ModSecur® UPS

Uninterruptible Power Supply

USER MANUAL

MODSECUR M6M

SAVE THIS MANUAL

This manual contains important instructions and warnings that you should follow during the installation, operation, storage and maintenance of this product. Failure to heed these instructions and warnings will void the warranty.

Notice

The purchased products, services and features are stipulated by the contract made between the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specification in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Summaries

Thank you for choosing the modular ModSecur M6M!
This document gives a description of the M6M 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.

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.
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

Contents

1 Safety Description

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

1.1 Safety Announcements

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

CAUTION

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

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

NOTE

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

1.1.1 Safety Instructions

CAUTION

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 case of the UPS unless authorized person.

DANGER

It is prohibited to touching any terminal or conductor that connected with grid circuit, or, it may cause deadly danger.

DANGER

The damaged device 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 equipment struck by lightning, lightning protection and grounding system should be prepared in time.

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 less than 5V.

WARNING

If the output of the UPS cannot be half-wave rectification load or inductive load, such as air-condition, hair drier, starter, electric drill, motor, daylight lamp, etc.

WARNING

Please do not put finger or tool into rotating fans to avoid endanger the human safety or damage the device.

WARNING

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

CAUTION

No liquid or other objects are allowed to enter the cabinet.

CAUTION

Keep good ventilation! Ensure that the air inlet and outlet and fan unblocked.

CAUTION

The product is class C3 device. If it is used in the environment that includes all commercial, light industry and industrial establishments other than those directly connected to a low-voltage mains that supplies building used for residential purpose, it may cause wireless interference. User should take actions to avoid the interference.

CAUTION

Warning label should be affixed away from UPS location!
When UPS is power 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 brand and different model battery is different. Before using, ensure that the charging voltage of the UPS matches that of battery. If doubted, please consult the manufacturer for support.

WARNING

Battery operation must be done according to instructions!
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 batteries. The metal objects and circuit board will be corroded by the overflowing electrolyte and it will result in equipment damage and circuit board short circuit.
- Keep the battery away from fire source and all device that easy cause spark to avoid danger or unnecessary lose.

1.1.3 Anti-Static Protection

CAUTION

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

1.1.4 Grounding Requirements

WARNING

High leakage risk! The device must be grounded before electrical connection. The grounding terminal must be connected to earth.

- When installing, connect the grounding wire first; when dismantling, the grounding wire must be removed at last.
- It is prohibited to damage the grounding conductor.
- The device must be connected with protection earthing permanently. Before operating, please check the electric connection and ensure the device has been connected to earth reliably.

1.1.5 Safety Warning Label Setting

To avoid irrelevant person close to or misoperate the UPS, during installation or daily maintenance, please comply with the related standards.
- Set warning labels at the switches of input end and output end to avoid wrongly close and even cause accident.
- Set warning label or safety warning area to avoid irrelevant person entering and cause human injury or device damage.
- After maintenance, ensure that pull out the key of the UPS and save it properly.

1.2 Operation and Maintenance Requirements

There are 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 is just as a supplement to the local safety regulations. Our company does not undertake the responsibility caused by violating the common safety operation requirements or safety standards for design, manufacture and use the device.

CAUTION

The related operation and wiring for the UPS should be performed by qualified professionals, and ensure the electric installation accord with the electricity installation standards. The installation and maintenance man should be trained and know each safety announcements and get the right operation method, and then, the installation, operation and maintenance can be done.

DANGER

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

- Only authorized professionals are allowed to open the UPS chassis! The input and output of 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, output and battery terminal bars by a voltmeter to ensure the input power is disconnected and in a safe condition.
- Even if all external power is disconnected, there still exists residual electric charge on the capacitance inside the UPS, and the output terminal bars may exists high voltage which 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 cables are not isolated with AC input. There may exist dangerous voltage between battery terminal and grounding terminal. 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, do not do any operation in this environment.

The operation about any electronics device in explosive environment is exceeding danger, while using or storing the UPS, please strictly according to the environment mentioned in the manual. The operation environment of UPS should meet the following requirements.

- Please meet the technical specification for equipment operation (temperature: 0 -40 , relative humidity: 0%-95%).
- Please keep it well ventilated and far away from water sources, heat sources and inflammable and explosive goods.
- The altitude shall not exceed 1000m. If the altitude exceeds 1000m, it shall be reduced according to GB/T3859.2.
- Please avoid using the device in the following environment for 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, corrosive material, high salty or volatile gas.

CAUTION

The related operation and wiring for the UPS should be performed by qualified professionals, and ensure the electric installation accord with the electricity installation standards. The installation and maintenance man should be trained and know each safety announcements and get the right operation method, and then, the installation, operation and maintenance can be done.

2 Overview

This chapter mainly introduces the product features, work principle, structure of the UPS, including panel indicator meaning and signal port illustration.

2.1 Product Intro

M6M series UPS is modular online double-conversion UPS. They are made up of cabinet, power module, bypass module, system control box and distribution unit. The system is designed in module and user can online add /decrease or replace the power module conveniently and do not worry about the normal operation of system. The system is high performance sine-wave UPS that special 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 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 inversion technology: adopts three-level inversion technology, which makes the quality of output voltage wave better and the efficiency of whole UPS higher.

Completely digitalized DSP control: adopts digitalized DSP to control the inverting, phase synchronization, output current-sharing, logic of the power unit, which is with high precision, high speed and perfect whole system performance.

Energy conservation and high efficiency: adopts 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 power grid, and save 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 decrease the investment cost.

Smart fan speed control: the fan speed is adjusted automatically in accordance with the load status, which prolong fan life and reduce noise.

ECO energy conservation mode design: the UPS is designed with ECO energy conservation mode. When the user power grid is good, if the UPS operating in this mode, the bypass prior to output, and the efficiency can be 99%.When the bypass voltage or frequency out of normal range and cannot satisfy the user's power supply requirement, it will switch to inverter output, and this guarantee the reliability of power supply and also, save energy.

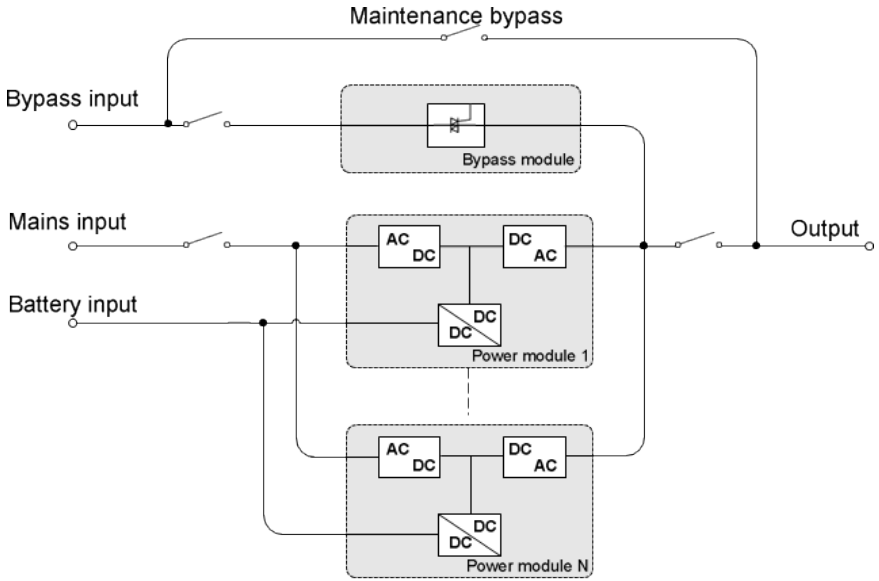
Manual maintenance bypass design: it designs manual maintenance bypass channel to ensure the UPS supply power for load while maintenance, which greatly improve the system operation reliability and maintainability.

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 power 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 unit, and record the history event and alarm information. It can store 10000 pieces of information at most.

2.3 Work Principle

2.3.1 Work Principle Diagram



2.3.2 Work Mode

There are 4 work modes of the MR series modular UPS: 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 normal, AC power is transformed to DC power by PFC, and supply 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 clean power for load. The specific work process is as follows. When mains normal, the rectifier, inside the power unit, rectify the mains into anode and cathode DC voltage, and store energy in DC electrolysis for inverter to use. The inverter absorbs energy from DC electrolysis and inverts to output stable 220Vac voltage. When the system detects the inverter normal, it will supply the inverting voltage to load.

Battery power supply mode

When mains abnormal, system will switch to battery input, the Boost circuit promotes the battery voltage to a certain value and then supply the DC power to the inverter, that makes the AC output without interruption phenomenon and then protect the load. The specific work process is as follows. When mains abnormal at any time, the rectifier will switch to battery input immediately to maintain the voltage of DC electrolysis, which guarantee the inverter without power down. Before battery discharge 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 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 max. discharge point, and long beeps to alarm. At that time, the load will power down.

Bypass power supply mode

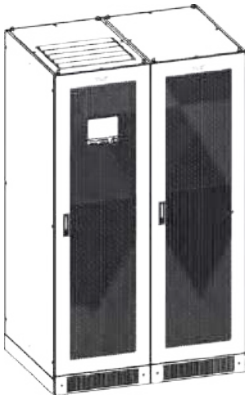
When system abnormal (such as over-temperature, short-circuit, output voltage abnormal or overload) and exceed the bear range, the inverter will shut down to avoid damage automatically. If mains still normal at this time, it will turn to bypass to supply power for load. The specific work process is as follows. If the inverter circuit fault or inverter overload and exceed the bear range, the UPS will turn to bypass to output. During bypass power supply, if fault or overload removed, the UPS will start inverter and begin to supply power for load. When the load is serious overload and exceeds the bypass bear 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 UPS mains breaker and bypass breaker 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 5 times. 5 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

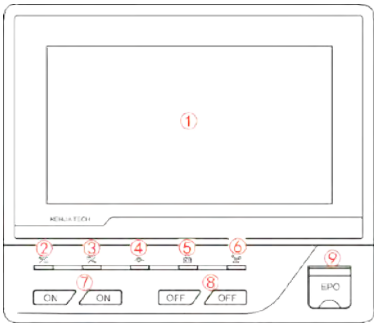
When the UPS needs to be maintained and the power supply for load cannot be interrupted, user can shut down the inverter and make the UPS works in bypass status, then switch on the maintenance bypass breaker and switch off the mains pint breaker and bypass power supply breaker. During the transforming of manual maintenance bypass, AC power is supplied for load by maintenance bypass breaker. At this time, the inner UPS has no electricity, maintainer can perform the maintenance safely.

2.4 Structure

M6M series modular UPS is mainly made up of cabinet, operation panel, power module, bypass module, system control box, distribution plate, etc. The appearance of M6M series modular UPS is as shown in figure below.



2.4.1 Operation Panel

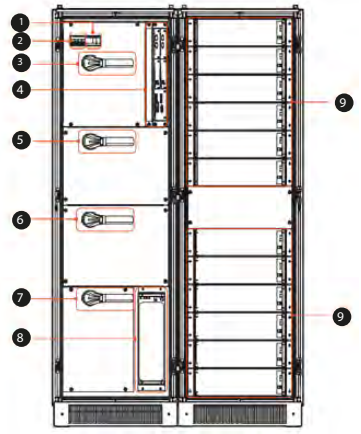


NO.	Name	Illustration
O, 1	Touch screen	Human-machine interactive interface
O, 2	AC/DC indicator	On (green): the rectifier work normally. On (red): the rectifier work abnormally.
O, 3	DC/AC indicator	On (green): the inverter work normally. On (red): the inverter work abnormally.
O, 4	BYP. indicator	On (green): bypass output On (red): bypass abnormal
O, 5	BATT. LOW indicator	On (green): battery low-voltage
O, 6	OVERLOAD indicator	On (red): overload
O, 7	ON combination button	Press the two buttons for 3s, the system will power on.
O, 8	OFF combination button	Press the two buttons for 3s, the system will power off.
O, 9	EPO emergency power off button	Press the button, the system will power outage immediately.

2.5 Structure Layout

NOTE: The system layout diagram takes the power module full allocation as an example, please refer to the real product.

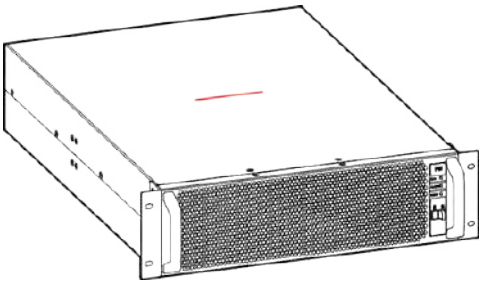
2.5.1 M6M Series 600K



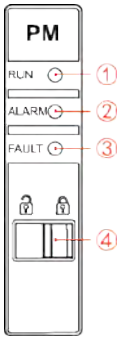
System layout diagram of M6M 600K (open front door)

1 - Surge protection devide (optional)
2 - Surge protection breaker (optional)
3 - Power switch
4 - System control box
5 - OUTPUT switch
6 - MAINTENANCE switch
7 - BYPASS switch
8 - Bypass module
9 - Power module

2.5.2 Power Module



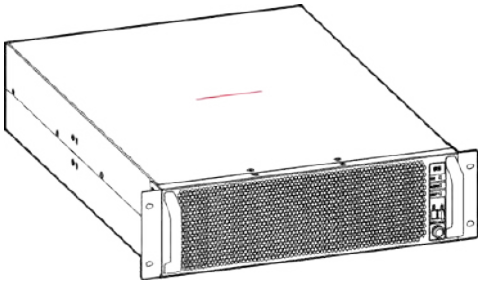
Appearance of power module



Operation panel of power module

NO.	Name	Illustration
O, 1	RUN indicator (green)	On: power module stay in inverter status Flicker: power module stay in standby status.
O, 2	ALARM indicator (yellow)	On: power module input voltage abnormal, fan abnormal, overload, etc.
O, 3	FAULT indicator (red)	On: power module fault.
O, 4	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 unit 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 unit cannot be dismantled.

2.5.3 Bypass Module



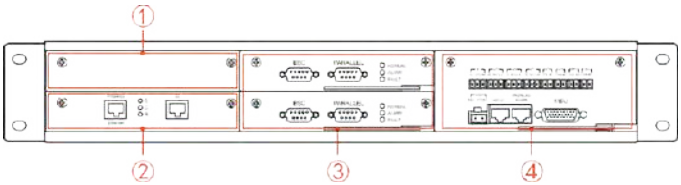
Appearance of bypass module

Operation panel of bypass module

NO.	Name	Illustration
O, 1	RUN indicator (green)	On: bypass unit is running.
O, 2	ALARM indicator (yellow)	On: bypass unit input voltage abnormal, fan abnormal, etc.
O, 3	FAULT indicator (red)	On: bypass unit fault.
O, 4	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 unit 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 unit cannot be dismantled.
O, 5	Battery start button	At the status of no mains, bypass, press the button for 2s, the system will start from battery status.

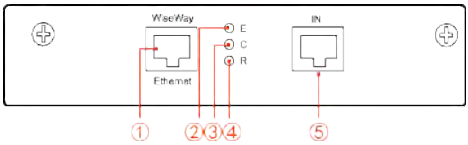
2.5.4 System Control Box

The system control box unit is as shown in figure below.



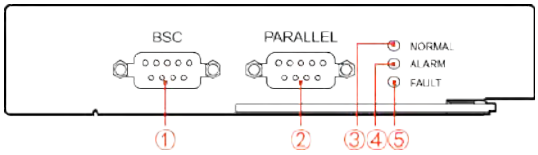
NO.	Name	Illustration
O, 1	Reserved slot position of expansion card	Install corresponding function expansion card according to function requirements
O, 2	SNMP card (optional)	It can realize the remote manage for the UPS. Detail operation and setting please see the user manual of network adapter.
O, 3	System control card	Manage the module output, and control the system parallel operation and output double busbar synchronization. The lower is system card 1, The upper is system card 2.
O, 4	System monitor card	Includes communication port, output dry contact and input dry contact.

SNMP Card (optional)



NO.	Name	Illustration
O, 1	Ethernet port	Connect to user's monitor port by network wire. Pin definition: Pin4、Pin5：3.3V、Pin1：TXP；Pin2：TXP；Pin3：REP；Pin6：RXN；Pin11：GND
O, 2	E indicator (red)	On: communication fault
O, 3	C indicator (yellow)	Flicker: communicating
O, 4	R indicator (green)	On: running status
O, 5	IN port	Connect to the RS232 port of system monitor card by network wire. Pin definition: Pin4、Pin6：Tx；Pin3、Pin5：Rx；Pin2、Pin8：0V；Pin1、Pin7：5V

System control card

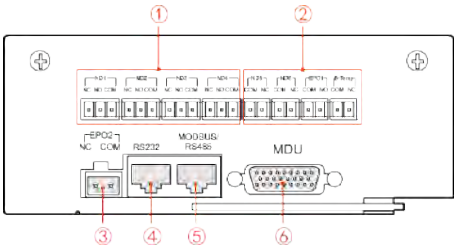


NO.	Name	Illustration
O, 1	BSC port	The output double bus control port is used in double bus system to synchronize the output frequency and phase position of each system, which is to ensure the two bus can switch each other.
O, 2	PARALELL port	Parallel signal port. When several UPS used in parallel system, it needs to use the parallel control wire to connect the parallel port of each UPS in ringlike. When the parallel system has N pieces of UPS, the connection needs N pieces of parallel control wire to ensure every UPS has 2 parallel control wires at least to connect, which is to enhance the reliability of parallel system.

NO.	Name	Illustration
O, 3	NORMAL indicator (green)	On: system control card stay in the status of main card running. Flicker: system control card stay in initializing status.
O, 4	ALARM indicator (yellow)	On: there is alarm signal in system control card. Flicker: system control card stay in backup card status.
O, 5	FAULT indicator (red)	On: system control card fault

System monitor card

There is a human-machine interactive communication port, 4 input dry contact communication signal and 4 output dry contact signal.



NO.	Name	Illustration
O, 1	Output dry contact	When the signal valid, COM and NO is closed, COM and NC is opened. Allowable withstand voltage is 250V/1A. The signal is preset and cannot set.
O, 2	Input dry contact	When NO and COM is short-circuit, the signal is valid. The signal is preset to battery switch and cannot set.
O, 3	EPO2 input dry contact	External EPO normal closed input port. When NC and COM is open-circuit, the signal is valid. The signal is preset and cannot set.
O, 4	RS232 communication port	It supports RS232 communication. Pin definition: Pin4, Pin6: Tx; Pin3, Pin5: Rx

NO.	Name	Illustration
O, 4	MODBUS/RS485 communication port	The communication protocol supports MODBUS RTU. It can set switch by touch screen. Pin definition: Pin3、Pin5：A；Pin4、Pin6：B
O, 5	MDU port	On: there is alarm signal in system control card. Flicker: system control card stay in backup card status.
O, 6	FAULT indicator (red)	Communication port of touch screen.

- Output dry contact

NO.	Silk-screen	Signal	Illustration
1	ND1	UPS FAULT signal	When the signal valid, COM and NO is closed, COM and NC is opened. Allowable withstand voltage is 250V/1A. The signal is preset and cannot set.
2	ND2	LINE FAIL signal	When the signal valid, COM and NO is closed, COM and NC is opened. Allowable withstand voltage is 250V/1A. The signal is preset and cannot set.
3	ND3	BAT. LOW or start generator signal	When the signal valid, COM and NO is closed, COM and NC is opened. Allowable withstand voltage is 250V/1A. The signal can be set to battery low-voltage or start generator, default is battery low-voltage.
4	ND4	Bypass fault or output overload signal	When the signal valid, COM and NO is closed, COM and NC is opened. Allowable withstand voltage is 250V/1A. The signal can be set to bypass fault or output overload, default is bypass fault.

- Input dry contact

NO.	Silk-screen	Signal	Illustration
1	ND5	External maintenance bypass switch or mains power down	When NO and COM is short-circuit, the signal is valid. The signal can be set to external maintenance bypass switch or mains power down, default is external maintenance bypass switch.

NO.	Silk-screen	Signal	Illustration
2	ND6	Battery switch	When NO and COM is short-circuit, the signal is valid. The signal is preset to battery switch and cannot set.
3	EPO1	External EPO normal open input port	When NO and COM is short-circuit, the signal is valid. The signal is preset and cannot set.
4	B-Temp	Battery temperature detection	Connect with optional battery temperature sensor. It is used to measure the battery temperature.

2.6 Alarm Function

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

Alarm action	Protection action	Fault name
Buzzer long beeps	Shut down all inverter output and bypass output	EPO enable
		Bypass overload protection
		Bypass output under-voltage
	Shut down all inverter output and turns to bypass output	Inverter output over-voltage
		Inverter output under-voltage
		Inverter overload protection
		Parallel system sovereignty fault
		Parallel system communication abnormal
		Maintenance bypass is on
Buzzer beeps apace	It is not allowed to supply power by battery or charge battery	Inverter output over-voltage
		Inverter output under-voltage
	None	Inverter overload protection
	None	Parallel system sovereignty fault

Alarm action	Protection action	Fault name
Buzzer long beeps	Shut down all inverter output and bypass output	EPO enable
		Bypass overload protection
		Bypass output under-voltage
	Shut down all inverter output and turns to bypass output	Inverter output over-voltage
		Inverter output under-voltage
		Inverter overload protection
		Parallel system sovereignty fault
		Parallel system communication abnormal
		Maintenance bypass is on
Buzzer beeps apace	It is not allowed to supply power by battery or charge battery	Battery over-voltage
		Battery circuit abnormal
	None	Battery backup time is not enough.
	None	Output overload alarm.
Buzzer beeps apace, the red BATT. LOW indicator on	None	Battery low-voltage alarm
Buzzer beeps slowly	None	Output circuit abnormal
		Output current DC component is too large
		Fan is about to use up
		Busbar capacitance is about to use up
		System card redundancy
		Environment temperature is too high
		Power module without redundancy
		Generator startup failure

Alarm action	Protection action	Fault name
Buzzer beeps slowly	None	Generator shutdown failure
		Communication fault
		BMS communication fault
		The communication of cabinet inner busbar 1 abnormal
		The communication of cabinet inner busbar 2 abnormal
		The communication of cabinet inner busbar 3 abnormal.
		BSC synchronization wire abnormal
		Battery low-temperature alarm
	The static startup is not allowed	PFC software version is inconformity
		INV software version is inconformity
		System control card X- software version is inconformity
		The parallel address repeated
		Module amount is inconsistent
		Cabinet amount is inconsistent
		Bypass power down
		Bypass over-voltage
		Bypass under-voltage
		Bypass over-frequency
		Bypass under-frequency
		Bypass phase sequence is wrong
		Bypass lack-phase
		Bypass module off-line

Alarm action	Protection action	Fault name
Buzzer beeps slowly	ECO output is not allowed.	Generator shutdown failure
		Communication fault
	Mains power supply is not allowed	Generator shutdown failure
		Communication fault
		Generator shutdown failure
		Communication fault
		Generator shutdown failure
		Communication fault
		Generator shutdown failure
		Communication fault
		Generator shutdown failure
		Communication fault
	It turns to float charge. The charge current-limiting value will be set to 0.05C	Battery high-temperature alarm
	Charging is not allowed	Battery over-temperature

CAUTION

After the protection for battery under-voltage, once mains recover to normal power supply, the UPS will restart and charge the batteries.

3 Installation

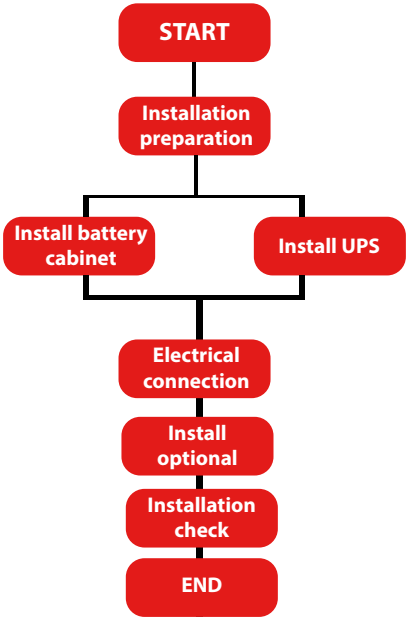
This chapter mainly introduces the installation of the UPS, including unpacking and checking, installation procedure, installation preparation, mechanical installation and system checking and test, etc.

CAUTION

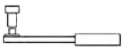
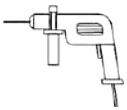
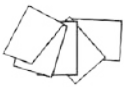
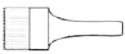
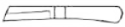
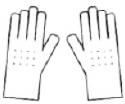
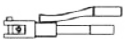
The UPS installation should be performed by authorized person who is special trained and achieve the qualification of high-voltage and AC power. The UPS is just suitable for installing on the concrete or nonflammable surface.

3.1 Installation Procedure

The installation procedure of M6M series modular UPS is as shown in figure below. .



3.2 Installation Preparation
3.2.1 Installation Tools

Tools			
 Clamp meter	 Multi meter	 Laber paper	 Philips screwdriver
 Flat-head screwdriver	 Socket wrench	 Adjustable wrench	Torque wrench
 COAX crimping tool	 Diagonal pliers	 Wire striper	 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 should be with isolated operation to avoid electric shock.

3.2.2 Installation Environment

- Do not install the UPS in the place where exceeds the provision of technology index (temperature: 0℃ ~40℃, relative humidity: 0%~95%).
- It is strictly prohibit installing the UPS in the environment with metal conductive dust.

.Do not install the UPS in the open air, and the installation environment should meet the provision requirements.
.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.

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

CAUTION

The optimal operating temperature for batteries is 20–30°C. Operating at temperatures lower than 20°C will shorten the battery backup time, and operating at temperatures higher than 30°C will shorten the battery lifespan. Make sure that the external DC distribution circuit is configured with a bipolar disconnecting switch.

3.2.3 Installation Space

Maintain a clearance of at least 800mm from the front panel, side pane or rear panel of the UPS to the wall or adjacent device, and maintain a clearance of at least 500mm from the top of the UPS to ceiling, which is to ensure good ventilation, as shown in figure below.

NOTE: The installation space requirement for the UPS is the same, in above figure, we take MR33400 as an example to illustrate.

- Avoid any object block the ventilation hole on the front panel and rear panel, which is to keep good ventilation for the UPS, or, it may rise the inner temperature, even influence the UPS service time.

3.2.4 Surge Protection Device

If the UPS is installed in a lightning-prone area, install multiple surge protection devices between the power grid and the UPS. The UPS installed outdoors requires a higher surge protection level than those installed indoors.

3.2.5 Reverse Feedback Protection (Optional)

It is suggested to add the contactor with 220V AC coil at the AC power distribution side as the reverse feedback protection device.

3.3 Transportation and Unpacking

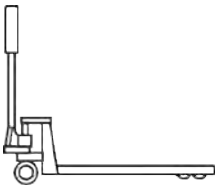
3.3.1 Transportation

CAUTION

The UPS should be transported by trained professional. During transporting, please take care and avoid impact or falling off. If the UPS needs to be stored for a long time after unpacking, it is suggested to package the UPS with original plastic bag.

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

Motor-driven forklift



Manual forklift

CAUTION

When lifting, pay attention to the balance and stable of the UPS. During moving, keep the UPS vertical and do not put down or uplift suddenly.

3.3.2 Unpacking

NOTE: The package of the UPS is similar. Following we take M6M 33400 as an example to illustrate.

Step 1 Check if the package appearance is in good condition and if there has any transportation damage. If any damage, please inform the carrier immediately.
Step 2 Transport the UPS to assigned site.

CAUTION

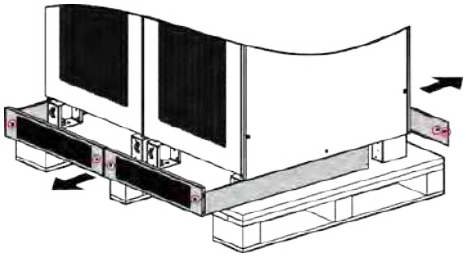
To avoid toppling over during transporting, ensure that the end of the forklift arm exceed the wooden bracket.

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

Step 4 Check the UPS.

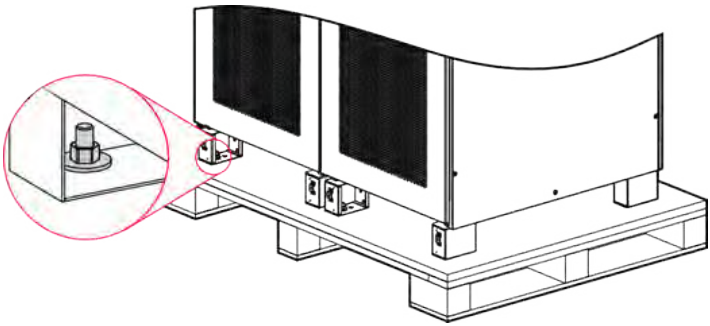
- Inspect the appearance of the UPS and check if there has any damage caused by transportation. If any damage, please inform the carrier immediately.
- Compare with the packing list and check if the accessories mode is complete and proper. If the accessories lack or model wrong, please take note and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

Step 5 If the UPS is OK, dismantle the fasten screws of front and rear cover plate at the bottom of the cabinet, by Phillips screwdriver, and then remove the front and rear cover plate.



Dismantle the bottom cover plate

Step 6 Unscrew the bolts that connected with cabinet and wooden bracket by socket wrench, the bolt position is as shown in figure below.



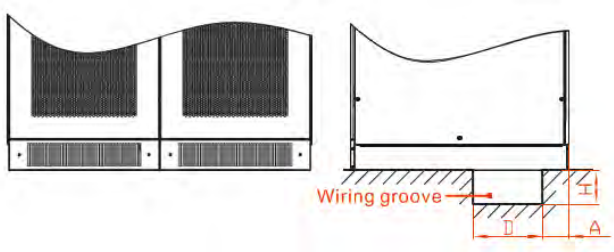
Bolt position

3.4 Mechanical Installation

NOTE: In this section, we take ground installation as an example to illustrate.

CAUTION

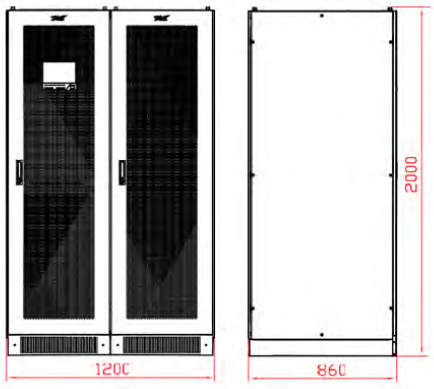
If the UPS is installed on the ground, it is necessary to set the wire groove to connect wires in advance, as shown in figure below.



Wiring groove diagram (unit: mm)

The wiring groove requirements of M6M series UPS is the same, in above figure.

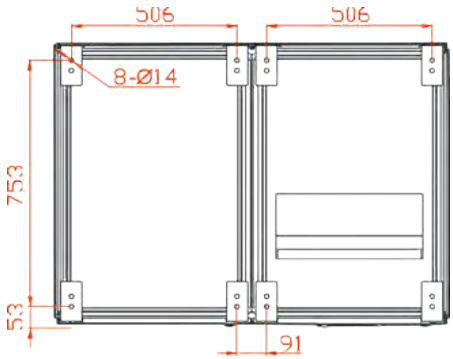
Step 1 Determine and plan the installation position according to the UPS size and installation clearance requirement (see3.2.3 Installation Space).



Size of M6M 600K

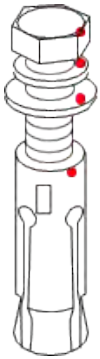
Step 2 Drill 4 holes (hole diameter isφ13) by hammer drill according to the bottom installation hole size.

If the UPS is installed on U-steel, drill 4 hole (hole diameter isφ14) on the U-steel directly, and then perform Step 4 directly.



Bottom size of M6M 600K (unit: mm)

Step 3 Install expansion bolts. The structure and installation for the expansion bolt is as shown in figure below.



Expansion bolt structure and installation

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

CAUTION

Take whole expansion tube into the hole as standard of expansion bolt installation depth. Expansion tube should not higher than ground, which is to avoid effect the following cabinet installation.

NOTE: The outer height of expansion bolts should be within the range of 30-50mm.

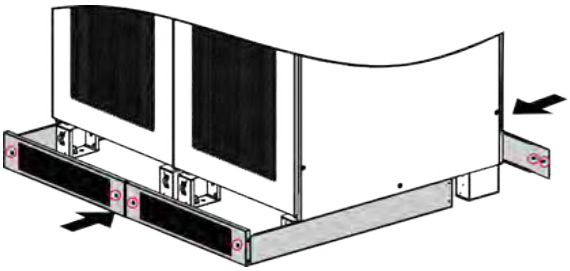
Step 4 Move the UPS from wooden bracket to the ground, and align the bottom installation hole at the expansion bolt, lock the bolts.

CAUTION

When moving M6M 600K UPS by forklift, the forklift arm must be inserted from front or back direction. During transporting, please ensure that the UPS center of gravity locate at the centre of forklift arms, which is to avoid UPS tilting.

NOTE: If the wiring of the UPS is from bottom, please ensure that the installation position is right above the wiring groove.

Step 5 Install the bottom cover plates, and then finish the UPS installation.



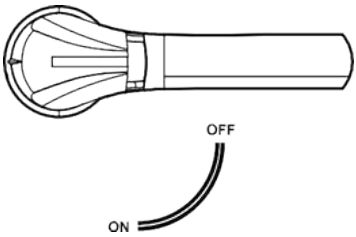
Install bottom cover plates of M6M 600K

3.5 System Wiring

The M6M 600K UPS is compatible with top and bottom wiring.

3.5.3 M6M 600K

Step 1 Open the front door of distribution cabinet, place the input switch (POWER), output switch (OUTPUT), maintenance switch (MAINTENANCE), bypass switch (BYPASS) to OFF, as shown in figure below.

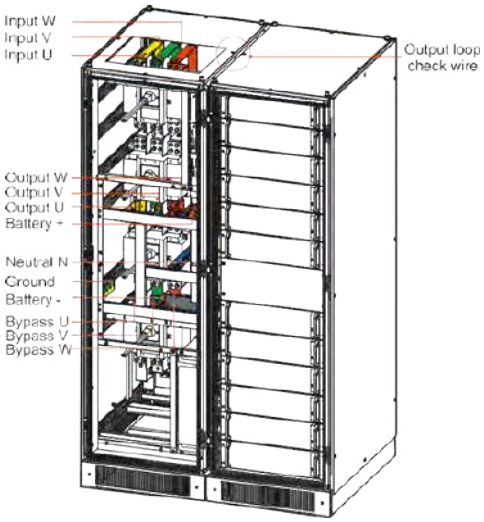


Place the switch to OFF

Step 2 Loose the fasten bolts of each cover plate, screw the handle of each switch, and then dismantle the wiring cover plate, as shown in figure below.

Dismantle the wiring cover plate of distribution cabinet

Step 3 Connect the input, output and battery wires according to Figure3-13 in proper order, and then fasten the bolts.

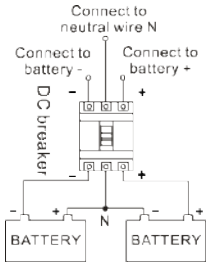


Wiring terminal of distribution cabinet

NOTE:
- If the wiring is from upside, it needs to make the cable go through the top styrofoam, and then connect the cables.
- If the wiring is form downside, it needs to knock down the bottom wiring hole, and then connect the cables.
- After connecting, connect the cables onto the front isolation beam of the cabinet shipshape.

CAUTION

It is suggested to equip DC breaker for battery DC input, specific wire connection is as shown in figure below.

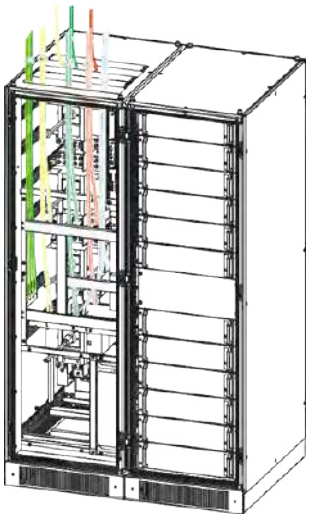


Battery wire connection diagram

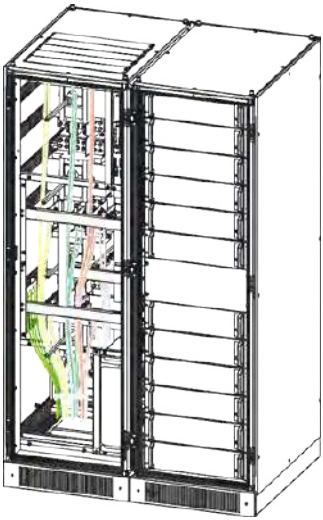
CAUTION

When wiring, ensure that the input, output wires and input, output terminal contact firmly and must not contact bad or wrong.

Step 4 After wiring, fasten the cables to corresponding epoxy plate by cable tie, and install the wiring cover plate again, and then install the handle of switch. The wiring is finished.



Wiring diagram of distribution cabinet (top wiring)

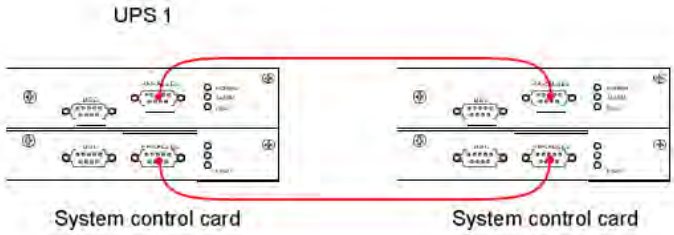


Wiring diagram of distribution cabinet (bottom wiring)

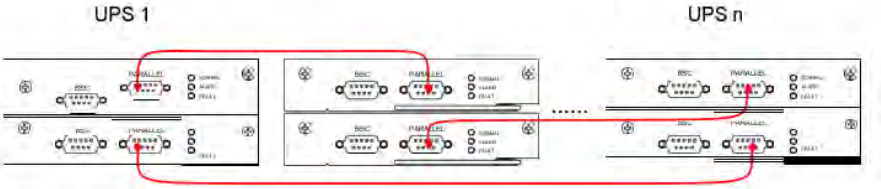
Step 5 After finish the installation of cover plate, fill the empty part with insulation fireproofing mud. After finish the assembling, perform the test and then the UPS can be put in use.

3.6 Parallel System Connection

When the wiring of parallel system is needed, please refer to figure below to connect the parallel system.

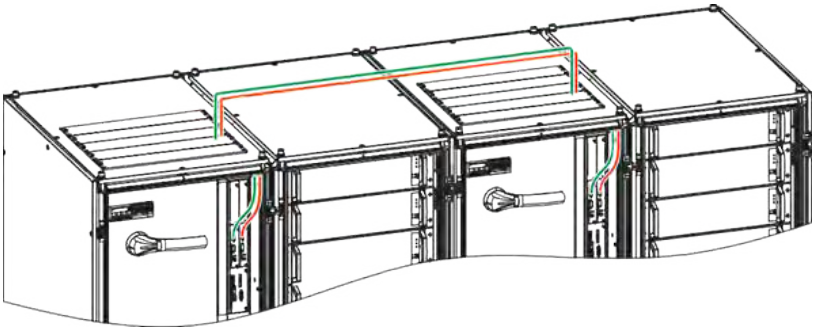


Parallel system (with 2 UPS) connection

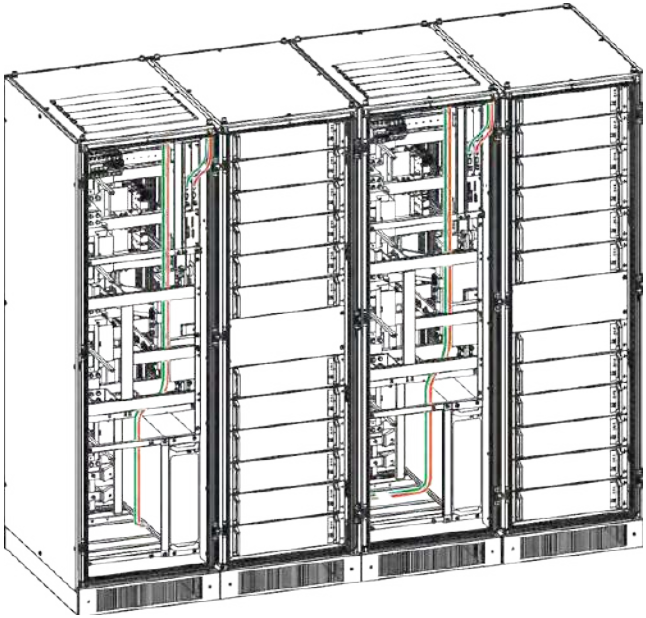


Parallel system (with several UPS) connection

If there is 2 UPS in parallel system, the wiring way is as follows.



Parallel system connection diagram of M6M 600K (top wiring)



Parallel system connection diagram of M6M 600K (bottom wiring)

3.7 System Check and Test
3.7.1 Check Electrical Connection

After fini hing the electrical connection, check the following items.

NO.	Check Item	Result
1	Check if the color of AC cables 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 identification of AC power distribution unit is complete.	Yes ☐ No ☐
4	Check if the wire connection point is firmly.	Yes ☐ No ☐
5	Check if the battery is connected in right polarity and sequence.	Yes ☐ No ☐
6	Check if the cable identification is correct.	Yes ☐ No ☐
7	Check if the wiring is neat and the cable connection is in accordance with the specification.	Yes ☐ No ☐
8	Check if the UPS installation and wiring is advantageous to the transformation, expansion and maintenance in the future.	Yes ☐ No ☐
9	Check if the UPS has any foreign matter. (such as the back of module, top of UPS, wiring terminal row, switch and so on).	Yes ☐ No ☐

3.7.2 UPS Test

Turn off the mains input switch to simulate the situation of mains fault. When mains fault, the UPS turns to battery inverter, the touch screen will show the alarm and the buzzer will beep every 1s.

3.7.3 Connect Load

After the UPS starting and working stably, turn on the load. Start big-power devices before small--power ones. Some devices has large starting current which may cause overload protection (or bypass operation), it is better to start these equipment before others.

4 Touch Screen Operation and Setting

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

4.1 Menu Structure

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

4.2 Main Page

After powering on, it will enter system monitor main page, as shown in figure below.

Monitor 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. When output abnormal, the icon flickers and shows as

Back to main page

Information record

System parameter setting

Login

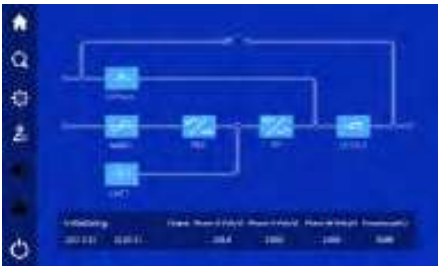
Buzzer control

Alarm

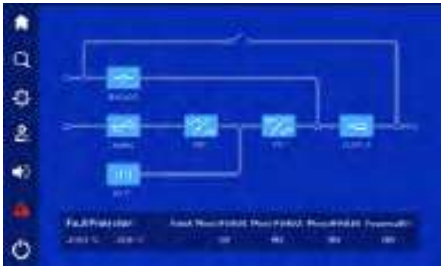
ON/OFF

4.3 System Work Status Display

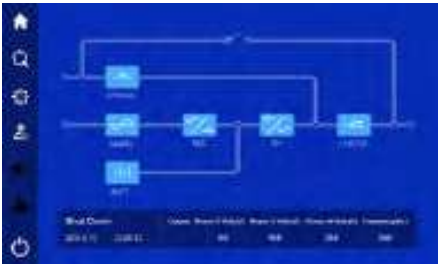
The system work status includes: initializing, fault protection, shutdown, exit parallel system, bypass output, inverter output, grid-connected aging, ECO bypass output, frequency conversion INV. output, maintenance bypass output, grid-connected aging off. Each interface is as shown below.



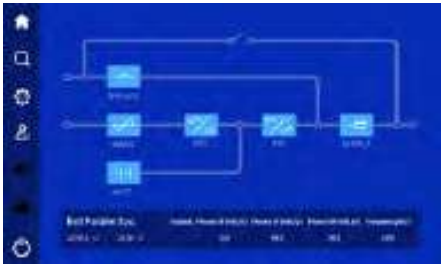
Initializing



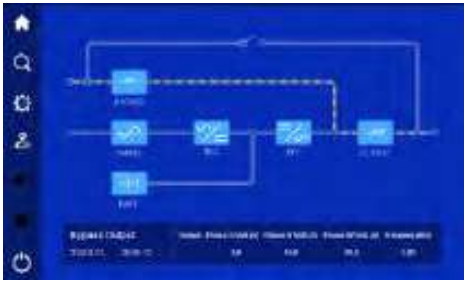
Fault protection, with no output



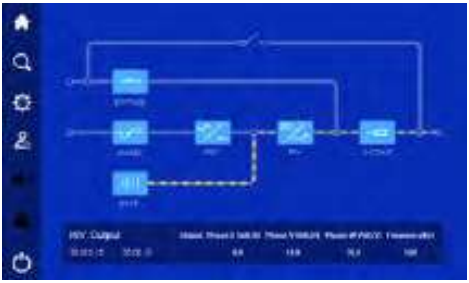
Shutdown



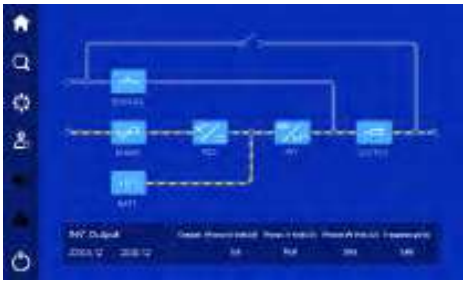
Exit parallel system



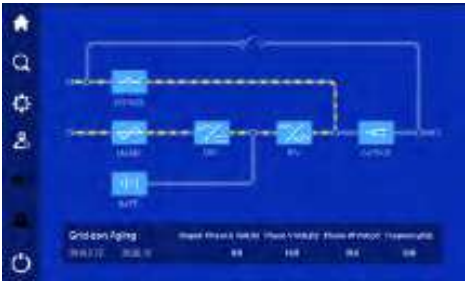
Bypass output



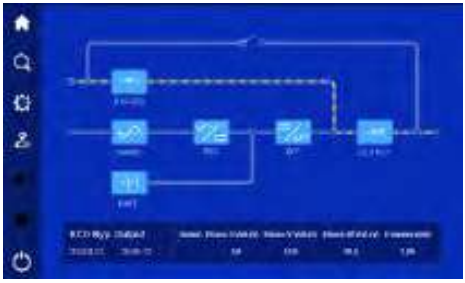
Battery INV. output



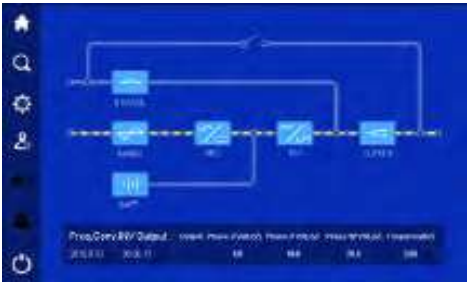
Mains INV. output



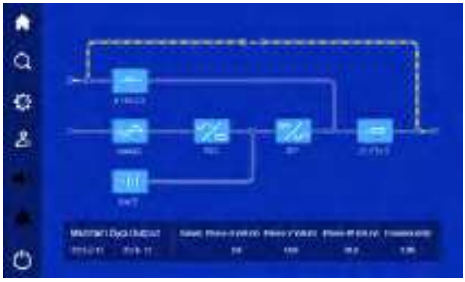
Grid-connected aging running



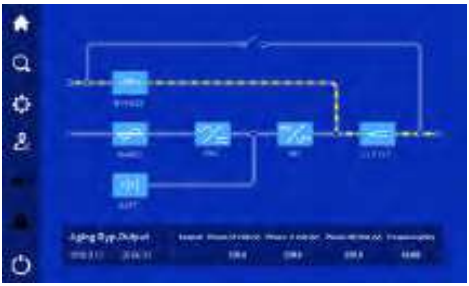
ECO bypass output



Frequency conversion INV. output

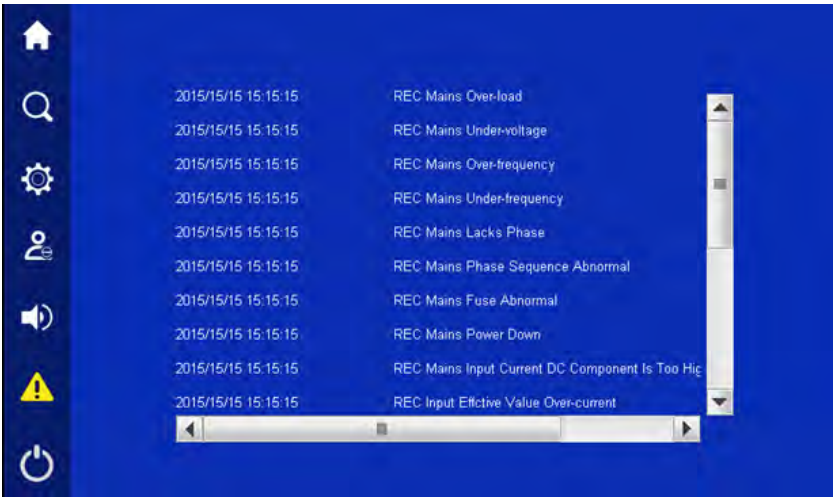


Maintenance bypass output



Aging bypass output

When module or system abnormal, the main page will show "fault alarm" indicator, click the "fault alarm", it will show the current fault information, as shown in figure below.



Dismantle the bottom cover plate

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

4.5 Monitor Function

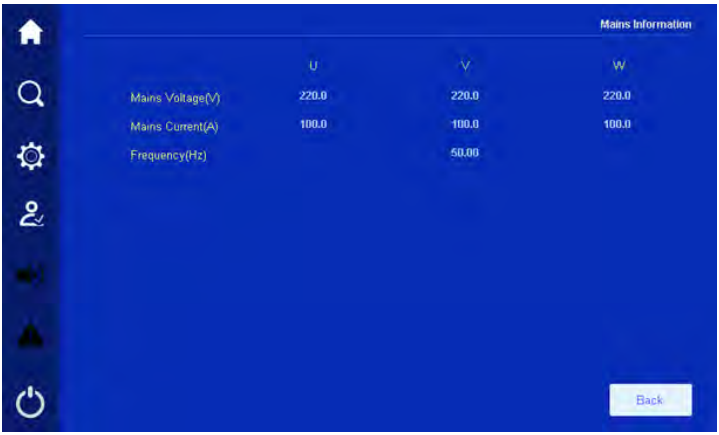
4.5.1 Bypass Information

In main page, click icon, it will enter system bypass information page, as shown in figure below. In the page, it shows the bypass three-phase voltage, current, active power, apparent power and frequency.

Bypass information

4.5.2 Mains Information

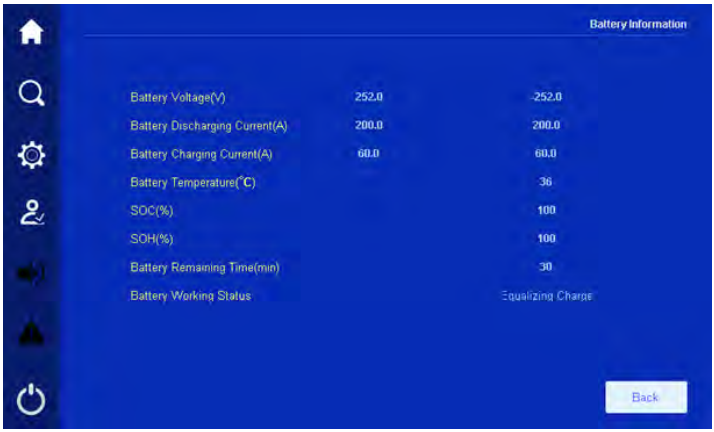
In main page, click  icon, it will enter system mains input information page, as shown in Figure4-17. In the page, it shows the mains three-phase voltage, current, frequency and total input energy of current system.



Mains information

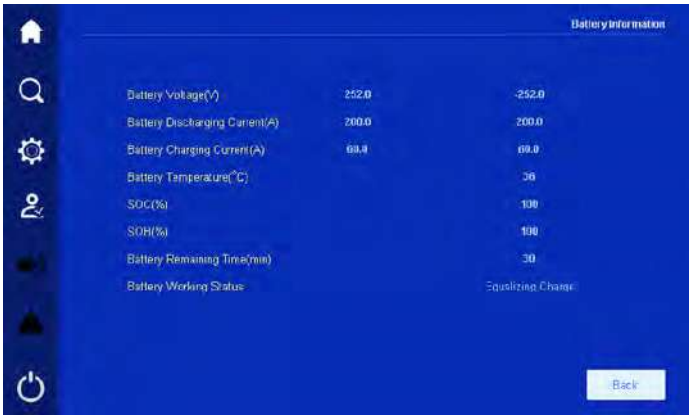
4.5.3 Battery Information

In main page, click icon, it will enter battery information page. If the battery is lead-acid cell, it shows the positive and negative battery group voltage, charge/discharge current, 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 figure below.



Battery information

When the battery type is lithium cell, the page shows the positive and negative battery group voltage, charge/discharge current, remaining capacity, battery remaining time, battery temperature, BMS fault code, SOC, SOH and battery status. It shows the charging current or discharging current according to battery charge/discharge status, as shown in figure below.



Battery information page

4.5.4 Power Module Information

In main page, click icon, it will enter rectifier information page, as shown in Figure4-20. Click "Select Module", it can check the information of each power module.

Rectifier information

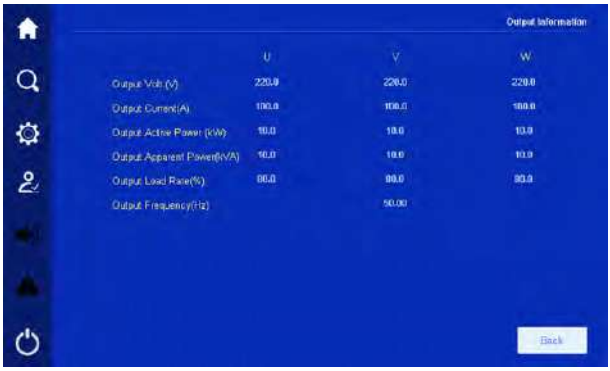
4.5.5 Inverter Information

In main page, click icon, it will enter inverter module information page, as shown in figure below. Click "Select Module", it can check the information of each power module.

Inverter module information

4.5.6 Output Information

In main page, click icon, it will enter system output information page, as shown in figure below. In the page, it shows the current three-phase output voltage, current, active power, apparent power, load percentage, frequency and total output energy.



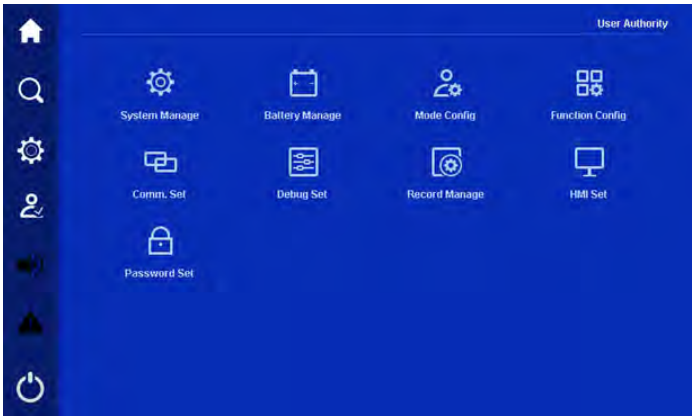
System output information

4.6 Setting Management

In main page, click icon, it will enter user login page, as shown in Figure4-23.

Use login page

After entering right password the icon will show as Click the left icon, it will turn to setting interface, as shown in figure below. Common user can check the parameters, but cannot set the parameters. Maintenance staff can check and set each parameter.



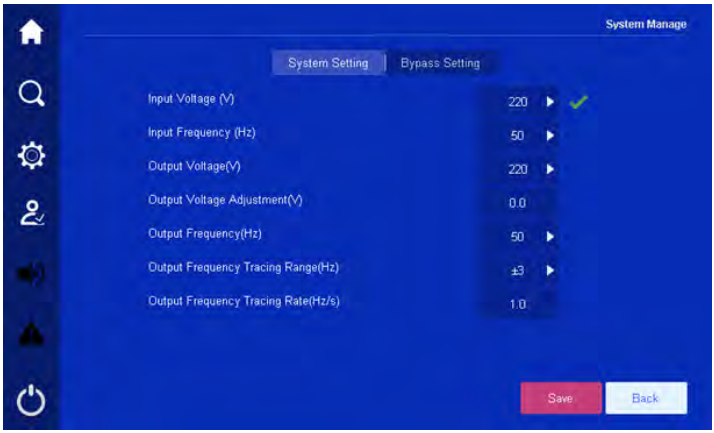
Setting management page

4.6.1 System Manage

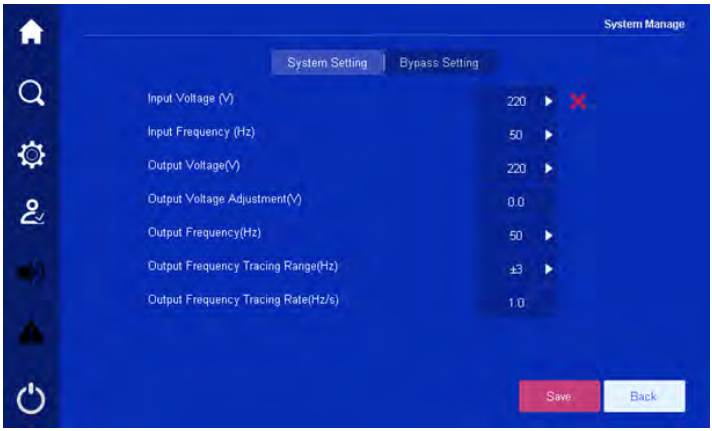
In setting management interface, click System Manage icon, it will enter system manage page, as shown in figure below. System manage includes system setting, bypass setting. Click enter box to change parameter. Click save button to save the setting.

System setting

If the setting succeeds, on the right of the parameter, it will show ✓ mark, as shown in Figure4--26. If setting fails, it will show ✗ mark, as shown in figure below.



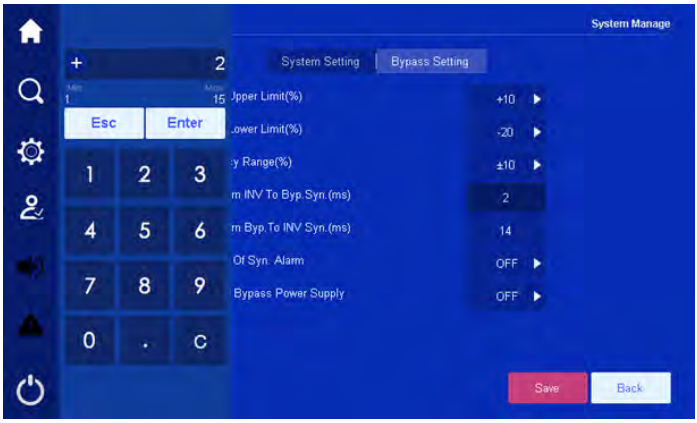
Setting success



Setting failure

Click Bypass Setting, it will turn to bypass setting page. Click enter box, such as the max. time turn INV. to bypass synchronous (ms), it will show as as figure below At the top of the enter box, it shows the setting range, once setting exceed the range, the setting will be invalid, after change the parameter, click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.

Bypass setting



Parameter setting

4.6.2 Battery Manage

In setting management page, click Battery Manage icon, it will enter battery manage page, as shown in figures below.The page includes battery setting, charging setting, battery test. Click enter box to change the parameter. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.

Battery setting 1

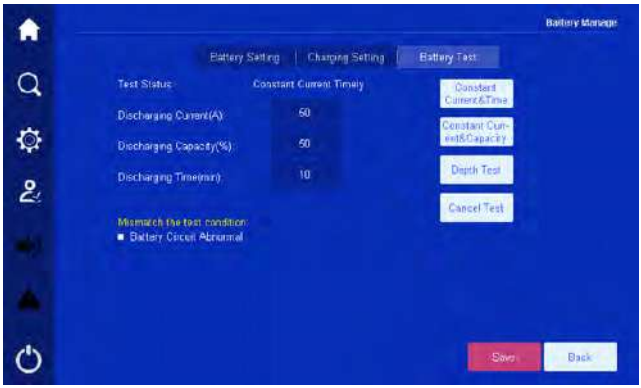
Battery setting 2

Click Charging Setting, it will turn to charging setting page, as shown in figures below. Click enter box to change the parameter. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.

Charging setting 2

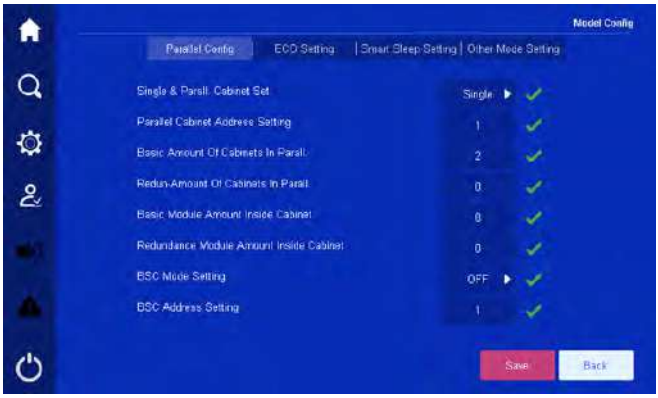
Charging setting 2

Click Battery Test to enter battery test page, as shown in figure below.



4.6.3 Mode Configuration

In setting management page, click Mode config. icon, it will enter mode configuration page. The page includes parallel configuration, ECO configuration, smart sleep setting and other mode setting. After setting, click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.



Parallel configuration page

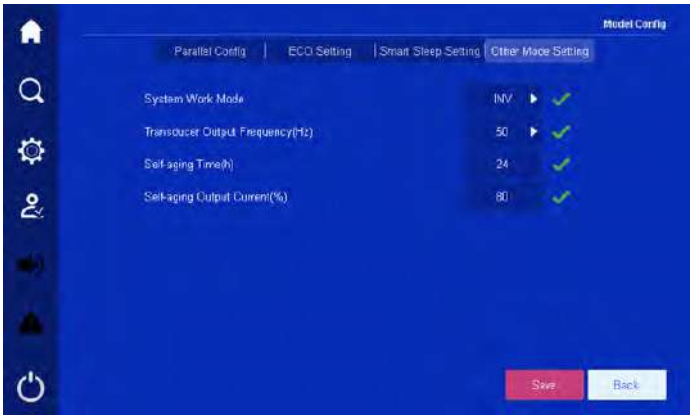
Click ECO Setting, it will turn to ECO configuration page, as shown in figure below. Click enter box to change the setting. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting

ECO setting page

Click Smart Sleep Setting, it will turn to smart sleep setting page, as shown in figure below. Click ente box to change the setting. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.

Smart sleep setting page

Click Other Mode Setting, it will turn to other mode setting page, as shown in figure below. Click enter box to change the setting. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.



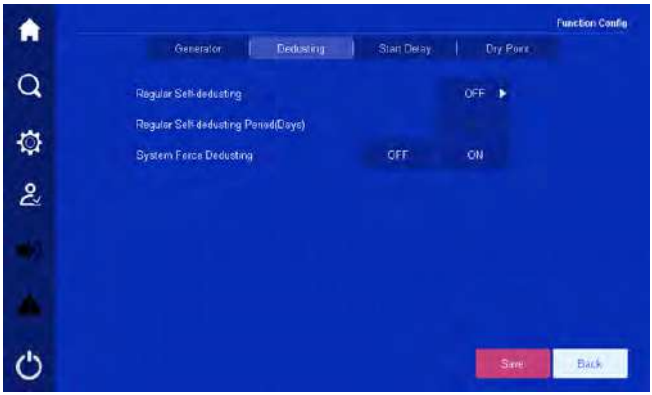
Other mode setting page

4.6.4 Function Configuration

In setting management page, click Funciton Config. icon, it will enter funciton configuration page. The page includes generator configuration, dedusting configuration, start delay configuration, dry point configuration. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.

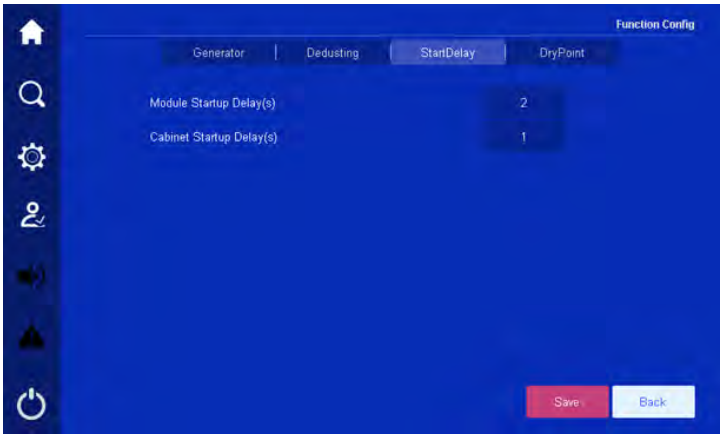
Generator configuration

Click Dedusting, it will enter the dedusting configuration page, as shown in figure below. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.



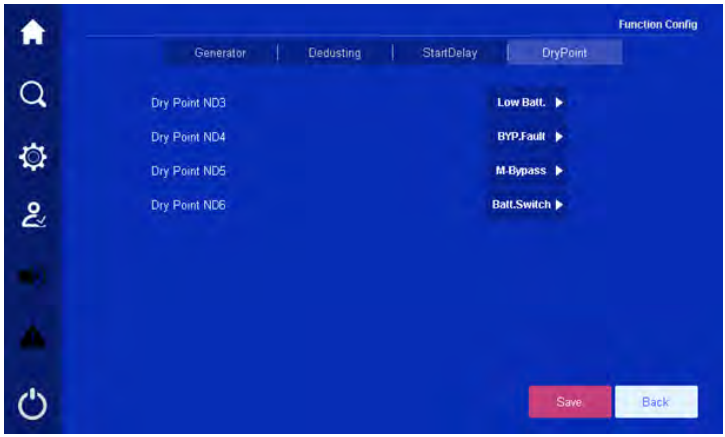
Dedusting configuration

Click StartDelay, it will enter the delay starting configuration page, as shown in figure below. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.



Delay starting configuration

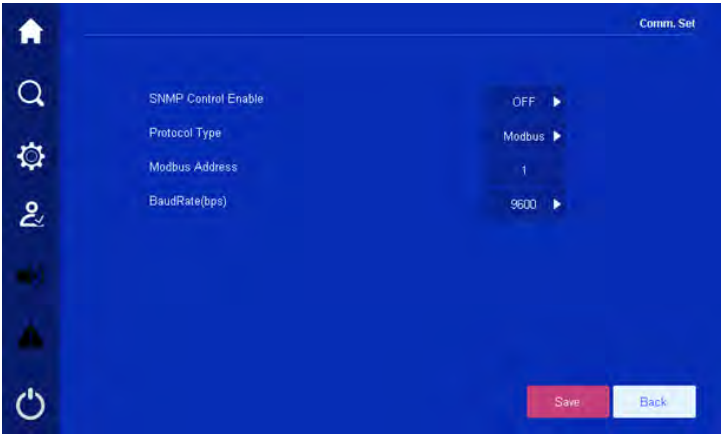
Click Dry point, it will enter the dry contact configuration page, as shown in Figure4-42. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.



Dry contact configuration

4.6.5 Communication Setting

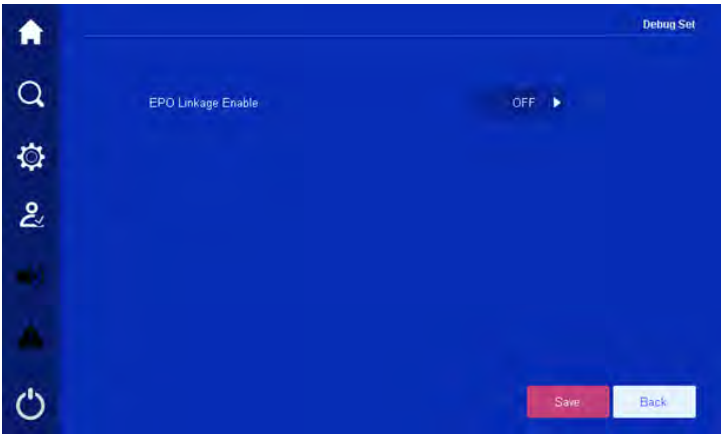
In setting management page, click Communication Setting icon, it will enter communication setting page, as shown in figure below. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.



Communication setting

4.6.6 Debug Set

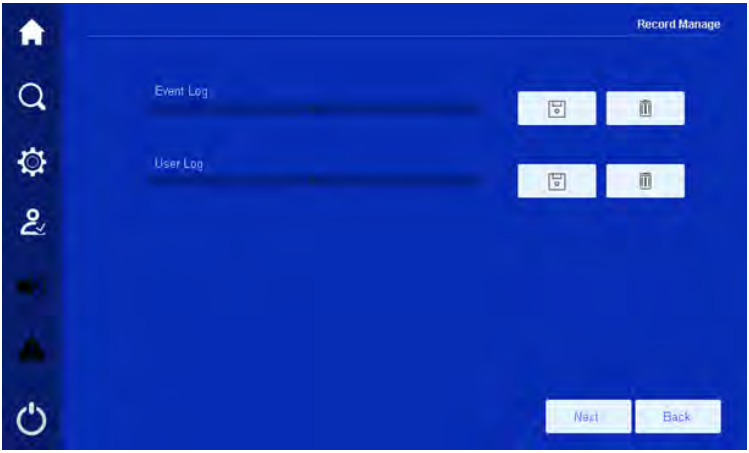
In setting management page, click Debug Set icon, it will enter debug set page, as shown in figure below. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.



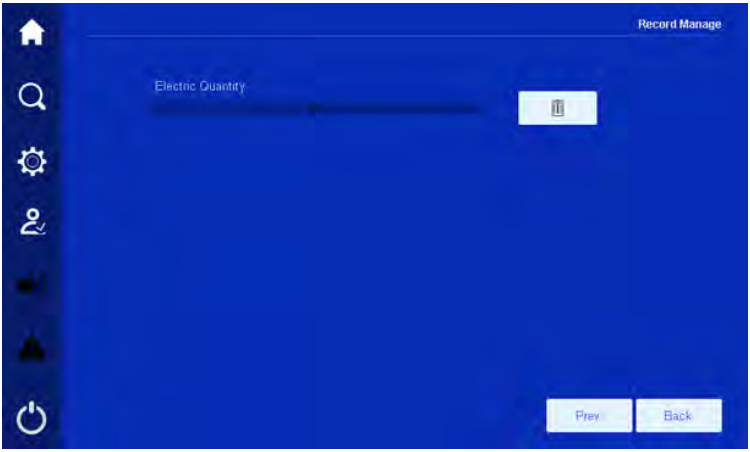
Debugging setting

4.6.7 Record Manage

In setting management page, click Record Manage icon, it will enter record manage page, as shown in figures below. Click Save button to save the setting. The mark of setting success and setting failure is the same as that of system setting.



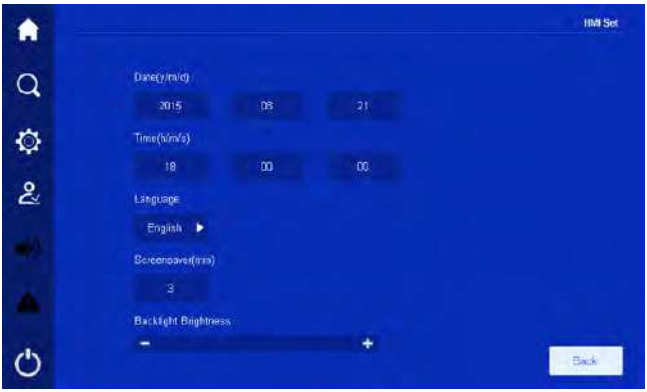
Record manage 1



Record manage 2

4.6.8 HMI Set

In setting management page, click HMI Set, it will enter HMI set page, as shown in figure below.



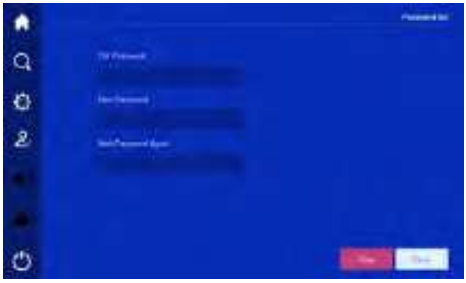
HMI setting

CAUTION

When setting system time, ensure that the setting value is the same as the real time, which is to keep the veracity of system event log and master the system status of some time and maintain conveniently.

4.6.9 Password Set

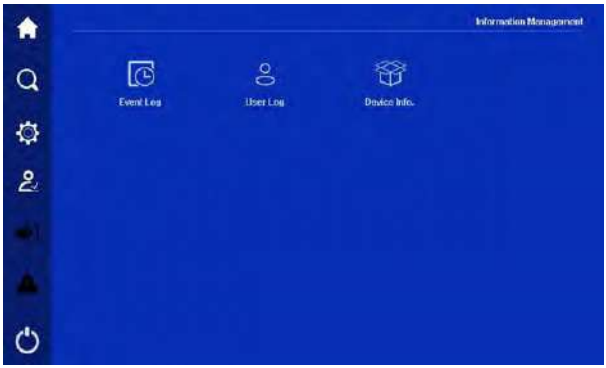
In setting management page, click Password Set icon, it will enter password set page. In password setting page, user can only change the password of current user, as shown in figure below. The password is 1 to 6 places Arabic numerals. After filling, click Save button to change the setting.



Password Setting

4.7 Information Query

In main page, click  icon, it will enter information query page, as shown in Figure4-49.



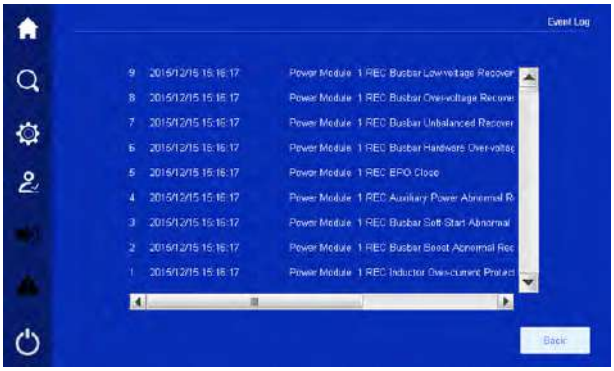
Information query

CAUTION

It can record 9000 pieces information at most. When the record exceeds 9000 piece, the earliest information will be covered by new one. All records are ranked in inverted order of time.

4.7.1 Event Log

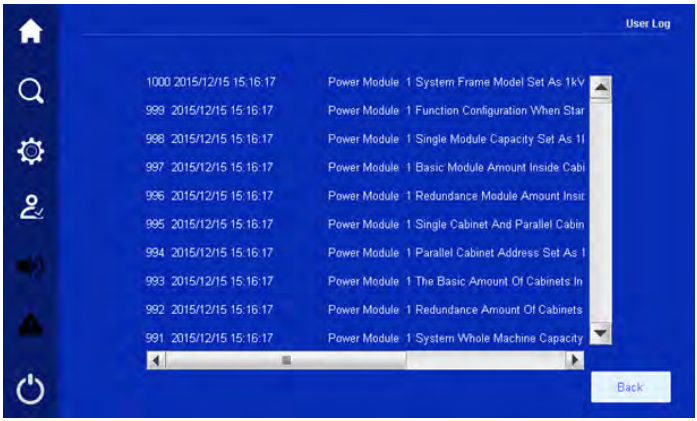
In information query page, click Event log icon, it will enter event log page, as shown in figure below. This page records the history fault and alarm information of system and module



Event Log

4.7.1 Event Log

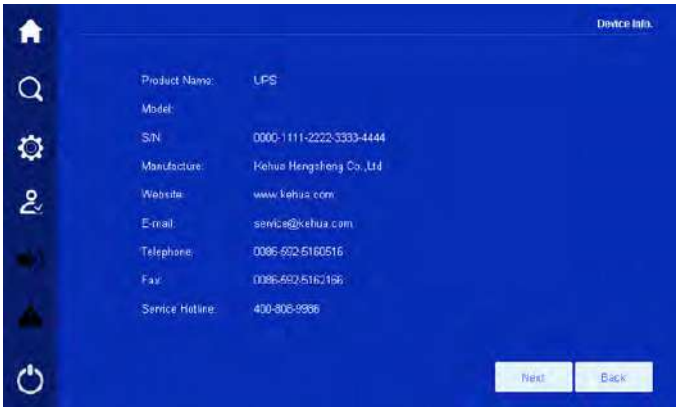
In information query page, click User Log icon, it will enter user log page, as shown in figure below. This page shows the user parameter setting record.



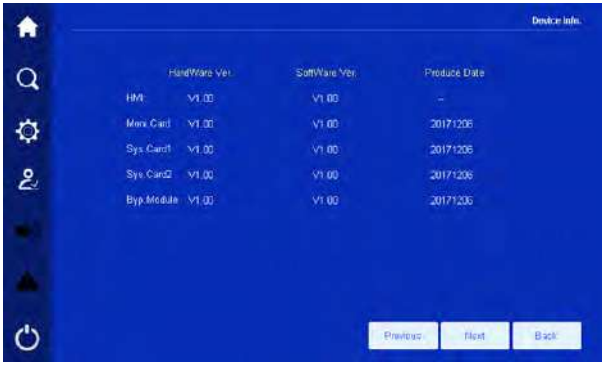
User Log

4.7.2 User Log

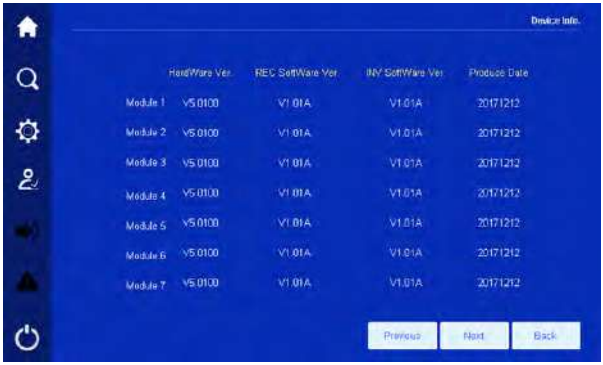
In information query page, click Device Info icon, it will enter device information page. This page shows the S/N, product name, model, status, version, as shown in figures below.



Product Information 1

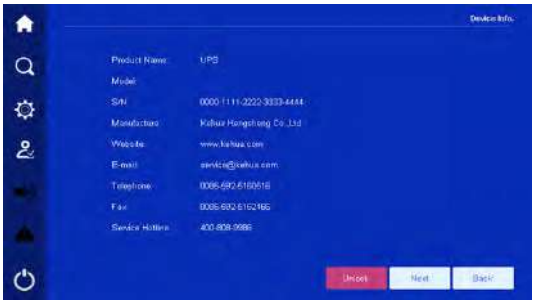


Product information 2



Product information 3

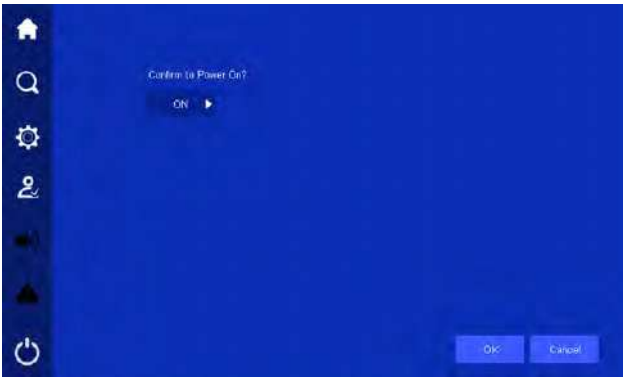
When the probation function is enabled, the device status shows as Lock, as shown in figure below. At this time, click Lock button, it will enter the probation unlock page. After unlocking, the Lock button disappear.



Probation function is enabled

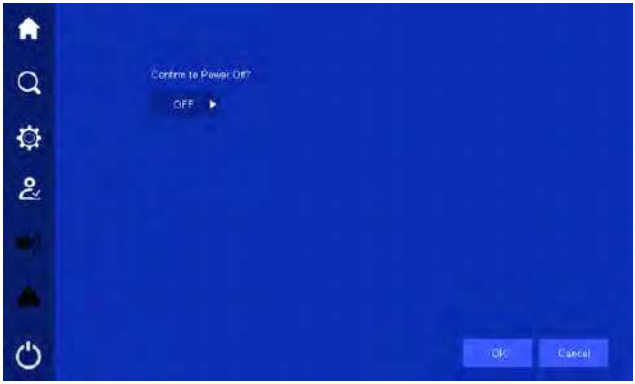
4.8 ON/OFF

In main page, click  icon, it will enter ON/OFF page, when the system is OFF, click the icon to enter the confirm page, as shown in figure below, click OK button to perform the start operation.automatically.



Confirm to power on

While powering off, click  icon, it will enter the confirm page, as shown in Figure4-57, click OK button to perform the shutdown operation.



Confirm to power off

5 Use and Operation

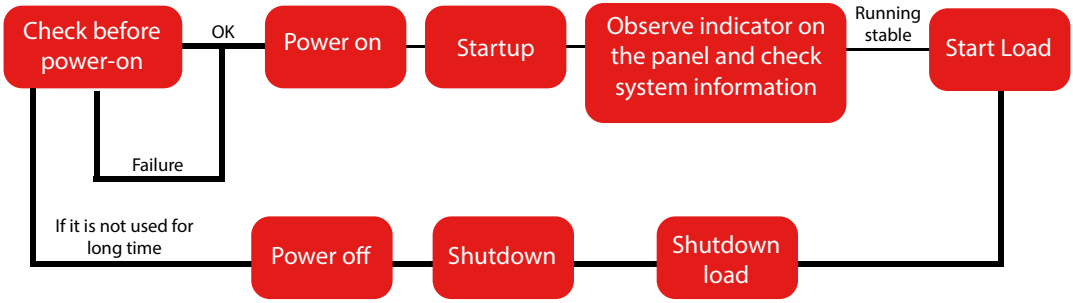
This chapter mainly introduces the operation procedure and method, including using announcements, operation procedure, UPS start and parallel system start, etc.

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 UPS panel as the power supply switches of load. Do not start the UPS frequently.
- After UPS work stably, turn on the load. Start big-power devices before small-power ones. Some devices have large starting current which may cause overload protection, it is better to start this equipment before others. If the UPS needs to be shut down, turn off the 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 work stably, the UPS can be connected, or it may cause UPS or load damage. If the generator needs to be shut down, turn of the UPS firstly.

5.2 Operation Procedure

Before first start the UPS, it is necessary to do the check, see section 5.3.1. Only pass the examination, then the UPS can be powered on. If the UPS won't be used for a long time, it also needs to be checked before startup. Operation procedure is as shown in figure below.



Operation procedure

5.3 UPS Start and Shutdown

5.3.1 Check before Startup

Before startup, check according to following steps. Only when the check is OK, then the UPS can be started.

Step 1 Ensure that the POWER switch, BYPASS switch, OUTPUT switch, MAINTENANCE switch are all OFF.

Step 2 Check load

-Ensure that the load is not conductive load. The output of the UPS cannot be conducti ve load, such as motor, fan, air-condition, etc. Generally, these loads are power supplied by power-grid.

- Ensure that the load is close. And at the same time, the load capacity should not exceed the UPS rated output capacity, 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 of input and output.

Step 4 Measure the AC voltage of mains input terminal, and the voltage should be in the range of 80V~280V, or, it only can be started from battery status.

Step 5 Measure the DC voltage of battery input terminal. The voltage of positive battery group should be greater than a certain value (+11.5× battery amount), the voltage of negative battery group should be less than a certain value (-11.5× battery amount), and pay attention to the polarity, avoid wrong battery connection.

Step 6 Ensure that the auxiliary contact of battery breaker is connected to the ND6 dry contact of system monitor card.

5.3.2 Startup

Step 1 Ensure that all the system parameters setting are right.

Step 2 Close the ready switch of bypass module and all power modules.

-Ensure that the load is not conductive load. The output of the UPS cannot be conducti ve load, such as motor, fan, air-condition, etc. Generally, these loads are power supplied by power-grid.

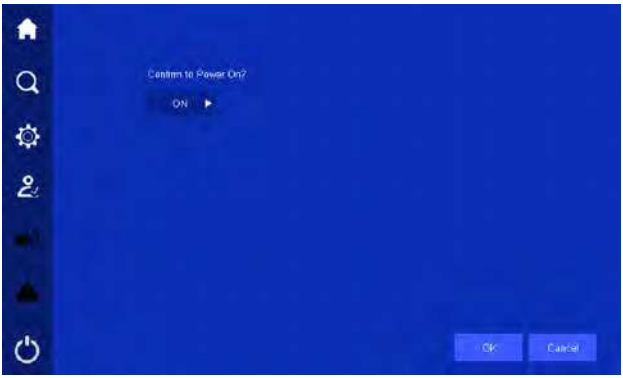
- Ensure that the load is close. And at the same time, the load capacity should not exceed the UPS rated output capacity, or, it will cause overload protection.

Step 3 Close the BYPASS switch POWER switch external battery switch, the UPS outputs by bypass. (if it is battery start, for this step, just close the external battery switch, and then press the battery button on the bypass module for more than 3s, the system power is set up.)

Step 4 Start the inverter.

- Start the inverter by panel ON combination button 1
When the green indicator of all power module slow flicker, long press the panel "ON" combination button for 3s, the system inverters to output. Check the system running status in the touch screen, and ensure that the system turns to inverter power supply mode. During testing, ensure that the UPS three-phase output voltage and frequency is normal through the real-time data in the touch screen.
- Start the inverter by touch screen 2

In main page of touch screen, click  icon, it will enter the ON/OFF page, as shown in figure below, click OK to perform the start operation.



Step 5 After start the inverter, UPS turns to inverter to supply power. User can check the system running status chart and ensure if the system turns to inverter supply power. During testing, ensure that the UPS three-phase output voltage and frequency is normal throu gh the real-time data in the touch screen.

Step 6 Close the OUTPUT switch, measure the output voltage, output frequency by multimeter, and ensure the voltage and frequency normal, and then, the UPS can be put into use.

Step 7 Start the load. Generally, start the large-power device first, and then start the small -power device.

5.3.3 UPS Shutdown

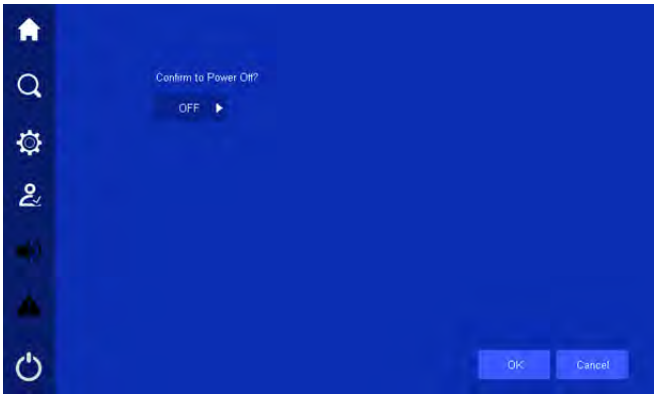
CAUTION

If the system bypass normal, after the UPS shutdown, system will turn to bypass power supply mode; if system bypass abnormal, after the UPS shutdown, system will be with no output. Before shutting down, please ensure that the load is closed.

Step 1 Shut down the user load.
Step 2 Shut down the inverter.

- Shut down the inverter by panel OFF combination button 1. Long press the panel OFF combination button for 3s, system will turn to bypass supply power from inverter output. Check the system running status on the touch screen, and ensure that the system has turned to bypass output from inverter to supply power.
- Shut down the inverter by touch screen 2.

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



ON/OFF page

Step 3 Disconnect the external battery switch > POWER switch > BYPASS switch > OUTPUT switch.
Step 4 After the touch screen and all LED indicators are off, the UPS is completely shut down.

5.3.4 Switch to Bypass Mode Manually

CAUTION

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

Shut down the UPS inverter, please see step 2 in 5.3.3 UPS Shutdown, The system will turn to bypass to supply power 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 Normal Output

CAUTION

Unless professional person, no one can perform the following operation. Manufacturer does not take charge of the problem caused by the operation of untrained person.

Step 1 Shut down the inverter. In main page, click  icon, it will enter ON/OFF interface, click OFF and then click OK icon to shut down the inverter.

NOTE: The inverter also can be shut down by OFF combination button on the panel, generally, it is not suggested to operate like this.

Step 2: After switch to bypass and the energy flow on the touch screen shows bypass output, place the MAINTENANCE switch to ON position.
Step 3: Disconnect the POWER switch > external battery breaker > BYPASS switch.
Step 4: Disconnect OUTPUT switch, after the touch screen, LED indicators are all off, the mainte nance can be done.

CAUTION

During maintenance, it is strictly forbidden to close the OUTPUT switch.

5.3.6 Switch to Inverter Power Supply from Maintenance Bypass

CAUTION

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

Step 1 Close the BYPASS switch > POWER switch > external battery breaker > OUTPUT switch successively.
Step 2 After the power supply normal and the energy flow on touch screen shows bypass output, place the MAINTENANCE switch to OFF. At this time, the bypass supply power for load.
Step 3 Start the inverter system.

When the green indicator of all power module slow flicker, click  icon in main page to enter ON/OFF page, click ON and then click OK icon to start the inverter. The UPS turns to inverter output.

NOTE: The inverter also can be started by ON combination button on the panel, generally, it is not suggested to operate like this.

5.3.7 Emergency Power Off (EPO)

CAUTION

Do not 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

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

5.3.8 Emergency Power Off Recovery

Step 1 Ensure that the dry contact of monitor card, which connected to the external EPO switch, is not in emergency power off status.

Step 2 Disconnect the POWER switch, OUTPUT switch and battery breaker of battery cabinet, and wait for all system indicators off, the UPS is completely power down.

Step 3 Close the POWER switch, BYPASS switch, battery breaker of battery cabinet, system will be started again, and EPO removes.

5.4 Parallel System Startup and Shutdown

5.4.1 Start Parallel System

CAUTION

1. Before start the parallel system, please perform the operation of 5.3 UPS Start and Shutdown for each UPS.
2. Before test and power on the parallel system, please ensure that the wire connection of input and output cables 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 all UPS input breaker (including POWER 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, close the POWER and BYPASS switch of the UPS. Close the POWER switch and BYPASS switch of all UPS (keep the OUTPUT switch of all UPS stay in 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 parallel system.

Step 4 After the monitor interface of each UPS without abnormal alarm, close the battery input breaker of each UPS (if there are many groups battery, it needs to close the switch of each battery group, and then close the total breaker between UPS and battery groups). Measure the voltage of battery breaker by multimeter (if there are many groups battery, measure the voltage of each battery group, and then meausre the voltage of total battery breaker). Ensure that the battery connection is normal (the "battery circuit abnor mal" alarm on the main page of touch screen disappear in 2min)

Step 5 Check if the system alarms are all disappeared. If there is any fault alarm, please suspend 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 and the system has no abnormal alarm, start the inverter of each UPS manually, all UPS turn to inverter supply power.

Step 7 Measure the output voltage and frequency of each UPS. After each UPS turns to inverter power supply (user can check whether the system stay in inverter power supply mode by system running status chart), check whether the UPS three-phase output voltage and frequency is normal by the real-time data in touch screen, measure the front-end three -phase output voltage of output breaker in output distribution cabinet or external output distribution breaker, ensure that the inverter output voltage is normal (the three -phase output voltage = output voltage setting ±2V), and ensure that the inverter frequency is normal (the three-phase output frequency = output frequency setting ±0.1Hz). Record the measured three-phase 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 UPS less than 5V, and then the parallel operation can be done. If it does not meet the requirement, the UPS with big voltage deviation cannot put into parallel system, and it is necessary to debug again.

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

Step 10 Check the bypass phase sequence. Close the OUTPUT switch of UPS1 (ensure that the total breaker of load is disconnected, or once closing the OUTPUT switch of UPS1, it will supply power for load), maintain the OUTPUT switch of other UPS disconnected, keep the multimeter in AC position, one pen connect with the output switch front-end phase-A of UPS2, the other pen connect with the output switch back-end phase-A of UPS2, measure the voltage different between front-end and back-end of UPS2 output switch. Measure the voltage difference of phase-B and phase-C as the same way. If the phase sequence is right, the voltage different of each phase should be less than 5V; if the phase sequence is not right, there is at least one phase voltage difference greater than 5V. Measure whether the bypass sequence of each paralleled UPS is right (when measu re other UPSs' phase sequence, it doesn't need to operate the switch. Maintain the OUTPUT switch of UPS1 is closed and the OUTPUT switch of other UPS is not closed). If all bypass phase sequence of all UPS 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 Close the OUTPUT switch of all UPS.Ensure that each UPS with no abnormal alarm, close the OUTPUT switch of all UPS successively. Ensure that the output end of all UPS stay in parallel status.

Step 12 Ensure that the system is with no abnormal alarm, manually start the inverter of each UPS successively. System starts inverter power supply. Monitor that there is no abnormal alarm.

Step 13 Shut down the inverter of each UPS. Ensure that each UPS with no abnormal alarm, shut down the inverter of all UPS, the system turns to bypass power supply.

Step 14 Close the total output breaker of load. After the parallel system turns to bypass power supply, close the total output breaker of load, system bypass supplies power for load.

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

5.4.2 Shutdown Parallel System

CAUTION

If the system bypass is normal, after shutting down the UPS, the system will turn to bypass power supply mode; if the system bypass is abnormal, after shutting down the UPS, the system will turn to no output mode, the system output is outage. Before shutting down, please ensure that load is closed and can endure the status of power outage at any time.

Step 1 Close the load of parallel system, keep the UPS run without load for a while to eliminate inner heat.

Step 2 Perform 5.3.3 UPS Shutdown to close all UPS, system turns to bypass power supply.

Step 3 Disconnect the load total breaker, each UPS OUTPUT switch, battery breaker, BYPASS switch, POWER switch successively.

NOTE: If it just needs to close the inverter of the UPS, system turns to bypass power supply and the load without power outage, just perform Step 2; if it needs to power off all UPS system, perform all above steps.

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 shut down and close all output.

Multi UPS running in parallel

EPO linkage is enabled

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

EPO linkage is not enabled

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

Press the EPO button of total system, all paralleled UPS 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 equipment 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 close the battery breaker 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 wiring terminals on input, output cables are in good contact every half year.
- Check the fans work status periodically and avoid sundries blocking the air vents. If a fan is damaged, maintain it or replace it in time.
- Check the voltage of batteries periodically, ensure that the battery voltage is within the normal range.

6.2 Battery Maintenance

Battery charge requirements

– When first use the battery, 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 less than the standard vale this time.

– Generally, the battery needs to be charged and discharged every 4 to 6 months. First, discharge till battery low-voltage alarm and then charge the battery. The charge time of each time cannot 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 less than 24h.

– If the battery will not be used for long time, it also needs to charge the battery every 3 months and the charge time of each time cannot less than 24h.

- Clean battery shells by cloth. Oil and organic solvents, such as petrol and diluents are prohibited.
- To avoid explosion, keep batteries far away from fire sources and devices that easily generate sparks.
- Avoid over-discharge the battery during using. Fully charge the battery immediately after discharge (24h at latest) 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 damage battery.
- To avoid battery discharging for too much time after mains power outage, disconnect the battery breaker when the UPS is not used.

6.3 Announcementsfor Battery Replacement

- Do not put the battery into fire, which is 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 start, please refer to Table6-1 to find possible reason. Meanwhile, check whether the fault is caused by external environment, such as temperature, humidity is not accordance with the requirement or overload.

Table6-1only 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.

NO	Abnormal phenomena	Possible reason
1	Mains normal, but UPS works in battery inverting status, the buzzer beeps intermittently.	Each connection point, socket of grid circuit is not so good, which causes the AC power supply input blocked.

NO	Abnormal phenomena	Possible reason
2	After installation, close breaker or power supply switch, the fuse will fuse or trip off.	The three-phase input wire is wrongly connected, such as neutral wire and ground wire or live wire and grounding (case) is wrongly connected or the three-phase output wire is wrongly connected.
3	After startup, the UPS outputs 220V AC power, but the UPS works in bypass status.	1. The load it too large and exceed 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.
4	The UPS output normally after startup, but once turn on load, the UPS stop 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 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 run stably, start the load according to the sequence from large power device to small power device.
5	The UPS work normally after startup, but some time later, the UPS shut down automatically.	At the status of battery supply power, the battery is runs out and system protects for battery under-voltage, the UPS shut down automatically. This phenomenon is normal. Once mains normal, system will start and charge battery automatically. Warning: if the battery stays in under-voltage status for long time, it will influence the battery service life. After battery under-voltage protection, if mains cannot recover in a long time, please disconnect the battery breaker to protect battery and restart the UPS and fully charge the battery once mains recovers.

NO	Abnormal phenomena	Possible reason
6	After startup and work 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 causes under-voltage protection.
7	When there is mains, the UPS output 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 not good. 4. Battery breaker is not closed. 5. After serious overload, the UPS is not restarted, which causes the UPS stay in bypass output status.
8	Buzzer long beeps, the UPS turns to bypass supply power.	See the fault information on touch screen.
9	There is mains, but buzzer beeps intermittently.	The mains voltage or frequency exceed 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 so good and the float voltage between neutral wire and grounding wire is too large.
11	FAULT indicator of a power unit 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 supply of UPS by the touch screen, if necessary, close the user load and disconnect the input and output switch of the UPS to avoid further damage for the UPS. Inform the engineering technicist to maintain.

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

When some 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 technicist 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 (≥10min) 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 of Company 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, eat source, cold source, window or air inlet.

Storage temperature: -25~55℃. 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.


ModSecur®
UPS
Uninterruptible Power Supply