Li90 Three-Phase UPS

User & Installation Manual

Contents

1 Safety Description

This chapter introduces the safety announcements. Prior to performing any work on the UPS, please read the user manual carefully to avoid human injury and device damage by irregular operations.

1.1 Safety Announcements

This section introduces the safety announcements that must be complied with and pay special attention while installing, using, maintenance and other relative operations.

CAUTION

Before operating, please read the announcements and operation instructions in this section carefully to avoid accidents.

The DANGER, WARNING, CAUTION, etc. in the manual are not all the safety announcements that you must abide by, they are just the supplements for the safety announcements during operating.

NOTE

Our company does not undertake the responsibility caused by violating common safety operation requirements or the safety standard of design, manufacture and use.

1.1.1 Safety Instructions

CAUTION

There exists high temperature and high voltage inside the UPS. During using, please strictly comply with all warnings and operation instruments on the UPS and in the user manual.

DANGER

In case of fire, please use the fire extinguisher which is suitable for li-ion battery system.

CAUTION

The UPS is a class C3 device. If it is used in residential purpose, it may cause wireless interference. User should take actions to avoid the interference.

- No liquid or other objects are allowed to enter the UPS.
- UPS must be well grounded.
- In case of fire, please use a dry power fire extinguisher. If using liquid fire extinguisher, it may cause electric shock.

1.1.2 Use Announcements for Battery

CAUTION

Before using, please confirm that the charge voltage of li-ion battery system matches that of connected UPS. If you have any questions, please consult the manufacturer to support.

- Only authorized professionals can replace battery. Do not wear conductive objects, such as watches, bracelets and rings during operation. Wear rubber shoes and gloves and use tools with insulated handle.
- Don't put tools or other conductive objects on the battery.
- It is prohibited to short the positive pole and negative pole of the battery or connect them reversely, which is to avoid fire or electric shock.
- The battery must be replaced with the same type, model and manufacturer.
- Battery should be kept away from fire source or other electrical equipment that may easily cause spark to avoid human injury.
- Don't open or destroy the battery. The electrolyte in the battery includes some dangerous objects, such as strong acid, which will be harmful to skin and eyes. If it is careless to touch the electrolyte, clean it by a lot of water immediately and then check it in the hospital.

- The waste battery should be disposed of according to the local regulations.

1.1.3 Anti-Static Protection

CAUTION

The static generated by human bodies may damage the electrostatic-sensitive components on PCB. Before touching the sensitive component, please wear anti-static rings and connect the other end of the anti-static rings to ground.

1.2 Operation and Maintenance Requirements

CAUTION

Only authorized professionals are allowed to open the UPS chassis, or it may cause electric shock and the caused UPS fault is out of the guarantee range.

- If UPS needs to be moved, rewired or maintained, disconnect all electrical connection, such as AC power, battery power, etc. to isolate power input. Do not do any work on the UPS until it is powered off completely (≥10min). Otherwise, the output may have electricity, which may cause electric shock.
- When dismantling fans, do not put fingers or tools into the rotating fan to avoid device damage or human injury.

1.3 Environment Requirements

DANGER

Do not put the UPS in the environment where has inflammable, explosive gas or smog, do not do any operation in this environment.

- Do not use the UPS in the place where it has direct sunshine, rain or a wet environment.

- The normal work temperature of UPS is 0℃~+40℃(32℉~104℉), relative humidity: 0%-95%RH, with no condensation (recommended work temperature is 20℃~25℃(68℉~77℉), humidity is about 50%).
- Put the UPS in the flat floor without vibration and the vertical gradient is less than 5°. Keep good ventilation around the UPS. The clearance between the rear or the side of UPS and adjacent devices or wall should be at least 300~500mm (11.9~19.7in). Poor ventilation will rise temperature inside UPS, which will reduce the service life of inner components and even affect the life span of the UPS.
- The UPS must be used below 2000m.
- Avoid installing UPS in environments with direct sunlight, dust, volatile gases, corrosive substance and high salinity.
- Do not install UPS in an open-air environment, the installation environment of li-ion battery module should meet the li-ion battery module specification.
- It is strictly forbidden to install the UPS in an environment with metal conductive dust.

⚠ CAUTION

The optimal operating temperature for the battery is 20℃~30℃ (68℉~86℉). Working at a temperature higher than 30℃ (86℉) will shorten the battery life, and working at a temperature below 20℃ (68℉) will shorten the battery's backup time.

2 Overview

This chapter mainly introduces the UPS's model meaning, features, structure, work principle, etc.

2.1 Product Introduction

Li90 series UPS is a high frequency, pure online, double-conversion, smart product. The system is perfect power security for file server, enterprise server, center server, micro-computer, concentrator, telecom system, data center and others that require high quality power protection. They are widely used in many key business areas, such as finance, network, stock, Oil & Gas, industrial power, electric power, automobile, etc.

2.1.1 Features

Completely digitalized smart control

The UPS can monitor the grid frequency (50Hz/60Hz) and self-adapt the frequency. The output voltage can be set to 190V/200V/208V/220V, which makes the use more flexible.

Energy saving and high efficiency

Adopts three-level inverter technology and PFC control technology, the output voltage wave is perfect and the whole efficiency can be 94%, the input power factor is greater than 0.99, which greatly improves the use ratio of electric energy and reduces the load of power grid.

Smart fan speed control

The fan speed is adjusted automatically in accordance with the load status, which prolongs fan life and reduces noise.

ECO energy saving mode

The UPS is designed with ECO energy saving mode. When the grid is good, if the UPS operating in this mode, the bypass prior to output, and the efficiency can be 98%. When the bypass voltage or

frequency is out of normal range and cannot satisfy the user’s power supply requirement, it will switch to inverter output, which guarantees the reliability of power supply.

Low mains input voltage

Adopt the independent rapid detection technology. When output load is small, even the mains voltage is 70V, which is the mains low limit, the battery still doesn't discharge. Therefore, in the mains mode, all output power gets from the grid, which is to ensure the battery in 100% energy storage status, and at the same time, reduce the battery discharge times and prolong the service life.

2.1.2 Appearance

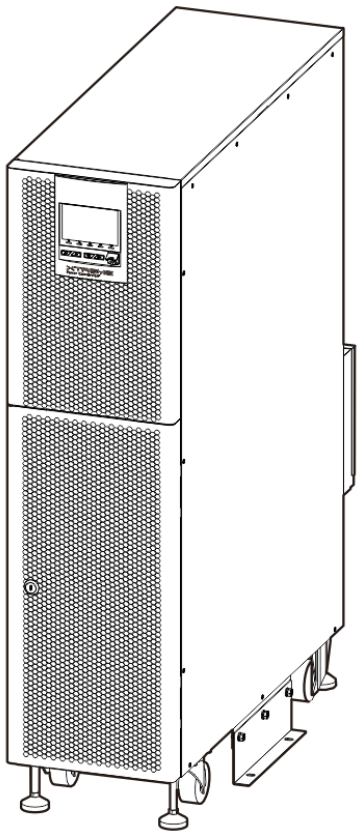


Figure2-1 Appearance

Operation panel

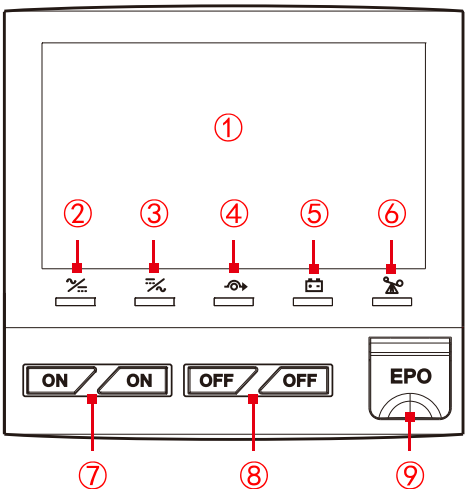


Figure2-2 Operation panel

Table2-1 Illustration for touch screen operation panel

No.	Name	Illustration
Illustration for operation panel		
①	Touch screen display	Shows the working status and system setting.
②	AC/DC indicator	On (green): rectifier works normally; On (red): rectifier abnormal.
③	DC/AC indicator	On (green): inverter works normally; On (red): inverter abnormal.
④	BYP. indicator	On (green): bypass output; On (red): bypass abnormal.
⑤	BATT. LOW indicator	On (red): battery is low-voltage.
⑥	OVERLOAD indicator	On (red): output is overload or overload protection.
Buttons operation instructions		
⑦	"ON" combination button	Press both "ON" buttons for 1s at the same time, the system will power on.
⑧	"OFF" combination button	Press both "OFF" buttons for 1s at the same time, the system

No.	Name	Illustration
		will power off.
⑨	EPO emergency power off button	Press the button, the system will turn off output power immediately.

Rear panel

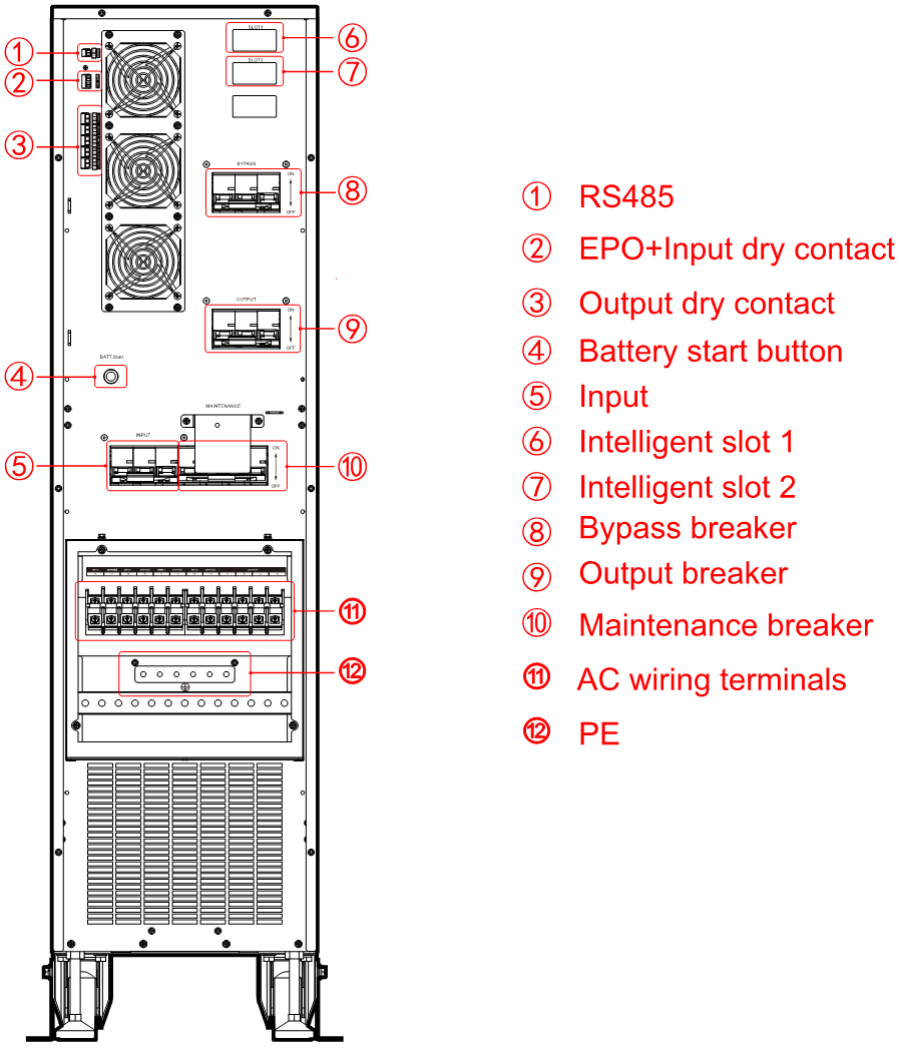


Figure2-3 Structure of rear panel

NOTE

1. The battery start operation: press "BATT. Start" button and wait for the buzzer sounds 7s, and then the system establishes auxiliary power and then start ON operation, the device will start up.

CAUTION

1. Battery start only works in this case: the UPS power on through battery power when there is no mains power.
2. The gate controlled switch releases automatically when removing the maintenance breaker cover plate and closes automatically when reinstalling the cover plate.
3. Operation method of maintenance bypass mode: firstly, remove the cover plate of maintenance breaker, the door control switch for maintenance bypass detection pops up automatically, the UPS turns off the inverter and switches to bypass mode. Switch on the maintenance bypass breaker and then switch off the input breaker, bypass breaker and output breaker. Meanwhile, the maintenance bypass power for load, and the UPS input and output power are all disconnect, so the UPS can dismantle wire for maintenance.
4. Operation method of restoring maintenance bypass mode to inverter mode: switch on input breaker, bypass breaker and output breaker in turn. When UPS working power is normal and touch screen has display bypass output voltage, switch off maintenance bypass breaker. Reinstall maintenance bypass breaker cover plate. Finally, press ON combination button on UPS panel to start UPS inverter power.

2.1.3 Li-ion Battery Module

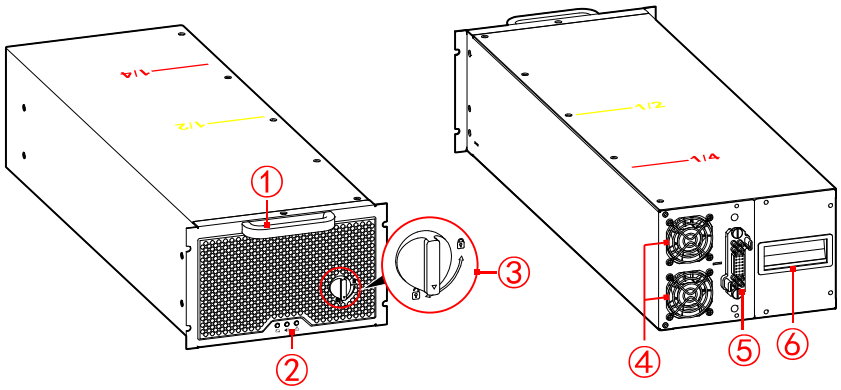


Figure2-4 Li-ion battery module appearance

Table2-2 Component illustration of li-ion battery module

No.	Name	No.	Name
①	Front handle	④	Fan
②	Indicator	⑤	Output connector

No.	Name	No.	Name
③	ON/OFF switch	⑥	Handle

NOTE

- At the top of the battery module, there are position marks. The yellow " 1/2 " means half of the module. The red " 1/4 " means quarter of the module.
- When the ON/OFF knob stays in  status, the module is not locked with cabinet, and the module can be removed.
- When the ON/OFF knob stays in  status, the module is locked with cabinet, and the module cannot be removed.

CAUTION

When the ON/OFF knob is in  status, the module starts to output automatically, and the output is with DC voltage.

Table2-3 Indicator illustration

Mark	Name	Color
	Run indicator	Green
	Alarm indicator	Yellow
	Fault indicator	Red

Table2-4 Indicator status illustration

Indicator / Status	Run	Alarm	Fault
Charge			
Discharge			
Sleep			
OFF			
Module alarm	-		
Communication abnormal	-		-
Module protection			
Battery abnormal			

NOTE
"*" means that the indicator stays in any status.
, , means that the corresponding indicator is on.
, , means that the corresponding indicator flickers once every 1 second.
means that the alarm indicator flickers once every 3 seconds.
, , means that the corresponding indicator is off.

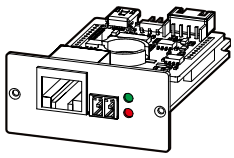
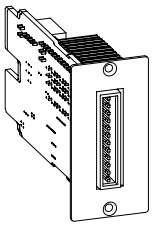
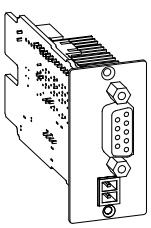
2.1.4 Communication

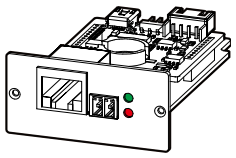
The supported communication methods of this series UPS include RS485, Parallel Kit-T (2m) NT-PA, communication dry contact, Dry-contact Kit (Y5) NT-RS485Y5, Protocol Transfer Kit NT-MODBUS and SNMP card.

Table2-5 Communication method correspondence with hardware port

Communication method	Communication port
RS485	RS485
Dry contact	Dry contact 1: output dry contact (OUT.1~OUT.5); Dry contact 2: input dry contact (EPO+IN.1)

Table2-6 Communication method correspondence with hardware port

Communication method	Sketch map	Communication port
SNMP card (optional)		Slot 1
Dry-contact Kit (Y5) NT-RS485Y5 (optional)		Slot 2 (choose any one)
Protocol Transfer Kit (optional)		

Communication method	Sketch map	Communication port
SNMP card (optional)		

RS485

The UPS uses the RS485 series port to communicate with PC. The corresponding pin relationship of RS485 port between UPS and PC is as shown Table2-7.

Table2-7 The corresponding pin relationship of RS485 port between of UPS and PC

RS485 port of UPS	RS485 port of PC
A	A (+)
B	B (-)

NOTE

The standard RS485 communication ports of rear panel cannot communicate normally when slot2 uses optional communication card.

Dry contact

The control of dry contact signal or alarm information can be achieved by communication dry contact. Dry contact function can be set through the touch screen.

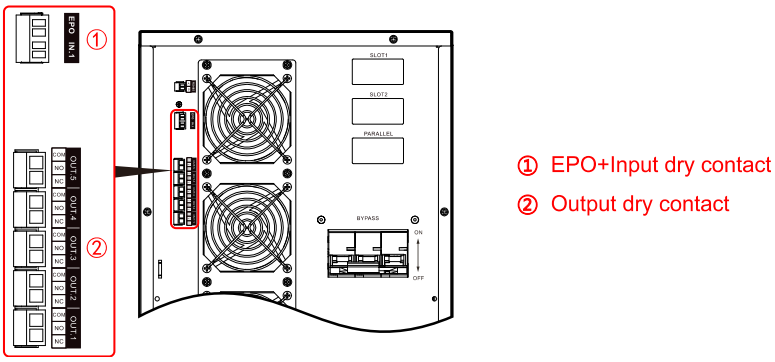


Figure2-5 Dry contact position

CAUTION

Relay dry contact capacity is 277Vac/30Vdc/10A, relay coil voltage is 12V.

Table2-8 Dry contact functions illustration

No.	Silk-screen		Function illustration	Remarks
Dry contact 1	OUT.1	NC	Trigger action when signal is valid: NO and COM is connect, which disconnect with NC. The signal is settable and refers to the note for detail. Default is mains abnormal.	NC: normal close; NO: normal open; COM: common port.
		NO		
		COM		
	OUT.2	NC	Trigger action when signal is valid: NO and COM is connect, which disconnect with NC. The signal is settable and refers to the note for detail. Default is bypass abnormal.	
		NO		
		COM		
	OUT.3	NC	Trigger action when signal is valid: NO and COM is connect, which disconnect with NC. The signal is settable and refers to the note for detail. Default is battery abnormal.	
		NO		
		COM		
	OUT.4	NC	Trigger action when signal is valid: NO and COM is connect, which disconnect with NC. The signal is settable and refers to the note for detail. Default is output abnormal.	
		NO		
		COM		
	OUT.5	NC	Trigger action when signal is valid: NO and COM is connect, which disconnect with NC. The signal is settable and refers to the note for detail. Default is overload alarm.	
		NO		
		COM		
Dry contact 2	EPO		The signal is valid when 2P terminal block disconnect. The signal is EPO and cannot settable.	-

No.	Silk-screen	Function illustration	Remarks
	IN. 1	The trigger level of signal is settable (NC/NO) and short circuit is valid for default. The signal is settable and refers to the note for detail. Default is charge disabled.	-

NOTE

The settable item and illustrations of the corresponding input and output dry contact is as shown in Table2-9 and Table2-10.

CAUTION

Input dry contact port of EPO must be a normally closed circuit which allows the UPS to work normally.

If EPO port is disconnected, UPS shuts down all output of inverter and bypass, meanwhile the display screens report EPO fault. UPS will be reset from this fault after UPS shutdown totally and this port restoring short circuit.

Table2-9 The settable item and illustrations of input dry contact

NO.	Item	Illustration
1	Charge disabled	The charge disabled signal of battery: The UPS will alarm and turn off the battery charge when receiving this signal. The trigger level of signal is settable.
2	External MBB on	The breaker on signal of external maintenance bypass: The UPS will alarm and turn off the inverter output and switch over bypass output when receiving this signal. The trigger level of signal is settable.
3	UPS remote ON/OFF	The remote ON/OFF signal of UPS: The UPS will on when receiving this signal. The trigger level of signal is settable.
4	Batt. ground fault	The fault signal of battery ground: The UPS will report an alarm and prompts a fault when receiving this signal. The trigger level of signal is settable.

NO.	Item	Illustration
5	Discharge disabled	The discharge disabled signal of battery: The UPS will report an alarm and prohibits the battery discharge when receiving this signal. The trigger level of signal is settable.

Table2-10 The settable item and illustrations of output dry contact

NO.	Item	Illustration
1	Mains abnormal	When mains grid is abnormal, the signal is valid and triggers action of dry contact.
2	Bypass abnormal	When bypass is abnormal, the signal is valid and triggers action of dry contact.
3	Battery abnormal	When battery is abnormal, for example: battery low-voltage, battery over-voltage, battery over-temperature and battery disconnected, the signal is valid and triggers action of dry contact.
4	Output abnormal	When output is abnormal, the signal is valid and triggers action of dry contact.
5	Overload abnormal	When bypass or inverter of UPS is overloaded, the signal is valid triggers action of dry contact.
6	General abnormal	When the UPS is alarming for fault, the signal is valid and triggers action of dry contact.
7	Normal operation	When the UPS is in the normal operation, the signal is valid and triggers action of dry contact.
8	Battery operation	When the UPS is in the battery operation, the signal is valid and triggers action of dry contact.
9	Bypass operation	When the UPS is in the bypass operation, the signal is valid and triggers action of dry contact.
10	UPS ON/OFF status	When the UPS is in on status, the signal is valid and triggers action of dry contact.

NO.	Item	Illustration
11	Battery low	When battery is low voltage, the signal is valid and triggers action of dry contact.
12	ECO mode	When the UPS output mode is ECO, the signal is valid and triggers action of dry contact.
13	Fan fault	When fan is abnormal, the signal is valid and triggers action of dry contact.

Intelligent slot 1

SNMP card: Built-in card and configuration protocol through webpage. Through the web configuration protocol to meet the use of different models or different communication protocols.

Click "**Management>Device management>Network adapter**>**Power**>**UPS**" to enter the UPS list page, then click "**Edit**" button to enter the "**Device management parameters**" page, the **Communication protocol** is set to WRWF-1201-04_3I3O.

Click "**Setting**>**Serial port setting**" to enter the serial port list page, the **Interface standard** is set to RS232, **Baud rate** is set to 9600, **Data bit** is set to 8, **Stop bit** is set to 1, **Verification method** is set to No check. Communication can only be performed normally after the setting is completed.

Intelligent slot 2 (optional)

1. Dry-contact Kit (Y5) NT-RS485Y5 (optional): Built-in card. Three output dry contacts: mains status, battery status and inverter status (configurable as bypass output status). Two input dry contacts: battery temperature sampling status (temperature compensation), battery breaker status (configurable as remote ON/OFF status).

2. Protocol Transfer Kit NT-MODBUS (optional): Built-in card. One route for RS485 communication, reserved for li-ion battery communication (2P green terminal block); the other routes for RS485+RS232.Only one can be selected for communicate (DB9 terminal block).

3. SNMP card (optional): Built-in card and configuration protocol through webpage. Through the web configuration protocol to meet the use of different models or different communication protocols.

   Click "**Management>Device management**>**Power**>**UPS**" to enter the UPS list page, then click "**Edit**" button to enter the "**Device management parameters**" page, the **Communication protocol** is set to WRWF-1201-04_3I3O.

Click "**Setting**>**Serial port setting**" to enter the serial port list page, the **Interface standard** is set to RS232, **Baud rate** is set to 9600, **Data bit** is set to 8, **Stop bit** is set to 1, **Verification method** is set to No check. Communication can only be performed normally after the setting is completed.

2.2 Working Principle

2.2.1 Working Principle Diagram

Working principle diagram of the UPS is as shown in Figure2-6.

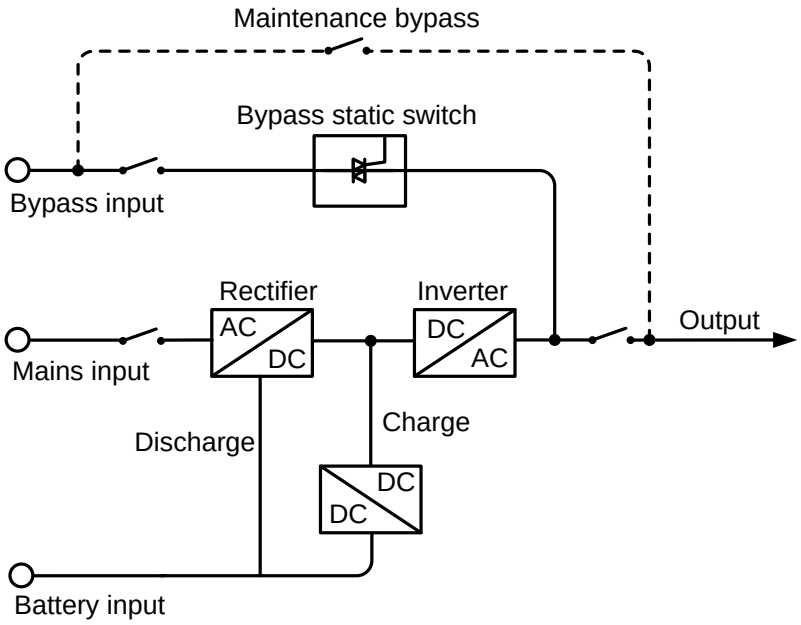


Figure2-6 Working principle diagram

The Li90 series UPS includes rectifier/PFC, inverter, charger, bypass static switch etc function module, the input power includes mains input, bypass input, battery input, the output mode includes inverter output, bypass output and maintenance bypass output (if equipped).

When mains is normal, the rectifier starts and the charger charges the battery at the same time. When UPS off, if bypass is normal, the system turns to bypass output; when UPS on, the mains boosts by rectifier/PFC and output DC bus voltage, and then go through inverter and output pure sine-wave AC power, the output turns to inverter output to load from bypass output (if equipped).

When mains is abnormal, the battery voltage boosts by rectifier/PFC and output DC bus voltage, and then go through inverter and output pure sine-wave AC power to load. When mains recover normal, the UPS turns to mains mode from battery mode automatically.

2.2.2 Work Mode

There are 5 work modes of the UPS: normal mains power supply mode, battery inverter mode, bypass power supply mode, ECO power supply mode and maintenance bypass power supply mode.

Normal mains power supply mode

When mains power is normal, the UPS works in mains inverter status and charges the battery at the same time. The work mode is as shown in Figure2-7.

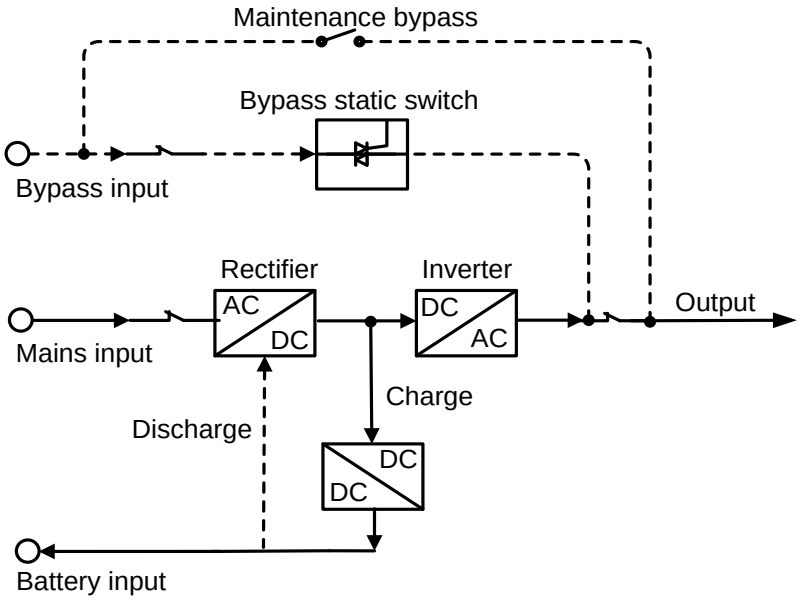


Figure2-7 Normal mains power supply mode (the thick solid line stands for the energy flow direction)

Battery inverter mode

When mains is abnormal, the rectifier will transfer to battery input immediately, boost the battery voltage and then maintain the voltage of DC bus voltage to guarantee the inverter output continuous. As shown in Figure2-8.

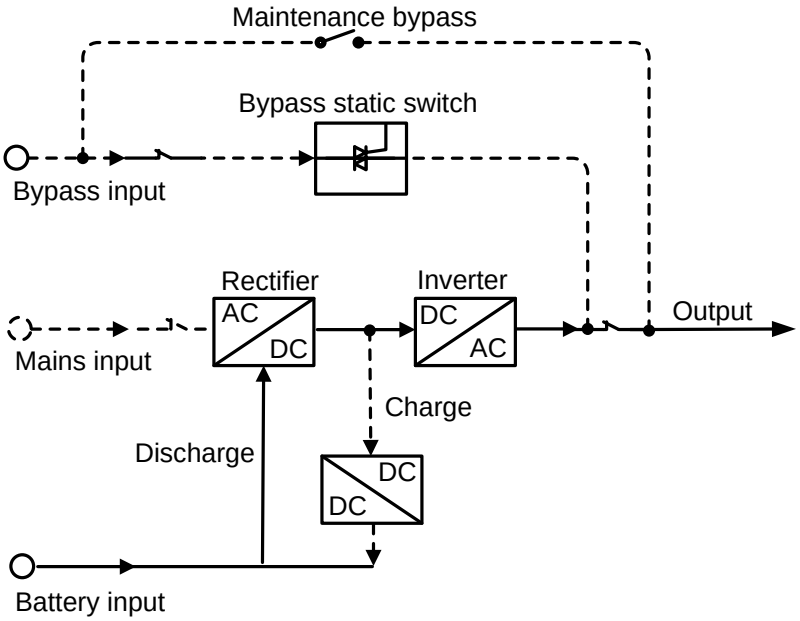


Figure2-8 Battery inverter mode (the thick solid line stands for the energy flow direction)

Before the battery stops discharging, if the mains recover normal, the rectifier will transfer to mains input automatically and charge the battery at the same time. That is to say, the UPS will return to normal mains power supply mode. If the mains remains abnormal and the battery is running out, the UPS will send sound and light alarm and stop working until battery reaches low-voltage point. At that time, the buzzer long beeps to alarm, the power for load powers down. Under the circumstance of mains power outage completely, the UPS will shut down about 1min later automatically and close the power of the UPS to avoid continuing to discharge the battery protect the service life of battery. Once the mains recover, the UPS will start automatically and turn to normal mains power supply mode.

Bypass power supply mode

Under the circumstance of bypass voltage is normal, when UPS is off or fault (such as inverter output overload, over-current surge or IGBT over-temperature etc.) while UPS on, the UPS will output by bypass. When UPS is on and the fault removed, it will return to inverter output again. If the same fault occurs more than 5 times in a short time, the UPS protects itself and switches to output by bypass until power off manually or power down and remove the fault, restart the UPS and then it will recover normal operation.

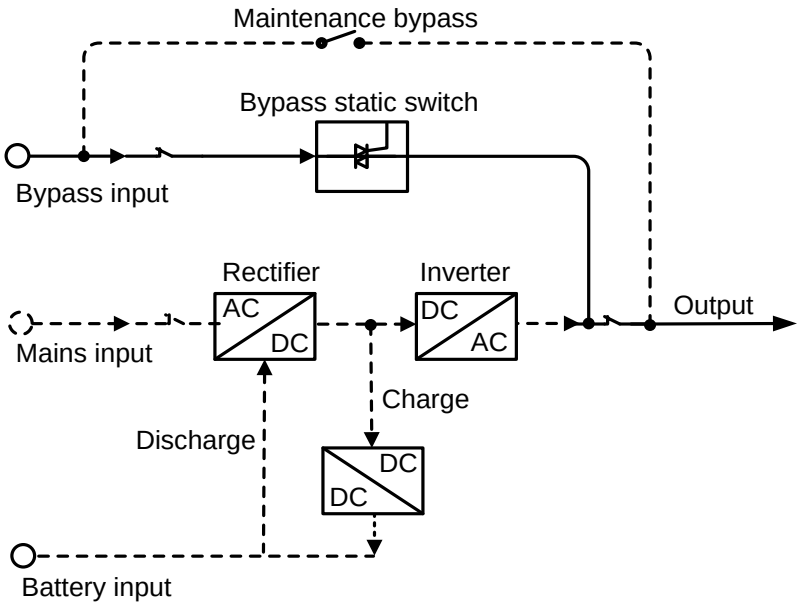


Figure2-9 Bypass power supply mode (the thick solid line stands for the energy flow direction)

ECO power supply mode (just suitable for single UPS)

In ECO mode, when bypass voltage is normal, the power for load is priority supplied by bypass, when bypass voltage is abnormal, the power for load turns to inverter. ECO mode is an economic operation mode. For the load which does not require high quality, user can select ECO mode to reduce the energy consumption. In ECO mode, the UPS efficiency can be up to 98%.

Maintenance bypass power supply mode

When the UPS needs to be maintained and the power supply for load cannot be interrupted, user can shut down the inverter and make the UPS works in bypass status. The gate controlled switch releases automatically when removing the maintenance bypass cover plate, then switch on the maintenance bypass breaker and switch off the mains input breaker and bypass input breaker, and output breaker. During the transition to manual maintenance bypass, AC power is supplied to the load by maintenance bypass breaker. At this time, the inner UPS has no electricity, maintainer can perform the maintenance safely.

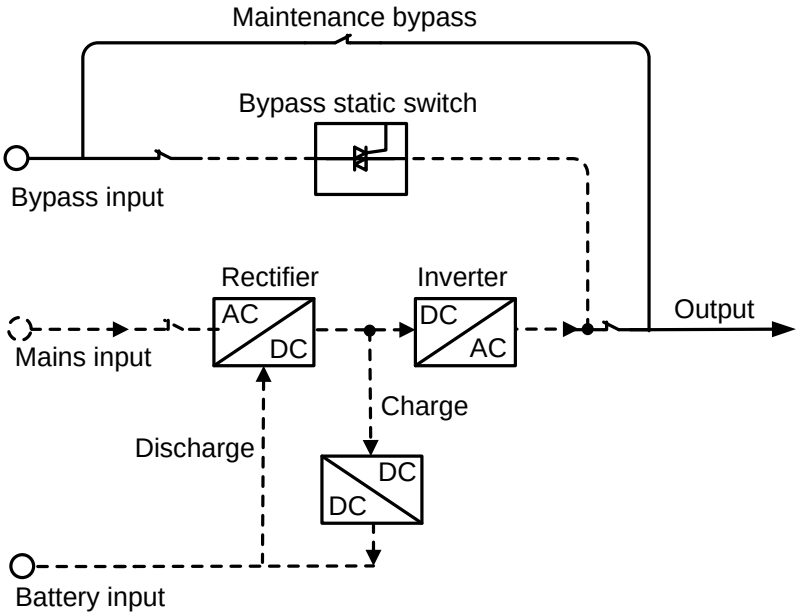


Figure2-10 Maintenance bypass power supply mode (the thick solid line stands for the energy flow direction)

3 Installation

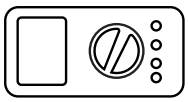
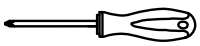
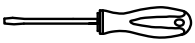
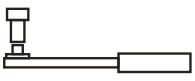
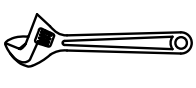
This chapter mainly introduces the installation of the UPS, including unpacking and checking, cable selection, installation, electrical connection, etc.

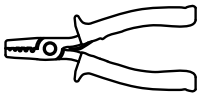
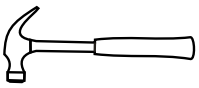
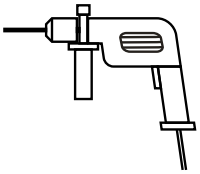
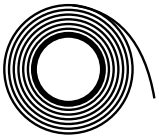
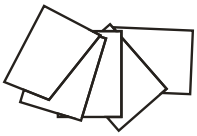
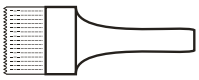
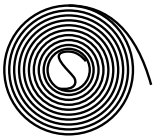
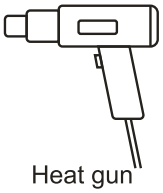
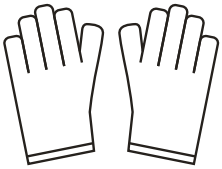
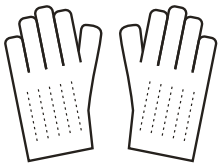
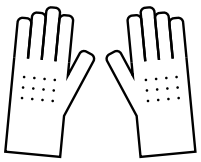
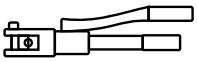
3.1 Announcements

- The installation tools should be with isolated operation, which is to avoid electric shock.
- There exist high-voltage in wiring terminal, please ensure that the wiring terminal with no electricity, and then the wire connection can be done.
- Place the UPS flat on the ground, avoid tilt and uneven ground.
- DO NOT place goods or sit on the UPS.

3.2 Installation Preparation

3.2.1 Tools

Tools			
 Clamp meter	 Multi-meter	 Label paper	 Phillips screwdriver
 Flat-headscrewdriver	 Socket wrench	 Adjustable wrench	Torque wrench

Tools			
 COAX crimping tool	 Diagonal pliers	 Wire stripper	 Claw hammer
 Hammer drill	 Insulation tape	 Cotton cloth	 Brush
 Heat shrink tubing	 Heat gun	 Electrician's knife	 Protective gloves
 ESD gloves	 Insulated gloves	 Hydraulic pliers	 Cable tie

3.2.2 Install Environment

The installation environment of the UPS should be with good ventilation, and far away from water source, heat source and inflammable and explosive objects. Avoid installing the UPS in the place where has direct sunshine, dust, volatile gas, corrosive objects or high salt.

3.2.3 Install Space

The installation site should be with enough space to place the device. At least 300mm (11.9in) clearance is maintained from the rear and left and right parts of the UPS to the wall or other device.

3.2.4 Select Breaker & Wires

The selecting for AC input and output wire, and corresponding breakers needs to be judged by the UPS's max. steady state phase current. Table3-1 shows the max. steady state phase current of each

work mode, Table3-2 shows the rated current of recommended breakers, Table3-3 shows the min. recommended wire cross-sectional area. Select the wires and breakers according to Table3-1 to Table3-4.

Table3-1 UPS max. steady state phase current

Type	Li90-10K	Li90-20K	Li90-30K
AC input (A)	30	60	89
Bypass input (A)	28	56	84
AC output (A)	28	56	84

3.2.5 Select Input Breaker

We suggest to add a breaker (we suggest to select the breaker with feedback double pole disconnection equipment) that matches the UPS power at the front of the UPS input to insulate the mains. Considering the UPS charge power and the impact current while power on, the selected breaker must be larger than max. current of UPS input and cannot with leakage protection, which is to avoid wrong action of breaker. The breaker of DC input should be selected not less than the 500Vdc. The selection of breaker, please reference Table3-2.

Table3-2 Recommended input breaker list

Type	Li90-10K	Li90-20K	Li90-30K
AC input (A)	40A	75A	125A
Bypass input (A)	35A.	70A	110A
AC output (A)	35A	70A	110A

CAUTION

Withstanding voltage value of recommended AC and Bypass input breaker and AC output breaker is 250Vac.

3.2.6 Select Wires

For the wire cross-sectional area of AC input and output, please see the recommended value in Table3-3. The cross-sectional area of the following cable is only for reference when the user is

connected wire for a length of about 5 meters. If the length of the lead wire exceeds 20 meters, the cross-sectional area of the conduct or wire shall be increased.

Table3-3 Recommended cross-sectional area of wire

Type	Li90-10K	Li90-20K	Li90-30K
Mains input live wire (U/V/W)	8AWG	6AWG	3AWG
Mains input neutral wire (N)	4AWG	3AWG	1/0AWG
Bypass input live wire (N)	10AWG	6AWG	4AWG
Bypass input neutral wire (U/V/W)	8AWG	3AWG	1/0AWG
Mains output live wire (U/V/W)	10AWG	6AWG	4AWG
Mains output neutral wire (N)	8AWG	3AWG	1/0AWG

NOTE

Grounding wire (PE)	Per NEC and local codes.

For connection to UPS, the copper wire temperature is 90°C (194°F) and the torque is in accordance with the appropriate bolt size. All wire sizes should meet local and national codes. When UPS is single input, Mains sizing should be used.

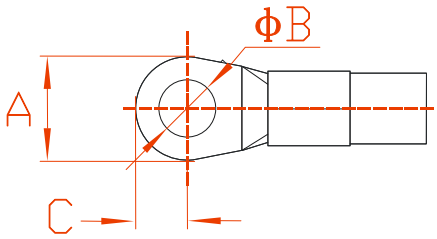


Figure3-1 Dimensions of wiring terminal

Table3-4 Dimension limits of wiring terminal

Dimensions	Input/Bypass/Output
A	≤19.5mm (≤0.77in)
B	≥6mm (≤0.24in)

Dimensions	Input/Bypass/Output
C	≤12mm (0.47in)

3.3 Transport and Unpacking

3.3.1 Transport

CAUTION

1. The UPS must be transported by trained professionals.
2. While transporting, please move gently and avoid impacting or dropping.
3. If the UPS needs to be stored for long time after unpacking, it is suggested to pack the device by original plastic bag.

The UPS can be transported by forklift and manual forklift. When lifting the device, the device's center of gravity should be at the center of the forklift arm. Keep the devices moving slowly and stably.

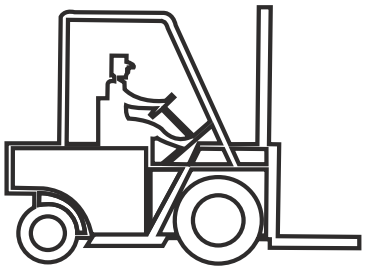


Figure3-2 Forklift transportation

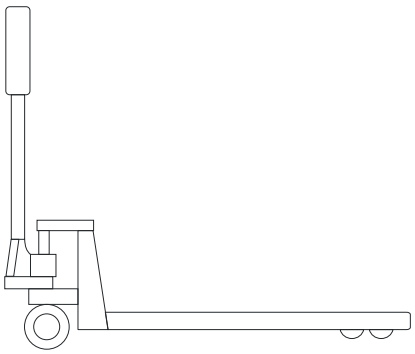


Figure3-3 Manual forklift transportation

CAUTION

1. During transporting, please take care and avoid impact or falling off.
2. During moving, keep the UPS vertical and do not put down or uplift suddenly.

3.3.2 Unpacking

NOTE

Determine the unpacking site in advance. In principle, the unpacking site should be as close as possible to the installation site.

Step 1 Check if the package appearance is in good condition and if there is any damage caused by transportation. If damaged, please inform the carrier immediately.

Step 2 Transport the UPS to assigned site.

Step 3 Unpack the external package, and take out the fittings.

Step 4 Check the UPS.

- Inspect the appearance and check if there has any damage caused by transportation. If damaged, please inform the carrier immediately.
- Compare with the packing list and check if the fittings are complete and proper. If the fittings lack or model wrong, please take note and contact the local agency of our company.

Step 5 Put the front plate down to become an oblique board.

Step 6 After checking, unscrew the bolts that connected with the UPS and wooden bracket and the supporting plate by socket wrench, the bolt position as shown in Figure3-4, dismantle the supporting plate.

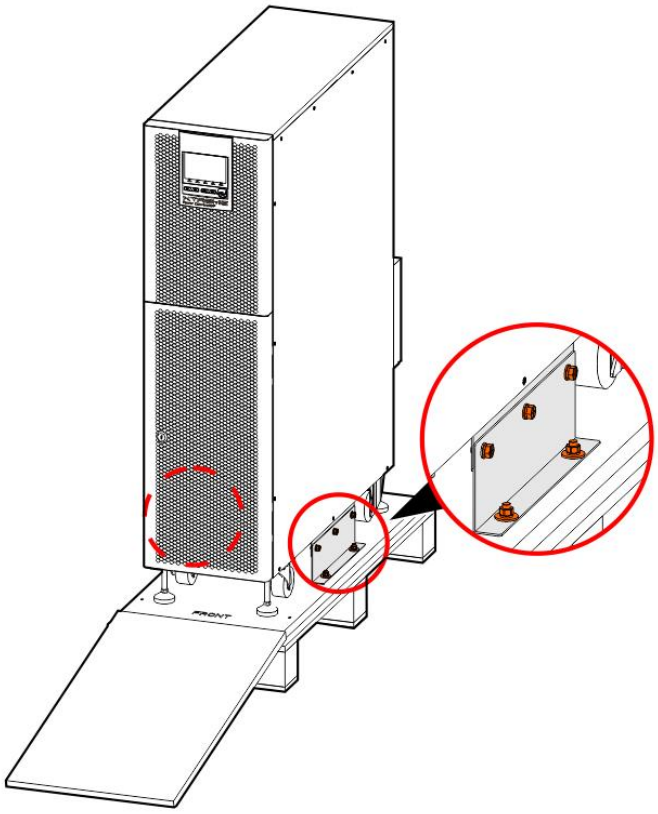


Figure3-4 Bolts position

Step 7 Then slip the UPS along the oblique board to ground slowly.

CAUTION

During moving, use two people (one at left side and the another at right side) to avoid tilting or human injury.

----End

3.4 Mechanical Installation

3.4.1 UPS Installation (for bolting to floor)

NOTE

In this section, we take the ground perforation installation as an example, please adjust the installation procedure on the basis of actual condition.

Step 1 Determine and plan the installation position according to the device size (as shown in Figure3-5) and install space requirement (see **3.2.3 Install Space**).

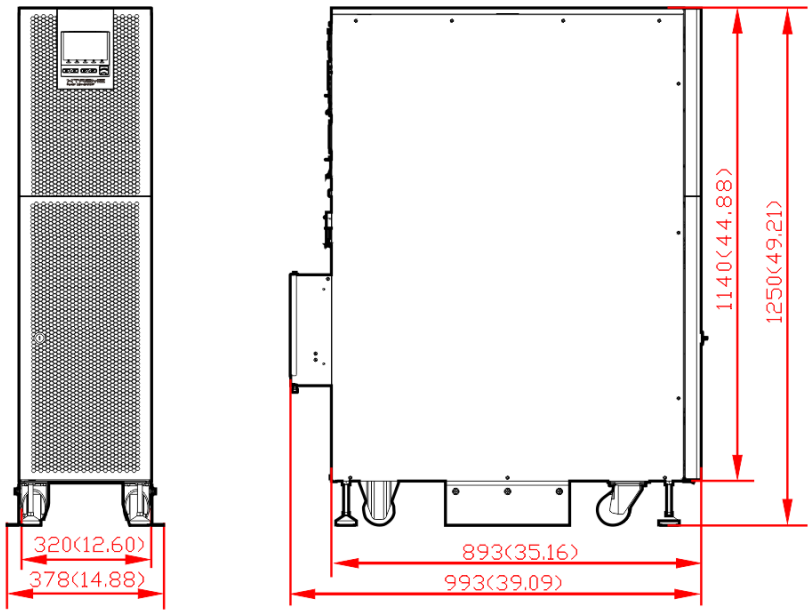


Figure3-5 Outer dimension (mm (in))

Step 2 Drill 4ϕ10 holes on the ground by impact drill according to the installation holes size of pedestal, as shown in Figure3-6 (drilling deviation ±2mm). Install expansion bolts M8. The structure and installation for the expansion bolt is as shown in Figure3-7.

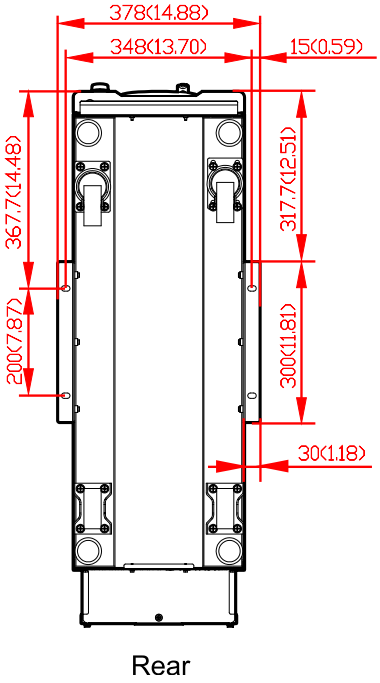
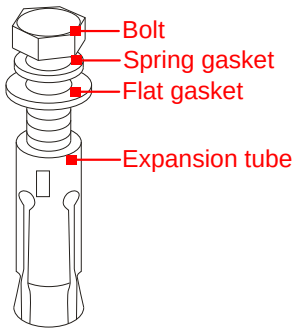


Figure3-6 Installation holes size (mm (in))



1. Drill holes on the installation ground by hammer drill.
2. Tighten the expansion bolts mildly, and put it to the hole vertically, and then knock the expansion bolt by rubber hammer till all the expansion tube into the hole.
3. Pre tighten the expansion bolt.
4. Screw out the bolt , take down the spring gasket and flat gasket.

Figure3-7 Expansion bolt structure and installation

NOTE

The exposed height of expansion bolt must be within 50mm (19.6in).

Step 3 Move the UPS above the holes, pre-lock the supporting plate (not fully locked, leave one-third to two-thirds of the screws). Move and align the bottom installation hole of the supporting plate with the expansion bolt. Install the flat gasket (Φ8), spring gasket (Φ8) and screw the bolts. Tighten the UPS and the six unlocked screws of supporting plate.

Step 4 Screw down the supporting feet anticlockwise of the UPS to parallel with ground.

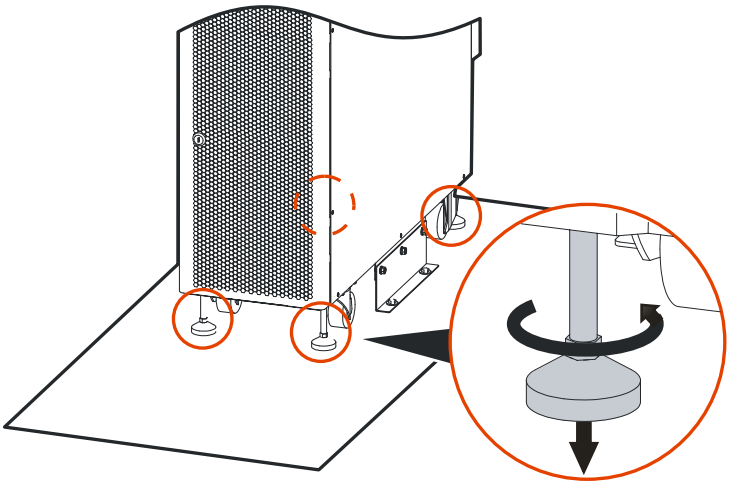


Figure3-8 Screw down the supporting feet brackets

NOTE

1. Adjust the support feet in clockwise to height the supporting feet, and adjust in anticlockwise to lower the supporting feet.
2. During operating, do not adjust one supporting foot only, adjust the four supporting feet in phase, which is to avoid tilting even device damage.

CAUTION

During moving the UPS, please move the device stably and avoid device tilting.

----End

3.4.2 Battery Installation

Step 1 Insert the key and rotate the key clockwise to open the front door.

Step 2 Disconnect three plug-in, as shown in Figure3-9.

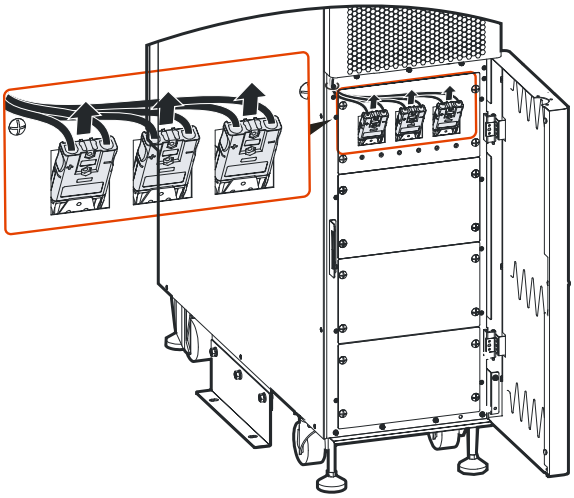


Figure3-9 Dismantle plug-in

Step 3 Remove battery cover plate by removing four screws.

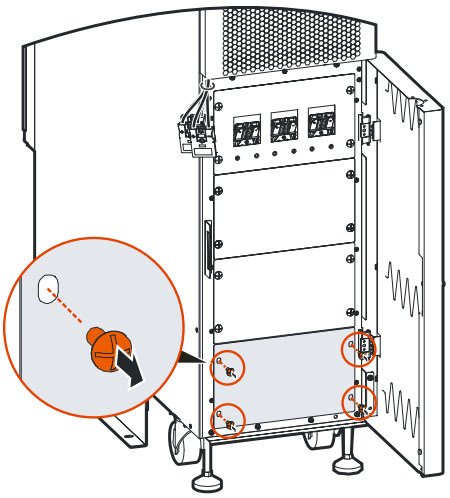


Figure3-10 Remove screws

Step 4 Insert the battery module to the UPS.

CAUTION

The weight of single li-ion battery module is 37kg (81.6lb). When transporting, please follow the relevant regulations.

Pay attention to the corresponding relationship between the module and the plug-in, and the battery module needs to be installed from bottom to top.

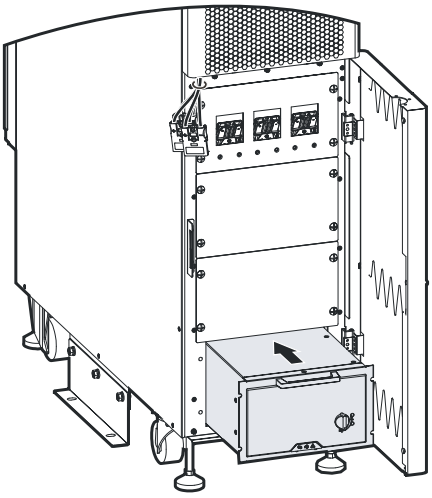


Figure3-11 Insert battery module

Step 5 Tighten the screws to fasten the battery module.

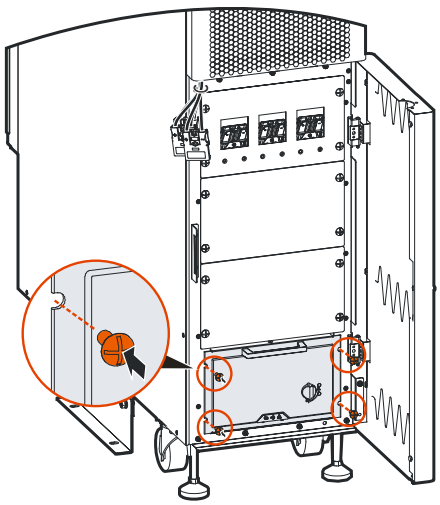


Figure3-12 Fasten the battery module

NOTE

The installation of battery module is the same, in above figure, we take the installation of 1 battery module as example to illustrate.

The quantity and installation position of battery module for Li90-10K, Li90-20K and Li90-30K are shown as follow:

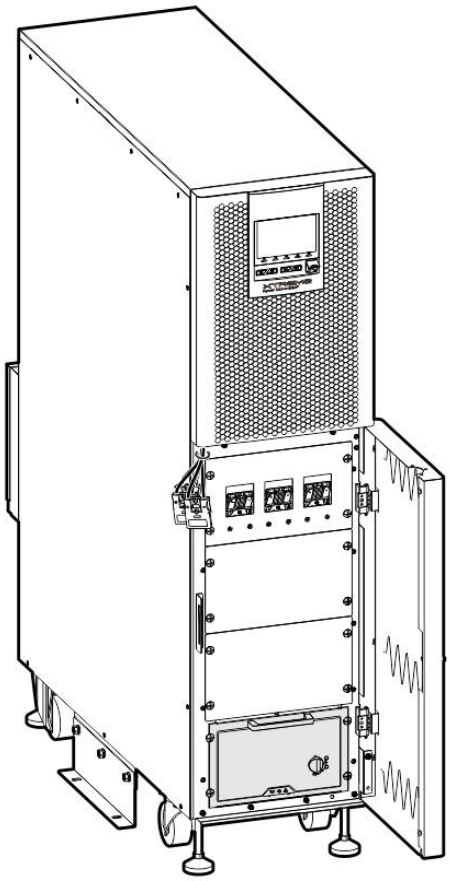


Figure3-13 Li90-10K

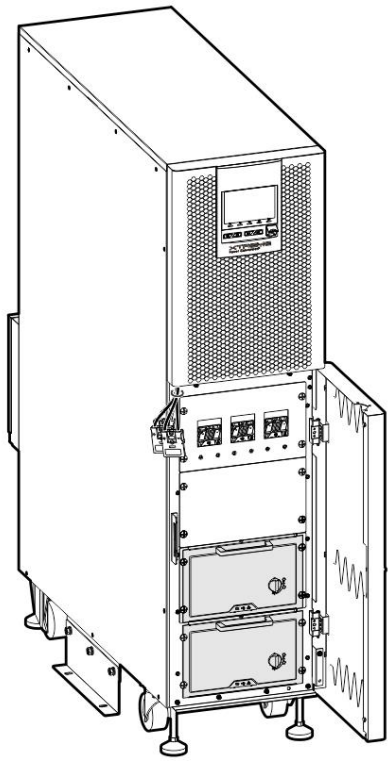


Figure3-14 Li90-20K

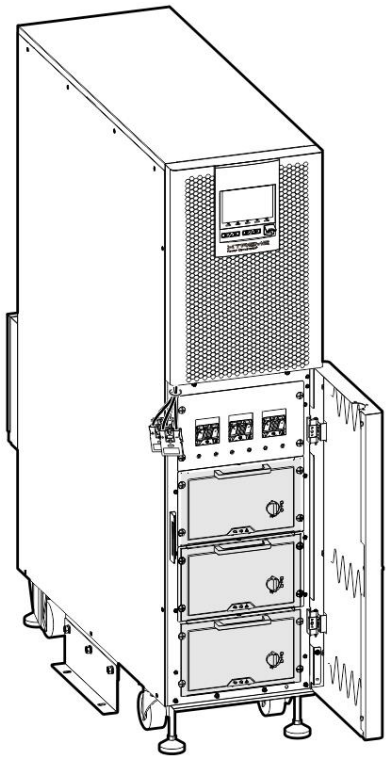


Figure3-15 Li90-30K

NOTE

Plug-in should be plugged back into the battery module after the wiring is completed, for detail please see 3.5.1 UPS Wiring Operation.

----End

3.5 Electrical Connection

WARNING

1. Before connecting, ensure that the rear breakers of mains are all open. DO NOT connect wires with live electricity.
2. While wiring, avoid making the power wire at the place where is easy to be trod or tripped.
3. DO NOT move the UPS after connect wires.

3.5.1 UPS Wiring Operation

Step 1 Loosen the screw at the bottom of the wiring box and then remove the bottom plate.

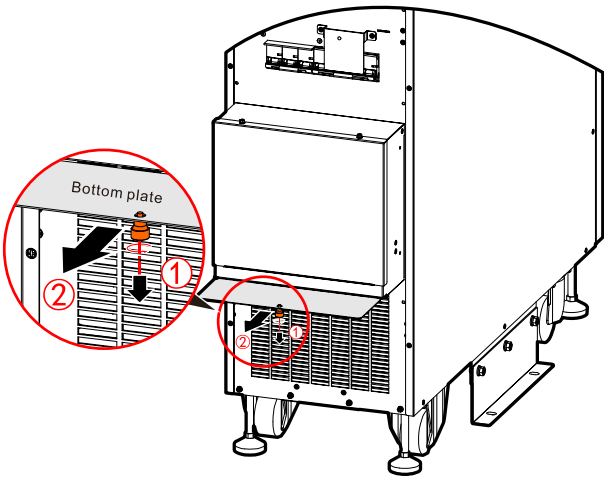


Figure3-16 Remove the bottom plate

Step 2 Drill wiring holes, the recommend drilling position as shown in Figure3-17.

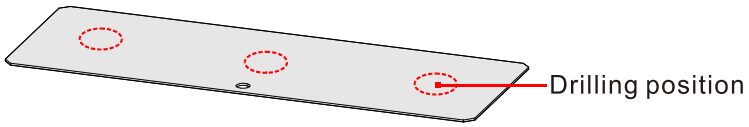


Figure3-17 Recommend drilling position

Table3-5 Recommend drilling size

Model	Drilling hole size
Li90-10K	ϕ27.8mm(ϕ1.09in)
Li90-20K	ϕ43.7mm(ϕ1.72in)
Li90-30K	ϕ50mm(ϕ1.97in)

NOTE
Customers can drill wiring holes according to actual needs.

Step 3 Reinstall the bottom plate back to the bottom of the wiring box.

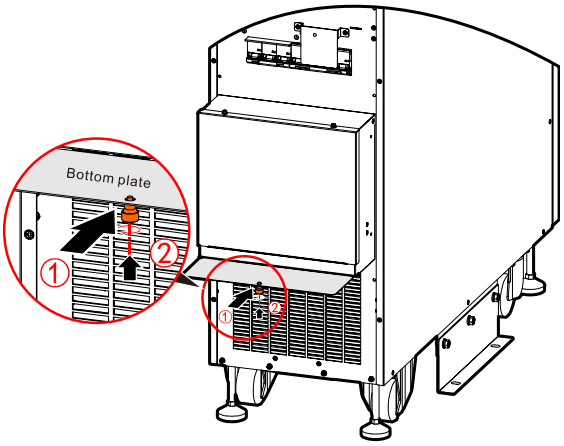


Figure3-18 Reinstall the bottom plate

Step 4 Remove the wiring cover plate. When removing the wiring cover plate, unscrew the cover plate bolts first, and then move the wiring cover plate upwards. As shown in Figure3-19.

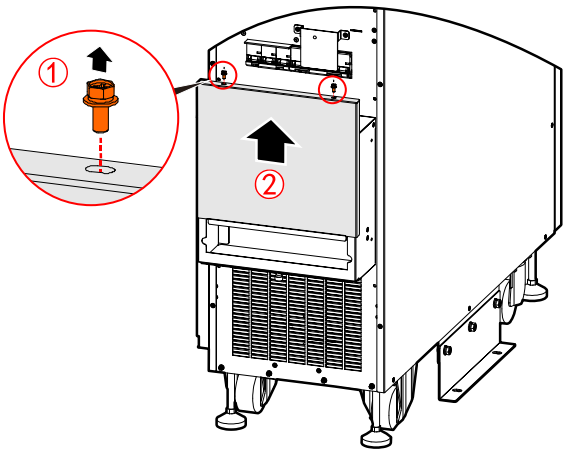


Figure3-19 Remove the wiring cover plate

Step 5 The silk-screen is as shown in Figure3-20. Connect the input, output and grounding wire to corresponding wiring terminal, as shown in Figure3-21. The unit will come from the factory with jumpers between the Input and Bypass connections for use as a single-input UPS. Remove these jumpers if installing as a dual-input UPS.

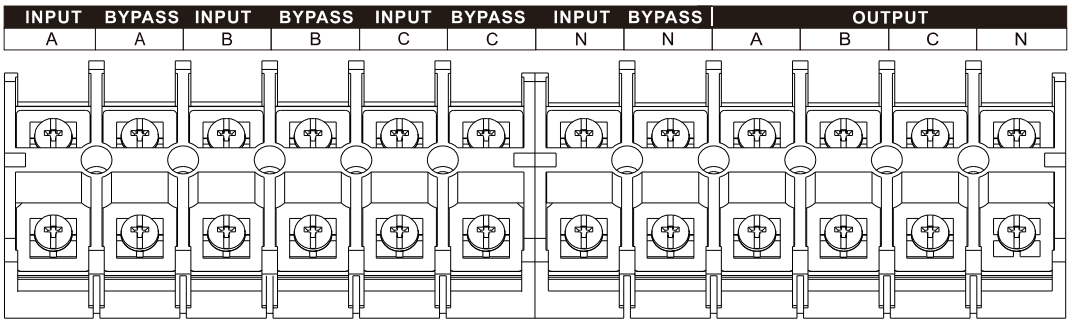


Figure3-20 Wiring terminal silk-screen

NOTE

Three-phase identify methods adoption A, B, C. Corresponding to U phase, V phase and W phase or R phase, S phase and T phase.

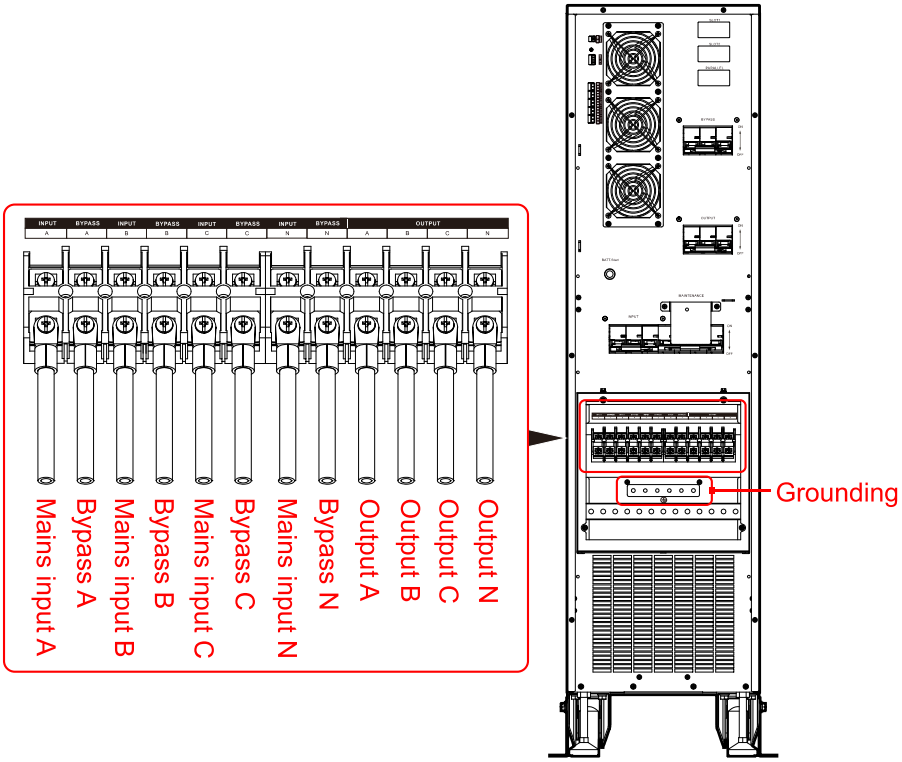


Figure3-21 Wiring diagram

CAUTION

1. UPS wiring must be strictly in accordance with Figure3-21 to avoid short circuit.
2. It is necessary to confirm that all wires are connected to the terminal properly and reliably before reinstall the wiring cover plate.
3. When wiring, it is necessary to connect grounding wire first.

Step 6 Divide the wires into three bundles and fixed to the bottom of device through cable tie.

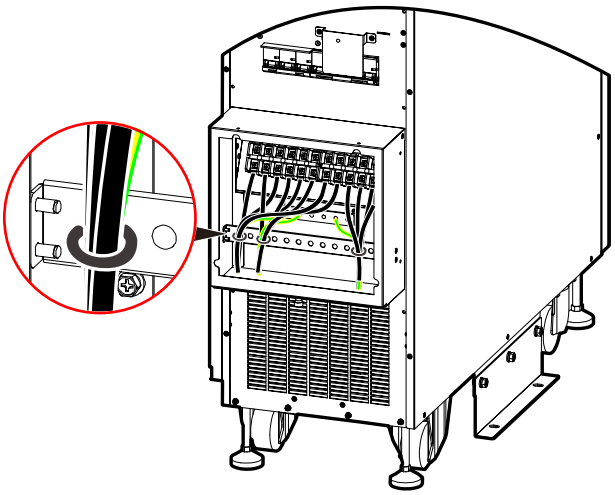


Figure3-22 Wires fixation

NOTE

The plastic protective cover should be disassembled before the external battery wiring, and put back to the original position after completing the external battery wiring.

External battery wiring requires vertical locking, and the terminal blocks between two phases are not allowed to contact.

Step 7 After wiring is completed, reinstall the wiring cover plate to the wiring box.

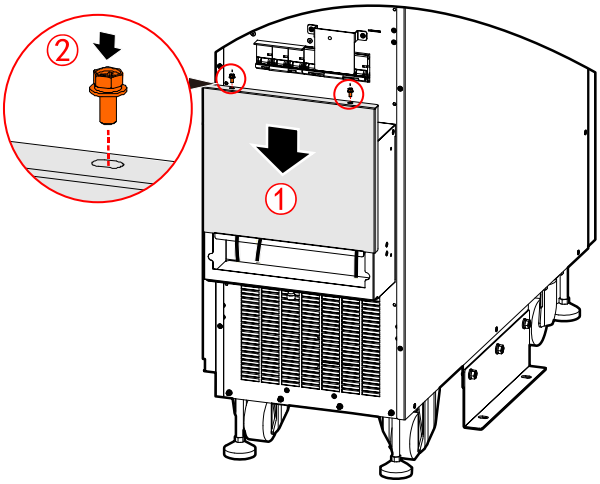


Figure3-23 Reinstall the wiring cover plate

Step 8 Insert three battery plug-in.

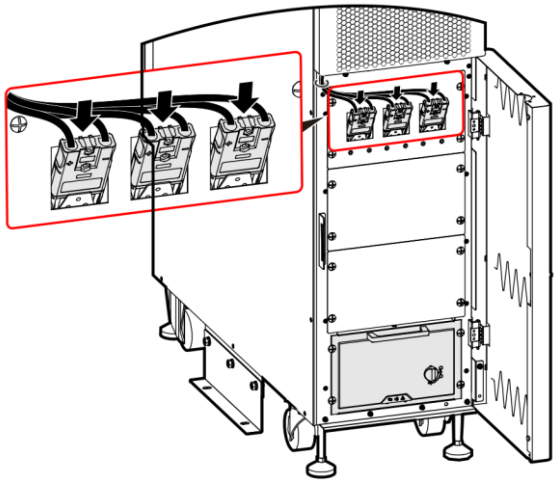


Figure3-24 Insert three plug-in

CAUTION

Insert the plug-in after all battery modules are installed.

If you need to remove the battery module, it is required to unplug the battery plug-in before removing the battery module.

Step 9 Turn the key counter-clockwise to close the front door, and pull out the key.

----End

NOTE

When operating the maintenance bypass switch, it is prohibited to operate the button switch. The button switch position is shown below.

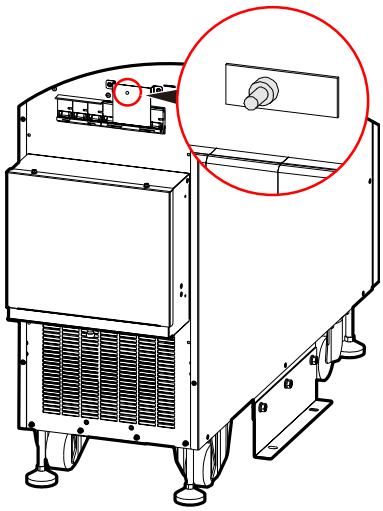


Figure3-25 Button switch position

4 Touch Screen Operation

In the touch screen, user can set and check the input parameter, output parameter, load parameter, battery parameter, get UPS status and warning information and perform relative setting. Besides, it also can query event log for fault diagnosis.

NOTE

The parameters values and other details in the pictures in this chapter are for illustration only. Detailed information should be based on the touch screen of the product.

The voltage displayed on the touch screen is the phase voltage, and the voltage displayed on the nameplate of the device is the line voltage

4.1 Menu Structure

The menu structure of the touch screen is as shown in Figure4-1.

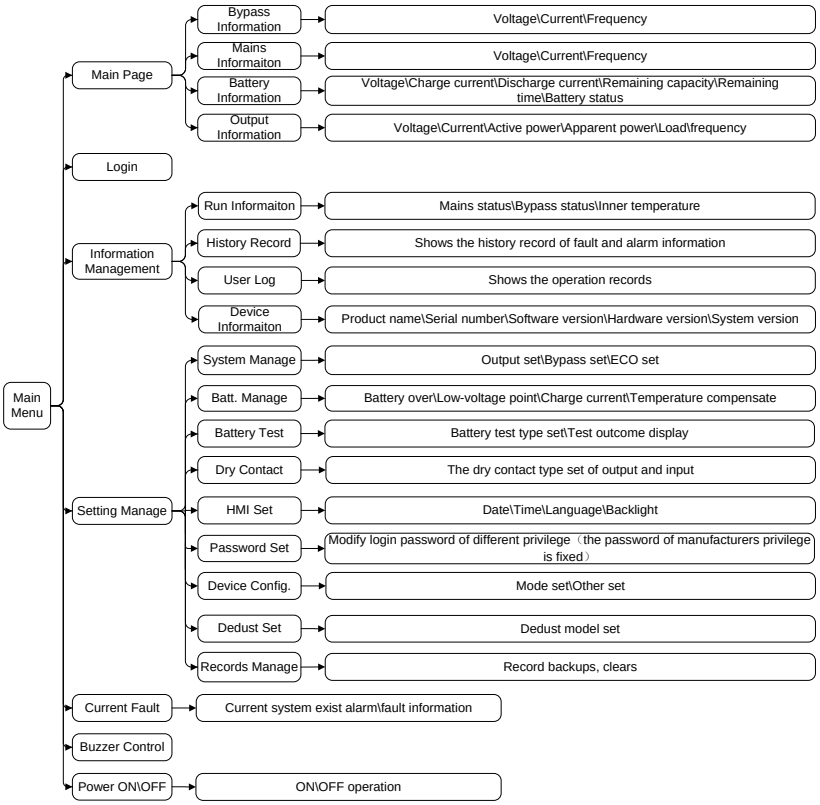


Figure4-1 Menu structure of the touch screen

WARNING

The touch screen contains parameters related to the operation of the device. All settings such as modification of parameters must be done by a trained professional. For parameters with unclear meanings, please refer to this manual or consult relevant staff of our company. Please do not modify without authorization.

4.2 Main Page

After powering on, the touch screen will enter initialize. Then will enter system monitoring main page after powering on, as shown in Figure4-2.

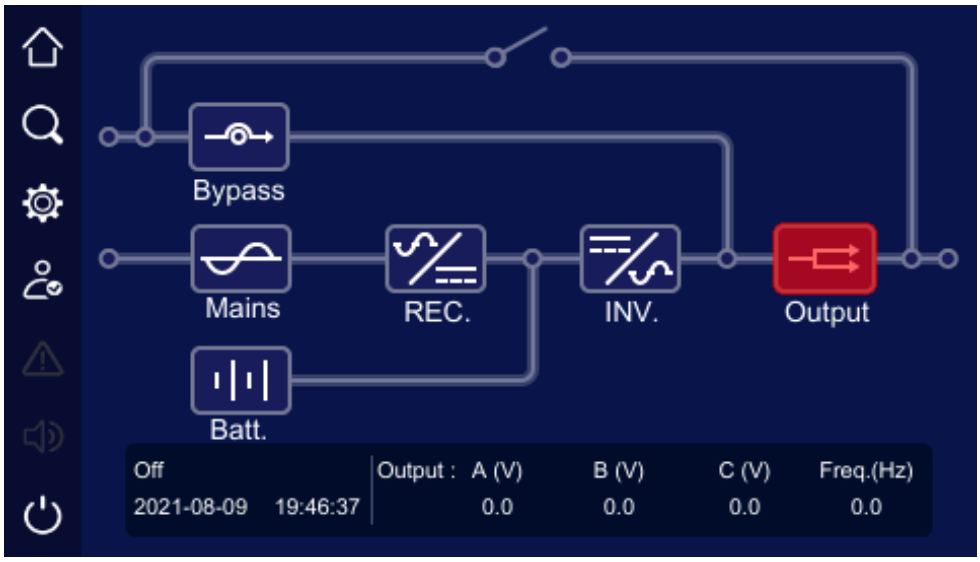


Figure4-2 Main page

4.2.1 Icon Meaning

In the main page, it shows the topological structure of UPS. The icon meaning is as follows:

: Homepage. Click the icon in any page, it will return to the main page.

: Information management. Click the icon it will enter the information management page.

: Setting management. Click the icon, it will enter the setting management page.

: Current fault information. If there is any fault, click the icon, you can check the corresponding fault information.

: Buzzer. Click the icon to control the buzzer.

: Login.

: ON/OFF.

: Bypass information. When bypass is abnormal, the icon will be on and show in red.

: Mains information. When mains is abnormal, the icon will be on and show in red.

: Battery information. When battery is abnormal, the icon will be turn on and show in red.

: Output information. When output is abnormal, the icon will be on and show in red.

4.2.2 Working Status

There are six main working statuses: without energy transmission status, mains inverting status, battery inverting status, bypass output status, ECO output and maintenance bypass output status. The corresponding water lights in the monitoring page are shown in Figure4-3 to Figure4-8. Besides, , other statuses also have corresponding indicator instruction.

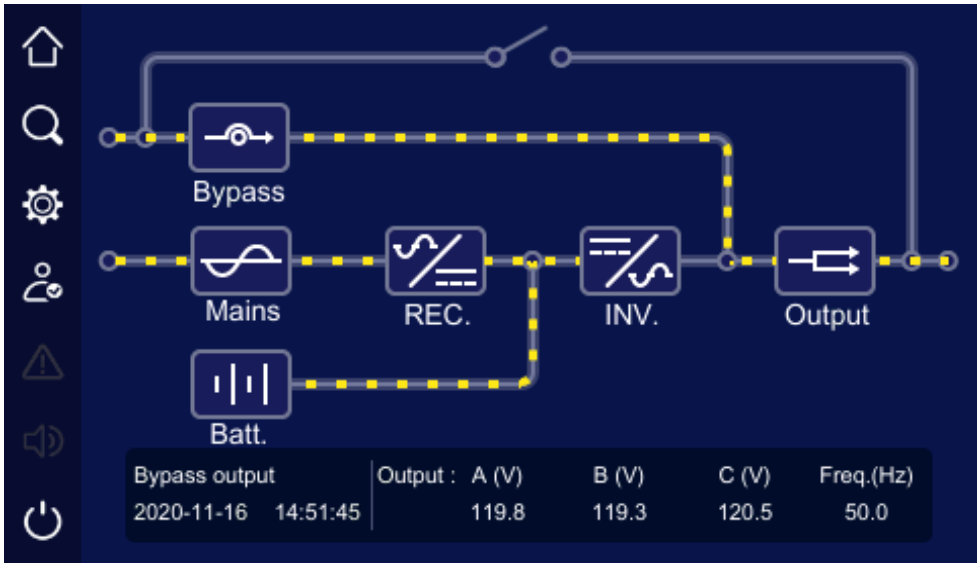


Figure4-3 Without energy transmission status

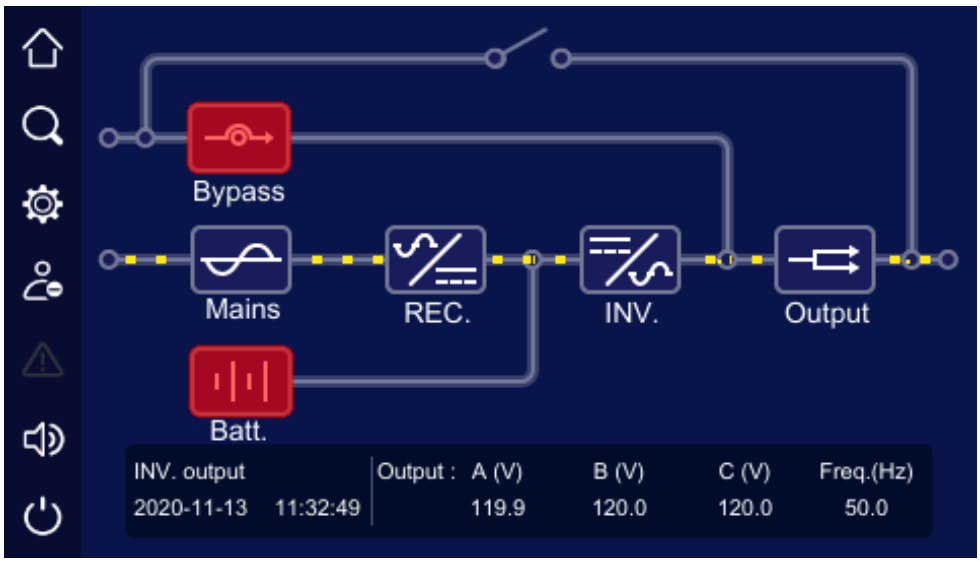


Figure4-4 Mains normal, mains inverting status

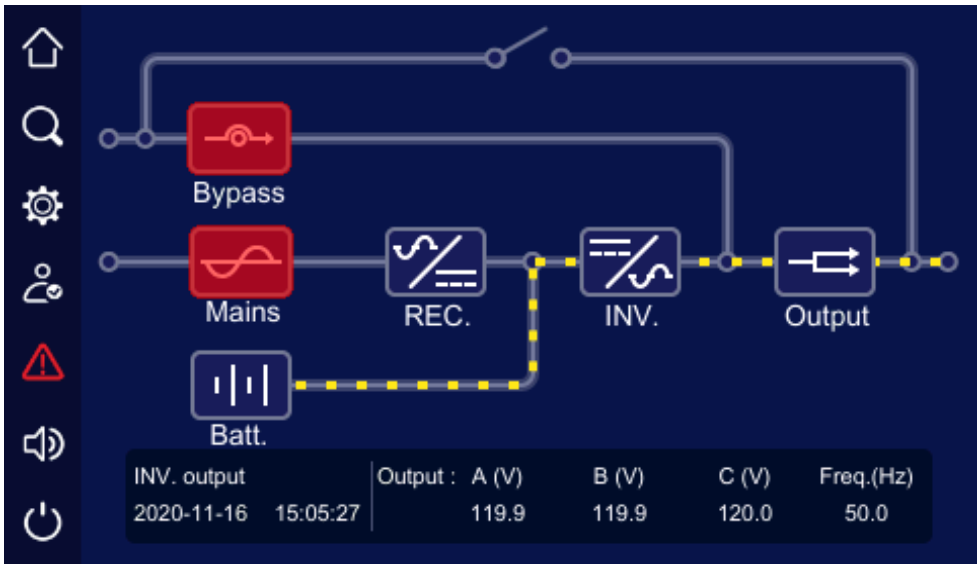


Figure4-5 Mains abnormal, battery inverting status

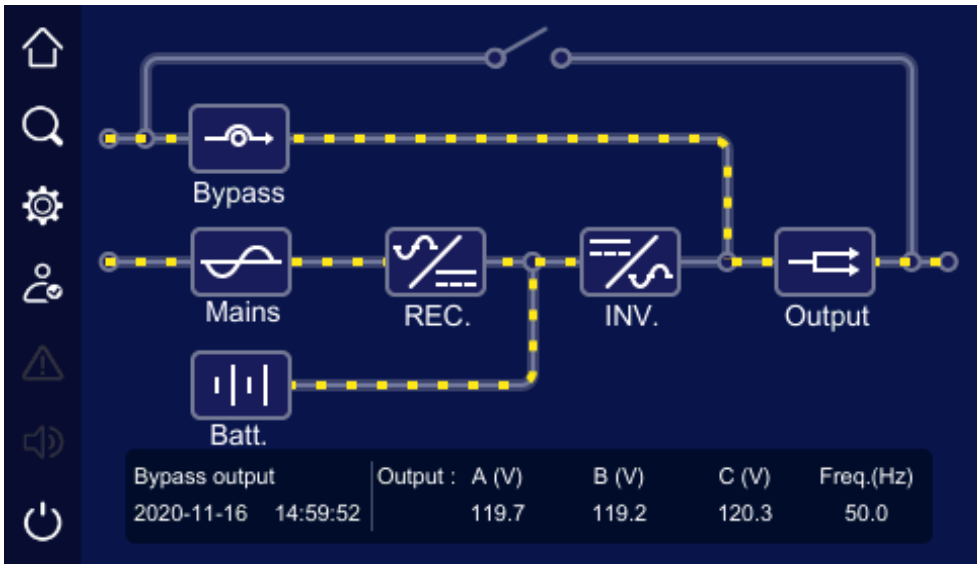


Figure4-6 Bypass output status

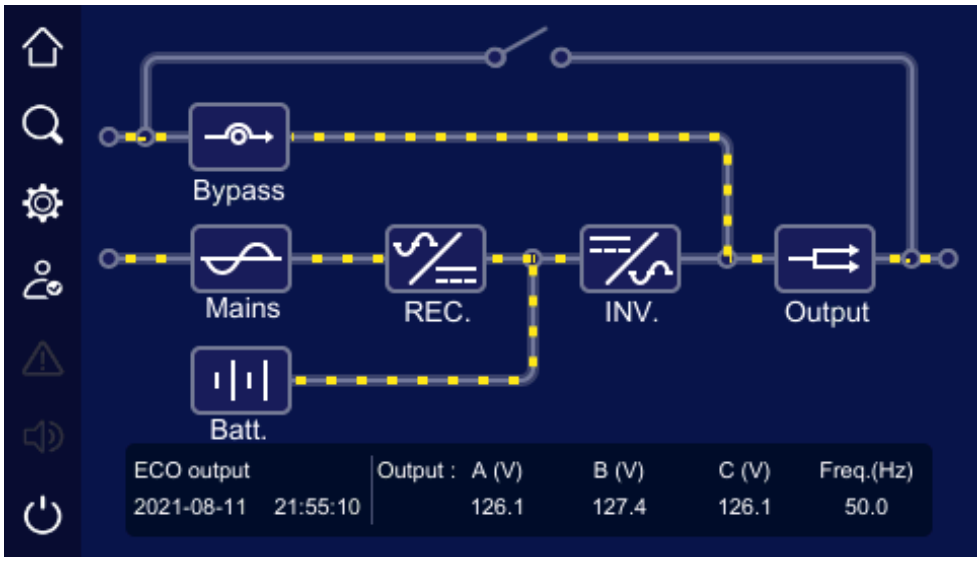


Figure4-7 ECO status

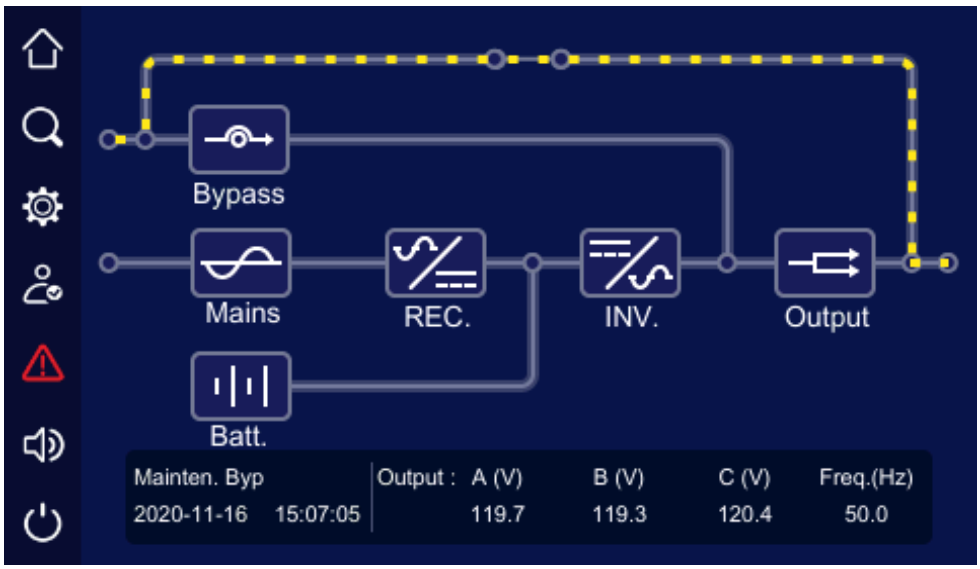


Figure4-8 Maintenance bypass output status

4.2.3 Bypass Information Page

On main page, click "  " icon, it will enter the bypass information page, as shown in Figure4-9.

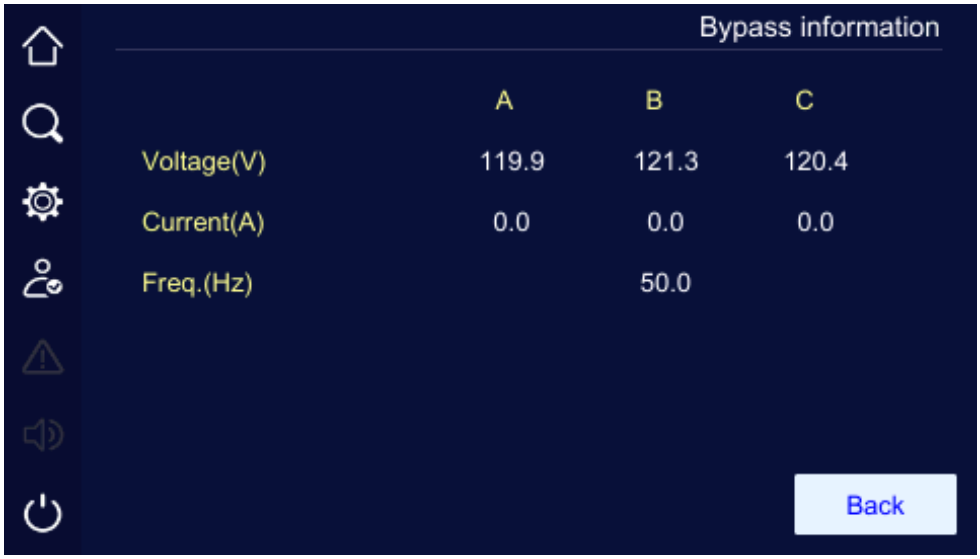


Figure4-9 Bypass information page

4.2.4 Mains Information Page

In the main page, click "  " icon, it will enter the mains information page, as shown in Figure4-10.

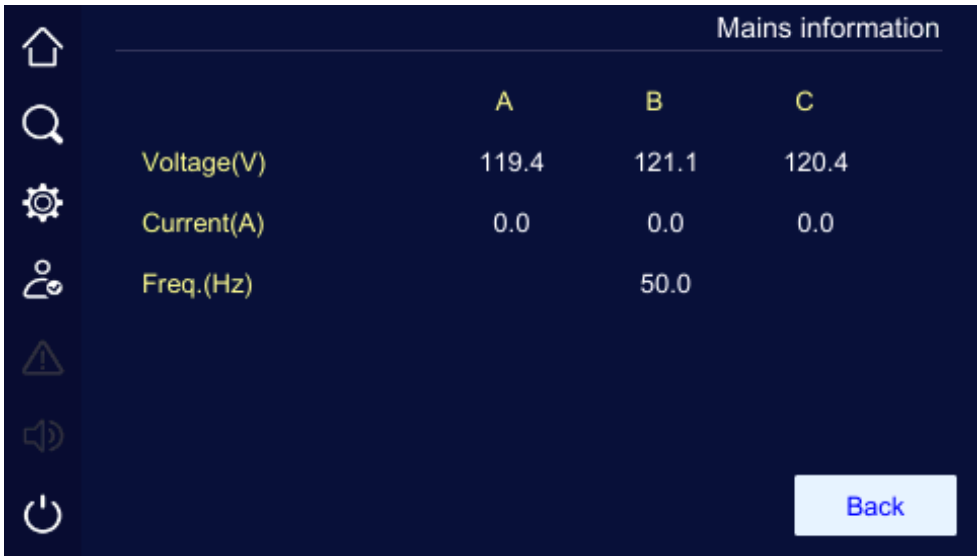


Figure4-10 Mains information page

4.2.5 Battery Information Page

In the main page, click "  " icon, it will enter the battery information page. The "Batt. cab. info." page shows information such as battery voltage, charge current, discharge current, SOC, SOH, battery status, remaining time. As shown in Figure4-11, Figure4-12.

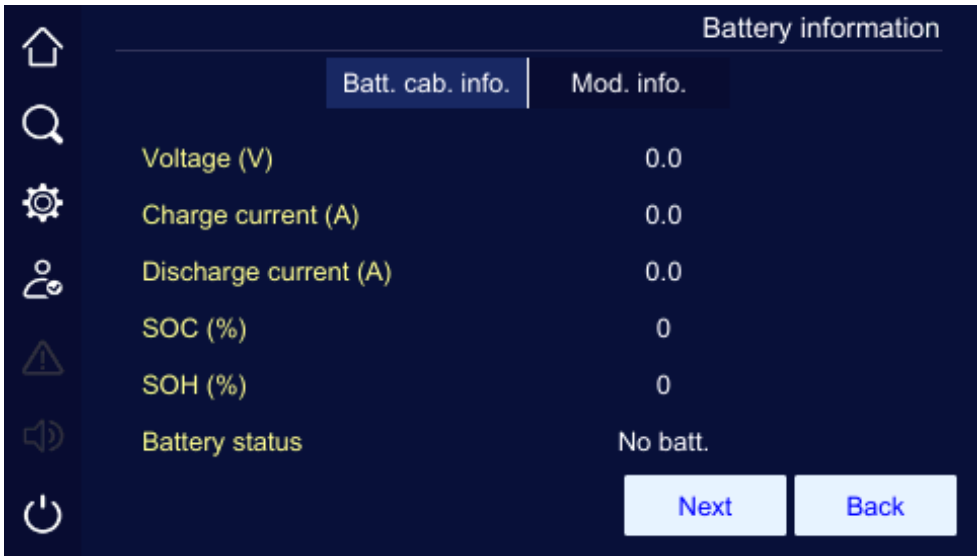


Figure4-11 Battery cabinet information page 1

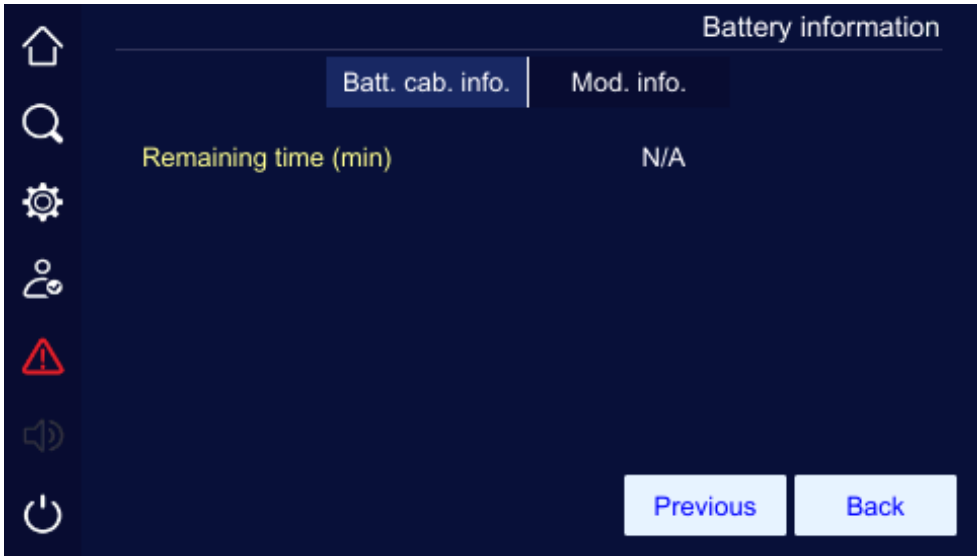


Figure4-12 Battery cabinet information page 2

"Mod.info" page shows running status and data of each module, you can click the icon in the lower left corner to select the module that needs to view the information. As shown in Figure4-13.

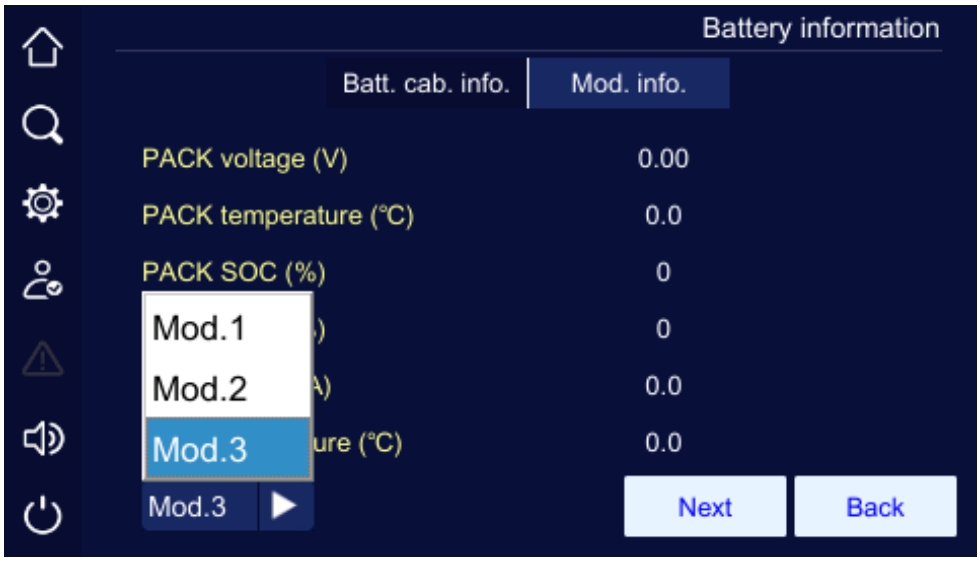


Figure4-13 Module selection

The "Mod.info" page shows battery module information such as PACK voltage, PACK temperature, PACK SOC, PACK SOH, total current, inner temperature, route1 output voltage, route2 output voltage, route1 output current, route2 output current, module On/Off status, charge/discharge status, module discharge status, module status, module disable test, positive insulation impedance, negative insulation impedance, system operation time, max. cell voltage, min. cell voltage, max. cell temperature, min. cell temperature. As shown in Figure4-14, Figure4-15, Figure4-16, Figure4-17.

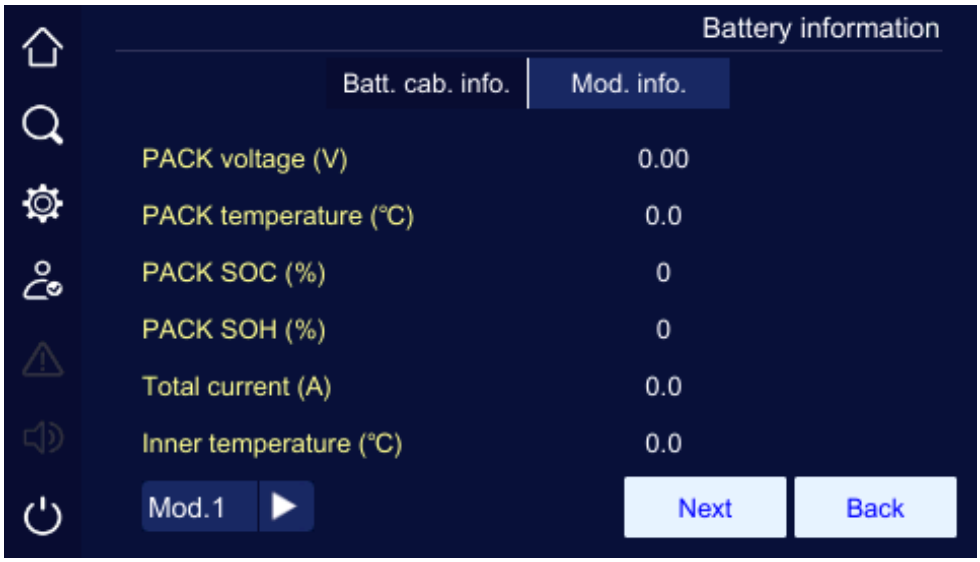


Figure4-14 Module information page 1

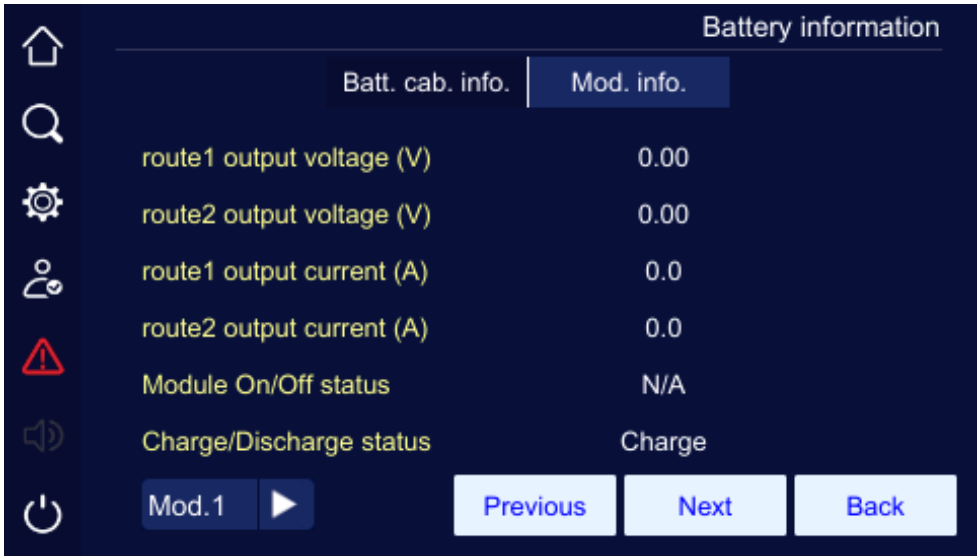


Figure4-15 Module information page 2

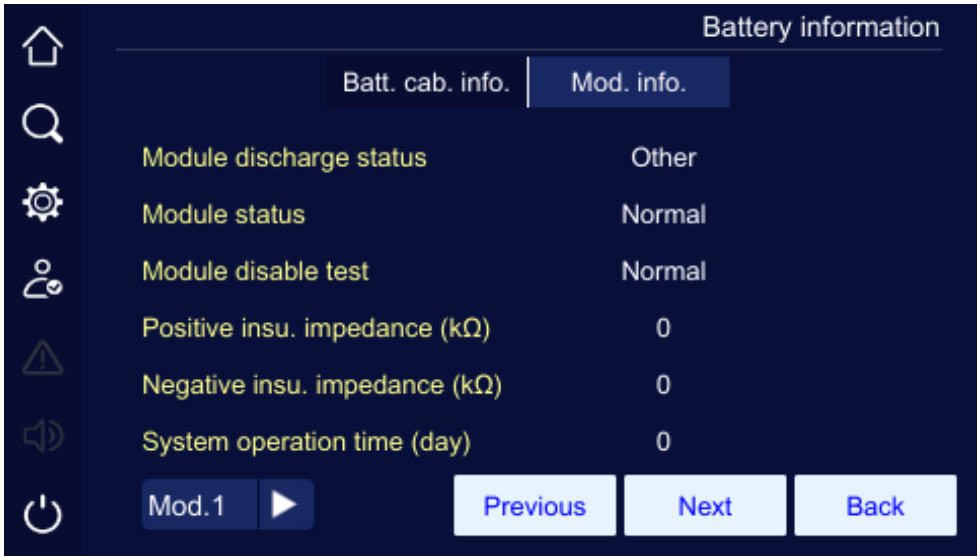


Figure4-16 Module information page 3

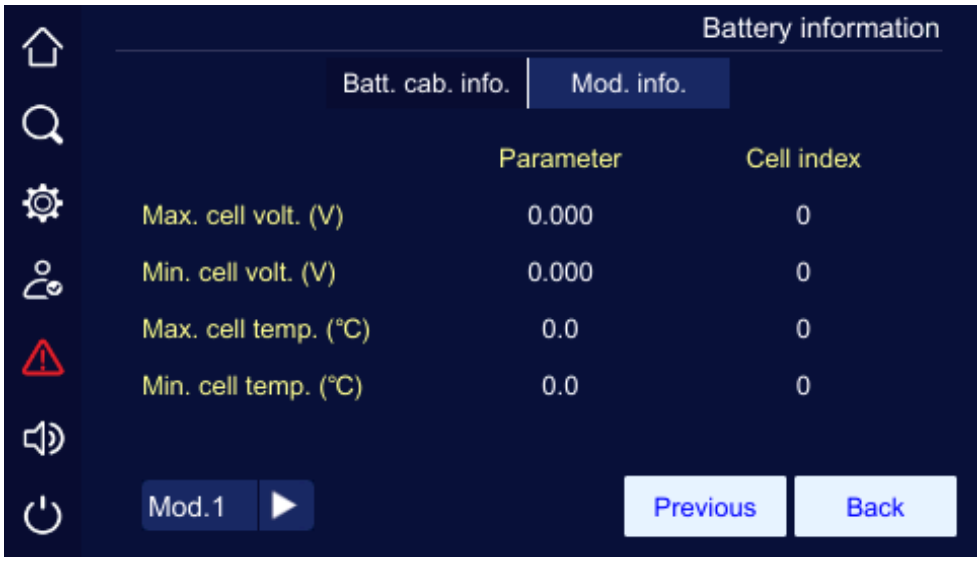


Figure4-17 Module information page 4

4.2.6 Output Information Page

In the main page, click "  " icon, it will enter the output information page. The page shows the output voltage, current, load, active power, apparent power, power factor, output frequency, etc. As shown in Figure4-18.

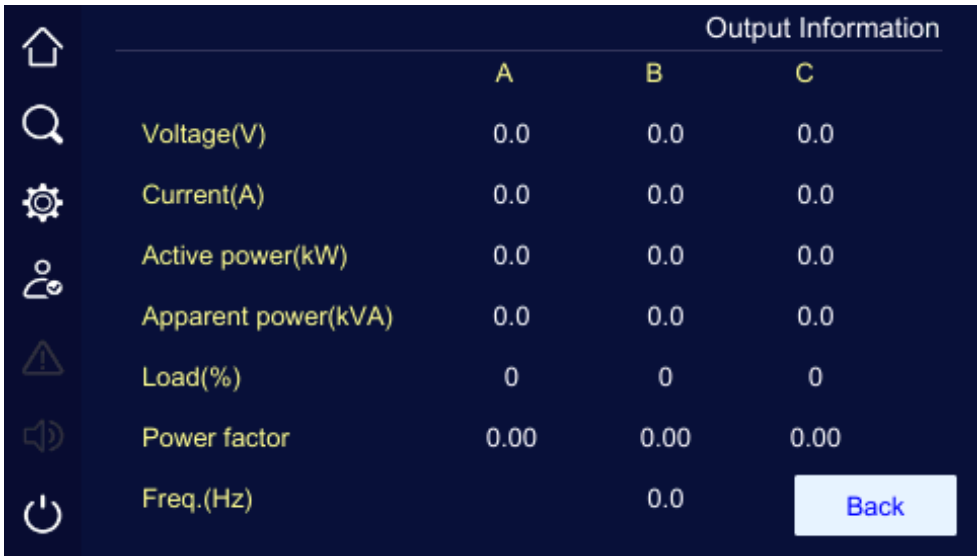


Figure4-18 Output information page

4.3 Login Page

In the main page, click "  " icon, it will enter the login page, as shown in Figure4-19. Only after login can the setting management can be accessed.

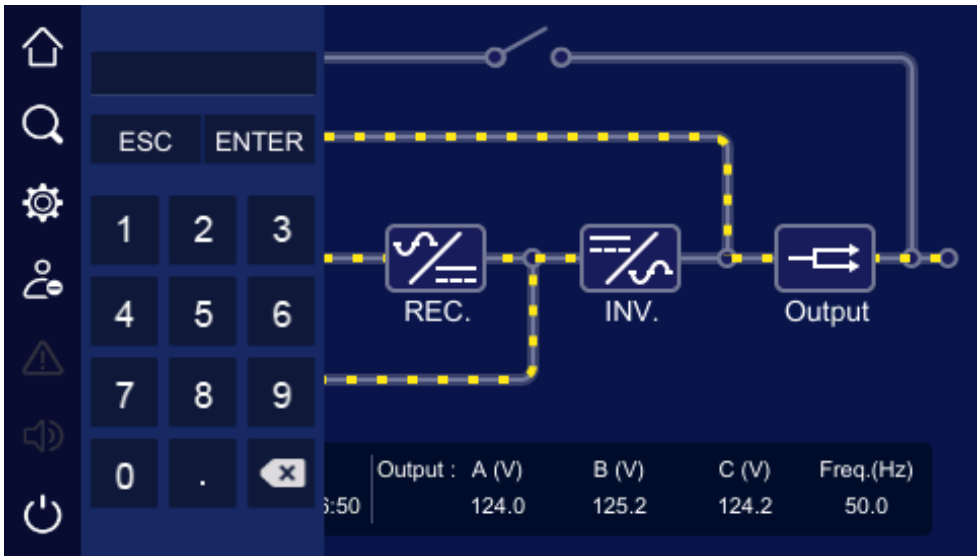


Figure4-19 Login page

NOTE

The default password for common user is 111, the default password for administrator is 222. Common user can check the parameters only, administrator can check and set the UPS parameters.

4.4 Information Management Page

In the main page, click "  " icon, it will enter the info manage page, as shown in Figure4-20. The page includes run info, history record, user log and device info.

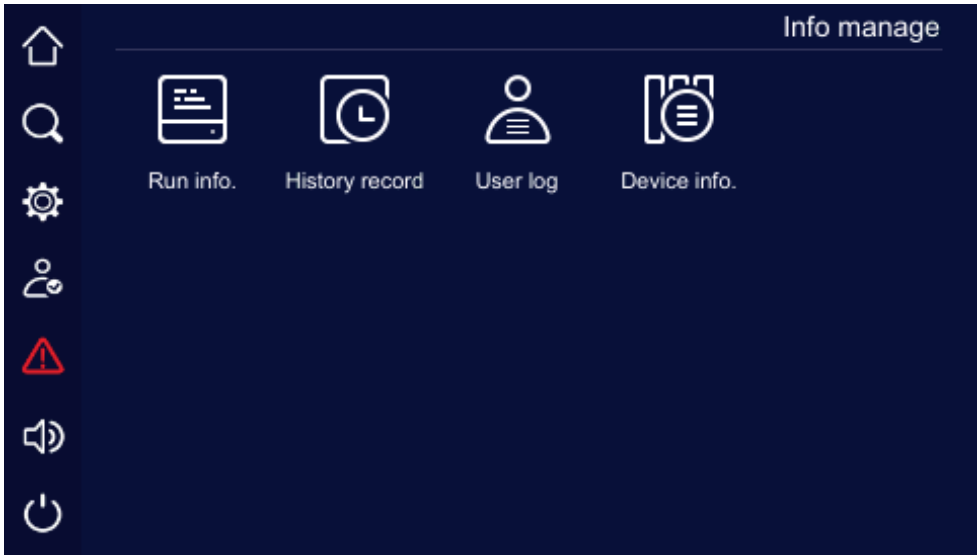


Figure4-20 Information management page

4.4.1 Run Information Page

In the info manage page, click "**Run info.**" icon, it will enter the run information page, as shown in Figure4-21 to Figure4-22. The page shows the UPS current status, including mains status, bypass status, battery status, output status, load status, rectifier status, inverter status, work mode, input loop, bypass loop, battery loop, fan status, inner temperature.

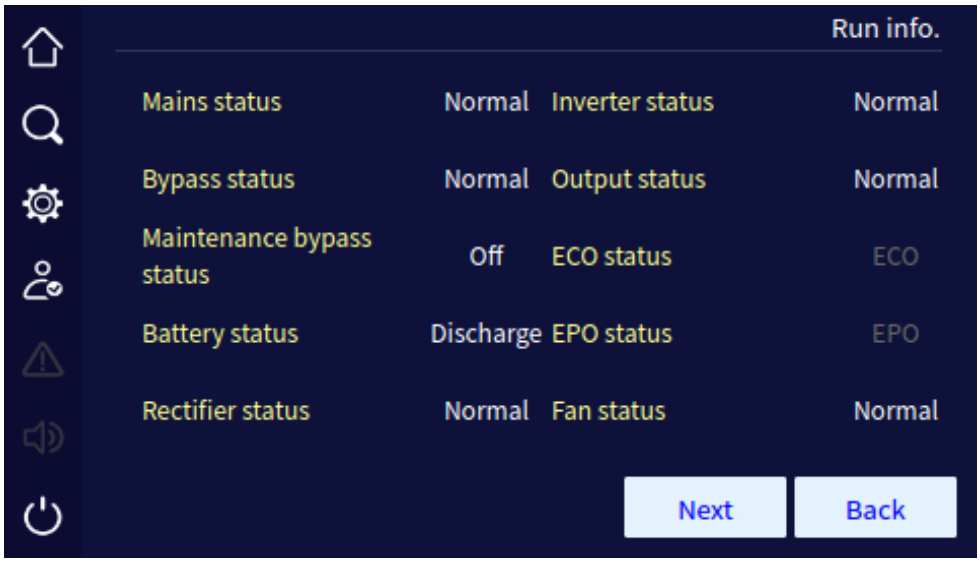


Figure4-21 Run info page 1

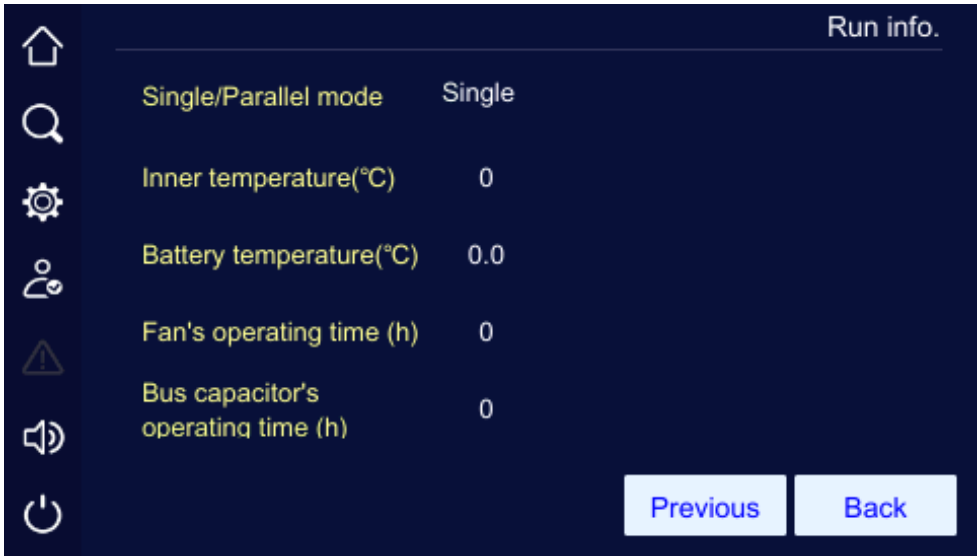


Figure4-22 Working status page 2

4.4.2 History Record Page

In the info manage page, click "**History record**" icon, it will enter the history record page, as shown in Figure4-23. The page shows the fault and alarm information, and they are listed on the basis of time. The first record is the latest fault.

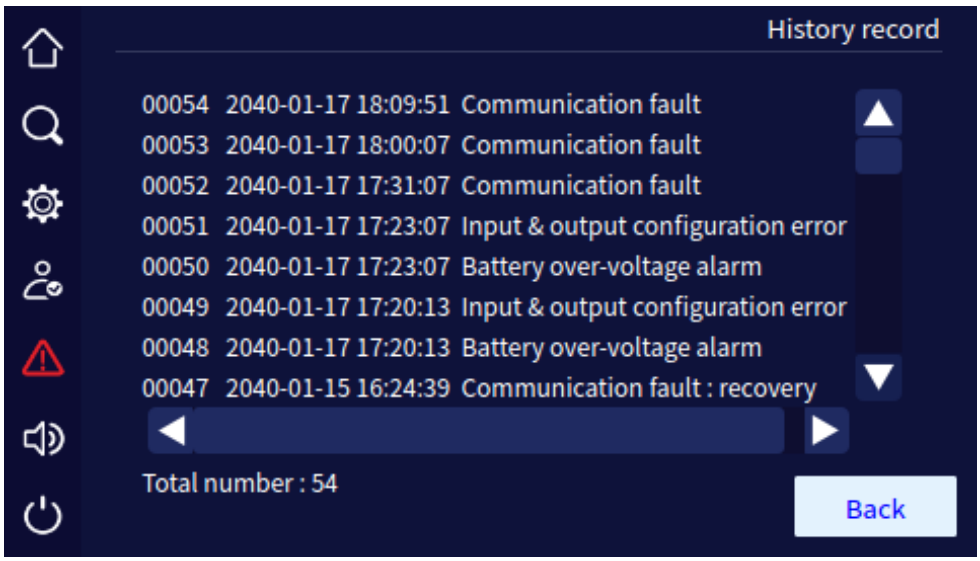


Figure4-23 Event log page

4.4.3 User Log Page

In the info manage page, click the "**User log**" icon, it will enter the user log page, as shown in Figure4-24. The page shows the operation records, such as ON\OFF operation, mains voltage range setting, bypass voltage setting, etc. The user log is listed on the bas is of time. The first record is the latest operation record.

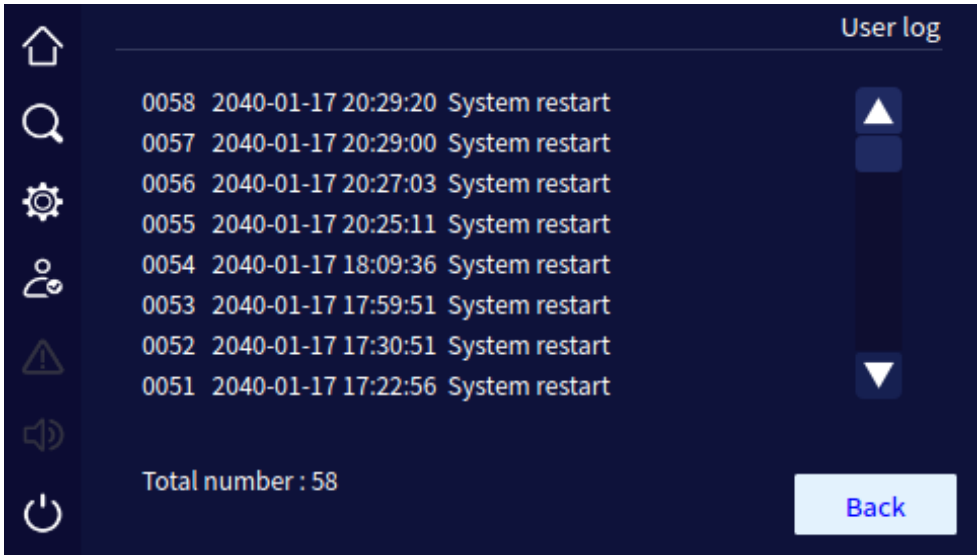


Figure4-24 User log page

4.4.4 Device Infomation Page

In the info manage page, click the "**Device info**" icon, it will enter the device information page, as shown in Figure4-25 and Figure4-26. Device information page includes product name and model, , version information includes serial number, rectifier version, inverter version, system version, protocol version and HMI software version, etc.

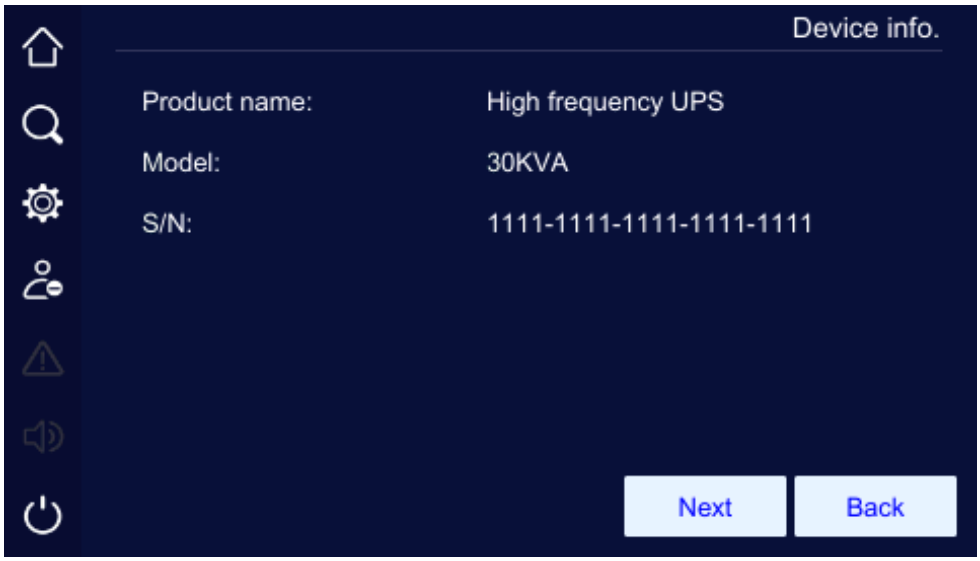


Figure4-25 Device information page 1

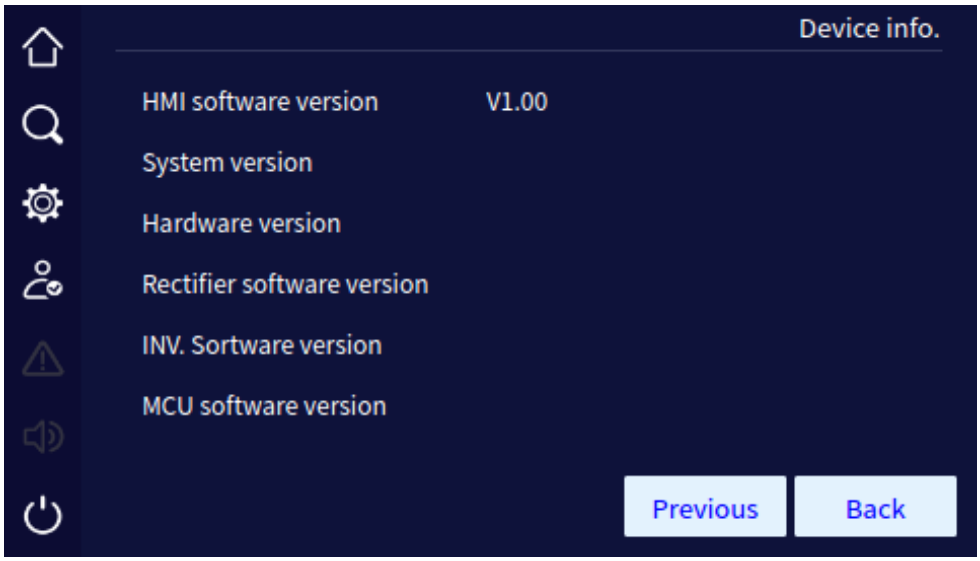


Figure4-26 Device information page 2

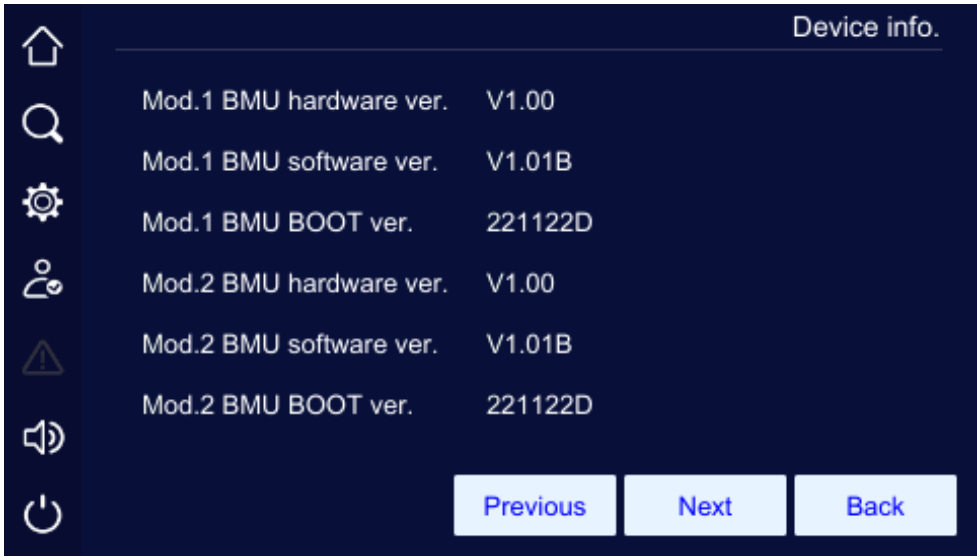


Figure4-27 Device information page 3

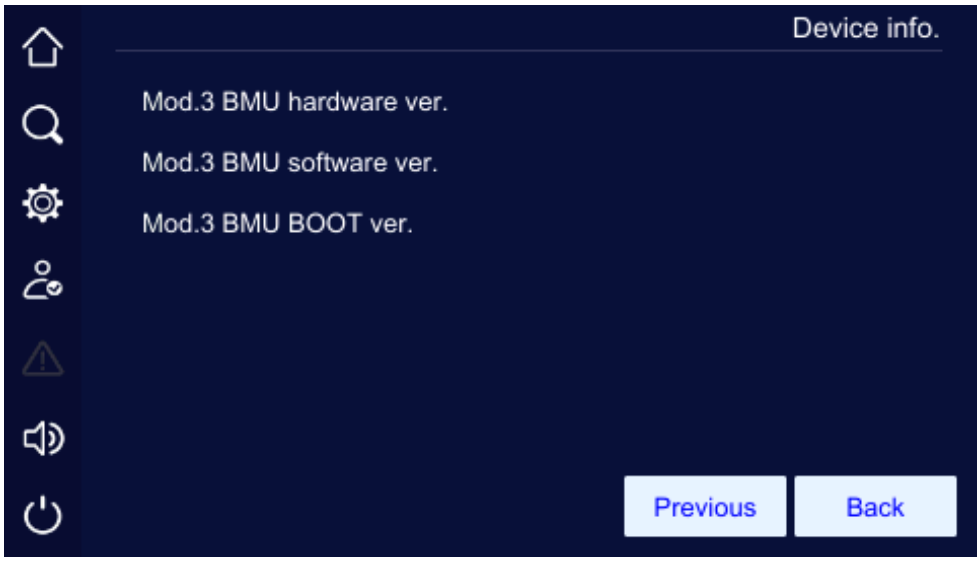


Figure4-28 Device information page 4

4.5 Setting Management Page

In the main page, after login, click "  " icon, it will enter the setting manage page, as shown in Figure4-29. The page includes: system manage, battery manage, battery test, log manage, communication setting, screen setting, dedust setting and password setting.

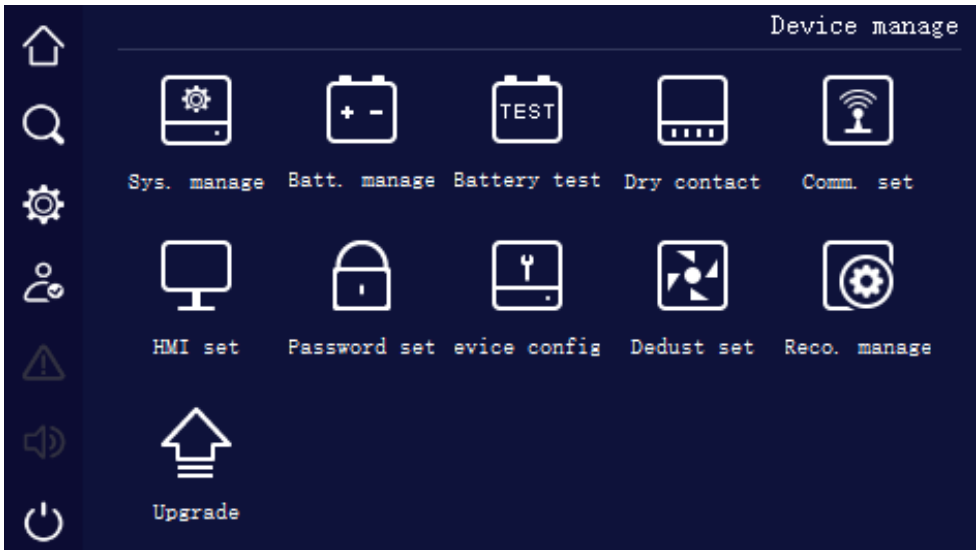


Figure4-29 Setting manage page

4.5.1 System Management Page

In the system manage page, user can set the mains voltage range, bypass voltage range, bypass frequency range, ECO mode and ECO voltage range, as shown in Figure4-30 to Figure4-32.

Figure4-30 System management page 1 of output set

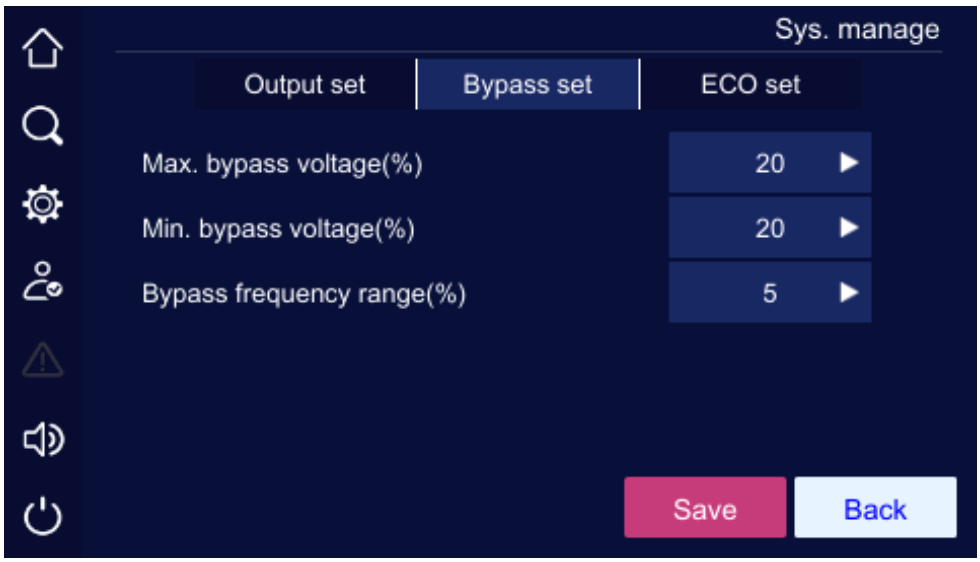


Figure4-31 System manage page 2 of bypass set

Figure4-32 System management page 3 of ECO set

Table4-1 Setting description for system mange

Item	Settable value
Output voltage (V)	190V, 200V, 208V, 220V
Output frequency (Hz)	50Hz, 60Hz
Output voltage adjustment (V)	-5~+5
Max. bypass voltage (%)	10%, 15%, 20%

Item	Settable value
Min. bypass voltage (%)	10%, 15%, 20%
Bypass frequency range (%)	5%, 10%
ECO mode	On, Off
ECO voltage range (%)	10%, 15%
ECO frequency range (%)	5%, 10%

After changing the parameter, it is necessary to click "Save" button to save the setting. If the setting is successful, there will be a "✓" icon at the right side of the parameter, as shown in Figure4-33, if the setting is unsuccessful, there will be a "✗" icon at the right side of the parameter, as shown in Figure4-34.

Figure4-33 Successful setting

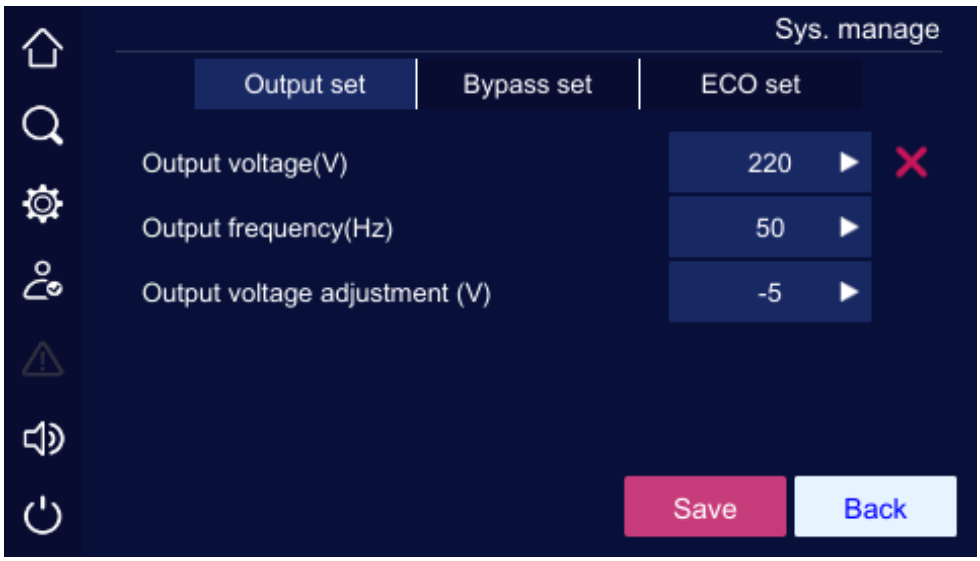


Figure4-34 Unsuccessful setting

4.5.2 Battery Management Page

In the "Battery Management" page, you can set the following parameters: li-batt. module quantity, module charge current, li-batt. ON, li-batt. OFF, li-batt. force charge on, li-batt. force charge off, battery backup function, li-batt. insulation detection, and li-batt. SOC balance enable.

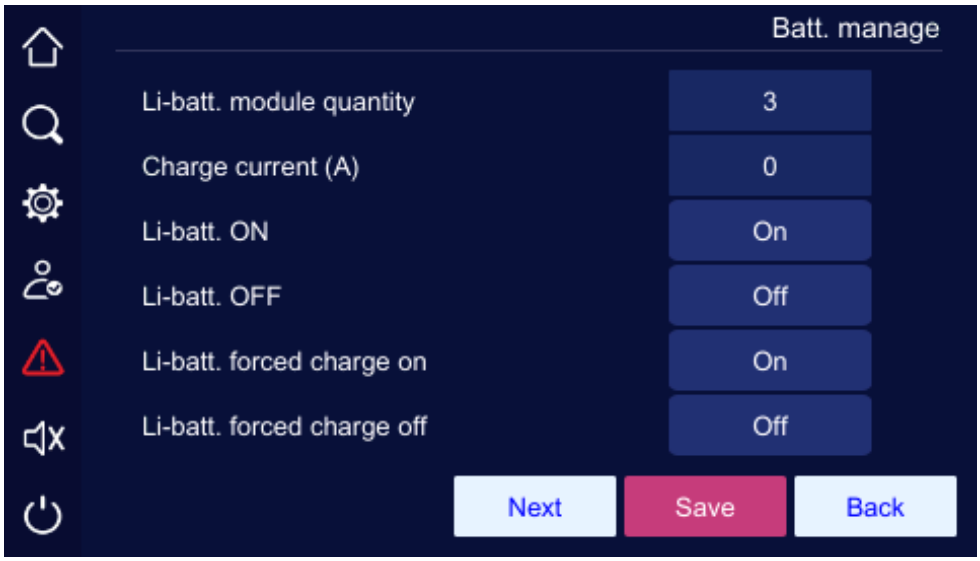


Figure4-33 Battery manage page 1

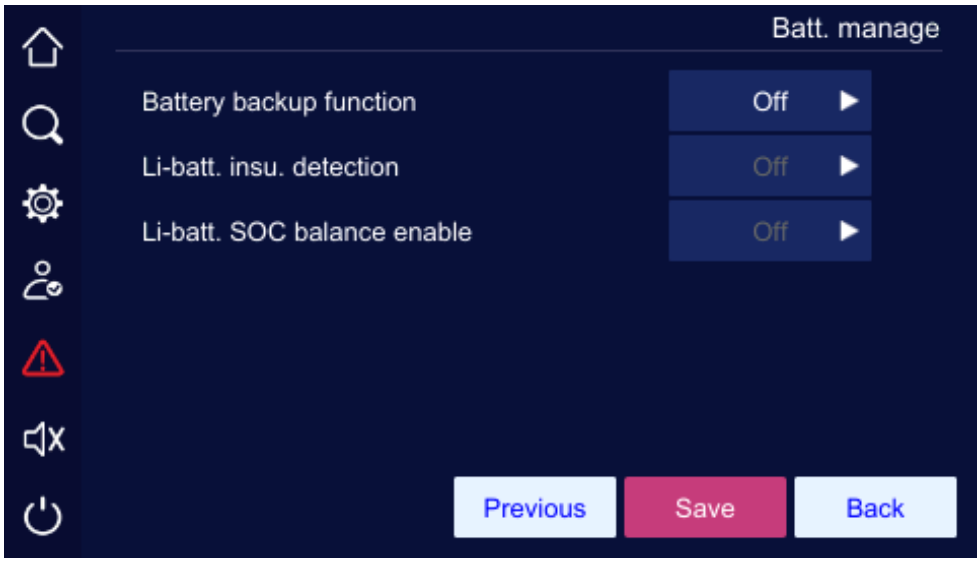


Figure4-35 Battery manage page 2

Table4-2 Setting description for battery mange page

Item	Settable value
Li-batt. module quantity	1-3
Charge current (A)	2-40
Li-batt. ON	On
Li-batt. OFF	Off
Li-batt. forced charge on	On
Li-batt. forced charge off	Off
Battery backup function	On, Off
Li-batt. insu. detection	On, Off
Li-batt. SOC balance enable	On, Off

Click number input box, it will display the input range of setting value at the top of the input keyboard. When the setting exceeds the range, the setting will be invalid. After setting, click "Save" button to save the setting. Successful setting/unsuccessful setting mark is the same as that of system management.

4.5.3 Battery Test Page

Battery test includes standard test and depth test and the battery test also can be canceled. The page shows the test status, battery current, consumed capacity and test time. The battery test page is as shown in Figure4-36.

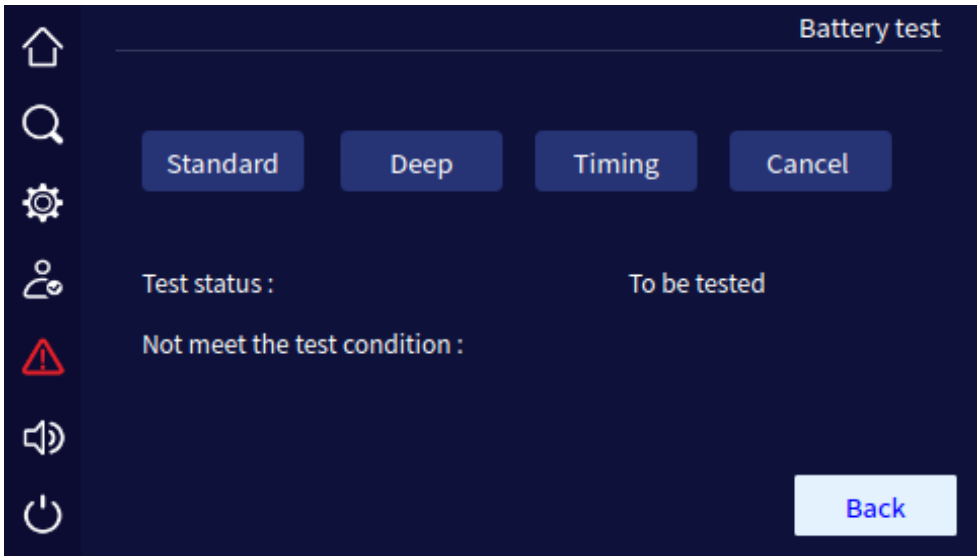


Figure4-36 Battery test page

4.5.4 Dry Contact Page

In setting manage page, click "**Dry contact**" icon, it will enter dry contact setting page, as shown in Figure4-37 and Figure4-40.

NOTE

The dry contact setting is the same, below we take dry contact 1 as an example to illustrate.

Input dry contact

On Dry contact page, click "Charge forbidden" icon, it will enter corresponding dry contact setting page, as shown in Figure4-38.Click "OK" button to save the dry contact setting and return Dry contact setting page. After setting, click "Save" button on Dry contact page to save the setting. Successful setting/unsuccessful setting mark is the same as that of system management.

Figure4-37 Input dry contact setting page 1

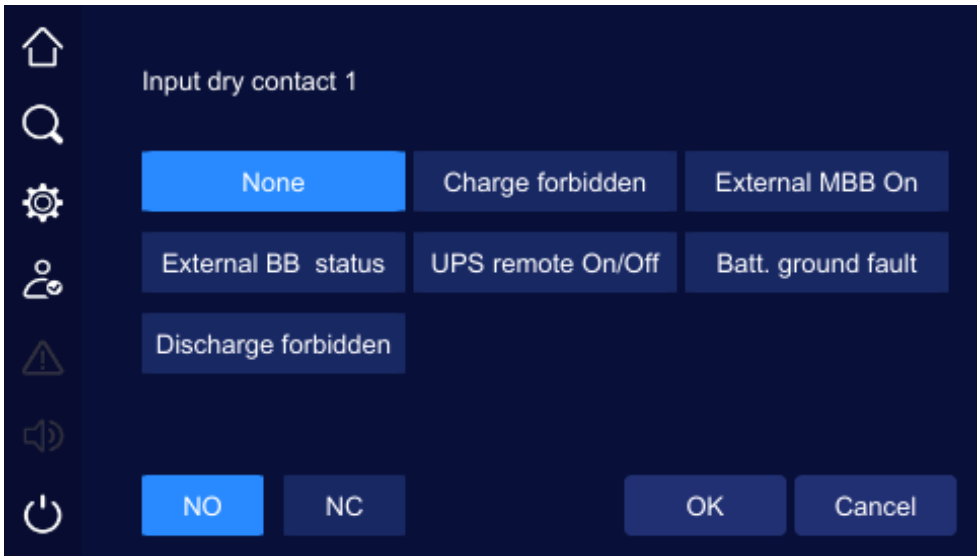


Figure4-38 Input dry contact setting page 2

Output dry contact

On Dry contact page, click "ECO output" icon, it will enter corresponding dry contact setting page, as shown in Figure4-40. Click "OK" button to save the dry contact setting and return Dry contact setting page. After setting, click "Save" button on Dry contact page to save the setting. Successful setting/unsuccessful setting mark is the same as that of system management.

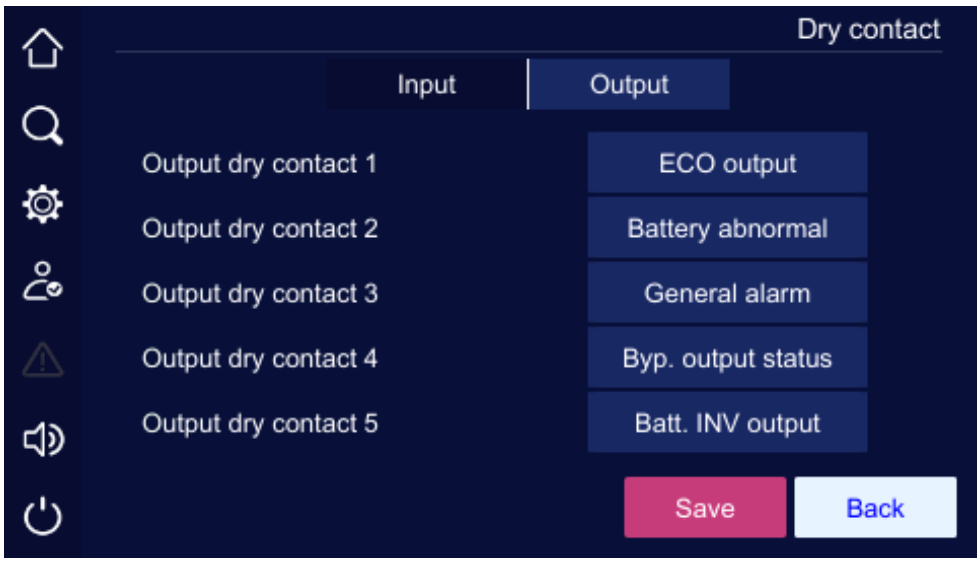


Figure4-39 Output dry contact setting page 1

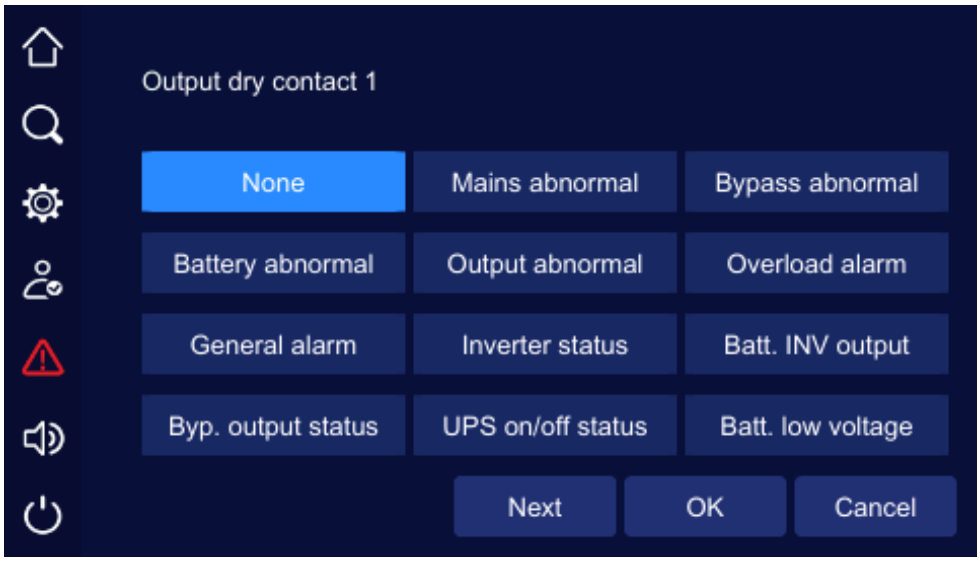


Figure4-40 Output dry contact setting page 2

4.5.5 HMI Setting Page

In HMI set page, user can set the date, time, language, backlight and screen saver, as shown in Figure4-41.

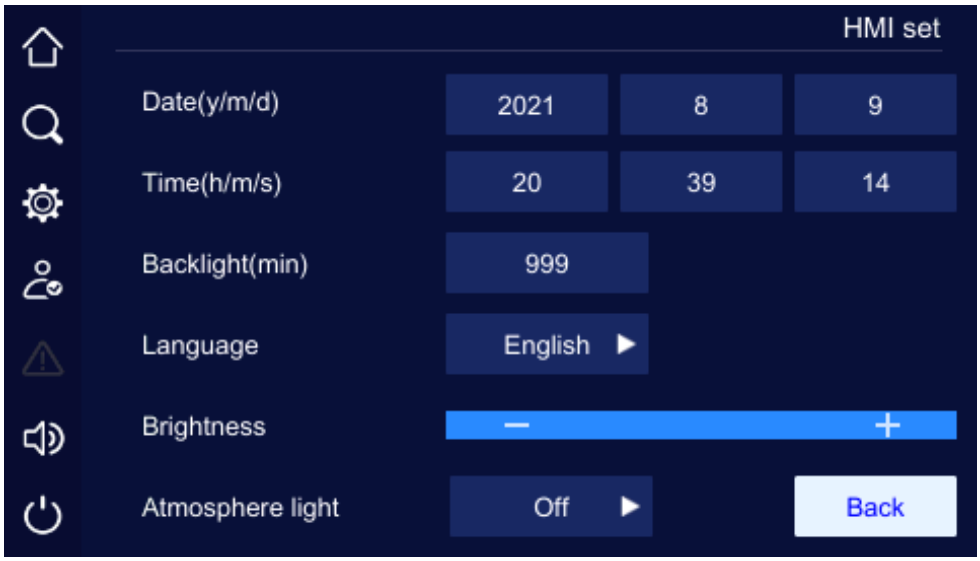


Figure4-41 Screen setting page

4.5.6 Password Setting Page

In setting manage page, click "**Password set**" icon, it will enter the password setting page, as shown in Figure4-42. *VERY IMPORTANT NOTE: If the password is changed and is then lost, the ONLY way to recover the password is by resetting the password with a firmware update by a factory technician. This update is NOT covered under warranty and will be a chargeable visit.*

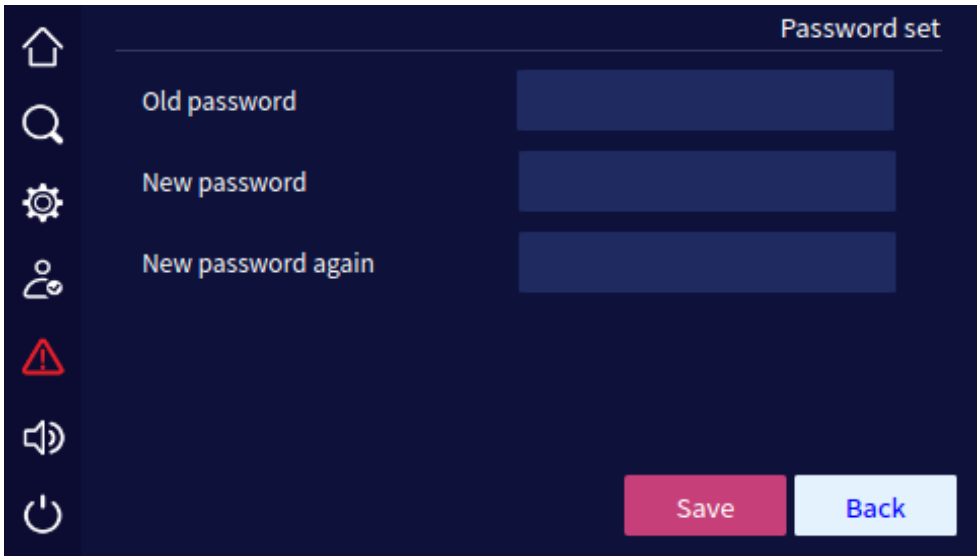


Figure4-42 Password setting page

4.5.7 Device Configuration Page

In setting manage page, click "**Device config.**" icon, it will enter Device configuration page, as shown in Figure4-43 to Figure4-46.

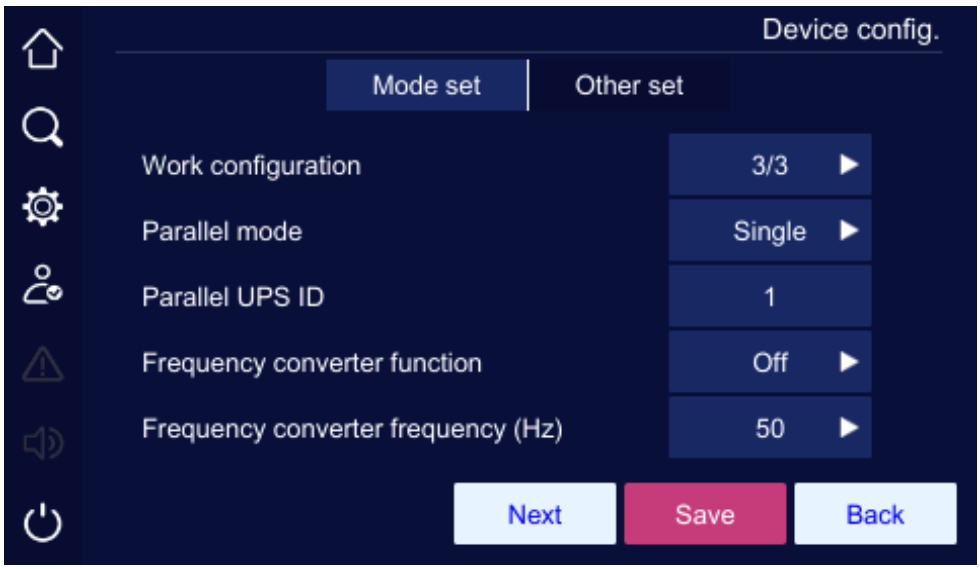


Figure4-43 Mode set page 1 of device configuration

Figure4-44 Mode set page 2 of device configuration

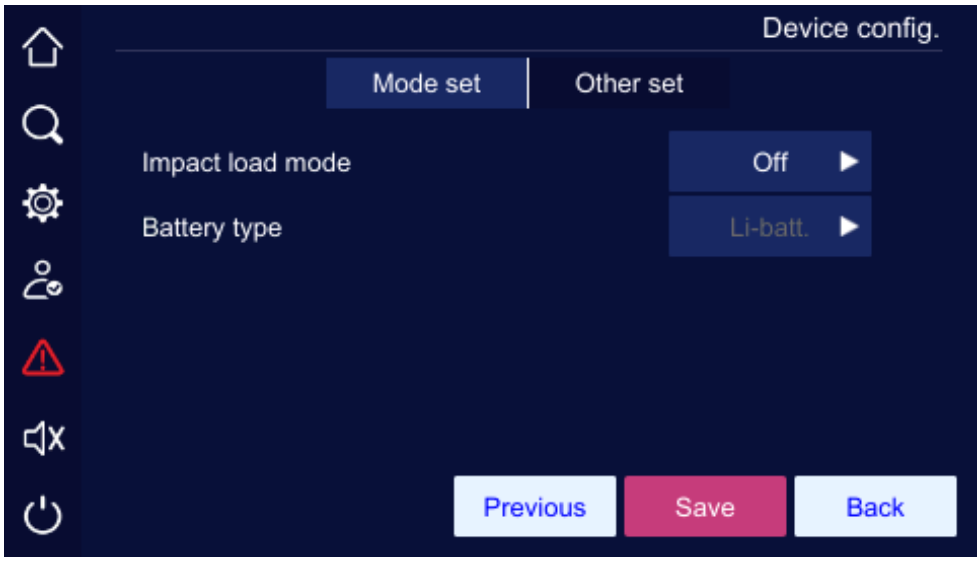


Figure4-45 Mode set page 3 of device configuration

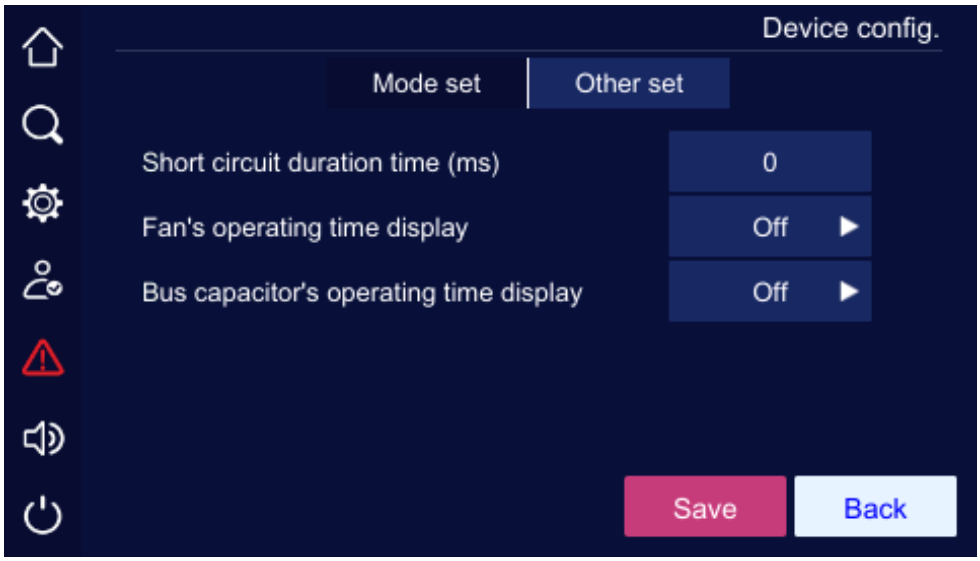


Figure4-46 Other set page of device configuration

Table4-3 Setting description for battery management page

Item	Settable value
Short circuit duration time (ms)	10-200
Fan's operating time display	On, Off
Bus capacitor's operating time display	On, Off
Work configuration	33

Item	Settable value
Parallel mode	Redundant, Single, Expand, BSC
Parallel UPS ID	1-4
Frequency converter function	On, Off
Frequency converter frequency	50, 60
Self-start when power on	UPS will not turn off, On, Off
Bypass disable	On, Off
Bypass disable when short circuit	On, Off
Test load function	On, Off
Test load rate (%)	10-100
Impact load mode	On, Off
Battery type	Li-batt.

Click number input box, it will display the input range of setting value at the top of the input keyboard. When the setting exceeds the range, the setting will be invalid. After setting, click "Save" button to save the setting. Successful setting/unsuccessful setting mark is the same as that of system management.

4.5.8 Dedust Setting Page

In setting manage page, click "**Dedust set**" icon, it will enter dedust set page, as shown in Figure4-47.

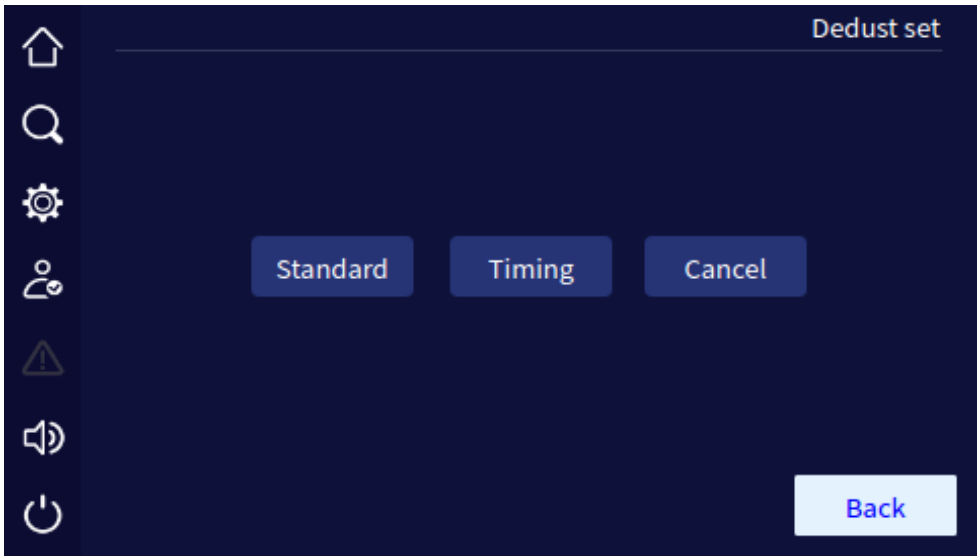


Figure4-47 Dedust set page

4.5.9 Record Management Page

NOTE: The USB port to download these records is located behind the front display over and should only be accessed by trained personnel. Record mange page can be exported and clear the history log, user log, and wave capture. Click " " button, you can export the selected items by USB flash drive, click the " " button, you can clear the selected items. Before clearing, it will show the prompting window to confirm, as shown in Figure4-48.

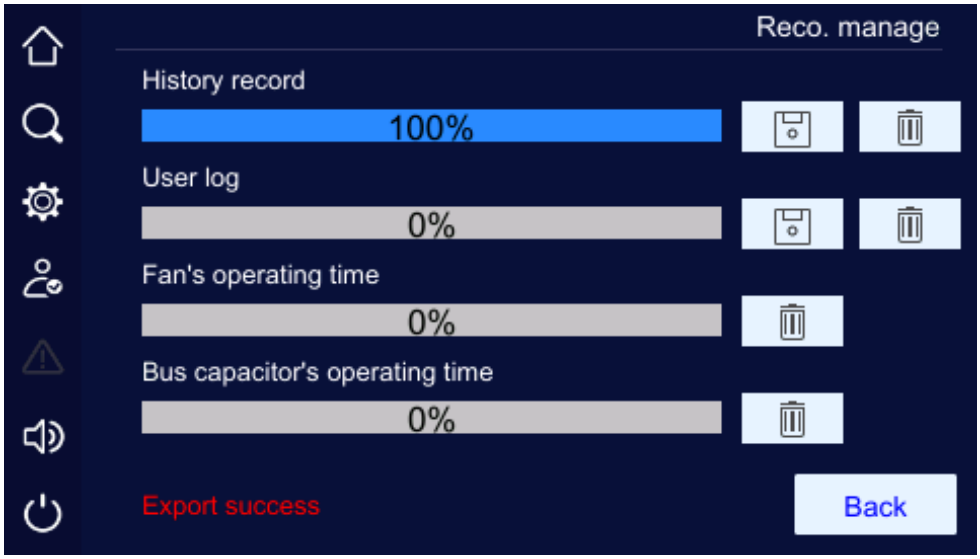


Figure4-48 Export success of record manage page

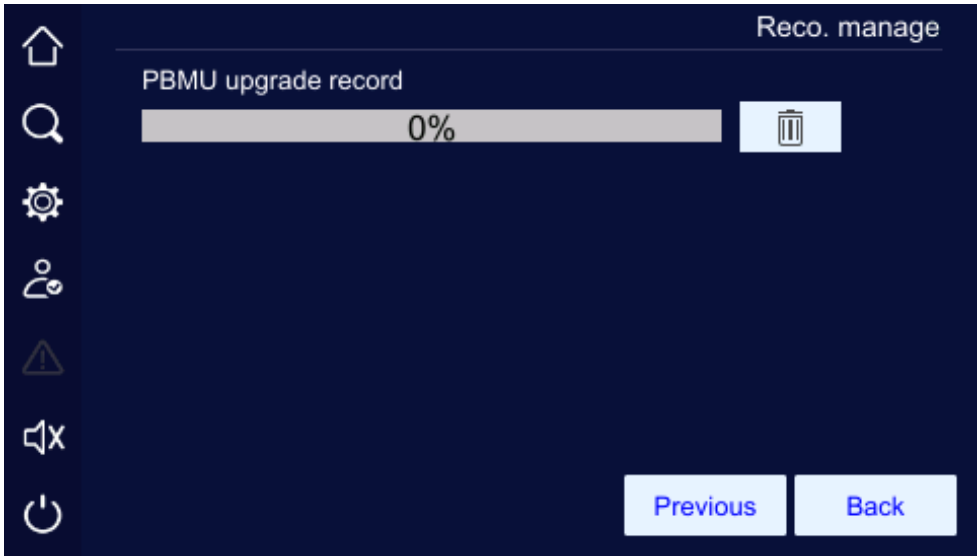


Figure4-49 PBMU upgrade record page

Insert U dish, you can backup the records, as shown in Figure4-50 and Figure4-51.

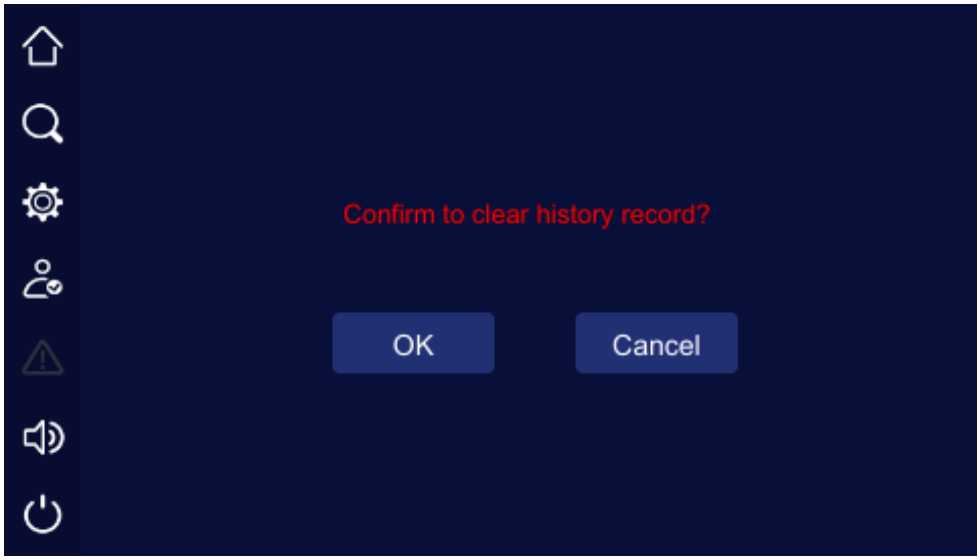


Figure4-50 Prompting for clearing log

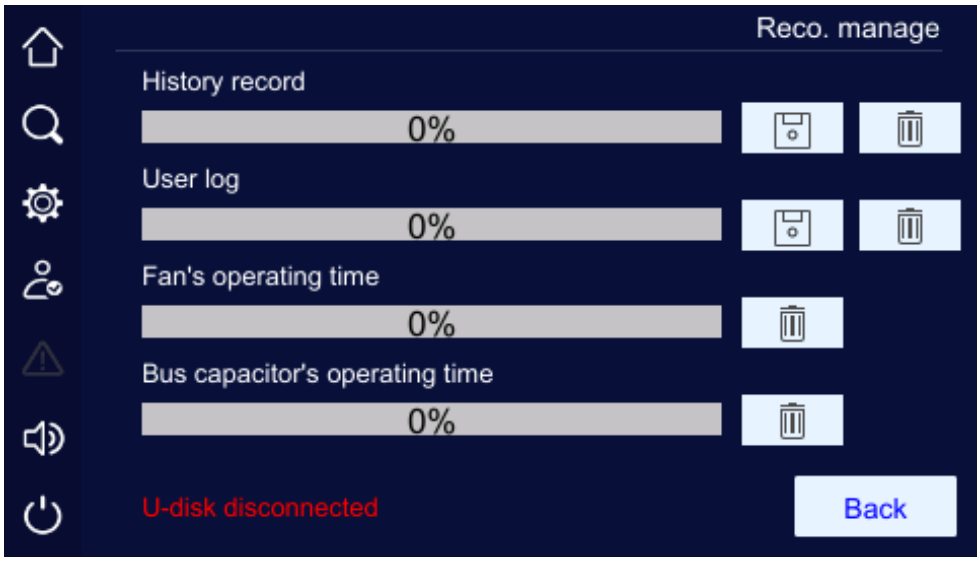


Figure4-51 The U dish is not inserted

4.6 Current Fault Page

When the UPS is fault, the "⚠" icon at the left will light on, as shown in Figure4-52. Click it, the page will show the current fault information, as shown in Figure4-53.

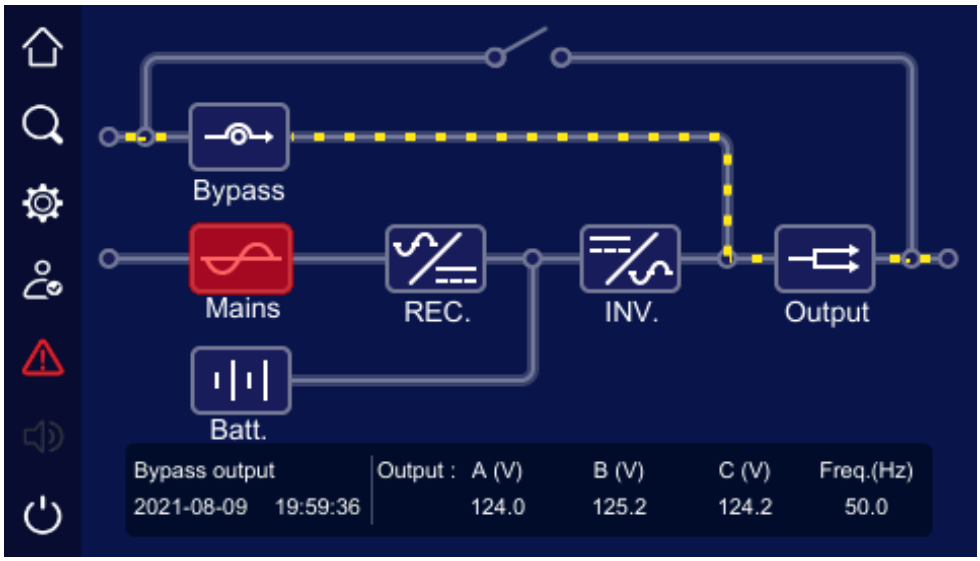


Figure4-52 Fault alarm status

Figure4-53 Current fault information

4.7 Buzzer Control

When the UPS fault, the buzzer icon will light on. Click the "  " icon, the buzzer can be muted or opened. Figure4-54 shows the buzzer mute status.

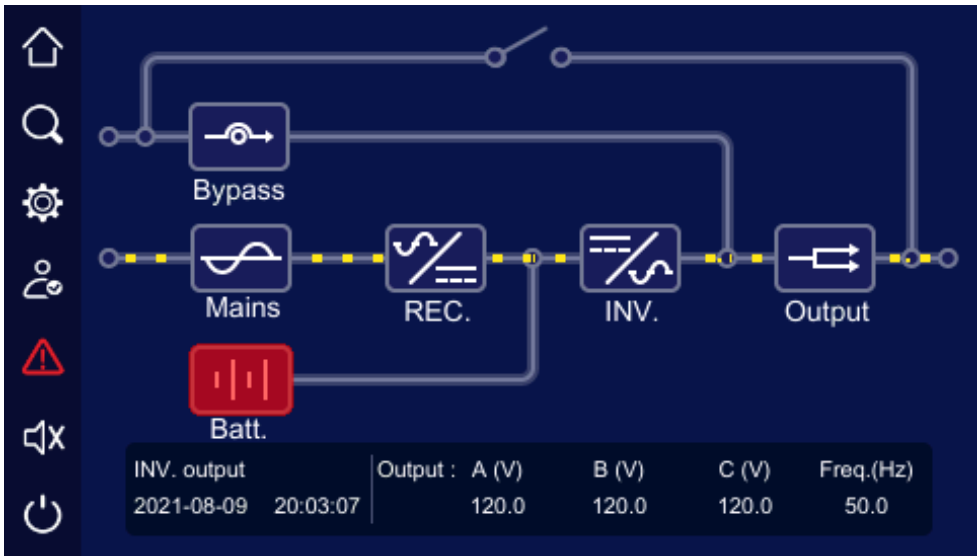


Figure4-54 Buzzer mute status

NOTE

The buzzer cannot be muted when it has a long beep.

4.8 ON\OFF Operation

4.8.1 UPS ON/OFF Operation

In main page, click "  " icon, the UPS can be started or shutdown. When the UPS is shutdown, click the icon, it will show " Confirm to power on? " , when the UPS is started, it will show " Confirm to power off ? " as shown in Figure4-55 and Figure4-56.

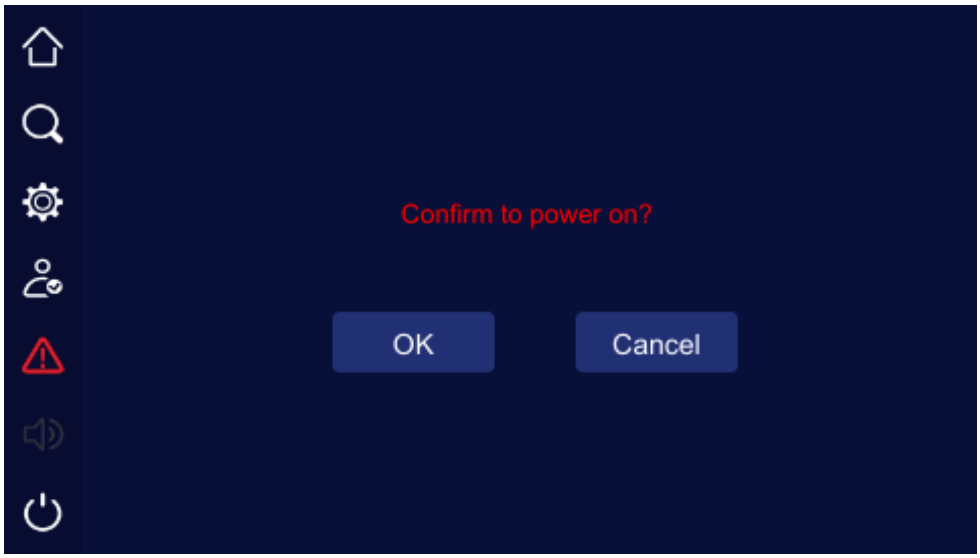


Figure4-55 Confirm to turn on page

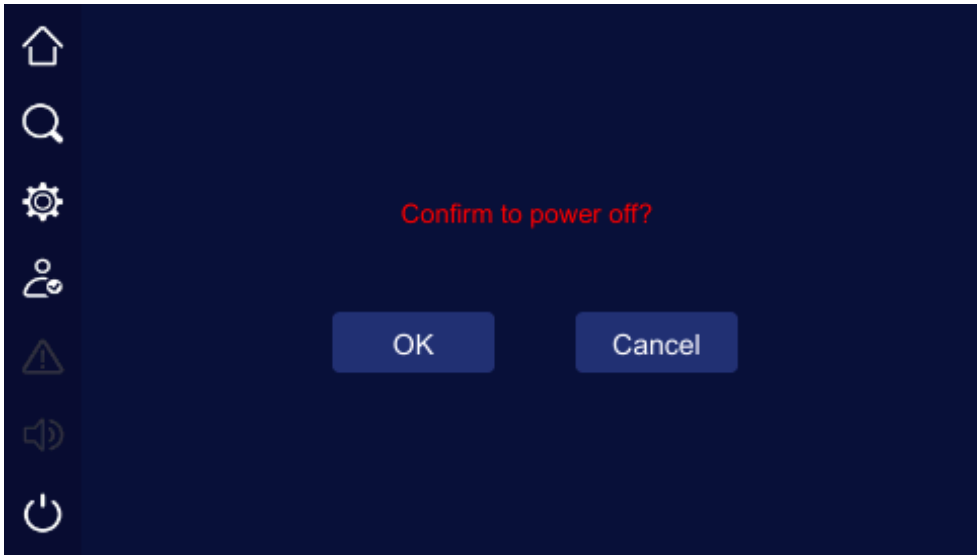


Figure4-56 Confirm to turn off page

4.8.2 Li-ion battery ON/OFF Operation

When the battery module is powered on, it will automatically turn on. In the Batt. manage page, set "Li-batt. OFF" to "Off", the page will prompt "Confirm to power off ? " , then you can click "**OK**"

button to power off all battery module. Set "Li-batt. ON" to "On", the page will prompt "Confirm to power on? ", then you can click "**OK**" button to power on all battery module. As shown in below.

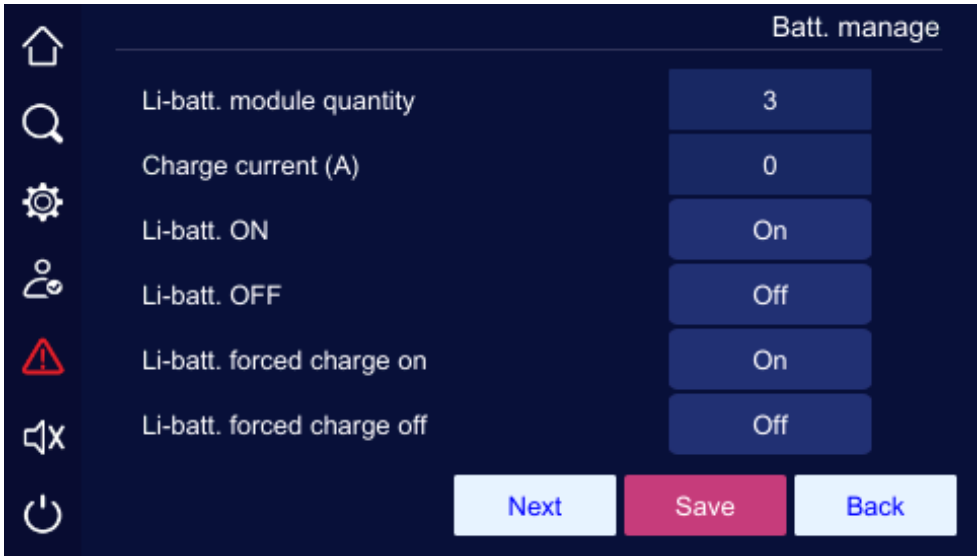


Figure4-57 Li-ion battery ON/OFF page

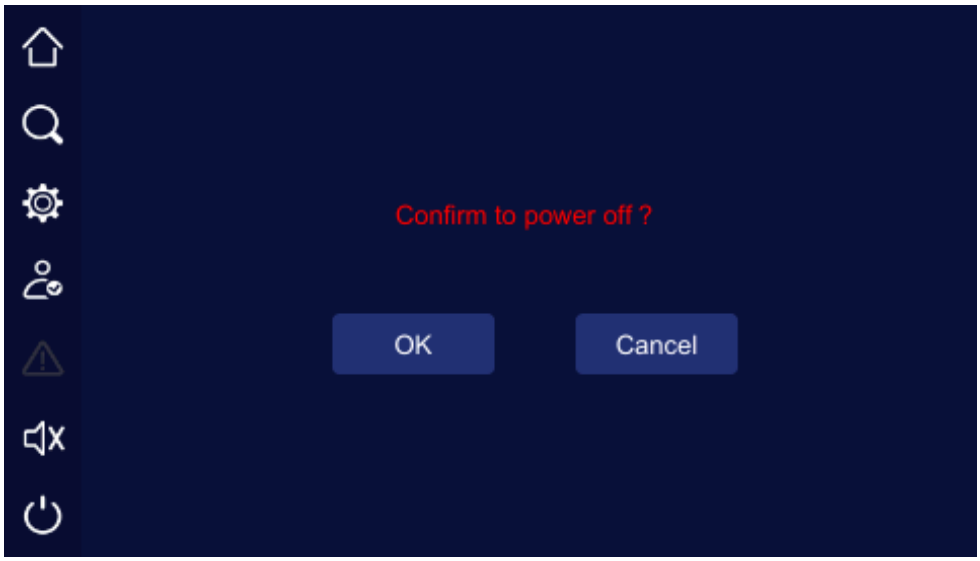


Figure4-58 Li-ion battery power off confirmation

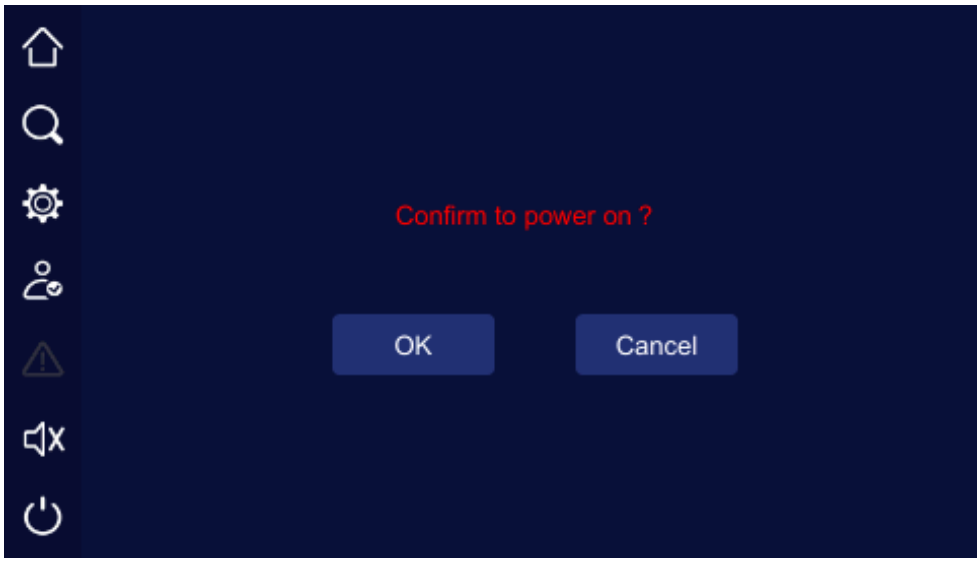


Figure4-59 Li-ion battery power on confirmation

5 Operation and Maintenance

This chapter mainly describes the operation process, operation method, daily maintenance and troubleshooting, etc.

5.1 Check Before Startup

- Check if the wire connection is firm and the color of AC wires is in accordance with the specification.
- Check if UPS is grounded reliably.
- Check if the voltage between the neutral wire and grounding wire is less than 5Vac.
- If the UPS equipped with remote monitoring device, check if the wiring of the RS485 port is correct.
- Check if the wiring is neat and the wire binding is in accordance with the specification.
- Check if the installation and wiring are good for transformation, expansion and maintenance in future.
- Check that there is no short-circuit in the output of the UPS and the load capacity isn't beyond the rated capacity of the UPS.

5.2 Startup Operation

Step 1 Close the breaker of input and bypass.

Step 2 After touch screen light on, turn the switch on all battery modules to  position, until all green indicators are on.

Step 3 Press "ON" combination button (touch screen) for 1s at the same time to start the UPS.

Step 4 After about 10 seconds, the UPS will turn on and start powering loads.

CAUTION

Start load according to "high power device→ small power device", which is to avoid overload protection when starting high power device.

----End

5.3 Shutdown Operation

Step 1 Turn off loads and open output breaker. It is recommended to keep the UPS running without load for about10 minutes to exhaust heat.

Step 2 Press "OFF" combination button (touch screen) for 1s at the same time to shut down the UPS.

Step 3 Turn the switch on all battery modules to  position, all indicators are off.

Step 4 Open the breaker of input and bypass.

----End

5.4 Maintenance Guide

Proper maintenance is the key to make the Li90 li-ion battery system operate at its best and with a longer service life.

5.4.1 Safety Precautions

To ensure human safety and device safety, observe the following precautions.

- Please keep in mind that there is dangerous voltage inside the Li90 li-ion battery system even if it is not operating. Before maintenance, use a multi-meter to check the voltage and make sure that the Li90 li-ion battery system is completely shut down and stays in safe status.
- Do not wear any conductive metal objects during operating, such as rings or watches.
- Observe safety regulations strictly. If any doubt, please consult a professional who is familiar with the li-ion battery system.

5.4.2 Preventive Maintenance

To improve the reliability and efficiency of Li90 li-ion battery system, perform the following maintenance tasks regularly.

- Keep the operating environment clean to avoid dust or chemical pollution to the li-ion battery system.
- Check the wiring terminals on input, output cables every half year for proper torque.
- Check the fans work status regularly, avoid anything blocking the air vents. If a fan is damaged, maintain or replace it immediately.
- Check the SOC and SOH of li-ion battery modules regularly, ensure that the li-ion battery modules are in good working order.
- Check the work status of Li90 li-ion battery system regularly and ensure that any fault can be found in time.

5.5 Module Replacement

- Do not put the battery into fire, which is to avoid explosion.
- Do not open or disassemble the battery, especially for the inner cells, which is to avoid electric shock or burn dangerous.
- The recycle for the li-ion battery module should be done according to corresponding laws and regulations.
- Dangerous voltage may exist in the output end of the li-ion battery module, before contacting, please check if there is dangerous voltage to avoid endanger human safety.
- Keep the ON/OFF knob of replaced module at  status If the replaced module needs to be transported, it is suggested to pack the module the original package material or contact the local agency.

5.6 Troubleshooting

5.6.1 Common Fault

As shown in Table5-1, it only includes some common fault diagnosis. If any doubt, contact the local office or distributor for details.

Table5-1 Troubleshooting

Fault phenomenon	Possible reason
The mains normal, after starting	Check if the contactors and wiring terminals in the input

Fault phenomenon	Possible reason
the UPS, it outputs normally, but it works in the battery mode and the buzzer beeps intermittently.	circuit are in good condition; Check if the displayed input voltage amplitude or frequency of mains on the touch screen is beyond the allowable range of UPS; Check if the mains input breaker is disconnected, if yes, please close the breaker again.
After installing UPS, connecting with power will fuse the fuse or cause tripping operation.	The wiring of UPS input or output is short circuit.
After starting, the touch screen display and output are normal. But once connecting with load, it will stop outputting immediately.	UPS is seriously overload or the output circuit is short-circuit. Please reduce load to proper capacity or find the short-circuit reason. The common reason is that the output changeover socket short-circuit or the input short-circuit after UPS damage; The load is not started according to "high power device → small power device". Restart the UPS, and after the UPS works steadily, start high power load first, and then start small power ones successively.
Buzzer long beeps, fault indicator lights on, UPS works in bypass mode and inverter failure.	The output is overloaded. The load is too heavy and beyond the rated power of the UPS. Please reduce load or select a UPS with larger power capacity. If it is temporary bypass caused by impact of load start and recovers automatically, it still is normal; UPS over-temperature protection. Check if the air inlet and air outlet of UPS is blocked or the working temperature of UPS is beyond the allowable range.
Usually, UPS works normally. When power failure, it doesn't transfer to battery mode or it transfers to battery mode and battery under-voltage protection soon.	Battery aging, the battery capacity loss. Please replace battery; Battery charger fault. At ordinary time, the battery cannot be charged; Battery wire doesn't connect well or the terminals contact is bad.

Fault phenomenon	Possible reason
When the load is PC, everything works normally. When power failure, UPS works normally, but the computer system halted.	The grounding connection is not so good. The floating voltage between the neutral wire and the grounding wire is too high.
The module quantity on the touch screen is not the same as the actual module quantity.	The module quantity on the touch screen is not set according to the actual used module.
Mains normal and the SOC of li-ion battery module is lower than 80%, but the charging for li-ion battery module cannot be done.	1. The charge voltage of UPS beyond the allowed range and cannot charge the li-ion battery system. 2. The wiring of battery is not well connected or the polarity of battery is reverse connected. 3. Li-ion battery power off.
Once the Li90 li-ion battery system switches to discharge status, it starts to protect immediately.	1. The connected load capacity exceeds the rated output capacity of li-ion battery system. Please lessen the load or add the battery module quantity. 2. The Li90 li-ion battery system is not charged for a long time and cause the SOC low or the battery damaged, once discharge, it will turn to protect for low SOC.
After starting, the Li90 li-ion battery system works normally, but some time later, it will shut down automatically.	On battery supply power mode, the system turns to battery low-voltage protection for discharging ending, the system shut down automatically, this phenomenon is normal. When the mains recover, the system will start and charge the battery automatically.
The red indicator on the panel of li-ion battery module light on.	1. The module protects for low SOC. 2. The operating temperature exceeds the allowed range or the heat dissipation fan is not started. 3. The module fault, please replace it in time.

Table5-2 Meaning of fault symbol and buzzer status

NO.	Fault symbol	Buzzer status	Meaning
1	EPO	Long beep	UPS has emergency protection (if equipped with EPO function), Bypass output and inverting output are all closed.
2	Mode fault	Long beep	UPS system mode system settings and the actual wiring do not match the fault, please check the main power or bypass wiring, and make the actual system is consistent with the set mode system.
3	Maintain bypass fault	Long beep	UPS maintenance bypass protection, inverted output closed, please checks back board maintenance bypass detection port is shorted.
4	Output fault	Long beep	The UPS output is faulty, detect the UPS output is short or over load.
5	Mode mismatch	Long beep	The UPS of the input and output mode in the parallel does not match the actual system.
6	Voltage mismatch	Long beep	The UPS of the output voltage in the parallel does not match the actual system.
7	Frequency mismatch	Long beep	The UPS of the frequency in the parallel does not match the actual system.
8	Bypass mismatch	Long beep	The UPS of the bypass voltage or frequency in the parallel does not match the actual system.
9	Pattern mismatch	Long beep	The UPS parallel mode setting in the parallel system does not match the actual system.
10	Power mismatch	Long beep	The UPS of the output power setting in the parallel does not match the actual system.
11	Battery number mismatch	Long beep	The UPS of the battery number setting in the parallel does not match the actual system.
12	Parallel mismatch	Long beep	The UPS of parameters setting in the parallel does not match the actual system.

NO.	Fault symbol	Buzzer status	Meaning
13	Short mismatch	Long beep	The UPS of short turn to bypass setting in the parallel does not match the actual system.
14	Two-ended fault	Long beep	Fall-off fault at both ends of the parallel wire.
15	Single-ended fault	Slow beep	Fall-off fault at one ends of the parallel wire.
16	Auxiliary power supply failure	Long beep	UPS internal working power failure, if it cannot be automatically recovered, please report repair promptly.
17	Fan failure	Urgent beep (alarm once about every 0.2s)	Fan fault warning prompt, please check the fan for damage or blocking.
18	CAN fault	Slow beep (alarm once about every 2.0s)	The CAN communication of parallel system abnormal, please check if the parallel wire is damaged or there is only one UPS in parallel system works.
19	SCI fault	Long beep	UPS internal communication abnormal, if the continuous alarm cannot be restored, please report repair promptly.
20	There is no redundancy in the parallel UPS	Slow beep (alarm once about every 2.0s)	The total output load of the UPS parallel system exceeds the full load of the single machine, check that the output load exceeds the requirements for redundant backups.
21	Main power abnormal	Long beep	The mains power input phase sequence is abnormal, please check the main power input wiring.
		3 continuous alarms at 10s	The main power input occur lack N fault, power down failure, overvoltage protection, under voltage protection, over-frequency fault,

NO.	Fault symbol	Buzzer status	Meaning
		intervals	under-frequency fault, please check whether the main power input status is normal.
22	Bypass abnormal	Slow beep (alarm once about every 2.0s)	At mains status, the bypass voltage abnormal, frequency abnormal, phase sequence abnormal, or mode setting mismatches the wiring. Please check if the bypass breaker is closed, if the bypass phase sequence is normal, if the wiring way of bypass matches the system mode setting.
23	Battery abnormal	Slow beep (alarm once about every 2.0s)	Battery has been pressure protection, charging fuse failure, over-pressure alarm fault, please check the battery status is normal.
		Urgent beep (alarm once about every 0.2s)	Battery wiring fault, charging short, under-voltage protection, under-voltage warning problem, please check the battery wiring and the current state is normal.
		No buzzer warning	The battery charging temperature is too high.
24	Rectifier abnormal	Urgent beep (alarm once about every 0.2s)	UPS rectifier fault.
25	Inverter abnormal	Long beep	UPS inverter fault.

NOTE

The buzzer alarm in the table above describes the phenomenon of UPS boot state and no beep ban when the buzzer is not set, the shutdown state or some abnormal phenomena when setting the buzzer ban will prompt the information in the touch screen, but the buzzer alarm will not be issued.

When one battery module fault, it will be insulated with system automatically. Generally, it will not affect the normal operation of system, but it will decrease the redundancy degree of module. At this time, please shut down the fault module and pull it out of the cabinet, and then inform the engineering technicist to maintain.

6 Package, Transportation and Storage

6.1 Package

During packing, please pay attention to the place direction requirements. At the side of the package, there is wet, handle with care, upward, etc. alarm marks. The device model is printed on the package. At front of the package, the device name is printed.

6.2 Transportation

During transporting, pay attention to the warning marks and avoid severe impact on the package. Place the device according to the marked direction, which is to avoid damage the component. Any inflammable, explosive, corrosive object is not allowed to shipping with the device. While midway transportation, do not put the device in the open air. The device cannot suffer any rain, snow or liquid material or mechanical damage. The capacity of transported li-ion battery module should be within the range of 20-50%.

6.3 Storage

During storing, place the UPS according to the marked direction. The package box should be far away from ground for 200mm(7.9in), and keep at least 500mm(19.7in) from wall, eat source, cold source, window or air inlet.

Storage temperature: -10~45℃(14~113℉), relative humidity is 20%~80%.In the warehouse, any inflammable, explosive, corrosive object or harmful gas is not allowed, and also, strong mechanical shake, impact or magnetic field is forbidden. The storage period of these requirements, generally, is 6 months. If the UPS is stored more than 6 months, it is necessary to check again. If the UPS is stored for a long time, please charge the battery every 3 months. If the device is stored for a long time, please charge the li-ion battery system every 3 months.

7 Specifications

MODEL NUMBER		Li90-10K	Li90-20K	Li90-30K
CAPACITY	Power rating	10kVA/10kW	20kVA/20kW	30kVA/30kW
INPUT	Voltage / range	208/220 (3W+N+G) / 120V-156V linear derating, 156V-268V at full load		
	Frequency	40–70Hz		
OUTPUT	Voltage / Frequency	190/200/208/220±1% (L-L) ±1% (default is 208V) / 50/60±0.1 (battery mode)		
	Oveload Capacity - Online Mode	<105% Continuous, <110% 60 min, <130% 10 min, <150% 1 min, <200% 200 ms		
	Efficiency	up to 94.5% online mode or 99% ECO mode		
INTERNAL BATTERY	Battery type	Lithium Iron Phosphate (LFP) Module		
	Battery Module Specs	50AH, 240Vdc		
	Module Weight	81.6 lbs		
	Battery Quantity	1 Module (1-3 Selectable)	2 Module (2-3 Selectable)	3 Modules
	Charge Current	2A - 40A Selectable (20A default)		
PHYSICAL	Dimensions (W x D x H)	12.6"W x 35.2"D x 49.2"H*		
	Weight	298 lbs	390 lbs	485 lbs
ENVIRONMENT	Operating temperature	23F-122F (-5C-50C) Derates above 104F (40C)		
	Audible noise	<63dB (10, 20kW), <68dB (30kW)		
	Relative humidity	0 - 95% (non condensing)		
	Altitude	5,200 ft above sea level		
APPROVALS		UL, cUL, FCC		
WARRANTY		5 years warranty (USA and Canada)		
COMMUNICATIONS INTERFACE		RS485+EPO+Dry contact (1 input,5 output)+2 Slots+SNMP (optional)		
INCLUDED IN BOX		User manual, RS-232 communication cable, USB cable		
AVAILABLE OPTIONS		External maintenance bypass		

8 Obtaining Service

If the UPS requires Service:

1. Use the TROUBLESHOOTING section in this manual to eliminate obvious causes.
2. Verify there are no circuit breakers tripped.
3. Call your dealer for assistance. If you cannot reach your dealer, or if they cannot resolve the problem, call Xtreme Power Conversion Corp Technical Support at 800.582.4524. Technical support inquiries can also be made at support@xpcc.com. Please have the following information available BEFORE calling the Technical Support Department:
   - Your name and address.
   - The serial number of the unit.
   - Where and when the unit was purchased.
   - All of the model information about your UPS.
   - Any information on the failure, including LED's that may or may not be illuminated.
   - A description of the protected equipment, including model numbers if possible.
   - A technician will ask you for the above information and, if possible, help solve your problem over the phone. In the event that the unit requires factory service, the technician will issue you a Return Material Authorization number (RMA).

If you are returning the UPS to Xtreme Power for service, please follow these procedures:

1. Pack the UPS in its original packaging. If the original packaging is no longer available, ask the Technical Support Technician about obtaining a replacement set of packaging material. It is important to pack the UPS properly in order to avoid damage in transit. Never use Styrofoam beads for a packing material.
2. Include a letter with your name, address, daytime phone number, RMA number, a copy of your original sales receipt, and a brief description of the problem.

3. Mark the RMA number on the outside of all packages. Xtreme Power cannot accept any package without the RMA number marked on the outside of the boxes.
4. Return the UPS by insured, prepaid carrier to the address provided by the Technician.
5. Refer to the Warranty statements in this manual for additional details on what is covered.

9 Xtreme Power Conversion Limited Warranty

Xtreme Power Conversion (XPC) Corporation warrants Xtreme Power Conversion equipment, when properly applied and operated within specified conditions, against faulty materials or workmanship for a period of **five years for Li90-Series products** from the date of purchase. XPC Corporation warrants **internal batteries for a period of five years** from the date of purchase. For equipment sites within the United States and Canada, this warranty covers repair or replacement, at the sole discretion of XPC Corporation. The customer is responsible for the costs of shipping the defective product to XPC Corporation. XPC Corporation will pay for ground shipment of the re- paired or replacement product. This warranty applies only to the original purchaser.

If equipment provided by XPC Corporation is found to be **Dead-on-Arrival (DOA)**, the customer must request and received a **Return Material Authorization (RMA)** number. DOA equipment is defined as equipment that does not properly function according to user documentation when initially received and connected in conjunction with proper procedures as shown in the user documentation or via support provided by XPC Corporation personnel or authorized agents.

This warranty shall be void if (a) the equipment is repaired or modified by anyone other than XPC Corporation or a XPC Corporation approved third party; (b) the equipment is damaged by the customer, is improperly used or stored, is subjected to an adverse operating environment, or is operated outside the limits of its electrical specifications; or (c) the equipment has been used or stored in a manner contrary to the equipment's operating manual, intended use or other written instructions. Any technical advice furnished by XPC Corporation or a XPC Corporation authorized representative before or after delivery with regard to the use or application of Xtreme Power Conversion equipment is furnished on the basis that it represents XPC Corporations best judgment under the situation and circumstances, but it is used at the recipient's sole risk.

EXCEPT AS STATED ABOVE, XPC Corporation DISCLAIMS ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCEPT AS STATED ABOVE, IN NO EVENT WILL XPC Corporation BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF Xtreme Power Conversion EQUIPMENT, including but not limited to, any costs, lost profits or revenue, loss of equipment, loss of use of equipment, loss of software, loss of data, cost of substitutes, or claims by third parties. Purchaser's sole and exclusive remedy for breach of any warranty, expressed or implied, concerning Xtreme Power Conversion equipment, and the only obligation of XPC Corporation under this warranty, shall be the repair or replacement of defective equipment, components, or parts; or, at XPC Corporations sole discretion, refund of the purchase price or substitution of an equivalent replacement product.