

UPS IST6

(400-1200kVA) Series

User Manual



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Foreword

Summaries

Thank you for choosing the IST6 series modular UPS!

This document gives a description of the IST6 series modular UPS, including the features, performance, appearance, structure, working principles, installation, operation and maintenance, etc.

Please save the manual after reading, in order to consult in the future.



NOTE

The figures in this manual are just for reference, for details please see the actual product.

Suitable Model

- IST6400
- IST6500
- IST6600
- IST6800
- IST61000
- IST61200

Symbol Conventions

The manual quotes the safety symbols, these symbols used to prompt users to comply with safety matters during installation, operation and maintenance. Safety symbol meaning as follows.

Symbol	Description
 DANGER	Alerts you to a high risk hazard that could, if not avoided, result in serious injury or death.
 WARNING	Alerts you to a medium or low risk hazard that could, if not avoided, result in moderate or minor injury.

Symbol	Description
 CAUTION	Alerts you to a potentially hazardous situation that could, if not avoided, result in equipment damage, data loss, performance deterioration, or unanticipated results.
	Anti-static prompting.
	Be care electric shock prompting.
 TIP	Provides a tip that may help you solve a problem or save time.
 NOTE	Provides additional information to emphasize or supplement important points in the main text.

Product standard: Q/ZZKJ 007

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 004 (2021-05-10)

Add IST61000 and IST61200.

Issue 003 (2021-01-09)

Add communication port illustration and modify company name.

Issue 002 (2020-12-11)

Modify Figure3-9.

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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 mainly describes the safety announcements when operation and maintenance. For details, please refer to safety description in relevant chapters.



CAUTION

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

The promptings in the user manual, such as "Danger", "Warning", "Caution", etc. don't include all safety announcements. They are just only the supplement of safety announcements when operation.



NOTE

Any device damage caused by violating the general safety operation requirements or safety standards of design, production, and usage will be out of Kehua's guarantee range.

1.1.1 Safety Instructions



CAUTION

The input and output of the UPS is dangerous high voltage, once operate improperly, it may endanger human safety. Please read this manual carefully before installing or operating, and pay attention to the warning labels. Do not dismantle the cover plate of the UPS unless authorized person.

**DANGER**

Don't touch terminals or conductors that connected with grid to avoid lethal risk !

**DANGER**

Device damage or device fault may cause electric shock or firing!

- Before operating, please inspect the device and see if there is any damage or exist other danger.
 - Check if the external devices or circuit connection is safe.
-

**WARNING**

Touching high voltage directly or through damp objects will lead to lethal risk.

**DANGER**

During a lightning storm, it is strictly prohibited to perform high voltage and AC operation, as well as in the tower or the mast. The atmosphere will generate a strong electromagnetic field in a lightning storm. Therefore, in order to avoid device struck by lightning, lightning protection and grounding system should be prepared in time.

**WARNING**

The UPS output mustn't connect the half-wave rectifier load or inductive load, such as air-conditioner, hair drier, starter, electric drill, motor, daylight lamp, etc.

**WARNING**

Do not reversely connect the grounding wire and neutral wire, live wire and neutral wire, which will cause short circuit.

It should be well grounded and the voltage between ground wire and neutral wire should be not more than 5V.

**WARNING**

Please do not put fingers or tools into the rotating fans to avoid human injury or device damage.

**WARNING**

In case of fire, please use dry power fire extinguisher. If using liquid fire extinguisher, it may cause electric shock.

**CAUTION**

Keep good ventilation! Ensure that the air inlet and outlet and fan are not blocked.

**CAUTION**

The UPS is class C3 device. If UPS doesn't directly connect with the low-voltage power supply system of all commercial area, light industrial area, industrial area, which supplies power for the residential building, it may cause wireless interference. User should take additional actions to avoid the interference.

**CAUTION**

When UPS is powered off, there still exists dangerous voltage. It should affix warning labels away from UPS location and the warning labels should include: 1. It supplies power for UPS. 2. Please disconnect UPS before wiring.

1.1.2 Use Announcements for Battery

**CAUTION**

Please use specified battery. Non-specified battery will damage the UPS.

The charging voltage of different brands and different model batteries are different. Before using, ensure that the charging voltage of the UPS matches with battery. If any doubt, please consult the manufacturer for support.

**WARNING**

Battery operation must be done according to instructions, especially battery wiring. Irregular operation will cause battery damage, even human injury.

- It is prohibited to short circuit the anode and cathode of the battery. The battery wiring must be tightened. It is strictly prohibited to touch any two wiring terminals of battery or the bare terminals of wires simultaneously, or it may cause battery damage or human injury.
- Prevent electrolyte leaking from battery. The metal objects and circuit board will be corroded by the overflowing electrolyte and it will result in device damage and circuit board short circuit.
- Keep the battery away from fire source and devices that easy cause spark to avoid danger or unnecessary loss.

1.1.3 ESD Protection



CAUTION

To prevent human electrostatic damaging sensitive components (such as circuit board), make sure that you wear a anti-static wrist strap before touching sensitive components, and the other end is well grounded.

1.1.4 Grounding Requirements



WARNING

The device must be grounded before wiring. The grounding terminal must be connected to earth.

- When installing, the UPS must be grounded first. When dismantling, the grounding wire must be removed at last;
- Don't damage the grounding conductor;
- The UPS must be connected to protection grounding permanently. Before operation, check the electrical connection to ensure the UPS is grounded reliably.

1.1.5 Warning Mark Setting

In order to avoid accident for the unwanted person gets close to the UPS or makes improper operation, observe the following requirements while installing, maintaining or repairing.

- Set warning marks where the switches are to avoid switching them on improperly.
- Set warning signs or safety warning belt in the operation area, which is to avoid human injury or device damage.
- After maintenance, please pull out the key of the UPS and save it properly.

1.2 Operation and Maintenance Requirements

There exists high temperature and high voltage inside the UPS. Please comply with the relevant safety regulations and operation procedures during installation, operation and maintenance to avoid human injury or device damage. The safety precautions mentioned in the user manual are just as a supplement to the local safety regulations.

**CAUTION**

The related operation and wiring for the UPS should be performed by qualified professionals, and ensure the electric installation accords with the electrical installation standards.

The installation and maintenance man should be trained and know about each safety announcements and get the right operation method, and then, the installation, operation and maintenance can be done.

**DANGER**

Mounting and dismantling power wires is prohibited when power on. Please switch off the power switches before mounting or dismantling power wires. Before connecting, make sure the wire connection, wire labels are in accordance with the actual installation.

- Only authorized professionals are allowed to open the UPS! The input and output of the UPS are dangerous high voltage. Touching high voltage will lead to lethal risk.
 - Before maintenance, please disconnect the AC power and battery to isolate the power input. It is better to measure the input terminals of UPS by a voltmeter to ensure the input power is disconnected and in a safe condition.
 - Even if all external powers are disconnected, there still exists residual electric charge on the capacitance inside the UPS, and the output terminals may exists high voltage which may endangers human life. It is necessary to set the UPS aside for enough time (≥ 10 min) to release all charge before opening the UPS chassis.
 - The battery circuit isn't isolated with AC input. There may exist dangerous voltage between battery terminals and grounding terminals. Battery group exists dangerous high voltage. Pay attention to the insulation when installing and using the battery.
 - Do not wear conductive objects, such as watches, bracelets and rings during operating.
-

**WARNING**

Drilling holes on the cabinet is prohibited! Inappropriate drilling will damage the components inside the UPS. Metal debris generated by drilling will lead to circuit board short circuit.

**NOTE**

Changing the UPS configuration, structure or assembly will affect the performance of the UPS. If user needs to do like this, please consult the manufacturer in advance.

1.3 Environment Requirements

**DANGER**

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

It's dangerous to operate UPS in the explosive environment, please strictly observe the environment requirements in the user manual when using and storing UPS.

The environment requirements of UPS are as follows.

- Meet the UPS operation specification (Operating temperature: 0°C~40°C, relative humidity: 0%~95%).
- Keep good ventilation and far away from water sources, heat sources and inflammable and explosive objects.
- The altitude should not exceed 1000m. If the altitude exceeds 1000m, it should reduce the rated power according to IEC 62040-3.
- Please avoid using UPS in the following environment for a long time.
 - The place where has direct sunshine or near a heat source.
 - The place where has metallic conductive dust.
 - The place where has dust, volatile gas, corrosive material or high salt.

2 Overview

This chapter mainly introduces the UPS features, working principle, working mode, appearance, optional components, alarm function, etc.

2.1 Product Intro

The IST6 series modular UPS is the online double-conversion UPS system, that consists of cabinet, power module, bypass module, system control box and distribution unit. The modular design is convenient for user to add, decrease or replace the power module online, which will not affect the UPS operation. It's a high performance sine-wave UPS that specially designed for the network computer room and precision instrument of financial, communication, insurance, transportation, tax, army, security, energy source, education, government, enterprise, etc.

2.2 Features

Hot swappable

The power module adopts the none-principle-subordinate parallel control technique, each power module is independent and do not need to match each other strictly. They can be put into use or exit online at will, which achieves the online hot maintenance. The system has high adaptability, availability, expandability and low cost.

Three-level inverter technology

Adopts three-level inverter technology, which makes the quality of output voltage wave better and the efficiency of whole UPS higher.

Completely digitalized DSP control

Adopt the digitalized DSP control for the inverter control, phase synchronization, output current-sharing, logic control of the power module, which is with high precision, high speed and perfect whole system performance.

Energy conservation and high efficiency

Adopt the advanced PFC control technology, the input power factor is greater than 0.99, which greatly improves the use ratio of electric energy and reduces the load of grid, and saves the cost of power distribution. The size of whole UPS is small, and the weight is light, calorific value is small, which enhances the use ratio of environment and decreases the investment cost.

Smart fan speed control

The fan speed is adjusted automatically in accordance with the load status to prolong fan life and reduce noise.

ECO energy conservation mode design

The UPS is designed with the ECO energy conservation mode. When the grid is good, if the UPS operates in this mode, the bypass prior to output, and the efficiency can be up to 99%. 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, and this guarantees the reliability of power supply and also, save energy.

Manual maintenance bypass design

It designs the manual maintenance bypass channel to ensure the UPS supplies power for load while maintenance, which greatly improve the system operation reliability and maintainability.

Reliable EMC performance

Pass the authority institution and professional test on EMC, including conducting disturbance, radioactive disturbance, conducting anti-disturbance, radioactive anti-disturbance, power falling, mass impulse, static discharging, surge, etc. The excellent EMC characteristics can completely filter each grid interference, and also, decrease and eliminate the interference of UPS itself effectively.

7 inch touch screen display

With 7 inch touch screen display, the operation is simple and convenient, which is convenient to daily manage and maintain the UPS. It can display the running parameters and running status of UPS and each power module, and record the history event and alarm information. It can store 10000 pieces of information at most.

2.3 Working Principle

2.3.1 Schematic Diagram

The schematic diagram of the UPS is as shown in Figure2-1.

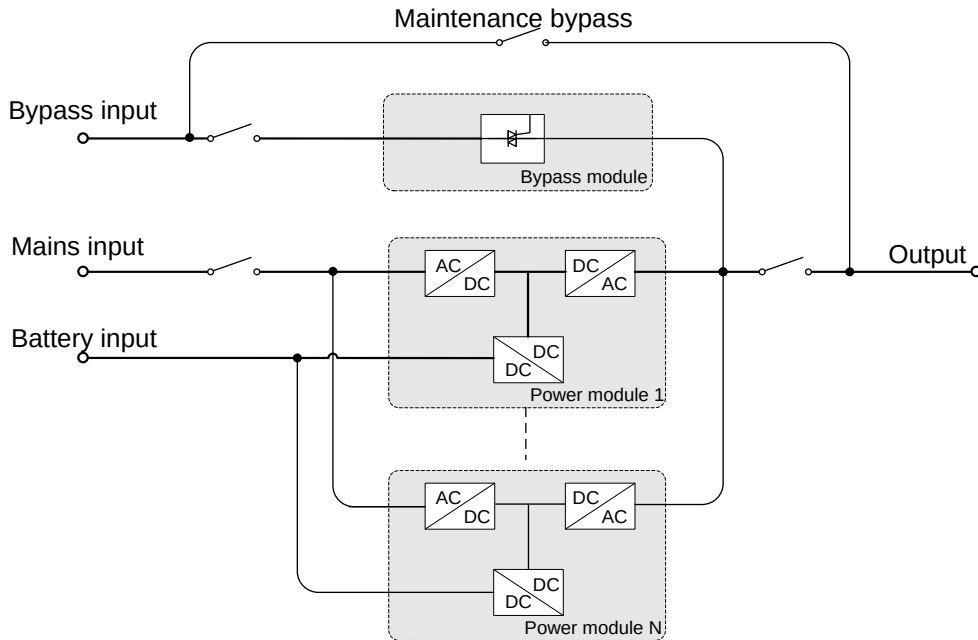


Figure2-1 Schematic diagram

2.3.2 Working Mode

The IST6 series modular UPS has four work modes: normal mains power supply mode, battery power supply mode, bypass power supply mode and maintenance bypass power supply mode.

Normal mains power supply mode

When the mains is normal, AC power is transformed to DC power by PFC, and supplies power for inverter. While rectifying the AC power into DC power, the rectifier eliminates the abnormal noise wave, noise and unstable frequency, and make the inverter provide stable and pure power for load. The specific working process is as follows.

When the mains power supply is normal, the rectifier inside the power module will rectify the mains power supply to a positive and negative DC voltage, and the DC voltage gets through the inverter and then will output a stable 220Vac AC voltage to supply power for the load. When the system detects that the inverter is normal, it will supply the inverter voltage to load.

Battery power supply mode

When mains is abnormal, system will switch to battery input, the Boost circuit boosts the battery voltage to a certain value and then supplies the DC power for the inverter, that makes the AC output without interruption phenomenon and then protects the load. The specific working process is as follows.

When mains is abnormal at any time, the rectifier will switch to battery input immediately to keep the voltage of DC electrolysis, which guarantee the inverter without power down. Before battery discharges completely, if mains recovers, the rectifier will switch to mains input and charge battery at the same time. During the switch between grid power supply and battery power supply, the inverter output cannot power down.

In the battery power supply mode, if mains does not recover normal all the time, and the battery energy is running out, the UPS will send sound & light alarm, and stop working at the min. discharge point, and long beep to alarm. At that time, the load will power down.

Bypass power supply mode

When system is abnormal (such as over-temperature, short-circuit, output voltage abnormal or overload, and exceeds the bearing range), the inverter will shut down to avoid damage automatically. If mains still is normal at this time, it will turn to bypass to supply power for load. The specific work process is as follows.

If the inverter circuit fault or inverter overload and exceed the bearing range, the UPS will turn to bypass to output. During bypass power supply, if fault or overload is removed, the UPS will start inverter and begin to supply power for load. When the load is serious overload and exceeds the bypass bearing range, the UPS will close the bypass output, and it will cause user load power down. When load fault or short circuit, the UPS will switch to bypass to supply power from inverter. If the short-circuit is serious, the mains switch and bypass switch of UPS may trip out. After suffering the short-circuit fault, UPS will try to restart. If the short-circuit is removed, the UPS will switch to inverter; if the fault is not removed, the UPS will try to restart for 3 times. 3 times later, the UPS will turn to fault protection. At this time, it needs to power off or press the touch screen to shut down the UPS, and restart the UPS, and then, it will recover normal work.

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 work in bypass status, then switch on the maintenance bypass switch and switch off the mains switch, bypass switch, output switch. During the transforming

of manual maintenance bypass, AC power is supplied for load by maintenance bypass switch. At this time, the inner UPS has no electricity, maintainer can perform the maintenance safely.

2.4 Appearance

The IST6 series modular UPS consists of cabinet, operation panel, power module, bypass module, system control box, distribution unit, etc. The appearance of the IST6 series modular UPS is as shown in Figure2-2, Figure2-3 and Figure2-4.

Appearance of IST6400, IST6500 and IST6600

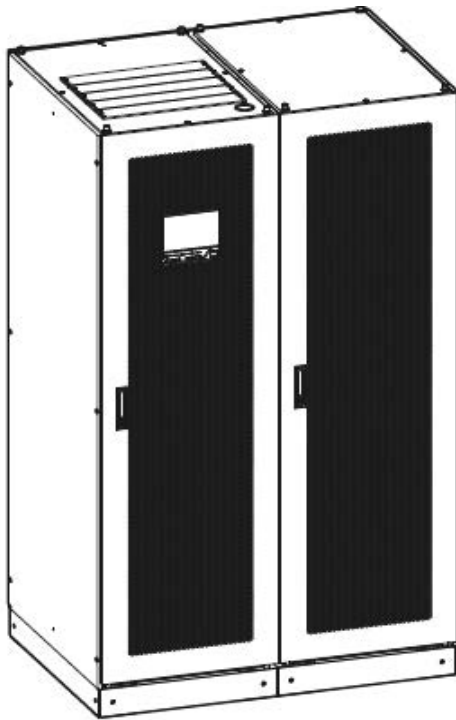


Figure2-2 Appearance of IST6400, IST6500 and IST6600

Appearance of IST6800

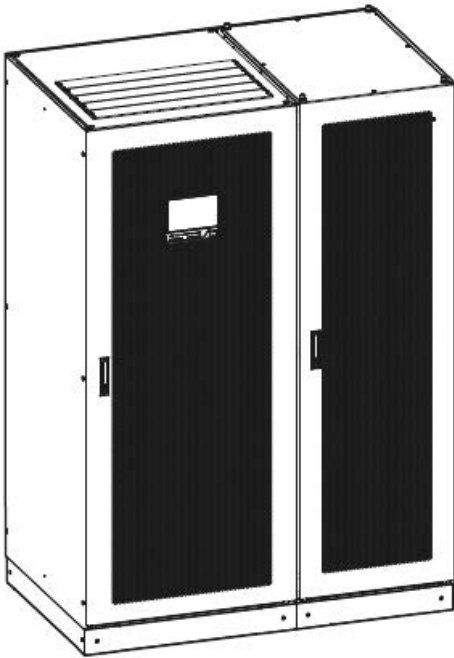


Figure2-3 Appearance of IST6800

Appearance of IST61000 and IST61200

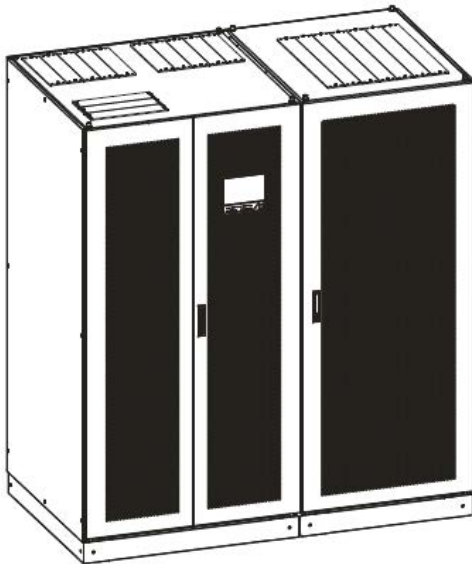


Figure2-4 Appearance of IST61000 and IST61200

Operation Panel

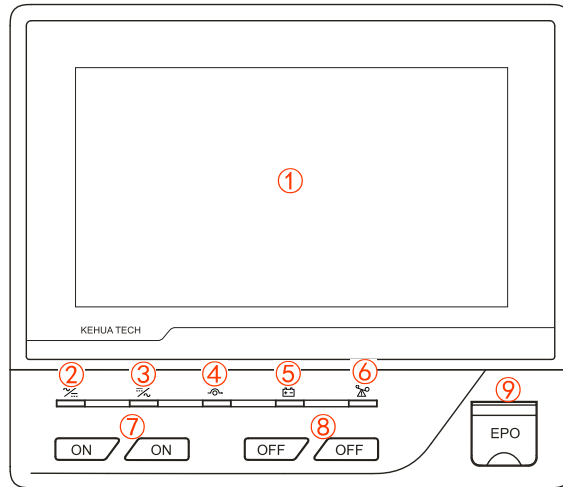


Figure2-5 Operation panel

Table2-1 Illustration of the operation panel

No.	Name	Illustration
○,1	Touch screen	Human-machine interactive interface
○,2	AC/DC indicator	● On (green): The rectifier works normally. ● On (red): The rectifier works abnormally.
○,3	DC/AC indicator	● On (green): The inverter works normally. ● On (red): The inverter works abnormally.
○,4	BYP. indicator	● On (green): Bypass outputs normally. ● On (red): Bypass is abnormal.
○,5	BATT. LOW indicator	● On (green): Battery power supply ● On (red): Battery low-voltage
○,6	OVERLOAD indicator	● On (green): Output normal ● On (red): Output overload
○,7	ON combination button	Press the two buttons for 3s, the system will power on.
○,8	OFF combination button	Press the two buttons for 3s, the system will power off.
○,9	EPO button	Press the button, the system will power outage immediately.

2.4.1 Structure Layout

Structure layout of IST6400, IST6500 and IST6600



NOTE

The structure layout of IST6400, IST6500 and IST6600 are similar, Figure2-6 takes IST6600 as an example.

The number of power module(Center installation) of IST6400, IST6500 and IST6600 is as follows respectively.

1. IST6400: four pieces(up: two pieces; down: two pieces);
2. IST6500: five pieces(up: two pieces; down: three pieces);
3. IST6600: six pieces(up: three pieces; down: three pieces).

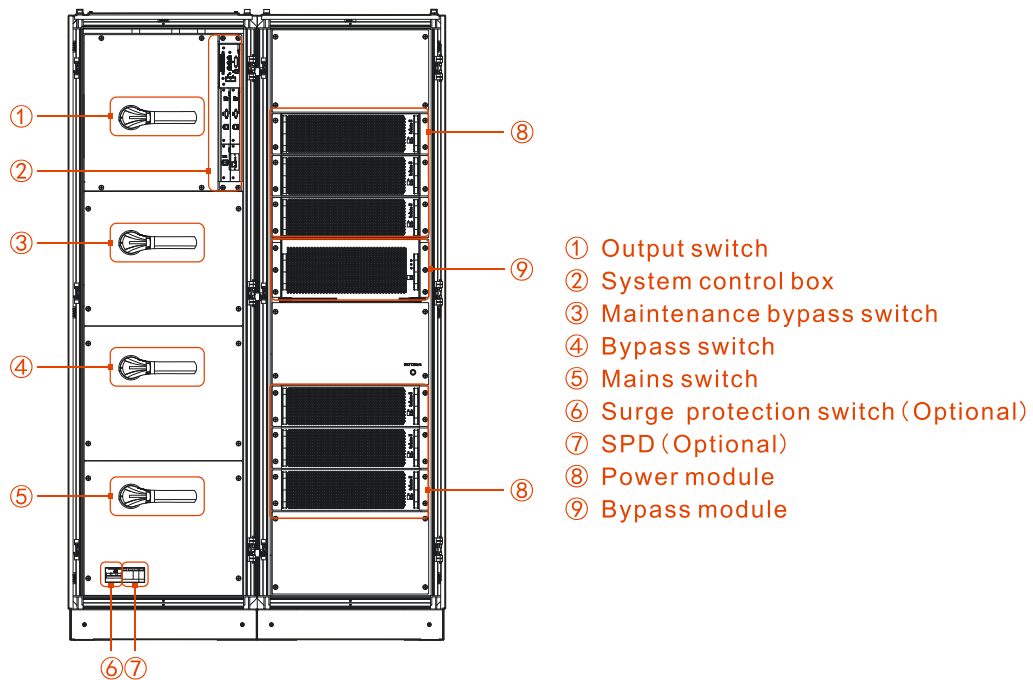


Figure2-6 Structure layout of IST6400, IST6500, IST6600

Structure layout of IST6800

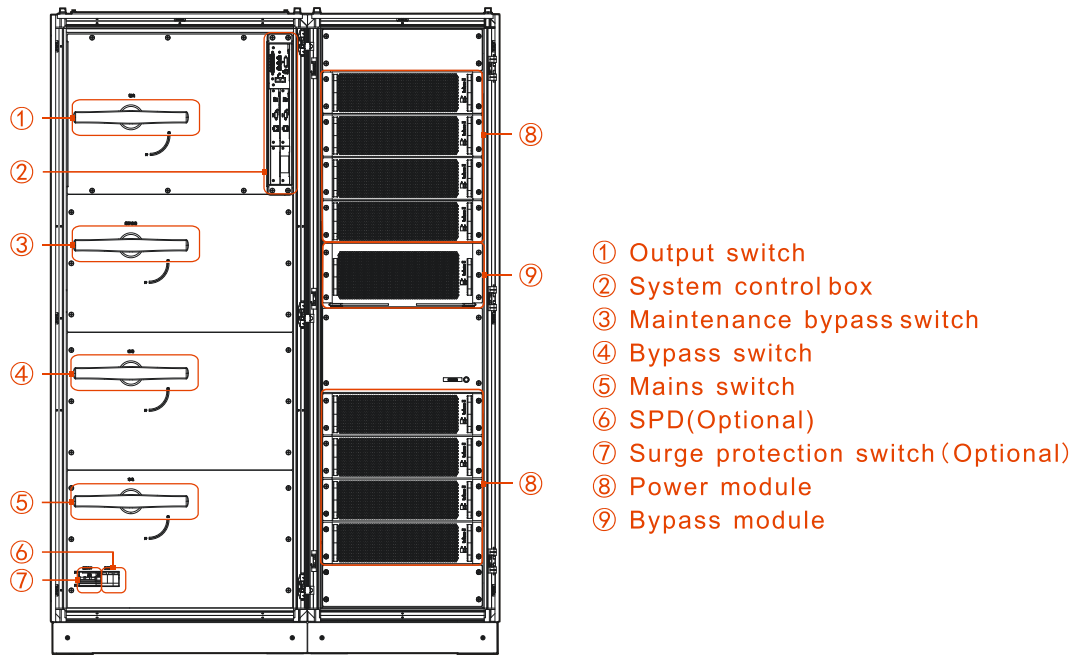


Figure2-7 Structure layout of IST6800

Structure layout of IST61000 and IST61200

NOTE

The structure layout of IST61000 and IST61200 are similar, Figure2-8 takes IST61200 as an example. The number of power module of IST61000 and IST61200 is as follows respectively.

1. IST61000: ten pieces(left: zero pieces; right: ten pieces);
2. IST61200: twelve pieces(left: two pieces; right: ten pieces).

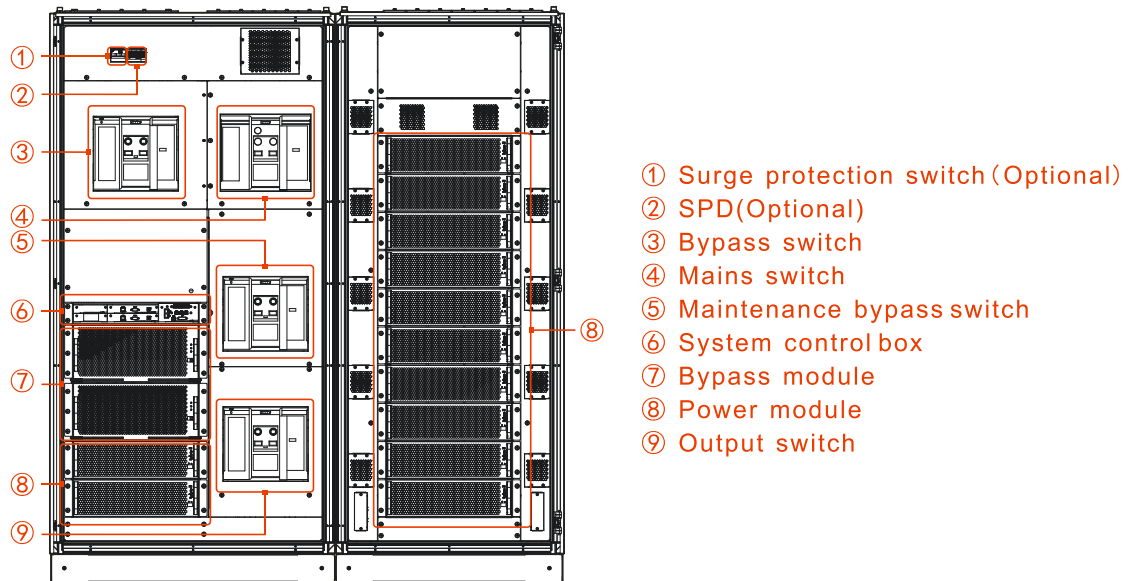


Figure2-8 Structure layout of IST61000 and IST61200

2.5 Component Illustration

2.5.1 Power Module/Bypass Module

NOTE

Power module has the similar appearance as the bypass module. The different point is only the label above the right indicator. Power module label is PM. Bypass module label is BM.

IST6400 bypass module height is 3U, and IST6500, IST6600, IST6800, IST61000 and IST61200 bypass module height is 4.5U. For details please see the actual product.

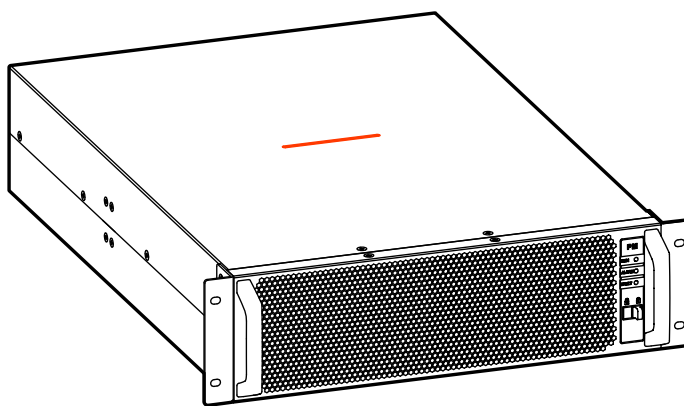


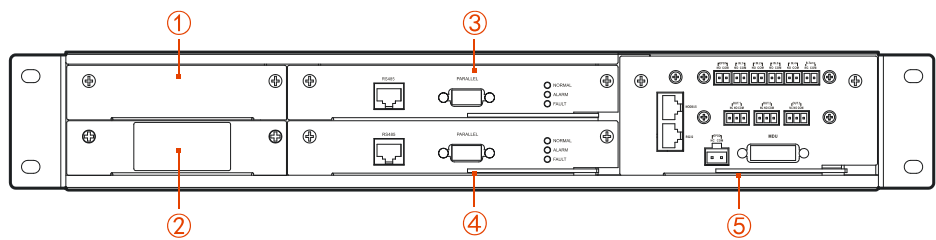
Figure2-9 Appearance of power module/bypass module

Table2-2 Illustration of the operation panel of power module/bypass module

Name	Illustration
RUN indicator(green)	● Power module: 1. On: Power module stays in inverter status 2. Flicker: Power module stays in standby status. ● Bypass module: 1. On: Bypass module is working.
ALARM indicator(yellow)	On: Module input voltage abnormal, fan abnormal, overload, etc.
FAULT indicator(red)	On: Module fault.
Ready switch	● Place the ready switch to “unlock” status, the indication color is green, the power module is not locked with the cabinet, and at this time, the power module can be dismantled. ● Place the ready switch to “lock” status, the indication color is red, the power module is locked with the cabinet, and at this time, the power module cannot be dismantled.

2.5.2 System Control Box

The system control box is as shown in Figure2-10.



① Dry contact expansion card position(Optional)

② SNMP card position(Optional)

④ Control card 2

③ Control card 1

⑤ System monitor card

Figure2-10 System control box

System control card

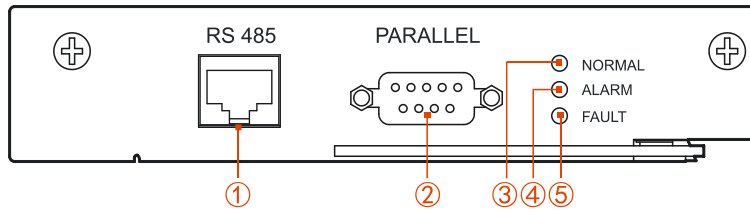


Figure2-11 System control card

Table2-3 Illustration of the system control card

No.	Name	Illustration
○,1	RS485 port	It is used for a machine to monitor the running information of other parallel systems. RS485 port adopts RJ45 plug. The pin definition of RS485 port is shown in Figure2-12. In parallel system, the RS485 connection are as shown in Figure2-13 and Figure2-14.
○,2	PARALLEL port	Parallel wires are for parallel ports connection between cabinets. When multi UPSs in parallel, connect the parallel port of each UPS by parallel wire. N UPSs require N parallel wires to ensure there are at least two parallel wires for a UPS, which will improve parallel reliability.
○,3	NORMAL indicator(green)	● On: The system control card is in the running status of the main card. ● Flicker: The system control card is in the initialization status.
○,4	ALARM indicator (Yellow)	● On: The system control card has the alarm signal. ● Flicker: The system control card in the running status of the secondary card.
○,5	FAULT indicator (Red)	On: System control card fault.

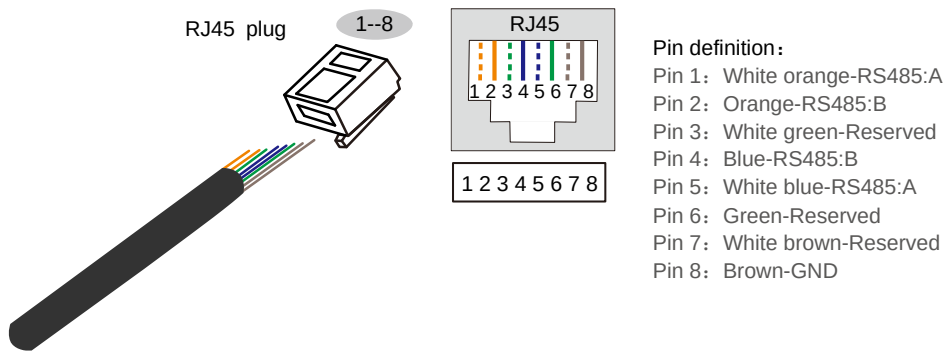


Figure2-12 Pin definition of RS485 port

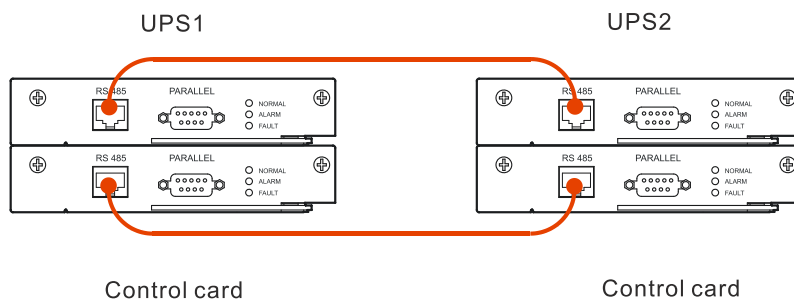


Figure2-13 RS485 port connection(Two UPSs)

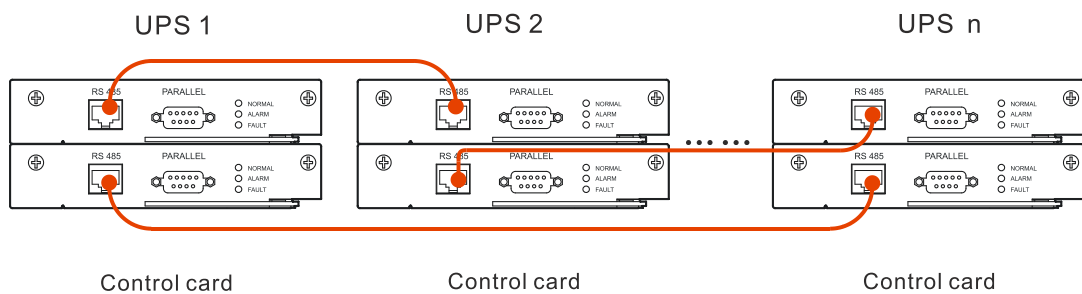


Figure2-14 RS485 port connection(Multiple UPSs)

System monitor card

There is one human-machine interactive communication port, six input dry contact communication signals and three output dry contact signals(as shown in Figure2-15), the illustration is as shown in Table2-4.

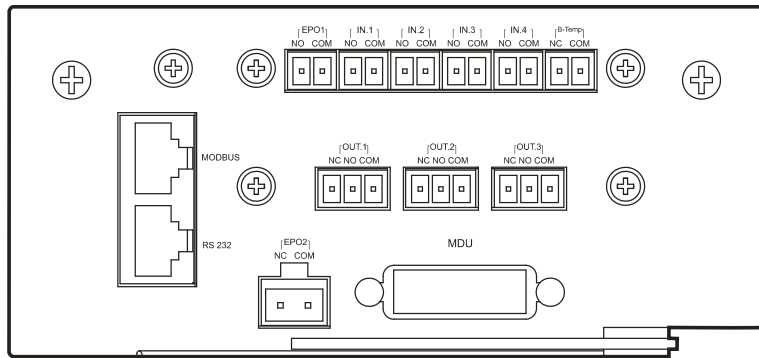


Figure2-15 System monitor card

There are two network ports on the system monitor card: MODBUS port and RS232 port.

- MODBUS port is used for MODBUS communication, which is to communicate with upper computer. MODBUS port adopts RJ45 plug. The pin definition of MODBUS port is shown in Figure2-16

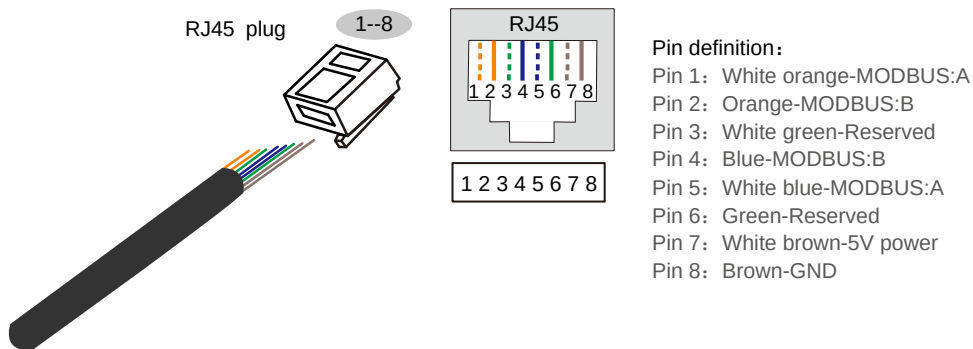


Figure2-16 Pin definition of MODBUS port

- RS232 port is used for RS232 communication, which is to achieve the external SNMP card communication. RS232 port adopts RJ45 plug. The pin definition of RS232 port is shown in Figure2-17.

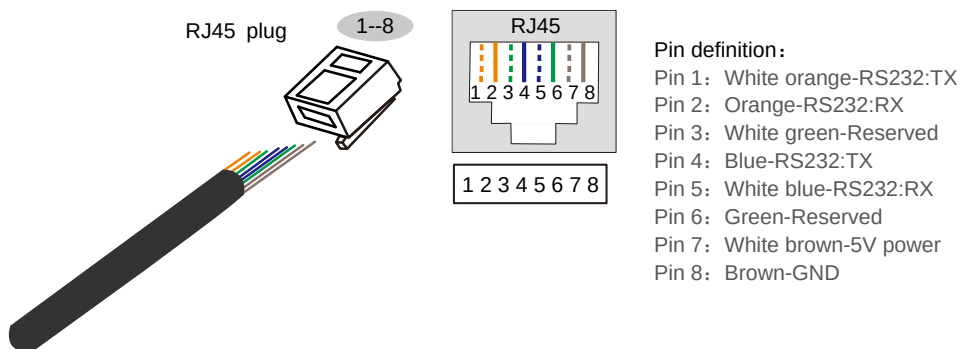


Figure2-17 Pin definition of RS232 port

Table2-4 Illustration of dry contact

Port	Mark	Signal	Illustration
EPO1	NO	External EPO normal open port	When the NO and COM is short circuit, the signal is effective. The signal is preset and isn't settable.
	COM	Reinforced insulation ground	
B-Temp	NC	Battery temperature sampling resistance port	External temperature sampling wire. The signal is preset and isn't settable.
	COM	Reinforced insulation ground	
EPO2	NC	External EPO normal close port	When the NC and COM disconnect, the signal is effective. The signal is preset and isn't settable. (When use, the CN8 in the monitor card should be connected by 2P jumper cap.)
	COM	Reinforced insulation ground	
OUT.1	NC	OUT.1 normal close output port	When the signal is effective, COM and NO connect, and NC disconnects. This signal is settable.
	COM	Reinforced insulation ground	
	NO	OUT.1 normal open output port	
OUT.2	NC	OUT.2 normal close output port	When the signal is effective, COM and NO connect, and NC disconnects. This signal is settable.
	COM	Reinforced insulation ground	
	NO	OUT.2 normal open output port	
OUT.3	NC	OUT.3 normal close output port	When the signal is effective, COM and NO connect, and NC disconnects. This signal is settable.
	COM	Reinforced insulation ground	
	NO	OUT.3 normal open output port	
IN.1	NO	External switch normal open input port	When the NO and COM is short circuit, the signal is effective. This signal is settable.
	COM	Reinforced insulation ground	
IN.2	NO	External switch normal open input port	When the NO and COM is short circuit, the signal is effective. This signal is settable.
	COM	Reinforced insulation ground	

Port	Mark	Signal	Illustration
IN.3	NO	External switch normal open input port	When the NO and COM is short circuit, the signal is effective. This signal is settable.
	COM	Reinforced insulation ground	
IN.4	NO	External switch normal open input port	When the NO and COM is short circuit, the signal is effective. This signal is settable.
	COM	Reinforced insulation ground	

The four input ports(IN port) on the system monitor card can be defined (as shown in the Table2-5) according to user requirements.

Table2-5 The definition of the input dry contact

No.	Definition	Remark
1	Battery abnormal	When this signal is received, UPS alarms and records this status, and then turn off charge function.
2	Battery grounding fault	Grounding fault signal
3	Battery switch disconnected	Battery switch auxiliary contact.
4	Bypass switch disconnected	Bypass switch auxiliary contact.
5	Mains abnormal	Mains power failure signal, cooperate with auto generator mode to start the generator.
6	Input SPD abnormal	Input SPD abnormal, UPS record this event

The three output ports on the system monitor card can be defined (as shown in the Table2-6) according to user requirements.

Table2-6 The definition of the output dry contact

No.	Definition	Remark
1	Inverter output	UPS is in the inverter output status, and this dry contact is ON.
2	Bypass output	UPS is in the bypass output status, and this dry contact is ON.
3	Battery trips	Battery trips, and this dry contact is ON.

No.	Definition	Remark
4	Battery supply output	UPS is in the battery power supply status, and this dry contact is ON.
5	Battery under-voltage alarm	Battery discharges to the under-voltage alarm, and this dry contact is ON.
6	Battery under-voltage protection	Battery discharges to the under-voltage protection status, and this dry contact is ON.
7	Output overload	UPS is in the overload status, and this dry contact is ON.
8	UPS fault	Fault status, and this dry contact is ON.
9	Bypass abnormal	Bypass is abnormal or it's unable to track bypass, and this dry contact is ON.
10	Mains abnormal	Mains is abnormal, and this dry contact is ON.
11	Start generator	When the generator starts, and this dry contact is ON.

2.6 Optional Accessory

The IST6 series modular UPS can be equipped with different accessories to meet the needs of different users.

2.6.1 SNMP Card and Its Software

SNMP card(as shown in Figure2-18) is installed in the UPS to realize the UPS remote management.

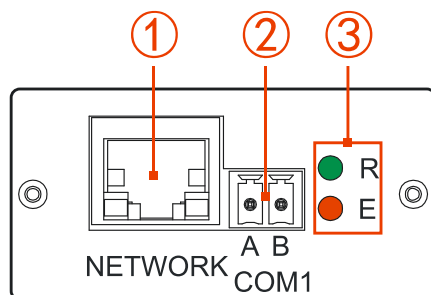


Figure2-18 SNMP card

NOTE

When the SNMP card is selected, the SNMP card will be installed on the system control box of UPS.

Table2-7 Illustration of SNMP card

NO.	Name	Function description
○,1	NETWORK port	Ethernet port
○,2	COM1 port	Connect with humiture module(RS485)
○,3	Indicator	Show working status

Table2-8 Illustration of indicator of the SNMP card

Green indicator (R)	Red indicator (E)	Status description
ON	ON	Start
Flicker	*	Running.
OFF/ON	*	Crash, keep final status
*	OFF	NO alarm
*	Flicker	Alarm

 NOTE

* means the indicator is in any status.

NETWORK port

NETWORK port adopts RJ45 plug. The pin definition of the NETWORK port is shown in Figure2-19.

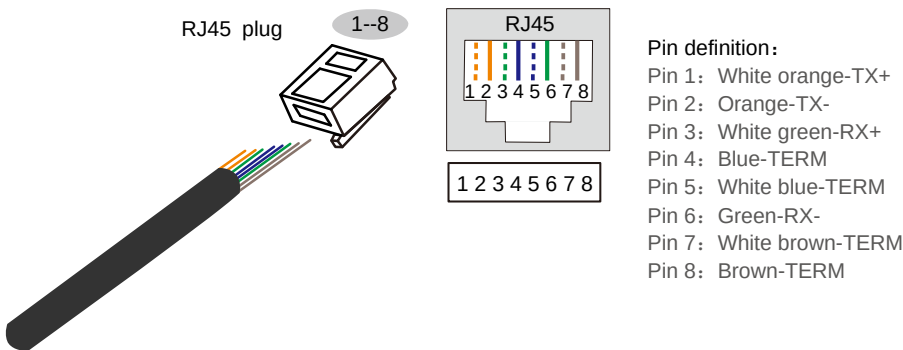


Figure2-19 The pin definition of the NETWORK port

SNMP card software

NOTE

It is suitable but not only for the following browsers(the early operating system may not be good in compatibility): Chrome56+ browser, IE11+ browser. The login interface is different in different browser.



CAUTION

Please ensure that the setting IP address is in the same network segment with user's computer IP address.

After finishing the SNMP installation and wiring, please configure the software in the following order.

- Step 1 Open browser, and enter the IP address of the WiseWay built-in card (KC502)(default IP is 192.168.0.100).

NOTE

When the IP address of the SNMP built-in card(KC502) is changed or multiple SNMP cards are used at the same time, the corresponding IP address can be obtained through WiseFind software(enter the address in PC to download the WiseFind software and then install it).

- Step 2 Enter the user name and password in the login page and click **Login** to enter the monitoring page.

NOTE

Default user name is admin, corresponding password is KHadmin0592.

User can scan the QR code or enter the URL through browser(PC mode)to get more product information.

User manual	Software			
WiseWay KC502	WiseClose	WiseFind	WiseInsight	WiseSMS
				
https://drive.263.net/link/YtH6Mi1Mtb0CpH/	https://drive.263.net/link/a0WjvayXwu0lQ4m/	https://drive.263.net/link/rvRBjZcMLiFrC1J/	https://drive.263.net/link/Rqk69m4ek9UGEKI/	https://drive.263.net/link/MzoJG3ljCc3cC3H/

----End

2.6.2 Expansion Cards

Dry contact expansion card

The dry contact expansion card(as shown in Figure2-20) is mainly used for the detection signal collection. The dry contact expansion card includes three input dry contact communication signals and two output dry contact signals, the illustration is shown in Table2-9.

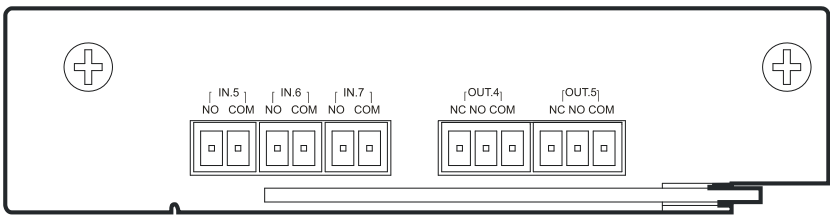


Figure2-20 Dry contact expansion card



NOTE

When the dry contact expansion card is selected, the dry contact expansion card will installed on the system control box of UPS.

Table2-9 Illustration of the dry contact

Port	Mark	Signal	Illustration
OUT.4	NC	OUT.4 normal close output port	When the signal is effective, COM and NO connect, and NC disconnects. This signal is settable.
	COM	Reinforced insulation ground	
	NO	OUT.4 normal open output port	
OUT.5	NC	OUT.5 normal close output port	When the signal is effective, COM and NO connect, and NC disconnects. This signal is settable.
	COM	Reinforced insulation ground	
	NO	OUT.5 normal open output port	
IN.5	NO	External switch normal open input port	When the NO and COM is short circuit, the signal is effective. This signal is settable.
	COM	Reinforced insulation ground	
IN.6	NO	External switch normal open input port	When the NO and COM is short

Port	Mark	Signal	Illustration
	COM	Reinforced insulation ground	circuit, the signal is effective. This signal is settable.
IN.7	NO	External switch normal open input port	When the NO and COM is short circuit, the signal is effective. This signal is settable.
	COM	Reinforced insulation ground	

The pin definition of the input dry contact and output dry contact are as shown in Table2-5 and Table2-6.

BMS expansion card

The BMS expansion card(as shown in Figure2-21) is mainly used for the Li-battery communication. The BMS expansion card includes one BMS communication port, two input dry contact and one output dry contact. The illustration is shown in Table2-10.

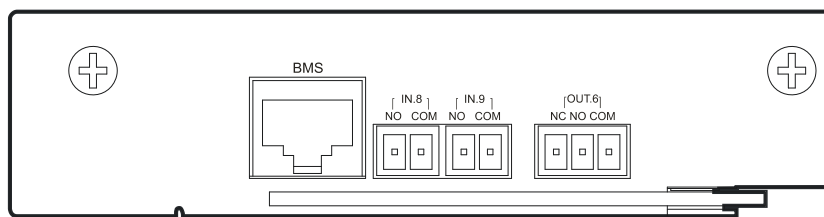


Figure2-21 BMS expansion card

Table2-10 Illustration of the BMS expansion card

Port	Mark	Signal	Illustration
BMS		BMS port	It is used to communicate with the Li-battery. BMS port adopts RJ45 plug. The pin definition of BMS port is shown in Figure2-22.
IN.8	NO	External switch normal open input port	When the NO and COM is short circuit, the signal is effective. This signal can be set to disable charging.
	COM	Reinforced insulation ground	
IN.9	NO	External switch normal open input port	When the NO and COM is short circuit, the signal is effective. This signal can be set to disable discharging.
	COM	Reinforced insulation ground	

Port	Mark	Signal	Illustration
OUT.6	NC	OUT.6 normal close output port	When the signal is effective, COM and NO connect, and NC disconnects. This port is reserved.
	COM	Reinforced insulation ground	
	NO	OUT.6 normal open output port	

 NOTE

For Li-battery reliability consideration, if Li-battery is used, please contact with local agency or dealer.

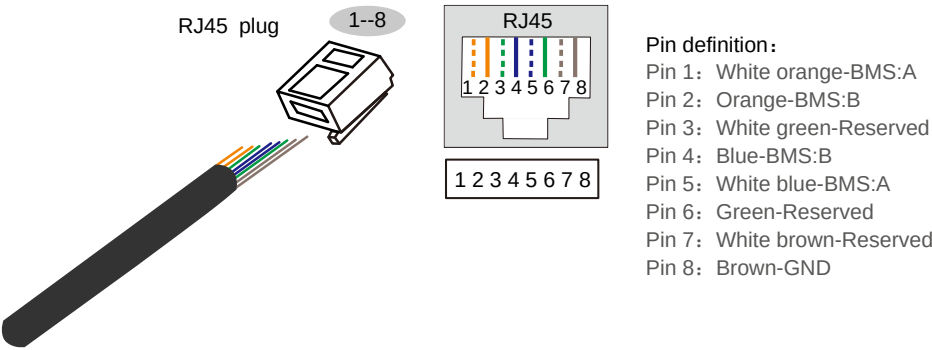


Figure2-22 Pin definition of BMS port

2.6.3 Parallel System Accessory

Parallel wires are for parallel ports connection between cabinets. When multi UPSs in parallel, connect the parallel port of each UPS by parallel wire. N UPSs require N parallel wires to ensure there are at least two parallel wires for a UPS, which will improve parallel reliability.

 NOTE

The parallel wires are configured.

- Parallel system connection(Two UPSs)

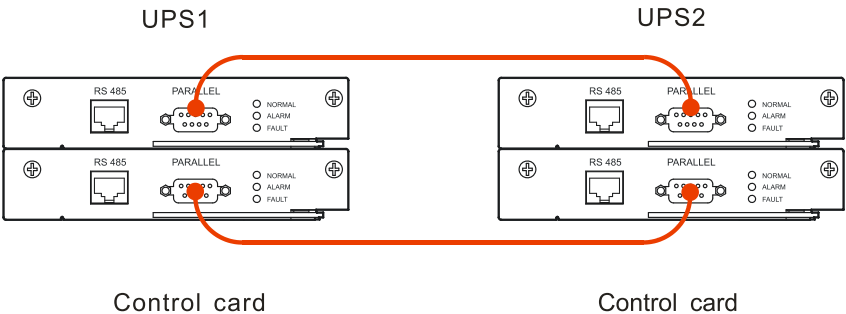


Figure2-23 Parallel system connection(Two UPSs)

- Parallel system connection(Multiple UPSs)

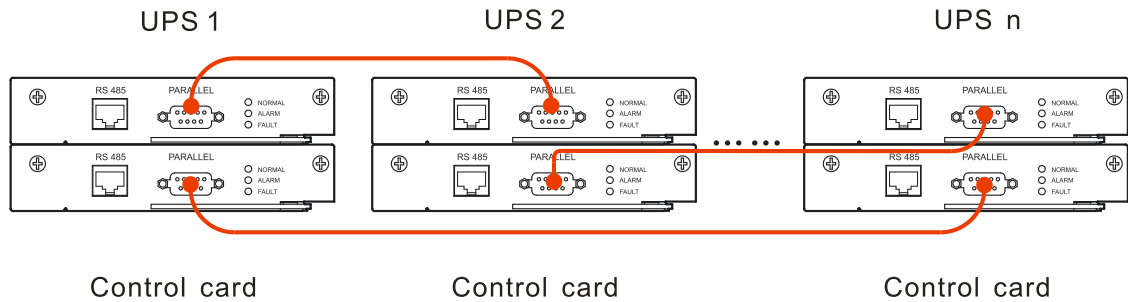


Figure2-24 Parallel system connection(Multiple UPSs)

2.6.4 Synchronous BSC Accessory

The synchronous BSC output dual bus control is used in a dual bus system to synchronize the output frequency and phase of each system in a dual bus system to ensure that the two buses can switch to each other. The connection way, please refers to Figure2-23 and Figure2-24.

2.6.5 Battery Temperature Compensation Accessory

The battery temperature compensation is used to monitor the battery temperature to realize the battery charging and discharging temperature compensation.



NOTE

When the battery temperature compensation function is selected, it will be configured that one temperature control wire, one temperature control extension cord and one 2Pin green terminal.

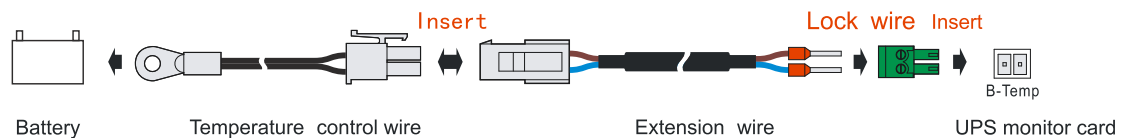


Figure2-25 Battery temperature compensation connection



NOTE

The temperature control wire should be fixed in the higher temperature area of the battery.

2.7 Alarm Function

Once the UPS is abnormal, it will send sound & light alarm. The alarm or protection function of the UPS is as shown in Table2-11.

Table2-11 Abnormal status and alarm/ protection function

Fault	Information	Protect requirement	Alarm requirement
Mains fault	Mains fault	Mains power supply is not allowed.	Buzzer slowly beeps, the AC/DC indicator turns red, and the mains icon on the touch screen turns red.
	Mains over-voltage		
	Mains under-voltage		
	Mains unbalance		
	Mains over-frequency		
	Mains under-frequency		
	Mains failure		
	Mains phase loss		
	Mains phase sequence abnormal		
	Large mains harmonic component		
	Mains drop		
	Mains PFC overload protection		
	Mains neutral wire loss		
	Large mains DC component		
Battery fault	Battery fault	Battery power supply is not allowed.	Buzzer fast beeps, the BATT. LOW indicator turns red, and the battery icon on the touch screen turns red.
	Battery reversed		
	Battery over-voltage		
	Charger over-current		
	Battery circuit abnormal		
	Bypass under-voltage protection		
	Bypass overload		

Fault	Information	Protect requirement	Alarm requirement
Bypass fault	Bypass fault	Bypass power supply is not allowed.	Buzzer slowly beeps, the BYP. indicator turns red, and the bypass icon on the touch screen turns red.
	Bypass over-voltage		
	Bypass under-voltage		
	Bypass unbalance		
	Bypass over-frequency		
	Bypass under-frequency		
	Bypass failure		
	Bypass phase loss		
	Bypass phase sequence abnormal		
	Large bypass harmonic component		
	Bypass drop	ECO output is not allowed.	Buzzer slowly beeps.
	ECO over-voltage		
	ECO under-voltage		
	ECO over-frequency		
	ECO under-frequency		
Output fault	Inverter output fault	Inverter output is not allowed.	Buzzer long beeps, the DC/AC indicator turns red, and the output icon on the touch screen turns red.
	Output short circuit		
	Inverter over-voltage		
	Inverter under-voltage		
	Output circuit abnormal	None	Buzzer slowly beeps, the DC/AC indicator turns red, and the output icon on the touch screen turns red.

Fault	Information	Protect requirement	Alarm requirement
	Low output PF	Inverter output is not allowed.	Buzzer long beeps, DC/AC indicator turns red on the touch screen, and the output icon turns red.
	Large output current DC component		
System fault	System fault	None	Buzzer long beeps
	System EPO on	Bypass output and inverter output are not allowed.	
	System bypass fault	None	
	System inverter fault	None	
	EPO on	Bypass output and inverter output are not allowed.	
	Bypass overload protection	Bypass output and inverter output are not allowed.	Buzzer long beeps, the OVERLOAD indicator turns red, and the output icon on the touch screen turns red.
	Bypass SCR abnormal	Bypass output is not allowed	Buzzer long beeps, the BYP. indicator turns red, and the bypass icon on the touch screen turns red.
	Parallel wire abnormal	Inverter output is not allowed	Buzzer long beeps.
	Parallel system sovereignty fault	None	Buzzer long beeps.
	Inverter overload protection	Inverter output is not allowed	Buzzer long beeps, the OVERLOAD indicator turns red, and the output icon on the touch screen

Fault	Information	Protect requirement	Alarm requirement
			turns red.
	Maintenance bypass on	Inverter output is not allowed	Buzzer long beeps
	Battery charge disabled on	None	Buzzer fast beeps, the BATT. LOW indicator turns red, and the battery icon on the touch screen turns red.
	Battery discharge disabled on	None	
Cabinet fault	Cabinet fault	None	Buzzer long beeps.
	Bypass over-temperature	Check whether bypass output or not by the bypass over-temperature enable.	Buzzer long beeps, the BYP. indicator turns red, and the bypass icon on the touch screen turns red.
	Inverter output over-current	None	Buzzer long beeps.
	Rectifier fault self-locking	None	
	Inverter fault self-locking	None	
	Battery overload protection	None	
	Battery discharge protection	None	
	UPS fault	None	
Cabinet pre-alarm	Cabinet pre-alarm	None	Buzzer fast beeps.
	Cabinet over-temperature alarm	None	
	High battery temperature alarm	None	
	Low battery temperature alarm	None	
	Battery under-voltage alarm	None	
	Backup time insufficient	None	
	Output overload alarm	None	Buzzer fast beeps, the

Fault	Information	Protect requirement	Alarm requirement
			OVERLOAD indicator turns red, and the output icon on the touch screen turns red.
	Output frequency out of scope	None	Buzzer fast beeps.
	Bypass auxiliary power abnormal	None	
	Bypass over-temperature alarm	None	
	Some power modules PFC abnormal	None	
	Battery auto-start once power recover disable	None	
Cabinet alarm	Cabinet fault	None	Buzzer slowly beeps.
	Battery no connection alarm	None	
	Auxiliary power abnormal	None	
	Bypass module is not installed.	Bypass output is not allowed	Buzzer slowly beeps, the BYP. indicator turns red, and the bypass icon on the touch screen turns red.
	Setting parameters mismatched	None	Buzzer slowly beeps.
	Battery parameters mismatched	None	
	Module number mismatched	None	
	Cabinet number mismatched	None	
	System card n _ it is not installed.	None	
	System card n _ flash abnormal.	None	

Fault	Information	Protect requirement	Alarm requirement
	System card n _ card slot address repeated.	None	
	System card n _ ON/OFF status and the primary card out of sync.	None	
	Bypass output now.	None	
	System card n _ parameter of primary and secondary card out of sync.	None	
	System card n _ output status out of sync	None	
	Fan dedusting	None	
Startup fault alarm	Startup fault alarm	Static startup is not allowed to work.	Buzzer slowly beeps.
	Reserved		
	Cannot inverter output for heavy load		
	Waiting common inverter for unknown load		
	PFC software version inconformity		
	INV software version inconformity		
	CCM software version inconformity		
	Module hardware version inconformity		
	Key parameters mismatched		
	Combined cabinet address		

Fault	Information	Protect requirement	Alarm requirement
	conflict		
	Module serial version inconformity		
Component failure alarm	Component failure	None	Buzzer slowly beeps.
	Bypass 1 NTC failure		
	Bypass 2 NTC failure		
	Cabinet NTC failure		
	System card NTC failure		
	Bypass fan abnormal		
	Cabinet fan abnormal		
	Parallel wire 1 alarm		
	Parallel wire 2 alarm		
	Bypass 1 is not installed.		
	Bypass 2 is not installed.		
	Monitor card is not installed.		
	Bypass module offline	Bypass output is not allowed.	Buzzer slowly beeps, the BYP. indicator turns red, and the bypass icon on the touch screen turns red.
	Dry contact expansion card offline	None	Buzzer slowly beeps.
	Bypass NTC failure		
Comm. abnormal alarm	Communication abnormal	None	Buzzer fast beeps.
	Sync CAN inside cabinet abnormal		
	Equalized-current CAN inside		

Fault	Information	Protect requirement	Alarm requirement
	cabinet abnormal		
	BMS communication fault		
	Display CAN inside cabinet abnormal		
	Sync CAN among cabinets abnormal		
	Equalized-current CAN among cabinets abnormal		
	Inner SCI communication abnormal		
Smart mode alarm	Smart mode alarm	None	Buzzer slowly beeps.
	Start generator		
	Generator charge disabled		
	Only one BCS system has been detected.		
	The load exceeds the set safety load.		
	Power module no redundancy		
	Power module redundancy insufficient		
	Cabinet no redundancy		
	Cabinet redundancy insufficient		
	System card no redundancy		
	Self-load switch abnormal		
	Self-load over-time alarm		

Fault	Information	Protect requirement	Alarm requirement
	Inverter bypass out of sync		
Input dry contact status	Input dry contact alarm	None	Buzzer slowly beeps.
	Battery abnormal		Buzzer fast beeps, the BATT. LOW indicator turns red, and the battery icon on the touch screen turns red.
	Battery grounding fault		
	Battery switch opened		Buzzer slowly beeps, the BYP. indicator turns red, and the bypass icon on the touch screen turns red.
	Bypass switch opened		
	Output switch opened		Buzzer slowly beeps.
	Battery discharge disabled on		Buzzer fast beeps, the BATT. LOW indicator turns red, and the battery icon on the touch screen turns red.
	Battery charge disabled on		Buzzer fast beeps, the BATT. LOW indicator turns red, and the battery icon on the touch screen turns red.
	Mains abnormal		Buzzer slowly beeps.
Offline alarm status	Power module 1 offline	None	Buzzer slowly beeps.
	Power module 2 offline		
	Power module 3 offline		
	Power module 4 offline		
	Power module 5 offline		
	Power module 6 offline		
	Power module 7 offline		
	Power module 8 offline		

Fault	Information	Protect requirement	Alarm requirement
	Power module 9 offline		
	Power module 10 offline		
	Power module 11 offline		
	Power module 12 offline		
	Power module 13 offline		
	Power module 14 offline		
	Power module 15 offline		
	Power module 16 offline		
	Power module 17 offline		
	Power module 18 offline		
	Power module 19 offline		
	Power module 20 offline		
	Power module 21 offline		
	Power module 22 offline		
	Power module 23 offline		
	Power module 24 offline		
	Power module 25 offline		
	Power module 26 offline		
	Power module 27 offline		
	Power module 28 offline		
	Power module 29 offline		
	Power module 30 offline		
	System card 1 offline		
	System card 2 offline		

**CAUTION**

In the battery under-voltage protection, if the mains is normal, the UPS will restart and charge the battery group.

3 Installation

This chapter mainly introduces the installation of the UPS, including installation process, installation preparation, unpacking and checking, UPS installation, electrical connection and system checking and test, etc.



CAUTION

Only trained professionals who are with high voltage and AC qualification can install UPS.

The UPS is just suitable to install on the flat ground that is concrete or non-flammable.

3.1 Installation Process

The installation process of the IST6 series modular UPS is as shown in Figure3-1.

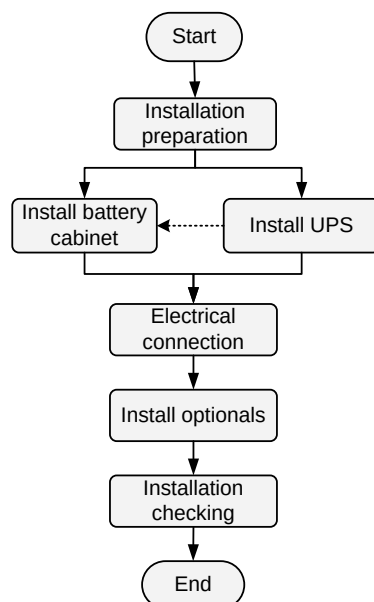
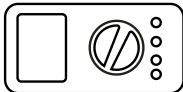
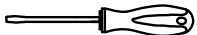
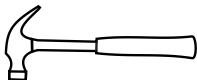
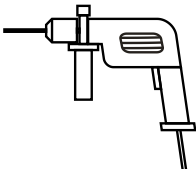
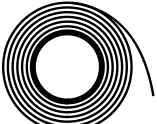
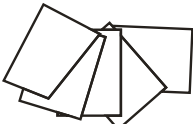
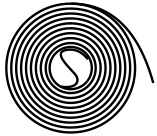
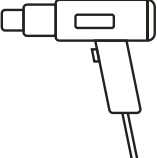
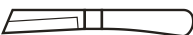
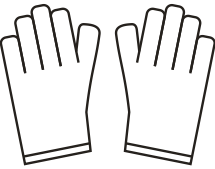
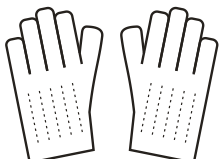
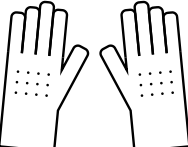


Figure3-1 Installation process

3.2 Installation Preparation

3.2.1 Installation Tools

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

**CAUTION**

The installation tools must be insulated to avoid electric shock.

3.2.2 Installation Environment

- Install the UPS in the place where the temperature and humidity are within the range of 0°C~40°C and 0%~95% respectively.
- Don't install the UPS in the environment where has metal conductive dust.
- Don't install the UPS in the open air. The installation environment should meet the specifications of the UPS.
- Basic requirements for power supply.
 - Grounding preparation. Ensure that the grounding terminal is OK and the voltage between neutral wire and grounding wire should not exceed 5V.
 - Before installation, please ensure that the AC input voltage and mains input wire capacity meet the UPS requirements, and considering if there has current-carrying capacity descending caused by wire aging.
 - The mains input voltage range of the UPS is 80~280VAC. The mains capacity should be greater than the max. input power of the UPS.
 - The selected breaker should not with leakage current protection.
- Install the UPS in the environment where with good ventilation and free of dust, volatile gas, salt, and corrosive materials. Keep the UPS far away from water, heat source, flammable and explosive substances. Avoid direct sunlight.

**CAUTION**

The optimal operating temperature for battery is 20°C–30°C. Operating at temperatures higher than 30°C will shorten the battery lifespan., and operating at temperatures lower than 20°C will shorten the battery backup time.

For safety consideration, please ensure the external DC distribution circuit is with three polarity breaker.

3.2.3 Installation Clearance

- Keep appropriate clearance from the front panel and the rear panel of the UPS to the wall or adjacent device, from the top of the UPS to the ceiling for heat dissipation and maintenance, as shown in Figure3-2 and Table3-1.

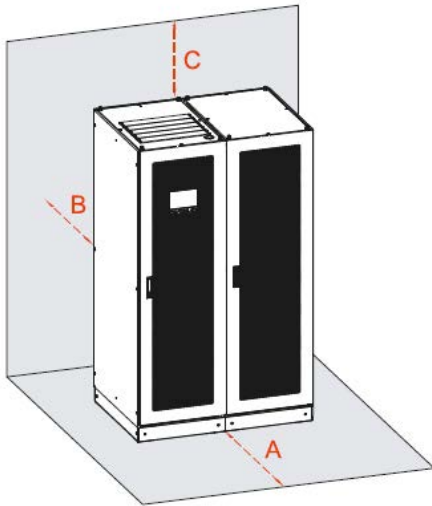


Figure3-2 Installation clearance(unit: mm)

NOTE

Figure3-2 takes the IST6600 as example.

Table3-1 Illustration of installation clearance

Model	A(mm)	E(mm)	C(mm)
IST6400, IST6500, IST6600	≥ 800	≥ 800	≥ 500
IST6800, IST61000, IST61200	≥ 1000	≥ 800	≥ 500

- Keep the ventilation holes on the front panel and rear panel unblocked to facilitate ventilation and heat dissipation, or, it may rise the inner temperature, even influence the UPS service time.

3.2.4 Input and Output Wire Selection

For the cross-sectional area of input wires and output wires of the UPS, please refer to the recommended values in Table3-2 and Table3-3(the rated power of one power module is 100kVA).

Table3-2 Wire and terminal requirements of IST6400, IST6500 and IST6600

Model				IST6400	IST6500	IST6600
System max. capacity(kVA)				400	500	600
Mains input	Mains input current(A)			661	826	991
	Cross-sectional area of wire(mm ²)	U/V/W/N		2*(4*185)	2*(4*240)	3*(4*240)
	Terminal model			DT-185	DT-240	DT-240
Bypass input	Bypass input current(A)			606	758	909
	Cross-sectional area of wire(mm ²)	U/V/W/N		2*(4*150)	2*(4*185)	3*(4*240)
	Terminal model			DT-150	DT-185	DT-240
Output	Output current(A)			606	758	909
	Cross-sectional area of wire(mm ²)	U/V/W/N(Select larger cross-sectional area of Neutral wire for non-linear load.)		2*(4*150)	2*(4*185)	3*(4*240)
	Terminal model			DT-150	DT-185	DT-240
Battery input	± 20 pieces of 12V storage batteries	Nominal discharge current of storage battery(The current at 480V)(A)		868	1085	1302
		Max. discharge current of storage battery(The ending discharge current value <the voltage of each battery is 10.5V>		992	1240	1487
		Cross-sectional area of wire(mm ²)	+ /N /-	3*(3*185)	3*(3*185)	3*(3*240)
		Terminal model		DT-185	DT-185	DT-240

Model				IST6400	IST6500	IST6600
System max. capacity(kVA)				400	500	600
	± 15 pieces of 12V storage batteries	Nominal discharge current of storage battery(The current at 360V)(A)		926	1158	1389
		Max. discharge current of storage battery(The ending discharge current value <the voltage of each battery is 10.5V>		1058	1323	1587
		Cross-sectional area of wire(mm ²)	+ / N / -	3*(3*185)	3*(3*240)	4*(3*185)
		Terminal model		DT-185	DT-240	DT-185
Grounding	Cross-sectional area of wire(mm ²)		PE	185	240	2*185
	Terminal model			DT-185	DT-240	DT-185

Table3-3 Wire and terminal requirements of IST6800, IST61000 and IST61200

Model			IST6800	IST61000	IST61200
System max. capacity(kVA)			800	1000	1200
Mains input	Mains input current(A)		1322	1652	1982
	Cross-sectional area of wire(mm ²)	U/V/W/N	4*(4*240)	5*(4*240)	6*(4*240)
	Terminal model		DT-240	DT-240	DT-240
Bypass input	Bypass input current(A)		1212	1515	1818
	Cross-sectional area of wire(mm ²)	U/V/W/N	4*(4*240)	5*(4*240)	6*(4*240)
	Terminal model		DT-240	DT-240	DT-240

Model				IST6800	IST61000	IST61200
System max. capacity(kVA)				800	1000	1200
Output	Output current(A)			1212	1515	1818
	Cross-sectional area of wire(mm²)	U/V/W/N(Select larger cross-sectional area of Neutral wire for non-linear load.)		4*(4*240)	5*(4*240)	6*(4*240)
	Terminal model			DT-240	DT-240	DT-240
Battery input	± 20 pieces of 12V storage batteries	Nominal discharge current of storage battery(The current at 480V)(A)		1735	2169	2603
		Max. discharge current of storage battery(The ending discharge current value <the voltage of each battery is 10.5V>		1983	2479	2975
		Cross-sectional area of wire(mm²)	+ /N /-	4*(3*240)	7*(3*240)	8*(3*240)
		Terminal model		DT-240	DT-240	DT-240
	± 15 pieces of 12V storage batteries	Nominal discharge current of storage battery(The current at 360V)(A)		1852	2314	2777
		Max. discharge current of storage battery(The ending discharge current value <the voltage of each battery is 10.5V>		2117	2644	3174
		Cross-sectional area of wire(mm²)	+ /N /-	5*(3*240)	7*(3*240)	8*(3*240)
		Terminal model		DT-240	DT-240	DT-240

Model			IST6800	IST61000	IST61200
System max. capacity(kVA)			800	1000	1200
Grounding	Cross-sectional area of wire(mm ²)	PE	2*240	3*240	3*240
	Terminal model		DT-240	DT-240	DT-240

**NOTE**

The wires prepared by our company have passed the GB or UL certification. The wires quality is excellent, and all meet the production compliance. The cross-sectional areas above are recommended for 5m wires. Longer wires require larger cross-sectional areas.

3.2.5 Surge Protection Device(Optional)

In areas where lightning strikes are frequent, multistage surge protection system should be installed at the incoming wire of the mains to ensure the safe operation of the device. Require higher surge protection level when outdoor installation.

**NOTE**

If the surge protection facilities are selected, they will be installed in the UPS.

3.2.6 Feedback Protection Device(Optional)

It's recommended to add the contactor with 220V AC coil in the AC distribution side as the feedback protection device.

3.3 Transporting, Unpacking and Checking

3.3.1 Transportation

**CAUTION**

The UPS must be transported by trained professionals.

When transporting, please move carefully and avoid impacting or dropping.

If the UPS needs to be stored for a long time after unpacking, it is suggested to pack the UPS by original plastic bag.

The UPS can be transported by motor-driven forklift (as shown in Figure3-3) or manual forklift (as shown in Figure3-4). While lifting, please keep the UPS center of gravity at that of the forklift and move slowly and stably.



Figure3-3 Motor forklift

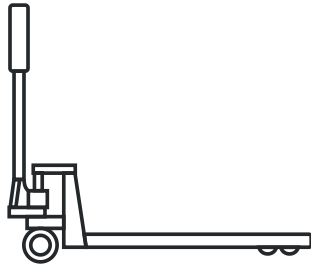


Figure3-4 Manual forklift



CAUTION

While lifting the UPS, please keep stable and balanced.

During transporting, keep the UPS vertical. Avoid put down or put up the UPS suddenly.

3.3.2 Unpacking and Checking



NOTE

The package of the IST6 series modular UPS is similar. Here we take IST6600 as an example.

- Step 1 Inspect the package's appearance for shipping damage, if any shipping damage is found, report it to the carrier immediately.
- Step 2 Transport the UPS to assigned site.

**CAUTION**

To avoid tilting during transportation, keep the forklift arm exceeding the wooden bracket.

Step 3 Unpack the external package. Remove the foam pad and plastic bag, take out the accessories and documents.

Step 4 Check the UPS.

- Inspect the UPS's appearance for shipping damage, if any shipping damage is found, report it to the carrier immediately.
- Check if the types of the accessories are complete and correct. If there is any discrepancy, take notes and contact the distributor immediately.

Step 5 Unscrew the bolts that connected with UPS and wooden bracket by socket wrench, the bolt position is as shown in Figure3-5.

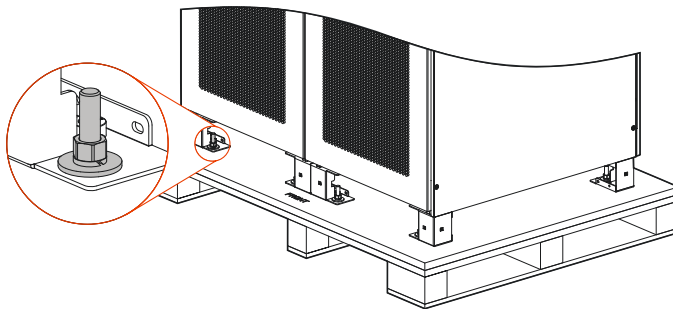


Figure3-5 Bolt position

----End

3.4 UPS Installation

**NOTE**

Here we take the floor installation as an example. For other installation way, please adjust the installation procedures on the basis of actual condition.

**CAUTION**

For the bottom wiring, dig the wiring groove for wiring in advance, as shown in Figure3-6.

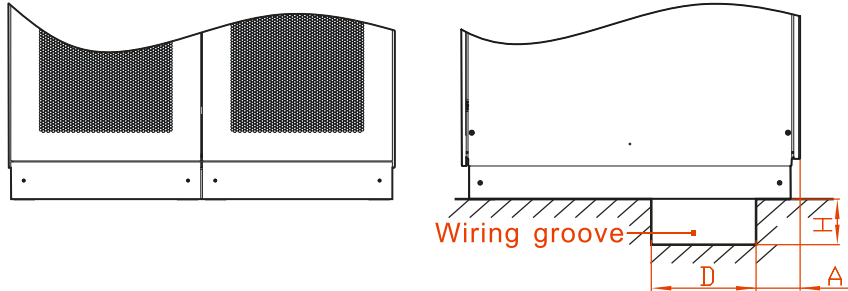


Figure3-6 Wiring groove diagram(Unit: mm)

**NOTE**

The recommended wiring groove size is as follows:

1. IST6400, IST6500, IST6600: $A \times D \times H$: 245×500×300(mm);
2. IST6800: $A \times D \times H$: 245×600×300(mm).

Step 1 Determine and plan the installation position according to the UPS size (as shown in Figure3-7, Figure3-8 and Figure3-9) and installation clearance requirement (see **3.2.3 Installation Clearance**).

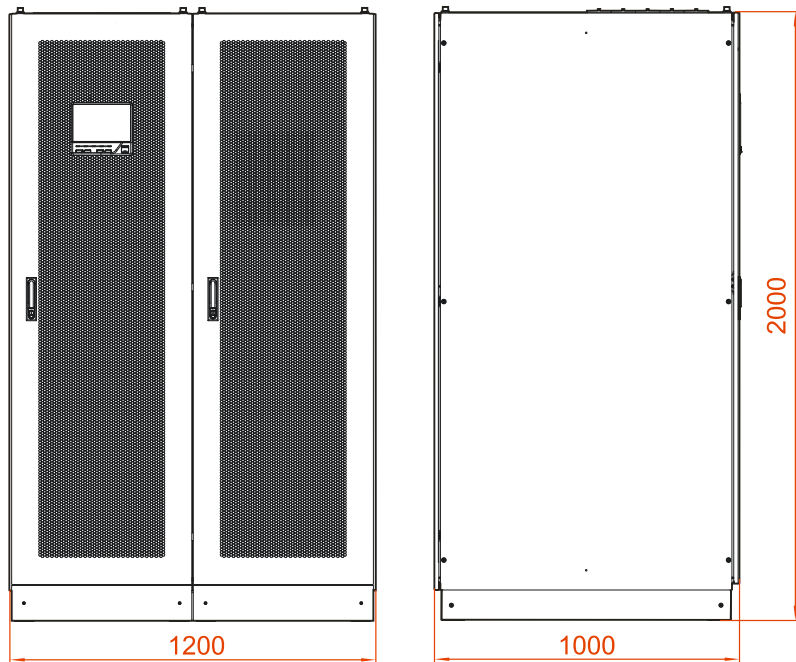


Figure3-7 Size of IST6400, IST6500 and IST6600(unit: mm)

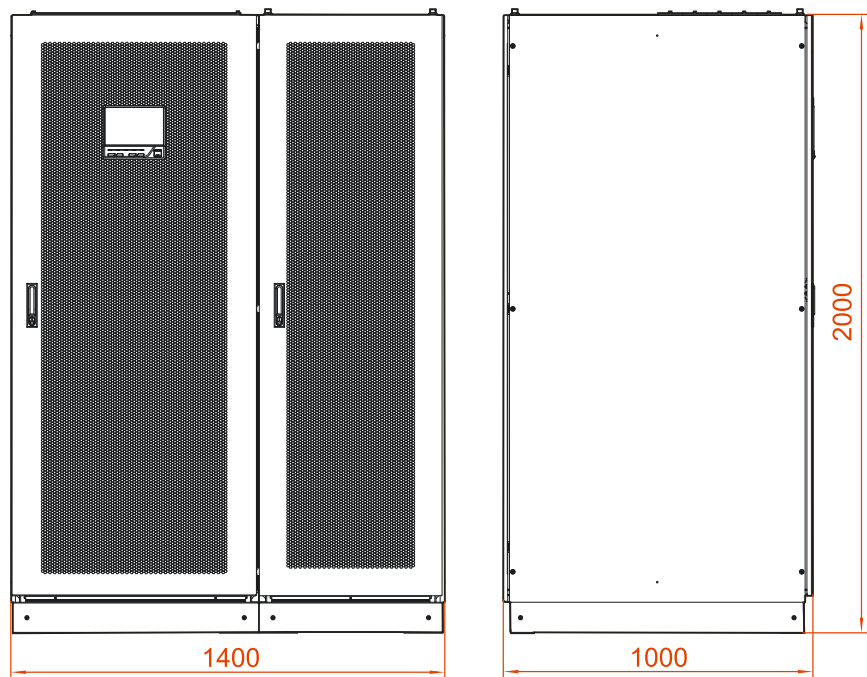


Figure3-8 Size of IST6800(unit: mm)

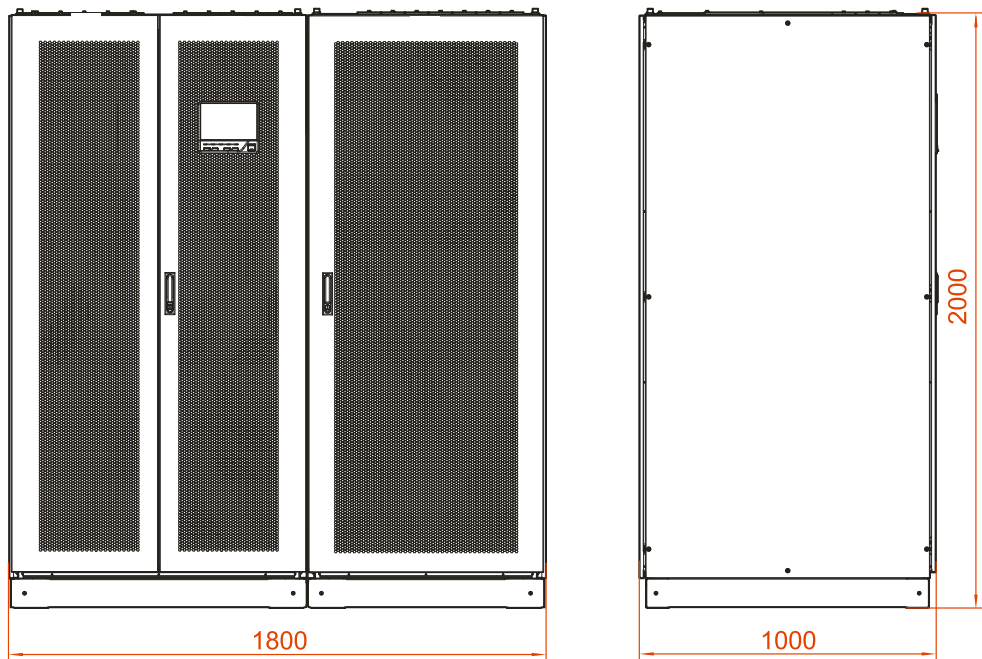


Figure3-9 Size of IST61000 and IST61200(unit: mm)

Step 2 Drill $\phi 14\text{mm}$ holes on the ground by impact drill according to the installation hole size of pedestal (as shown in Figure3-10 , Figure3-11 and Figure3-12).



NOTE

If the UPS is installed on U-steel, drill four holes(Hole diameter is $\phi 14\text{mm}$) on the U-steel directly according to the Figure3-10 , Figure3-11 and Figure3-12, and then perform **Step 4** directly.

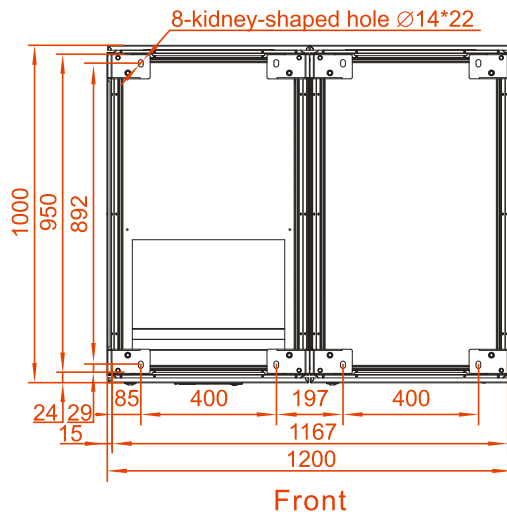


Figure3-10 The installation hole size of pedestal of IST6400, IST6500 and IST6600(unit: mm)

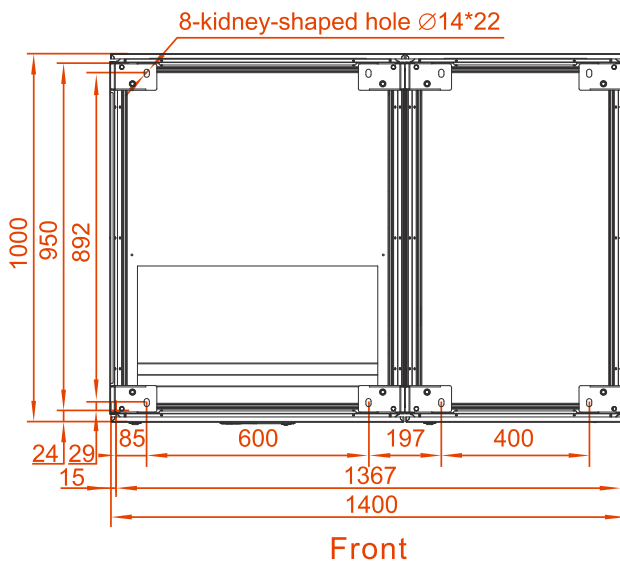


Figure3-11 The installation hole size of pedestal of IST6800(unit: mm)

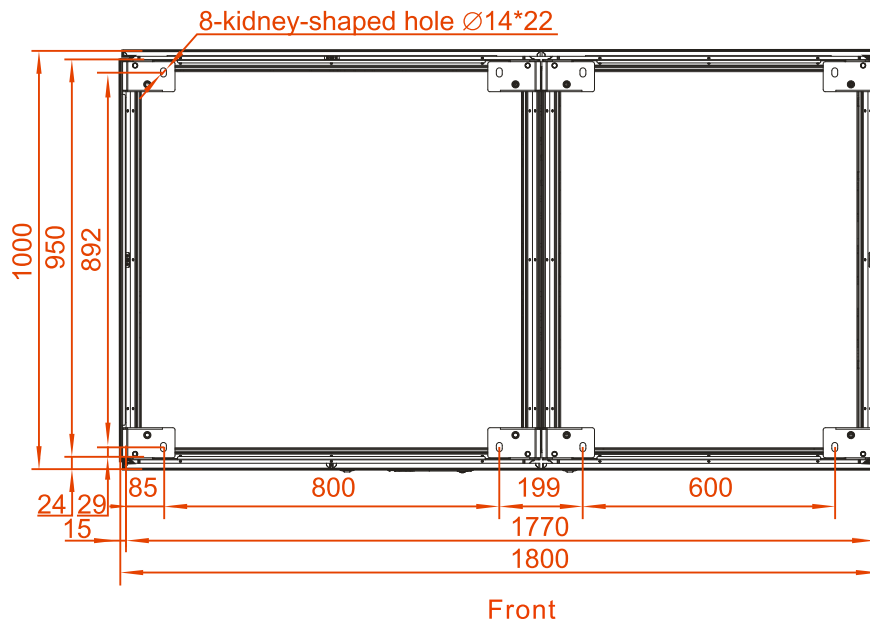
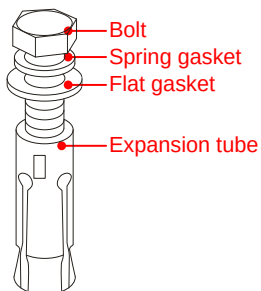


Figure3-12 The installation hole size of pedestal of IST61000 and IST61200(Unit: mm)

Step 3 Install the expansion bolts. The structure and installation of the expansion bolt is as shown in Figure3-13.



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 out the spring gasket and flat gasket.

Figure3-13 Structure and installation of expansion bolt



CAUTION

For installation consideration, the expansion tube should be into the installation hole, that is it should be not higher than ground.



NOTE

The outer height of expansion bolts should be within 30-50mm.

Step 4 Move the UPS from wooden bracket to the ground, align the bottom installation hole with the expansion bolt, and lock the bolts.

**CAUTION**

When moving UPS by forklift, the forklift arm must be inserted from the front or rear of UPS.

While lifting, please keep the UPS center of gravity at that of the forklift to avoid tilting.

**NOTE**

If adopting the bottom wiring, please ensure that the installation position is right above the wiring groove.

Step 5 Install the bottom plates.

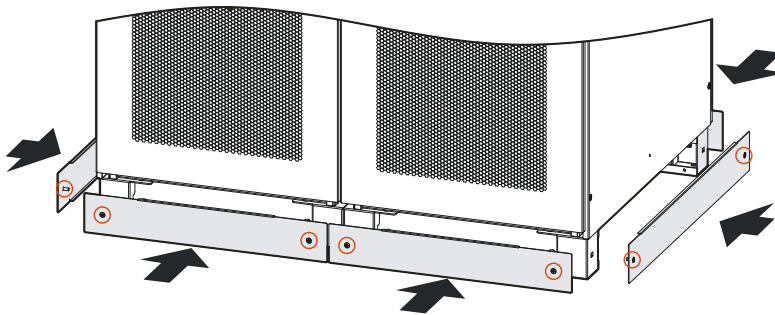


Figure3-14 Install the bottom plates

**NOTE**

The installation way of bottom plate of the IST6 series modular UPS is similar. Here we take IST6600 as an example.

----End

3.5 Optional Accessory Installation

3.5.1 SNMP Card Installation

The SNMP card is a independent product. Install it in the installation position.

Step 1 Dismantle the SNMP card plate on the system control box, as shown in Figure3-15.

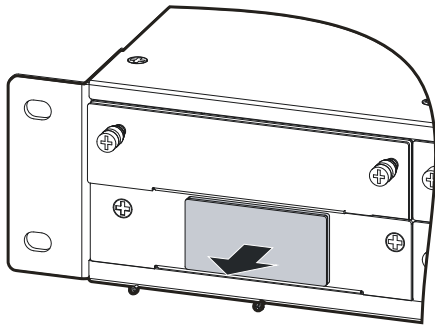


Figure3-15 Dismantle the SNMP card plate

Step 2 Install SNMP card on the system monitor box, as shown in Figure3-16.

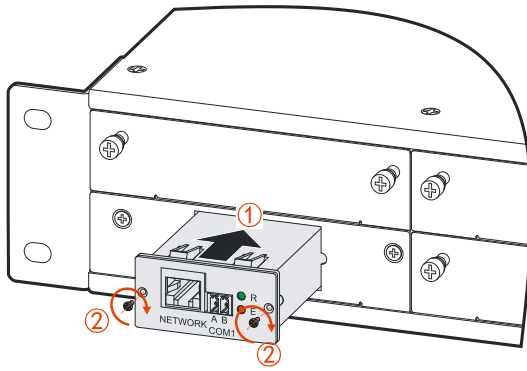


Figure3-16 Install SNMP card

----End

3.5.2 Dry Contact Expansion Card/BMS Expansion Card

The installation way for the dry contact expansion card and the BMS expansion card is the same. Here we take the dry contact expansion card as example.

Step 1 Loose the screws of the expansion card plate on the system control box, and then take down the dry contact expansion card plate, as shown in Figure3-17.

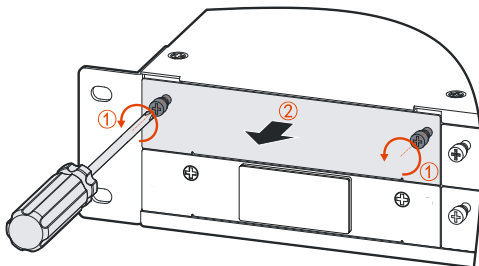


Figure3-17 Dismantle the dry contact expansion card plate

Step 2 Install the dry contact expansion card on the system monitor box, as shown in Figure3-18.

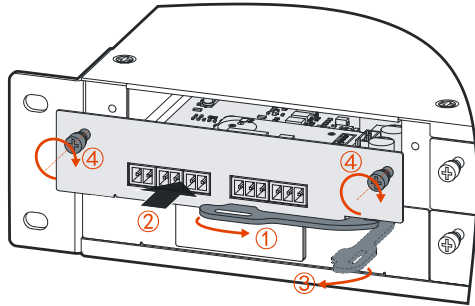


Figure3-18 Install the dry contact expansion card

----End

3.6 Electrical Connection

IST6400, IST6500, IST6600 and IST6800 include two wiring ways, top wiring and bottom wiring. IST61000 and IST61200 support the top wiring.

3.6.1 IST6400, IST6500, IST6600(Top Wiring and Bottom Wiring)

Step 1 Open the front door of distribution cabinet, set the input switch, output switch, bypass switch, maintenance bypass switch to OFF, as shown in Figure3-19.

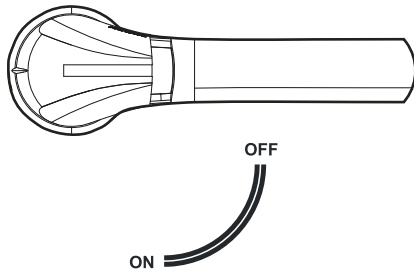


Figure3-19 Set the switch to OFF

Step 2 Loose the screws of each wiring plate, dismantle the wiring plates, as shown in Figure3-20.

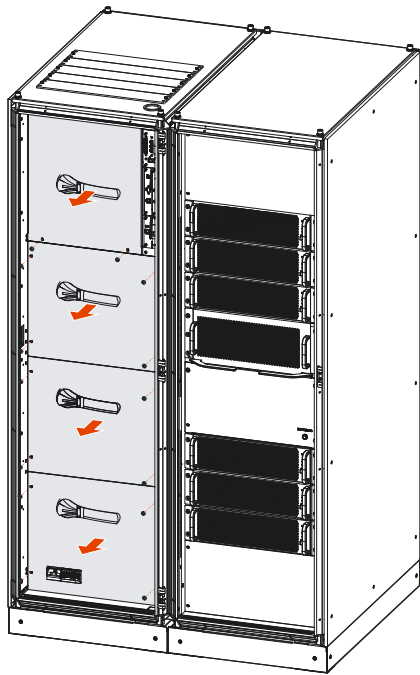


Figure3-20 Dismantle the wiring plates of distribution cabinet

Step 3 Follow the order to connect wires: grounding wire, mains input wire, bypass input wire, battery wire, neutral wire, output wire, and then fasten the bolts, as shown in Figure3-21.

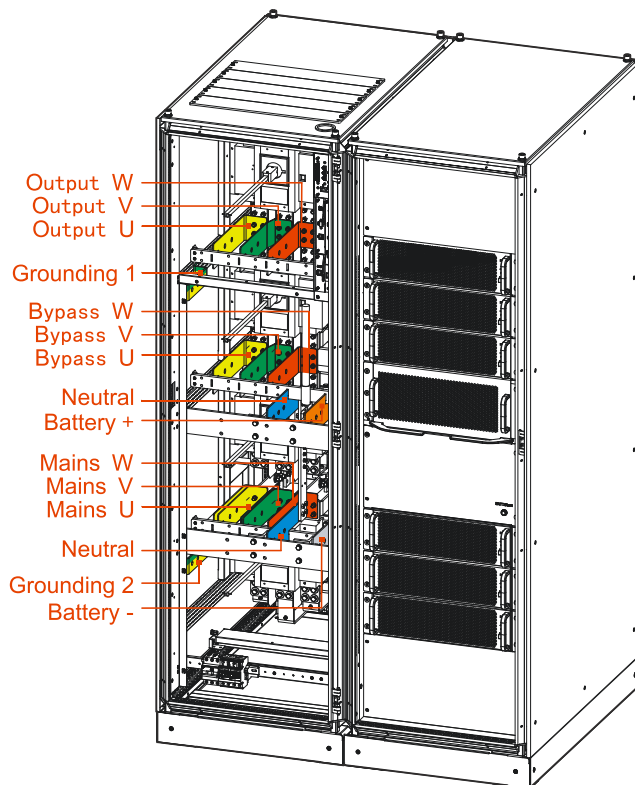


Figure3-21 Wiring position of IST6400, IST6500 and IST6600

NOTE

1. When wiring, the U, V, W wires should be connected at the same side of the copper bar for good electrical performance.
2. For the top wiring, draw wires through the top epoxy plate and connect wires.
3. For the bottom wiring, draw wires through the bottom wiring hole and connect wires.
4. After wiring, connect the wires onto the front insulated beam shipshape.
5. The number of grounding bar of IST6400, IST6500 and IST6600 is different. IST6400 only has one the grounding bar: grounding 2; IST6500 and IST6600 have two grounding bars: grounding 1 and grounding 2. The detail is subject to the actual situation.



CAUTION

Add a DC switch when battery DC input, the wiring is as shown in Figure3-22.

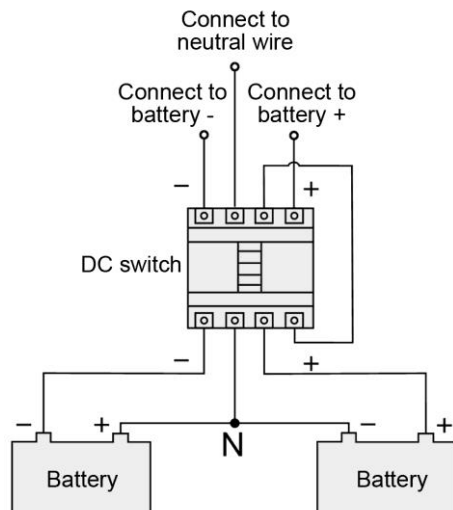


Figure3-22 Wiring diagram of battery



CAUTION

When wiring, make sure that wires are connected with terminals tightly. Do not make any poor connection or connect wires reversely.

- Step 4 After wiring, fasten the wires to corresponding epoxy plate by cable ties, install the wiring plates and close the front door(here we take the IST6600 as an example.).

**NOTE**

When the IST6400, IST6500 and IST6600 adopt the bottom wiring, fill the empty part of the bottom wiring hole with insulated fireproofing mud.

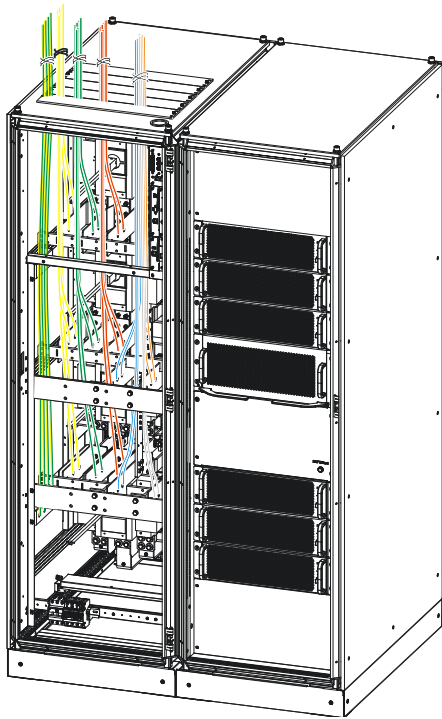


Figure3-23 Wiring diagram of distribution cabinet(top wiring)

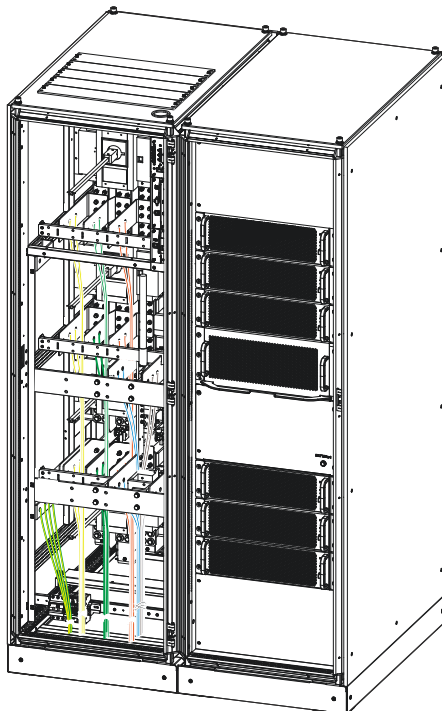


Figure3-24 Wiring diagram of distribution cabinet(bottom wiring)

---End

After wiring, perform the test and then the UPS can be put in use.

3.6.2 IST6800(Top Wiring and Bottom Wiring)

- Step 1 Open the front door of distribution cabinet, set the input switch, output switch, bypass switch, maintenance bypass switch to OFF, as shown in Figure3-25.

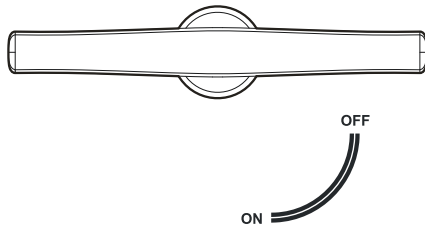


Figure3-25 Set the switch to OFF

- Step 2 Loose the screws of each wiring plate, and then dismantle the wiring plates, as shown in Figure3-26.



Figure3-26 Dismantle the wiring plates of distribution cabinet

- Step 3 Follow the order to connect wires: grounding wire, mains input wire, bypass input wire, battery wire, neutral wire, output wire, and then fasten the bolts, as shown in Figure3-27.

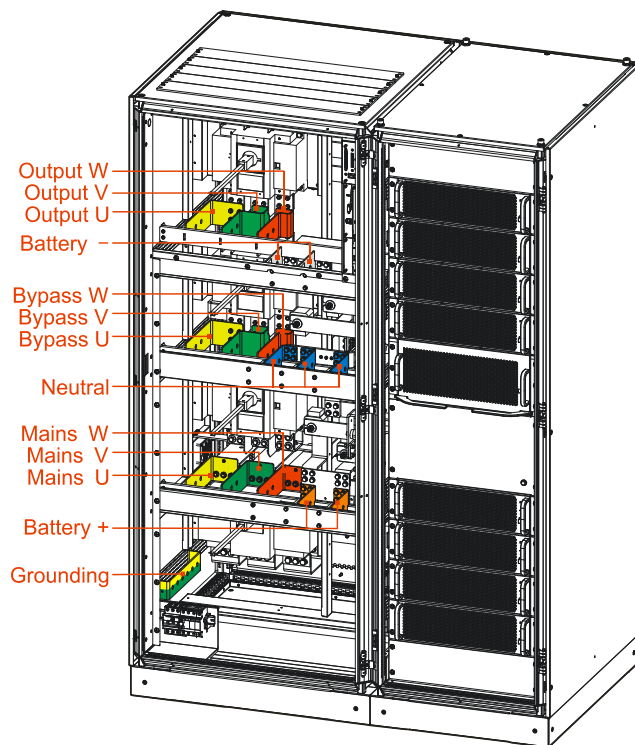


Figure3-27 Wiring position of IST6800

 NOTE

1. When wiring, the U, V, W wires should be connected at the same side of the copper bar for good electrical performance.
2. For the top wiring, draw wires through the top epoxy plate and connect wires.
3. For the bottom wiring, draw wires through the bottom wiring hole and connect wires.
4. After wiring, connect the wires onto the front insulated beam shipshape.

**CAUTION**

Add a DC switch when battery DC input, the wiring is as shown in Figure3-28.

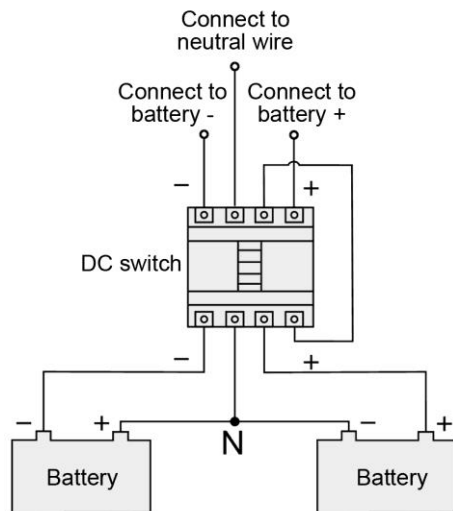


Figure3-28 Wiring diagram of battery

**CAUTION**

When wiring, make sure that wires are connected with terminals tightly. Do not make any poor connection or connect wires reversely

- Step 4 After wiring, fasten the wires to corresponding epoxy plate by cable ties, install the wiring plates and close the front door.

**NOTE**

When the IST6800 adopts the bottom wiring, fill the empty part of the bottom wiring hole with insulated fireproofing mud.

---End

After wiring, perform the test and then the UPS can be put in use.

3.6.3 IST610000 and IST61200(Top Wiring)

- Step 1 Open the front door of distribution cabinet, set the input switch, output switch, bypass switch, maintenance bypass switch to OFF.
- Step 2 Loose the screws of wiring plate at the left rear of UPS, and then dismantle the wiring plate, as shown in Figure3-29.

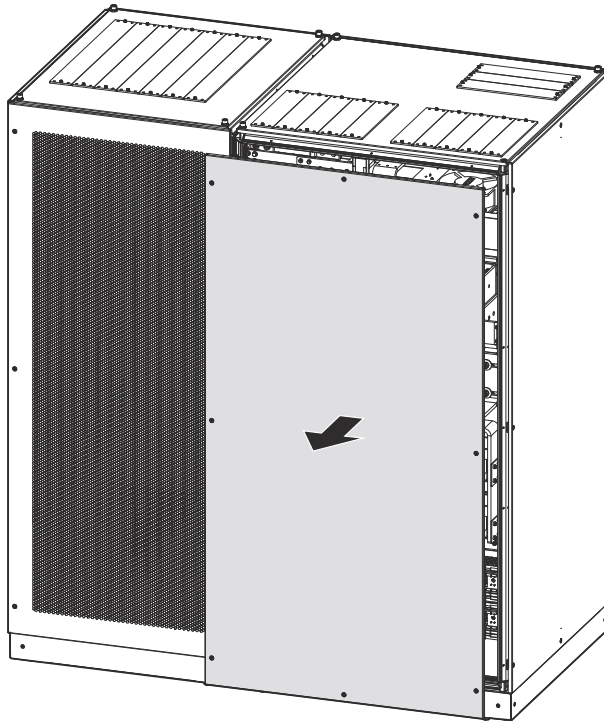


Figure3-29 Dismantle the wiring plate

- Step 3 Follow the order to connect wires: grounding wire, input wire, output wire, battery wire, and then fasten the bolts, as shown in Figure3-30 and Figure3-31.

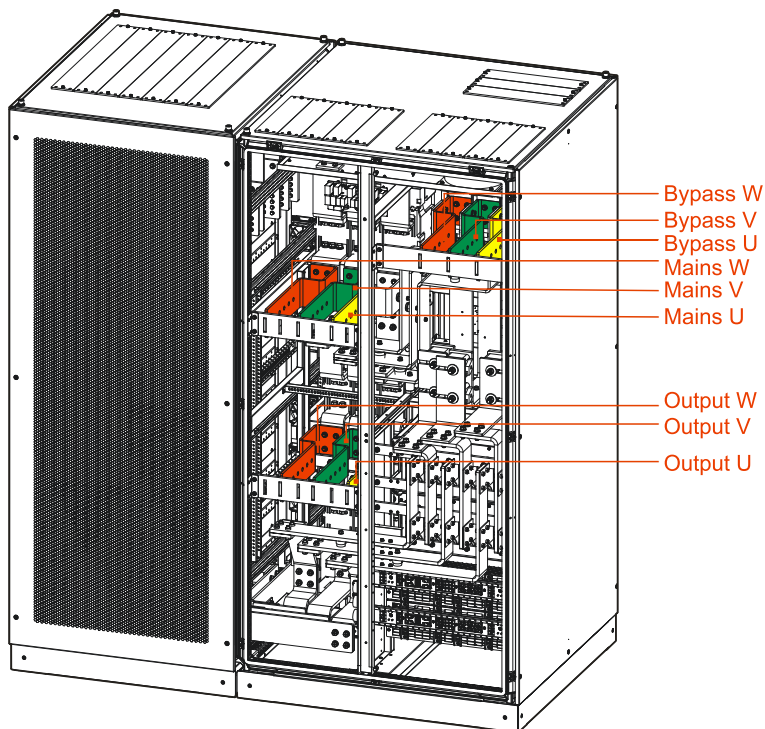


Figure3-30 Wiring position of IST61200 1

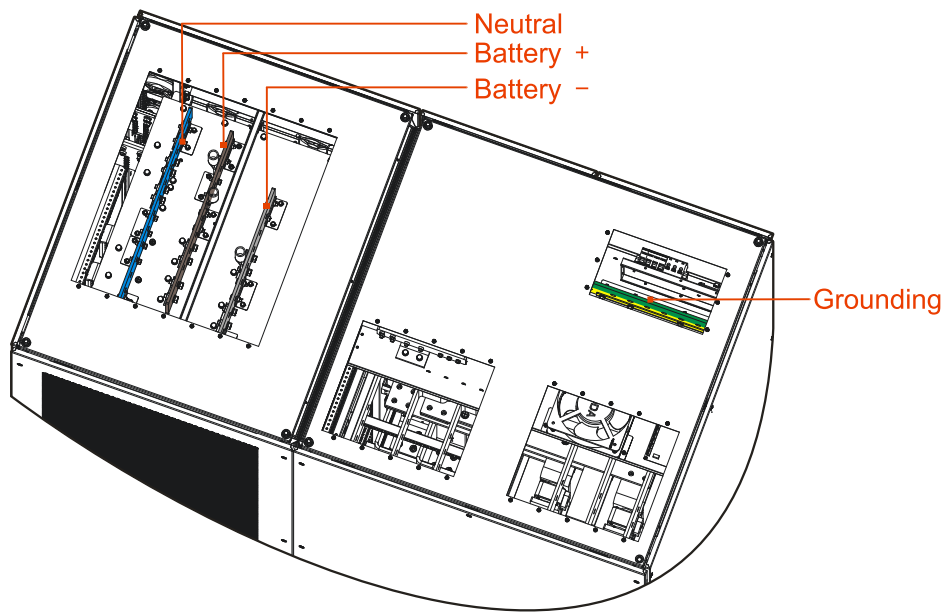


Figure3-31 Wiring position of IST61200 2

NOTE

1. When wiring, the U, V, W wires should be connected at the same side of the copper bar for good electrical performance.
2. When wiring, draw wires through the top epoxy plate and connect wires.
3. After wiring, connect the wires onto the front insulated beam shipshape.



CAUTION

Add a DC switch when battery DC input, the wiring is as shown in Figure3-28.

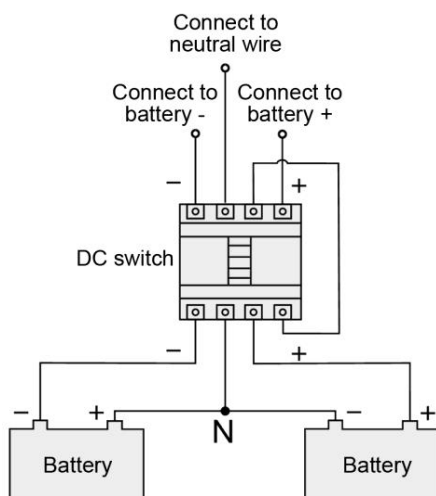


Figure3-32 Wiring diagram of battery

**CAUTION**

When wiring, make sure that wires are connected with terminals tightly. Do not make any poor connection or connect wires reversely

- Step 4 After wiring, fasten the wires to corresponding epoxy plate by cable ties, and install the wiring plates and close the front door.

----End

After wiring, perform the test and then the UPS can be put in use.

3.7 Parallel System Connection

IST6400, IST6500, IST6600 and IST6800(top wiring and bottom wiring)

**NOTE**

The parallel system connection of the IST6400, IST6500, IST6600 and IST6800 UPS is similar. Here we take IST6600 as an example.

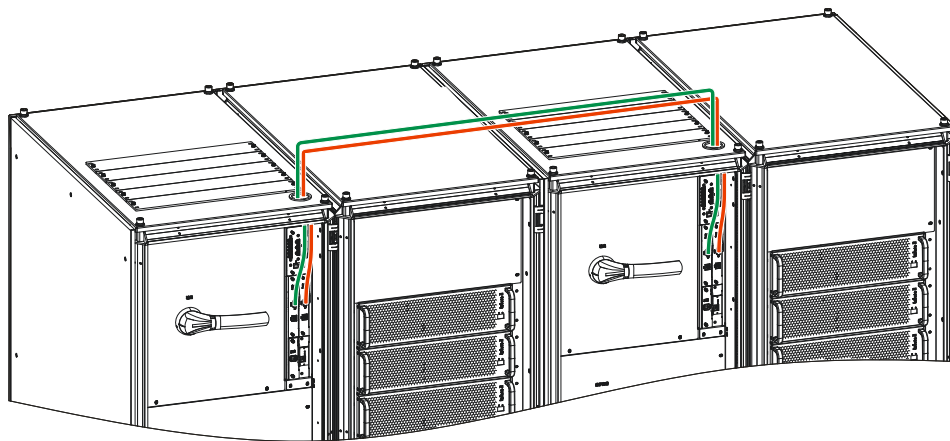


Figure3-33 Parallel system connection diagram(top wiring)

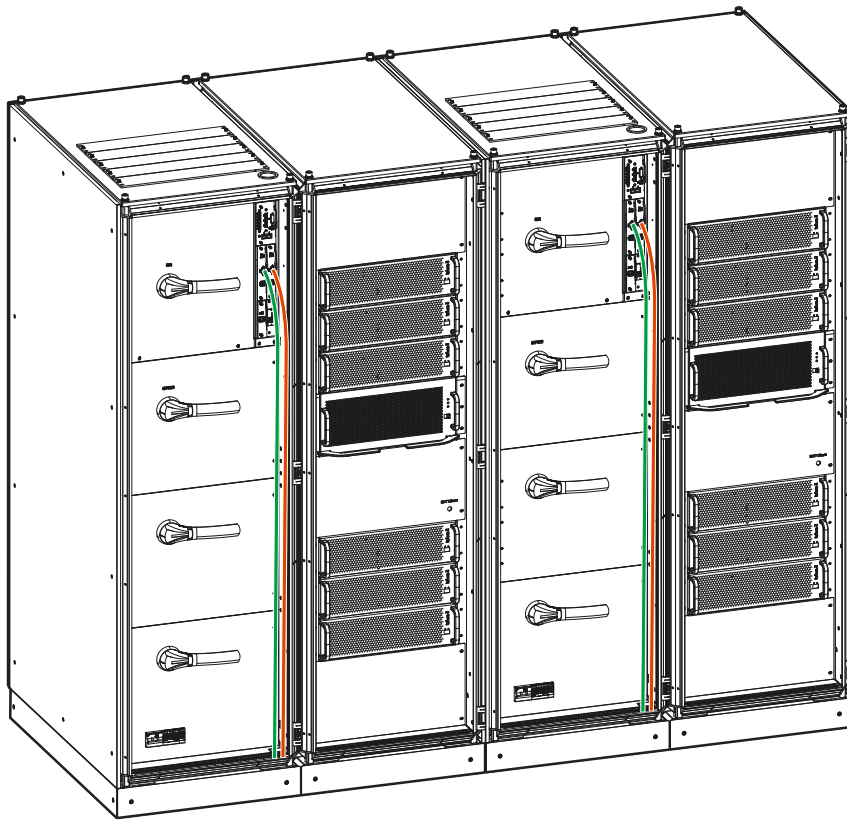


Figure3-34 Parallel system connection diagram(bottom wiring)



NOTE

The wire color above is just used to distinguish the different ports, the actual wire color may not be the same as shown in the figure.

IST61000 and IST61200(top wiring)

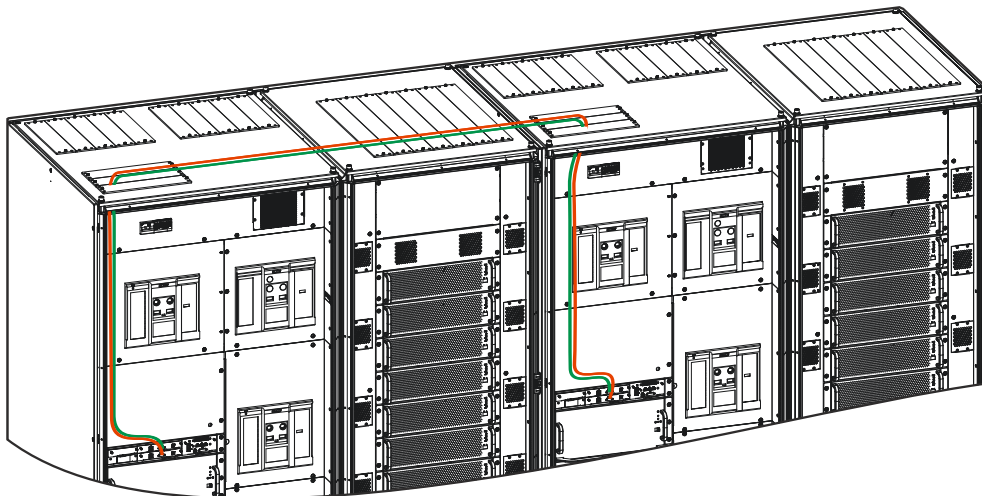


Figure3-35 Parallel system connection diagram(top wiring)

**NOTE**

The wire color above is just used to distinguish the different ports, the actual wire color may not be the same as shown in the figure.

3.8 System Check and Test

3.8.1 Check Electrical Connection

After finishing the electrical connection, check the following items.

Table3-4 Check list

No.	Check item	Result
1	Check if the color of AC wires is in accordance with the specification.	Yes ☐ No ☐
2	Check if the wiring of the UPS is firmly.	Yes ☐ No ☐
3	Check if the safety mark of AC distribution unit is complete.	Yes ☐ No ☐
4	Check if the wire connection is firmly.	Yes ☐ No ☐
5	Check if the battery is connected in right polarity and sequence.	Yes ☐ No ☐
6	Check if the wire mark is correct.	Yes ☐ No ☐
7	Check if the wiring is neat and the wire connection is in accordance with the specification.	Yes ☐ No ☐
8	Check if the UPS installation and wiring is good for transformation, expansion and maintenance in future.	Yes ☐ No ☐
9	Check if the UPS has any foreign matter. (E.g. The rear of module, the top of UPS, wiring terminal bar, switch and so on.)	Yes ☐ No ☐

3.8.2 UPS Test

Switch off the mains input to simulate the situation of mains fault. When mains fault, it will turn to battery inverter from mains inverter, and the touch screen will show the alarm and the buzzer will beep once every 1s.

3.8.3 Connect Load

After the UPS works stably, turn on the load. Start large power devices first, then small power device. Some devices has large starting current which may cause overload protection (or bypass operation), it is better to start these devices first.

4 Touch Screen Operation

This chapter mainly introduces the working parameters, working status and system setting of the UPS.

4.1 Menu Hierarchy

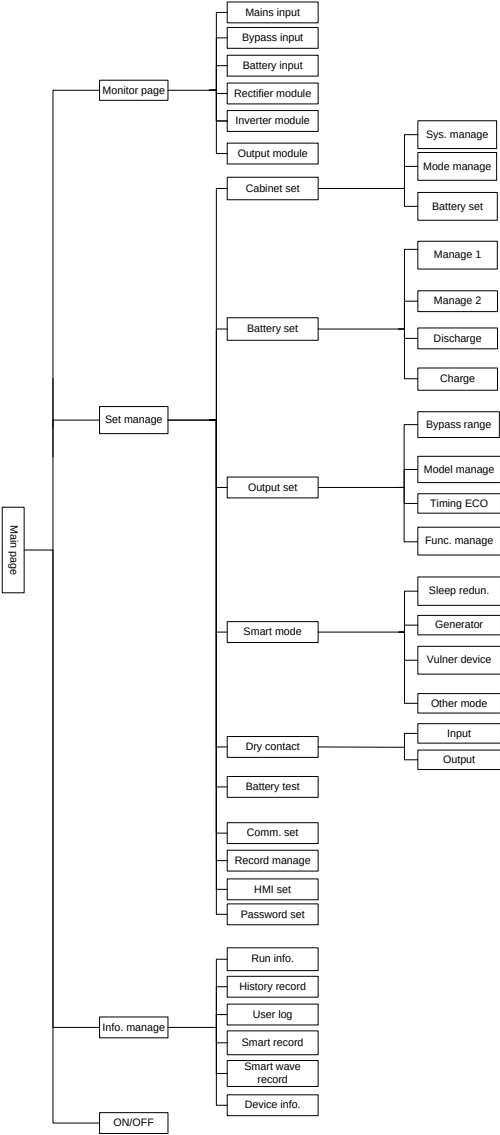


Figure4-1 Menu hierarchy

NOTE

The value in the figures of this chapter is just for illustration, for real page please see the actual product.

4.2 Main Page

After powering on, it will enter the main page, as shown in Figure4-2.

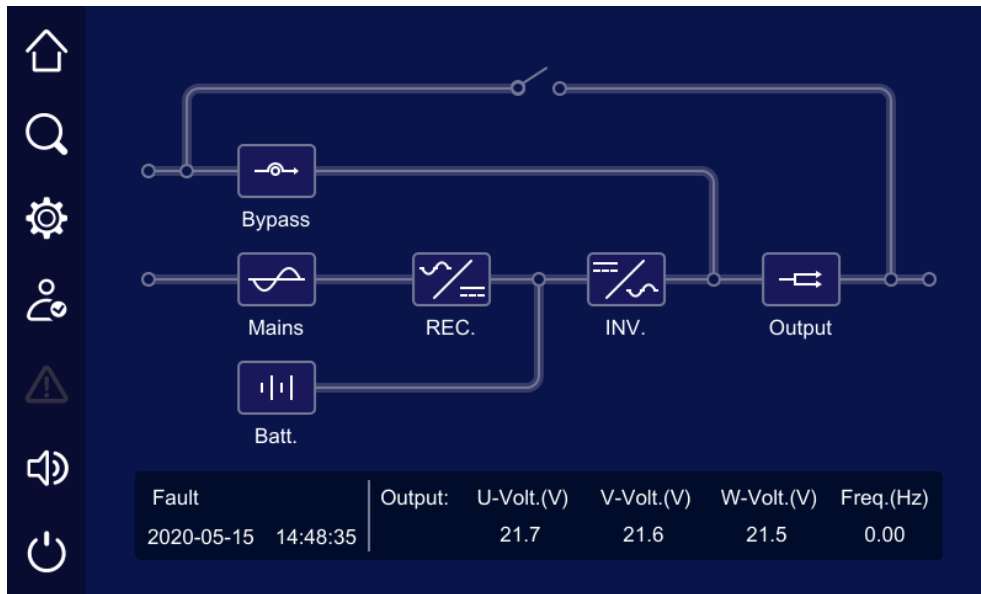


Figure4-2 Main page

After entering the main page, user can monitor the system conveniently. The icon meaning on the main page is as follows.

: System bypass input. When bypass input abnormal, the icon flickers and shows as .

: System mains input. When mains input abnormal, the icon flickers and shows as .

: Rectifier information. Click the icon, you can select and check the rectifier information of each module.

: Inverter information. Click the icon, you can select and check the inverter information of each module.

: Battery status. When battery abnormal, the icon flickers and shows as .

: System output status. When output abnormal, the icon flickers and shows as .

: Back to main page.

- :Information record.
- :System parameter setting.
- :Login.
- :Buzzer control.
- :Alarm.
- : ON/OFF.

The working status and energy flow on the main page shows the system running status and module running condition directly.

4.3 System Work Status Display

The system working status includes: fault protection, shutdown, bypass output, inverter output, grid-tied self-aging running, ECO bypass output, transducer INV. output, maintenance bypass output. Each page is as shown from Figure4-3 to Figure4-11.

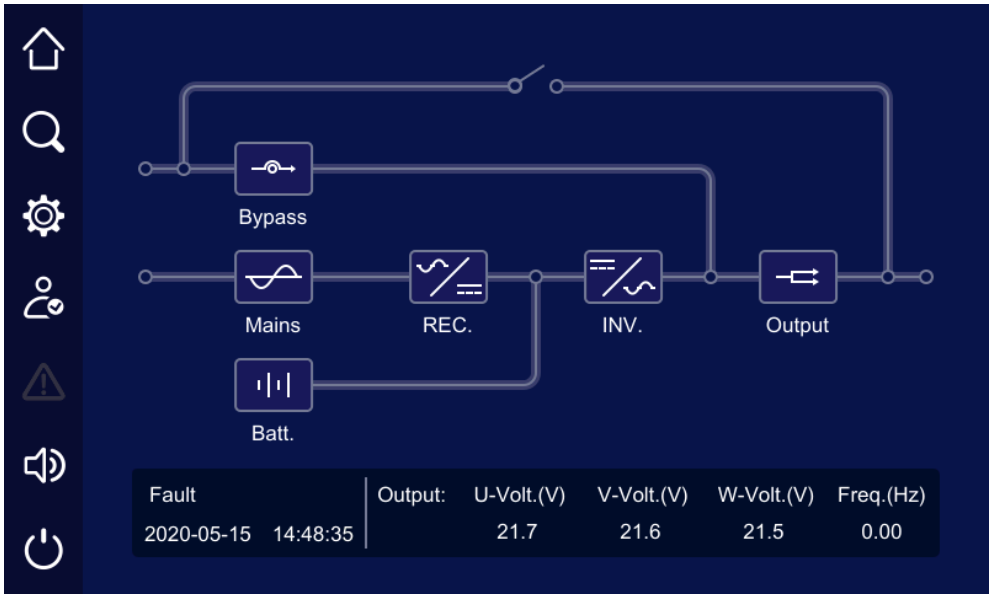


Figure4-3 Fault protection, with no output

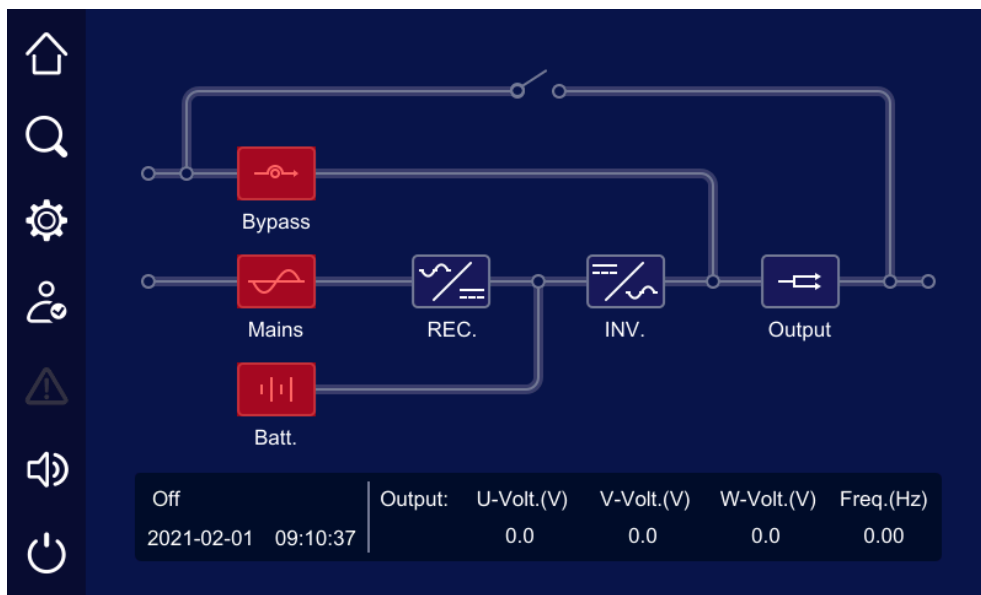


Figure4-4 Shutdown

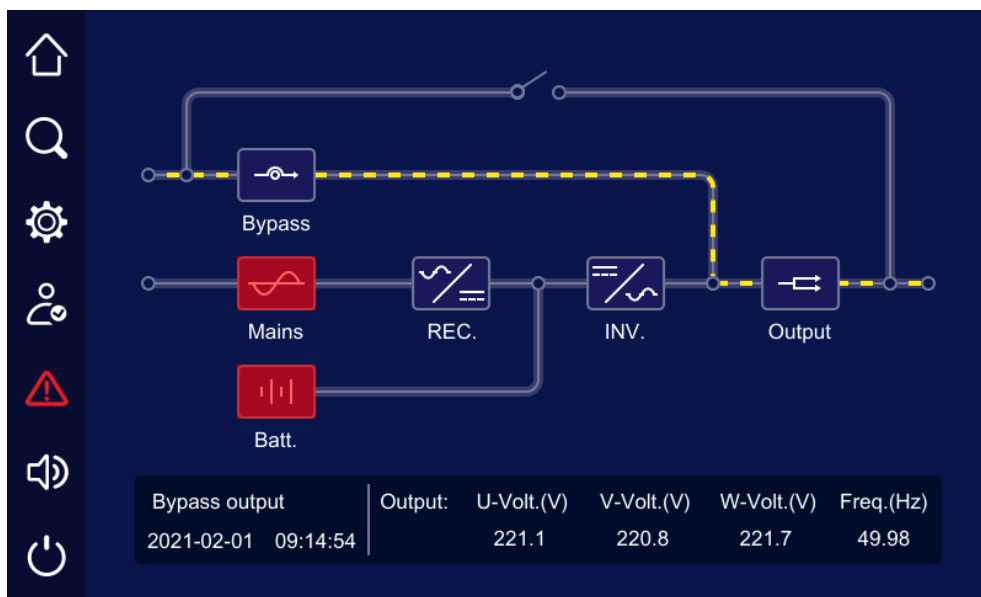


Figure4-5 Bypass output

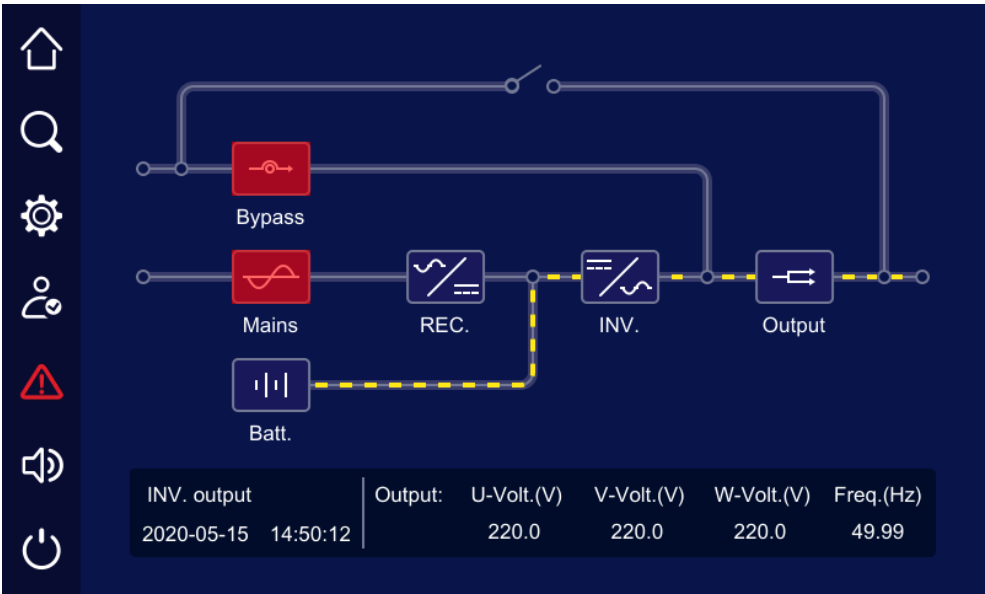


Figure4-6 Battery INV. output

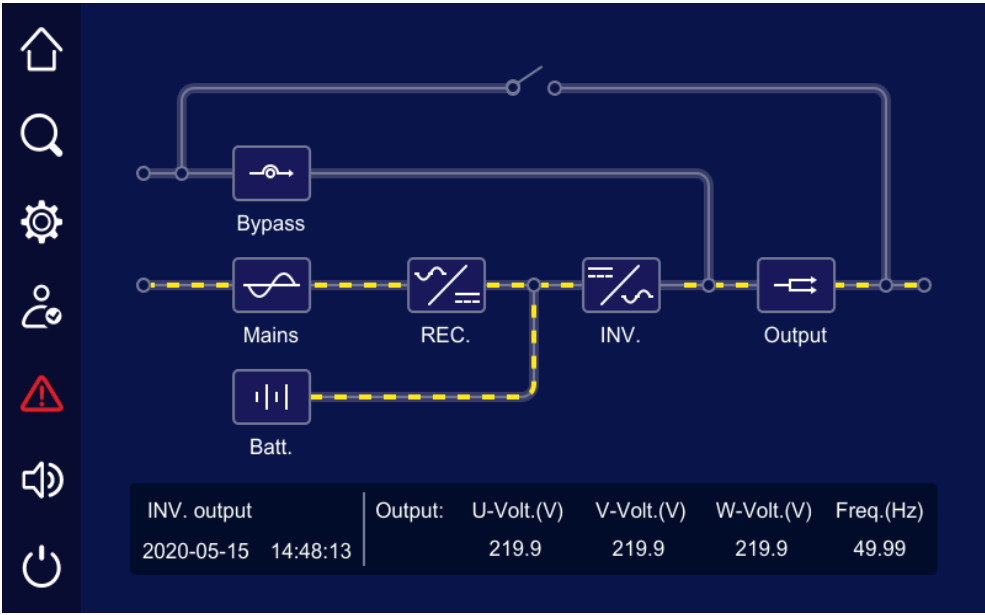


Figure4-7 Mains INV. output

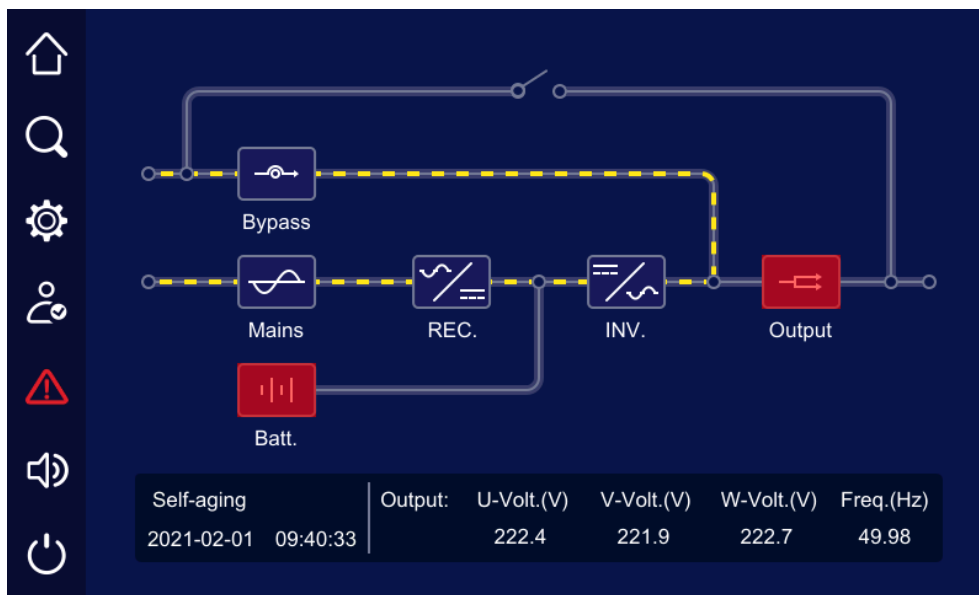


Figure4-8 Grid-tied self-aging running

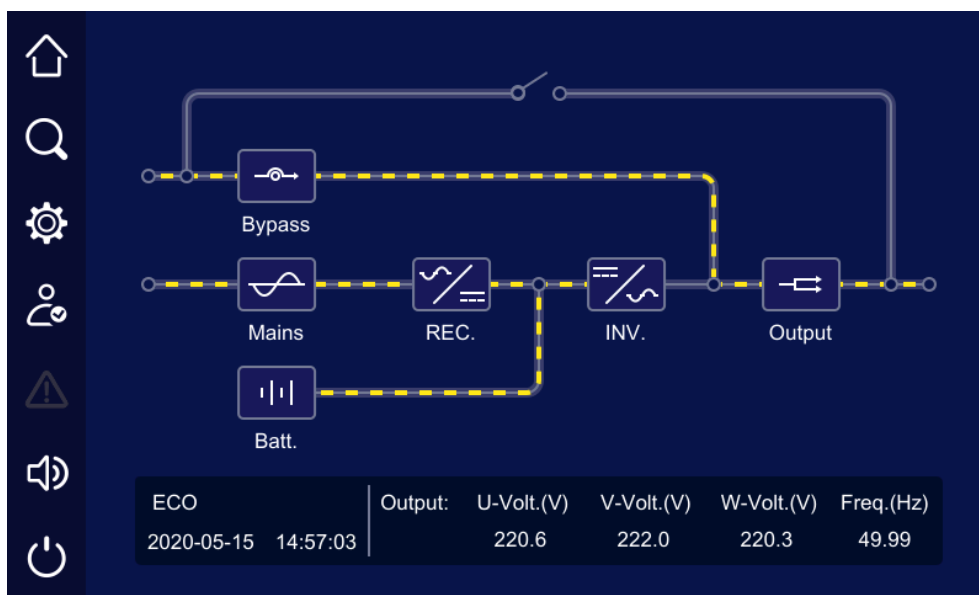


Figure4-9 ECO bypass output

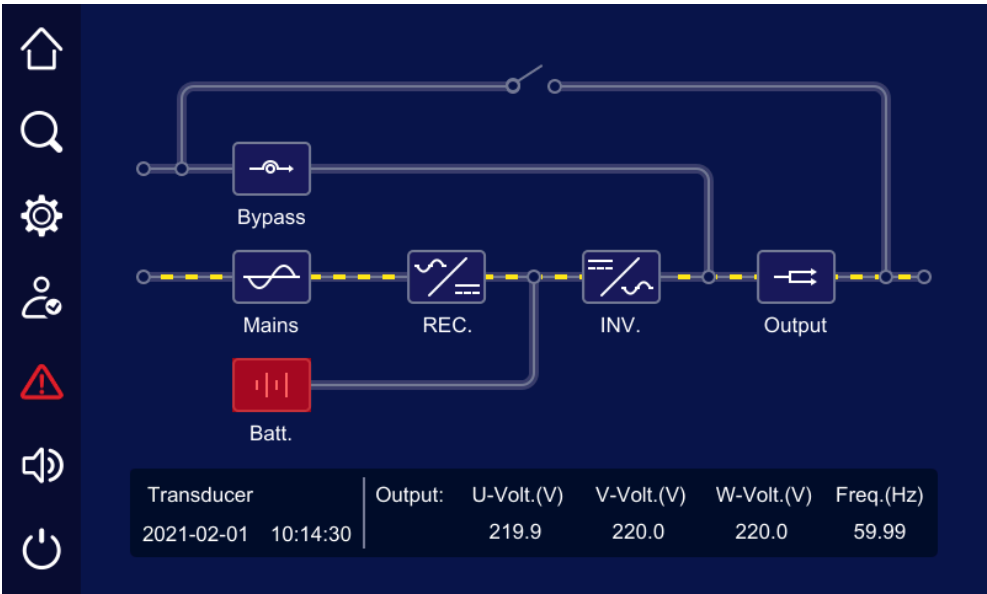


Figure4-10 Transducer INV. output

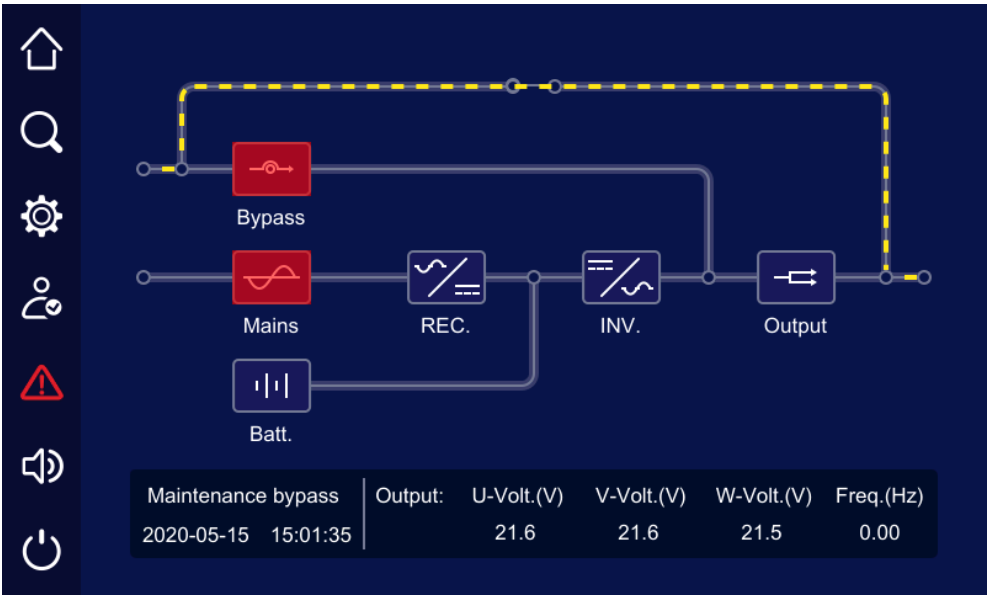


Figure4-11 Maintenance bypass output

When module or system abnormal, the main page will show “fault alarm” indicator, click the “fault alarm” indicator, it will show the current fault information, as shown in Figure4-12.

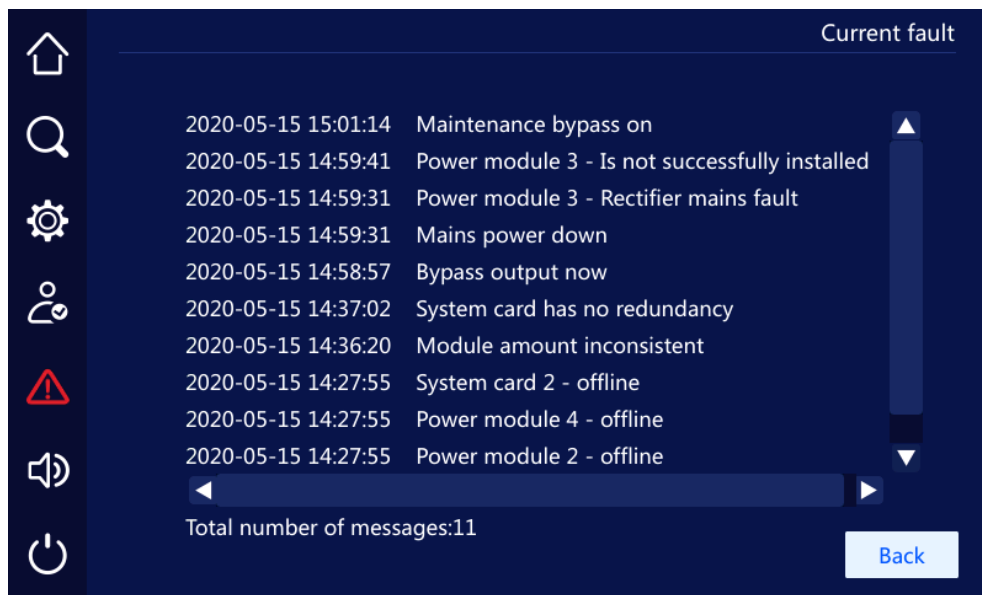


Figure4-12 Current fault information

4.4 Buzzer Control Function

When module or system abnormal, the system will send sound alarm. User can click the  icon at left to close or open the buzzer. After closed, if there is new fault, the buzzer will be opened automatically.

4.5 Monitor Page

4.5.1 Mains Input

In main page, click  icon, it will enter the mains information page, as shown in Figure4-13. In the page, it shows the mains phase voltage, mains current, mains frequency and total input electricity of current system.

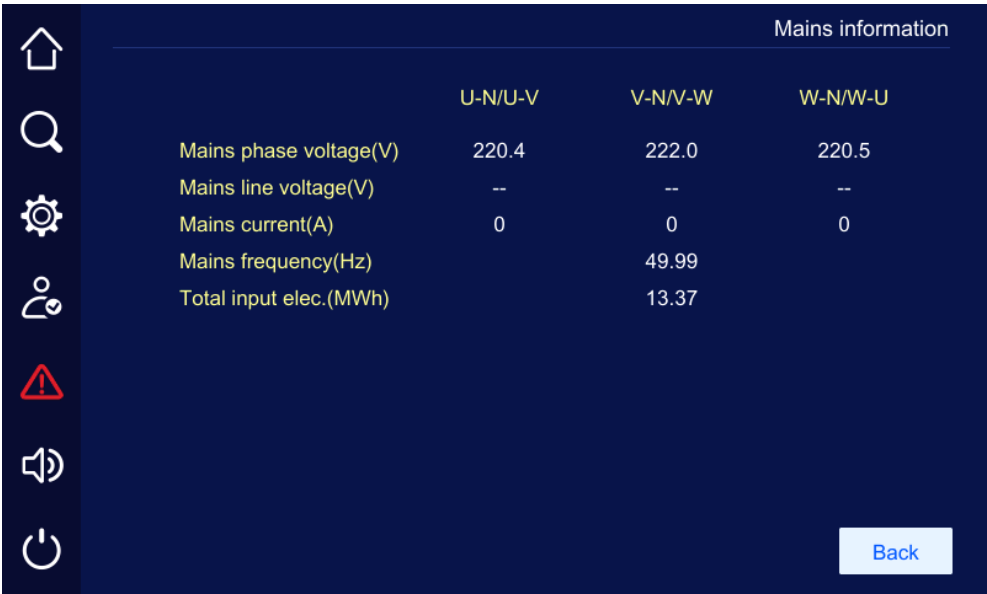


Figure4-13 Mains information

4.5.2 Bypass Input

In main page, click  icon, it will enter the bypass information page, as shown in Figure4-14. In the page, it shows the bypass phase voltage, bypass line voltage, bypass current and bypass frequency.

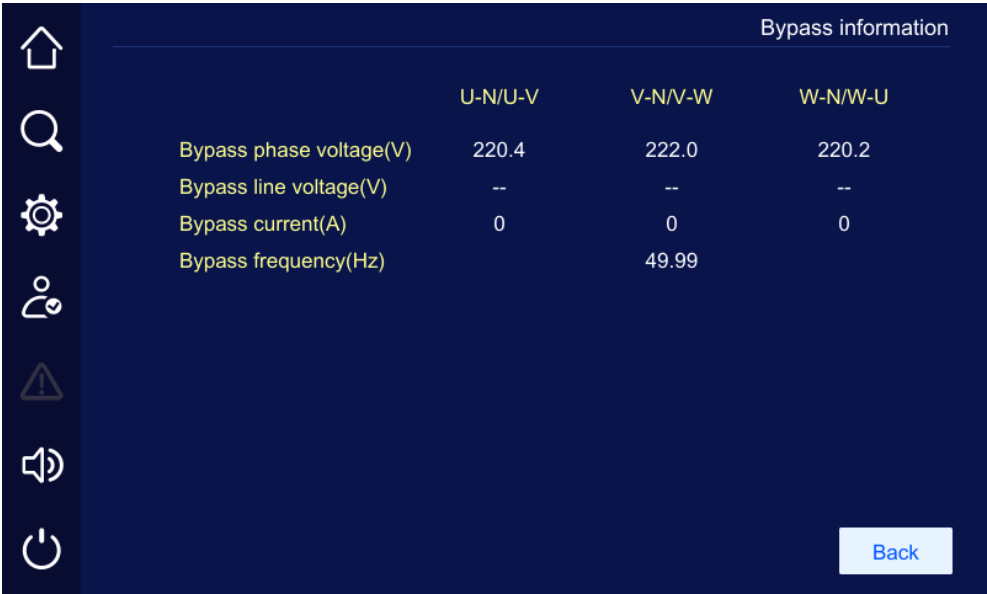
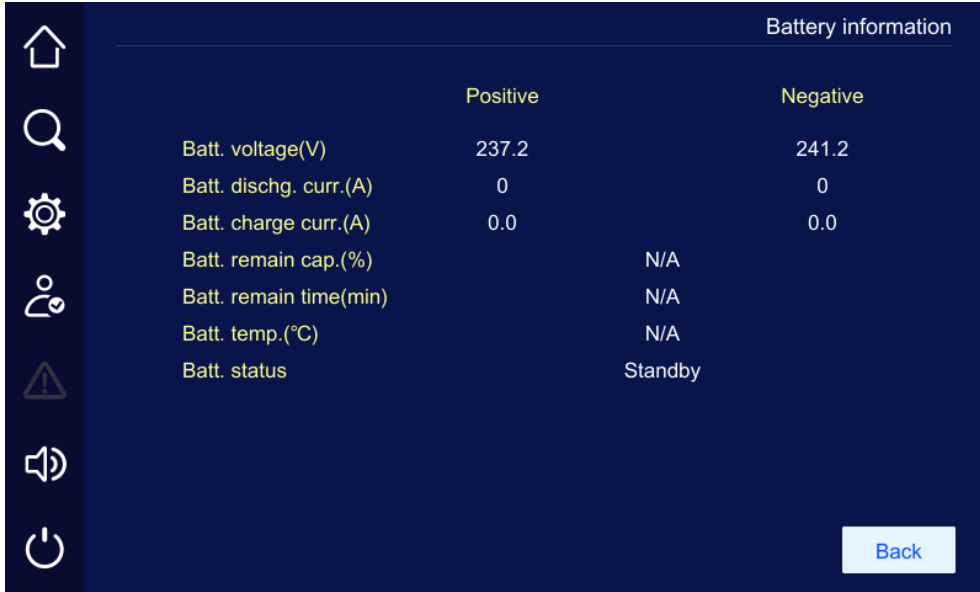


Figure4-14 Bypass information

4.5.3 Battery Input

In main page, click  icon, it will enter the battery information page. If the battery is lead-acid cell, it shows the positive and negative battery group voltage, battery charge/discharge current, battery remaining capacity, battery remaining time, battery temperature, battery status. It shows the charging current or discharging current according to battery charge/discharge status, as shown in Figure4-15.



	Positive	Negative
Batt. voltage(V)	237.2	241.2
Batt. dischg. curr.(A)	0	0
Batt. charge curr.(A)	0.0	0.0
Batt. remain cap.(%)	N/A	
Batt. remain time(min)	N/A	
Batt. temp.(°C)	N/A	
Batt. status	Standby	

Back

Figure4-15 Battery information

4.5.4 REC. Module

In main page, click  icon, it will enter the REC. information page, as shown in Figure4-16. Click “Module” button, it can view the information of each power module.



Figure4-16 REC. information

4.5.5 INV. Module

In main page, click  icon, it will enter INV. information page, as shown in Figure4-17. Click “Module” button, it can view the information of each power module.

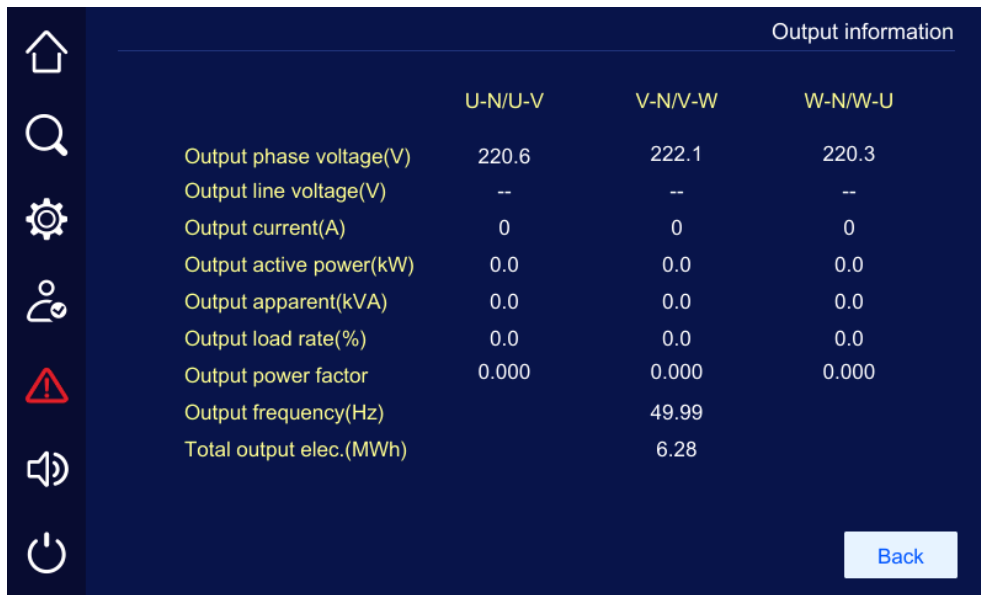


Figure4-17 INV. information

4.5.6 Output Information

In main page, click  icon, it will enter the output information page, as shown in Figure4-18. In the page, it shows the current output phase voltage, output line voltage, output current, output active

power, output apparent power, output load rate, output power factor, output frequency and total output electricity.



	U-N/U-V	V-N/V-W	W-N/W-U
Output phase voltage(V)	220.6	222.1	220.3
Output line voltage(V)	--	--	--
Output current(A)	0	0	0
Output active power(kW)	0.0	0.0	0.0
Output apparent(kVA)	0.0	0.0	0.0
Output load rate(%)	0.0	0.0	0.0
Output power factor	0.000	0.000	0.000
Output frequency(Hz)		49.99	
Total output elec.(MWh)		6.28	

Figure4-18 Output information

4.6 Set Manage

In main page, click  icon, it will enter the set manage page, as shown in Figure4-19. In the page, it shows cabinet set, battery set, battery test, output set, smart mode, dry contact, HMI set, password set, comm. set and record manage.

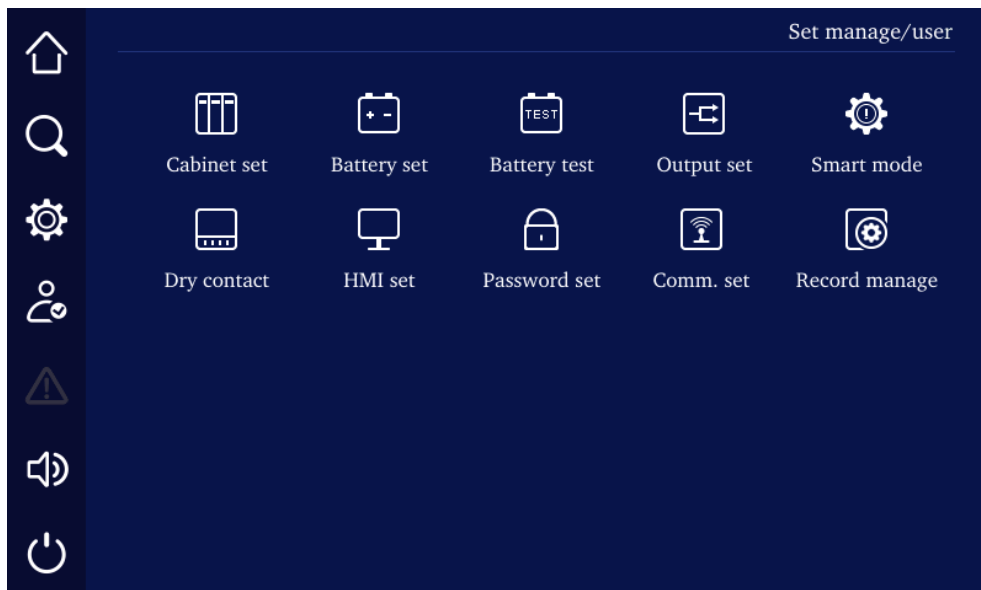


Figure4-19 Set manage

4.6.1 Cabinet Set

In set manage page, click  icon, it will enter the cabinet set page, as shown in Figure4-20.

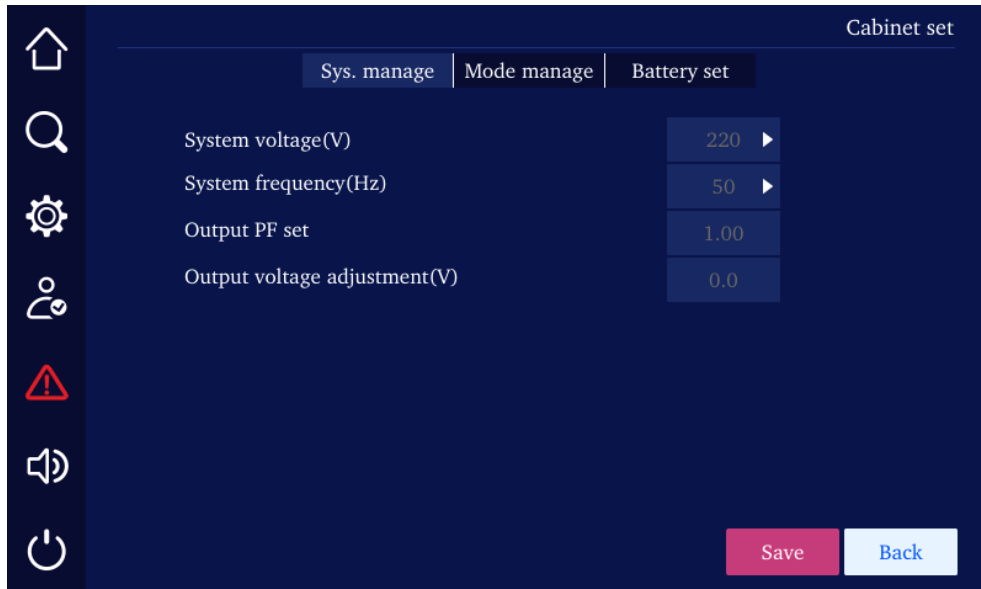


Figure4-20 cabinet set

4.6.2 Battery Set

In set manage page, click  icon, it will enter the battery set page, as shown in Figure4-21.

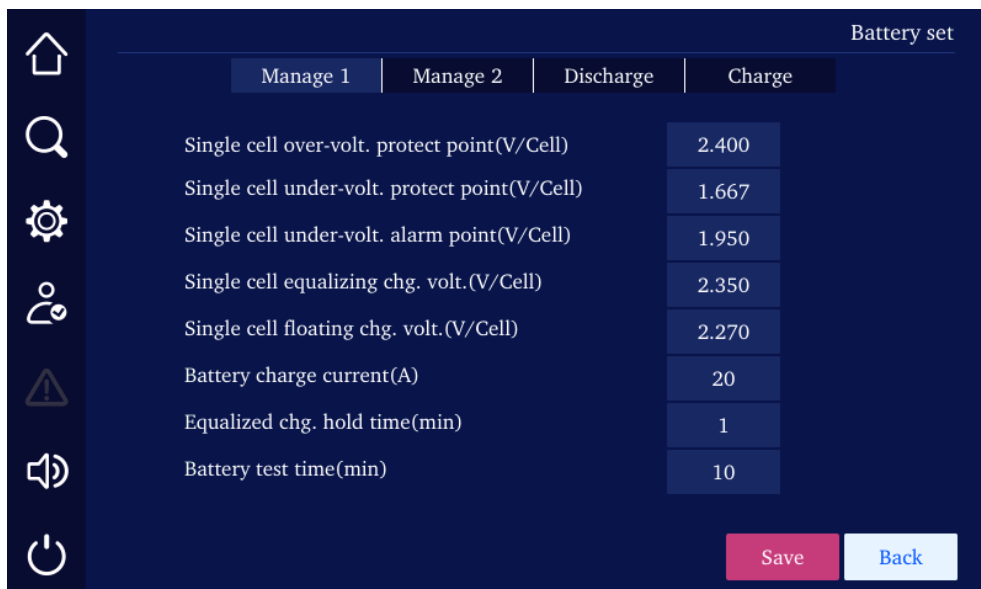


Figure4-21 Battery set

4.6.3 Output Set

In set manage page, click  icon, it will enter the output set page, as shown in Figure4-22.

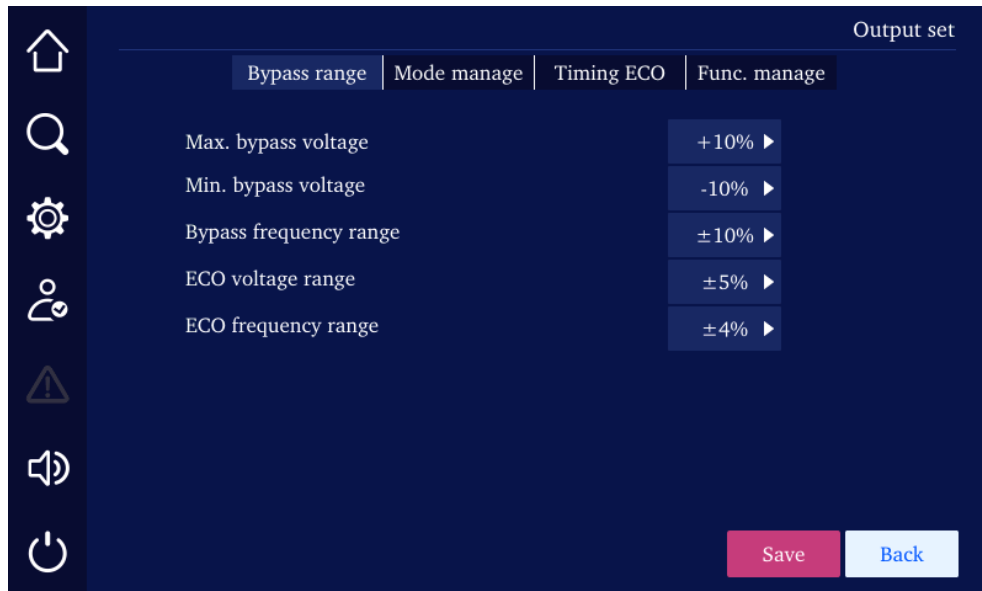


Figure4-22 Output set

4.6.4 Smart Mode

In set manage page, click  icon, it will enter the smart mode page, as shown in Figure4-23.

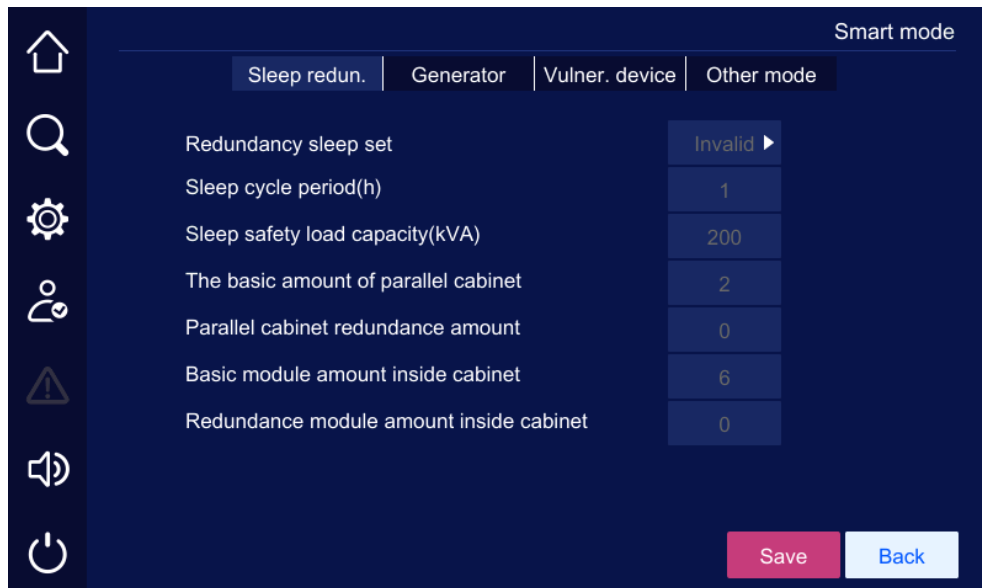


Figure4-23 Smart mode

4.6.5 Dry Contact

In set manage page, click  icon, it will enter the dry contact page, as shown in Figure4-24.



Figure4-24 Dry contact

4.6.6 Battery Test

In set manage page, click  icon, it will enter the battery test page, as shown in Figure4-25.

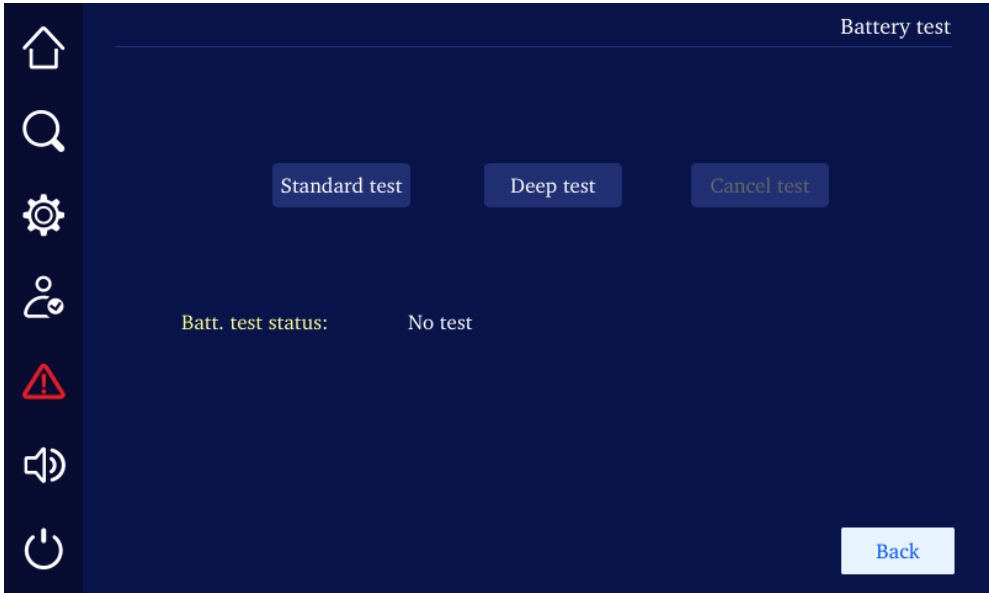


Figure4-25 Battery test

4.6.7 Communication Set

In set manage page, click  icon, it will enter the communication set page, as shown in Figure4-26.

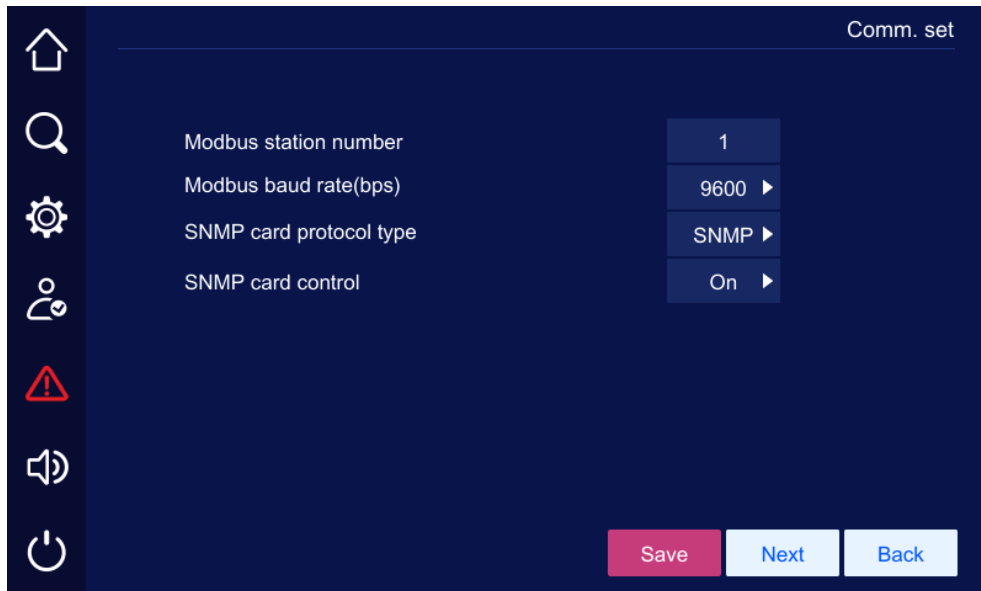


Figure4-26 Communication set

4.6.8 Record Manage

In set manage page, click  icon, it will enter the record manage page, as shown in Figure4-27.

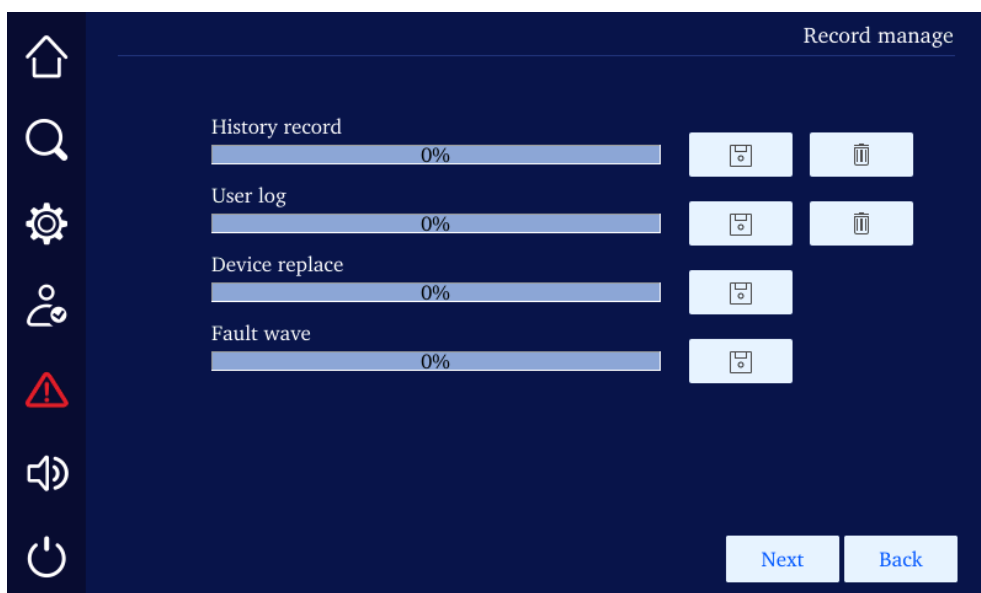


Figure4-27 Record manage

4.6.9 HMI Set

In set manage page, click  icon, it will enter the HMI set page, as shown in Figure4-28.

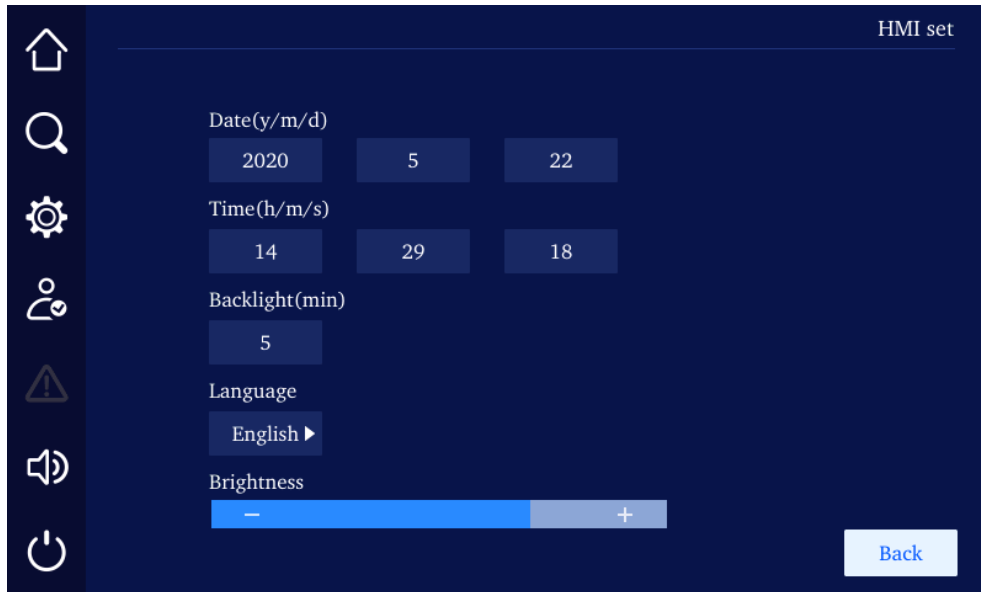


Figure4-28 HMI set

4.6.10 Password Set

In set manage page, click  icon, it will the password set page, as shown in Figure4-29.

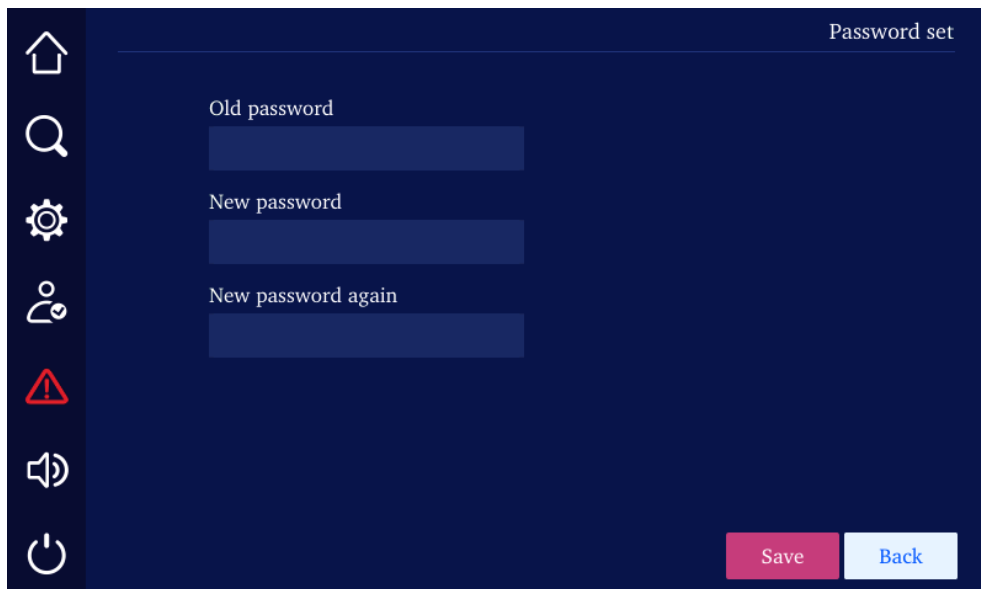


Figure4-29 Password set

**NOTE**

The initial user password is 111.

4.7 Information Manage

In main page, click  icon, it will enter the information manage page, as shown in Figure4-30.

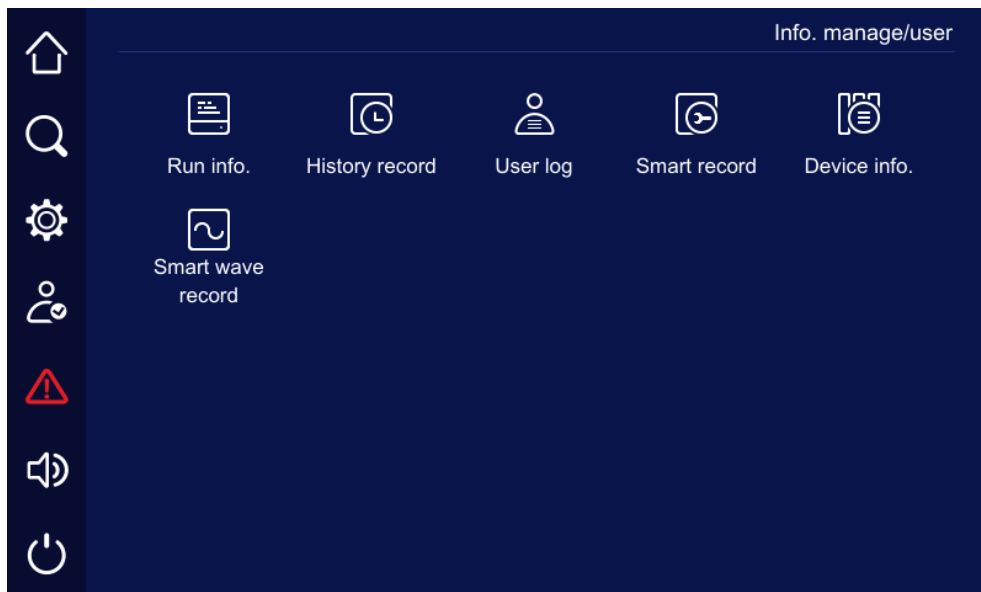


Figure4-30 Information manage

**CAUTION**

It can record 10000 pieces information at most. When the record exceeds 10000 pieces, the earliest information will be covered by new one. All records are ranked in reverse order of time.

4.7.1 Run Information

In information manage page, click  icon, it will enter the run information page, as shown in Figure4-31.

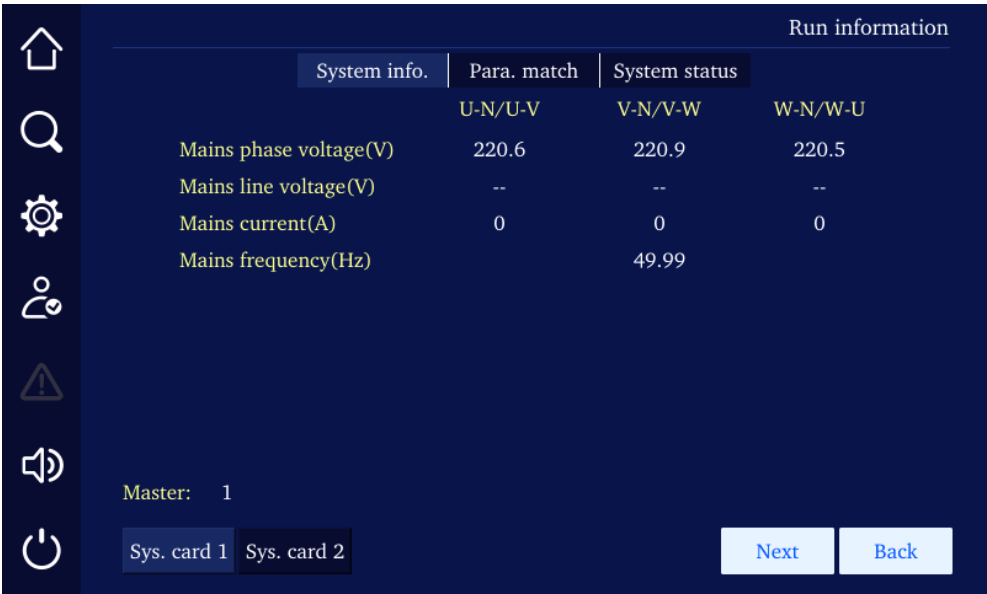


Figure4-31 Run information

4.7.2 History Record

In information manage page, click  icon, it will enter the history record page, as shown in Figure4-32. In the page, it shows the history fault and alarm information of system and module.

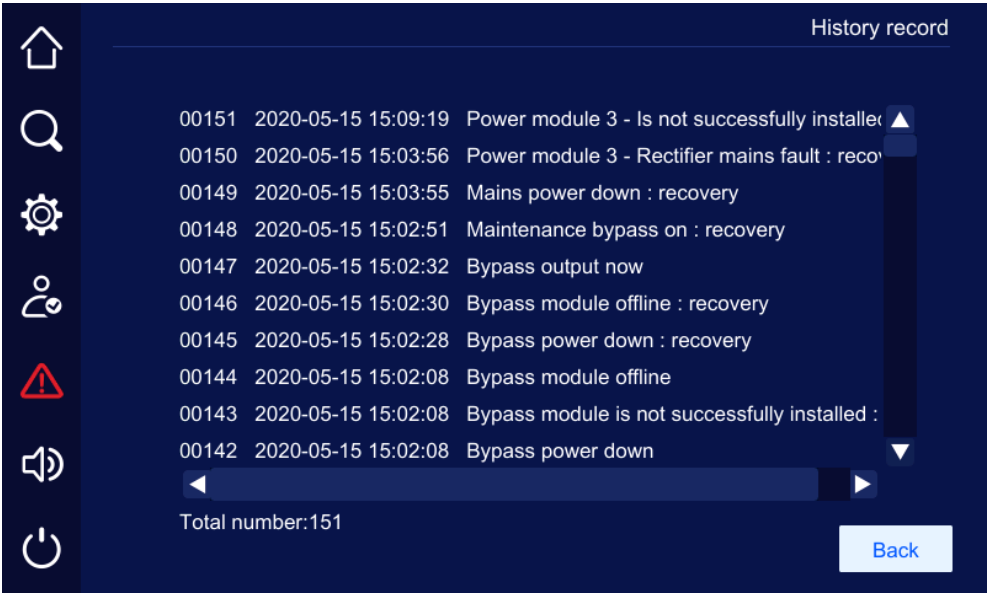


Figure4-32 History record

4.7.3 User Log

In information manage page, click  icon, it will enter the user log page, as shown in Figure4-33. In the page, it shows the user parameter setting record.



Figure4-33 User log

4.7.4 Smart Record

In information manage page, click  icon, it will enter the smart record page, as shown in Figure4-34

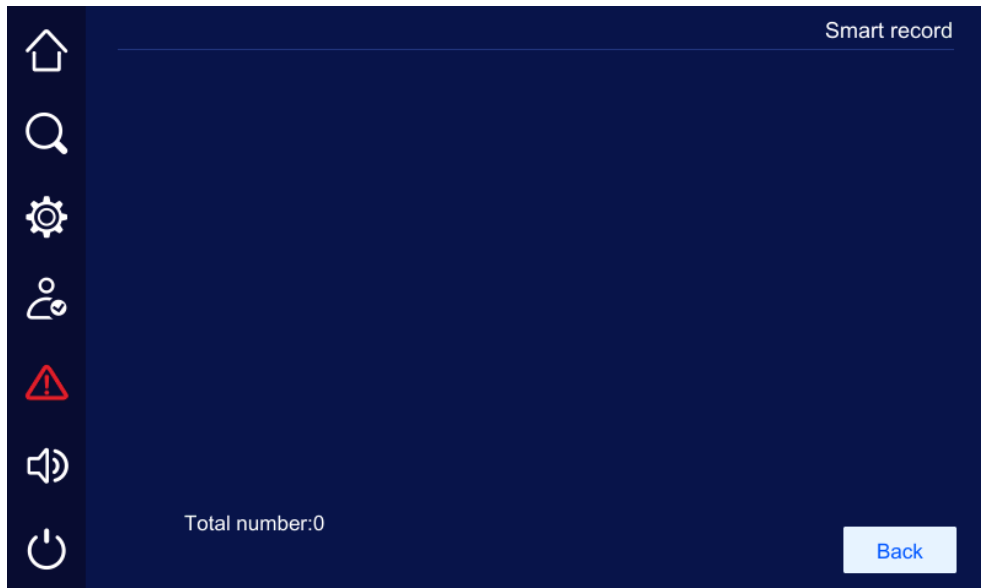


Figure4-34 Smart record

4.7.5 Smart Wave Record

In information manage page, click  icon, it will enter the smart wave record page, as shown in Figure4-35.

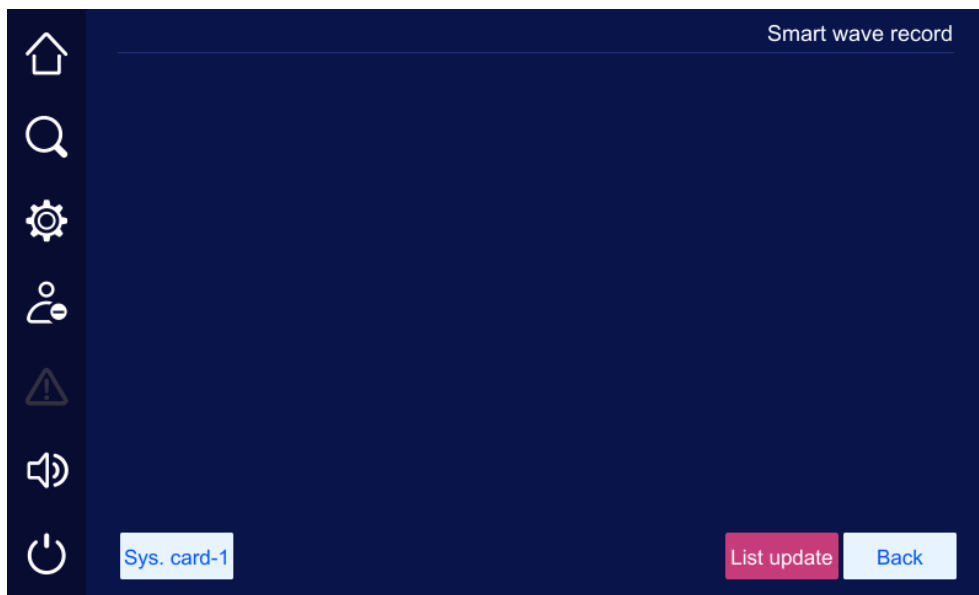


Figure4-35 Smart wave record

4.7.6 Device Information

In information manage page, click  icon, it will enter the device information page. In the page, it shows the product name, model, S/N, product version, status, etc, as shown in Figure4-36, Figure4-37, Figure4-38.

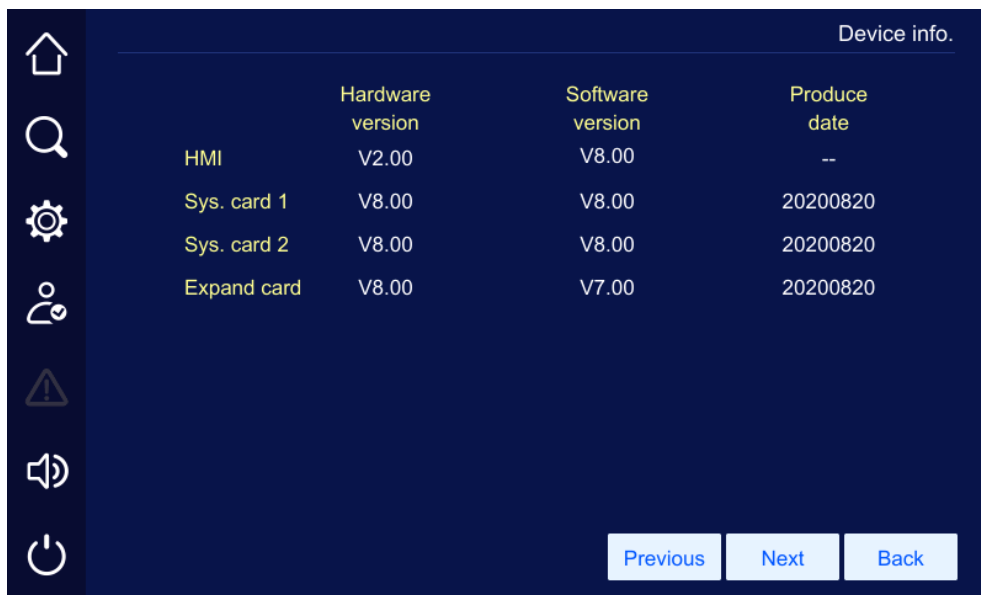


Figure4-37 Product information 2

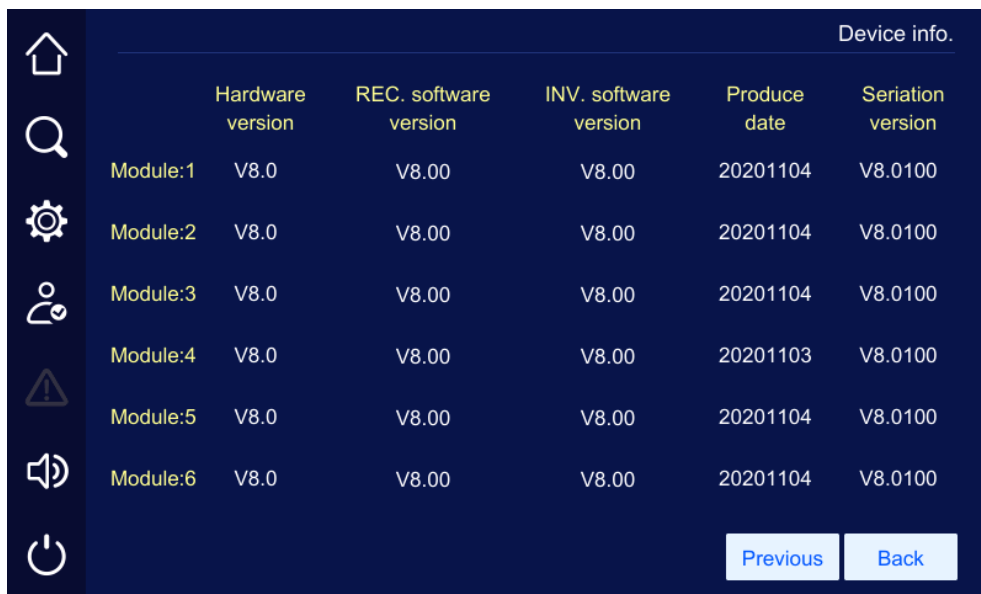


Figure4-38 Product information 3

4.8 ON/OFF

In main page, click  icon, it will enter the ON/OFF page. When the system is OFF, click the icon to enter the confirm page, as shown in Figure4-39. Click **Confirm** button to perform the startup operation.

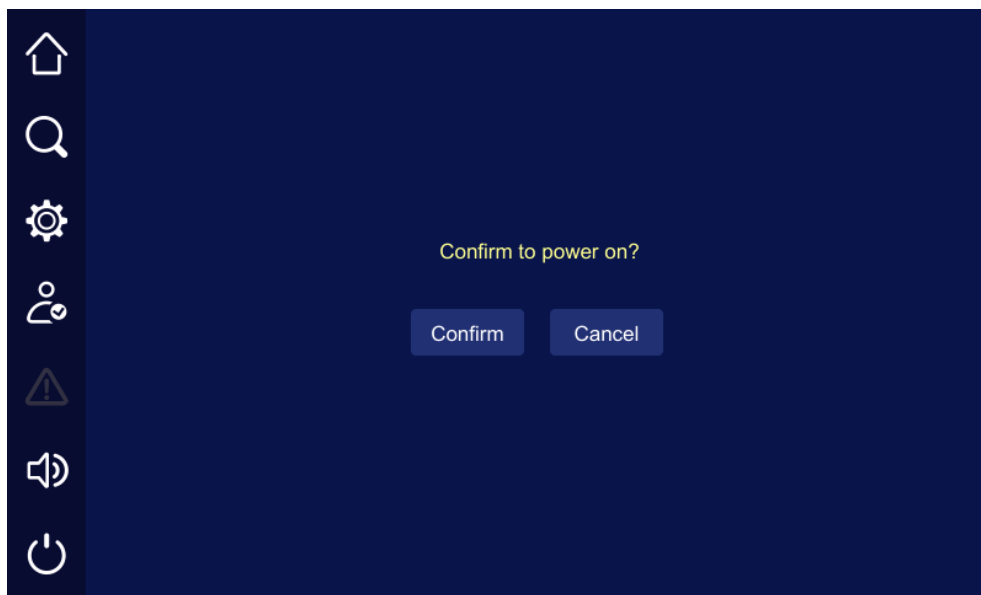


Figure4-39 Power on prompting

5 Use and Operation

This chapter mainly introduces the operation process and method, including using announcements, operation process, UPS ON/OFF operation and parallel system ON/OFF operation, etc.

5.1 Use Announcements

- Before starting the UPS, check whether the load is proper. The load must not exceed the rated output power of the UPS, which is to avoid overload protection.
- Do not use the <ON> and <OFF> buttons on the panel of UPS as the power switch of load. Do not start the UPS frequently.
- After the UPS works stably, turn on the load. Some devices has large starting current which may cause overload protection, it is better to start these devices first. Start large power device first, then small power device. If you want to turn off UPS, it must turn off load first.
- When mains power outage, if the UPS is power supplied by generator, it is necessary to start the generator firstly. After the generator works stably, the UPS can be connected, or it may cause UPS or load damage.

5.2 Operation Process

Operation process is as shown in Figure5-1.If it starts UPS at the first time, it is necessary to do the checking before power-on, see **5.3.1 Check Before** . If all OK, power on UPS. If the UPS isn't used for a long time, it also needs to be checked before power-on.

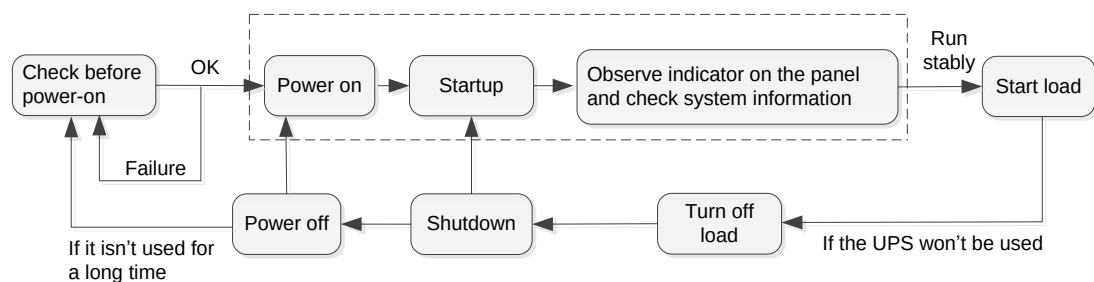


Figure5-1 Operation process

5.3 ON/OFF Operation

5.3.1 Check Before Power-on

Before startup, do the check according to following steps. If all OK, start UPS.

- Step 1 Ensure that the mains switch, bypass switch, output switch, maintenance bypass switch are all OFF.
- Step 2 Check load.
- Ensure that the load is not conductive load. The UPS output cannot be connected with conductive load, such as motor, fan, air-conditioner, etc. Generally, grid supplies power for these loads.
 - Ensure that the load is closed. At the same time, the load capacity should not exceed the rated output capacity of UPS, or, it will cause overload protection.
- Step 3 Ensure that there is no short-circuit between the live wire and neutral wire, live wire and grounding wire in the input and output.
- Step 4 Measure the AC voltage of mains input terminals, and the voltage should be in the range of 80V~280V, or, it only use battery to start UPS.
- Step 5 Measure the DC voltage of battery input terminals. The voltage of positive battery group should be greater than a certain value ($+11.5 \times$ battery amount), the voltage of negative battery group should be less than a certain value ($-11.5 \times$ battery amount), and pay attention to the polarity, avoid wrong battery connection.
- Step 6 Ensure that the auxiliary contact of battery switch is connected to a input dry contact of system monitor card, and display the corresponding information on the touch screen.

----**End**

5.3.2 Start UPS

- Step 1 Ensure that all the system parameters setting in **5.3.1 Check Before Power-on** are right .
- Step 2 Switch off the ready switch of bypass module(BM) and all power modules(PM).
- Step 3 Switch on the bypass switch → mains switch → external battery switch, it will in bypass power supply mode. (If it is battery cool start, only just switches on the external battery switch, and then press the battery cold start button on the bypass module for more than 3s, the system power is set up.)
- Step 4 Start the inverter.
- Startup method 1: ON combination button on the panel

When the green indicators of all power modules slowly flicker, press ON combination button on the panel for 3s, the system will turn to the inverter output. View the system running status in the touch screen to check if the system turns to the inverter power supply mode. During test, check if the output voltage and output frequency of UPS are normal through the real-time data in the touch screen.

- Startup method 2: Touch screen

In main page of touch screen, click  icon, it will enter the ON/OFF page, as shown in Figure5-2, click **Confirm** button to perform the startup operation.

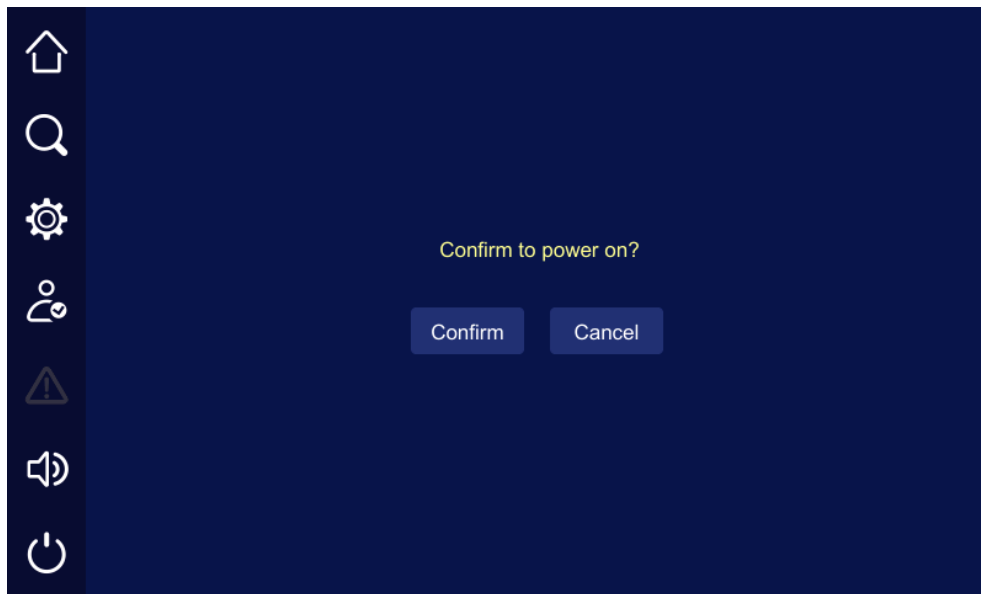


Figure5-2 Power on prompting

- Step 5 After starting the inverter, UPS turns to inverter to supply power. User can check the system running status chart and ensure if the system turns to the inverter power supply mode. During test, check if the output voltage and output frequency of UPS are normal through the real-time data in the touch screen.
- Step 6 Switch on the output switch, check if the output voltage and output frequency of UPS are normal by multimeter. If yes, UPS can be used.
- Step 7 Start the load. Generally, start large power device first, then small power device.

----**End**

5.3.3 Shut Down UPS



CAUTION

If the bypass is normal, after the inverter shutdown, system will turn to the bypass power supply mode. If bypass is abnormal, after the inverter shutdown, system will be with no output. Before performing shutdown operation, please ensure that the load is closed.

Step 1 Close the user load.

Step 2 Shut down the inverter.

- Shutdown method 1: OFF combination button on the panel

Press the panel OFF combination button on the panel for 3s, the system will turn to the bypass output from inverter output. View the system running status in the touch screen to check if the system turns to the bypass power supply mode.

- Shutdown method 2: Touch screen

In main page, click  icon, it will enter the ON/OFF page, as shown in Figure5-3, click **Confirm** button to perform the shutdown operation.

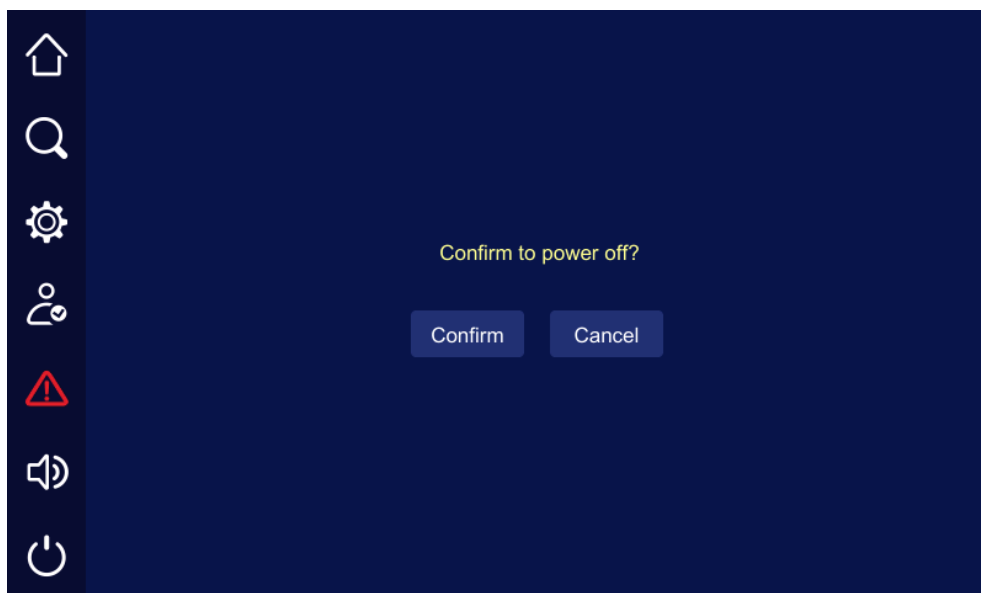


Figure5-3 Power off prompting

Step 3 Switch off the external battery switch → mains switch → bypass switch → output switch.

Step 4 After the touch screen and all LED indicators are off, the UPS is completely shut down.

----End

5.3.4 Switch to Bypass Mode Manually



CAUTION

Before shutting down the inverter, please ensure that the bypass is normal. If bypass is abnormal, after shutting down the inverter manually, the system will be with no output and the power supply for load will be broken off.

Shut down the UPS inverter, please see **Step2** in the **5.3.3 Shut Down UPS**, The system will turn to the bypass supply power mode automatically.



NOTE

When the bypass input voltage or frequency exceeds the setting value, shutting down the inverter will cause system without output, and the power supply for load will be interrupted.

5.3.5 Switch to Maintenance Bypass Mode From Mains Mode



CAUTION

The following operations only can be performed by professionals. Any device damage caused by violating the general safety operation requirements or safety standards of design, production, and usage will be out of guarantee range.

Step 1 Shut down the inverter. In main page, click  icon, it will enter the ON/OFF page, click **Confirm** button to shut down inverter.



NOTE

The inverter also can be shut down by OFF combination button on the panel. Generally, it isn't recommended to operate like this.

Step 2 After switch to bypass and the energy flow on the touch screen shows bypass output, set the maintenance bypass switch to ON.

Step 3 Switch off the mains switch→external battery switch→bypass switch.

Step 4 Switch off the output switch, after the touch screen and all LED indicators are all off, the maintenance can be done.



CAUTION

During maintenance, it is strictly forbidden to switch off the output switch.

----End

5.3.6 Switch to Inverter Mode from Maintenance Bypass Mode



CAUTION

Before perform the operation of switching to inverter mode from maintenance bypass mode, please ensure that the system bypass input is normal.

Step 1 Switch on the bypass switch → mains switch → external battery switch → output switch.

Step 2 After the power is normal and the energy flow on touch screen shows bypass output, set the maintenance bypass switch to OFF. At this time, the bypass supplies power for load.

Step 3 Start the inverter.

When the green indicator of all power modules slowly flicker, click  icon in the main page to enter the ON/OFF page, click **Confirm** button to start inverter. The UPS turns to inverter output.



NOTE

The inverter also can be started by ON combination button on the panel. Generally, it isn't recommended to operate like this.

----End

5.3.7 Emergency Power Off (EPO)



CAUTION

Don't perform the EPO operation unless emergency.

Press the EPO button on the panel or external EPO button of system, the UPS will turn to emergency power off status. At this time, the touch screen shows EPO protection, and the buzzer long beeps.



CAUTION

1. After pressing the EPO button, the UPS will be with no output, the power supply for load is interrupted.
 2. When the system stays in maintenance bypass mode, after pressing EPO button, the UPS still has output.
-

5.3.8 Emergency Power Off Recovery

- Step 1 Ensure that the dry contact of system monitor card, which connected to the external EPO switch, is not in emergency power off status.
- Step 2 Switch off the mains switch → bypass switch → output switch → battery switch, and wait for all LED indicators off, the UPS is completely shut down.
- Step 3 Switch on the mains switch → bypass switch → output switch → battery switch, system will be started again, and EPO removes.

----End

5.4 Parallel System ON/OFF Operation

5.4.1 Start Parallel System

**CAUTION**

1. Before starting the parallel system, please perform the **5.3 ON/OFF Operation** for each UPS.
 2. Before starting the parallel system, please ensure that the wire connection in the output and output and phase sequence is right and the parallel wire is well connected and stay in disconnection status.
 3. Before completely starting the parallel system, please do not start load, and ensure that all switches of load are off.
 4. Before performing the parallel wire operation, please do not connect the parallel wire.
-

- Step 1 Measure the front-end voltage and frequency of input switch of all UPSs(including mains switch and bypass switch) or external input distribution switch. Voltage range: 80V-280V, frequency range: 40Hz-60Hz(50Hz system) or 50Hz~70Hz (60Hz system).
- Step 2 Connect the parallel wires, switch on the mains switch and bypass switch of all UPSs(keep the output switch of all UPSs on off status). If the input power is normal, the rectifier will start automatically, and the touch screens begin to start.
- Step 3 Connect the battery to the parallel system.
- Step 4 If the monitor page of each UPS has no alarm, switch on the battery switch of each UPS(if there are many groups of batteries, it needs to switch off the switch of each battery group, and then switch off the total switch between UPS and battery groups). Measure the voltage of battery switch by multimeter (if there are many groups of batteries, measure the voltage of battery switch of each battery group, and then measure the voltage of total switch). Ensure that the battery connection is normal (the “battery circuit abnormal” alarm on the main page of touch screen disappears within 2min).
- Step 5 Check if the system alarms are all disappeared. If there is any fault alarm, please stop the startup operation and inform serviceman to solve the problem till all faults are removed.
- Step 6 Start the inverter of each UPS. Ensure that each UPS stay in bypass power supply mode and the system has no alarm, start the inverter of each UPS manually, and all UPSs turn to inverter mode.
- Step 7 Measure the output voltage and output frequency of each UPS. After each UPS turns to inverter mode(view the system running status in the touch screen to check if the system is in the inverter power supply mode.), check if the output voltage and output frequency of UPS are normal through the real-time data in the touch screen, measure the front-end output voltage of output switch in output

distribution cabinet or external output distribution switch to ensure that the inverter output voltage is normal(output voltage = output voltage setting $\pm 2V$), and ensure that the inverter output frequency is normal(output frequency = output frequency setting $\pm 0.1Hz$). Record the measured output voltage effective value of each UPS).

Step 8 Compare the output voltage of each UPS. After measuring the output voltage and frequency of each UPS, compares the output voltage of each UPS, ensure that the phase voltage effective value difference of any two UPSs is less than 5V, and then the parallel operation can be done. If it does not meet the requirement, the UPS with big voltage difference be connected in parallel system, and it is necessary to debug again.

Step 9 Shut down the inverter of each UPS. Ensure that there is no alarm of each UPS, shut down each UPS manually. All UPSs turn to the bypass power supply mode.

Step 10 Check the phase sequence of bypass.

Switch on the output switch of UPS1(ensure that the total switch of load is switched off, or once switching on the output switch of UPS1, it will supply power for load), keep output switches of other UPSs off, set the multimeter to AC position, one pen connects with the output switch front-end phase-A of UPS2 and the other pen connects with the output switch back-end phase-A of UPS2 to measure the voltage difference between the front-end and back-end of output switch of UPS2. Measure the voltage difference of phase-B and phase-C as the same way. If the phase sequence is right, the voltage difference of each phase should be less than 5V. If the phase sequence is not right, at least one phase voltage difference is greater than 5V. Measure whether the bypass sequence of each paralleled UPS is right(When measuring the other UPSs' phase sequence, it doesn't need to operate the switch. Keep the output switch of UPS1 on and the output switches of other UPSs off). If all bypass phase sequence of all UPSs is right, go on next step. If the phase sequence of any UPS is not right, power off the system and check the input and output wiring of each UPS and see if the connection is right.

Step 11 Switch on the output switches of all UPSs.

Ensure that each UPS is with no alarm, switch on the output switches of all UPSs successively. Ensure that the output of all UPSs is in parallel status.

Step 12 Start the inverter of each UPS.

Ensure that the system is with no alarm, manually start the inverter of each UPS successively. System starts inverter output. Monitor that there is no alarm.

Step 13 Shut down the inverter of each UPS.

Ensure that each UPS is with no alarm, shut down the inverters of all UPSs, the system turns to the bypass power supply mode.

Step 14 Switch on the total output switch of load.

After the parallel system turns to the bypass power supply mode, switch on the total output switch of load, bypass supplies power for load.

Step 15 Start each UPS successively, the system will turn to the inverter power supply mode.

----**End**

5.4.2 Shut Down Parallel System



CAUTION

If the bypass is normal, after the inverter shutdown, system will turn to the bypass power supply mode. If bypass is abnormal, after the inverter shutdown, system will be with no output. Before performing shutdown operation, please ensure that the load is closed.

Step 1 Shut down all loads in the parallel system, keep the UPS running without load for a while for heat dissipation.

Step 2 Perform **5.3.3 Shut Down UPS** to shut down all UPSs, system turns to the bypass power supply mode.

Step 3 Switch off the total load switch, output switch, battery switch, bypass switch and mains switch of each UPS successively.

----**End**



NOTE

If it just needs to shut down the inverter of the UPS, system turns to the bypass power supply mode and the load without power outage, just perform **Step 2**. If it needs to shut down all UPS system, perform all above steps.

If it needs to quit the parallel system, shut down the inverter of the UPS first, system turns to the bypass power supply mode, and then disconnect the parallel wires.

5.4.3 Emergency Power Off(EPO)

Single UPS running

Press the EPO button of the UPS or the EPO button of total system, the UPS will be shut down and close all outputs.

Multi UPSs running in parallel

- EPO linkage is enabled.

Press the EPO button of any UPS or the EPO button of total system, all the paralleled UPSs will be shut down and close all outputs.

- EPO linkage is disabled.

Press EPO button of one UPS, the output of this UPS will be closed.

Press the EPO button of total system, all paralleled UPSs will be shut down and all output will be closed.

6 Maintenance and Troubleshooting

This chapter mainly introduces the UPS maintenance guide, battery daily maintenance, battery replacement announcement and troubleshooting, etc.

6.1 Maintenance Guide

Proper maintenance is the key to make the device operate in best status and with a longer service life.

6.1.1 Safety Precautions

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

- Please keep in mind that there is dangerous voltage inside the UPS even if the UPS does not operate. Before maintenance, use a multimeter to check the voltage and make sure that the UPS is completely shut down and stays in safe status.
- Before switching off the battery switch at any time, use a multimeter to measure if the voltage of wiring terminal is normal and the polarity is reverse connected. If the result is abnormal, it is strictly forbidden to close the battery breaker.
- Do not wear any conductive metal objects during operation, such as ring, watch.
- Observe safety regulations strictly. If any doubt, consult professionals.

6.1.2 Preventive Maintenance

To improve the reliability and efficacy of the UPS, perform the following maintenance tasks on a quarterly basis.

- Keep the operating environment free from dust and chemical pollutants.
- Check if the terminals in the input and output are in good contact every half year.
- Check the working status of fans periodically and avoid sundries blocking the air vents. If a fan is damaged, maintain or replace it in time.
- Check the voltage of battery group periodically, ensure that the battery voltage is within the normal range.

- Check the UPS status periodically and ensure that any fault can be found in time.

6.2 Battery Maintenance

- Battery charge requirements
 - When using the battery at the first time, please start the UPS and charge the battery for 24h. During charging, the UPS still can be used, but if power outage occurs at the same time, the battery discharge time may be less than the standard value this time.
 - Generally, the battery needs to be charged and discharged every 4 to 6 months. First, discharge till 1/3 of battery capacity and then charge the battery. The charge time of each time cannot be less than 24h.
 - In high temperature area, the battery needs to be charged and discharged every 2 months and the charge time of each time cannot be less than 24h.
 - If the battery will not be used for a long time, it also needs to charge the battery every 3 months and the charge time of each time cannot be less than 24h.
- Clean battery shells by cloth. Oil and organic solvents, such as petrol and diluents are prohibited.
- Keep batteries far away from fire sources and devices that easily generate sparks to avoid explosion.
- Avoid over-discharge the battery during using. Fully charge the battery immediately after discharge(24h at most) and then the battery can discharge again. It is strictly forbidden to discharge the not fully charged battery, or, it will cause battery capacity decrease even battery damage.
- To avoid battery discharging for too much time after mains power outage, switch off the battery switch when the UPS is not used.

6.3 Battery Replacement Announcements

- Do not put the battery into fire to avoid explosion.
- Do not open or disassemble the battery, for the inner electrolyte is harmful for skin and eyes.
- Recycle the battery according to the relative illustration on the battery.
- The battery should be replaced in whole group, do not use the new battery and old battery together.

- A new battery should be with the same capacity, model, and manufacturer as the replaced one. The battery with different capacity, different type and different manufacturer battery is strictly forbidden to use together.
- Dangerous voltage may exist in the battery terminal and grounding terminal, before touching, please measure if there is dangerous high voltage, which is to avoid endanger human safety. It is strictly forbidden to touch the two wiring pillars or the bare end of battery.

6.4 Troubleshooting

6.4.1 Common Abnormal Phenomena Diagnosis

If the UPS works abnormally after startup, please refer to Table6-1 to find possible reason. Meanwhile, check if the fault is caused by external environment, such as temperature, humidity is not accordance with the requirement or overload.

Table6-1 only includes some simple diagnosis. If the diagnosis is not clear, or not sufficient to solve the problem, please contact with local agency or dealer to deal with.

Table6-1 Troubleshooting

NO.	Abnormal phenomenon	Possible reason
1	Mains is normal, but UPS works in battery inverter status, the buzzer beeps intermittently.	Each connection point, socket of grid circuit is poor contact, which causes the AC power supply input blocked.
2	After installation, switch on switches or power switch, the fuse will fuse or trip off.	The three-phase input wires are wrongly connected, such as neutral wire and grounding wire or live wire and grounding wire (case) is wrongly connected or the three-phase output wires are wrongly connected.
3	After startup, the UPS outputs 220V AC power, but the UPS works in bypass status.	1. The load is too large, which exceeds the rated output capacity of the UPS. It needs to reduce load or select a UPS with larger output capacity. 2. If it is temporary bypass caused by the impact of load startup, and it can recover to normal automatically, that is normal.

NO.	Abnormal phenomenon	Possible reason
4	The UPS output normally after startup, but once start load, the UPS stops outputting immediately.	1. The UPS is serious overload or the output circuit is short-circuit. It is necessary to reduce load to proper capacity or find the reason of short-circuit. Common reason is the output socket is short-circuit or input short-circuit caused by device damage. 2. The load is not started according to the sequence from large power device to small power device. You should restart the UPS. After the UPS runs stably, start the load according to the sequence from large power device to small power device.
5	The UPS works normally after startup, but some time later, the UPS shuts down automatically.	In the battery supply power mode, the battery is runs out and system takes the battery under-voltage protection, the UPS shuts down automatically. This phenomenon is normal. Once mains is normal, system will start and charge battery automatically. Warning: If the battery stays in under-voltage status for a long time, it will influence the battery service life. After taking battery under-voltage protection, if mains cannot recover for a long time, please switch off the battery switch to protect battery and restart the UPS and fully charge the battery once mains recovers.
6	The UPS works normally after startup for a long time, buzzer long beeps and the touch screen shows battery low-voltage.	The grid voltage is too low, and the UPS works in battery inverting status, finally, the battery is under-voltage and takes the under-voltage protection.

NO.	Abnormal phenomenon	Possible reason
7	When there is mains, the UPS outputs normally. When there is no mains, the UPS is with no output.	1. Battery fault or the battery group is serious damaged. 2. Charger fault. The battery cannot be charged and causes battery energy insufficient. 3. Battery wire is not well connected or the contact of wire terminal is poor. 4. Battery switch is not switched off. 5. After serious overload, the UPS is not restarted, which causes that the UPS is in bypass output status.
8	Buzzer long beeps, the UPS turns to bypass supply power mode.	See the fault information on touch screen.
9	There is mains, but buzzer beeps intermittently.	The mains voltage or frequency exceeds the allowable range of the UPS.
10	At mains status, the UPS works normally, once power outage, the UPS works normally but load system halt.	The grounding is not poor and the floating voltage between neutral wire and grounding wire is too high.
11	FAULT indicator of a power module is on.	The power module is fault, replace it in time.

6.4.2 Emergency Dispose for System Fault

- How to deal with the system fault in emergency

When system fault, shut down the power of UPS by the touch screen, if necessary, shut down the user load and switch off the input and output switch of the UPS to avoid further UPS damage. Inform the engineering technician to maintain.

- How to deal with the fault of single power module in emergency

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

After pulling out the module, there still has high voltage inside the module and on the rear connector pin. It is necessary to wait enough time ($\geq 10\text{min}$) and then open the cover to maintain.

7 Package, Transportation and Storage

This chapter mainly introduces the package, transportation and storage of the UPS.

7.1 Package

During packing, please pay attention to the place direction requirements. At the side of the package, there is afraid of wet, handle with care, upward, stack layer limit, etc. alarm marks. And also, the device model is printed on the package. At front of the package, the LOGO and device name is printed.

7.2 Transportation

During transporting, pay attention to the warning marks and avoid severe impact on the device. 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.

7.3 Storage

When storing the device, place the device according to the marked direction. The package box should be far away from ground for 200mm, and keep at least 500mm from wall, heat source, cold source, window or air inlet.

Storage temperature: -25~55℃(Exclude battery). If the device is transported or stored out of the storage temperature, before installation and startup, put the device aside and let the device temperature recover to normal range for more than 4h. 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 device stored more than 6 months, it is necessary to check again. If the device is stored for a long time, please charge the battery every 3 months.

A Technical Specifications

Index \ Model		IST6400	IST6500	IST6600	IST6800	IST61000	IST61200
Input	Input mode	3 ϕ 4W+PE					
	Rated input voltage(VAC)	220/230/240(phase voltage)					
	Input voltage range	Vin=187Vac~280Vac, it does not need to decrease rated power to use Vin=80Vac~186Vac, for linear load, it is necessary to decrease rated power to use					
	Input frequency range (Hz)	40~70					
	Bypass sync tracking range (Hz)	50/60 $\pm$ 6					
	Bypass input voltage(VAC)	220/230/240(phase voltage)					
	Input power factor	≥ 0.99					
	Input THDi	Full load: $\leq 1.5\%$					
	Battery voltage (VDC)	$\pm 180 \sim \pm 276$ (it can be selected in the range of ± 15 pieces to ± 23 pieces, the default is ± 20 pieces.)					
	Charge current (A)	40	50	60	80	100	120
Output	Output mode	3 ϕ 4W+PE					
	Output waveform	Sine-wave					
	Voltage(VAC)	L—N: 220/230/240 L—L: 380/400/415					

Index \ Model		IST6400	IST6500	IST6600	IST6800	IST61000	IST61200
	Frequency (Hz)	When mains is normal, it tracks the bypass input frequency; When mains is abnormal, it tracks the frequency 50 ± 0.1 or 60 ± 0.1 of the UPS.					
	Three-phase phase error	With balance load $\leq 1^\circ$					
	Wave form distortion(THDv)	Linear load $\leq 1\%$; non-linear load $\leq 4\%$					
	Bypass inverter switching time (ms)	Sync $< 1\text{ms}$; Async $< 15\text{ms}$					
	System efficiency	95%					
	Overload capacity	Inverter overload capacity: ● Linear load(PF=1.0) For less than 105% load, it runs for long-term; For 106%~110% load, it turns to bypass after 60min; For 111%~125% load, it turns to bypass after 10min; For 126%~150% load, it turns to bypass after 1min; For greater than 151% load, it turns to bypass immediately. ● Non-linear load(PF=0.9) For less than 105% load, it runs for long-term; For 106%~110% load, it turns to bypass after 60min; For greater than 110% load, it turns to bypass immediately. ● Non-linear load(PF=0.8) For less than 105% load, it runs for long-term; For greater than 105% load, it turns to bypass immediately.					

Index \ Model		IST6400	IST6500	IST6600	IST6800	IST61000	IST61200
		Bypass overload capacity: For less than 130% load, it runs for long-term; For 131%~150% load, it turns to bypass after 5min; For 151%~200% load, it turns to bypass after 1s; For 201%~300% load, it turns to bypass after 100ms; For greater than 300% load, protect immediately.					
	Accuracy of current sharing between units	≤5%					
	Output DC component	-200mV~+200mV					
	Dynamic response transient range	The load changes in the range of 0%~100% or 100%~0%, its output voltage is less than 5%.					
	Load unbalance capacity	It can bear 100% unbalance load					
	Manual maintenance bypass	Equipped with the maintenance bypass switch with no switching time.					
Others	DC startup function	Equipped					
	Touch screen display	Three-phase input voltage, input frequency, three-phase output voltage, load, battery voltage, battery charge/discharge current, output current of each module and inner temperature, parameter setting, history record, etc.					
	LED display	Display the working status and fault of UPS					
	Alarm function	Input abnormal, battery low-voltage, overload, fault.					
	Communication function	Provide dry contact communication, RS232, and it can select SNMP card to realize the smart monitoring of the UPS.					
	Protection function	Output short-circuit protection, output over-voltage/ under-voltage protection, overload protection, over-temperature protection, battery under-voltage protection, communication abnormal, etc.					
	EMC	Meet GB7260.2-2009					
	Cooling way	Forced wind-cooling					

Index		Model	IST6400	IST6500	IST6600	IST6800	IST61000	IST61200
	Operating temperature(°C)	0~40						
	Size (Width×Depth×Height) (mm)	1200×1000×2000				1400×1000 ×2000	1800×1000×2000	

- Specifications are subject to change without prior notice.

B Physical Characters

Item \ Model		IST6400	IST6500	IST6600	IST6800	IST61000	IST61200
Wiring way		Top wiring / bottom wiring	Top wiring / bottom wiring	Top wiring/ bottom wiring	Top wiring/ bottom wiring	Top wiring	Top wiring
Weight (kg)	Cabinet without module	480	506	506	580	731	731
	Power module	55	55	55	55	55	55
	Bypass module	32	50	50	60	60	60
Noise(dB)		<70(1m at the front)					
Protection grade		IP20					
Communication function		Dry contact, RS232, MODBUS, SNMP(optional)					
Operating temperature (°C)		0~40					
Storage temperature (°C)		-25~55					
Relative humidity		0%~95%RH(With no condensation)					

C Acronyms and Abbreviations

A

AC Alternating Current

D

DC Direct Current

DSP Digital Signal Processor

E

ECO Energy Control Operation

EPO Emergency Power Off

L

LED Light-emitting Diode

P

PE Protective Earthing

R

RS232 Recommend Standard232

RS485 Recommend Standard485

S

SNMP Simple Network Management Protocol

T

THDi Total Distortion of the input current waveform

THDv Total Harmonic Distortion of output voltage

U

UPS Uninterruptible Power System