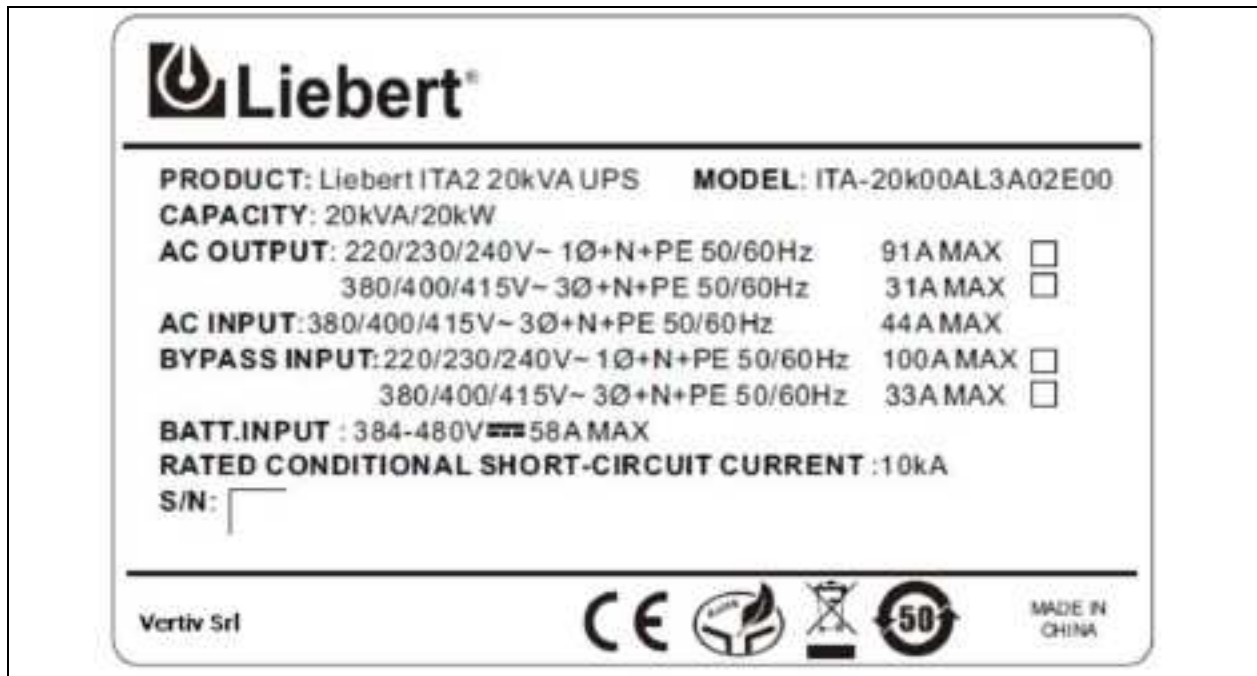
- Remove the EPO jumpers from the REPO dry contact port.
- Switch the system on. Set the system to '1phase' by selecting ENTER -> 'Settings' (default password: 111111) -> 'Output' -> 'Output phase No.', and then switch the system off completely and switch it on again, access the above menu again to verify that the setting is valid.
- Switch the system off completely and restore the EPO jumpers on the REPO dry contact port.



WARNING! Prior to the commissioning engineer's visit, if the load is not ready to be connected to the power supply, it is important to ensure the terminals of the output cables are insulated safely.

After the connecting the output cables, locate the label (using the 20 kVA model as an example) shown in **Figure 3.22** below on the top cover of the UPS and tick the AC OUTPUT and BYPASS INPUT boxes corresponding to the installation configuration, in order to simplify maintenance operations.

Figure 3.22 Label (20 kVA)



3.6.2 Connecting Battery Cables

NOTE: Before connecting the battery cables, confirm that the actual number of battery cells and the battery capacity are consistent with the parameter settings on the LCD menus.

NOTE: NEVER reverse the polarity of the battery cables.

NOTE: Before replacing the battery module and connecting the battery cables, disconnect the DC battery MCB, switch the UPS off completely, and insulate the terminals.

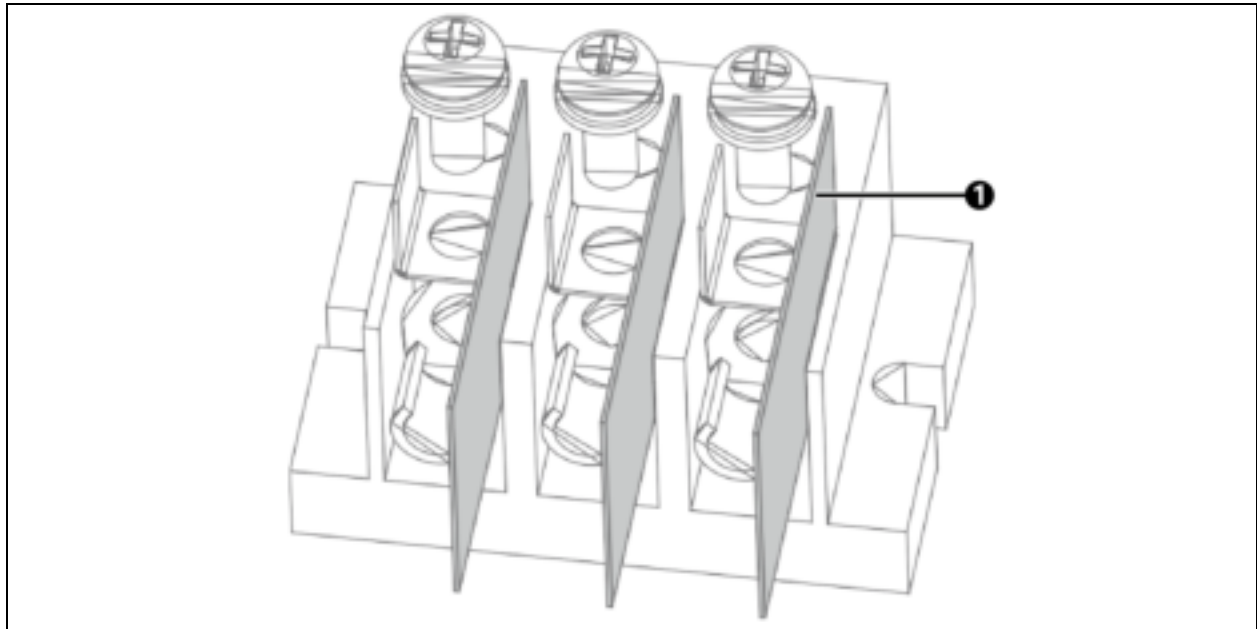
NOTE: We recommend a maximum battery cable length of 3 meters. If the cables are longer than this, the UPS may not operate correctly.

Installing the Battery Insulation Plates

The battery terminals must be fitted with insulating plates in order to guarantee sufficient insulation distance between the external battery cable connections and prevent faults such as arcing, and short circuits

To install the battery insulating plates, proceed as follows:

Figure 3.23 Installing the Battery Insulating Plates



Item	Description
1	Battery insulating plate

Installing Battery

1. Before installation, inspect the appearance and accessories of the battery, and carefully read this manual and the user manual provided by the battery manufacturer.
2. Maintain at least 10 mm (0.39 in.) clearances between the front, rear, side panels of the battery and the wall or adjacent equipment to keep well ventilated.
3. Maintain some clearances between the top of the battery and the upper baffle to for the ease of monitoring and maintenance of the battery.
4. Install the batteries from the bottom to the top to prevent too high center of gravity. Place the battery well to avoid shaking and impact.

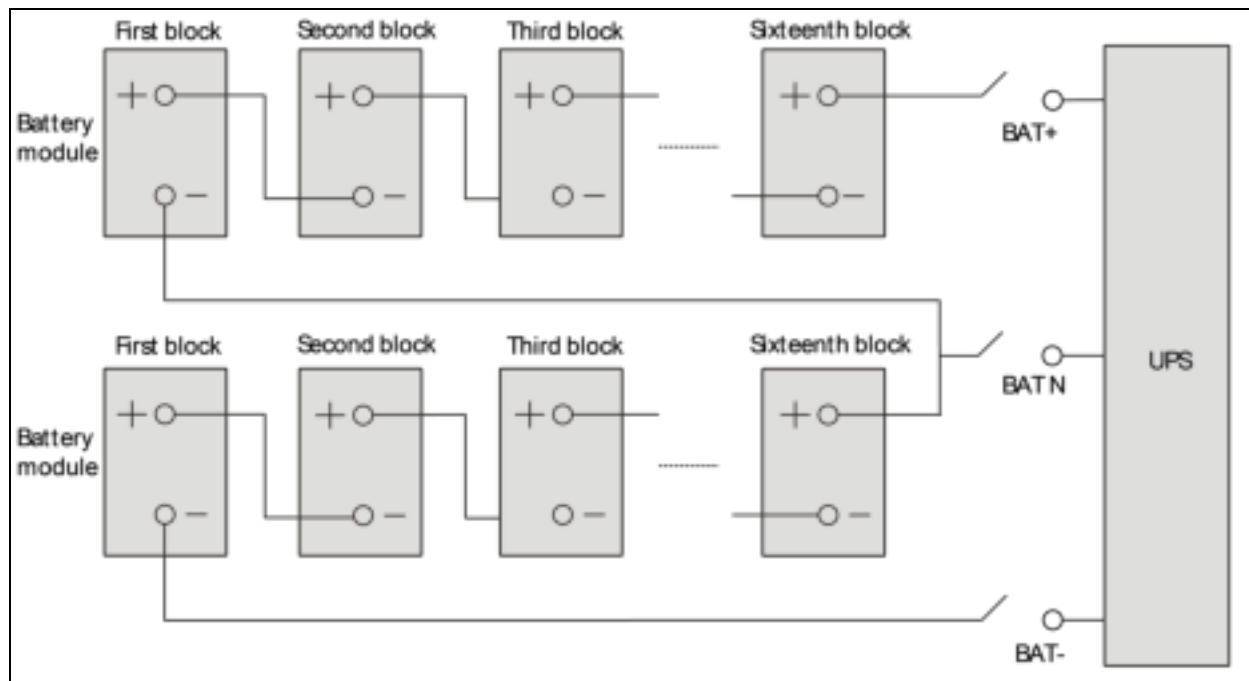
Connecting External Battery String

20 kVA: The default battery number of the ups is 32-block (16 blocks for positive and 16 blocks for negative). The external battery string connection principal diagrams for the self-distribution configuration are shown in **Figure 3.24** on the next page.



WARNING! As shown in **Figure 3.24** below, one DC battery MCB must be installed between the battery strings and the UPS. The battery string delivers a high DC voltage, the capacity of the MCB and output cables is listed in **Table 3.4** on page 35.

Figure 3.24 Battery String Connection Principal Diagram



Connecting the Battery Module Cables

As shown in **Figure 3.25** below, when connecting several battery modules, use the cable ITA-BCI0020K02L2. Cable terminal A is connected to terminal A of the first group of the battery module, and terminal B is connected to terminal B of the second group of the battery module.

Figure 3.25 Cables Between Two Battery Modules

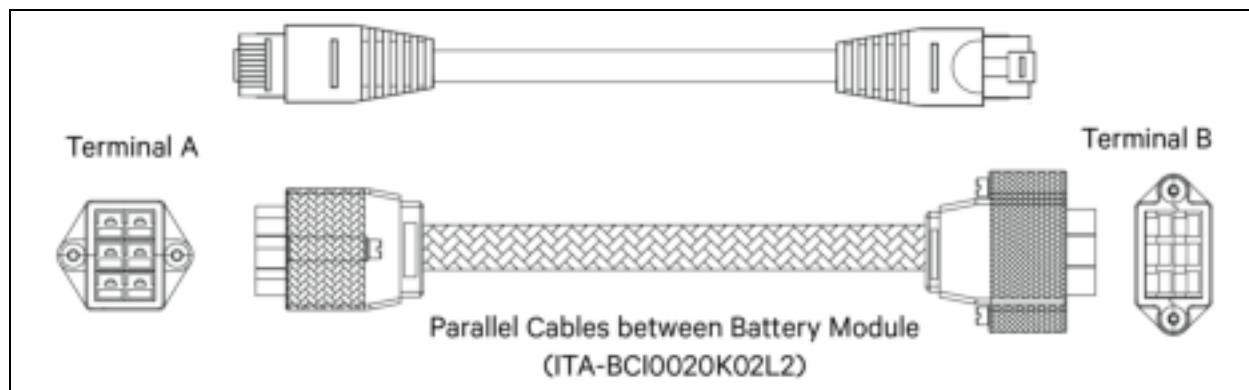
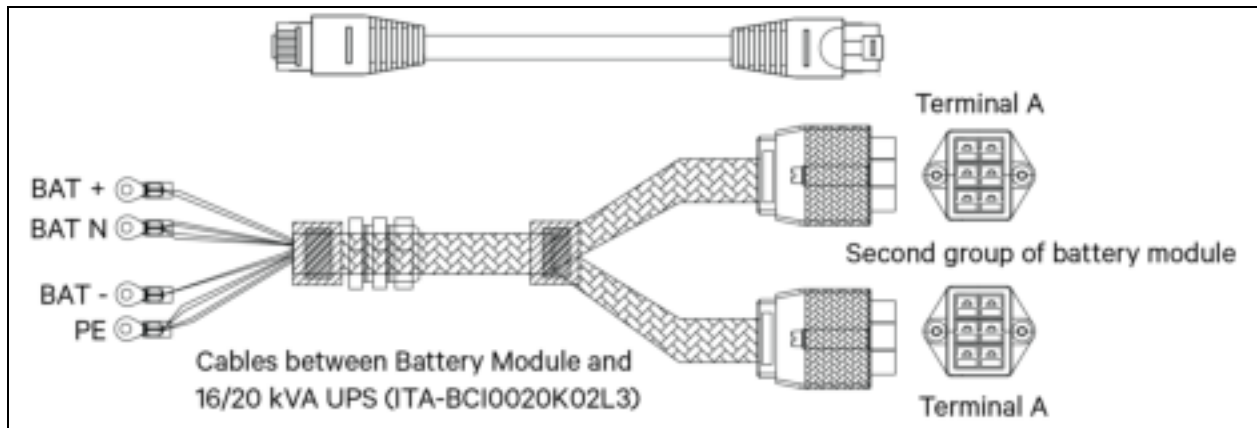
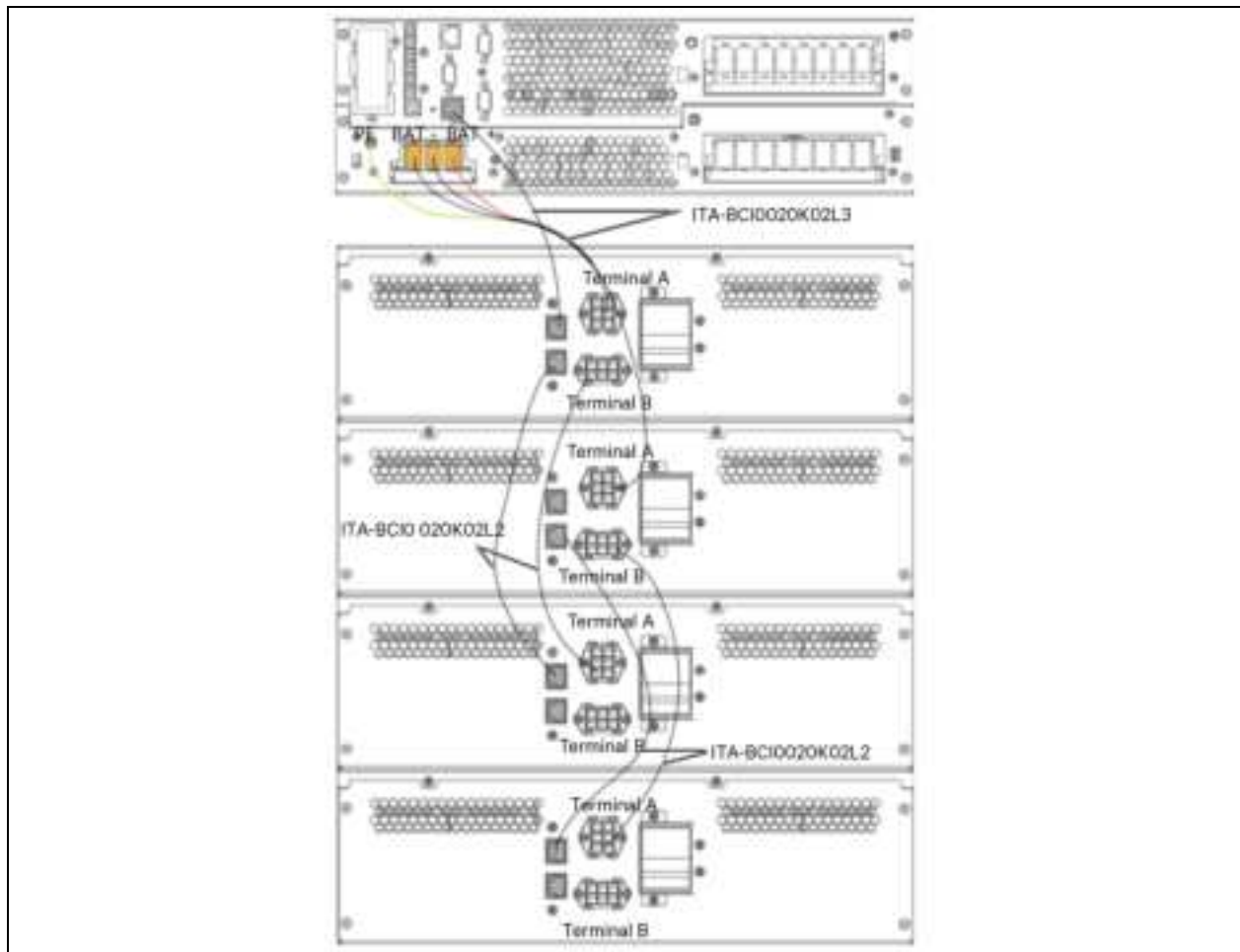


Figure 3.26 Cables Between UPS and Battery Modules



The cable connections between the battery module and 20 kVA UPS are shown in **Figure 3.26** above.

Figure 3.27 Cable Connection Diagram between the Battery Module and UPS



3.7 Single UPS Commissioning

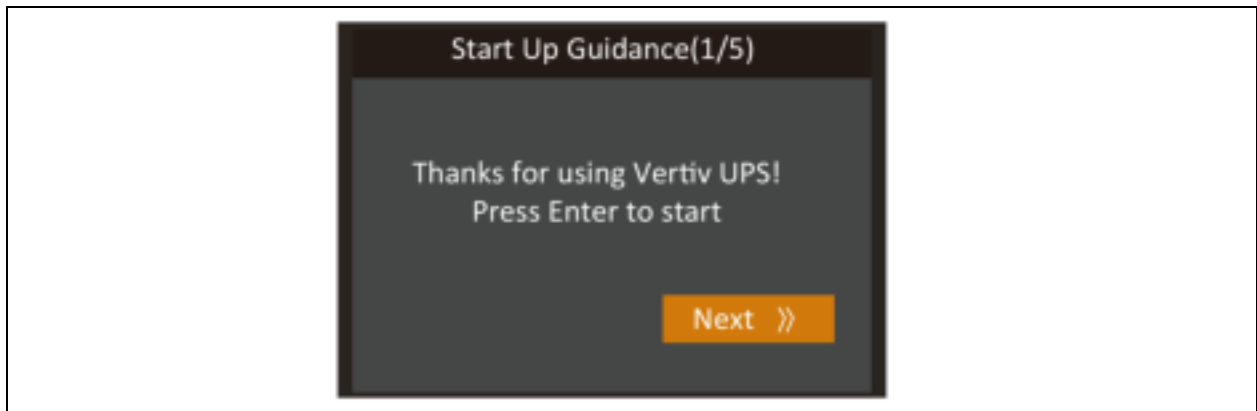
3.7.1 Check Before Startup

1. Check and confirm that the power distribution mode of the UPS and the POD (if configured) is correct, that the connection of the power cables and signal cables is correct and there is no short circuit.
2. Check that the battery installation and the cable connection are correct, that the positive pole and the negative pole of the battery are correct.
3. Measure and confirm that the mains voltage and frequency are normal.
4. The output terminals of the UPS and the POD (if configured) are energized upon the startup. If the load is connected to the output terminals, make sure that the power to the load is safe.

3.7.2 Startup Interface

If the system is first startup, only mains input mode can be used, and the LCD screen will display the startup interface, see Figure 3.28 below.

Figure 3.28 Startup Interface



3.7.3 Normal Mode Startup

1. Close the *external output MCB* and *input MCB* of the UPS one after another. If the single POD is selected to connect with the UPS, close the input MCB, bypass MCB and output MCB of the POD.

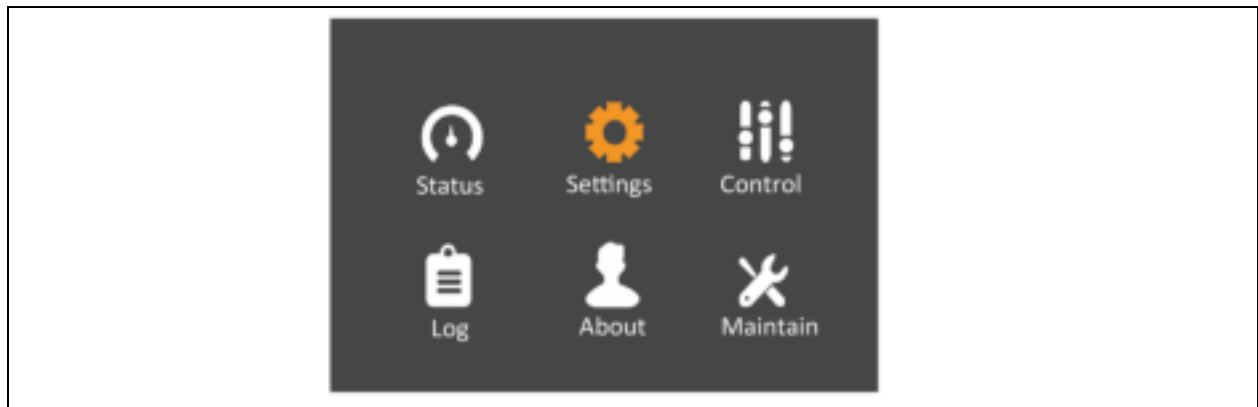


WARNING! Once the UPS external output MCB or the POD output MCB are closed, the output terminal block of the UPS, output terminal block of the POD and power distribution end of the load will be live. Pay attention to personal safety to avoid electric shock. Check whether it is safe to feed power to the load.

The rectifier runs in normal state for about 30 seconds; the startup of the rectifier is finished.

2. Finish and check the parameter settings of the single UPS.
 - a. At main menu screen, press the  or  key to select *Settings*, and press the  key to enter the interface shown in Figure 3.29 on the facing page.

Figure 3.29 Main Menu Screen



- b. Press the  or  key to select and set corresponding parameters (taking 'Output' as an example). As shown in **Figure 3.30** below.

Figure 3.30 Output Interface



3. After setting corresponding parameters, press the power button for 2 seconds, and the LCD prompts a dialogue box shown in **Figure 3.31** below.

Figure 3.31 Turning ON UPS



After selecting YES, the run indicator (green) blinks, the inverter starts, and the run indicator turns on.

4. Measure whether the inverter output voltage is normal.
5. If the battery is not connected, the alarm indicator is yellow. If the battery is connected, the alarm indicator turns off.

3.7.4 Battery Mode Startup

1. Close the *battery MCB*, and press the power button on the UPS front panel for 2 seconds, the LCD displays the startup screen. The alarm indicator will be yellow, and the buzzer will beep continuously after the rectifier finishes the startup.
2. Press the *power button* for 2 seconds, the LCD prompts a dialogue box shown in **Figure 3.32** below.

Figure 3.32 Turning ON UPS



After selecting YES, the inverter starts, and the run indicator (green) is on.

4 Parallel UPS Installation and Commissioning

This chapter gives information about the features, requirements, installation and commissioning of the parallel system.

The UPS parallel system provides the user with $N + X$ ($2 \leq N + X \leq 4$, $X = 0$ or 1) parallel configuration where,

- N stands for the basic parallel sets and,
- X stands for the redundant sets.

1+1 parallel POD (optional) can provide safe and reliable power distribution function for the parallel system. The 1+1 parallel system only needs one 1+1 parallel POD, if N is not less than two, the external self-distribution will be required for the parallel system.

4.1 Features

1. The software and the hardware of each of the UPS in parallel system are same as those of the single UPS. The basic parameters of the parallel system can be set through the LCD see [Parallel System Parameters Setting](#) on page 57 for details, and the detailed parameters can be set through the background software (For service engineers only). For all UPS of the parallel system, the requirements of the parameter settings are same.
2. The parallel cables form a ring connection see [Connecting Parallel Cables](#) on page 53 for details, to provide reliability and redundancy for the system. The intelligent parallel logic provides the user with maximum flexibility. For example, each UPS in the parallel system can be switched off or on in random order; seamless transfer can be achieved between Normal mode and Bypass mode, and the transfer is automatically recoverable: that is, after the overload is removed, the system will return to the original operation mode automatically.
3. The total load of the parallel system can be identified through the LCD of each UPS.

4.2 Requirements

A UPS system consists of multiple parallel-connected UPS is equivalent to a large UPS system. Nevertheless, it provides increased system reliability.

To ensure equal utilization of all UPS and compliance with relevant wiring regulations, the following requirements must be met:

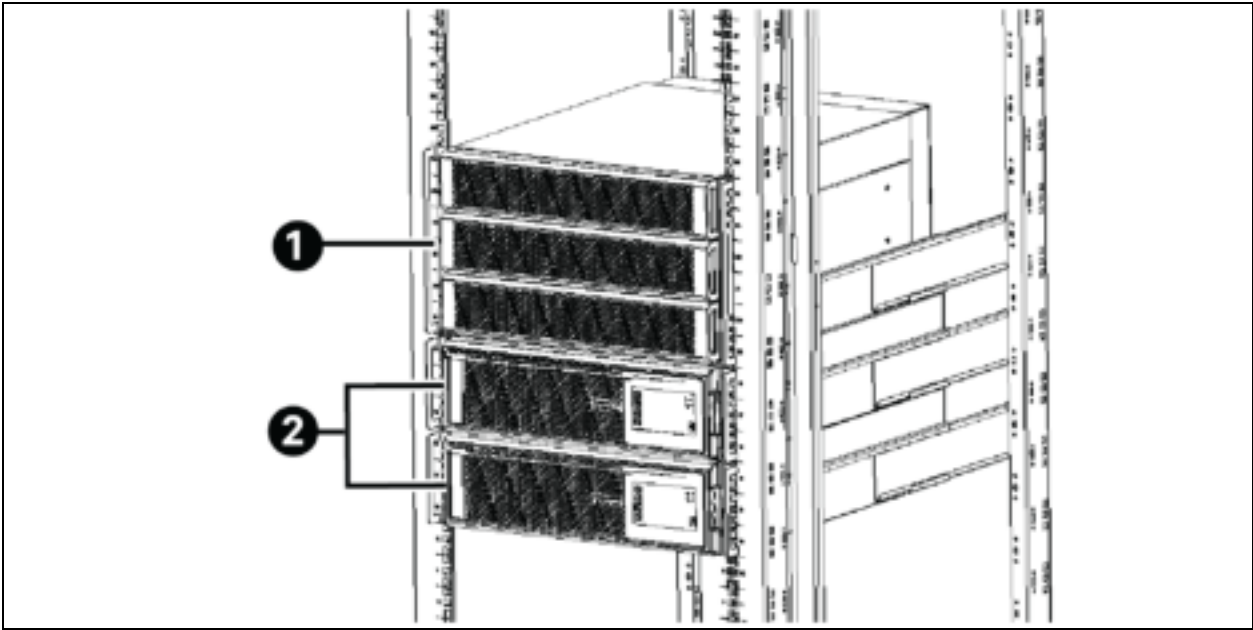
1. Each UPS in the UPS large system must have the same capacity. The UPS must be connected to the same bypass source.
2. The bypass input power and the rectifier input power must be connected to the same neutral line input terminal.
3. If a residual current detector (RCD) is required, it must be set correctly and installed before the same neutral line input terminal, and it must monitor the protective earth current of the system. See Warning: High leakage current of [Important Safety Information](#) on page 1.
4. The output of each UPS must be connected to the same output bus.
5. Because the UPS parallel system is not fitted with any auxiliary contact detection devices for the output MCB or the maintenance bypass MCB of the UPS, removing the single UPS from the parallel system before maintenance and adding the single UPS into the parallel system after maintenance must be conducted strictly following the procedures provided in [Transfer Procedures between Operation Modes](#) on page 87. Failure to follow the given instructions may affect the reliability of the load power supply.

4.3 Mechanical Installation

For the rack installation of the 1+1 parallel system, the mechanical installation method of the parallel system is as follows:

- 1. The installation method of 1+1 parallel UPS is the same as that of the single UPS. For more information on installation, see [Mechanical Installation](#) on page 26.
- 2. The UPS should be installed at the bottom; and the 1+1 parallel POD should be installed on the top to facilitate the cable connection and operation. The installation method of 1+1 parallel POD is the same as that of the UPS, see [Figure 4.1](#) below.

Figure 4.1 Installing a 1+1 Parallel System (without Battery Module)



Item	Description
1	1+1 Parallel POD
2	UPS (2 PCs)

4.4 Connecting Power Cables

Each single UPS of the parallel system needs to configure the MCB and cables respectively, see [Connecting Power Cables](#) on page 33 for the specification. The recommended configurations of the total power cables are listed in **Table 4.1** below for the parallel system.

Table 4.1 Input/Output Cable CSA for the 20 kVA Parallel System (Unit: mm², Ambient Temperature: 25°C)

Parallel UPS Number	3-In 3-Out				3-In 1-Out		
	Single Input Cable for Parallel System	Single Output Cable for Parallel System	Total Neutral Line for Parallel System	Grounding Cable for Parallel System	Total Output Cable for Parallel System	Total Neutral Line for Parallel System	Grounding Cable for Parallel System
2 units	25	25	25	25	50	50	50
3 units	35	35	35	35	70	70	70
4 units	50	50	50	50	95	95	95

4.4.1 Connecting I/O Cables

The power cables of the UPS are connected to the I/O terminal block of the rear panel of the UPS. For the layout of the I/O terminal block, see [Connecting Input/Output Cables](#) on page 36.

Power Distribution Mode

There are two modes for UPS parallel power distribution: using the 1 + 1 parallel POD (optional) provided by Vertiv, self-distribution.

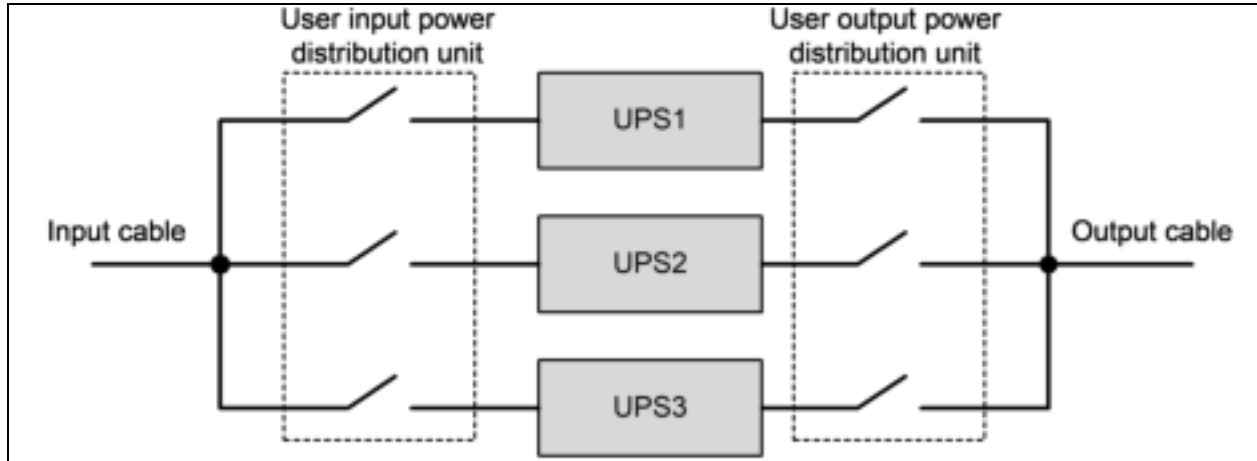
The power distribution mode of the parallel system is the same as that of the single unit. For more information, see [Connecting Input/Output Cables](#) on page 36.

1. Using parallel POD power distribution
It is recommended to use 1 + 1 parallel POD power distribution mode if you need 1 + 1 parallel system, see [Mechanical Installation](#) on the previous page for details. For more information on the installation and commissioning of different models, refer to **Vertiv™ Liebert® ITA2 10 kVA to 20 kVA UPS Power Output Distribution Unit User Manual**.
2. Self-distribution for the parallel system

When the UPS number of the parallel system is more than two, use self-distribution mode.

The block diagram of three UPSs parallel system is shown in **Figure 4.2** below. See Power distribution mode in [Connecting Input/Output Cables](#) on page 36 for the cable connection of each UPS. See [Connecting Power Cables](#) on page 33 for the input and output MCB, the battery MCB and the cables when using the self-distribution mode.

Figure 4.2 Block Diagram of Three UPSs Parallel System



WARNING! Configure each UPS with external input MCB and external output MCB when carrying out the power distribution for the parallel system, as shown in **Figure 4.2** above.

NOTE: After connecting power cables, the protective cover of the I/O terminal block must be reinstalled to avoid electric shock.

Changing Power Distribution Mode

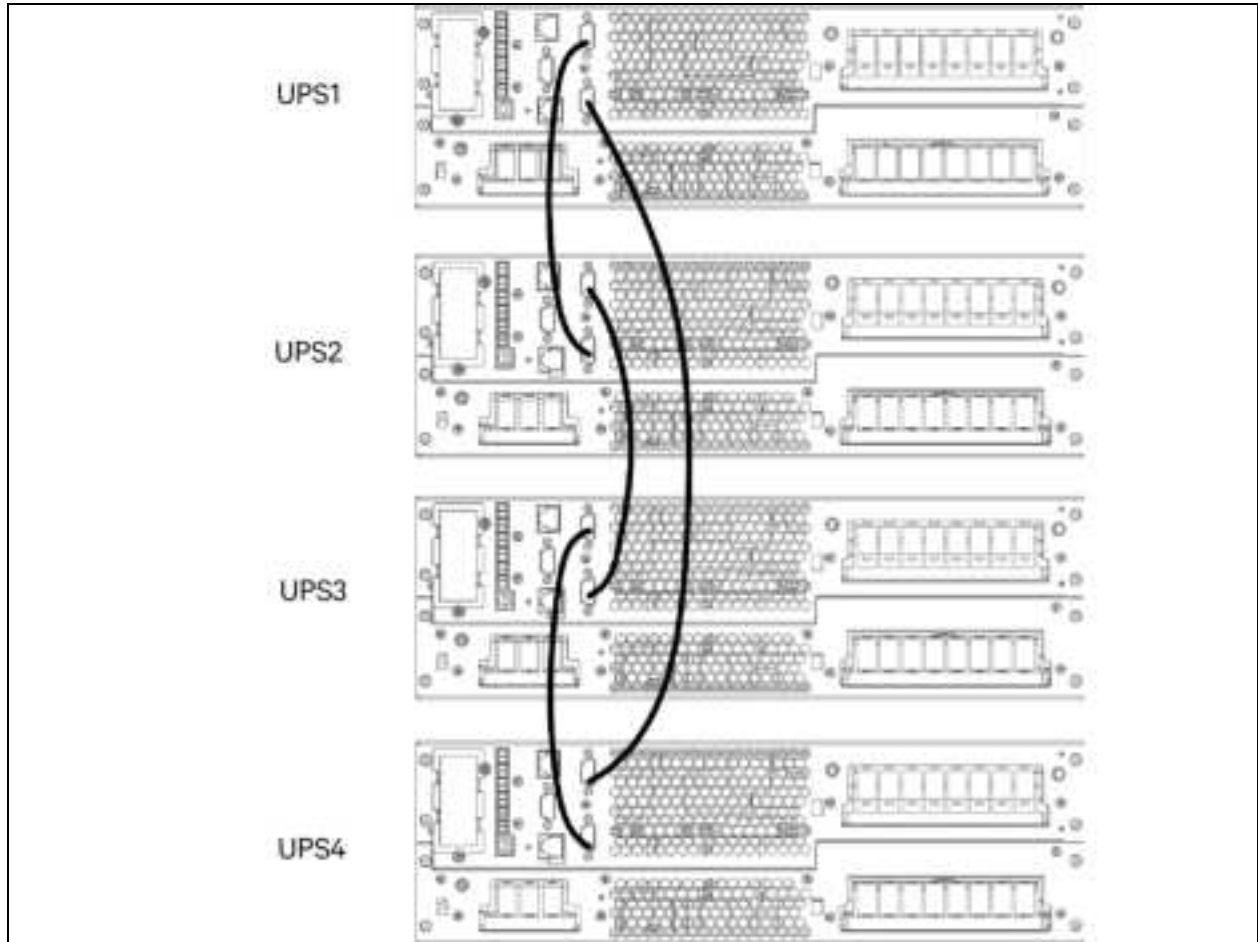
The 20 kVA model is compatible with 3-in 3-out/3-in 1-out, factory default: 3-in 3-out.

If you need to change the mode from 3-in 3-out to 3-in 1-out or from 3-in 1-out to 3-in 3-out, carry out the parallel connections only after converting the single system as required. See [Connecting Input/Output Cables](#) on page 36 for more details.

4.4.2 Connecting Parallel Cables

The parallel system provides parallel cable option. The parallel cables form a ring connection through the parallel ports on the rear panel of the UPS. The cable connection schematic diagram of 3 + 1 parallel system is shown in **Figure 4.3** below.

Figure 4.3 Cable Connection Schematic Diagram of 3 + 1 Parallel System



NOTE: The Vertiv parallel cables must be used for the parallel system.

NOTE: If the parallel communication fault occurs during the parallel commissioning or operation, just shut off the system and check whether the connection of the parallel cables is correct.

NOTE: During parallel system operation, do not unplug the parallel cables to avoid the risk of system damage.

4.4.3 Connecting Battery Cables

In the parallel system, the UPS can either share the battery strings or use the battery strings independently.

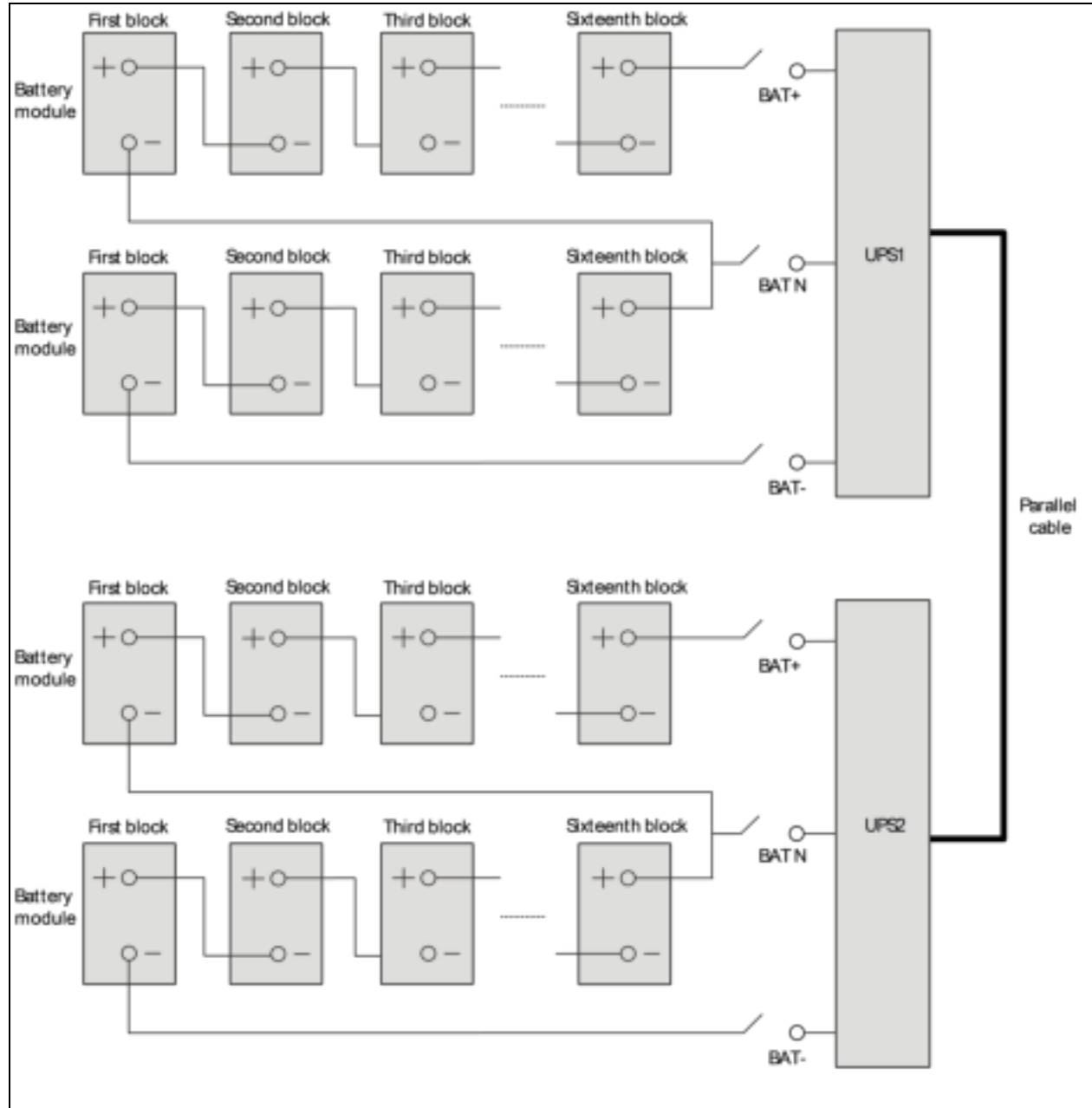
NOTE: Each UPS should be equipped with an independent battery MCB. Refer to **Table 3.4** on page 35 for selection of the battery MCB.

Using Battery String independently

When each UPS of the parallel system uses the battery string independently, the battery cables connection of each UPS in the parallel system is the same with that of the single UPS, see [Connecting Power Cables](#) on page 33 for the installation method. The schematic diagram of battery strings in 1 + 1 parallel system with independent battery strings is shown in **Figure 4.4** below. See [Connecting Power Cables](#) on page 33 to configure an MCB.

NOTE: Make sure that the LCD settings are correct when using the battery strings independently for the parallel system, see [Parallel System Parameters Setting](#) on page 57 for details.

Figure 4.4 Connection Principal Diagram Upon Using Battery Strings Independently



Common Battery Strings

Using the shared battery strings in the parallel system can save investment in equipment for the users.

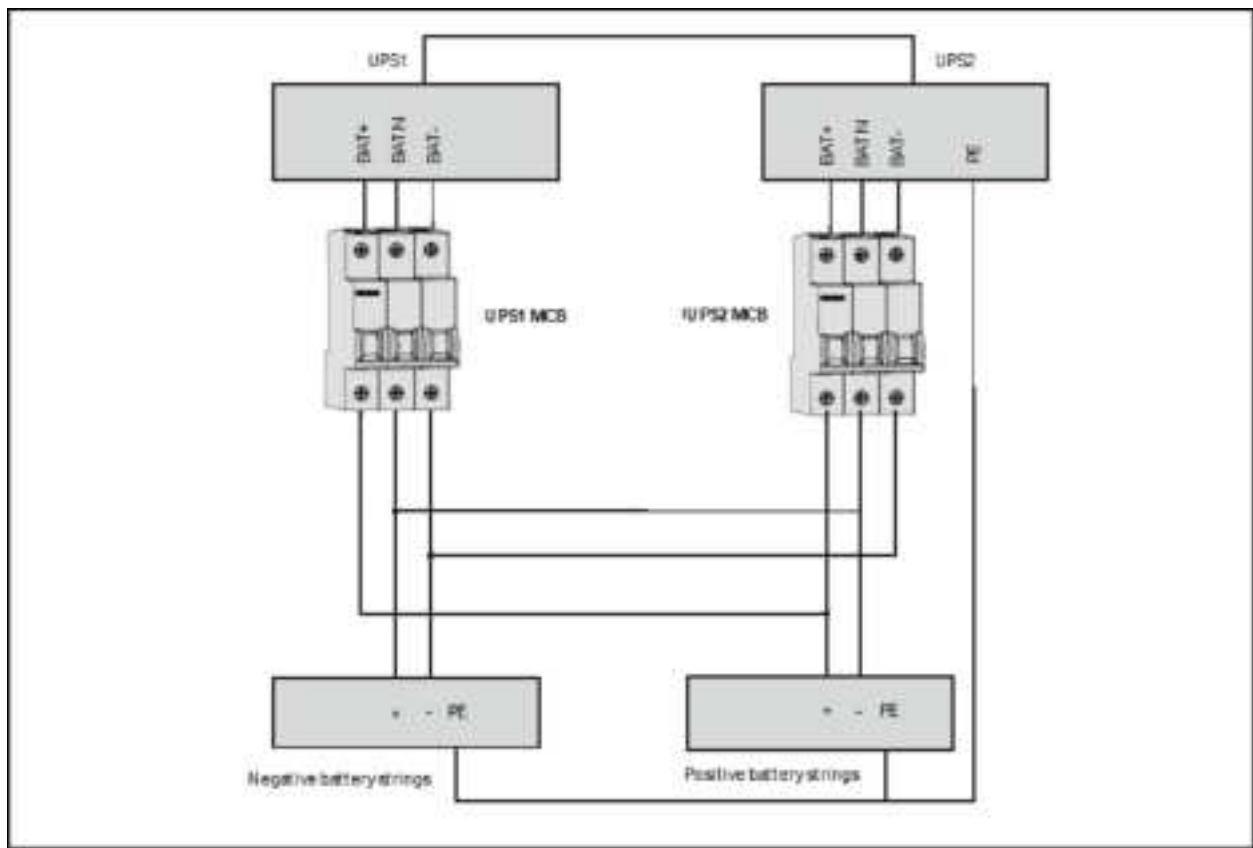
NOTE: To ensure the abundant backup time of the battery, it is recommended to use the external battery cabinet with big capacity.

NOTE: The UPS shares the battery system, make sure that in each of the UPS enable share battery function. See [Setting Parameters of LBS](#) on page 60.

Wiring

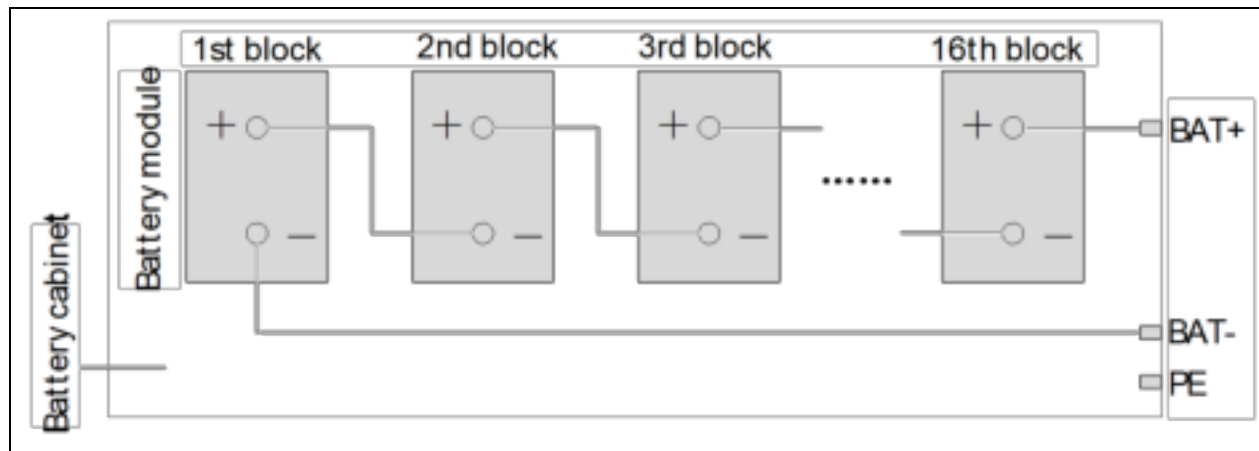
Power off the parallel system completely, disconnect the battery MCBs of all single UPSs, and then use battery cables see [Connecting Power Cables](#) on page 33 for the cables and the MCBs to connect '+' 'N' '-' and 'PE' terminals of the battery strings respectively to 'BAT+', 'BAT-', 'BAT N' and 'PE' terminals of the corresponding I/O terminal block of the UPS in the parallel system through each battery MCB, as shown in **Figure 4.5** below.

Figure 4.5 Connection Diagram of Shared Battery String in 1 + 1 Parallel System



Refer to **Figure 4.6** below to configure the positive battery string and negative battery string.

Figure 4.6 Internal Connection Diagram for Positive Battery String and Negative Battery String



Close the *battery MCB* of each UPS.

4.5 Commissioning Parallel System

4.5.1 Check Before Startup

1. Check and ensure that power distribution mode of the UPS and the 1+1 parallel POD (if configured) is correct; those connections of the power cables and the signal cables are correct and there is no short circuit.
2. Check that the battery installation and cable connection is correct and there is no short circuit, and that the positive pole and negative pole of the battery are correct. Especially when each UPS of the parallel system shares the battery strings, check these items carefully.
3. Check all the working status of the parallel system, ensure that the phase sequence of the main, bypass and output of each UPS is correct and consistent, that the connection of the parallel cable is reliable, and that the user load is not connected during power-on.
4. Measure and ensure that the mains voltage and frequency are normal.
5. The output terminals of the UPS and the 1+1 parallel POD (if configured) are energized upon the startup. If the load is connected to the output terminals, make sure that the power to the load is safe.

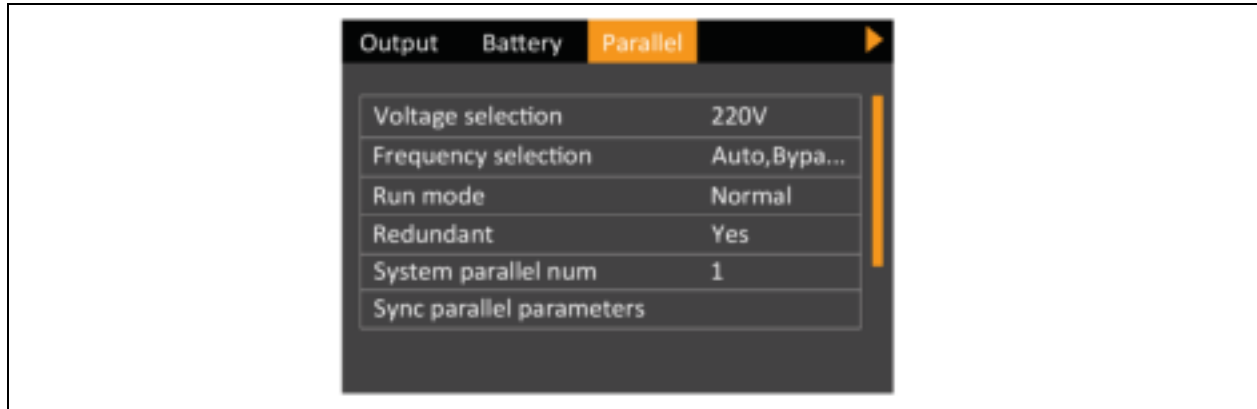


WARNING! The output terminals of the UPS and the POD (if configured) will be energize after starting on the UPS. When bypass of the single UPS in the parallel system is not consistent, the system fault may occur, check and ensure the bypass before power-on.

4.5.2 Parallel System Parameters Setting

The parallel parameters for all the UPS in the parallel system should be set. See **Figure 4.7** below.

Figure 4.7 Settings for Parallel Parameters



The user can change these settings according to actual needs see [LCD Parameters Setting](#) on page 123 for details. After the change, press the last item *Sync parallel parameters* to validate the setting.

4.5.3 Power on Commissioning for Parallel System

1. Set the parallel parameters of each UPS in the parallel system, then commission the inverter.
The specific commissioning procedures are as follows:
 - a. Make sure that the output MCBs of all UPSs in the parallel system are open, and then close the external input MCB of each UPS in the parallel system, the UPS is powered on at the same time. If 1+1 parallel POD is configured, close the corresponding input MCB and bypass MCB. At the same time, close the corresponding output MCB of the other UPS which is being tested, and make sure that the corresponding output MCB of the other UPS is open.



WARNING! Electric shock. After the UPS external output MCB or POD output MCB is closed, the UPS output terminal block, POD output terminal block and load will be live, pay attention to personnel safety to avoid electric shock. Confirm whether it is safe to feed power to load.

NOTE: The LCD displays the self-check screen, and the alarm indicator (red) and run indicator (green) are on at the same time for about 5 seconds.

NOTE: After the rectifier has been in normal operation state for about 30 seconds, the rectifier start up is finished.

- b. See [Parallel System Parameters Setting](#) above for the parallel parameters setting for each UPS. Check whether there is an alarm of *Parallel comm. Fail*, if yes, clear the fault according to **Table 5.5** on page 82. Carry out the following procedures if the UPS is running normally.
- c. Press the power button of one UPS for 2 seconds, if 1+1 parallel POD is configured, press power button of the UPS which is being tested in the parallel system, then press Enter key to start the UPS. The run indicator (green) will blink, after the inverter is turned on, the run indicator will turn on, if 1+1 parallel POD is configured, the other UPS will display no redundancy in parallel, ignore the prompt at the moment.

NOTE: If the battery is not connected, the alarm indicator will be solid on, and the buzzer will beep every second. If the battery is connected, the alarm indicator will turn off.

- d. If the UPS is working normally, press the power button for two seconds to turn off the inverter.
- e. Repeat the preceding Step a to Step d to power on and commission the inverter of other UPS respectively.

NOTE: Carry out the parallel commissioning after each UPS is working normally.

2. After confirming that the inverter of each UPS is normal, commission the parallel system, the specific procedures are as follows:
 - a. Close the external output MCB and input MCB of each UPS, and all UPSs are powered on at the same time. After the start of the rectifier is finished, press the power button of one UPS for 2 seconds, the run indicator (green) will be on. Measure whether the inverter output voltage is normal. If the 1+1 parallel POD is configured, close the corresponding input MCB, bypass MCB and output MCB of the POD.
 - b. Start the inverter of the second UPS, check whether there is an alarm on the LCD, and confirm that the UPS parallel works normally.
 - c. Follow the methods to start inverter of the third or the fourth UPS to connect UPS into the parallel system.



WARNING! During the parallel power-on, confirm that the external output MCB of each UPS has been closed, and that all the inverter output of the UPSs are connected parallel. During the parallel power on, confirm that the system is working normally, and then feed power to the load, to void load power failure.

3. If the user needs to add one UPS in the parallel system, follow the commissioning procedures below:
 - a. Check and confirm that the power distribution mode, each power cable and signal cable of the added UPS are well connected without short circuit. Check that the battery installation and cables connection are correct without short circuit, and that the positive and negative are correct.
 - b. Repeat Step a to Step e in Part 1 to complete the single unit commissioning of the added UPS, before completely power off the UPS.
 - c. Ensure that the connection of power cable and signal cable is reliable.
 - d. Close the external input switch of the added UPS. After the system power on, find any online UPS, and enter the interface shown in **Figure 4.7** on the previous page. Set the system parallel No. from 'N' to 'N+1', then click the *Sync parallel parameters*.
 - e. Close the external output switch of the added UPS once again, normally start the inverter after the rectifier start up. Then check that the LCD has no alarm, and that the UPS parallel system works normally.

NOTE: For 1+1 parallel system, when one UPS is faulty and needs to be replaced on line, the above operation steps are available too. The difference is no need to change parallel No., just click the 'Sync parallel parameters' for the online UPS.

NOTE: Clicking the *Sync parallel parameters* to achieve the synchronization of the items in parallel settings interface, and the parameters will affect the parallel system. The user should manually set other parameters according to actual needs.

NOTE: When parallel system has output, *Sync parallel parameters* function can only be achieved via the UPS with output, otherwise this function is invalid.

NOTE: When adding a single unit in the parallel system, first ensure the parallel cables connection is correct, then power on the single unit.

4.6 Installation and Commissioning for Dual Bus System

4.6.1 Introduction

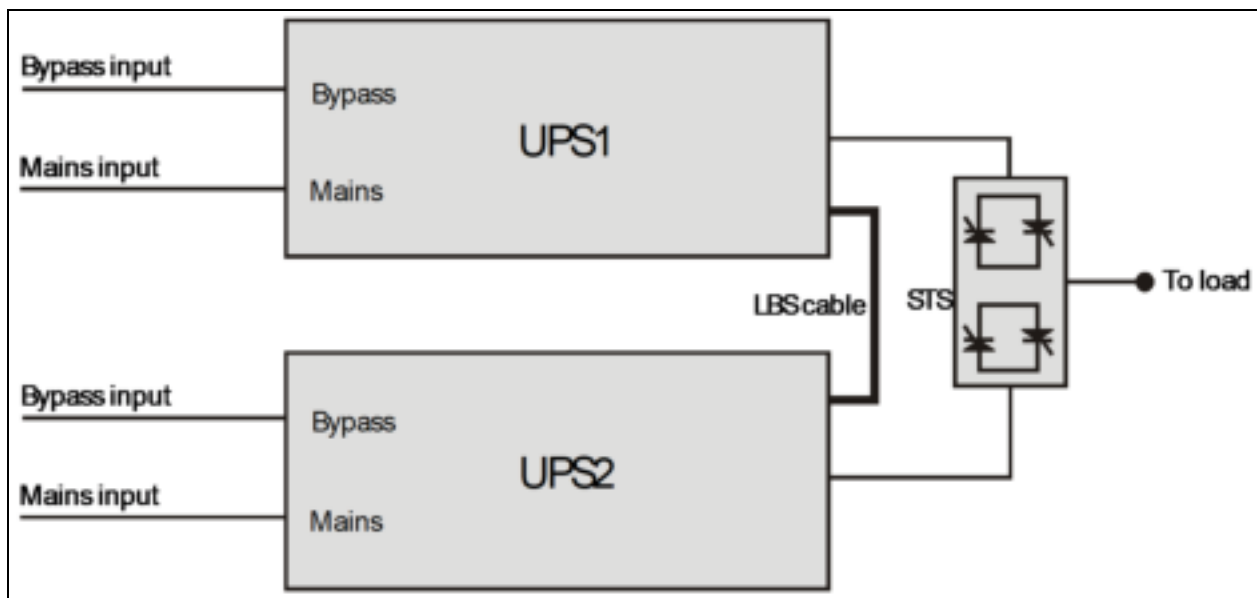
The dual bus system consists of two independent UPS systems; each UPS system consists of one single UPS.

The dual bus system has high reliability, which is suitable for the load with many input terminals. For single UPS input load, you can add a static trigger switch (STS, optional) to start the standard load bus synchronization (LBS) system.

Place all the UPS side by side, and connect them as following below instructions:

The dual bus system adopts the LBS system to realize the output synchronization of the two independent UPS systems. One is the primary system, and the other is the secondary system. The operation mode of the dual bus system contains primary system and/or secondary system running in Normal mode or Bypass mode. The schematic diagram of the LBS system built by two UPS is shown in **Figure 4.8** below.

Figure 4.8 LBS System Schematic Diagram



NOTE: UPS1 is primary system while UPS2 is secondary system.

NOTE: Refer to [Single UPS Commissioning](#) on page 46 respectively for the settings of the single UPS.

4.6.2 Installing External Protective Device

See [External Protective Devices](#) on page 22 for details of installation and type selection.

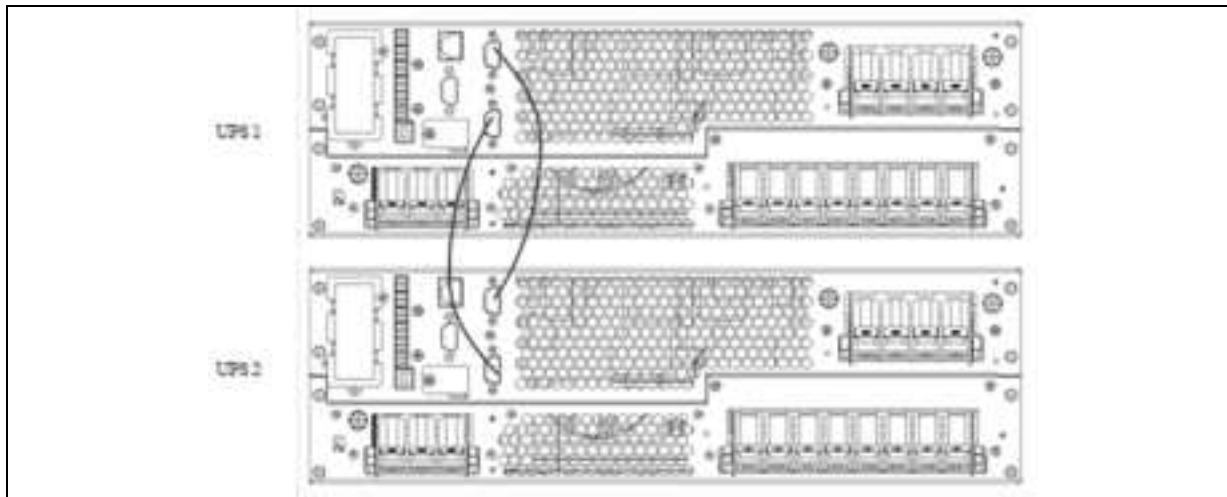
4.6.3 Connecting Power Cables

In dual bus system, refer to [Connecting Power Cables](#) on page 33 and [Connecting Power Cables](#) on page 51 to select the power cables for single UPS and parallel system respectively. The bypass input power and main input power must use the input terminal of the same neutral line. If the input terminal has leakage current, the leakage current protective device should be installed before the input terminal.

4.6.4 Connecting LBS Cables

NOTE: The appearance of the LBS port is the same as the parallel port see **Figure 2.3** on page 8.

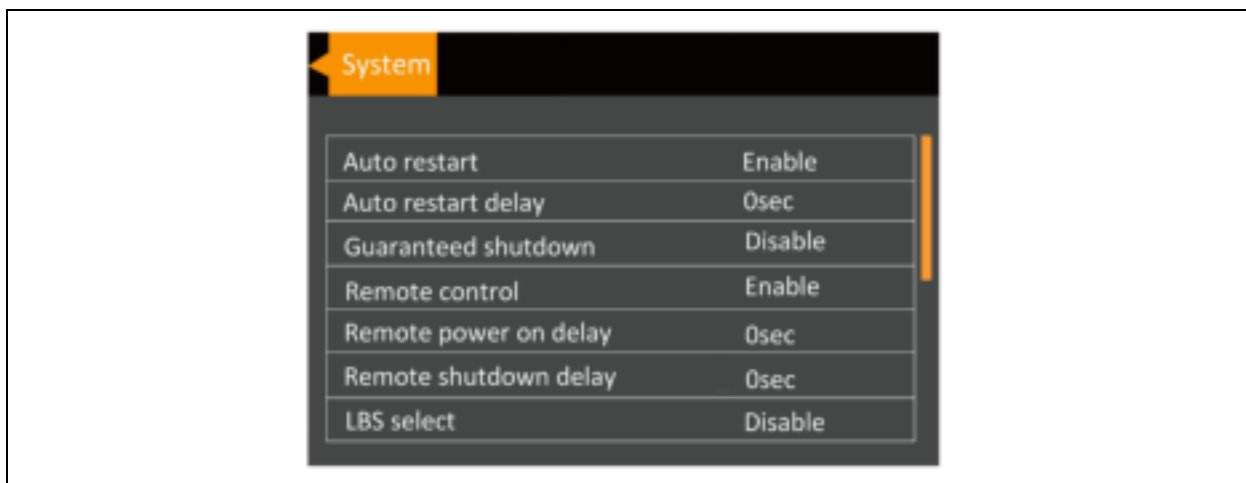
Figure 4.9 LBS Cable Connection



4.6.5 Setting Parameters of LBS

- The LBS parameters setting interface is shown in **Figure 4.10** below.
- Procedures for setting LBS parameters:
- Through the *Settings* -> *System* -> *LBS*, you can set the LBS according to actual needs.
- There are three items of LBS for selection: Disable, Secondary, Primary.

Figure 4.10 LBS Parameters Setting Interface



The LBS is the load synchronous system, which is used to implement the output voltage phase synchronization of the two sets of UPS system. Two sets of UPS system can only be two single UPS.

Manually set the Primary and Secondary through the LCD.

The UPS which is set to LBS primary can send synchronization signal to LBS secondary UPS according to the own inverter voltage phase. After the secondary UPS receives the synchronization signal sent by the primary UPS. The secondary UPS adjusts its inverter voltage phase to ensure synchronization with the primary UPS.

Through the above to realize the inverter voltage phase synchronization of two sets of UPS system, and realize the reliable transfer between the two sets of UPS output voltage and STS, then provide the reliable uninterrupted power supply to the load.

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5 Operation and Display Panel

This chapter gives information about the functions and use of the components on the UPS operation and display panel, and provides LCD display information, including the;

- LCD screen types
- Detailed menu messages
- Prompt windows message and UPS alarm list

5.1 Introduction

The operation and display panel is located on the front panel of the UPS. Through the operation and display panel, conduct the operation and control of the UPS and check all the UPS parameters, UPS and battery states, and alarm message.

The operation and display panel provides LCD, menu keys, LED indicators (run indicator and alarm indicator), see **Figure 5.1** below.

Figure 5.1 Operation and Display Panel



Item	Description
1	LCD
2	Run indicator
3	Alarm indicator
4	Power button
5	Menu keys

NOTE: The device has a gravity sensor function, thus the LCD display direction will change according to the device layout mode.

5.1.1 LED Indicators

The LED indicators have the run indicator and alarm indicator. **Table 5.1** below gives the description of the indicators.

Table 5.1 Description of LED indicators

Indicator	Color	State	Meaning
Run indicator	Green	On	UPS has output
		Blinking	Inverter is starting
		Off	UPS has no output, inverter is starting
Alarm indicator	Yellow	On	Alarm occurs
	Red	On	Fault occurs
	/	Off	No alarm, no fault

5.1.2 Audible Alarm (Buzzer)

The UPS operation is available with the following two different kinds of audible alarms described in **Table 5.2** below.

Table 5.2 Description of Audible Alarm

Sound	Meaning
Continuous beep	When the UPS fault appears, such as fuse or hardware failure.
One beep every 0.5 second	When the UPS critical alarm appears, such as Inverter overload.
One beep every second	When the UPS critical alarm appears, such as battery low voltage.
One beep every 3.3 seconds	When the UPS general alarm appears.

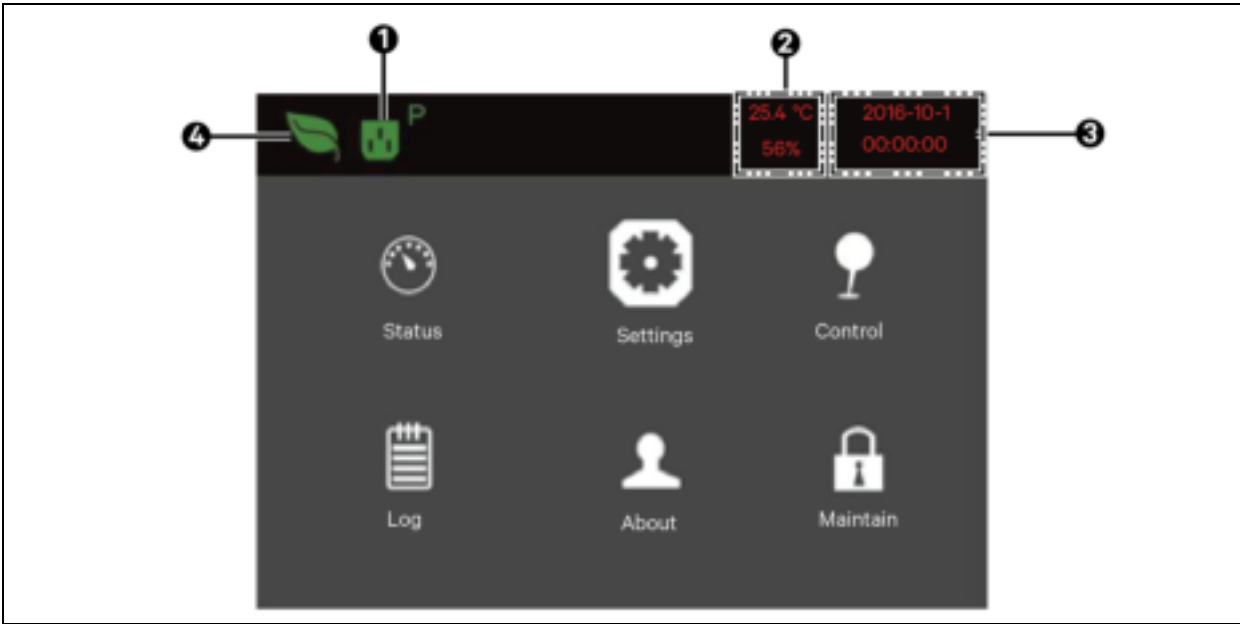
5.1.3 LCD and Functional Keys

The operation and display panel provides five functional keys, the functions are described in **Table 5.3** below.

Table 5.3 Description of Control Buttons

Functional key	Silkprint	Description
Confirm		To confirm or enter
Up		To page up, turn left or add value, etc.
Down		To page down, turn right or reduce value, etc.
Escape		To get back, escape, cancel or forbid operation
Power		To power on, power off or transfer to bypass mode

Figure 5.2 LCD Screen



Item	Description
1	Programmable output
2	Ambient temperature (Displays only when sensor connected)
3	Date and Time
4	ECO Mode

The LCD has user friendly interface and the 320 × 240 dot matrix image display. The user friendly and menu driven LCD allows to easily browse through the UPS input, output, parameters of the load and the battery, learn about the current UPS status and alarm message, perform functional settings and control operation. The LCD also stores historical alarm records that can be retrieved for reference and diagnosis.

5.1.4 Initial Startup Guidance

When the UPS is in the initial startup, the interface shown in **Figure 5.3** below will appear to guide the user to set basic parameters of the UPS.

Figure 5.3 Initial Startup Guidance (1)



Welcome page

Click *Next* to start the guidance.

Language, date and time page

At this page, set the language, date, and time you need.

Figure 5.4 Initial Startup Guidance (2)



Battery Parameter Page

At this page, set the battery cell number and total Ah.

For 20 kVA model, the battery series are 24, 26, 28, 30, 32, 34, 36, 38 and 40. See **Figure 5.5** below.

Figure 5.5 Initial Startup Guidance (3)

The image shows a digital display screen titled "Start UP Guidance(3/5)". Below the title, there are two input fields. The first field is labeled "Battery series" and has the value "40" entered. The second field is labeled "Local battery total AH" and has the value "18AH" entered. At the bottom of the screen, there are two buttons: a "Prev" button with a double left arrow icon and a "Next" button with a double right arrow icon. The "Next" button is highlighted in orange.

If there is an external battery module, the Local battery total Ah will not appear, see **Figure 5.6** below.

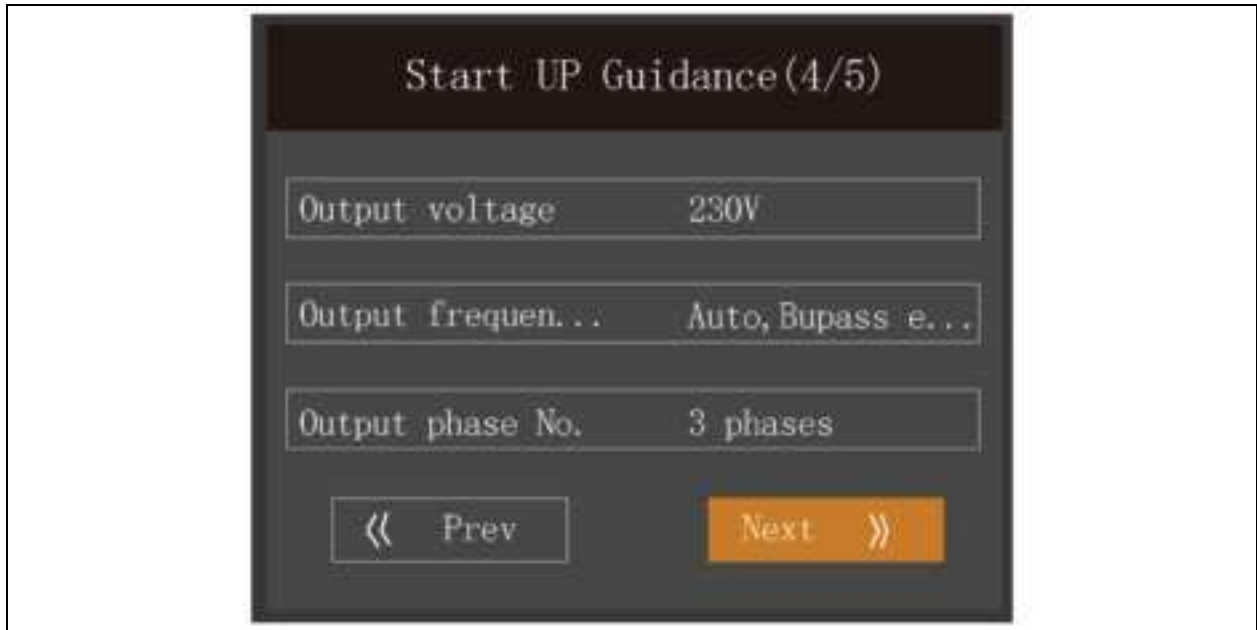
Figure 5.6 Initial Startup Guidance (3)

The image shows a digital display screen titled "Start UP Guidance(3/5)". Below the title, there is one input field labeled "Battery series" with the value "40" entered. The "Local battery total AH" field is missing. At the bottom of the screen, there are two buttons: a "Prev" button with a double left arrow icon and a "Next" button with a double right arrow icon. The "Next" button is highlighted in orange.

Output Page

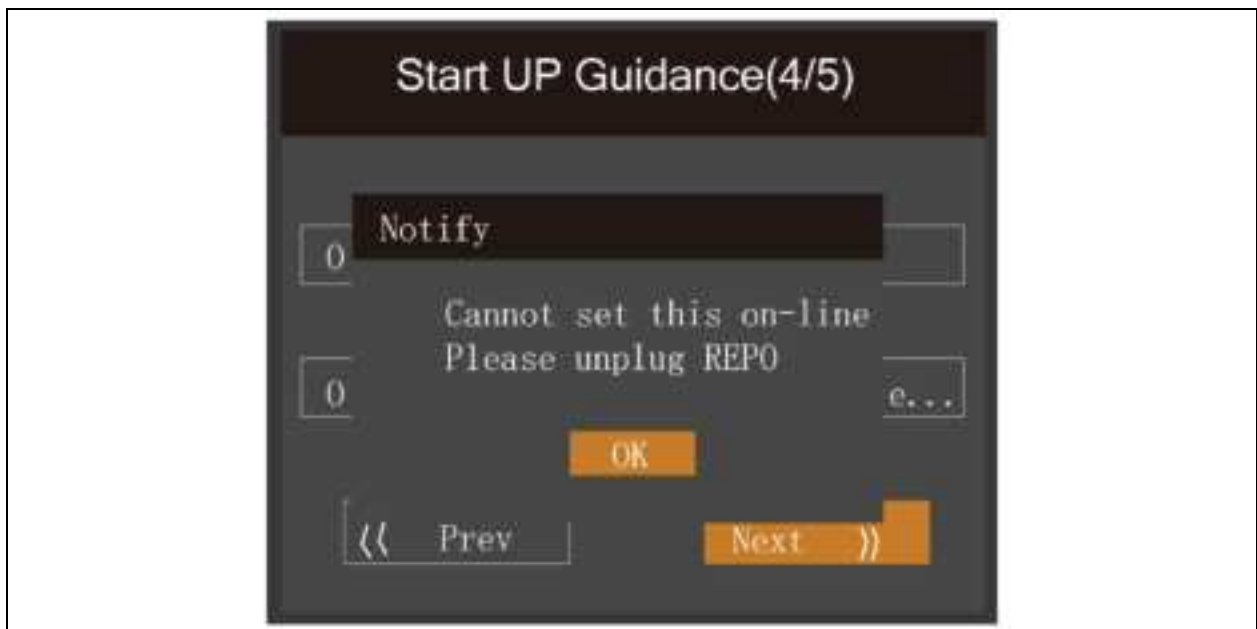
As shown in **Figure 5.8** below, set output voltage, output frequency. The output voltage is detected automatically. If the result is displayed as *No*, the output voltage can be set manually. In the case of 20 kVA models, the Output phase No. may be set to single or 3 phases. See the right hand diagram in **Figure 5.7** below.

Figure 5.7 Initial Startup Guidance (4)



NOTE: In the case of the output page, the REPO terminal (forcible output shutdown) must be unplugged when carrying out the settings, otherwise the interface shown in **Figure 5.8** below will appear.

Figure 5.8 Prompt for Removing REPO Terminal

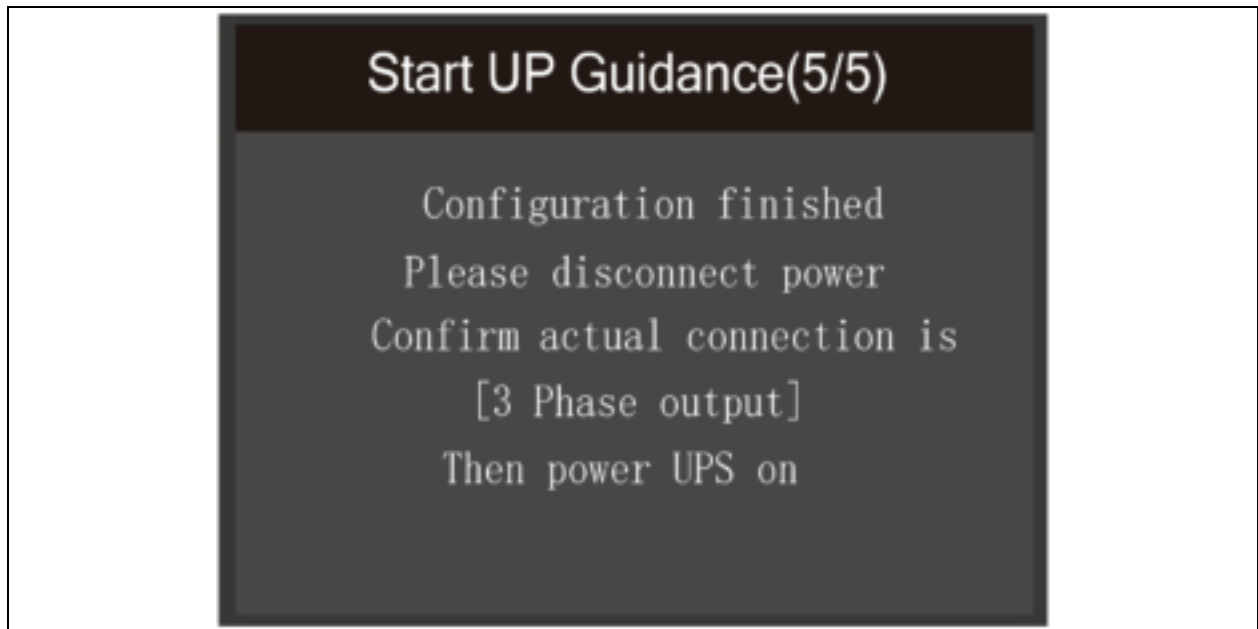


Finish Page

In the case of 20 kVA models, the interface shown in **Figure 5.9** below will appear. This means that the function keys and LCD are invalid; the user cannot continue with the operation. Please switch the UPS off based on the prompt shown in **Figure 5.9** below, confirm that the actual wiring method applied to the output terminal is consistent with the method selected during the setup procedure, and then switch the UPS on again.

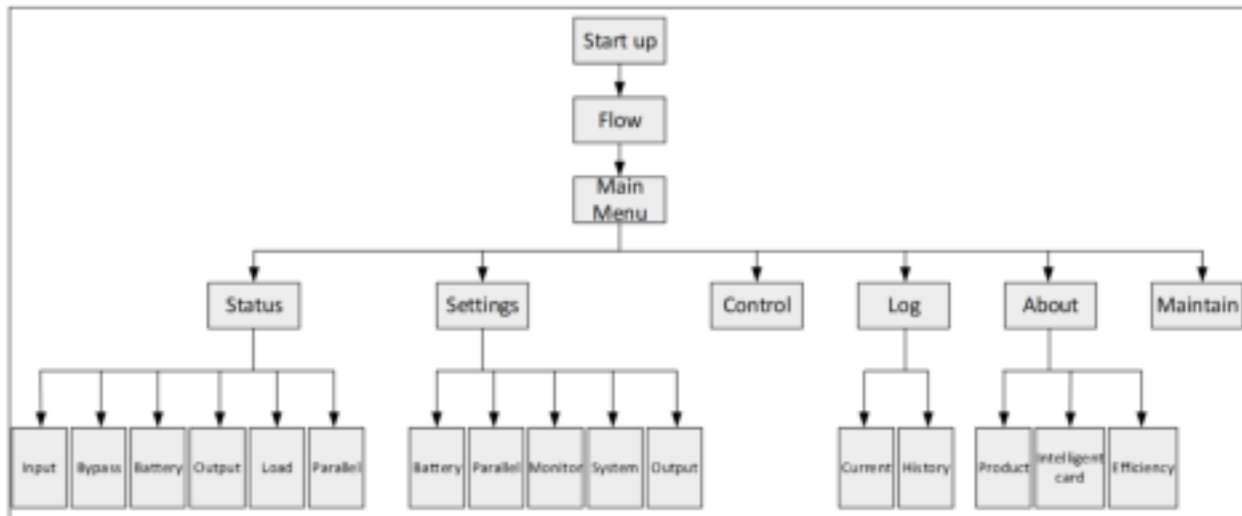
After the startup, the user can operate the UPS normally.

Figure 5.9 Initial Startup Guidance (5)



5.2 LCD Menu Structure

Figure 5.10 LCD Menu Structure



5.3 LCD Screen Types

5.3.1 Start Screen

Upon UPS startup, the UPS executes the system self-test, and the start screen will appear for about 10 seconds, as shown in Figure 5.11 below.

Figure 5.11 Start Screen

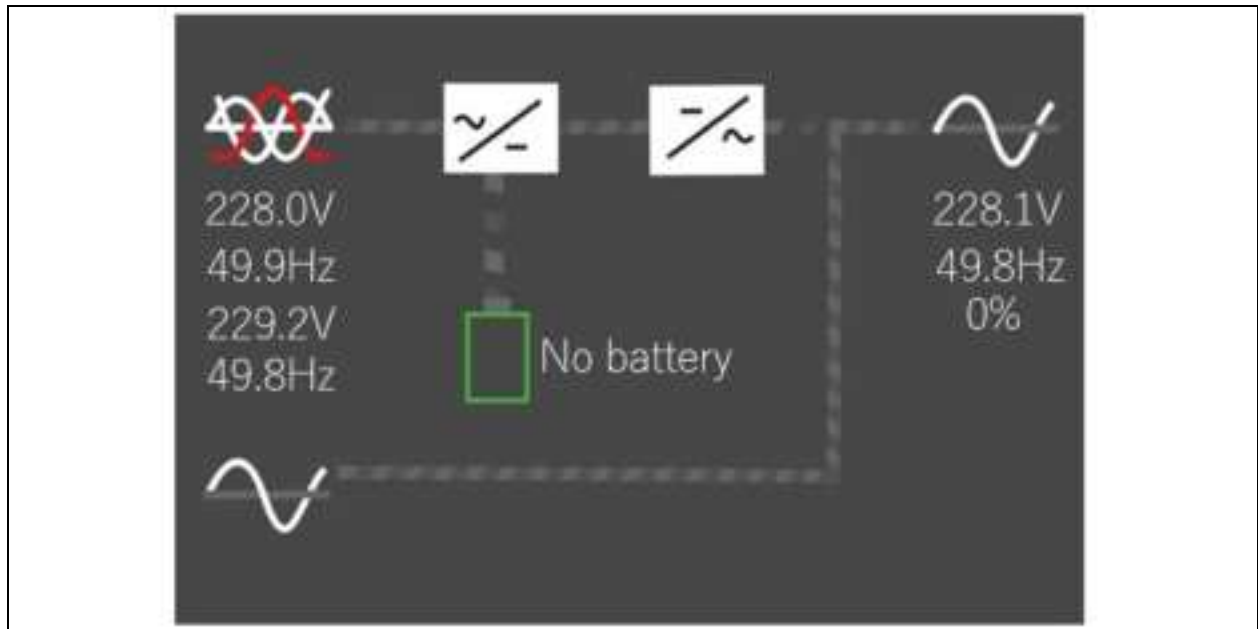


5.3.2 Flow Screen

After the self-test of the UPS, the flow screen shown in **Figure 5.12** below will appear.

The flow screen is the complete status view of the UPS, includes input, bypass, rectifier, battery, inverter and output, and so on. The working modes with color display while the invalid modes with gray display.

Figure 5.12 Flow Screen



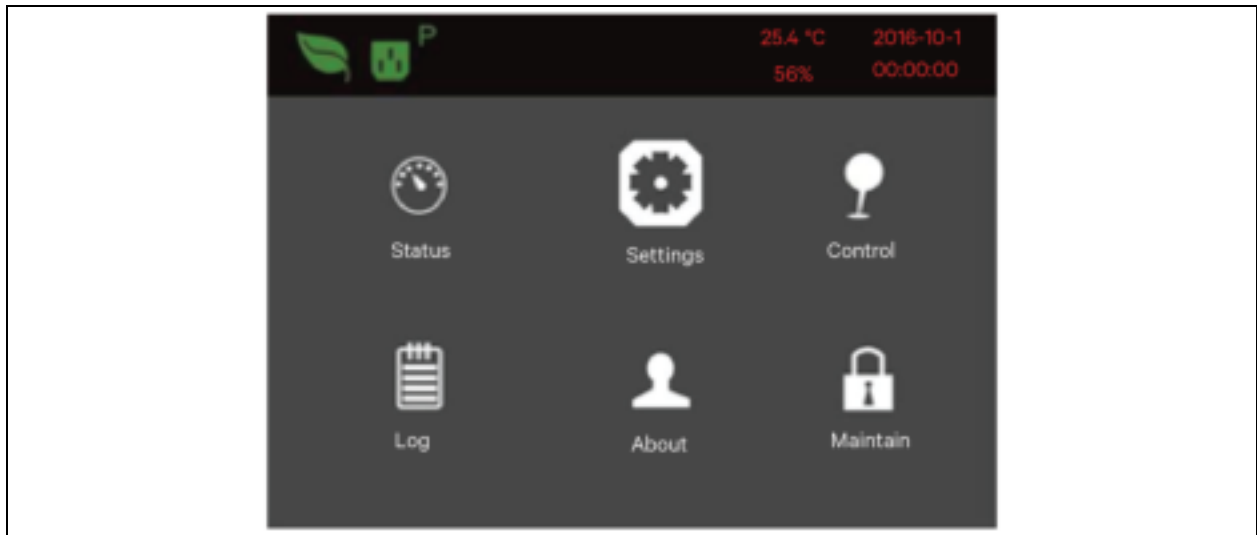
At the flow page, press the  key to enter the primary screen.

5.3.3 Main Menu Screen

The main menu screen has following six icons, see **Figure 5.13** below.

- Status
- Settings
- Control
- Log
- About
- Maintain

Figure 5.13 Main Menu Screen



At main menu screen, press the  key to get back to the flow screen. Press the  or  key to switch the cursor to select the submenu, then press the  key to confirm it.

5.3.4 Submenu Screen

- The submenu screen has the UPS parameters and item settings.
- In the submenu screen, if there is a tab control, just move the cursor to the tab. At this time, you can press the  or  key to switch the tab. Press the  key to move the cursor to a certain item.
- In the submenu screen, if there is no tab control, then the cursor will stop at a certain item.
- Press the  key to get back to the previous screen.
- For details about the submenu screen, see following pages.

Status Page

The Status page has the Input, Bypass, Battery, Output and Load as shown in **Figure 5.14** below.

Figure 5.14 Status Page



Settings Page

The Settings page has the Output, Battery, Parallel, Monitor, System, and Outlet. For details about the parameters setting, see [LCD Parameters Setting](#) on page 123.

Figure 5.15 Settings Page

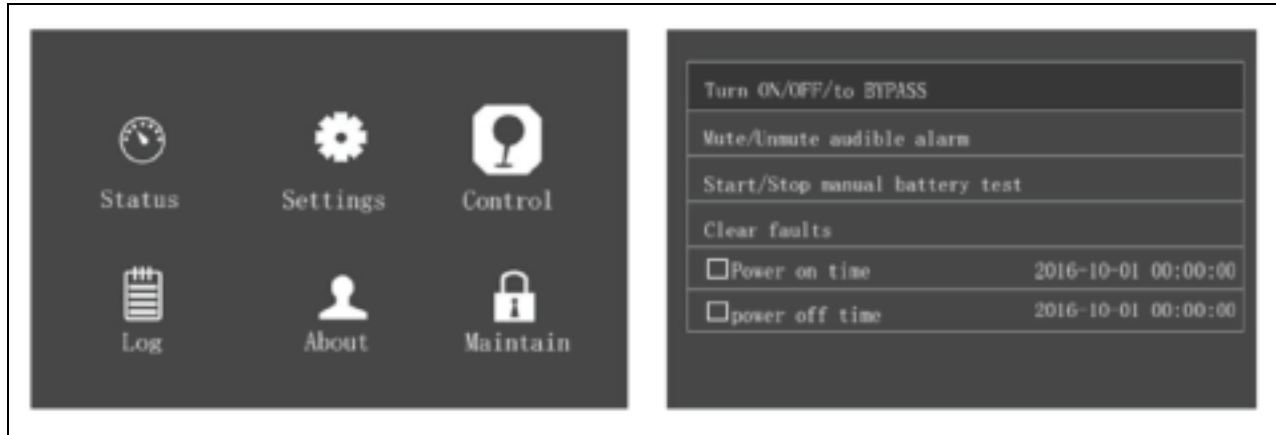




Control Page

The Control page has the Turn ON/OFF/to BYPASS, and Manual battery test, etc. See **Figure 5.16** below.

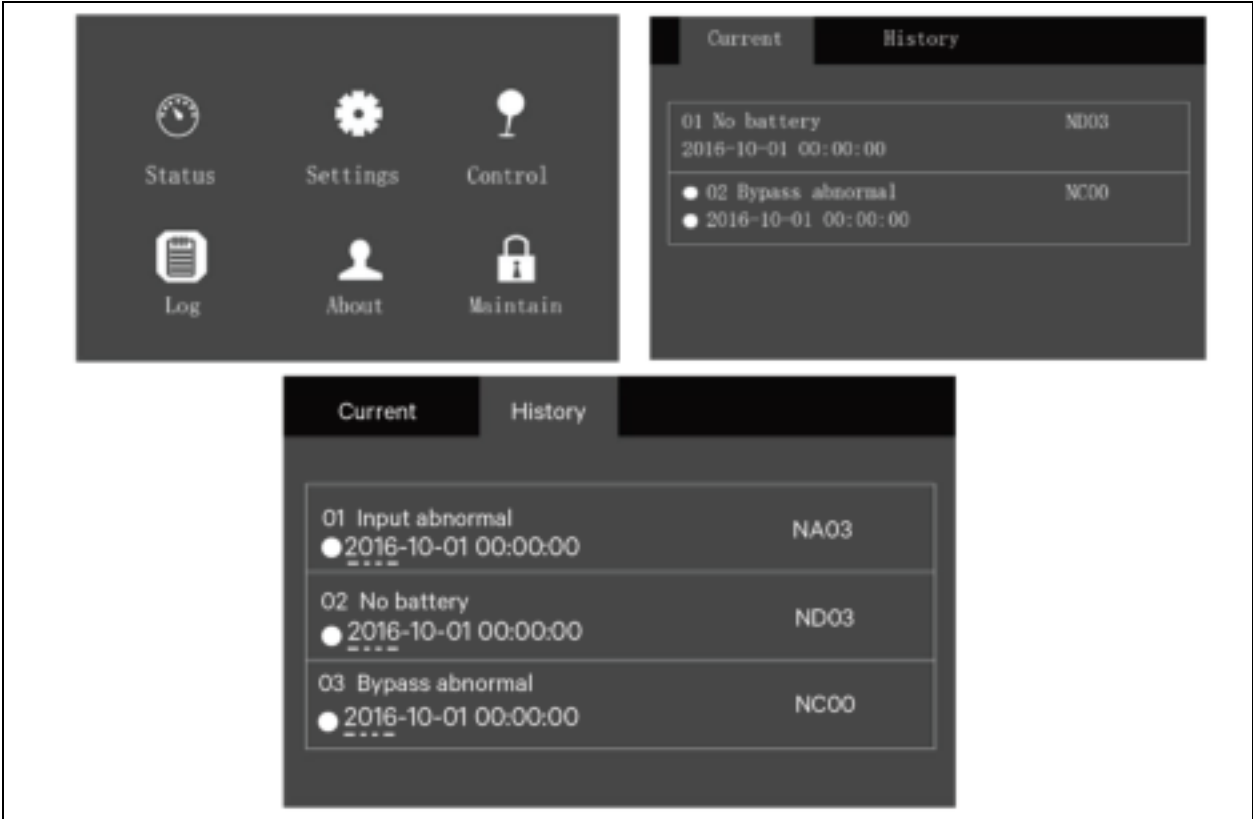
Figure 5.16 Control Page



Log Page

The Log page has the Current and History. See **Figure 5.17** below.

Figure 5.17 Log Page



About Page

The About page has the Product, Network, and Efficiency. See **Figure 5.18** below.

Figure 5.18 About Page



Maintain Page

NOTE: The Maintain page needs correct password and the Vertiv service engineer can only access the maintain page.

Figure 5.19 Maintain Page



5.3.5 Default Screen

During the UPS operation, if there is no alarm within two minutes, the default screen shown in **Figure 5.20** below will appear. At the default screen, if there is an alarm or a fault, or the user press any key, the Flow screen will appear again.

Figure 5.20 Default Screen



5.4 Prompt Window

A prompt window is displayed during the operation of the system to alert about the conditions and/or if confirmation of a command or other operation is required. **Table 5.4** below lists the prompts and meanings.

Table 5.4 Prompts and Meanings

Prompt	Meaning
System setting is different, please check	When the parallel parameters are different, this prompt will appear
Cannot set this on-line, please shut down output	If the user attempts to change certain important settings while the output is active (output voltage, output frequency, output phase No.), this prompt will appear
Incorrect password, please input again	This prompt will appear when the user enters an incorrect Settings password
Operation failed, condition is not met	This prompt will appear when the user attempts to execute a certain operation, but the necessary condition is not met
Password changed OK	This prompt will appear when the user has changed the Settings password successfully
Fail to change password, please try again	This prompt will appear when the user attempts to change the Settings password but has failed to the same new password twice
The time cannot be earlier than system time	This prompt will appear when the user sets the 'Turn on delay' or 'Turn off delay' value to a time earlier than the current system time
Turn on failed, condition is not met	This prompt will appear when the user presses the power button (or executes the 'Turn on/Turn off/to Bypass' command on the 'Control' page).
Cannot set this on line, please unplug REPO	This prompt will appear if the user attempts to change output phase No. while the output is active
Please disconnect power, check output: 1 phase, 3 phase, then power UPS on	This prompt will appear when the output phase is changed. To ensure safety, the system requests the user to switch the UPS off and check the cable connections, and then switch the UPS on again

5.5 UPS Alarm Message List

Table 5.5 below gives all UPS alarm messages of the Current and History menus.

Table 5.5 UPS Alarm Message List

Alarm message	Description
Communication fail	Internal communication is abnormal, please check whether the communication cables are connected correctly or not.
Rectifier fault	The rectifier is faulty and is not running.
DC/DC fault	The discharger is faulty, because the bus voltage exceeds the setting range when discharger starts or soft starts.
DC bus abnormal	The inverter is off when DC bus voltage is faulty. The load will transfer to bypass, if the bypass is available.
Charger fault	The battery charger output voltage is abnormal, and the charger is off.
Aux. power fault	The auxiliary power output voltage exceeds the normal range.
Input backfeed	Battery mode. The mains relay is shorted and the difference between the mains and battery voltage is less than the setting range.
Inverter fault	The inverter is off when the inverter output voltage and current exceed the setting range. If the bypass is available, the UPS will transfer to bypass mode, otherwise the system will switch off.
Output short circuit	Check for short circuits between the output cables.
Output off, voltage is not zero	The Output is switched off, but the system detects the presence of a voltage at the output terminals.
Inverter relay shorted	The inverter relay is short circuited.
Parallel No. abnormal	The on-line parallel number is inconsistent with the value in the settings. Please check that the parallel number on the 'Settings' page is the same as the actual on-line number, and that the parallel cables are normal.
Parallel comm fault	The local UPS and its on-line frequency configuration is different or there is a conflict with the parallel address. Please check that the parallel system parameter setting is the same as the local parameter setting.
Parallel cable connection abnormal	The system has detected that the parallel cables are not secure.
Input neutral lost	The AC input mains N line has not been detected. Please check whether the input N line has been interrupted or disconnected.
Input ground lost	Check whether the PE line is connected securely, and that the alarm can be cleared online.
Input phase reversed	The mains AC input phase is reversed. Normally, phase B lags phase A by 120 degrees, and phase C lags phase B by 120 degrees. Check that the UPS mains input phase sequence is correct. If not, correct it.
Input abnormal	The rectifier and charger have switched off because the mains voltage and frequency values exceed the normal operating range. Check whether the rectifier input phase voltage and frequency exceed the normal range or the mains power has been switched off.
Rectifier overload	The output power exceeds the rectifier overload point. Check that the input voltage meets the output load requirement, a mains input range 176 V to 100 V corresponds to a load range of 100% to 50%, with linear derating.
Battery reversed	The positive and negative terminals of the battery are reversed. Connect the battery terminals again correctly.
Battery low pre-warning	This alarm is generated when the battery reaches the EOD (End Of Discharge voltage). The battery will continue to provide full load discharge capacity for another 2 minutes after this warning appears. The user can set this value ranging from 2 Minutes to 30 Minutes, (2 Minutes by default). Please shutdown the load as quickly as possible.
Battery voltage abnormal	When the battery is connected, the system checks whether the battery voltage exceeds the normal setting range. Check whether the battery terminal voltage exceeds the normal setting range.

Table 5.5 UPS Alarm Message List (continued)

Alarm message	Description
No battery	Check the battery and battery cable connections.
Battery series not qualified	The actual number of connected battery cells differs from the setting. Modify either the number of batteries or the setting so that these two values are consistent.
Battery aged	The battery capacity is less than 25% of the initial value. Battery replacement is recommended.
Battery test fail	The battery low voltage is detected during the manual or periodic battery self-test. Battery replacement is recommended.
Battery overtemperature	The battery ambient temperature is too high. Check whether the battery ambient temperature exceeds the setting value of 40 to 60 (default: 50 C).
Battery cabinet not connected	The battery cabinet is not connected to the system.
Fan fault	At least one fan is faulty. Check whether the fan is blocked or the cables have been disconnected.
System overtemperature	The internal heat sink temperature is too high, and the inverter has been switched off. This alarm may only be cancelled by reducing the heat sink temperature of each module to within the setting range. The system will restart automatically once the fault has been resolved. If overtemperature state is reached, check the following: 1. If the ambient temperature is too high. 2. If the ventilation holes are blocked by dust. 3. That the fans are working correctly.
Inverter overload	The inverter load demand exceeds the rated value, the overload delay time has expired, and the inverter has shut down. If the bypass is available, the UPS will transfer to bypass mode, otherwise the output to the load will be interrupted. Check that the current inverter load demand, if it is overloaded, simply reduce the load demand and the system will revert to inverter mode five minutes after the alarm condition has been cleared.
Bypass phase reversed	The bypass voltage phase sequence is reversed. Normally, phase B lags phase A by 120 degrees, and phase C lags phase B by 120 degrees. Check that the UPS bypass input phase sequence is correct. If not, correct it.
Bypass overcurrent	The bypass current exceeds the rated value. The overload delay time has expired and the inverter has shut down.
Parallel bypass cable connection abnormal	The bypass phase number is different from the output phase number indicated on the 'Monitor' page. Please check that the bypass cable connection is the same as the configured phase number.
Bypass abnormal	This may be caused by the bypass voltage and frequency being outside the acceptable range, the bypass being switched off or by the bypass cables being connected incorrectly. 1. Check that the bypass voltage and frequency are within the setting range. 2. Check the bypass cable connections.
Bypass abnormal in ECO mode	ECO mode is available, and the bypass voltage and frequency are outside the setting range. Check that the bypass input voltage and frequency are within the setting range.
Output LPE short	There is a short circuit between the output and the enclosure. Check for short circuits between the output cables and the enclosure.
Output LPE short	There is a short circuit between the output and the enclosure. Check for short circuits between the output cables and the enclosure.
Output pending	Remote shutdown has been enabled, and the system will be switched off.
Output disabled	The system is in the standby state, and the shutdown dry contact has been enabled. Check whether the shut-down dry contact has been enabled or not.

Table 5.5 UPS Alarm Message List (continued)

Alarm message	Description
Version incompatible	The monitoring board and DSP board versions are incompatible.
Electrical leakage alarm	Short circuit between bus and enclosure or between battery and enclosure. Check for short circuits between the bus or battery cables and the enclosure.
On maintenance bypass	The maintenance bypass state dry contact has been activated.
Battery mode	The UPS is in battery mode, and the inverter starts running.
Bypass mode	The UPS is in bypass mode.
System overload	The parallel system load demand exceeds the max. load capacity of the parallel sets. Check the parallel system load demand, and if the system is overloaded, simply reduce the load.
Loss of redundancy	After parallel redundancy has been enabled, the system load demand exceeds the rated load capacity (the load capacity is equivalent to the total capacity of the on-line sets, minus one).
Load sharing abnormal	Load sharing is abnormal in the parallel system.
System parallel settings async.	Check that parallel setting parameters of each unit are consistent.
Local parallel settings async.	Check that the Settings pages for the local unit and the other units are consistent.
LBS abnormal	Check that the LBS cables are normal, the system is in stand-by mode, or that the system is in bypass mode and it is not possible to trace the bypass.
REPO	The UPS has been shutdown because the Normally Closed REPO terminal contact has been opened.
Bypass phase reversed	In parallel connection configuration, the bypass phase sequence is not consistent. Check the parallel bypass cable connections.
System battery low pre-warning	In a parallel system, there is a battery voltage low warning for all the devices supplied by the battery inverter.
Battery test started	The periodic battery self-test or manual self-test is in progress.
Battery test stopped	The periodic battery self-test or manual self-test is complete.
EOD turn off	The inverter has switched off because EOD has been reached. Check the mains power-off state and restore the mains in time.
Guaranteed shut-down	In forced EOD mode, then system shuts down once the battery is fully discharged.
Shutdown due to overtemp	During the UPS operation, the system checks whether the heat sink temperature exceeds the setting range. If overtemperature, check the following: 1. If the ambient temperature is too high. 2. If the ventilation holes are blocked by dust. 3. That the fans are working correctly.
Remote shutdown	Dry contact activated causes shut-down irrespective of operating mode.
Remote power-on	UPS switched on remotely.

Table 5.5 UPS Alarm Message List (continued)

Alarm message	Description
Remote shut-off	UPS switched off remotely.
Load off due to shutdown on battery	Shutdown in battery mode.
Output off due to bypass abnormal	The bypass is abnormal, and has switched from the working state to the standby state. Check that the bypass input is normal.
Battery to utility transition	The UPS is powered by the mains instead of the battery.
Manual power-on	Set power-on via LCD panel.
Manual shut-down	Set shutdown via LCD panel.
Operating on inverter	The UPS output is supplied by the Inverter.
Battery series set to 24 (24 to 40)	The number of battery cells has been modified (20 kVA).
Restore factory defaults	With the UPS in standby mode, select the 'Restore Factory Defaults' function on the Maintain page.
Output phase No. set to 1	The output phase has been changed from 3-phase to 1-phase.
Output phase No. set to 3	The output phase has been changed from 1-phase to 3-phase.
UPS out of service	The UPS is out of service.
Switch on programmable output	The programmable output status has been changed from Switch Off to Switch On.
Switch off programmable output	The programmable output status has been changed from Switch On to Switch Off
System parallel settings start sync	Set the 'Sync parallel parameters' command manually to activate the event
Local settings sync OK	The local parameters have been synchronized successfully.
System settings sync OK	All the parameters have been synchronized successfully.
Load off due to output short	There is a short circuit on the inverter or bypass output Carry out the appropriate checks.
Output off due to overload & bypass abnormal	The output has been switched off due to an overload and the bypass supply is abnormal. Carry out the appropriate checks.
Parallel No. abnormal	The parallel on-line number and the configured value are inconsistent Please check that the parallel number on the Settings page is the same as the actual on-line number, and that the parallel cables are normal.
Bypass disabled	If Settings->Output->Frequency is set to 'Auto, BypDisa; 50 Hz, BypDisa; 60 Hz, BypDisa', the LCD will generate the BypDisa alarm.

Table 5.5 UPS Alarm Message List (continued)

Alarm message	Description
In intelligent sleep mode	When intelligent sleep mode is enabled, the system may perform N sets of inverter start-up. When the system meets the sleep mode requirements (Condition for entering sleep mode: The UPS must be connected to a common, large battery string (if there is no large battery string, entering sleep mode will result in the charger failing to recharge the battery), sleep mode must be enabled on the host, there must be no faults or alarms active on the inverter or rectifier, the battery must not require recharging, a period of at least 1 hour must have elapsed since last exiting sleep mode, the unit is not the master unit and, with the exception of the module in sleep mode, the local unit ID number has not received a start-up command within the last 5 minutes). When the N minus 2 unit rated load is larger than the existing system rated load capacity, the unit with the largest ID number starts to enter sleep mode (inverter off), at this point, N minus 1 units are operating in inverter mode. When the N minus 3 units are larger than the current system rated load capacity, the unit with the largest ID number remains in sleep mode.
Battery cabinet connection abnormal	The system detects that there are more than six battery cabinets connected and indicates that the battery cabinet connection is abnormal.
Battery cabinet not connected	The battery cabinet group number is specified, but the communication cables are not connected.
Battery EOD	Battery end of discharge voltage reached.
Faults cleared	Press the 'Clear faults' button on the 'Control' page, the system then records this event.
Manual shut off	After the user shuts down the UPS output, the system will record this event.
System warning	In the case of parallel systems, this alarm is generated when the UPS auto-adapting output frequency is inconsistent. Solution: Switch on again.
System fault	This alarm occurs when the model identification is incorrect. Solution: Contact service manager.

NOTE: If the alarm rings because of the setting of the software value, which is done by the Vertiv authorized engineer, to change the software setting values, contact to the Vertiv local customer service center.

6 UPS Operation Instructions

This chapter gives a detailed description of the UPS operation procedures.

During the operation, the buzzer alarm may ring, at this point, When the alarm rings press  the key for three seconds to silent the alarm.



WARNING! Hazardous mains and/or battery voltage exist behind the protective cover. No user accessible parts are located behind the protective covers that require a tool for removal. Only qualified service personnel are authorized to remove such covers. If maintenance for rack is needed, ensure that the neutral line is live.

6.1 UPS Startup

The startup procedure is performed after the installation is completed, the system is commissioned by authorized engineer and the external input MCBs are closed.



WARNING! In startup procedure the mains voltage is applied to the UPS output terminals. Ensure that the load power is safe, if there is a load to be connected with the UPS output terminal. Ensure that the load is isolated with the UPS output terminal, if the load is not ready for accepting the power.

The startup mode of the single UPS includes normal mode startup and battery mode start up. For more information, see [Normal Mode Startup](#) on page 46 and [Battery Mode Startup](#) on page 48.

6.2 Transfer Procedures between Operation Modes

NOTE: The Inverter operation mode includes Normal mode (mains inverter) and Battery mode (battery inverter).

6.2.1 Transfer from Normal Mode to Battery Mode

In case of mains failure, the UPS will transfer to Battery mode. If you wish to transfer the UPS from Battery mode to Normal mode, wait few seconds for mains input recovery. 10 seconds later, the rectifier will restart automatically, and the inverter will restore the power.

6.2.2 Transfer from Inverter Mode to Bypass Mode

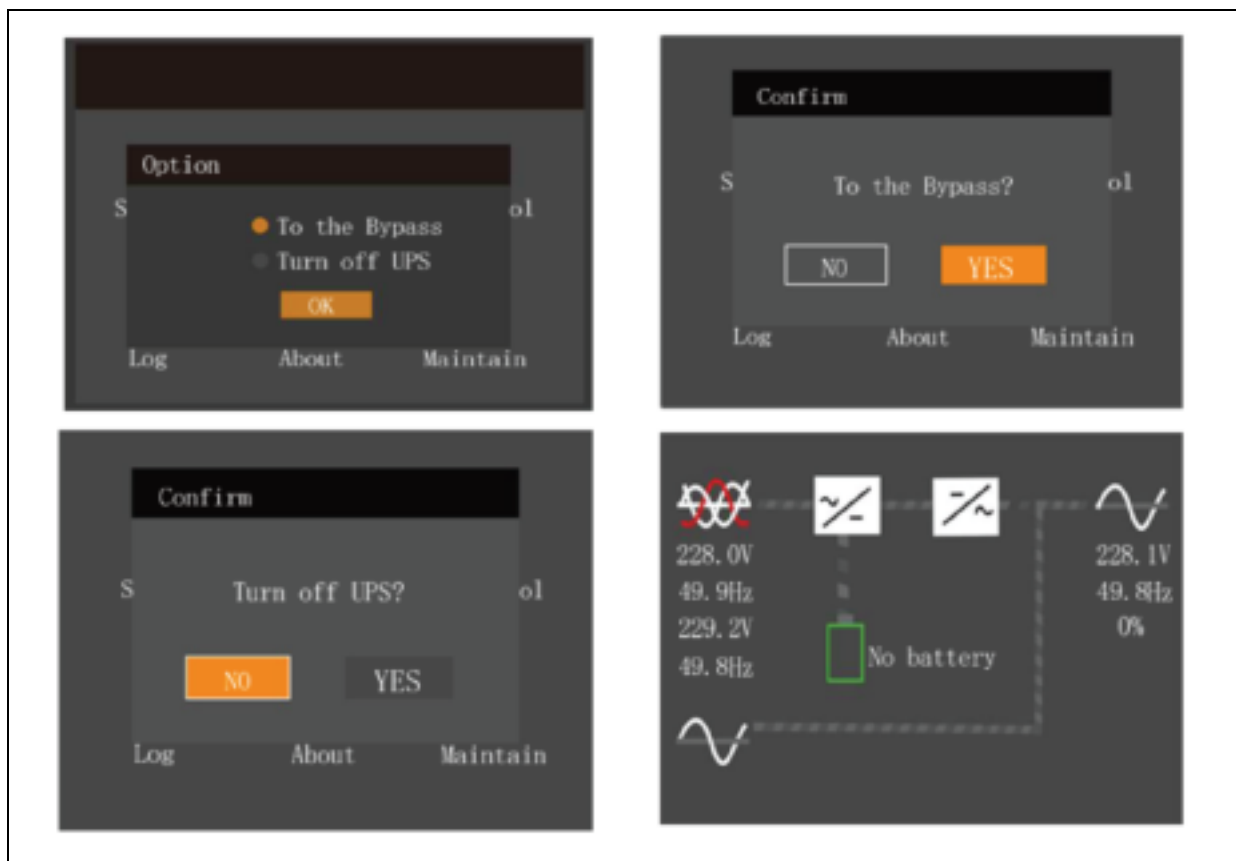
In standby mode, press and hold the power button. If the rectifier and inverter are normal, the interface shown in **Figure 6.1** below will appear, select YES to turn on the UPS.

Figure 6.1 Turning ON UPS



In Inverter mode, press and hold the power button. If the bypass is normal, the interface shown in **Figure 6.2** below will appear. Select *To the Bypass* and click OK to transfer the UPS to Bypass mode; select *Turn off UPS* and click OK to turn off the UPS.

Figure 6.2 Bypass Normal Interface



In Inverter mode, press and hold the power button. If the bypass is abnormal, then the interface shown in **Figure 6.3** below will appear, select *YES* to shut down the UPS output.

Figure 6.3 Bypass Abnormal Interface



NOTE: In Bypass mode, the load is directly fed by the mains power instead of the pure AC power from the inverter.

For the detailed information of the Normal mode, Bypass mode, Battery and Maintenance Bypass mode, see [UPS State and Operation Mode](#) on page 10.

6.2.3 Transfer from Bypass Mode to Inverter Mode

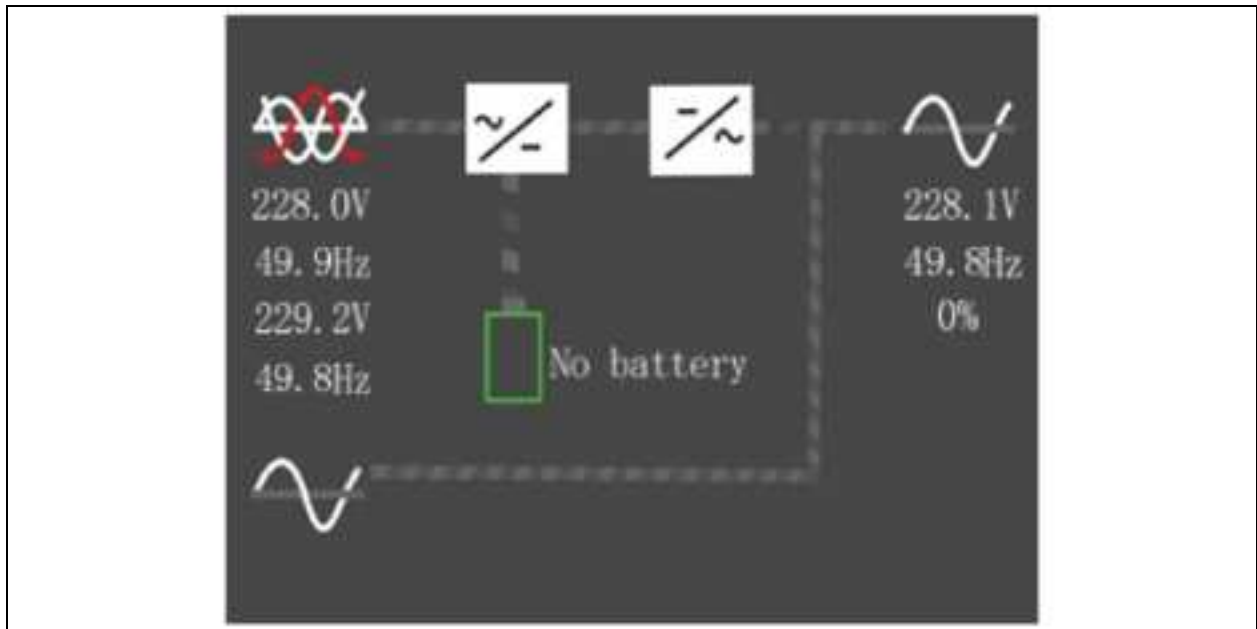
In Bypass mode, press and hold the *power button*.

If the ECO mode is not turned on, the interface shown in **Figure 6.4** below will appear.

Figure 6.4 ECO Mode Not Turned ON



1. Select *Turn on UPS* and click *OK* to transfer to the Inverter mode, see **Figure 6.5** below.
2. Select *Turn off UPS* and click *OK* to shut down the UPS output.

Figure 6.5 Bypass to Inverter Mode

If the ECO turned on, the interface shown in **Figure 6.6** below will appear. Select *YES* to shut down the UPS output.

Figure 6.6 ECO Turned on Interface

6.2.4 Transfer from Inverter Mode to Maintenance Bypass Mode

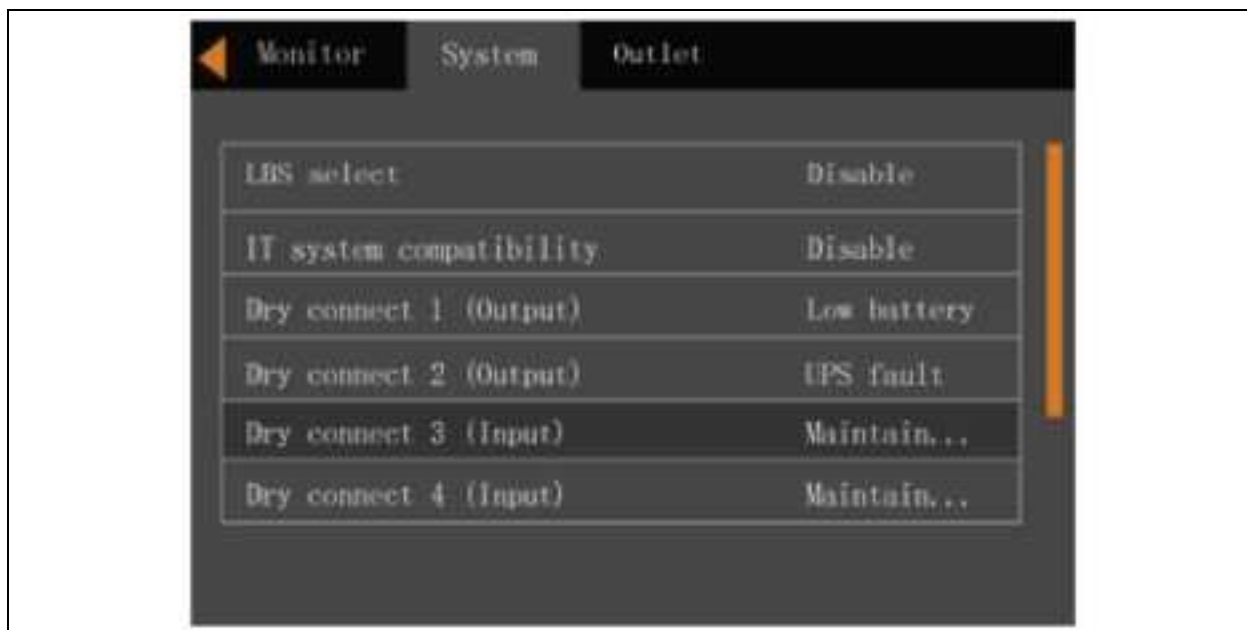
When the UPS is running in Normal mode, use this procedure to make the load transfer from inverter output to maintenance bypass.



CAUTION: Before performing this procedure, check the LCD information first, and make sure the bypass is normal and synchronizes with the inverter. Otherwise, it may result in the load power interruption for a while. Select the single POD or prepare the maintenance bypass MCB by yourself to realize this function.

1. Through the LCD settings page, change the Dry connect 3 to Maintain mode. See **Figure 6.7** below.

Figure 6.7 Changing Dry Contact 3 to Maintain Mode



2. Remove the *fixing screws* of the baffle of the maintenance bypass switch, then rotate the baffle upwards till it is completely fixed, fasten the fixing screws.

At this time, the system Interlock function is activated, the UPS will transfer to internal bypass mode.

3. After the confirmation, close the *maintenance bypass switch*.

6.2.5 Transfer from Maintenance Bypass Mode to Inverter Mode

After UPS maintenance is completed, use this procedure to transfer the load from the maintenance bypass to the inverter.



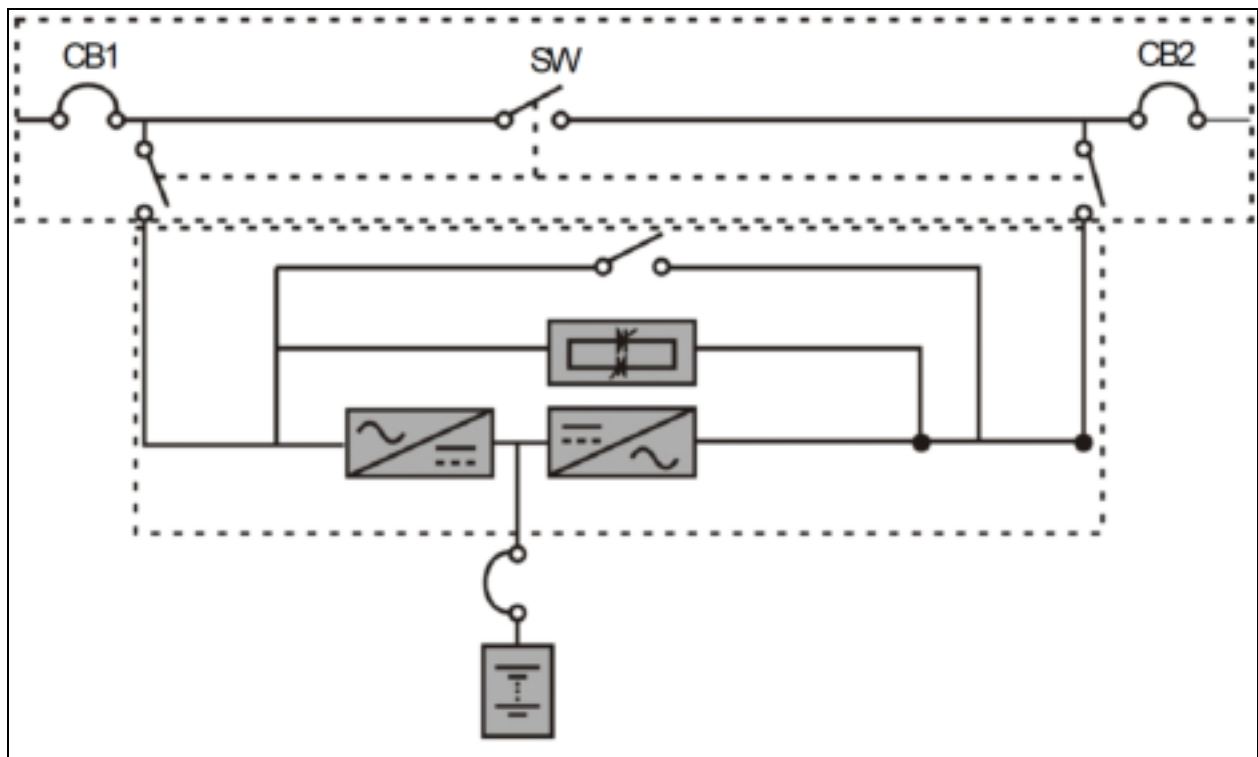
WARNING! If the maintenance bypass switch is configured by the user, after the UPS maintenance, the user must manually transfer the UPS to bypass mode and then close the output switch. Failure to obey this may cause damage to the equipment.

1. Ensure that the *baffle* of the maintenance bypass switch has been rotated upwards correctly.
2. Close the *mains input* MCB and bypass input MCB on the front panel of the POD. At this time, the UPS will power on again and operate at bypass mode.
3. Confirm that the UPS has operated in Bypass mode, then close the *output* MCB on the front panel of the POD.
4. Open the *maintenance bypass* MCB on the front panel of the POD. Rotate the baffle of the maintenance bypass switch to its original position, then fasten the fixing screws.
5. Press the *power button* on the operation and display panel of the UPS, and the UPS transfers to Inverter mode.

6.3 UPS Complete Shutdown

For the UPS system with POD, to shut down the UPS completely and make no effect on the use of the load during the UPS power-off, transfer the UPS from Inverter mode to Maintenance Bypass mode according to the procedures in [Transfer from Inverter Mode to Maintenance Bypass Mode](#) on the previous page. If the power to the load is not needed, open the input MCB, maintenance bypass MCB and output MCB to shut down the UPS completely. For the system has been transferred to maintenance bypass system, open the maintenance bypass MCB directly, as shown in **Figure 6.8** below.

Figure 6.8 Configuration of the UPS with External Maintenance Bypass



The UPS system distribute power, to isolate the UPS from AC power, disconnect the external input MCB. (If the main and bypass are independently powered, close the two input MCBs).



WARNING! Cut off the maintenance power, to prevent the physical injury.

6.4 REPO

Located at rear of the UPS, the REPO port is designed to switch off the UPS in emergency conditions (such as fire, flood). The system will turn off the rectifier, inverter and stop powering the load immediately (inverter and bypass output included), and the battery stops charging or discharging. Unplug the terminal connected to the REPO for the emergency power-off.

If the mains input is present, the UPS control circuit will remain active; however, the output is closed. To remove all mains power from the UPS, the external main input MCB should be disconnected.

6.5 Auto Restart

In case of the mains power failure, the UPS draws power from the battery to supply the load until the batteries are depleted, then the UPS will shut down.

The UPS will automatically restart and recover output power supply:

- After the mains power is restored.
- The UPS Auto Restart function is enabled.
- After the Auto Restart is delayed (default: 0 second). During the Auto Restart delay, the UPS will charge the battery to provide a safety margin for equipment shutdown if input power fails again.

If the Auto Restart function is disabled, restart the UPS manually by pressing the power button.

6.6 Mains/Bypass Backfeed Protection Enabled

For information about the mains/bypass backfeed protection function, refer [Rectifier and Bypass Input](#) on page 22.

6.7 Language Selection

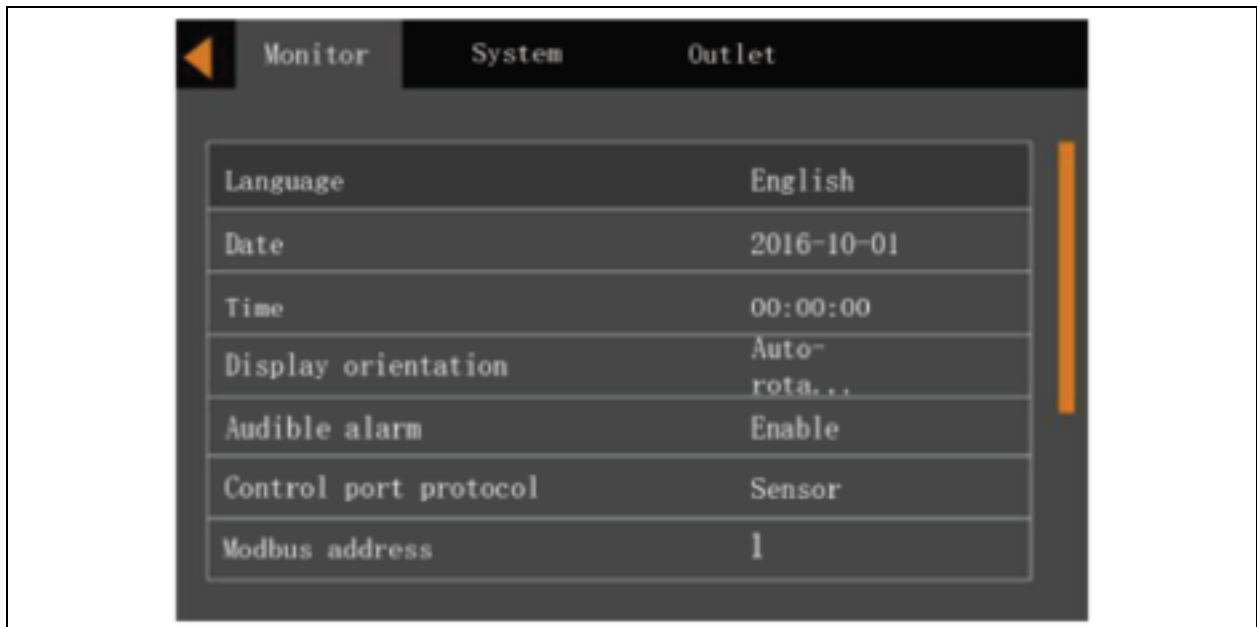
The LCD menus are available in 2 languages:

- Chinese
- English

1. At the main menu screen, press the  or  key to switch the cursor to select *Settings*, then press the  key to confirm it. See **Figure 6.9** below.

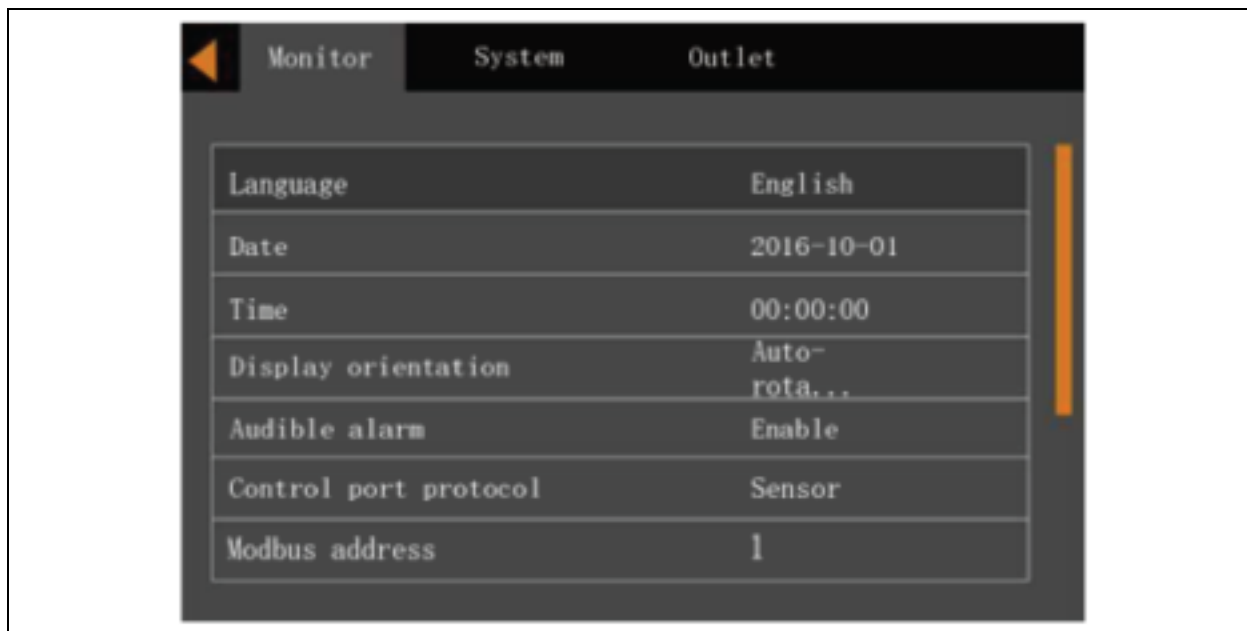
Figure 6.9 Main Menu

2. Press the  key to move the cursor to *Monitor*, see **Figure 6.10** below.

Figure 6.10 Monitor Interface

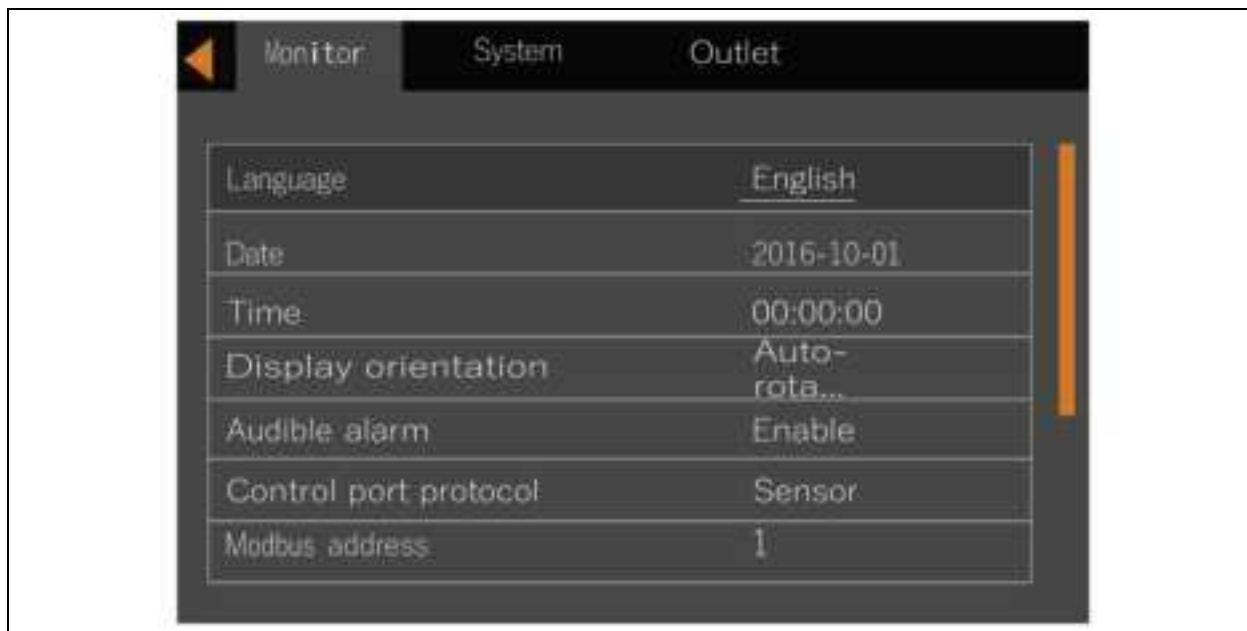
3. Press the  key to highlight the language, see **Figure 6.11** below.

Figure 6.11 Language Selection



4. Press the  or  key to select the *Language*, then press the  key to confirm it. The LCD will display the content in the selected language by you. See **Figure 6.12** below.

Figure 6.12 Changing Language



5. Press the  key for several times to get back to the main menu screen.

6.8 Changing Current Date and Time

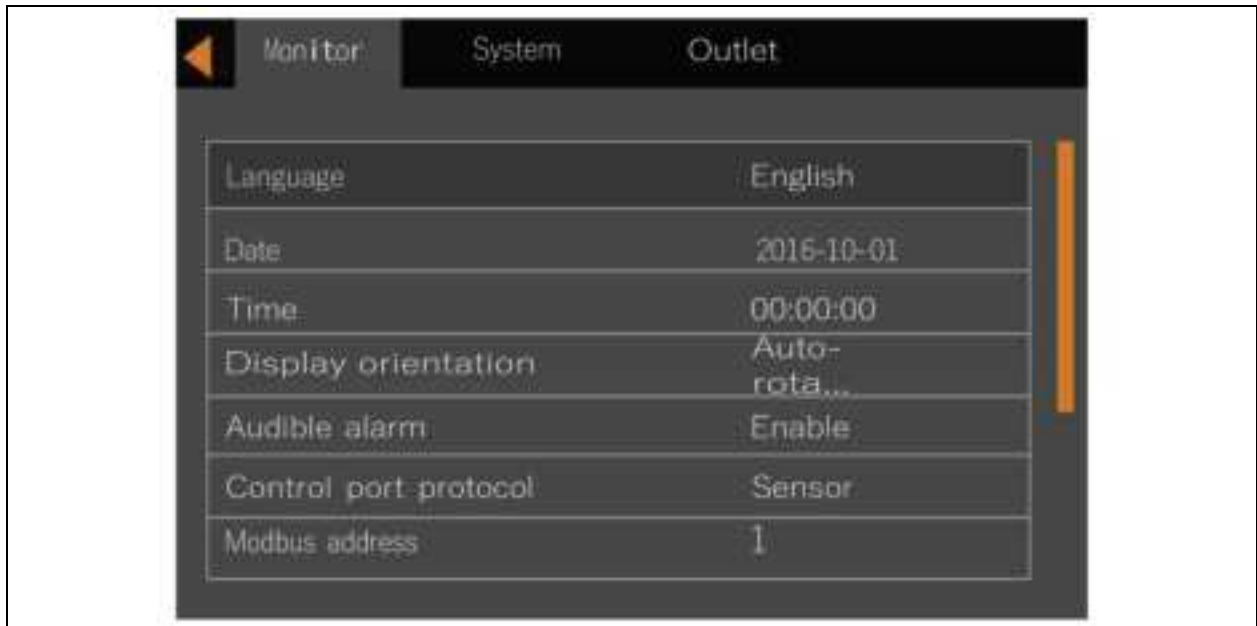
1. At the main menu screen, press the  or  key to switch the cursor to select 'Settings', then press the  key to confirm it. See **Figure 6.13** below.

Figure 6.13 Main Menu Screen



2. Press the  key to move the cursor to 'Monitor', see **Figure 6.14** below.

Figure 6.14 Monitor Interface



3. Press the  key, and press the  or  key to highlight the date and time, see **Figure 6.15** below.

Figure 6.15 Selection of Date and Time



4. Press the  key, move the cursor and press the  or  key to change the date and time. See **Figure 6.16** below.

Figure 6.16 Changing the Date and Time



5. Press the  key to confirm it, and then press the key  several times to get back to the main menu screen.

6.9 Setting Password

1. After powering on the UPS, at the main menu screen, press the  or  key to move the cursor to select *Settings*. See **Figure 6.17** below.

Figure 6.17 Main Menu



2. Press the  key, the interface shown in **Figure 6.18** below will appear.

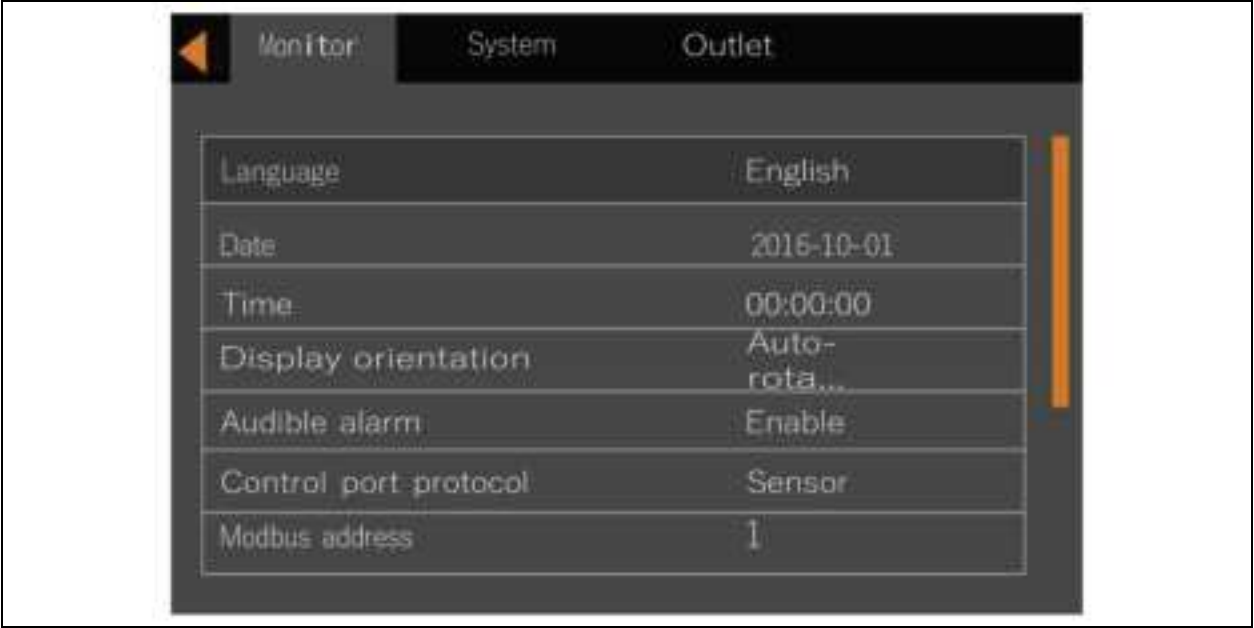
Figure 6.18 Inputting Password



The user can follow the following procedure to change password:

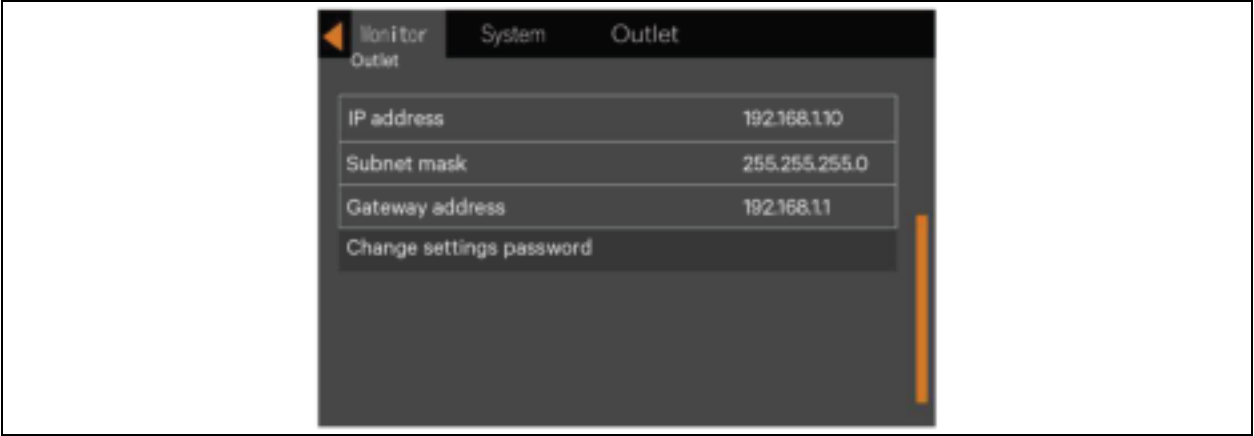
- 1. Press the  key to move the cursor to the *Monitor*, see **Figure 6.19** below.

Figure 6.19 Monitor Interface



- 2. Press the  key, then press the  key to select the *Change settings password*, see **Figure 6.20** below.

Figure 6.20 Changing Settings Password



3. Press the  key, the interface shown in **Figure 6.21** below will appear.

Figure 6.21 Password for Settings



4. Enter the existing password, press the  key to confirm it, then the system requires to enter a new password. See **Figure 6.22** below.

Figure 6.22 Inputting New Password



5. After entering the new password, press the  key to confirm it, then the system requires to confirm the new password, see **Figure 6.23** below.

Figure 6.23 Confirming New Password



6. After the confirmation, press  the key and the system prompts that the password changing is successful, see **Figure 6.24** below.

Figure 6.24 Password Changed OK



7. Press the  key for several times to get back to the main menu screen.

NOTE: Only through the correct password (default: 111111) verification, the parameters of the UPS can be accessed.

7 Communication

This chapter provides an overview of the UPS communication.

The communication ports includes the following:

- Intelligent card port
- Dry contact port
- 232 port
- Control port and
- USB port

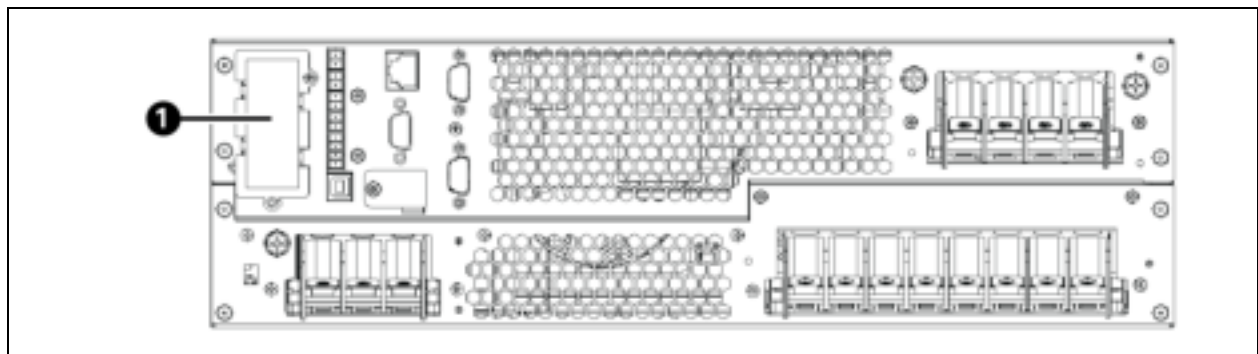
NOTE: It is recommended to keep the signal cable length less than 3 meter and keep it away from the power cable.

7.1 Installing Intelligent Card

7.1.1 Intelligent Card Port

Vertiv™ Liebert® ITA2 10 kVA to 20 kVA UPS provides an intelligent card port see **Figure 7.1** below, for installing the communication device options, such as SIC card, RDU-SIC card, UNITY card, RELAY card. Both the intelligent card port and the USB port can be used simultaneously.

Figure 7.1 Intelligent Card Installation (Rear View)



Item	Description
1	Intelligent card port

7.1.2 Intelligent Card Option

Relay Card

Provide the dry contacts alarm information, such as: batteries, bypass, low battery, alarm, fault and UPS signal, which is used to communicate with remote monitoring system or with Vertiv™ Liebert® MultiLink software used together. The card can accept input signals to shut down the UPS regardless of the current mode of operation.

Please refer to the corresponding user manual for installation and operation information.

Unity Card

- **IS-UNITY-LIFE:** This card is installed as standard on every Liebert ITA2 unit. It is used for communication between the Liebert ITA2 UPS and Vertiv Trellis® NMS and LIFE Services.
- **IS-UNITY-S:** This optional card can be used instead of the standard card if communication to a third party platform is required. Third-party platforms include SNMP or RS 485 (Modbus/Bacnet) protocols. This card may also be used for communication between the Liebert ITA2 and Vertiv Trellis NMS and LIFE Services. All communication protocols are active simultaneously.
- **IS-UNITY-DP:** This optional card can be used instead of the standard card if communication to two third party platforms is required. Third-party platforms include SNMP and RS 485 (Modbus/Bacnet) protocols. This card may also be used for communication between the Liebert ITA2 UPS and Vertiv Trellis NMS and LIFE Services. All communication protocols are active simultaneously.

Refer to the corresponding user manual for the installation and operation information.

7.2 Connection Cables for Dry Contact Port

The UPS provides five dry contact ports. The silkprints of the five dry contact ports are 1 to 12. See **Figure 7.2** below for the pin layout of each dry contact port and **Table 7.1** below for the port description.

Figure 7.2 Pin Layout of Dry Contact Ports

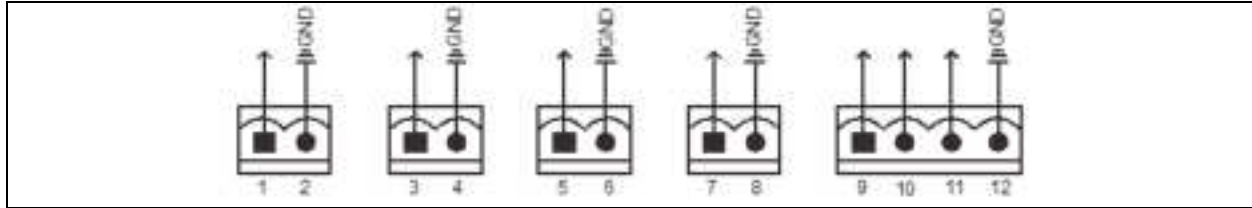


Table 7.1 Pin Layout

Sr.No.	Port Name	Pin No.	Pin Name	Description
1	Output port 1	1	LOW_BATTERY/ INPUT BACKFEED / UPS_FAULT / ON_BATTERY/ON_BYPASS	Default: LOW_BATTERY, can be set via the LCD settings page. When the system has as alarm, short Pin 1 and Pin 2
		2	GND	GND
2	Output port 2	3	LOW_BATTERY/ BYPASS BACKFEED/ ON_BYPASS / ON_BATTERY/ UPS_FAULT	Default: UPS_FAULT, can be set via the LCD settings page. When the system has as alarm, short Pin 3 and Pin 4
		4	GND	GND
3	Input port 1	5	Battery mode shutdown/Any mode shutdown (Remote Comms Shutdown)/ Maintain mode/Charger disable mode	Default: Maintain mode, can be set via the LCD settings page. When Pin 5 and Pin 6 are shorted, the function is valid
		6	GND	GND
4	Input port 2	7	Battery mode shutdown/Any mode shutdown (Remote Comms Shutdown)/ Maintain mode/ Charger disable mode	Default: Maintain mode, can be set via the LCD settings page. When Pin 7 and Pin 8 are shorted, the function is valid
		8	GND	GND
5	REPO input port*	9	+5 V	REPO power supply, 5 VDC 100 mA
		10	REPO Coil -NC	NC, ECO activated when Pin 9 and Pin 10 opened
		11	REPO Coil -NO	Trigger REPO when Pin 11 and Pin 12 closed
		12	GND	REPO ground

NOTE: The I/O dry contact port capacity is: 125 VDC, 0.5 A, 30 VDC, 1 A respectively.

Pin 11 and Pin 12 reserves the corresponding terminals for configuring the REPO function. The REPO device also needs the shielded cable to connect to the Normally Open remote REPO switch between the two terminals. Pin 9 and Pin 10 should be disconnected, if they are not required. Pin 9 and Pin 10 are shorted before delivery.

NOTE: The EPO action of the UPS will close the rectifier, inverter and static bypass, but it cannot disconnect the UPS mains input inside. If the UPS has to be completely disconnected, just disconnect the upstream input MCB when generating the EPO.

In emergency conditions, close the REPO switch (prepared by users) to shut down the rectifier and inverter, and the UPS will be powered off. In normal condition, the REPO switch cannot cut off the UPS input power. If a switch of electronic control tripping function is used at the UPS input, the REPO switch can help the switch trip and thus cut off the UPS input power. See **Figure 2.3** on page 8 for the position of the REPO switch and see **Figure 7.3** below for the REPO cable connection.

Figure 7.3 REPO Cable Connection



Steps to connect the REPO cable connection are as follows:

1. Loosen '11' and '12' connection terminals of the REPO port.
2. Insert the two ends of the copper core cables into connection terminals '11' and '12' of the REPO port, with the insulation peeled/removed and press down the terminals. The REPO cable connection is complete now.

NOTE: Ensure that the REPO cable is securely connected to avoid no action or incorrect action of the REPO caused by accidental dropping or loose contact.

3. While connecting the REPO cable for parallel UPS, parallel connect '11' of the REPO port with one end of the electronic switch, and parallel connect '12' with the other end of the electronic switch.

When the REPO switch at the user end is closed, the UPS will generate an alarm and cut off the output immediately, and it will not return to the normal operation state automatically. At this point, change the REPO switch state, and power on the UPS manually.

NOTE: It is recommended to use 0.82 mm² to 0.33 mm² (signal cable of 18 AWG to 33 AWG) copper core cable.

NOTE: If the switch you have configured is of electronic control tripping function, when the REPO signal takes action, close the switch before restarting the UPS.

7.3 Connecting USB Communication Cables

The steps to connect the USB communication cable are as follows:

1. Insert one end of the USB communication cable to the USB port, see **Figure 2.3** on page 8 on the rear panel of the UPS, and connect the other end to the USB port of the computer.
2. After the connection, install the USB drive program in the installation disk.

7.4 Connecting Serial Port Communication Cable

The methods to connect the serial port communication cable are as follows:

1. Insert one end of the DB9 serial port communication cable to the DB9 serial port, see port 5 in **Figure 2.3** on page 8 on the rear panel of the UPS, and the other end to the DB9 port of the computer.

The pin function of DB9 is listed below:

Pin No.	Function
2	Send data
3	Receive data
5	Common terminal

7.5 Connecting Control Port

The control port uses the standard RJ45 port, which supports the Modbus/Jbus port and connects the Vertiv temperature and humidity sensor.

The user can select Modbus/Jbus protocol function or sensor function via the Settings option available on the LCD.

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8 Maintenance

This chapter focuses on the the Vertiv™ Liebert® UPS maintenance, including the fan maintenance, battery maintenance, UPS cleaning, UPS state check, UPS function check.

NOTE: Ensure to remove power before performing the UPS Internal maintenance.

8.1 Fan Maintenance



CAUTION: Do not insert your fingers or or any object/tool into the rotating parts of the fan to avoid damage to the unit or personal injury.

The UPS fans are expected to run for 20000 hours to 40000 hours continuously. The higher the ambient temperature, the shorter the fan life is.

During the UPS operation, verify the fan status once in every six months by confirming that air blows out from the ventilation holes on the rear panel.

8.2 Battery Maintenance



WARNING! Never reverse the connection of the battery, otherwise the fire will occur. Never open the battery to avoid physical injury because of the electrolyte. If you accidentally touch the electrolyte, wash the area immediately with plenty of clean water and go to hospital.

The internal battery of the UPS is sealed, lead-acid, maintenance-free battery. The battery life depends on the ambient temperature, charge and discharge times. High ambient temperature and deep discharge shortens the battery life.

To ensure the battery life, it is required to:

- Keep the ambient temperature ranging from 15 °C (59 °F) to 25 °C (77 °F).
- Prevent small current discharge. Continuous battery operation time exceeding 24 hours is strictly prohibited.
- Charge the battery for at least 12 hours, if the battery hasn't been charged for three months at specified ambient temperature, or two months at high ambient temperature.

NOTE: Check and tighten the screws at the battery connection parts regularly the screws at the battery connection parts.

NOTE: Make sure that the safety equipment are complete and that the function is normal, especially that the settings of the battery management parameters are normal.

NOTE: Measure and record the internal temperature of the battery room at regular intervals.

NOTE: Check whether the battery ports are damaged or hot, and whether the chassis and the covers are damaged.

If liquid leakage and damage to the battery are found, place the battery in the anti-vitriol tank, and deal with it according to the local regulations.

The waste lead-acid battery is dangerous waste material. It is one of the national emphases to control the waste battery pollution. Its storage, transportation, usage and disposal must follow the national and local law and other criteria about the dangerous waste material and the waste battery pollution prevention.

According to the related regulations, recycle the waste lead-acid battery, and other disposal methods are prohibited. Throwing away randomly the waste lead-acid battery and other improper disposal methods can result in serious environmental pollution, which will be investigated the legal responsibility.

As the provider of the lead-acid battery, Vertiv has built perfect service network and recycle system for the waste battery to assist users to deal with the waste battery by law. Contact Vertiv or the nearest service center for the detailed information of the recycle system about the waste battery.

Vertiv is not liable for the environment results caused by failure to comply with the notices in this section or to use the waste battery recycle system provided by Vertiv.

8.3 Cleaning UPS

Clean the UPS periodically, especially the ventilation holes, to ensure free airflow inside the UPS. If necessary, clean the UPS with a vacuum cleaner. Confirm that the ventilation holes are not blocked or obstructed.

8.4 Checking the UPS Operating Status

It is recommended to check the UPS operation status once in every 6 months.

Check the following items:

1. If the UPS alarm is faulty: Is the alarm indicator on? Is the UPS giving any alarm?
2. If the UPS is operating: Bypass Mode, One of the reason for this could be operator intervention, overload, internal fault, and so on.
3. If the battery is discharging: One of the reason for this could be mains failure, battery test, operator intervention, and so on.

8.5 Checking UPS Functions

NOTE: UPS functions check procedures may cause power interruption to load.

It is recommended to check the UPS functions in every 6 months.

NOTE: Backup the load data before conducting the UPS functions check.

Steps to check the UPS functions are as below:

1. Press the *power button* to check if the buzzer beeps, indicators are on and the LCD display is normal.
2. Press the *ESC key* to check again if the indicators are on, the LCD display is normal and the UPS has been transferred to the inverter mode.

9 Options

This chapter includes the options of the Vertiv™ Liebert® ITA2 UPS.

9.1 Options

See **Table 9.1** below for the options.

Table 9.1 Options

Option	Model	PN	Description
POD	ITA-20K00POD10	02010026	Single POD (20 kVA with maintenance bypass)
	ITA-20K00POD11	02010027	1+1 POD (20 kVA with maintenance bypass)
Communication Cables	00B46158PEXS4	00B46158PEXS4	UPS parallel communication cables 4 m (3.28 ft.)
Guide Rail	UF-RMKIT2438	UF-RMKIT2438	Guide rail for rack installation
Communication Options	IS-RELAY	IS-RELAY	The Relay card is used with the UPS series Intellislot
	IS-UNITY-SNMP	IS-UNITY-SNMP	The Unity card is used with the UPS series Intellislot
	IS-UNITY-DP	IS-UNITY-DP	
Temperature Sensor	10H32479P01	10H32479P01	Intelligent temperature sensor
Battery Module	ITA-BCI0020k02	0235A02J	(3U) Battery module with built-in 16-block 12 V (9 Ah) batteries
	ITA-BCI0020k02	02312702	(3U) VRLA Battery half-string module with no battery inside
	ITA-BCI0020k01	02010024	(2U) Battery module with 16 x 9 Ah VRLA batteries
	ITA-BLI0020KL1	02010527	(1U) Battery module with 192 V 6 Ah Lithium-ion batteries
	ITA-BLI0020KL2	02010529	(2U) Battery module with 192 V 12 Ah Lithium-ion batteries

9.2 Battery Module

9.2.1 List Of Battery Module Options

The battery module options are listed in **Table 9.2** below.

Table 9.2 Battery Module Options

PN	Name	Description	Dimensions W x D x H mm (in.)	Weight kg (lbs.)
0235A02J	Battery module (3U)	Built-in 16-block 12 V 9 Ah VRLA batteries, may be used to prolong operating time. NOTE: We recommend installing six battery modules, at least two for each 20 kVA UPS. The battery module is supplied with an accessory cable.	430 x 600 x 130 (16.93 x 23.62 x 5.12)	51 (112.4)
02312702	Battery module (3U)	VRLA Battery half-string module with no battery inside	430 x 600 x 130 (16.93 x 23.62 x 5.12)	29 (63.93)
02010024	Battery module (2U)	Battery module with 16 x 9 Ah VRLA batteries	430 x 755 x 85 (16.93 x 29.72 x 3.35)	57 (125.66)
02010527	Battery module (1U)	Battery module with 192 V 6 Ah LIB batteries	430 x 750 x 43 (16.9 x 29.5 x 1.7)	23 (50.7)
02010529	Battery module (2U)	Battery module with 192 V 12 Ah LIB batteries	430 x 680 x 86 (16.9 x 26.8 x 3.4)	35 (77)

PN	Name	Description
ITA-BCI0020K02L2	VRLA Battery module connection cable	1 every 2 battery modules, starting from the second string
ITA-BCI0020K02L3	Connection cable between UPS and VRLA battery modules	1 each UPS
04114539	Connection cable between ITA2 10 kVA to 20 kVA UPS and 2U LIB battery modules	1 meter (1 each UPS)
02010527	1U Battery module with 192 V 6 Ah LIB batteries (See Note-1)	Compatible with ITA2 10 kVA to 20 kVA only

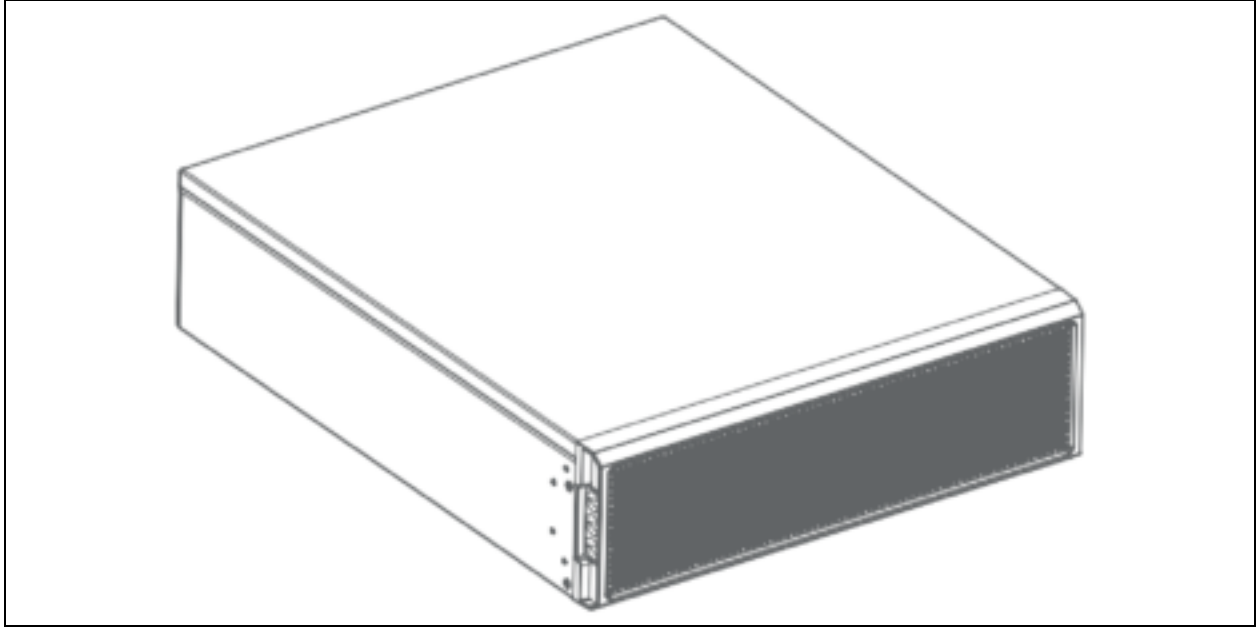
NOTE: The battery loop and AC input are not insulated, therefore hazardous voltages may exist between the battery port and earth. In order to avoid electric shocks, never touch them without using the appropriate protection equipment.

NOTE: The battery cables must be configured according to the specific installation requirements. The UPS requires ITA-BCI0020k02L3.

9.2.2 Appearance of VRLA Battery Module

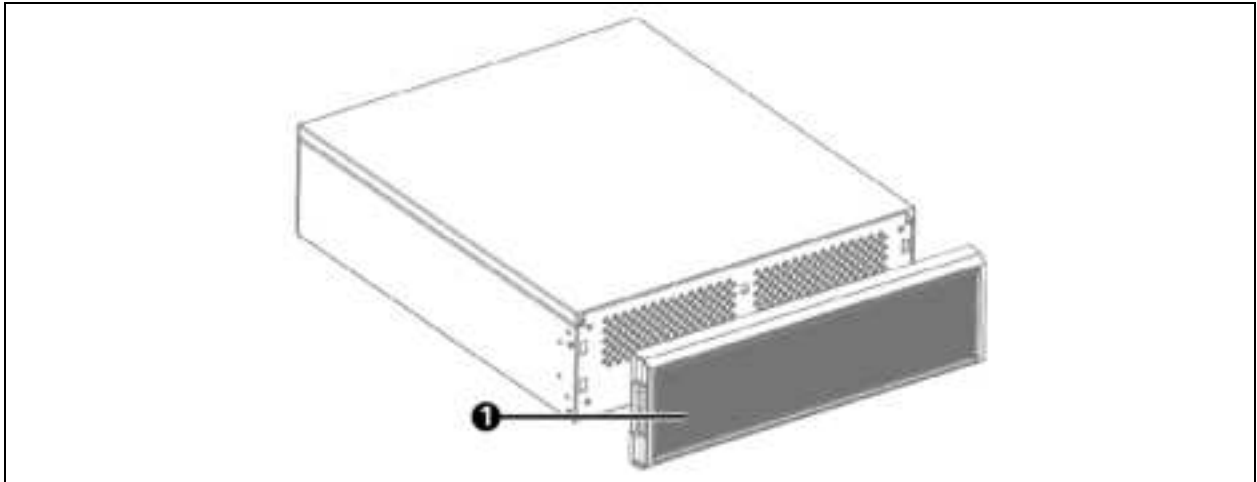
The appearance of the UPS is shown in **Figure 9.1** below.

Figure 9.1 Appearance of VRLA Battery Module



There is no operator and display panel on the front of the battery module. The plastic panel can be removed and adjusted according to specific requirements, as shown in **Figure 9.2** below.

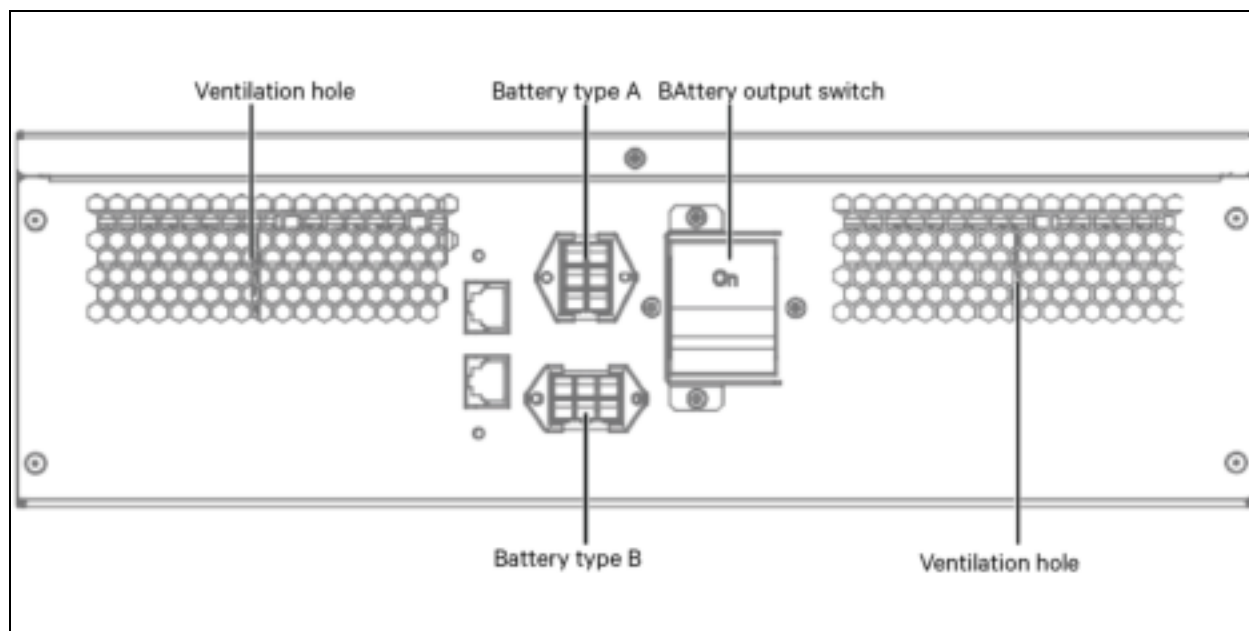
Figure 9.2 Removing the Plastic Panel



Item	Description
1	Plastic panel

The battery module is complete with ventilation holes, battery ports and a battery output switch on the rear panel, as shown in Figure 9.3 below.

Figure 9.3 Rear Panel of VRLA Battery Module



9.2.3 Appearance of Lithium-ion Battery Module

Figure 9.4 1U Lithium EBC Front View



Figure 9.5 2U Lithium EBC Front View



Figure 9.6 1U Lithium EBC Front Panel



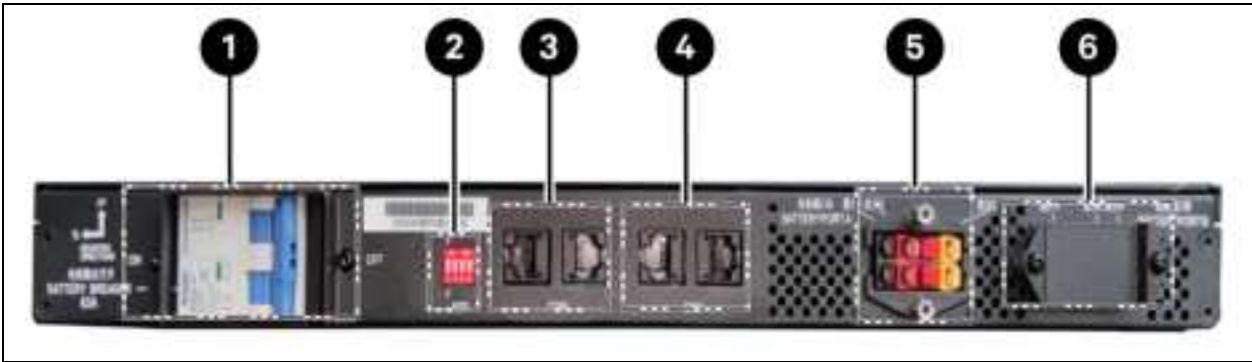
Item	Description
1	Battery energy indicators
2	Alarm indicators
3	Status indicators

Figure 9.7 2U Lithium EBC Front Panel



Item	Description
1	Battery energy indicators
2	Alarm indicators
3	Status indicators

Figure 9.8 1U Lithium EBC Rear Panel



Item	Description
1	Battery circuit breaker
2	DIP switch (BMS addressing)
3	UPS communication ports
4	CAN communication ports
5	Battery connector port A
6	Battery connector port B

Figure 9.9 2U Lithium EBC Rear Panel



Item	Description
1	Battery circuit breaker
2	DIP switch (BMS addressing)
3	UPS communication ports
4	CAN communication ports
5	Battery connector port A
6	Battery connector port B

9.2.4 Backup Time of Standard Battery Module for Single UPS

The backup time of the ITA-BCI0020k01 and ITA-BCI0020k02 battery module is shown in **Table 9.3** below.

Table 9.3 VRLA Battery Backup Time

Model	Module number	Backup Time (Unit: min)									
		20 kVA	18 kVA	16 kVA	14 kVA	12 kVA	10 kVA	8 kVA	6 kVA	4 kVA	2 kVA
20 kVA	4	5.5	6.5	7.5	9.5	11.5	15.0	21.0	31.0	51.5	111.0
	6	10.0	11.5	14.0	17.0	21.0	27.0	36.5	51.5	81.5	181.5
	8	15.0	17.5	21.0	25.5	31.0	39.5	52.0	72.0	112.0	252.5
	10	21.0	24.5	28.5	34.0	41.5	52.0	67.0	92.5	148.0	324.0
	12	27.0	31.5	36.5	43.0	52.0	64.0	82.0	112.5	184.0	395.0

To guarantee the backup time, we recommend configuring at least four groups of battery modules for the 20 kVA model.

Table 9.4 MPL 192 V 6Ah Lithium EBC with ITA2 20 kVA 3-Phase UPS Models

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 (See Note)	2	3	4	6	8	10	14	19	28	53
2	10	11	13	15	18	22	28	38	57	111
3	16	18	20	23	28	34	43	58	86	166
4	22	25	28	35	38	46	58	78	115	219
5	28	31	35	41	48	58	73	98	145	275
6	34	38	43	50	58	71	89	119	175	332
7	40	45	51	58	68	83	103	139	204	388
8	47	52	58	67	78	94	117	158	234	445
*1 string = 2 packs of 12 Ah lithium battery										
NOTE: When the ambient temperature is 15 °C (59 °F) or below, one string 192V 6Ah Lithium battery cabinets cannot support full load operation of this UPS model. It requires reduced full load operation (ambient temperature 15 °C to 0 °C (59 °F to 32 °F), power linear derating normal load to 10kVA) or at least two strings battery cabinets to ensure full load work, or use one string 192V 12Ah Lithium battery cabinets.										

Table 9.5 MPL 192 V 12Ah Lithium EBC with ITA2 20 kVA 3-Phase UPS Models

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
*1 string = 2 packs of 12 Ah lithium battery										

NOTE: Backup time may vary depending on battery manufacturer, model and usage. The data in the above table are provided for reference only.

The backup times listed in **Table 9.3** on the previous page are provided on the assumption that the battery is in good condition. If the battery performance is reduced, the actual achievable time may not correspond to the values indicated in **Table 9.3** on the previous page.

9.3 POD

POD (option of the UPS) can provide safe and reliable power distribution function. The descriptions of the POD are listed in Table 9.6 below.

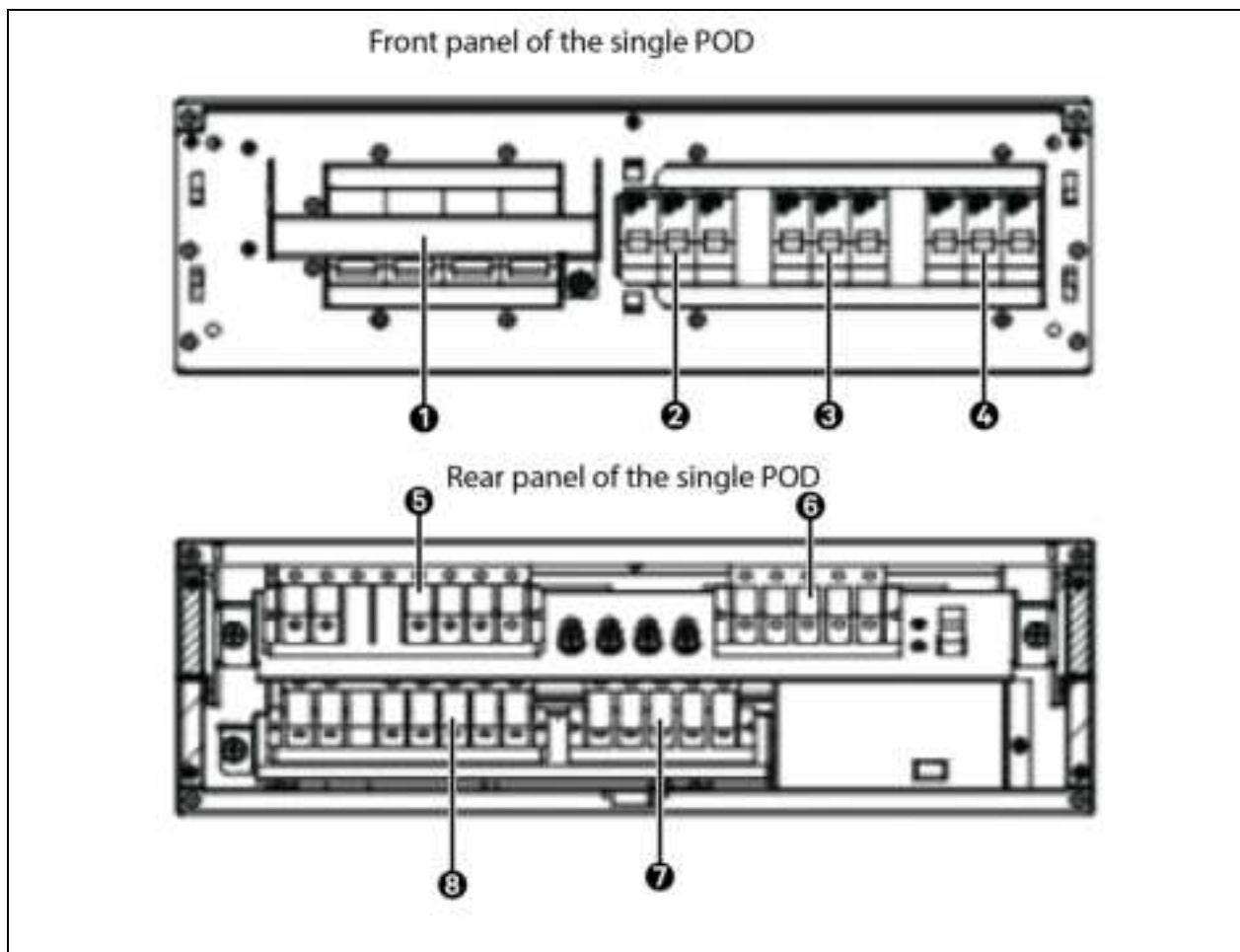
Table 9.6 POD

PN	Name	Description W × D × H mm (In.)
PN: 02010026	Single POD with maintenance bypass	430 × 600 × 173 (16.93 × 23.62 × 6.81)
PN: 02010027	1+1 POD with maintenance bypass	430 × 600 × 261 (16.93 × 23.62 × 10.28)

For the installation and commissioning of the POD, refer to **Vertiv™ Liebert® ITA2 10 kVA to 20 kVA UPS Power Distribution Unit User Manual**.

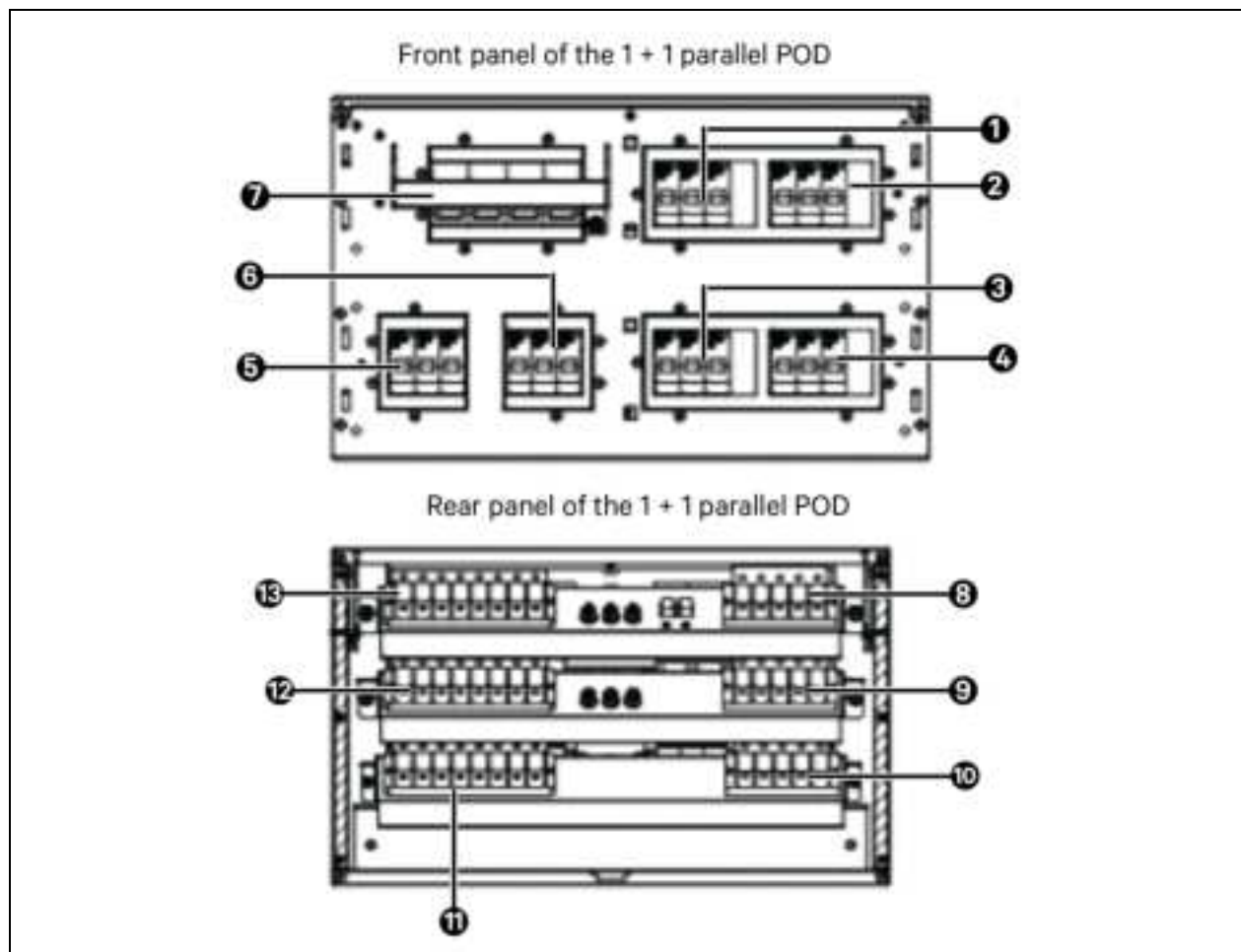
Remove the plastic panel to reveal the POD front panel; remove the rear baffle plate to reveal the POD rear panel. The front panel and rear panel of the single POD are shown in Figure 9.10 below. The front panel and rear panel of the 1 + 1 parallel POD are shown in Figure 9.11 on the next page.

Figure 9.10 Front Panel and Rear Panel of the Single POD



Item	Description
1	Maintenance bypass input MCB
2	Bypass input MCB
3	UPS input MCB
4	UPS output MCB
5	User input terminals block
6	User output terminals block
7	UPS output terminals block
8	UPS input terminals block

Figure 9.11 Front Panel and Rear Panel of the 1+1 Parallel POD



Item	Description
1	UPS1 bypass input MCB
2	UPS1 main input MCB
3	UPS2 bypass input MCB
4	UPS2 main input MCB
5	UPS1 output MCB
6	UPS2 output MCB
7	Maintenance bypass input MCB
8	User output terminal
9	UPS1 output terminals
10	UPS2 output terminals
11	UPS2 input terminal block
12	UPS1 input terminal block
13	User input terminal block

9.4 Communication Cables

Communication cable is compulsory in parallel system. See **Table 9.7** below for cable description. Refer to [Connecting Power Cables](#) on page 51 for the methods to connect the parallel cables.

Table 9.7 Description of the Communication Cable

Part Number	Name	Description	Appearance
00B46158PEXS4	Parallel communication cable	For N+1 parallel system, N+1 communication cables 1 m (3.38 ft.) are required. For example, two communication cables are required in 1+1 parallel system; three communication cables are required in 2+1 parallel system, four communication cables are required in 3+1 parallel system.	

9.5 Guide Rail

The guide rail is used in rack installation of the UPS, POD (optional). The detailed description is listed in **Table 9.8** below.

Table 9.8 Description of the Guide Rail

Type	Name	Description	Appearance
UF-RMKIT2438	Guide rail for rack installation	A set of guide rail includes a left guide rail and a right guide rail, and its bearing and its bearing capacity is 50 kg (110 lbs). Use the guide rail in the rack installation. It is applicable to the various server cabinet, the UPS, and the POD.	

For the rack mode installation procedure, see [Rack Installation](#) on page 28.

9.6 Dual Bus Parts

The LBS cables are compulsory in dual bus system. See **Table 9.9** below for the dual bus parts.

Table 9.9 Dual Bus Parts

Part Number	Name	Description	Appearance
04112519	LBS cable	Used to form LBS system (1 m). Two LBS cables are recommended	

9.7 Communication Options and Temperature and Humidity Sensor

The communication and the monitoring options are listed in **Table 9.10** below.

Table 9.10 Communication and Monitoring Options

Name	Type	Description	Appearance
Relay card	IS-RELAY	1. It can be connected to remote 4-route relay switch signal output: Low battery, On bypass, On battery, UPS fault. Each dry contact output includes a normally open and normally closed interface for user selection. 2. The relay card can receive 3-route switch signal input, two of which control UPS startup and shutdown functions, and the third one is reserved	
UNITY card	IS-UNTIY-DP	Unity card adopts Ethernet network to monitor and manage various operating parameters, alarms and notifications about power, distribution and cooling equipment. The card also communicates with the building management system and the network management system	
Intelligent Temperature sensor	10H32479P01	Complete with LCD screen, can be connected to the multifunction port	

NOTE: While using the SIC card to connect to the temperature sensor as battery temperature compensation, connect to the COM1 port of the SIC card, and set DIP switch of the temperature sensor to '1'. For the installation and setting of the SIC card, refer to RDU-SIC Card User Manual.

Appendices

Appendix A: LCD Parameters Setting

Table A.1 LCD Parameters Setting

Menu	Item	Setting Range	Default Setting
System	Auto restart	Disable, Enable	Enable
	Auto restart delay	0 to 999 seconds	10, Single unit only
	Guaranteed shut-down	Disable, Enable	Disable
	Remote control	Disable, Enable	Enable
	Remote power on delay	0 to 999 seconds	0
	Remote shut-down delay	0 to 999 seconds	0
	Redundant	NO, YES	Yes
	LBS select	Disable, Master, Slave	Disable, 20 kVA only
	IT system compatibility	Disable, Enable	Disable
	Dry contact 1 (Output)	Low battery, On bypass, On battery, UPS fault	Low battery
	Dry contact 2 (Output)	Low battery, On bypass, On battery, UPS fault	UPS fault
	Dry contact 3 (Input)	Battery mode shutdown, Any mode shutdown, Maintain mode	Maintain mode
	Dry contact 4 (Input)	Battery mode shutdown, Any mode shutdown, Maintain mode	Maintain mode

Table A.1 LCD Parameters Setting (continued)

Menu	Item	Setting Range	Default Setting
Output	Voltage selection	220 V, 230 V, 240 V	220 V
	Start-up on bypass	Disable, Enable	Disable
	Frequency selection	Auto, BypEna; Auto, BypDisa; 50 Hz, BypDisa; 60 Hz, BypDisa	Auto, BypEna
	Inverter sync range	±0.5 Hz, ±1.0 Hz, ±2.0 Hz, ±3.0 Hz, ±4.0 Hz, ±5.0 Hz	±3.0 Hz
	Bypass voltage upper limit	+10%, +15%, +20%	+20%
	Bypass voltage lower limit	-10%, -20%, -30%, -40%	-40%
	Bypass frequency range	±5 Hz, ±10 Hz	±10 Hz
	Run mode	Normal, ECO mode	Normal
	ECO voltage range	±5%, ±10%, ±15%	±10%
	ECO frequency range	±1 Hz, ±2 Hz, ±3 Hz	±3 Hz
	ECO requalification time	5, 15, 30 (minutes)	30
	Output phase No.	1 phase, 3 phases	3 phases
Parallel	Voltage selection	220 V, 230 V, 240 V	220 V
	Frequency selection	Auto, BypEna; Auto, BypDisa; 50 Hz, BypDisa; 60 Hz, BypDisa	Auto, BypEna
	Run mode	Normal, ECO mode	Normal
	Redundant	NO, YES	YES
	System parallel No.	1 to 4	1
	Output phase No.	1 phase, 3 phases	3 phases
	Sync parallel parameters	Button	Button

Appear only when the 'Run mode' is set to 'ECO mode'

Table A.1 LCD Parameters Setting (continued)

Menu	Item	Setting Range	Default Setting
Battery	Shared battery	Disable, Enable	Disable; 20 kVA only
	Local/Parallel battery total Ah	7 to 3000 Ah	18 Ah (20 kVA)
	External battery cabinet group No.	Auto test, 0 to 10	Auto test
	Low battery time	2 to 30 (minutes)	2
	Battery replaced time	YYYY-MM-DD HH:MM:SS	2000-01-01 0:00:00
	Battery test interval	Disable, 8 weeks, 12 weeks, 16 weeks, 20 weeks, 26 weeks	Disable
	Battery test weekday	Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday	Wednesday
	Battery test time	HH:MM:SS	0:00:00
	Battery series	20 kVA: 24, 32, 40	32 (20 kVA)
	Discharge protect time	1 to 4320 (minutes)	4320
	Equal charge enable	NO, YES	NO
	Temperature compensation	Disable, Enable	Disable
	Replace battery	Button	Button
Outlet	Turn on outlet		Appear only when outlet off
	Turn off outlet		Appear only when outlet on
	Reboot outlet		Appear only when outlet on
	Turn off when UPS overload on battery	YES, NO	No
	Turn off when UPS on battery for	0 to 4320 (minutes)	2
	Turn off when backup time less than	0 to 4320 (minutes)	0
	Turn off when battery capacity less than	20 to 80%	30%
	Turn on when power returns for	0 to 4320 (minutes)	0
Monitor	Language	English, Chinese	English
	Date	YYYY-MM-DD	2016-10-01
	Time	HH:MM:SS	0:00:00
	Display orientation	Auto-rotate, Horizontal, Vertical	Auto-rotate

Table A.1 LCD Parameters Setting (continued)

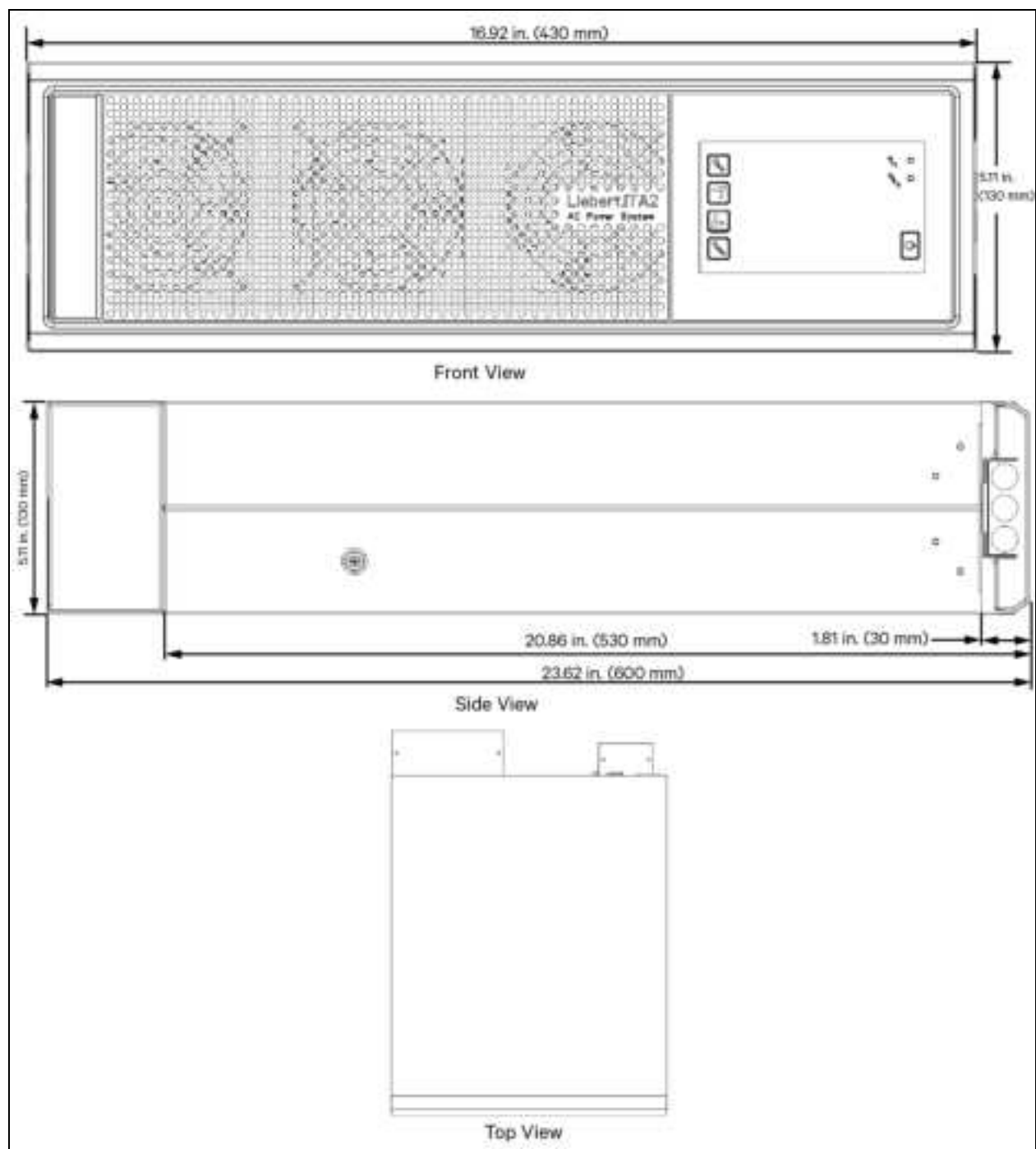
Menu	Item	Setting Range	Default Setting
	Audible alarm	Enable, Disable	Enable
	Control port protocol	Modbus, Sensor	Sensor
	Modbus address	1 to 128	1
	IPv4 address	ddd.ddd.ddd.ddd (where 'd' is a decimal number)	192.168.1.10
	Subnet mask		255.255.255.0
	Gateway address		192.168.1.1
	Change settings password	The password may be a numerical value only and include any character between 0 and 9. The password length is 6 characters	111111

Appendix B: Glossary

Table B.1 Glossary

Term	Abbreviation
AC	Alternating Current
CB	Circuit Breaker
CSA	Cross Sectional Area
DC	Direct Current
DIP	Dual In-line Package
DSP	Digital Signal Processor
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EOD	End Of Discharge
EPO	Emergency Power Off
I/O	Input/Output
LBS	Load Bus Synchronizer
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
MCB	Miniature Circuit Breaker
NMS	Network Management System
PE	Protective Earth
RCCB	Residual Current Circuit Breaker
RCD	Residual Current Detector
REPO	Remote Emergency Power Off
RFI	Radio Frequency Interference
SCR	Silicon-Controlled Rectifier
SNMP	Simple Network Monitoring Protocol
STS	Static Transfer Switch
UPS	Uninterruptible Power System

Appendix C: Dimension



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