

iTrust Adapt 10kVA UPS

User Manual

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Safety Guidelines

Prohibitions

1. Non-professionals are prohibited to install or commission the UPS alone.
2. As hazardous voltages are present within the UPS, only an Emerson technician or an Emerson-authorized technician is permitted to open it. Failure to observe this could result in electric shock risk and invalidation of any implied warranty.
3. Never dispose of the battery in a fire, as it may explode and jeopardize personnel safety when exposed to flame.

Matters needing attention

1. The standard UPS has its own energy source, external battery, therefore, the output terminal of the UPS may carry live voltage even when the UPS is not connected to the AC mains.
2. Before moving or re-wiring the UPS, please disconnect the mains source and make sure the UPS is completely shut down. Or else, the output terminal may carry live voltage, thus presenting electric shock risk.
3. To ensure human safety and normal operation, the UPS must be solidly and adequately grounded before use.
4. The operating environment and save method affect the UPS lifetime and reliability. It is advisable not to use the UPS for long in the following environments:
 - Places where the temperature and relative humidity are outside the specifications (temperature: 0°C ~ 40°C, relative humidity: 5% ~ 95%)
 - Places in direct sunlight or near heat source
 - Places subject to vibrations or shocks
 - Places which are dusty, strewn with corrosive substances or salts, or where flammable gases are present
5. Please keep the air inlet and outlet unobstructed. Poor ventilation will increase the internal temperature, which will shorten the lifetime of the UPS components, hence that of the UPS.
6. Liquid and other irrelevant objects are strictly prohibited inside the UPS.
7. In case of fire, use dry chemical fire extinguisher to put out the fire. Using foam fire extinguisher may cause electric shock.
8. High ambient temperature shortens the battery lifetime. To ensure normal UPS operation and adequate autonomy time, the battery should be replaced periodically. Only Emerson-authorized technicians are permitted to replace the battery.
9. If the UPS will remain idle for a long period, it must be stored in a dry environment. The storage temperature should range between -20°C and +55°C for standard UPS (with internal battery), between -40°C and +70°C for extended UPS (with no internal battery.)
10. This UPS complies with IEC61000-3-12 provided that the short-circuit ratio R_{sce} is greater than or equal to 250 at the interface point between the user's supply and the public system. It is the responsibility of the user to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit ratio R_{sce} greater than or equal to 250.
11. The UPS output cable must be less than 10m.
12. The backfeed protection unit is external. Refer to *UF-BFP-63A Backfeed Protection Unit User Manual* for its using method.

Others

When the UPS is purchased to deliver power to the equipment listed below, please discuss with the distributor in advance about the applicability, settings, management and maintenance of the UPS, as these need special considerations during design and development.

- Life-supporting medical apparatus
- Facilities such as lifts/elevators where adequate care has to be taken to avoid any fatal eventuality endangering human life
- Any other mission-critical equipment like the above

Contents

Chapter 1 Product Description	1
1.1 Features.....	1
1.2 Model Configuration.....	1
1.3 Appearance And Components.....	2
1.3.1 Appearance	2
1.3.2 Components	2
1.4 Operating Principle	2
1.5 UPS State And Operation Mode	3
1.5.1 Normal Mode	3
1.5.2 Bypass Mode.....	3
1.5.3 Battery Mode	3
1.5.4 ECO Mode	4
1.5.5 Fault State	4
1.6 Specifications.....	4
Chapter 2 Installation	6
2.1 Unpacking Inspection.....	6
2.2 Installation Preliminaries	6
2.3 Mechanical Installation.....	6
2.3.1 Installing UPS	7
2.3.2 Installing Plastic Panel.....	8
2.3.3 Operating Display Panel	9
2.4 Cable Connection	10
2.4.1 I/O Terminal Block	10
2.4.2 Connecting Input And Output Cables	10
2.4.3 Connecting Battery Cables.....	11
2.4.4 Connecting Communication Cables	12
2.4.5 Connecting REPO Cable	13
2.4.6 Connecting 10A External Charger Cable.....	13
2.5 1 + 1 Parallel System (Optional)	14
2.5.2 Mechanical Installation	14
2.5.3 Setting Parallel Addresses.....	16
2.5.4 Connecting Parallel Cables	16
2.5.5 Connecting POD Cables.....	17
Chapter 3 LED Display Panel.....	19
3.2 Control Keys	19
3.3 Indicators	19
3.3.2 UPS State Indicators	20

3.3.3 UPS Load Battery Capacity And Fault Orientation Indicator.....	20
Chapter 4 Operation Instructions	21
4.1 Check Before Power-On	21
4.2 UPS Power-On	21
4.3 Turning On UPS.....	21
4.4 Battery Self-Test	22
4.4.1 Battery Power-On Self-Test.....	22
4.4.2 Battery Manual Self-Test	23
4.4.3 Battery Periodic Self-Test	23
4.5 Turning Off UPS.....	23
4.6 UPS Power-Off	24
4.7 Transferring UPS Between Operation Modes.....	24
4.7.1 Transferring UPS From Overload Protection To Bypass Mode	25
4.7.2 Transferring UPS From Mains Failure To Battery mode.....	25
4.7.3 Transferring UPS From Inner Overheating Protection To Bypass Mode	25
4.7.4 Transferring UPS From Output Short Protection To Fault State.....	25
4.8 UPS Monitoring.....	25
Chapter 5 Maintenance And Troubleshooting	26
5.1 Fan Maintenance	26
5.2 Battery Maintenance	26
5.3 Cleaning UPS	26
5.4 Checking UPS State	26
5.5 Checking UPS Functions	26
5.6 Troubleshooting	27
Appendix 1 Battery Module	29
Appendix 2 Communication Function.....	30
Appendix 3 LCD Display Panel	31
1. Installation.....	31
2. Brief Introduction.....	32
3. LCD Display Interface	32
Appendix 4 POD	37
1. Single-Phase Input Single-Phase Output 1 + 1 POD	37
2. 3-Phase Input Single-Phase Output 1 + 1 POD.....	37
Appendix 5 Optional Part List.....	39

Chapter 1 Product Description

iTrust adapt 10kVA UPS (UPS for short) is an intelligent online UPS system with sine wave output developed by Emerson Network Power Co., Ltd. The UPS provides reliable and high quality AC power to your sophisticated equipment. The UPS adopts modular design, and rack/tower installation can be used depending on your requirements. It is applicable to supplying AC power to small scale computer center, network, communication system, automatic control system and precision instrument.

This chapter gives a brief description of the UPS, including the UPS features, model configuration, appearance, components, operating principle, state, operation mode and specifications.

1.1 Features

The UPS features include:

- Compatible with two input modes: 3-phase and single-phase input mode, with automatic input recognition function
- Capable of parallel connection to achieve up to 1 + 1 redundant power supply, with the additional function of 3 + 1 UPS parallel connection
- High-frequency double conversion topology structure, with high input power factor, wide input voltage range, and output immune to grid interference, thus adaptable to areas with unstable mains supply
- Small size and high power density
- Full digital control technology based on digital signal processor (DSP) to achieve high system reliability with self-protection and fault diagnosis
- Intelligent battery management to extend the battery life
- Display panel with both LCD and LED indication to help you learn about the system operation status and operating parameters
- 2U thick. Tower installation and rack installation are optional to meet different installation requirements
- Capable of ECO mode, which saves energy to the maximum extent
- Flexible network management with Emerson monitoring software
- Fan fault self-inspection and automated diagnosing function
- Provided with REPO port and DIP switch for Flash update program update
- SNMP card optional, providing network communication function
- Capable of connecting multiple battery strings, extending the power supply time of Battery mode, and 10A external charger can be adopted
- Two power distribution solutions: same power source for main circuit and bypass circuit and different power source for main circuit and bypass circuit; 220/230/240Vac multiple grid voltages and 50/60Hz frequency mode
- Three-level inverter technology adopted to improve the UPS efficiency

1.2 Model Configuration

As shown in Table 1-1, two UPS models are available: standard model and extended model.

Table 1-1 Model configuration

Model	Type	Remarks
Standard model	UHA1R-0100	Configured with battery module. See <i>Appendix 1 Battery Module</i> for the structure and connection of battery module
Extended model	UHA1R-0100L	No battery module is configured. You need to use external battery

1.3 Appearance And Components

1.3.1 Appearance

The UPS appearance is shown in Figure 1-1.

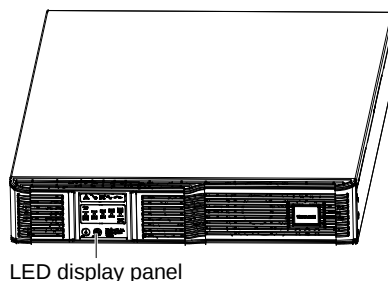


Figure 1-1 UPS appearance



Note

Non-professionals are prohibited from opening the chassis cover. Failure to observe this could result in electric shock.

1.3.2 Components

Display panel

As shown in Figure 1-1, a display panel is located on the front panel, providing LED indicators and control keys. For details, refer to *Chapter 3 LED Display Panel*.

Rear panel

As shown in Figure 1-2, the UPS rear panel provides a DIP switch for Flash update program update, parallel DIP switches, a parallel port, a bypass switch, a battery port, a USB port, ventilation holes, an SNMP card slot, an REPO port, a 10A external charger control port, an I/O terminal block and a bypass terminal block.

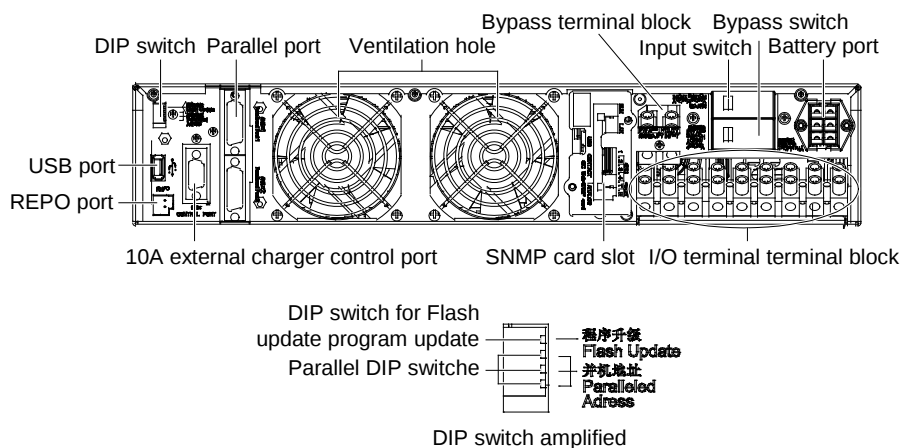


Figure 1-2 UPS rear panel

1.4 Operating Principle

The operating principle of the UPS is shown in Figure 1-3.

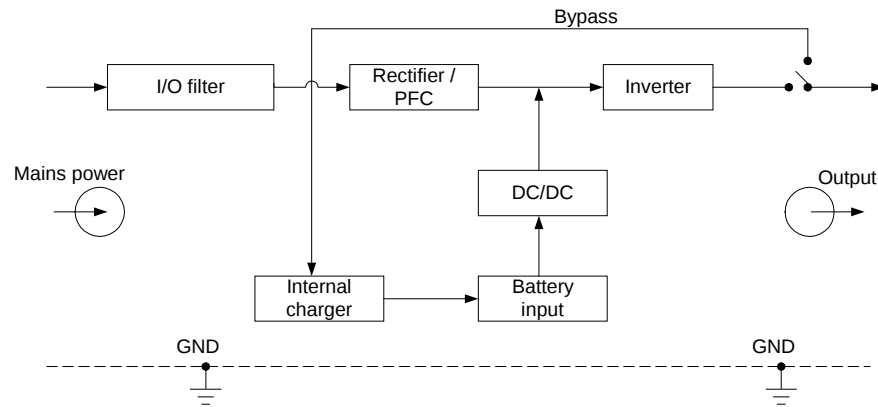


Figure 1-3 Operating principle diagram

1. The UPS is composed of mains input, I/O filter, rectifier/PFC, DC/DC boost, inverter, bypass, internal charger, battery input and UPS output.
2. When the mains is normal, close the bypass and mains switch, the internal charger will charge the battery. Before turning on the UPS, the output voltage is zero. After turning on the UPS, the electronic transfer switch connects the inverter to the load, the rectifier/PFC circuit rectifies the mains power into DC power and feeds the DC power to the inverter. The inverter then inverts the DC power to pure sine wave AC power and feeds the AC power to the load through electronic transfer switch.
3. During mains failure, the rectifier/PFC circuit boosts the battery voltage and feeds it to the inverter. The inverter then converts it into pure sine wave AC power, and feeds the AC power to the load through electronic transfer switch.
4. After the mains recovers, the UPS will switch to Normal mode from Battery mode, the rectifier/PFC circuit rectifies the mains power into DC power and feeds the DC power to the inverter, then electronic transfer switch feeds the DC power to the load.

1.5 UPS State And Operation Mode

The UPS state and operation modes include: Normal mode, Bypass mode, Battery mode, ECO mode and Fault state. For the descriptions of indicators and control keys in this section, refer to *Chapter 3 LED Display Panel*.

1.5.1 Normal Mode

After installing the UPS, press and hold the **ON/SILENCE** key for over one second until a beep sound is heard. The UPS is started and then enters Normal mode or Battery mode.

When the mains input and output load are normal, the load is powered by the mains after processing of the inverter and the rectifier; meanwhile, the internal charger charges the battery. When the UPS is in Normal mode, the AC input indicator and inverter indicator are on.

1.5.2 Bypass Mode

Upon output overload or faults during the UPS operation, the UPS will switch to Bypass mode, the load is powered by the bypass AC source, which comes directly from the AC mains input; meanwhile, the internal charger charges the battery. When the UPS is in Bypass mode, the bypass indicator is on.



Note

In the event of a mains failure or mains voltage outside the specifications (120Vac ~ 253Vac) when the UPS is in Bypass mode, the UPS will cease power for the load.

1.5.3 Battery Mode

Upon mains failure, rectifier overload or mains voltage outside the specifications, the rectifier and internal charger will become inoperative, and the battery will power the load through the inverter. When the UPS is in Battery mode, the

battery indicator and inverter indicator are on, and the buzzer beeps every 3.3 seconds, notifying the user that the battery is powering the load.



Note

1. In Battery mode, when the battery voltage is low, the buzzer beeps rapidly (once per second), and the corresponding measures must be done in time.
2. The battery had been fully charged before delivery. However, storage and transportation will inevitably cause some charge loss. Therefore, it is required to charge the battery for eight hours before putting the UPS into operation, so as to ensure adequate battery autonomy.

1.5.4 ECO Mode

In ECO mode, when the bypass voltage is $220\text{Vac} \pm 10\%$ and the frequency is within $50\text{Hz} \pm 2\text{Hz}$, the load is supplied by the bypass AC source and the bypass indicator is on. You can use the ECO mode to power through bypass those loads that are insensitive to power supply quality, so as to reduce the power loss.

When the bypass voltage is normal, and the inverter is in no-load state, the load is supplied by the bypass AC source and the bypass indicator is on.



Note

1. In ECO mode, if the bypass fails or bypass voltage is abnormal when the output is NOT overloaded, the UPS will switch to the Normal mode. However, if the bypass fails or bypass voltage is abnormal when the output IS overloaded, the UPS will not switch to the Normal mode, but shut down the bypass.
2. In ECO mode, the efficiency of the UPS is up to 97%.
3. Different voltage modes are corresponding to different voltage and frequency ranges.

1.5.5 Fault State

Upon inverter failure or UPS over-temperature, the UPS will switch to Bypass mode when the UPS is in Normal mode, or shut down and stop the output when the UPS is in battery state. In UPS Fault state, the fault indicator will turn on, the buzzer will keep beeping and the corresponding indicator will blink.



Note

In Fault state, if the bypass fails or bypass voltage is abnormal when the output is not overloaded, the UPS will shut down and be powered by the inverter, such as radiator over-hot. However, if the bypass fails or bypass voltage is abnormal when the output IS overloaded, the UPS will not switch to the inverter, but shut down the bypass.

1.6 Specifications

The UPS specifications are listed in Table 1-2.

Table 1-2 UPS specifications

Product model		Standard UPS	Extended UPS
		UHA1R-0100	UHA1R-0100L
Input	Rated voltage	Single-phase: 220Vac, 3-phase: 380Vac, supportive of 230Vac and 240Vac voltage system	
	Voltage range	176Vac ~ 288Vac, at full load 120Vac ~ 176Vac, linear derating 120Vac, at half load	
	Frequency	50/60Hz $\pm$ 5Hz	
	Power factor	Single-phase: $\geq$ 0.99, 3-phase: $\geq$ 0.95	
Output	Rated power	10kVA/9kW (25°C ~ 40°C)	
	Voltage	220/230/240Vac $\pm$ 3%	
	Frequency	In Normal mode: synchronizes with the bypass frequency when the bypass frequency is within 50Hz $\pm$ 5Hz In Battery mode, the output frequency is 50/60Hz $\pm$ 0.2Hz Bypass frequency track range is $\pm$ 10%	
	Slew rate	0.2Hz/s (default), 1Hz/s	

Product model		Standard UPS	Extended UPS
		UHA1R-0100	UHA1R-0100L
Output	Power factor	0.9 (10kVA)	
	Crest factor	3:1	
	Voltage harmonic distortion	$\leq 3\%$ (linear load), $\leq 5\%$ (non-linear load)	
	Load regulation rate	2%	
	Grid regulation rate	2%	
	Dynamic response recovery time	60ms	
	Overload capacity	105% ~ 125% rated load for 5min, 125% ~ 150% rated load for 1min, above 150% rated load for 500ms (in Normal mode); 105% ~ 125% rated load for 60s, above 125% rated load for 500ms (in Battery mode);	
	Bypass voltage	120Vac ~ 253/265/276Vac	
	Mains efficiency	93%	
Battery	Type	Sealed, lead-acid, maintenance-free battery (12V/7Ah)	
	Cell No.	16 × 2	
	Rated voltage	192Vdc	
	Recharge duration (standard UPS)	Six hours to 90% rated capacity	Depended on external battery capacity
	Charge current	2A	4A
Transfer time	Normal $\leftrightarrow$ Battery	0	
	Inverter $\leftrightarrow$ Bypass	$\leq 4\text{ms}$	
Noise (within 1m)		$\leq 50\text{dB}$	
Display		LED/LCD (optional)	
Safety		CCEE (GB4943-1995)/GB4943	
Storage		Satisfy Standard GB/T4798.1-86	
Transportation		Satisfy Standard GB/T4798.12-96	
EMC	Conduction emission	IEC/EN 62040-2	
	Immunity	$I \leq 16\text{A}$, IEC/EN61000-3-3; $16\text{A} < I \leq 75\text{A}$, IEC/EN61000-3-11	
	Harmonic current	$I \leq 16\text{A}$, IEC/EN61000-3-2; $16\text{A} < I \leq 75\text{A}$, IEC/EN61000-3-12 YD/T1095-2001 level 2 15%	
Surge protection		IEC/EN-61000-4-5, endurance level 4 (4kV) (live line to earth), level 3 (2kV) (during live lines)	
Protection level		IP20	
Environmental condition	Operating temperature	0°C ~ +40°C	
	Storage temperature	-40°C ~ +70°C (battery excluded); -20°C ~ +55°C (battery included)	
	Relative humidity	5% ~ 95%, non-condensing	
	Altitude	< 1500m, derating in accordance with GB/T3859.2 when higher than 1500m	
Size	W × H × D (mm)	430 × 88 × 640	
Weight	Standard UPS (kg)	24.8	
	Extended UPS (kg)	25	

Chapter 2 Installation

This chapter expounds the UPS installation, including the unpacking inspection, installation preliminaries, and detailed installation procedures.



Note

The UPS installation must be carried out by professionals strictly.

2.1 Unpacking Inspection

Unpack the UPS and conduct the following checks:

1. Visually inspect the UPS appearance for shipping damage. If any shipping damage is founded, notify the carrier immediately.
2. Check the accessories against the delivery list. If there is any discrepancy, contact the distributor immediately.

2.2 Installation Preliminaries

Notes

The UPS is suitable for resistive-capacitive load (like computer), resistive load and micro-inductive load. It is not suitable for purely inductive load or purely capacitive load (like motor, air-conditioner and duplicator), nor can it be connected to half-wave rectifier load.

Installation environment

1. Do not install the UPS outdoors. The installation environment should meet the specifications (see Table 1-2).
2. Install the UPS in an environment with good ventilation and free of dust, volatile gas, salt, and corrosive materials. Keep the UPS far away from water, heat source, flammables and explosive substances. Avoid direct sunlight.

Installation clearances

Maintain a clearance of at least 200mm at both sides and back of the UPS. Keep the air inlets unobstructed on the front panel and rear panel of the UPS to facilitate ventilation and heat dissipation. Otherwise, the UPS internal temperature will rise, which will shorten the lifetime of the UPS.

Installation tools

Prepare installation tools according to Table 2-1. The tools must be insulated and ESD-proof processed before they are used.

Table 2-1 Installation tools

Installation tool	Specification	Application
Cross screwdriver	EJ5100mm	Remove the UPS top plate, or open the chassis
Wire-pressure plier	YT-12	Press wires for I/O terminal block
Diagonal plier	MTC3C	Make input and output connection cables
Small slotted screwdriver	EJ375mm	Connect input and output cables

2.3 Mechanical Installation

The mechanical installation includes: installing UPS, installing plastic panel and installing display panel.

Two installation modes are available: tower installation and rack installation. You can select an appropriate installation mode according to the actual conditions.

2.3.1 Installing UPS

Tower Installation

Note

Various installation configurations are available: single UPS, single UPS with two or multiple battery modules. Their installation methods are all the same.

Installation method:

1. Take out support bases from the accessories, as shown in Figure 2-1, and then put the support bases down on the installation surface flatwise.

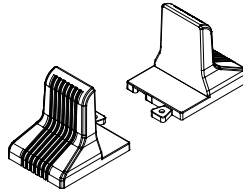


Figure 2-1 Support bases

2. If battery modules are connected to the UPS, take out the spacers delivered with the battery module, and then assemble the spacers and the support bases through fastenings, as shown in Figure 2-2.

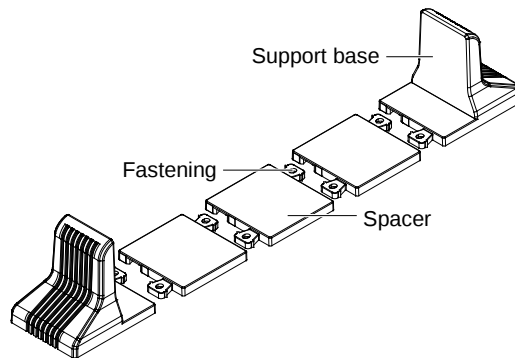


Figure 2-2 Support bases with spacers (front view)

3. Place the UPS on the support bases. Each UPS needs four support bases to install, as shown in Figure 2-3.

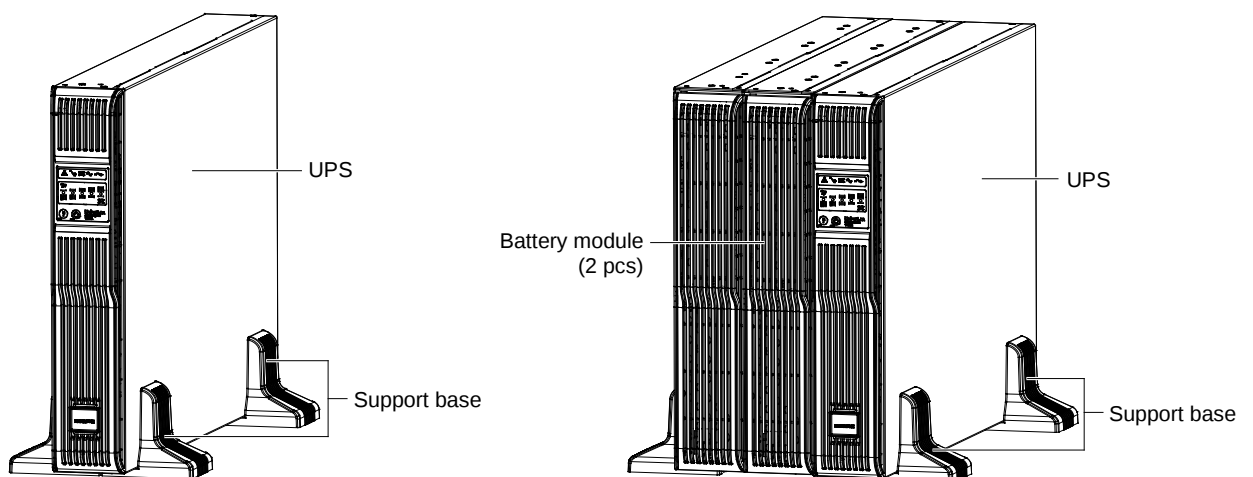


Figure 2-3 Tower installation

Rack installation



Note

1. Various installation configurations are available: single UPS, single UPS with two or multiple battery modules. Their installation methods are all the same.
2. Because battery modules are too heavy, they must be installed first, and two or more installation personnel are required to install them at the same time. Please install them from bottom to top.

Rack installation: fix the UPS and battery module onto the rack through brackets.

Installation method:

1. Take out two brackets and six M4 × 10 screws from the accessories, and fix the brackets onto the battery module using the screws through installation hole1, as shown in Figure 2-4.

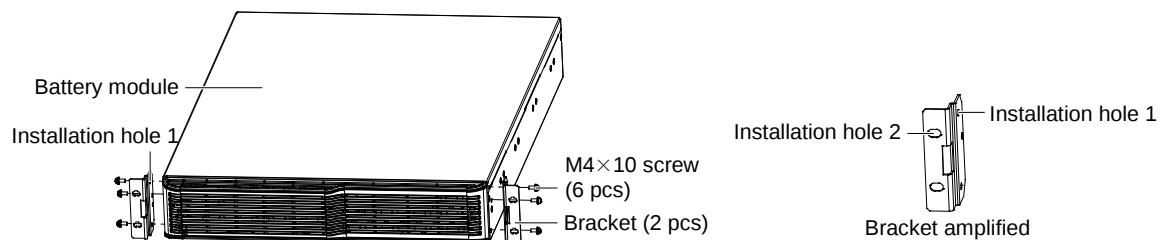


Figure 2-4 Installing bracket

2. Place the battery module onto guide rail in the rack, and push it completely into the rack along the guide rail (it is prohibited to move the battery module through the brackets). Take out four M6 × 16 screws from accessories, and fix the battery module onto the rack using the screws through installation hole2 on the bracket, as shown in Figure 2-5.

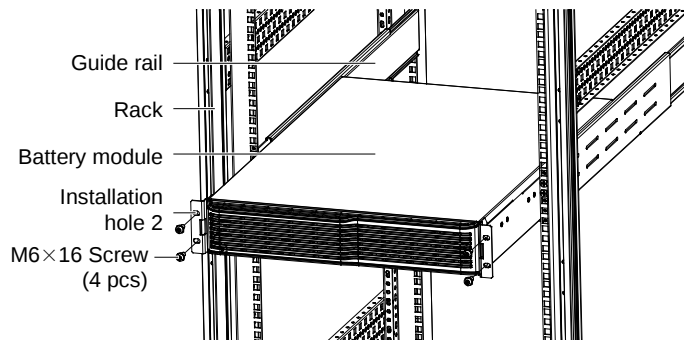


Figure 2-5 Installing battery module

3. The installation method of the UPS is the same as that of the battery module. Install the UPS on top of the battery module. The rack installation method of standard UPS with single UPS and two battery modules is shown in Figure 2-6.

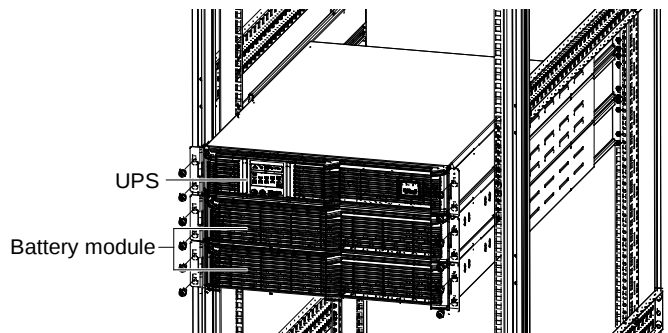


Figure 2-6 Rack installation of standard UPS with single UPS and two battery modules

2.3.2 Installing Plastic Panel

The installation method of the plastic panel is as follows:

1. Take out the plastic panel from the UPS package.

2. Align the plastic panel with the UPS display panel, and gently press the metal buckles on both sides of the plastic panel into the square holes on the UPS front panel according to the direction shown in Figure 2-7.

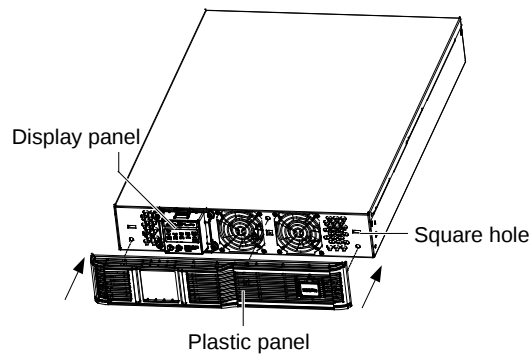


Figure 2-7 Installing the plastic panel

The method of uninstalling the plastic panel: in the rack or tower system, you do not need to uninstall the UPS. Press the two ends of the plastic panel with hands, and gently pull out the plastic panel.

2.3.3 Operating Display Panel

You can adjust the display mode of the display panel according to actual conditions, with no need to open the UPS chassis during operation.

The operation method is as follows:

1. Gently press the spring buckle, and pull out the display panel.
2. Rotate the display panel clockwise or counter-clockwise for 90 degrees.
3. Insert the display panel into the plastic bracket.

Figure 2-8 shows the operation method of making the display panel from tower mode to rack mode.

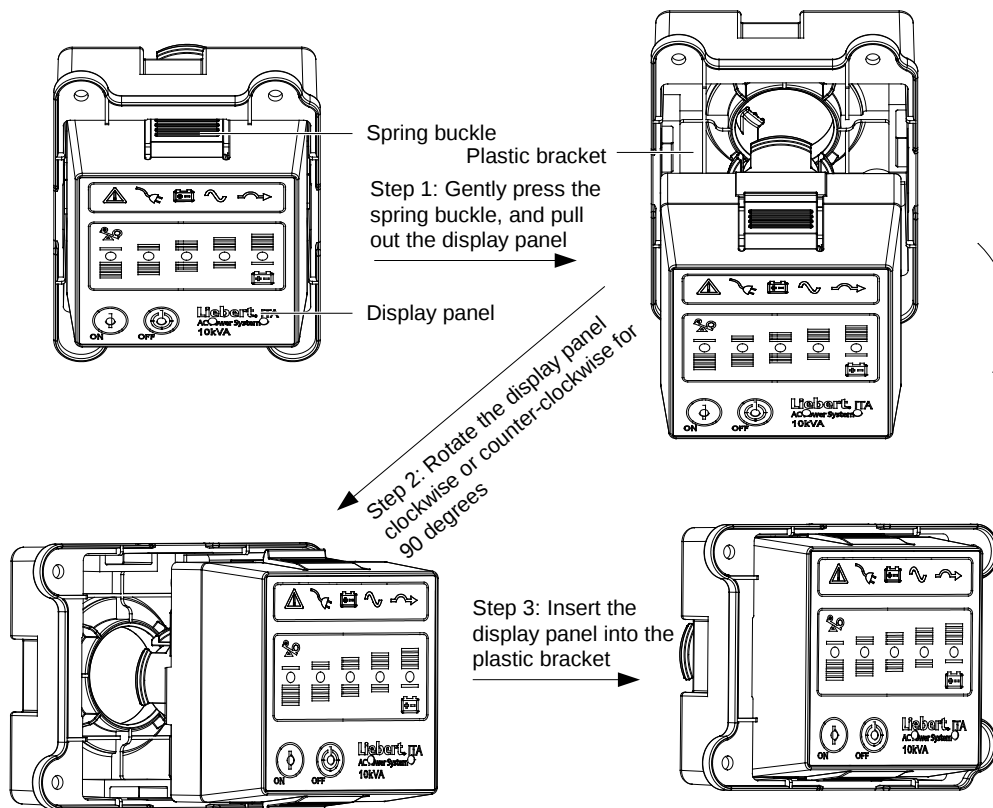


Figure 2-8 Display panel operation procedures

2.4 Cable Connection

The UPS is applicable to the TN and TT power distribution system.

UPS cables include input and output cables (prepared by users), battery cables (delivered with battery module), communication cable, REPO cable and 10A external charger cable.

2.4.1 I/O Terminal Block

The UPS provides an I/O terminal block (see Figure 1-2) on the rear panel for the connection of the UPS input and output cables. Remove the protective cover to get access to the I/O terminal block when connecting. Its terminals are shown in Figure 2-9.

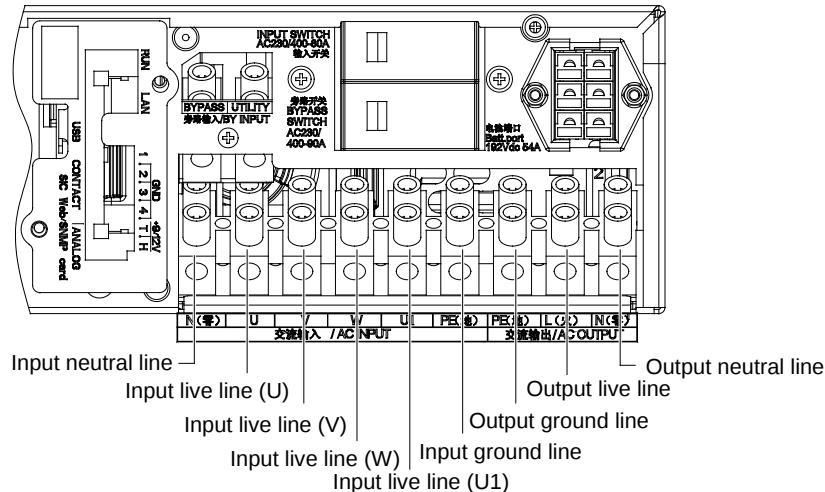


Figure 2-9 I/O terminal block

Note

After connecting the input, output and battery cables, please preserve the protective covers of the I/O terminal block and battery terminal block for future use.

2.4.2 Connecting Input And Output Cables

Notes

1. Do not reverse the input neutral line and live line.
2. Do not use a wall socket to feed power to the UPS. Otherwise, the socket may be burned.
3. Connect the output neutral line, live line and ground line correctly and reliably. For the sake of safety, the output ground line must be connected before the output neutral line and live line.
4. Install a quadrupole linkage breaker on the mains input neutral line and live line to facilitate cutting power under emergency conditions. Adopt correct power distribution method to ensure safety of the UPS and loads.
5. Input cables and output cables should be at least 6AWG or 10mm² copper wires. Tube cable lugs must be added to all cables to ensure reliable connection.

Correct power distribution method is shown in Figure 2-10.

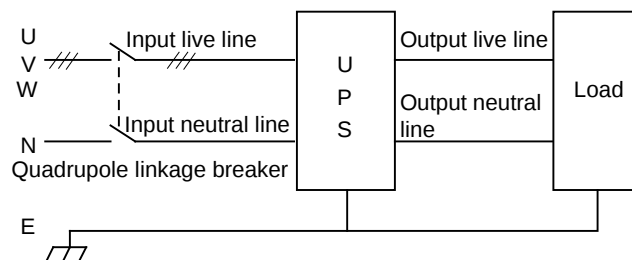


Figure 2-10 Correct power distribution method

Wrong power distribution method is shown in Figure 2-9.

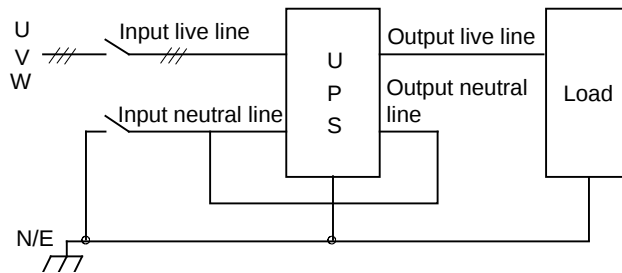


Figure 2-11 Wrong power distribution method

Connection Procedures

1. Confirm that all UPS input switches and output switches are open.
2. Remove the protective cover of the I/O terminal block. Remove the small cover first, and then the big one.
3. Connect the mains input neutral line, live line (U, V, W) and ground line to the input neutral line terminal, live line terminal (U), live line terminal (V), live line terminal (W) and ground line terminal on the UPS I/O terminal block respectively when the mains input is 3-phase, and tighten the fixing screws. Connect the mains input neutral line, live line (U) and ground line to the input neutral line terminal, live line terminal (U) and ground line terminal on the UPS I/O terminal block respectively when the mains input is single-phase, and tighten the fixing screws.
4. Connect the UPS output cables (live line, neutral line, ground line) to the output terminals (live line terminal, neutral line terminal, ground line terminal) on the UPS I/O terminal block, and tighten the fixing screws.
5. Connect the other end of the UPS output cables (live line, neutral line, ground line) to the load.
6. Refit the protective cover of the UPS I/O terminal block. Refit the big cover first, and then the small one.

Note

1. The mains input is single-phase in factory. Disconnect the external lines (line No.: W19) of the input live lines (U, V, W), and connect all mains input live lines to the input neutral line terminal, input live line terminal (U), input live line terminal (V), input live line terminal (W) and input ground line terminal on the UPS I/O terminal block, so as to change the mains input to 3-phase input.
2. The bypass input is from the same power source with mains A in factory. If you need to configure different power source for the mains and bypass, remove the W09 short-connect cable on the bypass terminal block, and connect the bypass cable to the bypass terminal block, at this point, a MCB must be used at the bypass input end. It is recommended to use a 125A MCB.
3. Use MCB at the UPS input and output ends to facilitate cutting power and loads at emergency conditions. It is recommended to use a 125A MCB at the input end and a 70A AC MCB at the output end. If the MCB is used by the UPS and other equipment together, it must be a plastic housing beaker.
4. After connecting input and output cables, refit the protective cover of the I/O terminal block and fasten the input and output cables with cable ties, so as to prevent electric shock.

2.4.3 Connecting Battery Cables

Before connecting the battery module, check that

1. The battery string comprises batteries of the same manufacturer, same model, and same use state.
2. The battery module number complies with the UPS specifications, that is, sixteen 12V batteries are connected in series.
3. The battery string voltage is about 200Vdc after series connected.

Battery cable connection includes: connecting battery cables of standard UPS and connecting battery cables of extended UPS.

Connecting battery cables of standard UPS

Connection procedures:

1. Confirm that all UPS input switches and output switches are open.
2. Use a screwdriver to remove the protective cover of the battery ports, and confirm with a voltmeter that no voltage is present at the battery ports on the rear panel.

3. Take out a battery cable from accessories of the UPS. Connect one end of battery cable to the battery port on the rear panel of the UPS, and connect the other end to any battery ports (four in all) on the rear panel of the battery module.

4. Use a screwdriver to screw down the fixing bolts on both sides of the battery port to avoid the battery cable from loosening or dropping.

The battery cable connection of standard UPS is shown in Figure 2-12.

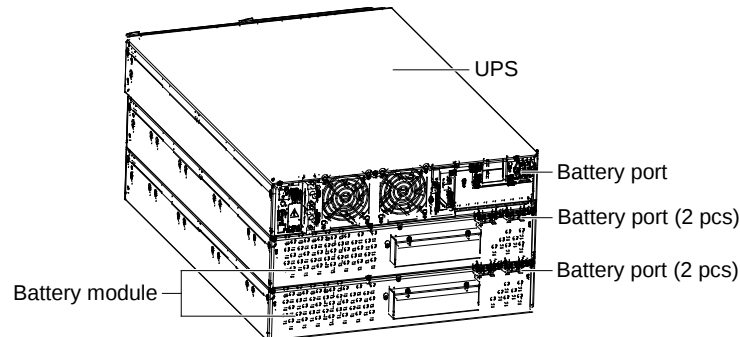


Figure 2-12 Battery cable connection of standard UPS



Note

1. It is prohibited to reverse the positive pole and negative pole of the battery.
2. Different UPS cannot use the same battery module. Otherwise, the UPS will be damaged.
3. The length of the battery cable configured with standard UPS is 0.5m. If you prepare battery cables by yourself, make the cables between the battery module and UPS as short as possible.
4. If the battery port is idle, please refit the protective cover to avoid electric shock.

Connecting battery cables of extended UPS

Connection procedures:

1. Switch off the input switch of the external battery module.
2. Take out the provided battery cable of extended UPS, one end of which is PP45 plug and the other end is three OT terminals.
3. Connect the red line, black line and yellow line of the OT terminal to the positive pole, negative pole and ground line of the battery input switch respectively. If the OT terminal is not matched with connection terminals of the battery input switch, cut the OT terminal and peel appropriate length of copper core and then connect it to the battery input switch.
4. Insert the PP45 plug to the battery port on the rear panel of the UPS, and use a screwdriver to screw down the fixing bolts on both sides of the cable port to avoid the battery cable from loosening or dropping.



Note

1. Before replacing the battery module and connecting battery cables, turn off the UPS.
2. Do not reverse the battery module when replacing the battery module on line.
3. Because the battery has dangerous energy, non-professionals are prohibited from connecting cables of battery for the extended UPS.
4. The length of external battery cables for the extended UPS is 1.5m. If you need more length cables, please consult with your dealer. It is recommended that the battery cable be shorter than 3m. Otherwise, the UPS cannot operate normally.
5. When using the extended UPS, you must configure an input MCB of the battery module.

2.4.4 Connecting Communication Cables

Communication cable connection includes: connecting USB communication cables and connecting SNMP card communication cables.

Connecting USB communication cables

1. Take out USB communication cables from accessories of the UPS.

2. Insert one end of the USB communication cable to the USB port on the rear panel of the UPS (see Figure 1-2).
3. Insert the other end of the USB communication cable to the USB port of the computer.

Connecting SNMP card communication cables

Through the optional SNMP card, users can access the UPS operation state and information using background monitoring software delivered with SNMP card.

The installation and communication cable connection of the SNMP card are as follows:

1. Remove the protective cover of the SNMP card slot, as shown in Figure 2-13 (a). Take care of the protective cover for future use.
2. Insert the SNMP card to the SNMP card slot and fasten it with screws, as shown in Figure 2-13 (b).
3. Connect the UPS to computer network port with network cables (prepared by users).
4. For the setting and use of the SNMP card, refer to *UPS Web/SNMP Agent Card User Manual*.

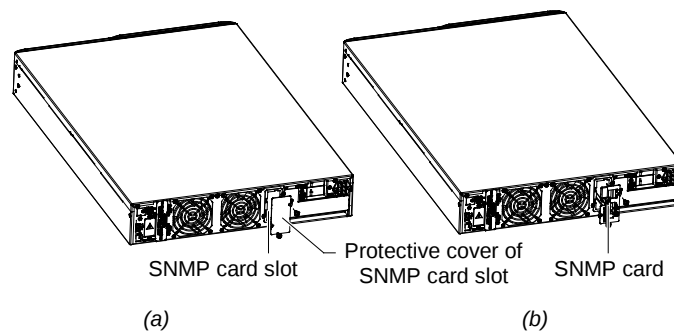


Figure 2-13 Installing SNMP card

2.4.5 Connecting REPO Cable

In emergency conditions, close the REPO switch (prepared by users) to shut down the rectifier and inverter, and the UPS is powered off. In normal condition, the REPO switch cannot cut off the UPS input power. If a switch of electronic control tripping function is adopted at the UPS input, the REPO switch can help the switch trip and thus cut off the UPS input power. The position of the REPO switch is shown in Figure 1-2, and the REPO cable connection is shown in Figure 2-14.

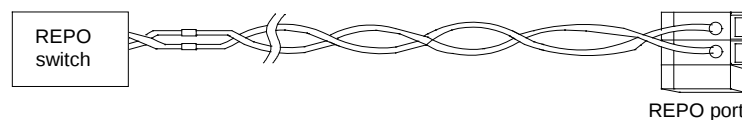


Figure 2-14 REPO cable connection

The cable connection procedures are as follows:

1. Press down the yellow buckle in the REPO port.
2. Insert the two ends of the copper core with the insulation leather peeled into the REPO port, and loosen the yellow buckle. The REPO cable is complete. Ensure that the REPO cable is firmly connected to avoid no action or wrong action of the REPO caused by accidental dropping or unfirm contact.

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

Note

1. It is recommended to use $0.82\text{mm}^2 \sim 0.33\text{mm}^2$ (signal cable of 18AWG $\sim$ 33AWG) copper core cable.
2. If the switch you have configured is of electronic control tripping function, when the REPO signal takes action, you need to close the switch before restart the UPS.

2.4.6 Connecting 10A External Charger Cable

The 10A external charger is optional, and its cable connection procedures are as follows:

1. Take out the 10A external charger cable (DB9) from the 10A external charger package, and open the protective cover of the control port on the rear panel of the 10A external charger, as shown in Figure 2-15. Insert one end of the cable into the control port.

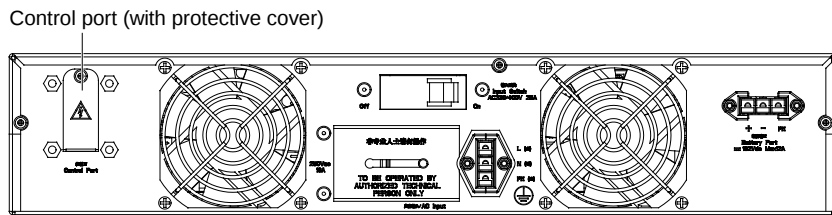


Figure 2-15 Control port on the rear panel of the 10A external charger

2. Open the protective cover of the 10A external charger control port on the UPS rear panel, and insert the other end of the cable into the 10A external charger control port (see Figure 1-2 for its position).
3. Use a screwdriver to screw down the fixing bolts on the two ends of the cable.

Note

1. For other cable connections between the 10A external charger and the UPS, please refer to *UF-BCH192/10 Charger Module User Manual*.
2. After removing the protective cover of the control port, please preserve it carefully. When the control port is idle, refit it to the original position to avoid electric shock.

After the installation, find the label shown in Figure 2-16 on the enclosure of the UPS and click “√” before “AC INPUT” according to the actual situation for easy maintenance.

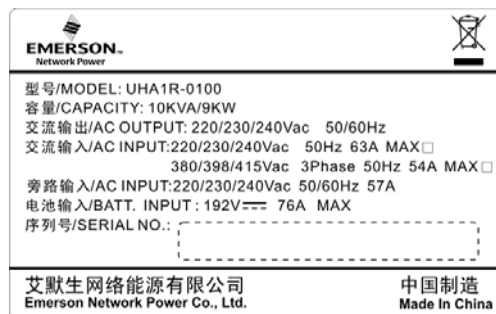


Figure 2-16 Label

2.5 1 + 1 Parallel System (Optional)

The UPS parallel system provides two parallel systems: single-phase input single-phase output 1 + 1 parallel system and 3-phase input single-phase output 1 + 1 parallel system.

UPS parallel output power distribution unit (POD for short) is an option of the UPS parallel system, which can provide safe and reliable power distribution function. POD includes single-phase input single-phase output 1 + 1 POD and 3-phase input single-phase output 1 + 1 POD. In addition, Adapt 10kVA has the 3 + 1 parallel extended function.

Installing parallel system includes:

- Mechanical installation
- Setting parallel addresses
- Connecting parallel cables
- Connecting POD cables

2.5.2 Mechanical Installation

Taking rack UPS parallel system installation as an example, the following introduces the installation method of the 1 + 1 parallel system.

Installation method: Installing POD, UPS and battery module. The installation methods of the POD and battery module are the same as that of the UPS. For details, refer to 2.3.1 *Installing UPS*.

The installation diagram of the single-phase input single-phase output 1 + 1 parallel system excluding battery module is shown in Figure 2-17.

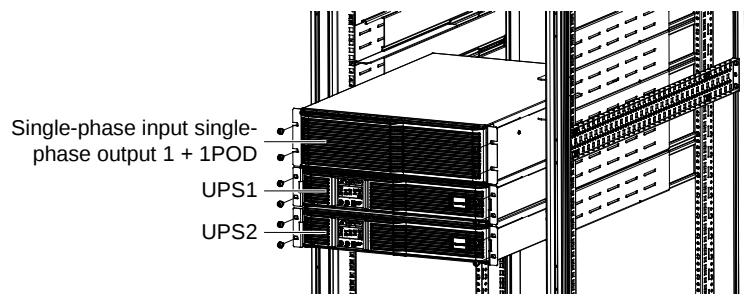


Figure 2-17 Installation diagram of the single-phase input single-phase output 1 + 1 parallel system excluding battery module

The installation diagram of the single-phase input single-phase output 1 + 1 parallel system including battery module is shown in Figure 2-18.

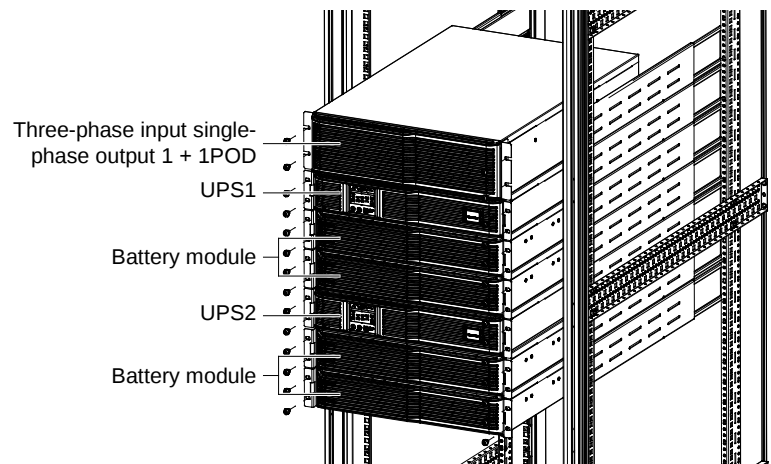


Figure 2-18 Installation diagram of the single-phase input single-phase output 1 + 1 parallel system including battery module



Note

1. Two UPSs cannot share one battery module. Otherwise, the UPS will be damaged.
2. The POD must be installed on the top of the UPS to facilitate cable connection and operation.

The installation diagram of the 3-phase input single-phase output 1 + 1 parallel system including battery module is shown in Figure 2-19.

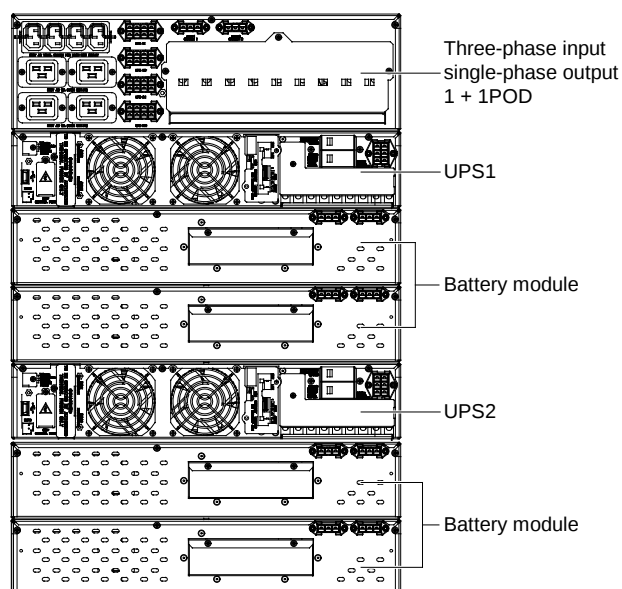


Figure 2-19 Installation diagram of the 3-phase input single-phase output 1 + 1 parallel system including battery module (rear view)

**Note**

Only professionals are allowed to install the parallel system.

2.5.3 Setting Parallel Addresses

For single-phase input single-phase output 1 + 1 parallel system and 3-phase input single-phase output 1 + 1 parallel system, the parallel addresses must be set when paralleling.

Set the parallel addresses through the DIP switch on the rear panel of the UPS, as shown in Figure 1-2.

Through the DIP switch, the UPS can be set to single mode or parallel mode. The UPS is set to single mode in factory. In single mode, all bits of the DIP switch are placed to the OFF positions.

Remove the protective cover of the DIP switch, whose amplified view is shown in Figure 2-20.

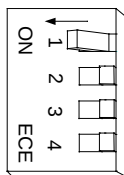


Figure 2-20 DIP switch

The setting list of the DIP switch for parallel address is given in Table 2-2.

Table 2-2 Setting of the DIP switch for parallel address

Parallel address DIP	Parallel 1#	Parallel 2#	Parallel 3#	Parallel 4#
DIP switch position				

**Note**

1. For single-phase input single-phase output 1 + 1 parallel system, the host and slave should be generated through the competition.
2. For 3-phase input single-phase output 1 + 1 parallel system, set the UPS according to Table 2-2.
3. Only Emerson-authorized technicians are allowed to operate the DIP switch. Otherwise, the UPS may be damaged.

2.5.4 Connecting Parallel Cables

The UPS provides parallel ports on the rear panel. Parallel cables are accessories of the UPS. The connection procedures are as follows:

1. Open the protective cover of the parallel ports. See Figure 1-2 for their positions.
2. Follow the ring connection mode shown in Figure 2-21 to connect the parallel cables (Figure 2-21 shows four UPSs connecting the parallel cables). That is, the parallel cables of two UPSs connect each other.
3. Use a screwdriver to screw down the fixing bolts on the two ends of the parallel cable.

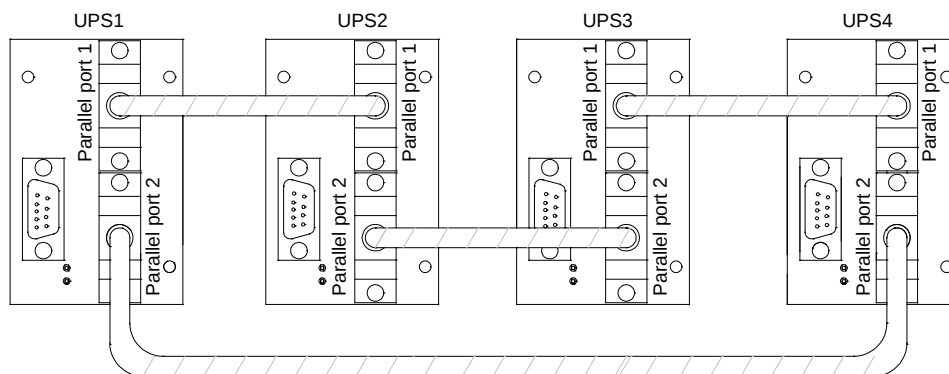


Figure 2-21 N + 1 parallel cable connection diagram

2.5.5 Connecting POD Cables

Connecting POD cables includes: connecting cables between the UPS and POD and connecting input and output cables of the POD.

For POD ports, refer to *Appendix 4 POD*.

Connecting cables between the UPS and POD

The method of connecting cables between the UPS and POD is as follows:

Take out cables from the package of the POD, and connect cables between the UPS and POD according to Table 2-3, Table 2-4 and Table 2-5.

Table 2-3 Cable connection between the POD and UPS

POD	UPS
Insert the accessory cables marked with UPSn to input and output ports of the UPSn (n represents 1, 2, 3, 4)	I/O terminal block

Table 2-4 Connecting accessory cables to I/O terminal block of UPS (single-phase input single-phase output 1+1 POD)

Mark of accessory cable	Silk print of I/O terminal block of the UPS	Mark of accessory cable	Silk print of I/O terminal block of the UPS
Input -PE	AC INPUT PE	Output -L	AC OUTPUT L
Input -N	AC INPUT N	Output -N	AC OUTPUT N
Input -L	AC INPUT U	Output -PE	AC OUTPUT PE
Input -BY	AC INPUT BYPASS		

Table 2-5 Connecting accessory cables to I/O terminal block of UPS (3-phase input single-phase output 1 + 1 POD)

Mark of accessory cable	Silk-print of I/O terminal block of the UPS	Mark of accessory cable	Silk-print of I/O terminal block of the UPS
Input -PE	AC INPUT PE	Input -W	AC INPUT W
Input -N	AC INPUT N	Output -PE	AC OUTPUT PE
Input -U	AC INPUT U	Output -L	AC OUTPUT L
Input -V	AC INPUT V	Output -N	AC OUTPUT N
Input -BY	AC INPUT BYPASS		

Note

When connecting cables, connect the UPS end first, and then connect the POD end.

Connecting input and output cables of the POD

The connection procedures of the POD input cable are as follows:

1. For 3-phase input single-phase output 1 + 1 POD, connect the mains input cables (U, V, W, N, PE) to the corresponding terminals on the I/O terminal block of the POD respectively.
2. For single-phase input single-phase output 1 + 1 POD, connect the mains input cables (L, N, PE) to the corresponding terminals on the I/O terminal block of the POD respectively.

The connection procedures of the POD output cables are as follows:

1. The POD output ports includes: 10A socket, 16A socket and output terminals of the I/O terminal block on the rear panel of the POD. You can select the output ports to connect output cables according to actual conditions.
2. Connect the other end of the output cable to the load.

**Note**

1. A protective MCB must be connected in series between the POD and the mains. It is recommended to use a 125A MCB for the single-phase input single-phase output 1 + 1 POD and 3-phase input single-phase output 1 + 1 POD.
 2. Confirm reliable connection for the ground line.
 3. When you need to turn off the UPS in the parallel system, press the **OFF** key on the corresponding UPS firstly to cut off the output of the UPS, and then open the input and output MCBs of the corresponding POD.
-

Chapter 3 LED Display Panel

This chapter introduces the control keys and indicators of the LED display panel.

The LED display panel is located on the front panel of the UPS, which provides two control keys and ten indicators, as shown in Figure 3-1, in which the figures are the indicator No.

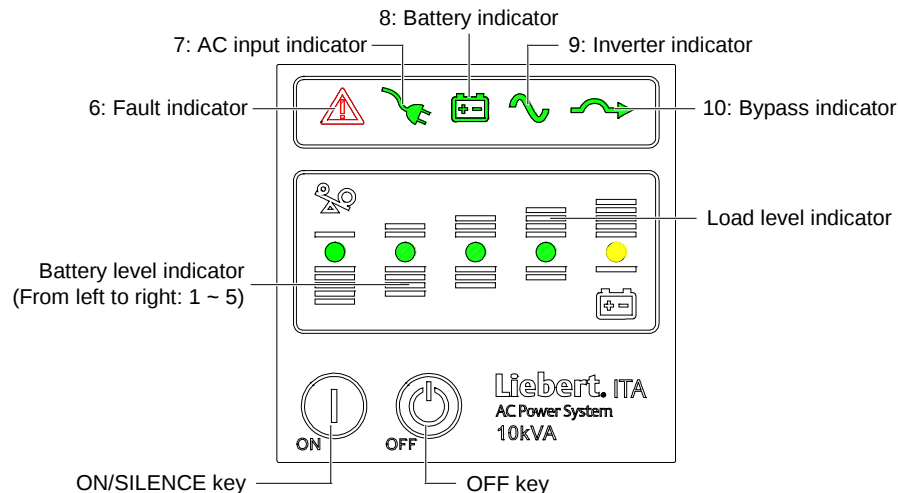


Figure 3-1 LED display panel

3.2 Control Keys

The display panel provides two control keys: **ON/SILENCE** key and **OFF** key. Their functions are given in Table 3-1.

Table 3-2 Functions of control keys

Control key	Function
ON/SILENCE key	1. Starting inverter: When the inverter is off, pressing and holding this key for one second starts the inverter. 2. Silencing alarm: In Battery mode, or upon overload or fault, the UPS has an audible alarm, pressing and holding this key for one second silences the alarm. 3. Initiating battery test: When the UPS is in Normal mode, pressing and holding this key for four seconds initiates battery test
OFF key	1. Turning off inverter: When the UPS is in Normal mode or Battery mode, pressing and holding this key for one second turns off the inverter. 2. UPS accessing to standby state: When the UPS is in Bypass mode, pressing and holding this key for ten seconds turns off UPS bypass output, then the UPS accesses to standby state

Note

Pressing and holding the **ON/SILENCE** key for one second silences the alarm, and do the same operation can resume the alarm beep.

3.3 Indicators

The display panel provides ten indicators, which can be divided into two groups according to the applications.

- UPS state indicators

The indicators include five indicators: fault indicator, AC input indicator, battery indicator, bypass indicator and inverter indicator. The fault indicator is red and the rest four indicators are green.

- UPS load battery capacity and fault orientation indicator

Load state, battery remaining capacity display or fault orientation indicator, includes five indicators, of which four indicators are green and one indicator is yellow. The yellow indicator indicates UPS load over-capacity or battery capacity too-low.

3.3.2 UPS State Indicators

UPS state indicators (see Figure 3-1) indicate the UPS operation and fault state, as described in Table 3-2.

Table 3-3 LED indicator description

Indicator No.	Definition	Color	Description
6	Fault indicator	Red	On in the event of fault, and off otherwise
7	AC input indicator	Green	On when the mains is normal, off during mains failure, and flashes when mains voltage is outside specifications
8	Battery indicator	Green	On when the battery is supplying power, off otherwise, and flashes upon failure
9	Bypass indicator	Green	On when the bypass is supplying power, and off otherwise
10	Inverter indicator	Green	On when the inverter is supplying power, and off otherwise

3.3.3 UPS Load Battery Capacity And Fault Orientation Indicator

The UPS load battery capacity and fault orientation indicator indicates the load situation of the UPS. In Battery mode, it indicates battery capacity. Upon UPS failure, it works with the UPS state indicators to indicate the UPS fault type.

Ten indicators cooperate to indicate the operation state and fault type of the UPS, as described in Table 3-3.

Table 3-4 Indicators combining to indicate the fault type of the UPS

No.	Operation state		Indicator No. (see Figure 3-1)										Alarm
			1	2	3	4	5	6	7	8	9	10	
1	Normal mode	5% ~ 25% load capacity	●						●			●	
2		26% ~ 50% load capacity	●	●					●			●	
3		51% ~ 75% load capacity	●	●	●				●			●	
4		76% ~ 95% load capacity	●	●	●	●			●			●	
5		96% ~ 105% load capacity	●	●	●	●	●		●			●	
6		> 105% load capacity	●	●	●	●	●		●			●	□2Hz
7	Battery mode	0% ~ 25% battery capacity					●			●		●	□1Hz
8		26% ~ 50% battery capacity				●				●		●	□1/3Hz
9		51% ~ 75% battery capacity			●	●				●		●	□1/3Hz
10		76% ~ 95% battery capacity		●	●	●				●		●	□1/3Hz
11		> 96% battery capacity	●	●	●	●				●		●	□1/3Hz
12	Bypass mode	< 105% load capacity	○	○	○	○	○		●		●		
13		> 105% load capacity	●	●	●	●	●		●		●		□2Hz
14	Inverter standby	< 105% load capacity	○	○	○	○	○		●		●	□	
15		> 105% load capacity	●	●	●	●	●		●		●	□	□2Hz
16	Non-operation mode									○			
17	Short fault						□	●					◇
18	Charger failure					□		●	○	○	○	○	◇
19	fan/over-temperature fault				□			●	○	○	○	○	◇
20	Parallel current sharing failure			□				●	○	○	○	○	◇
21	Rectifier failure (bus high fault)		□					●	○	○	○	○	◇
22	EPO fault							●					◇
23	Battery fault (high voltage)		○	○	○	○	○		○	□	○	○	
24	Battery fault (no battery, reverse connection)		○	○	○	○	○	●	○	□	○	○	◇
25	Other failures (auxiliary supply failure and inverter failure)		○	○	○	○	○	●	○	○	○	○	◇

Note: ○: off; ●: on; □: flashes; ◎: ensures according to the current operation mode of the UPS; ◇: alarm lasting; □: alarm; when the UPS is in the event of the normal mode, the AC input indicator and inverter indicator are on. The fault of 17, 18 and 22 need power off for recovery

Note

Indicator 5 is yellow, indicator 6 is red and other indicators are green.

Chapter 4 Operation Instructions

This chapter describes UPS check before power-on, and the UPS power-on, turning on and routine operation procedures.

Note

1. If the UPS is fed from an AC generator, follow the following instructions to switch on the UPS: Start up the generator (without switching on the loads), then connect the UPS to the generator. When the generator operates stably, switch on the loads one by one. To ensure reliable generator operation, it is recommended that the UPS load be less than 30% of the generator capacity. It is recommended that the generator capacity be 1.5 times ~ 2 times of UPS rated capacity.
2. The battery has been fully charged before delivery. However, storage and transportation will inevitably cause some charge loss. Therefore, it is required to charge the battery for eight hours before putting the UPS into operation, so as to ensure adequate battery autonomy.

4.1 Check Before Power-On

Before power-on, check the following:

1. Check that the input cables and output cables are connected properly and reliably, and the input cable connections are not reverse.
2. Check that the battery poles are connected properly.
3. Check that the communication cables are connected properly.

4.2 UPS Power-On

After connecting the UPS input and output cables, start up the UPS if the mains input voltage is 120Vac ~ 253Vac, and the UPS conducts self-test (including battery self-test). When the UPS self-test is complete, the UPS enters the standby state and the AC input indicator turns on, as shown in Figure 4-1.

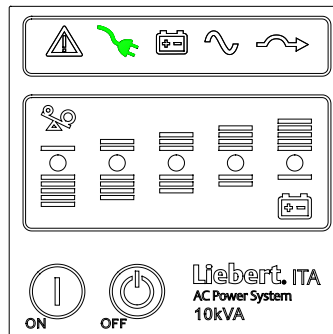


Figure 4-1 Indicator displaying during UPS power-on

4.3 Turning On UPS

After UPS power-up, press and hold the **ON/SILENCE** key for more than one second. After 30 seconds, the UPS will switch to mains inverter standby mode automatically and the inverter indicator will blink. When the UPS has output, the inverter indicator will turn on, as shown in Figure 4-2.

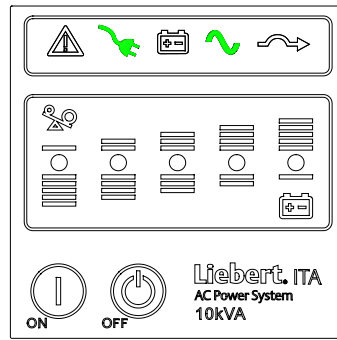


Figure 4-2 Indicator displaying during UPS turning on

Pressing the **OFF** key for 1s to confirm that the UPS is in the bypass mode, the interface is shown in Figure 4-3.

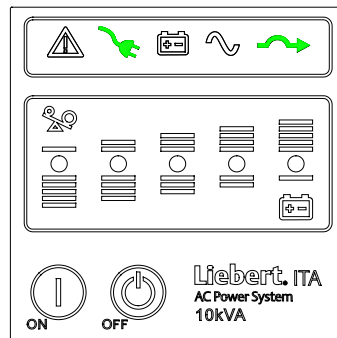


Figure 4-3 Bypass mode

It is recommended that load be less than 70% of the rated load, so as to ensure normal operation of the UPS in the event of short time extra-load, and prolong the lifetime of the UPS at the same time.



Note

If the UPS switches from Normal mode to Bypass mode three times within one hour due to overload, it will remain in Bypass mode for one hour afterwards and cannot switch back to Normal mode till the overload fault is removed.

4.4 Battery Self-Test

Battery self-test includes battery power-on self-test, battery manual self-test and battery periodic self-test.

4.4.1 Battery Power-On Self-Test

To ensure normal battery connection, the UPS will conduct self-test for the battery connection each time the UPS is powered-on. If the battery is not connected, reverse-connected or abnormal, the fault indicator will turn on and the battery indicator will blink to remind you to inspect the battery connection. At this moment, the UPS cannot start up. After the battery connection fault is removed, press and hold the **ON/SILENCE** key for four seconds, and the indicators states are shown in Figure 4-4. If the battery voltage is too high, only the battery indicator will blink.

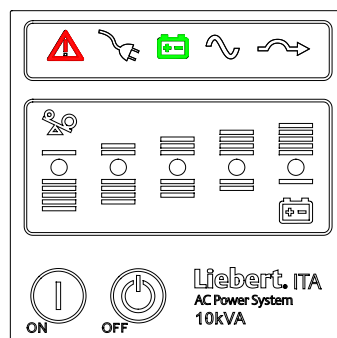


Figure 4-4 Battery power-on self-test

4.4.2 Battery Manual Self-Test

Battery manual self-test includes battery in-position test and battery state test.

Press and hold the **ON/SILENCE** key for four seconds, the battery self-test will begin and the battery indicator will turn on, under the precondition that:

The UPS is in Normal mode

The mains is normal

Rectifier output is not overloaded

Battery voltage is not lower than 12V

After the self-test, the battery indicator will turn off. Upon battery fault (battery not connected or failed), the fault indicator will turn on and battery indicator will blink, as shown in Figure 4-5.

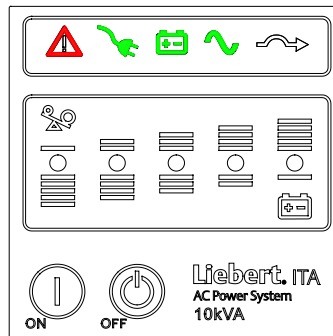


Figure 4-5 Battery manual self-test

4.4.3 Battery Periodic Self-Test

You can set self-test period of the battery through the monitoring software, which includes disabled, 3-month, 6-month, 9-month and 12-month.

The UPS will conduct periodic self-test according to the set self-test period, under the precondition that:

The UPS is in normal mode

The mains input is over 176Vac

The rectifier is normal

The single cell voltage is not lower than 12V

When the battery initiates periodic self-test, the battery indicator will turn on. Upon battery non-connected or failed during battery periodic self-test, the fault indicator will turn on and the battery indicator will blink, as shown in Figure 4-5.

Note

1. After every battery self-test, the UPS will refresh battery state information. Upon battery fault due to battery being under-charged, the UPS can confirm information through self-test after battery is fully charged.
2. Operation procedures: power-on battery, power-on mains and press the **ON/SILENCE** key.

4.5 Turning Off UPS

Turning off UPS includes turning off UPS from Normal mode, turning off UPS from Battery mode and turning off UPS from Bypass mode.

Turning off UPS from Normal mode

When the UPS is operating in Normal mode, press and hold the **OFF** key for one second until the buzzer beeps. At this point, the inverter turns off, the UPS transfers to Bypass mode, the AC input indicator and bypass indicator turn on. After the UPS transfers to Bypass mode, press and hold the **OFF** key for ten seconds, the UPS accesses to standby state. At this point, the UPS is not powered off completely and the AC input indicator flashes, as shown in Figure 4-6. If you wish to power off the UPS completely, you need to open the mains switch.

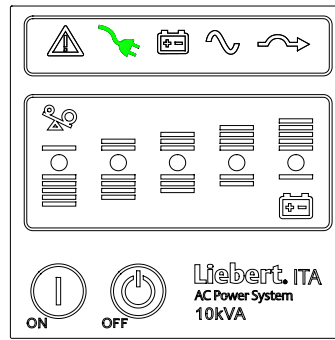


Figure 4-6 Indicator displaying during UPS turning off

Turning off UPS from Battery mode

When the UPS is operating in Battery mode, press and hold the **OFF** key for one second. At this point, the UPS turns off, the UPS ceases output, the load is powered off, the UPS is not powered off completely and the battery indicator flashes, as shown in Figure 4-7. If you wish to power off the UPS completely, you need to press and hold the **OFF** key for ten seconds.

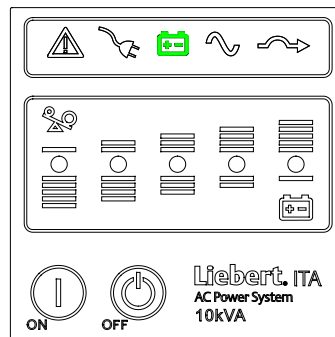


Figure 4-7 Indicator displaying during Battery mode

Turning off UPS from Bypass mode

Press and hold the **OFF** key for one second, the UPS in Bypass mode will cease output and enter the standby state. However, the UPS is not powered off completely then. If you wish to power off the UPS completely, you need to open the mains switch.

4.6 UPS Power-Off

The method of UPS power-off is as follows:

1. Disconnect input cable plug or open the UPS front-level switch after powering off the UPS. At this point, all indicators will turn off, the fan will stop (if the UPS is configured with a battery, the fan will stop 20 seconds later), and the power-off is complete.
2. Place the external switch to the OFF position if the UPS has an external battery.

After powering off the UPS, the UPS ceases output and the load is powered off.

4.7 Transferring UPS Between Operation Modes

In normal state, set the UPS to Normal mode. In the event of mains failure, the UPS will switch to Battery mode automatically and will not cease output. In the event of overload, the UPS will switch to Bypass mode and will not cease output. In the event of inverter fault and over-temperature in the UPS, the UPS will switch to work at fault state automatically.

4.7.1 Transferring UPS From Overload Protection To Bypass Mode

In the event of UPS load outside rated value and preset time, the UPS will switch to Bypass mode from Normal mode and send alarm rapidly (once per 0.5 second). At this point, the UPS outputs mains voltage, the alarm is not canceled till the extra load is removed. Five minutes later, the output will switch back to Normal mode automatically.

To protect the load and UPS, the time that the UPS switches from Normal mode to Bypass mode is not more than three within one hour due to overload. If more than three times, it will remain in Bypass mode and cannot switch back to Normal mode till one hour later.

4.7.2 Transferring UPS From Mains Failure To Battery mode

In the event of mains failure, the UPS will switch to Battery mode. If the UPS has been working till the battery is exhausted, the UPS will be shut down automatically. When the mains is normal, the UPS restarts automatically and switches to Normal mode. This restarting function is designed for unattended operation. If the UPS is shut down manually during battery state operation, the UPS should be restarted manually when the mains resumes.

4.7.3 Transferring UPS From Inner Overheating Protection To Bypass Mode

Keep proper ambient temperature and favorable ventilation for the UPS. Otherwise, the UPS internal temperature will rise. At this point, the UPS will switch to Bypass, the fault indicator will turn on, indicator 3 will blink (see Figure 3-1) and the UPS will keep beeping. You should cut off the UPS input supply, remove the obstacle at the air duct or increase the clearance between the UPS and the wall. After the UPS is cooled, re-connect it to the mains and restart it.

4.7.4 Transferring UPS From Output Short Protection To Fault State

If the load is shorted, the UPS will cease output, the fault indicator will turn on, the yellow indicator among the load level indicators will blink and the UPS will keep beeping. At this point, you should disconnect the shorting load from the UPS, cut off the input power supply and wait for 10 minutes until the UPS is shut down automatically (you also can shut down the UPS by pressing the **OFF** key after ten seconds). After removing the shorting fault, the UPS can be re-connected to the mains and be restarted.

4.8 UPS Monitoring

For UPS monitoring methods, refer to SiteMonitor and user-edition Paramset software and instructions delivered with the UPS.

Chapter 5 Maintenance And Troubleshooting

This chapter expounds fan maintenance, battery maintenance, UPS cleaning, state check, function check and troubleshooting.

5.1 Fan Maintenance

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

During UPS operation, please verify the fan status once half a year by confirming that air blows out from the ventilation holes on the rear panel.

5.2 Battery Maintenance

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 will shorten the battery life.

To ensure the battery life, it is required to

- Keep the ambient temperature between 15°C and 25°C.
- Prevent small current discharge. It is prohibited that the continuous battery discharge time exceeds 24 hours
- Charge the battery for at least 12 hours, if the battery hasn't been charged or discharged for three months at specified ambient temperature, or two months at high ambient temperature.



Note

1. Never short circuit the battery terminals, which will result in fire.
 2. Never open the battery, as the electrolyte is harmful to human body. In the event of inadvertent contact of the electrolyte, wash the affected area immediately with plenty of clean water and go to see the doctor.
-

5.3 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 unobstructed.

5.4 Checking UPS State

It is recommended to check the UPS operation status once every half year.

Check the following:

1. Check if the UPS is faulty: Is the fault indicator on? Is the UPS giving any alarm?
2. Check if the UPS is operating in Bypass mode: Normally, the UPS operates in Normal mode; if it is operating in Bypass mode, find out the reason, for instance, operator intervention, overload, internal fault, and so on.
3. Check if the battery is discharging: When the AC mains is normal, the battery should not discharge; if the UPS is operating in Battery mode, find out the reason, for instance, mains failure, battery test, operator intervention, and so on.

5.5 Checking UPS Functions



Note

UPS function check procedures may cause power interruption to load!

It is recommended to check the UPS functions once every half year.

Backup the load data, before conducting the UPS functions check. Procedures are as follows:

1. Press the **OFF** key to check if the buzzer beeps, indicators are on and the LCD display is normal.
2. Press the **ON/SILENCE** key to check again if the indicators are on, the LCD display is normal and the UPS transfers to Inverter mode.
3. Press the **ON/SILENCE** key for 4s after Inverter mode, the UPS should initiate battery self-test. Check if the battery is normal. If not, find out the problem and solve it.

5.6 Troubleshooting

In the event of a UPS fault, shoot the trouble in the first instance following the instructions provides in Table 5-1. If the fault persists, seek technical assistance from the local service center of Emerson.

Table 5-1 Troubleshooting table

No.	Fault	Possible cause	Action to take
1	The mains switch is closed, but the UPS provides no display on the display panel, and the UPS does not conduct self-test	Main supply not connected to the UPS	Check that the UPS input cables are connected properly
		Input voltage too low	Use a voltmeter to confirm that the UPS input voltage is within specifications
2	Mains supply is normal, but the AC input indicator is off, and the UPS is in Battery mode	UPS mains switch open	Close the UPS mains switch
		Input cables improperly connected	Connect the UPS input cables properly
3	No UPS alarm, but no UPS output voltage	Output cables improperly connected	Make sure the output cables are properly connected
4	After pressing the ON/SILENCE key, the UPS does not start	The key holding time is too short	Press and hold the ON/SILENCE key for more than one second till the buzzer beeps
		Overload	Remove all load and restart the UPS
5	The AC input indicator flashes	Mains voltage or frequency exceeds UPS input range	If the UPS is operating in Battery mode, pay attention to the battery backup time
6	The buzzer beeps every 0.5 second, and the LCD displays OVERLOAD	Overload	Rectifier is overload or mains voltage is overload. Need to remove non-priority load
7	The fault indicator illuminates, the LED displays BATTERY FAL, and the BATTERY indicator flashes	External battery breaker open	Close the external battery breaker
		External battery cables improperly connected	Check that the external battery cables are properly connected
		External battery polarity reversed	Check that the external battery cables are not reverse-connected
		Battery damaged	Contact the local service center of Emerson to replace the battery
8	The fault indicator illuminates, and the LED displays CHARGER FAIL	Charger failed	Contact the local service center of Emerson to replace or repair the charger
9	The UPS has reduced battery time	Battery not fully charged	When the mains power is normal, charge the battery for more than eight hours, and then test the battery discharge time
		Battery not able to hold a full charge due to age	Contact the local service center of Emerson to replace the battery
10	The buzzer beeps, the fault indicator illuminates, and the LED displays TEMP OVER	Internal over-temperature/fan fault	1. Check that fan is unobstructed and air blows out from the air outlet on the rear panel. 2. Check that the clearances on both sides and at the back of the UPS are greater than 200mm. 3. Check that the ventilation holes on the front panel, side panels, base plate and rear panel of the UPS are unobstructed. 4. Wait for ten minutes and restart the UPS
11	The buzzer beeps for a long time, the fault indicator illuminates, and the LED displays OUTPUT SHORT	UPS output short circuit	Remove the output short circuit fault and restart the UPS

No.	Fault	Possible cause	Action to take
12	The buzzer beeps for a long time, the fault indicator illuminates, and the LED displays RECTIFIER FAIL, INVERTER FAIL, AUX SUPPLY FAIL, or OUTPUT FAIL	UPS internal fault	The UPS needs repair. Seek technical assistance from the local service center of Emerson.
13	Abnormal noise or smell in UPS	UPS internal fault	Turn off the UPS and cut off the power input immediately. Seek technical assistance from the local service center of Emerson
14	Yellow indicator illuminates and the buzzer beeps for a long time in Battery mode.	Battery voltage is low, the UPS is about to shut down, and cease feeding the load	1. Save the load data immediately and turn off the load, to avoid data loss or damage. 2. Connect backup AC power to the UPS input
15	The fault indicator illuminates, and the buzzer beeps for a long time	The parallel address is wrong	1. Open the UPS mains switch. 2. Reset the parallel address

When reporting UPS fault to Emerson or dealer, please inform the UPS model and machine No. (the bar code on the rear panel of the UPS). If the UPS is an extended UPS, you also should provide battery configuration information.

Appendix 1 Battery Module

Appearance

You need to install the protective panel of the battery module after arriving at the installation location. Please refer to 2.3.2 *Installing Plastic Panel* for the installation method.

The standard UPS has a battery module. The appearance of the battery module is shown in Figure 1.

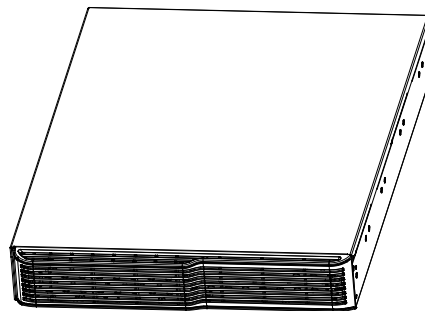


Figure 1 Battery module

Rear panel

Operation panel on the front panel of the battery module is not available. The battery module provides battery ports, battery fuse box and ventilation holes on the rear panel, as shown in Figure 2.

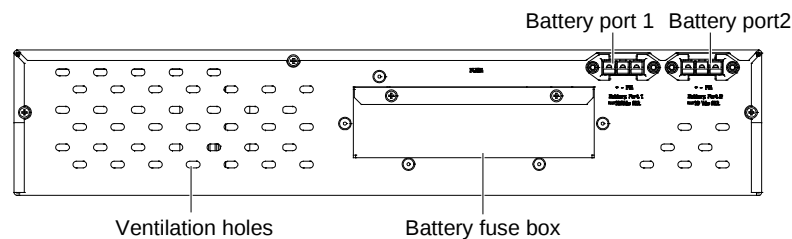


Figure 2 Rear panel of the battery module

Replacing battery fuse

If the battery internal fuse is damaged, loosen the protective cover on the rear panel of the battery module and replace the damaged fuse with a new one, then tighten the fixing screws of the protective cover to prevent electric shock risk during the UPS operation, as shown in Figure 3.

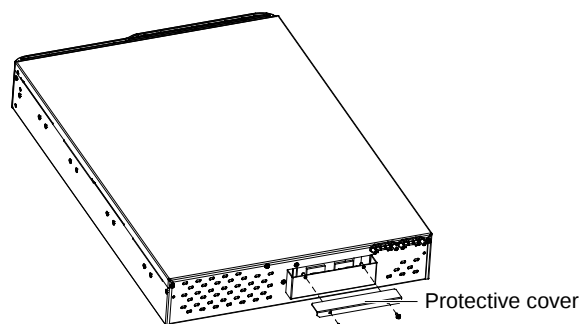


Figure 3 Replacing fuse



Note

1. Because battery loop and AC input are not insulated, a dangerous voltage may exist between the battery ports and ground, so it is prohibited to contact them with hands, thus presenting electric risk.
2. The length of the standard battery cable delivered with the battery module is 0.5m. If user needs more length cable, please consult the dealer.

Appendix 2 Communication Function

The UPS provides not only SNMP card but also dry contact, MODBUS card and other communication components. This chapter only introduces SNMP card. For the installation and use of the other communication components, refer to information delivered with each communication components.

The SNMP card realizes remote monitoring. For details, setting and use of the SNMP card, refer to *UPS Web/SNMP Agent Card User Manual*. The SNMP card ports and USB ports cannot be used at the same time.

The layout of pins for the SNMP card ports is shown in Figure 4.

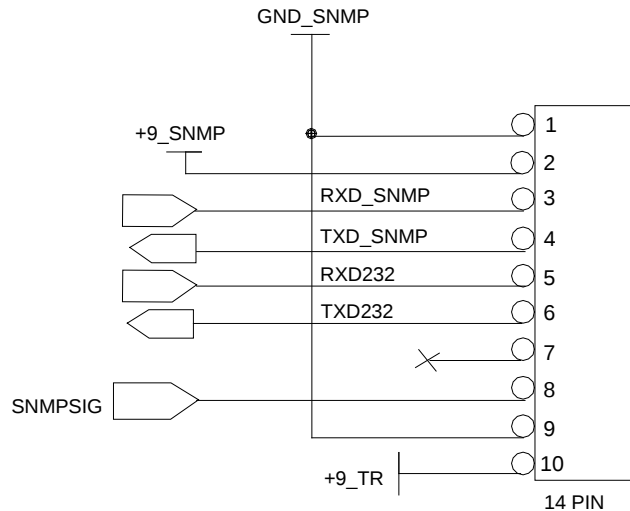


Figure 4 Layout of pins for the SNMP card ports

Definition of the pins for the SNMP card ports:

Pin 1 and pin 9: power ground of the SNMP card

Pin 2: supplied to SNMP card by DSP plate

Pin 3: signal from the SNMP card, connected to RXD of the DSP plate

Pin 4: signal to the SNMP card, connected to TXD of the DSP plate

Pin 5: connected to RX of the RS232 communication port of the host

Pin 6: connected to TX of the RS232 communication port of the host

Pin 7: reserved

Pin 8: card gating signal, connected to +9_TR after inserting SNMP card

Pin 10: supplied by DSP plate, used to card gating

Appendix 3 LCD Display Panel

LCD display panel is an option. The debugging had been finished before delivered. You need to install it by yourself. During installation, it is prohibited to open the LCD display panel.

1. Installation

You can install the LCD display panel with no need to open it. The detailed procedures are as follows:

1. Confirm that the UPS is powered off, the bypass and I/O switches are open, and the battery cable is disconnected.
2. Press two ends of the UPS plastic panel with hands, and gently pull out the plastic panel, as shown in Figure 5(a).
3. Use a screwdriver to remove the four M3 × 8 screws, which fix the LED display panel and the UPS chassis. Pull out the LED display panel and cables from the chassis, as shown in Figure 5(b). Disconnect the two cables connecting to the LED display panel, and remove the LED display panel.
4. Connect the two cables to the LCD display panel, and fix the LCD display panel with four M3 × 8 screws, as shown in Figure 5(c).
5. Install the plastic panel back to its position, as shown in Figure 5(d).

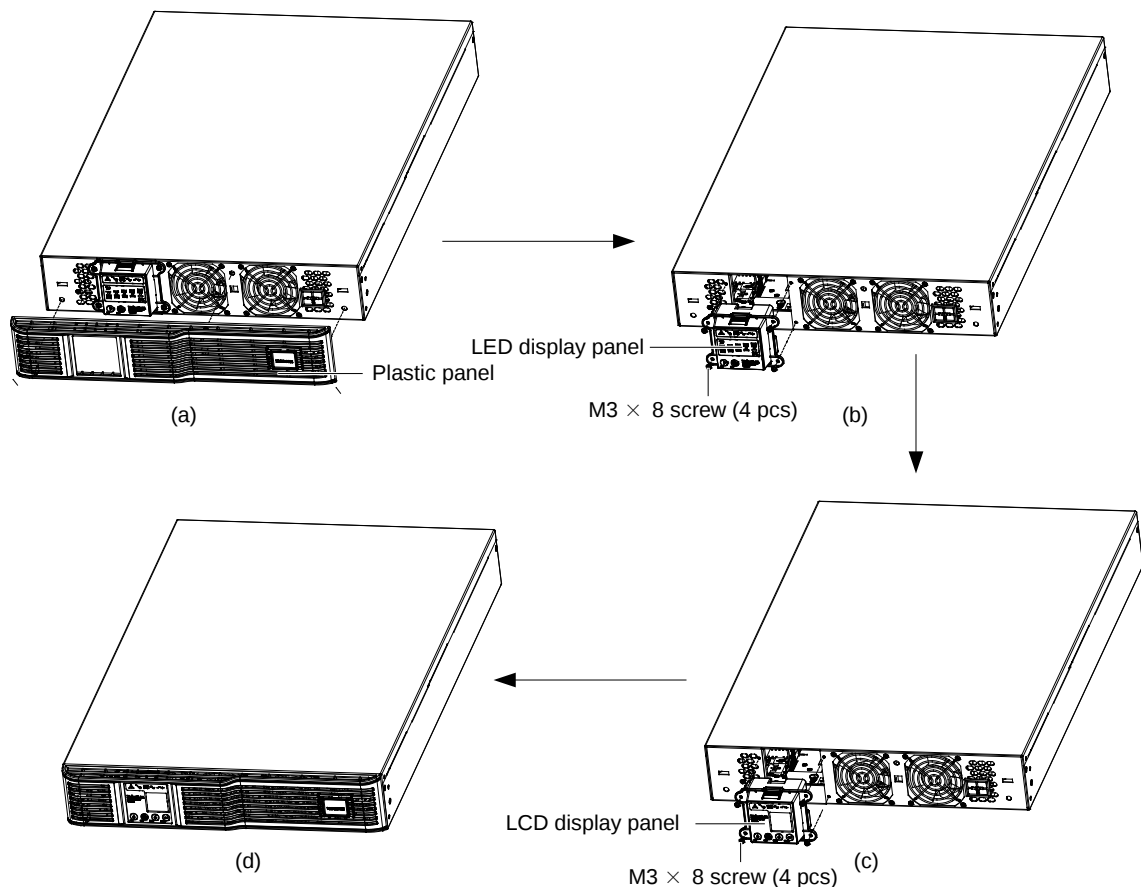


Figure 5 Installing the LCD display panel

Note

The rotation method of the LCD display panel is the same as that of the LED display panel, please refer to 2.3.3 *Operating Display Panel*.

2. Brief Introduction

The LCD display panel provides a LCD, indicators and control keys, as shown in Figure 6, which are used to display and control the following information: operation parameters, alarm information and function setup.

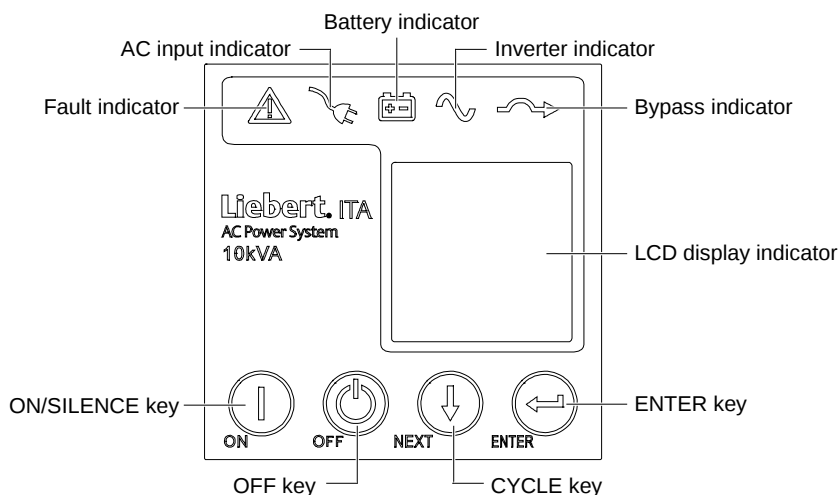


Figure 6 LCD display panel

The LCD display panel provides five indicators, a LCD and four control keys.

Indicators

The indicators include fault indicator, AC input indicator, battery indicator, bypass indicator and inverter indicator, which indicate UPS operation and fault states. For details, refer to Table 3-2.

LCD

The resolution of the LCD is 128×128 dots. The Chinese character dot matrix is 16×16 , English character, number character and small number dot matrix is 16×8 . The LCD is used together with the **CYCLE** and **ENTER** keys to provide the UPS running and alarm message and setting display interface.

Control keys

The LCD display panel provides four control keys: **ON/SILENCE** key, **OFF** key, **CYCLE** key and **ENTER** key. Their functions are listed in Table 1.

Table 1 Functions of the control keys

Control key	Function
ON/SILENCE key	1. Starting inverter: When the inverter is off, pressing and holding this key for one second starts the inverter. 2. Silencing alarm: In Battery mode, upon overload or fault, the UPS has an audible alarm, pressing and holding this key for one second silences the alarm. 3. Initiating battery test: When the UPS is in Normal mode, pressing and holding this key for four seconds initiates battery test
OFF key	1. Turning off inverter: When the UPS is in Normal mode or Battery mode, pressing and holding this key for one second turns off the inverter, then the UPS turns to the bypass mode 2. UPS accessing to standby state: When the UPS is in Bypass mode, pressing and holding this key for ten seconds turns off the UPS bypass output, then the UPS accesses to standby state
CYCLE key	Pressing and holding this key for less than one second shifts between menu items on the same level and selects parameters. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD
ENTER key	Pressing and holding this key for less than one second opens the selected menu and confirming. Pressing and holding this key for more than one second returns to previous menu

3. LCD Display Interface

The LCD provides the following interfaces, including power-on self-test interface and menu operation interface.

Power-on self-test interface

Power-on self-test interface is used to display the product series, type and company name for about 20 seconds, as shown in Figure 7. The definitions of the control keys in this interface are listed in Table 2.

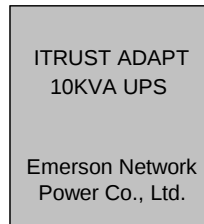


Figure 7 Power-on self-test interface

Table 2 Definitions of the control keys in the power-on self-test interface

Control key	Definition
ON/SILENCE key	Pressing and holding this key for one second starts the inverter
OFF key	No response
CYCLE key	Pressing and holding this key for more than one second turns on the backlight on the LCD
ENTER key	No response

Menu operation interface

The menu operation interface includes running interface, alarm message interface and setting interface.

You can enter the corresponding interfaces through the control keys on the LCD display panel, the interfaces are refreshed once per second. The definitions of each level menu are listed in Table 3.

Table 3 Sub-menu

Main menu	Level-1 menu	Level-2 menu	Level-3 menu	Level-4 menu
UPS1# UPS2# UPS3# UPS4# System information	Running	Input	Input voltage	Phase-A Phase-B (No display when input is single-phase) Phase-C (No display when input is single-phase)
			Frequency	
		Battery	Battery voltage	
			Battery capacity	
		Bypass	Bypass voltage	
		Output	Output voltage	
			Output current	
			Output frequency	
			Active power	
			Apparent output	
			Load factor	
		Return		
	Setting	System	EOD Startup	Enabled (default), disabled
			ECO function	Enabled (default), disabled
			Capacity	6kVA
			Self-test cycle	Disabled (default), 3-month, 6-month, 9-month, 12-month
		LCD	Installation mode	Horizontal (default), vertical
			Language	Chinese (default), English
		Resume default	Resume default	
		Return		
	Alarm message		Inverter asynchrony	
			Inverter failure	
			Rectifier failure	
			Abnormal bus voltage	
			Abnormal input	
			Abnormal bypass	
			Battery discharge end	
			Battery fault	
			Output overload	

Main menu	Level-1 menu	Level-2 menu	Level-3 menu	Level-4 menu
UPS1#	Alarm message		Output short	
			Charger failure	
UPS2#			Over-temperature for radiator	
			Fan fault	
UPS3#			auxiliary supply failure	
			Input neutral line in disconnected	
UPS4#			Parallel line fault	
			Current sharing fault	
System information			Parallel address conflict	
			Module communication fault	
	Return			

The contents displayed in the parallel menu are shown in Figure 8. "LOCAL" is the current DIP address, "ABSENT" indicates that the UPS on the address is not connected to the parallel system, "SYSTEM" is the output parameters of the parallel system. The definitions of the control keys in this parallel interface are listed in Table 4. When the UPS works in single mode, there is no main menu.

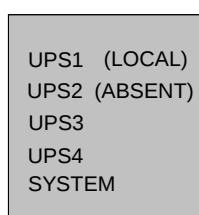


Figure 8 Parallel menu interface

Table 4 Definitions of the control keys in the parallel menu interface

Control key	Definition
CYCLE key	Pressing and holding this key for less than one second cycles display the selected content in high-light. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD
ENTER key	Pressing and holding this key for less than one second enters the corresponding menu or system

If the system is parallel, select the "UPS1 (LOCAL)", press and hold the **ENTER** key for less than one second to enter the level-1 menu. The displayed contents are shown in Figure 9(a). Select other UPSs, press and hold the **ENTER** key for less than one second to enter the level-2 menu of the running parameters (the alarm messages of other UPSs are not be displayed and the setting is invalid). If the UPS is single, enter the level-1 menu directly and the displayed contents are shown in Figure 9(b). The definitions of the control keys in this interface are listed in Table 5.

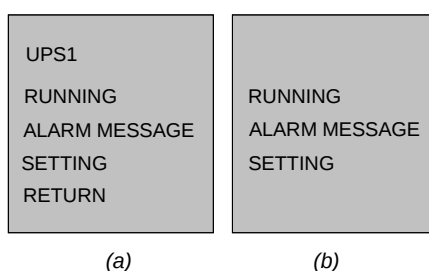


Figure 9 Level-1 menu interface

Table 5 Definitions of the control keys in level-1 menu interface

Control key	Definition
CYCLE key	Pressing and holding this key for less than one second cycles display the selected content in high-light. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD
ENTER key	Pressing and holding this key for less than one second enters the selected menu. Pressing and holding this key for more than one second returns to the parallel menu, there is no response when the UPS is single

The contents displayed in level-2 menu are shown in Figure 10 when the UPSs are parallel. The UPS address is not displayed when the UPS is single, and others are the same. The definitions of the control keys in this interface are listed in Table 6.

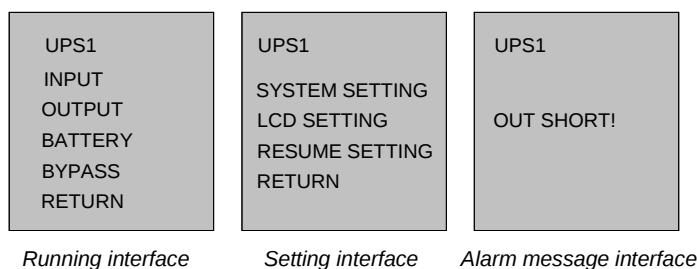


Figure 10 Level-2 menu interface

Table 6 Definitions of the control keys in the level-2 menu interface

Control key	Response relation
CYCLE key	Pressing and holding this key for less than one second cycles display the selected content in high-light. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD
ENTER key	Pressing and holding this key for less than one second enters the selected menu. Pressing and holding this key for more than one second returns to the previous menu

The contents displayed in level-3 menu include the specific contents of the running parameters, setting parameters and alarm messages.

The contents displayed in running parameter interface are shown in Figure 11 when the UPSs are parallel. The address is not displayed when the UPS is single, and others are the same. The definitions of the control keys in this interface are listed in Table 7.

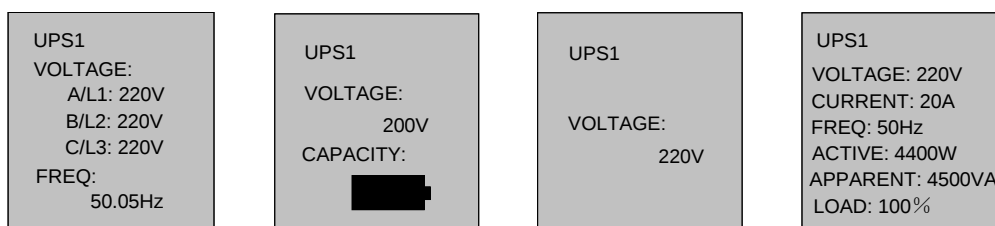


Figure 11 Level-3 and level-4 menu of running parameter interface

Table 7 Definitions of the control keys in the running parameter interface

Control key	Definition
CYCLE key	Pressing and holding this key for less than one second: no response; Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD
ENTER key	Pressing and holding this key for less than one second returns to the level-2 menu. Pressing and holding this key for more than one second returns to the previous menu

The contents displayed in setting parameter interface are shown in Figure 12. The definitions of the control keys in this interface are listed in Table 8.

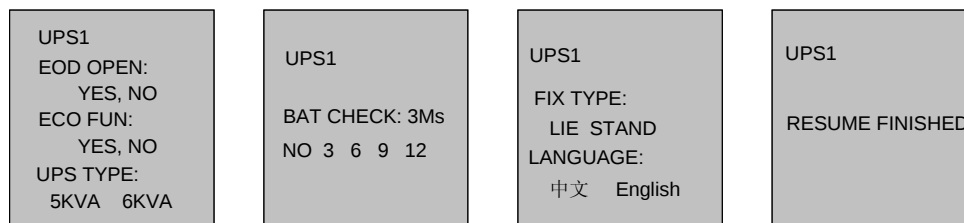


Figure 12 Parameter setup interface

Table 8 Definitions of the control keys in the parameter setup interface

Control key	Definition
CYCLE key	Pressing and holding this key for less than one second cycles display the selected items in high-light. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD
ENTER key	Pressing and holding this key for less than one second enters the selected items. Pressing and holding this key for more than one second returns to the previous menu

The contents displayed in alarm message interface are shown in Figure 13.

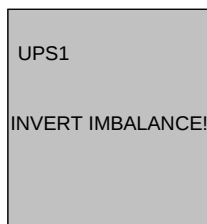


Figure 13 Alarm interface

The alarm message interface displays the current alarm information of the UPS for 20s in real time and return to the alarm message interface automatically. The specific alarm message can be displayed in the level-1 menu. The definitions of the control keys in this interface are listed in Table 9.

Table 9 Definitions of the control keys in the alarm message interface

Control key	Definition
CYCLE key	Pressing and holding this key for less than one second: no response. Pressing and holding this key for more than one second turns on/turns off the backlight on the LCD
ENTER key	Returns to the previous menu

Appendix 4 POD

UPS parallel output power distribution unit (POD for short) includes single-phase input single-phase output 1 + 1 POD and 3-phase input single-phase output 1 + 1 POD.

This chapter introduces the appearances and ports of the two PODs.

1. Single-Phase Input Single-Phase Output 1 + 1 POD

The appearance of the single-phase input single-phase output 1 + 1 POD is show in Figure 14.

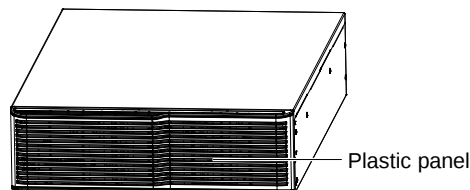


Figure 14 Appearance of single-phase input single-phase output 1 + 1 POD

Remove the plastic panel, you can access the operation panel of the single-phase input single-phase output 1 + 1 POD, as shown in Figure 15.

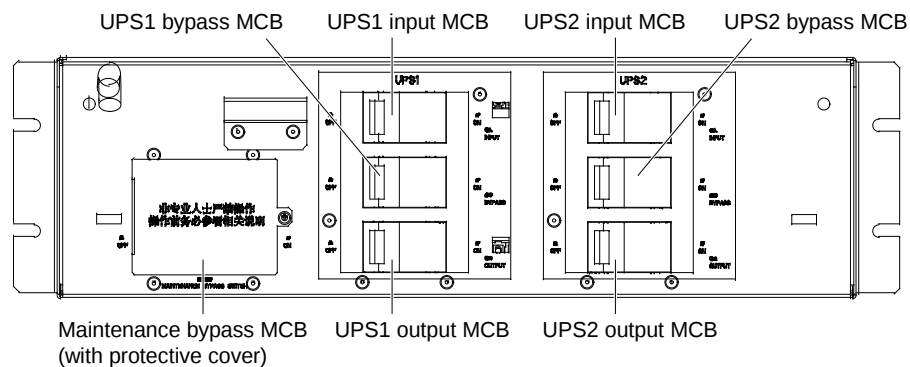


Figure 15 Operation panel of the single-phase input single-phase output 1 + 1 POD

The rear panel of the single-phase input single-phase output 1 + 1 POD is shown in Figure 16.

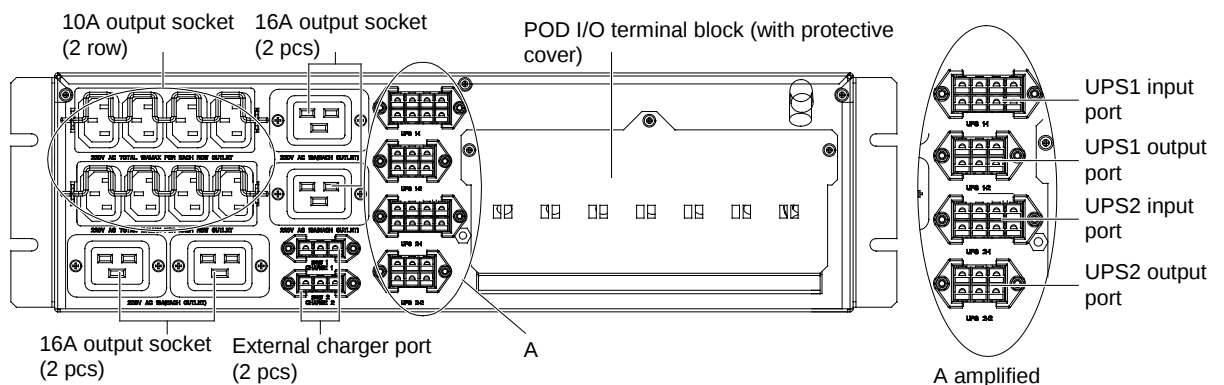


Figure 16 Rear panel of the single-phase input single-phase output 1 + 1 POD

2. 3-Phase Input Single-Phase Output 1 + 1 POD

The appearance of the 3-phase input single-phase output 1 + 1 POD is shown in Figure 17.

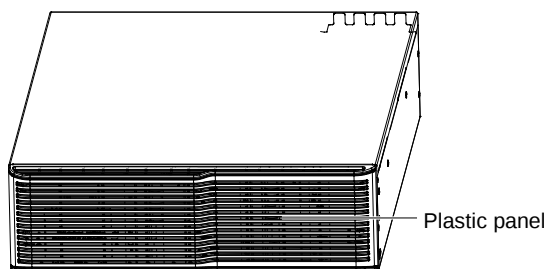


Figure 17 3-phase input single-phase output 1 + 1 POD

Remove the plastic panel, you can access the operation panel of the 3-phase input single-phase output 1 + 1 POD, as shown in Figure 18.

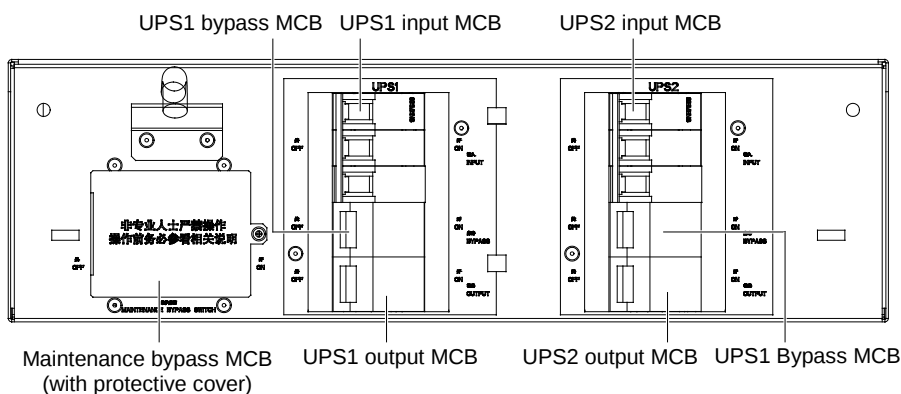


Figure 18 Operation panel of the 3-phase input single-phase output 1 + 1 POD

The rear panel of the 3-phase input single-phase output 1 + 1 POD is shown in Figure 19.

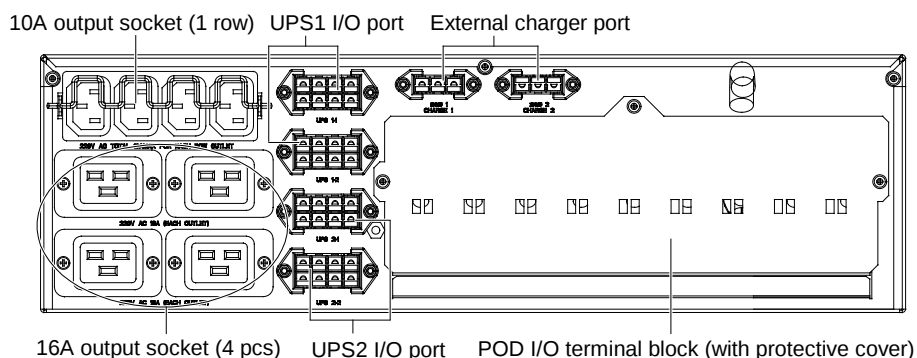


Figure 19 Rear panel of the 3-phase input single-phase output 1 + 1 POD

Appendix 5 Optional Part List

The optional part list is given in Table 10.

Table 10 Optional part list

Optional part	Type	Remark
Battery module	U16-07C1	Standard configuration
	U20-24C2	User needs to select a battery cabinet with two layers
	U20-38C3	User needs to select a battery cabinet with three layers
	U20-65C3	User needs to select a battery cabinet with three layers
	U20-100C3	User needs to select a battery cabinet with three layers
Communication options	UF-SNMP610	SNMP card assembly used in Intellislot UPS - ROHS
	UFDRY22Z1-UF-DRY220	Dry contact extended card used in UPS - {R5}
	UFDRY21Z1-UF-DRY210	Dry contact card and its assembly used in UPS - {R5}
	UFMOD11Z1-iTrust	MODBUS assembly used in UPS (UF-MODBUS110) - {R5}
POD	UF-POD113U11	single-phase input single-phase output rack model 10kVA UPS 1 + 1 POD - {R5}
	UF-POD113U31	3-phase input single-phase output rack model 10kVA UPS 1 + 1 POD - {R5}
Guide rail/rack	DMBM6.200.020	
LCD unit	UHA2SA1Z5	

The optional parts has been installed and debugged before delivery.