Preface

Usage

The manual contains information on installing, using, operation and maintenance of the ModularUPS. Please carefully read this manual prior to installation.

Users

Technical Support Engineer Maintenance Engineer

Note

Our company is providing a full range of technical support and services. Customer can contact our local office or customer service center for help. The manual will update irregularly, due to the product upgrading or other reasons. Unless otherwise agreed, the manual is only used as guide for users and any

statements or information contained in this manual make no warranty expressed or implied.

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Safety Precautions

This manual contains information concerning the installation and operation of Modular UPS. Please carefully read this manual prior to installation.

The ModularUPS cannot be put into operation until it is commissioned by engineers approved by the manufacturer (or its agent). Not doing so could result in personnel safety risk, equipment malfunction and invalidation of warranty.

Safety Message Definition

Danger: Serious human injury or even death may be caused, if this requirement is ignored.

Warning: Human injury or equipment damage may be caused, if this requirement is ignored.

Attention: Equipment damage, loss of data or poor performance may be caused, if this requirement is ignored.

Commissioning Engineer: The engineer who installs or operates the equipment should be well trained in electricity and safety and familiar with the operation, debug, and maintenance of the equipment.

Warning Label

The warning label indicates the possibility of human injury or equipment damage, and advises the proper step to avoid the danger. In this manual, there are three types of warning labels as below.

Labels	Description
Danger	Serious human injury or even death may be caused, if this requirement is ignored.
Warning	Human injury or equipment damage may be caused, if this requirement is ignored.
Attention	Equipment damage, loss of data or poor performance may be caused, if this requirement is ignored.

Safety Instruction

	♦	Performed only by commissioning engineers.
	\diamond	This UPS is designed for commercial and industrial
Z Danger		applications only, and is not intended for any use in life-support
		devices or system.
	\diamond	Read all the warning labels carefully before operation, and
Varning		follow the instructions.
	\diamond	When the system is running, do not touch the surface with this
		label, to avoid any hurt of scald.
	\diamond	ESD sensitive components inside the UPS, anti-ESD measure
All A		should be taken before handling.

Move & Install

A Danger	 Keep the equipment away from heat source or air outlets. In case of fire, use dry powder extinguisher only, any liquid extinguisher can result in electric shock.
Warning	 Do not start the system if any damage or abnormal parts founded. Contacting the UPS with wet material or hands may be subject to electric shock.
Attention	 ♦ Use proper facilities to handle and install the UPS. Shielding shoes, protective clothes and other protective facilities are necessary to avoid injury. ♦ During positioning, keep the UPS way from shock or vibration. ♦ Install the UPS in proper environment, more detail in section 3.3.

Debug & Operate

	\diamond	Make sure the grounding cable is well connected before
		connecting the power cables, the grounding cable and neutral
		cable must be in accordance with the local and national codes
		practice.
	\diamond	Before moving or re-connecting the cables, make sure to cut
A		off all the input power sources, and wait for at least 10 minutes
/h Dongor		for internal discharge. Use a multi-meter to measure the voltage
Danger		on terminals and ensure the voltage is lower than 36V before
		operation.
	\diamond	Risk of Voltage Backfeed.Before working on the circuits,
		isolate the Uninterruptible Power Supply (UPS), and then
		check for Hazardous Voltage between all terminals
		including the protective earth.
_	\diamond	The earth leakage current of load will be carried by RCCB or
		RCD.
Attention	♦	Initial check and inspection should be performed after long
		time storing of UPS.

Maintenance&Replacement

	\diamond	All the equipment maintenance and servicing procedures
		involving internal access need special tools and should be
		carried out only by trained personnel. The components that can
		only be accessed by opening the protective cover with tools
_		cannot be maintained by user.
	\diamond	This UPS full complies with "IEC62040-1-1-General and
/ 🖊 Danger		safety requirements for use in operator access area UPS".
		Dangerous voltages are present within the battery box.
		However, the risk of contact with these high voltages is
		minimized for non-service personnel. Since the component
		with dangerous voltage can only be touched by opening the
		protective cover with a tool, the possibility of touching high

voltage component is minimized. No risk exists to any
personnel when operating the equipment in the normal manner,
following the recommended operating procedures in this
manual.
♦ Risk of Fire.TO REDUCE THE RISK OF RIFE,
REPLACE FUSES WITH THE SAME TYPE AND
RATINGS. DISCONNECT OUTPUT AND ALL INPUT
SOURCES OF POWER FROM THIS EQUIPMENT
BEFORE SERVICING.

Battery Safety

	· .	
	♦	All the battery maintenance and servicing procedures involving
		internal access need special tools or keys and should be carried
		out only by trained personnel.
	\diamond	WHEN CONNECTED TOGETHER, THE BATTERY
		TERMINAL VOLTAGE WILL EXCEED 400Vdc AND IS
		POTENTIALLY LEATHAL.
	♦	Battery manufacturers supply details of the necessary
		precautions to be observed when working on or in the vicinity
		of a large bank of battery cells. These precautions should be
		followed implicitly at all times. Particular attention should be
		Tonowed implicitly at an times. Particular attention should be
		paid to the recommendations concerning local environmental
		conditions and the provision of protective clothing, first aid and
		fire-Figure ting facilities.
	♦	Ambient temperature is a major factor in determining the battery
		capacity and life. The nominal operating temperature of battery
		is 20 °C. Operating above this temperature will reduce the
		battery life. Periodically change the battery according to the
		battery user manuals to ensure the back-up time of UPS.
	\diamond	Replace the batteries only with the same type and the same
Z Danger		number, or it may cause explosion or poor performance.
	\diamond	When connecting the battery, follow the precautions for
		high-voltage operation before accepting and using the battery,
		check the appearance the battery. If the package is damaged, or
		the battery terminal is dirty, corroded or rusted or the shell is
		broken deformed or has leakage, replace it with new product
		Otherwise battery capacity reduction electric leakage or fire
		onici wise, battery capacity reduction, electric leakage of the
		may be caused.
		• Before operating the battery, remove the finger ring, watch,
		necklace, bracelet and any other metal jewelry
		 Wear fubber gloves. Eve protection should be worn to prevent injury from
		• Eye protection should be worn to prevent injury from
		 Only use tools (e.g. wrench) with insulated handles
		 The batteries are very heavy. Please handle and lift the
		battery with proper method to prevent any human injury or
		damage to the battery terminal.
		• Do not decompose, modify or damage the battery.
		Otherwise, battery short circuit, leakage or even human
		injury may be caused.

	The battery contains sulfuric acid. In normal operation, all
	the sulfuric acid is attached to the separation board and
	plate in the battery. However, when the battery case is
	broken, the acid will leak from the battery. Therefore, be
	sure to wear a pair of protective glasses, rubber gloves and
	skirt when operating the battery. Otherwise, you may
	become blind if acid enters your eyes and your skin may be
	damaged by the acid.
•	At the end of battery life, the battery may have internal
	short circuit, drain of electrolytic and erosion of
	positive/negative plates. If this condition continues, the
	battery may have temperature out of control, swell or leak.
	Be sure to replace the battery before these phenomena
	happen.
•	If a battery leaks electrolyte, or is otherwise physically
	damaged, it must be replaced, stored in a container resistant
	to sulfuric acid and disposed of in accordance with local
	regulations.
	If electrolyte comes into contact with the skin, the affected
	area should be washed immediately with water.

Disposal

	Warning	¢	Dispose of used battery according to the local instructions
--	---------	---	---

1 Overview

1.1 Product Description

The RM series Modular UPS is an online double-conversion UPS that uses digital signal processing(DSP) technology. Provide a stable and uninterrupted power supply for the important load.

1.2 System conceptual diagram

The Modular UPS is configured by the following part: Power modules, Bypass & Monitoring unit, and cabinet with manual Bypass switch. One or several battery strings should be installed to provide backup energy once the utility fails. The UPS structure is shown inFigure 1-1.



Figure 1-1UPS Conceptual Diagram

1.3 Power moduleconceptual diagram

The power module conceptual diagram is shown as Figure 1-2. The Power module contains a rectifier, an inverter, and a DC/DC converter for charge and discharge of the external batteries.



Figure1-2Power moduleconceptual diagram

1.4 Working Modes

The Modular UPS is an on-line, double-conversion UPS that permits operation in the following modes:

- Normal mode
- Battery mode
- Bypass mode
- Maintenance mode (manual bypass)
- ECO mode
- Auto-restart mode
- Frequency Converter mode

1.4.1 Normal mode

The inverter of power modules continuously supply the critical AC load. Therectifier/charger derives power from the AC mains input source and supplies DC power to the inverter while simultaneously FLOAT or BOOST charging its associated backup battery.



Figure1-3UPS conceptual diagram in normal mode

· Indicates the energy flow direction.

1.4.2 Battery Mode

Note

Upon failure of the AC mains input power, the inverter of power module, which obtain power from the battery, supply the critical AC load. There is no interruption in power to the critical load upon failure. After restoration of the AC mains input power, the" Normal mode" operation will continue automatically without the necessity of user intervention.



Figure1-4UPS conceptual diagram in Battery mode

Note

With the function of Battery cold start, the UPS may start without utility. See more detail in section 4.1.2.

1.4.3 Bypass Mode

If the inverter overload capacity is exceeded under Normal mode, or if the inverter becomes unavailable for any reason, the static transfer switch will perform a transfer of the load from the inverter to the bypass source, with no interruption in power to the critical AC load. Should the inverter be asynchronous with the bypass, the static switch will perform a transfer of the load from the inverter to the bypass with power interruption to the load. This is to avoid large cross currents due to the paralleling of unsynchronized AC sources. This interruption is programmable but typically set to be less than 3/4 of an electrical cycle, e.g., less than 15ms (50Hz) or less than 12.5ms (60Hz). The action of transfer/re-transfer can also be done by the command through monitor.



Figure1-5UPS conceptual diagram inBypass Mode

1.4.4 Maintenance Mode (Manual Bypass)

A manual bypass switch is available to ensure continuity of supply to the critical load when the UPS becomes unavailable e.g. during a maintenance procedure.



Figure1-6UPS conceptual diagram inMaintenance Mode



- During Maintenance mode, dangerous voltages are present on the terminal of input, output and neutral, even with all the modules and the LCD turned off.
- The UPS which without External maintenance switch in Maintenance Mode, dangerous voltages are present on terminal and internal Copper bar.

1.4.5 ECO Mode

The economy control operation (ECO) mode is an energy-saving mode, In ECO mode, when the bypass input voltage is within the ECO voltage range, the static bypass turns on, andthe bypass supplies power, and inverter is standby. When the bypass inputvoltage is beyond the ECO voltage range, the UPS transfers from bypass mode to normal mode.



Figure1-7UPS conceptual diagram inECO Mode

Note

There is a short interruption time (less than 10ms) when transfer from ECO mode to battery mode, it must be sure that the interruption as no effect on loads.

1.4.6 Auto-restart Mode

The battery may become exhausted following an extended AC mains failure. The inverter shuts down when the battery reaches the End of Discharge Voltage (EOD). The UPS may be programmed to "System Auto-Start Mode after EOD". The system starts after a delay time when the AC main recovers. The mode and the delay time are programmed by the commissioning engineer.

1.4.7 Frequency Converter Mode

By setting the UPS to Frequency Converter mode, the UPS could present a stable output of fixed frequency (50 or 60Hz), and the bypass static switch is not available.

1.5 UPS Structure

1.5.1 UPS Configure ration

The UPS configure ration is provided inTable 1-1.

Item	Components	Quantity/ pcs	Remark
2-slot Cabinet10-slot Cabinet	Circuit Breaker	4	factory installed
	Bypass & Monitoring unit	1	factory installed
4-slot Cabinet	Manual Bypass Breaker	1	factory installed
6-slot Cabinet	Bypass & Monitoring unit	1	factory installed
40kVA Power module	Power module	1~10	Requisite, installed on site
50kVA Power module	Power module	1~10	Requisite, installed on site

1.5.2 UPS Structure

The UPS structure is shown in Figure 1-8.



(a)2-slot UPSCabinet structure



(c)6-slot UPSCabinet structure



(d) 10-slot UPSCabinet structure Figure1-8UPS structure

2 Installation

2.1 Location

As each site has its requirements, theinstallationinstructions in this section areto act as a guide for the general procedures and practices that should be observed by the installingengineer.

2.1.1 Installation Environment

The UPS is intended for indoor installation and uses forced convection cooling by internal fans. Please make sure there is enough space for the UPS ventilation and cooling.

Keep the UPS far away from water, heat and inflammable and explosive, corrosivematerial. Avoid installing the UPS in the environment with direct sunlight, dust, volatile gases, corrosive material and high salinity.

Avoid installing the UPS in the environment with conductive dirt.

The operating environment emperature for battery is 20° C- 25° C. Operating above 25° C will reduce the battery life, and operation below 20° C will reduce the battery capacity.

The battery will generate a little amount of hydrogen and oxygen at the end of charging; ensure the fresh air volume of thebattery installation environment must meet EN50272-2001 requirements.

If external batteries are to be used, the battery circuit breakers (or fuses) must be mounted as close as possible to the batteries, and the connecting cables should be as short as possible.

2.1.2 Site Selection

Ensure the ground or installation platform can bear the weight of the UPS cabinet, batteries and battery rack.

The UPS cabinet, battery can battery rack are suitable for mounting on concrete or other non-combustible surface on

No vibration and less than 5 degree inclinationhorizontally.

The equipment should be stored in a room so as to protect it againstexcessivehumidity and heat sources.

The battery needs to be stored in dry and cool place with good ventilation. The most suitable storage temperature is 20 \degree to 25 \degree .

2.1.3 Weight and Dimensions

The size of three views for the UPS cabinet is shown inFigure2-2.



Ensure there is at least 0.8m before the front of the cabinet so as to easily maintain the power module with the front door fully open and at least 0.5m behind for ventilation and cooling. The room reserved for the cabinet is shown inFigure2-1.



Figure2-1 Room reserved for the cabinet (Unit: mm)



(a) Dimensions of 2-slot Cabinet (unit: mm)



(b) Dimensions of 4-slot Cabinet (unit: mm)



(c) Dimensions of 6-slot Cabinet (unit: mm)



(d) Dimensions of 10-slot Cabinet (unit: mm)

Figure2-2Dimensions

Ensure that the floor or installation support can bear the weight of the UPS, batteries, and battery racks. The weight of batteries and battery racks depends on the site requirements. The weightfor the UPS cabinet is shown in Table 2-1.

Capacity	Weight
2-slot Cabinet	120Kg
4-slot Cabinet	170 Kg
6-slot Cabinet	220 Kg
10-slot Cabinet	450 Kg
40KVA power module	44 Kg
50KVA power module	45 Kg

2.2 Unloading and Unpacking

2.2.1 Moving and Unpacking of the Cabinet

The steps to move and unpack the cabinet are as follows:

- 1) Check if any damages to the packing. (If any, contact to the carrier)
- 2) Transport the equipment to the designated site by forklift, as shown inFigure2-3.



Figure2-3Transport to the designated site

3) Open the top plate of the steel-edged wooden case with slotted awl and pier,followed by sideboards (seeFigure2-4).



- Figure2-4Disassemble the case
- 4) Remove the protective foam around the cabinet.



Figure2-5Remove the protective foam

5) Check the UPS.

(a) Visually examine if there are any damages to UPS during transportation. If any, contact to the carrier.

(b) Check the UPS with the list of the goods. If any items are not included in the list, contact to our company or the local office.

6) Dismantle the bolt that connects the cabinet and wooden pallet after disassembly.

7) Move the cabinet to the installation position.

Attention

Be careful while removing to avoid scratching the equipment.

Attention

The waste materials of unpacking should be disposed to meet the demand for environmental protection.

2.3 Positioning

2.3.1 Positioning Cabinet

The UPS cabinet has two way of supporting itself: One is to support itself temporarily by the four wheels at the bottom, making it convenient to adjust the position of the cabinet; The other is by anchor bolts to support the cabinet permanently after adjusting the position of the cabinet. The supporting structure is shown in Figure 2-6.



(a)Supporting structure of 2-slot Cabinet(Bottom view, unit: mm)



(b)Supporting structure of 4-slot Cabinet and 6-slot Cabinet(Bottom view, unit: mm)



(c)Supporting structure of 10-slot Cabinet(Bottom view, unit: mm)

Figure2-6Supporting structure

The steps to position the cabinet are as follows:

- 1) Ensure the supporting structure is in good condition and themountingfloor is smooth and strong.
- 2) Retract theanchor bolts by turning them counter clockwiseusing wrench. The cabinet is then supported by the four wheels.
- 3) Adjust the cabinet to the right position by the supporting wheels.
- 4) Put downtheanchor bolts by turning them clockwiseusing wrench, the cabinet is then supported by the four anchor bolts.
- 5) Ensure the four anchor bolts are in the same height and the cabinet is fixed and immovable.
- 6) Positioning done.

Attention

Auxiliaryequipment is needed when the mountingfloor is not solid enough to support the cabinet, which helps distribute the weight over a larger area. Forinstance, cover the floor with iron plate or increase the supporting area of the anchor bolts.

2.4 Battery

Three terminals (positive, neutral, negative) aredrawn from the battery unit and connected to UPS system. Theneutral line is drawn from the middle of the batteries in series (See Figure2-7).



Figure2-7Battery stringwiring diagram



The battery terminal voltage is of more than 200Vdc, please follow the safety instructions to avoid electric shock hazard.

Ensure the positive, negative, neutral electrode iscorrectly connected from the battery unitterminals to the breaker and from the breaker to the UPS system.

2.5 Cable Entry

Cables can enter the 2-slot cabinet and 4-slot cabinet from the bottom, can enter the 6-slot cabinet from the top, and can enter the 10-slot cabinet both from the top and bottom. The cable entry is shown inFigure2-8.



(a) Cable Entry of 2-slot Cabinet and 4-slot Cabinet



(b) Cable Entry of 6-slot Cabinet



(c) Top cable Entry of 10-slot Cabinet



(d) Bottom cable Entry of 10-slot Cabinet

Figure2-8Cable Entry

2.6 Power Cables

2.6.1 Specifications

The UPS power cablesare recommended inTable 2-2.

Contents		80/40	100/50	150/50	200/50	250/50	300/50	400/40	500/50	
	Main Inp Current(A	ut A)	128	159	239	319	398	478	638	797
		Α	35	50	95	120	185	185	2*150	2*185
Main Input	CableSection	В	35	50	95	120	185	185	2*150	2*185
	(mm ²)	С	35	50	95	120	185	185	2*150	2*185
		Ν	35	50	95	120	185	185	2*150	2*185
Main Output Current(A)		put A)	121	152	227	303	379	454	606	758
		А	35	50	70	120	185	185	2*150	2*185
Main Output	CableSection	В	35	50	70	120	185	185	2*150	2*185
	(mm ²)	С	35	50	70	120	185	185	2*150	2*185
		Ν	35	50	70	120	185	185	2*150	2*185
Bypass Input	Bypass In Current(A	put A)	121	152	227	303	379	454	606	758

Table 2-2Recommended cables for power cables

(Optional)		А	35	50	70	120	185	185	2*150	2*185
	CableSection	В	35	50	70	120	185	185	2*150	2*185
	(mm ²)	С	35	50	70	120	185	185	2*150	2*185
		Ν	35	50	70	120	185	185	2*150	2*185
Pattory	Battery Input current(A)		167	208	313	417	521	626	833	1042
		+	50	70	120	185	240	240	2*185	2*240
Input	CableSection	-	50	70	120	185	240	240	2*185	2*240
	(mm ²)	Ν	50	70	120	185	240	240	2*185	2*240
PE	CableSection (mm ²)	PE	50	70	120	185	2*120	2*120	2*150	2*150

Note

- The recommended cable section for power cables are only for situations described below:
- Ambient temperature: 30° C.
- AC loss less than 3%, DC loss less than 1%, The length of the AC power cables are no longer than 50 m and the length of the DC power cables are no longer than 30 m.
- Currents listed in the table are based on the 380V system (Line-to-line voltage).
- The size of neutral lines should be 1.5~1.7 times the value listed above when the predominant load is non-linear.

2.6.2 Specifications for Power Cables Terminal

Specifications for power cables connector are listed as Table 2-3.

Туре	Port	Connection	Bolt	Torque Moment
	Mains input	Cables crimped OT terminal	M6	4.9Nm
2 slot	Bypass Input	Cables crimped OT terminal	M6	4.9Nm
2-Slot	Battery Input	Cables crimped OT terminal	M8	13Nm
	Output	Cables crimped OT terminal	M6	4.9Nm
	PE	Cables crimped OT terminal	M6	4.9Nm
	Mains input	Cables crimped OT terminal	M10	15Nm
4-slot cabinet	Bypass Input	Cables crimped OT terminal	M10	15Nm
	Battery Input	Cables crimped OT terminal	M10	15Nm
	Output	Cables crimped OT terminal	M10	15Nm
	PE	Cables crimped OT terminal	M10	15Nm
	Mains input	Cables crimped OT terminal	M12	28Nm
6-slot cabinet	Bypass Input	Cables crimped OT terminal	M12	28Nm
	Battery Input	Cables crimped OT terminal	M12	28Nm
	Output	Cables crimped OT terminal	M12	28Nm
	PE	Cables crimped OT terminal	M12	28Nm
10-slot	Mains input	Cables crimped OT terminal	M16	96Nm
cabinet	Bypass Input	Cables crimped OT terminal	M16	96Nm

Table 2-3Requirements for power module terminal

Battery Input	Cables crimped OT terminal	M16	96Nm
Output	Cables crimped OT terminal	M16	96Nm
PE	Cables crimped OT terminal	M16	96Nm

2.6.3 Circuit Breaker

The circuit breakers (CB) for the system are recommended inTable 2-4.

Installed position	80/40	100/50	150/50	200/50			
Main input CB	160A/3P	250A/3P	320A/3P	400A/3P			
Bypass input CB	160A/3P	250A/3P	320A/3P	400A/3P			
Output CB	160A/3P	250A/3P	320A/3P	400A/3P			
Manual Bypass CB	160A/3P	250A/3P	320A/3P	400A/3P			
Dattam: CD	225A,	250A,	400A,	630A,			
Battery CB	250Vdc	250Vdc	250Vdc	250Vdc			
Installed position	250/50	300/50	400/40	500/50			
Main input CB	630A/3P	630A/3P	800A/3P	800A/3P			
Bypass input CB	630A/3P	630A/3P	800A/3P	800A/3P			
Output CB	630A/3P	630A/3P	800A/3P	800A/3P			
Manual Bypass CB	630A/3P	630A/3P	800A/3P	800A/3P			
Battery CB	800A/3P	1000 A/3P 250Vdc	1000A,	1250A,			
Datter y CD	250Vdc	1000A/3F 230 Vuc	250Vdc	250Vdc			

Table 2-4 Recommended CB



The CB with RCD (Residual Current Device) is not suggested for the system.

2.6.4 Connecting Power Cables

The steps of connecting power cablesare as follows:

- 1) Verify that all the switches of the UPS are completely open and the UPS internal maintenance bypass switch is opened. Attach necessary warning signs to these switches to prevent unauthorized operation.
- 2) Open the front door of the cabinet(10-slot Cabinet open the back door), remove the plastic cover. The input and output terminal, battery terminal and protectiveearth terminal are shown inFigure2-9.



(a) Connections terminals of 2-slot cabinet



(b) Connections terminals of 4-slot cabinet



(c) Connections terminals of 6-slot cabinet



(d)Connections terminals of10-slot cabinet

Figure2-9Connections terminals

- 3) Connect the protective earth wire to protective earth terminal (PE).
- 4) Connect the AC input supply cables to the Input terminal and AC output supply cables to the Output terminal.
- 5) Connect the Battery cables to the Battery terminal.
- 6) Check to make sure there is no mistake and re-install all the protective covers.

Attention

The operations described in this section must be performed by authorized electricians or qualified technical personnel. If you have any difficulties, contact the manufacturer or agency.

- Tighten the connections terminals to enough torque moment, refer to Table 2-3, and pleaseensure correct phaserotation.
- The grounding cable and neutral cable must be connected in accordance with local and national codes.
- Load must be connected to the same ground as that of UPS system

2.7 Control and Communication Cables

The front panel of the bypass module provides dry contact interface (J2-J11) and communication interface (RS232,RS485,SNMP,Intelligent card interface and USB port), as it is shown in Figure2-10.



(a) Dry contact & communication interface of 2-slot cabinet - 6-slot cabinet

O Battery Cold Start



(a) Dry contact & communication interface of 10-slot cabinet

Figure2-10Dry contact & communication interface

2.7.1 Dry Contact Interface

Dry contact interface includes port J2-J11 and the functions of the dry contact are shown in Table 2-5.

Port	Name	Function
J2-1	TEMP_BAT	Detection of battery temperature
J2-2	TEMP_COM	Common terminal for temperature detection
J3-1	ENV_TEMP	Detection of environmental temperature
J3-2	TEMP_COM	Common terminal for temperature detection
J4-1	REMOTE_EPO_NC	Trigger EPO when disconnect with J4-2
J4-2	+24V_DRY	+24V
J4-3	+24V_DRY	+24V
J4-4	REMOTE_EPO_NO	Trigger EPO when shorted with J4-3
J5-1	+24V_DRY	+24V
15-2	GEN CONNECTED	Input dry contact, function issettable,
35-2	OEN_CONNECTED	Default: interface for generator
J5-3	GND_DRY	Ground for +24V
I6-1	BCB Drive	Output dry contact, function issettable.
501	Deb blive	Default: Batterytrip signal

		Input dry contact, function issettable.
J6-2	BCB_Status	Default:BCB Status and BCB Online, (Alert no
		battery when BCB Status is invalid).
J7-1	GND_DRY	Ground for +24V
		Input dry contact, function issettable.
J7-2	BCB_Online	Default:BCB Status and BCB Online (Alert no
		battery when BCB Status is invalid).
		Output dry contact (Normally closed), function
J8-1	BAT_LOW_ALARM_NC	issettable.
		Default: Low battery alarming
		Output dry contact (Normally open), function
J8-2	BAT_LOW_ALARM_NO	issettable.
		Default: Low battery alarming
J8-3	BAT_LOW_ALARM_GND	Common terminal for J8-1 and J8-2
		Output dry contact, (Normally closed) function
J9-1	GENERAL_ALARM_NC	issettable.
		Default: Fault alarming
		Output dry contact, (Normally open) function
J9-2	GENERAL_ALARM_NO	issettable.
		Default: Fault alarming
J9-3	GENERAL_ALARM_GND	Common terminal for J9-1 and J9-2
		Output dry contact, (Normally closed) function
J10-1	UTILITY_FAIL_NC	issettable.
		Default: Utility abnormal alarming
		Output dry contact, (Normally open) function
J10-2	UTILITY_FAIL_NO	issettable.
		Default: Utility abnormal alarming
J10-3	UTILITY_FAIL_GND	Common terminal for J10-1 and J10-2

Note

The settable functions for each port can be set by the monitor software.

The default functions of each port are described as follows.

Battery Warning Output Dry Contact Interface

The input dry contact J2 and J3 can detect the temperature of batteries and environment respectively, which can be used in environment monitoring and battery temperature compensation. Interfaces diagram for J2 and J3 are shown in Figure2-11, the description of interface is in Table 2-6.



Figure2-11J2 and J3 for temperature detecting

Table 2-6Description of J2 and J3	3
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Port	Name	Function
J2-1	TEMP_BAT	Detection of battery temperature
J2-2	TEMP_COM	common terminal
J3-1	ENV_TEMP	Detection of environmental temperature
J3-2	TEMP_COM	common terminal

Note

Specified temperature sensor is required for temperature detection (R25=5Kohm, B25/50=3275), please confirm with the manufacturer, or contact the local maintenance engineers when placing an order.

Remote EPO Input Port

J4 is the input port for remote EPO. It requires shorting NC and +24Vand disconnecting NO and +24V during normal operation, and the EPO is triggered when opening NC and +24V or shorting the NO and +24V. The port diagram is shown in Figure2-12 and port description is shown in Table 2-7.



Figure2-12Diagram of input port for remote EPO

Port	Name	Function
J4-1	REMOTE_EPO_NC	Trigger EPO when disconnect with J4-2
J4-2	+24V_DRY	+24V
J4-3	+24V_DRY	+24V
J4-4	REMOTE_EPO_NO	Trigger EPO when connect with J4-3

Table 2-7Description of input port for remote EPO

Generator Input Dry Contact

The default function of J5 is the interface for generator J5 Connect pin 2 of J5 with +24V power supply; it indicates that the generator has been connected with the system. The interface diagram is shown in Figure2-13, and interface description is shown in Table 2-8.



Figure2-13Diagram of status interface and connection of generator

Table 2-8	8Description	of status	interface	and c	onnection	of	generator
							D

Port	Name	Function
J5-1	$+24V_DRY$	+24V
J5-2	GEN_CONNECTED	Connection status of generator
J5-3	GND_DRY	Power ground for +24V

BCBInput Port

The default function of J6 and J7 are the ports of BCB. The port diagram is shown in Figure2-14, and description is shown in Table 2-9.



Figure2-14BCB Port

Table 2-9Description	of BCB port
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Port	Name	Function
IG 1		BCB contact drive, provides +24V voltage, 20mA
J0-1	BCB_DRIV	drive signal
16.0	DCD Status	BCB contact status, connect with the normally open
J0-2	BCB_Status	signal of BCB
J7-1	GND_DRY	Power ground for +24V
17.2	PCP Online	BCB on-lineinput (normally open), BCB is
J7-2	DCD_Unine	on-line when the signal is connecting with J7-1

Battery Warning Output Dry Contact Interface

The default function of J8 is the output dry contact interface, which presents the battery warnings of low or excessive voltage, when the battery voltage is lower than set value, an auxiliary dry contact signal will be activated via the isolation of a relay. The interface diagram is shown in

Figure 2-15, and description is shown in Table 2-10.



Figure2-15Battery warning dry contact interface diagram

Port	Name	Function
I8-1	BAT LOW ALARM NC	Battery warning relay (normally closed) will be
50 1		open during warning
J8-2	BAT LOW ALARM NO	Battery warning relay (normally open) will be
		closed during warning
J8-3	BAT_LOW_ALARM_GND	Common terminal

Table 2-10Battery	warning	dry	contact	interface	description
2	\mathcal{O}	~			1

General Alarm Output Dry Contact Interface

The default function of J9 is the general alarm output dry contact interface. When one or more warningsare triggered, an auxiliary dry contact signal will be active via the isolation of a relay. The interface diagram is shown in Figure2-16, and description is shown in Table 2-11.



Figure2-16Integrated warning dry contact interface diagram

Port	Name	Function
I9-1	GENERAL ALARM NC	Integrated warning relay (normally closed) will be
371		open during warning
19_2	GENERAL ALARM NO	Integrated warning relay (normally open) will be
37-2		closed during warning
J9-3	GENERAL_ALARM_GND	Common terminal

Table 2-11General alarm dry contact interface description

Utility Fail Warning Output Dry Contact Interface

The default function of J10 is the output dry contact interface for utility failure warning, when the utility fails, the system will send a utility failure warning information, and provide an auxiliary dry contact signal via the isolation of a relay. The interface diagram is shown in Figure2-17, and description is shown in Table 2-12.



Figure2-17Utility failure warning dry contact interface diagram

Port	Name	Function
I10-1	ΙΤΗ ΙΤΥ ΕΔΗ ΝΟ	Mains failure warning relay(normally closed) will
510 1		be open during warning
110.2	UTILITY FAIL NO	Mains failure warning relay (normally open) will
510-2		be closed during warning
J10-3	UTILITY_FAIL_GND	Common terminal

|--|

2.7.2 Communication Interface

RS232, RS485 and USB port: Provide serial data which can be used for commissioning and maintenance by authorized engineersor can be used for networking or integrated monitoring system in the service room.

SNMP: Used on site installation for communication (Optional).

Intelligent card interface: Extensiondry contactinterface (Optional).
3 Operator Control and Display Panel

3.1 UPS operator panel

The structure of operator control and display panel for cabinet is shown inFigure3-1.



1:LCD touch screen2: EPO switch3: Audible Alarm (Buzzer)4:Status indicator5: Bypass indicator6: Rectifier indicator7: Inverter indicator8: Load indicator9: Battery indicator10: Bypass transfer11: Invertertransfer12: Mute

Figure3-1Control and display panel

The LCDpanel for cabinet is divided into three functional areas: LED indicator, control and operation keys and LCD touch screen.

3.1.1 LEDIndicator

There are 6 LEDs on the panel to indicate the operating status and fault. (See Figure 4-1). The description of indicators is shown in Table 3-1

Indicator	State	Description		
	Steady green	Rectifier normal for all modules		
	Flashing	Rectifier normal for at least one module, mains normal		
Rectifier	green			
indicator	Steady red	Rectifier fault		
F	Flashing red	Mains abnormal for at least one module		
	Off	Rectifier not operating		
Battery indicator	Steady green	Battery charging		
	Flashing	Battery discharging		
	green			
		Battery abnormal (battery failure, no battery or battery reversed)		
	Steady red	or battery converter abnormal (failure, over current or over		
		temperature), EOD		
	Flashing red	Battery low voltage		

Table 3-1Status description of indicator

Indicator	State	Description		
	Off	Battery and battery converter normal, battery not charging		
D	Steady green	Load supplied by bypass		
	Steady red	Bypass abnormal or out of normal range, or static bypass switch		
indicator		fault		
mulcator	Flashing red	Bypass voltage abnormal		
	Off	Bypass normal		
	Steady green	Load supplied by inverter		
	Flashing	Inverter on, start, synchronization or standby (ECO mode) for at		
	green	least one module		
Inverter	Steady red	System output not supplied by inverter, inverter fault for at least		
indicator		one module.		
	Flashing red	System output supplied by inverter, inverter fault for at least one		
		module.		
	Off	Inverter not operating for all modules		
	Steady green	UPS output ON and normal		
Lord	Steady red	UPS overload time is out, or output short, or output no power		
Load		supply		
mulcator	Flashing red	Overload output of UPS		
	Off	No output of UPS		
Status	Steady green	Normal operation		
indicator	Steady red	Failure		

There are two different types of audible alarm during UPS operation, as shown in Table 3-2.

Alarm	Description	
Two short alarm	when system has general alarm (for example: AC fault)	
with a long one	when system has general alarm (for example. AC fault),	
Continuous alarm	When system has serious faults (for example: fuse blown or hardware	
Continuous alarm	failure)	

3.1.2 Control and Operation Keys

Control and operation keys includefour keys of 2, 10, 11 and 12(See Figure 3-1), which are used together with LCD touch screen. The functions description is shown in Table 3-3.

Function Key	Description	
EDO	Long press, cut off the load power (shut down the rectifier, inverter,	
LFU	static bypass and battery)	
DVD	Long press, transfer to the bypass(Push the button up in the back of	
DIP	the door to enable, see Figure4.2)	
INV Long press, transfer to the inverter		
MUTE Long press to switch between turning off and on the buzz		

Table 3-3Functions of Control and operation keys

3.1.3 LCD touch Screen

Users can easily browse the information, operate the UPS, and set the parametersthrough the LCD touchscreen, which is friendly for users.

After the monitoring system starts self-test, the system enters the home page, following the welcome window. The home page is shown inFigure 3-2.



Figure3-2Home page

Home page consists of Status bar, Information display, warning information and main menu.

• Status bar

The Status bar contains the model of the product, capacity, operational mode, and the number of the power module and the time of the system.

• Warning Information

Display the warning information of the cabinet.

• Information Display

Users can check the information of the cabinet in this area.

The bypass voltage, main input voltage, batteryvoltage, and output voltages are presented in the form of gauge.

The loads are displayed in the form of bar chart in percentage. The green area stands for a load of less than 60%, yellow area for a load of 60%-100% and red area for a load of more than 100%. The energyflow mimics the flow of the power.

• Main Menu

The main menu includes Cabinet, Power m, setting,log, Operate and Scope. Users can operate and control the UPS, and browse all measured parameters through main menu. The structure of the main menu tree is shown inFigure3-3.



Figure3-3Structure of menu tree

3.2 Main Menu

The main menu includes Cabinet, Power module, Setting, Log, Operate and Scope and it is described in details below.

3.2.1 Cabinet

Touch the icon cabinet, (At the bottom left of the screen), and the system enters the page of the Cabinet, as it is shown inFigure3-4.



Figure3-4Cabinet

The Cabinet comprisessectors of title, information display, versionrunning status, information display and submenu. The sectors are described as follows.

• Title

Display the information of the selected submenu.

• Running status

The squares shown on the mini current path represent the various UPS power paths and show the current UPSoperating status. (The green square indicating the block working normally, the white indicating the absent of the block and red indicating the absence of the block or in fault).

• Version Information

The version information for LCD of the cabinet and monitor.

Submenu

It includes the submenu of Bypass, Main, Output, load and battery.

• Information display

Display information of each submenu.

The interface of each submenu is shown inFigure3-5.



(a) Interface of Main (b) Interface of Output



(d) Interface of Load(d) Interface of Battery Figure3-5Submenu interface of Cabinet

The submenu of Cabinet is described in details below inTable 3-4.

Submenu Name	Contents	Meaning
	V	Phase voltage
NC .	А	Phase current
Main	Hz	Input frequency
	PF	Power factor
Davesa	V	Phase voltage
Bypass	А	Phase current

Table 3-4Description of each submenu of Cabinet

Submenu Name	Contents	Meaning
	Hz	Bypass frequency
	PF	Power factor
	V	Phase voltage
	А	Phase current
Output	Hz	Output frequency
	PF	Power factor
	kVA	Sout:Apparent Power
T 1	kW	Pout: Active Power
Load	kVar	Qout:Reactive power
	%	Load (The percentage of the UPS load)
	V	Battery positive/negativeVoltage
	А	Battery positive/negative Current
	Capacity (%)	The percentage compared with new battery
	Capacity (70)	capacity
Dattany	Remain T (Min)	Remaining battery backup time
Dattery	Battery(°C)	Battery Temp
	Ambient(°C)	Environmental Temp
	Total Work T	Total work time
	Total Discharge T	Total discharging time

3.2.2 Power module

Touch the icon (At the bottom left of the screen), and the system enters the page of the Power unit, as is shown inFigure 3-6.



Figure3-6 Power module

The module comprises sectors of title, information display, power module

information, version information and submenu. The sectors are described as follows.

• Title

Present the title of submenuof the selected power module.

Information display

Display information of each submenu.

• Power module information

The users can choose the power module to browse the information in the "Information display" sector.

Colors of thesquareon the mimic current pathrepresent the various powermodule paths and show the current operating status.

(a) The green square indicating the power module working normally,

(b) Theblack indicating power modulein invalid

(c) The red indicating the absence of the power module or in fault

Take the 5#power module for example. It indicates that UPS is in Normal mode and the rectifier and inverter are working normally. The battery is not connected.

• Version Information

The version information for rectifier and inverter of the selected power module.

Submenu

The submenu includes Input, Output, Load, INFOand S-CODE.

Users can enter the interface of each submenu by directly touching the icon .Each interface of the submenu is shown in Figure 3-7.



(c) Interface of Information

(d) Interface of S-Code

Figure3-7Module menu

Submenu Name	Contents	Meaning
	V	Input phase voltage of selected module
Ŧ.	А	Input phase current of selected module
Input	Hz	Input frequency of selected module
	PF	Input power factor of selected module
	V	Output phase voltage of selected module
	А	Output phase current of selected module
Output	Hz	Output frequency of selected module
	PF	Output power factor of selected module
	V	Load voltage of selected module
Trad	%	Load (The percentage of the power module selected)
Load	KW	Pout: Active Power
	KVA	Sout:Apparent Power
	BATT+(V)	Battery Voltage (positive)
	BATT-(V)	Battery Voltage (negative)
	BUS(V)	Bus Voltage(Positive &Negative)
	Charger(V)	Charger Voltage(Positive &Negative)
Information	Fan Time	Total Fan's Running time of the selected power module
	Inlet Temperature(°C)	Inlet Temperature of the selected power module
	Outlet Temperature(°C)	Outlet Temperature of the selected power module
S-code	Fault Code	For the maintenance personnel

Table 3-5Description of each submenu of Power module

3.2.3 Setting

Touch the icon (At the bottom of the screen), and the system enters the page of the Setting, as it is shown inFigure 3-8.

Date Format				
YY-MM-DD	MM-DD-YY	DD-MM-YY	LANGUAGE	
	Time Setting		сомм.	
Cur	rent Time 2014-	02-14 11:28:42	USER	
Please	Confirm Settings	✓×	BATTERY	
			SERVICE	
			RATE	
			CONFIGURE	
Home Cabinet	Module		rate Scope	

V Setting interface

Figure3-8Setting menu

The submenus are listed on the right side of the Setting page. Users can enter each of the setting interfaces by touching the relevant icon. The submenus are described in details below inTable 3-6.

Submenu Name	Contents	Meaning
Date&Time	Dateformat setting	Three formats: (a) year/month/day,(b) month/date/year, (c) date/month/year
	Time setting	Setting time
Language	Current language	Language in use
	Language selection	Simplified Chinese and English selectable (The setting taking action immediatelyafter touching the language icon)
	Device Address	Setting the communication address
	RS232 Protocol Selection	SNT Protocol,Modbus Protocol,YD/T Protocol and Dwin (For factory use)
COMM.	Baudrate	Setting the baudrate of SNT,Modbus and YD/T
	Modbus Mode	Setting mode for Modbus:ASCII and RTU selectable
	Modbus parity	Setting the parity for Modbus
	Output voltage Adjustment	Setting the Output Voltage
	Bypass Voltage Up Limited	Up limited working Voltage for Bypass, settable:+10%, +15%, +20%, +25%
USER	Bypass Voltage Down	Down limited working Voltage for Bypass,
COLIK	Bypass Frequency Limited	Permitted working Frequency for Bypass Settable: +-1Hz, +-3Hz, +-5Hz
	Dust Filter Maintenance Period	Setting Dust Filter Maintenance Period
	Battery Number	Setting the number of the battery (12V)
	Battery Capacity	Setting of the AH of the battery
BATTERY	Float Charge Voltage/Cell	Setting the floating Voltage for battery cell (2V)
	Boost Charge Voltage/Cell	Setting the boost Voltage for battery cell (2V)
	EOD(End of discharge) Voltage/Cell,@0.6C Current	EOD voltage for cell battery,@0.6C current
	EOD(End of charge) Voltage/Cell,@0.15C Current	EOD voltage for cell battery,@0.15C current
	Charge Current Percent	Charge current (percentage of the rated
	Battery Temperature	Coefficient for battery
	Compensate	temperaturecompensation
	Boost Charge Time Limit	Setting boost charging time

Table 3-6Description of each submenu of Setting

Submenu Name	Contents	Meaning
	Auto Boost Period	Setting the auto boost period
	Auto Maintenance	Setting the period for auto maintenance
	Discharge Period	discharge
		Setting the system
SERVICE	System Mode	mode:Single ,parallel,Single ECO,parallel
		ECO,LBS,parallel LBS
RATE	Configure the rated Parameter	For the factory use
CONFIGURE	Configure the system	For the factory use

Note

- Users have various permissions to the configuration of the Setting :(a) for the Date &Time, LANGUAGE and COMM, user can set on their own without password. (b)For the USER, a one-level password is needed and the setting must be done by commissioning engineer (c) For the Battery and SERVICE, a Two-level password is needed and it is set by the after-service personal. (d)For the RATE and CONFIGURE, a Three-level password is needed and it is set only by the factory.
- The "C" stands for Ampere number. For instance, if the battery is 100AH, then C=100A.



Ensure the number of the battery, set via the menu or the monitoring software, is completely equal to the real installed number. Otherwise it will cause serious damage to the batteries or the equipment.

3.2.4 Log

Touch the icon (At the bottom of the screen), and the system enters the interface of the Log, as it is shown inFigure3-9Log menu. The log is listed in reverse chronological order(i.e. the first on the screen with #1 is the most new), which displays the events ,warnings and faults information and the data and time they occur and disappear.

NO.	M# EVENTS	TIME
1	0 # Load On UPS-Set	2014 - 2 - 14 16 26:1
2	4 # Module Inserted-Set	2014 - 2 - 14 16 :24: 27
3	0 # Byp Freq Over Track-Set	2014-2-14 16:22:31
4	0 # Load On Bypass-Set	2014 - 2 - 14 16 :21:33
5	0 # Bypass Volt Abnormal-Set	2014 - 2 - 14 16 :21:33
6	0 # Load On Bypass-Set	2014 - 2 - 14 16 :19:41
7	0 # No Load-Set	2014-2-14 16:18:45
8	4 # Load On Bypass-Set	2014 - 2 - 14 16 :18:45
9	0 # Byp Freq Over Track-Set	2014-2-14 16:18:45
10	4 # Module-Exit-Set	2014 - 2 - 14 16 :26: 1
Total Lo	g items 29	
Home	Cabinet Module Setting	Operate Scope

Figure3-9Log menu

The follow Table 3-7 gives the complete list of all the UPS events displayed by history record window and current record window.

NO.	UPS events	Description
1	Fault Clear	Manually clear fault
2	Log Clear	Manually clear History log
3	Load On UPS	Inverter feeds load
4	Load On Bypass	Bypass feeds load
5	No Load	No load
6	Battery Boost	Charger is working in boost charging mode
7	Battery Float	Charger is working in float charging mode
8	Battery Discharge	Battery is discharging
9	Battery Connected	Battery is connected already
10	Battery Not Connected	Battery is not yet connected.
11	Maintenance CB Closed	Manual maintenance breaker is closed
12	Maintenance CB Open	Manual maintenance breaker is opened
13	EPO	Emergency Power Off
14	Module On Less	Available power module capacity is less then the load capacity. Please reduce the load capacity or add extra power module to make sure that the UPS capacity is big enough.
15	Generator Input	Generator is connected and a signal is sent to the UPS.
16	Utility Abnormal	Utility (Grid) is abnormal. Mains voltage or frequency exceeds the upper or lower limit and results in rectifier shutdown. Check the input phase voltage of rectifier.
17	Bypass Sequence Error	Bypass voltage Sequence is reverse. Check if input power cables are connected correctly.

Table 3-7 U	PS Event List
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1		This alarm is triggered by an inverter software routine when the
		amplitude or frequency of bypass voltage exceeds the limit. The
		alarm will automatically reset if the bypass voltage becomes
		normal.
		First check if relevant alarm exists, such as "bypass circuit breaker
		open" "Byp Sequence Err" and "In Neutral Lost" If there is any
		relevant alarm, first clear this alarm.
	Bypass Volt	1 Then check and confirm if the bypass voltage and frequency
18	Abnormal	displayed on the LCD are within the setting range. Note that the
	7 tonormur	rated voltage and frequency are respectively specified by "Output
		Voltage" and "Output Frequency"
		2. If the displayed voltage is abnormal measure the actual hypass
		voltage and frequency. If the measurement is abnormal, check the
		avternal hypass power supply. If the alarm occurs frequently use
		the configurations of tware to increase the bypass high limit set point
		according to the user's suggestions
	Bypass Module	Rypass Module Fails. This fault is locked until power off. Or
19	Equil	bypass for fail
	Bypass Module	Bypass fails fail.
20	Dypass Module	125% of the roted current. The LIPS clorms but has no action
	Bypass Over Load	135% of the fated current. The of S ataritis but has no action.
21	Tout	The bypass overload status continues and the overload times out.
	Tout	This alarm is triggered by an inverter software routine when the
		fraguency of hypass voltage exceeds the limit. The alarm will
		automatically reset if the bypass voltage becomes normal
		First check if relevant alarm exists, such as "bypass circuit breaker
	BypFreq Over	open" "By Sequence Err" and "In Neutral Lost" If there is any
		relevant alarm first clear this alarm
		1. Then check and confirm if the hypass frequency displayed on the
22	Track	I CD are within the setting range. Note that the rated frequency are
	IIdek	LeD are within the setting range. Note that the rated nequency are
		respectively specified by "Output Frequency"
		respectively specified by "Output Frequency".
		respectively specified by "Output Frequency".2. If the displayed voltage is abnormal, measure the actual bypassfrequency. If the measurement is abnormal, check the external
		respectively specified by "Output Frequency".2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently use the
		respectively specified by "Output Frequency".2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point.
		respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions
		 respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions
	Exceed Ty Times	respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions The load is on bypass because the output overload transfer and re transfer is fixed to the set times during the current hour. The
23	Exceed Tx Times	respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions The load is on bypass because the output overload transfer and re-transfer is fixed to the set times during the current hour. The system can recover autometically, and will transfer heads to the
23	Exceed Tx Times Lmt	respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions The load is on bypass because the output overload transfer and re-transfer is fixed to the set times during the current hour. The system can recover automatically and will transfer back to the inverter with 1 hour
23	Exceed Tx Times Lmt	respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions The load is on bypass because the output overload transfer and re-transfer is fixed to the set times during the current hour. The system can recover automatically and will transfer back to the inverter with 1 hour
23	Exceed Tx Times Lmt	respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions The load is on bypass because the output overload transfer and re-transfer is fixed to the set times during the current hour. The system can recover automatically and will transfer back to the inverter with 1 hour Output shorted Circuit. Fist check and confirm if loads have something wrong
23	Exceed Tx Times Lmt Output Short	 respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions The load is on bypass because the output overload transfer and re-transfer is fixed to the set times during the current hour. The system can recover automatically and will transfer back to the inverter with 1 hour Output shorted Circuit. Fist check and confirm if loads have something wrong.
23	Exceed Tx Times Lmt Output Short Circuit	 respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions The load is on bypass because the output overload transfer and re-transfer is fixed to the set times during the current hour. The system can recover automatically and will transfer back to the inverter with 1 hour Output shorted Circuit. Fist check and confirm if loads have something wrong. Then check and confirm if there is something wrong with terminals, acakats or some other power distribution unit.
23	Exceed Tx Times Lmt Output Short Circuit	 respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions The load is on bypass because the output overload transfer and re-transfer is fixed to the set times during the current hour. The system can recover automatically and will transfer back to the inverter with 1 hour Output shorted Circuit. Fist check and confirm if loads have something wrong. Then check and confirm if there is something wrong with terminals, sockets or some other power distribution unit. If the foult is aslynd, mass "Foult Clear" to restart UDS

25	Pattomy FOD	Inverter turned off due to low battery voltage. Check the mains		
23	Ballery EOD	power failure status and recover the mains power in time		
26	Pattomy Test	System transfer to battery mode for 20 seconds to check if batteries		
20	Dattery lest	are normal		
27	Battery Test OK	Battery Test OK		
28	Battery	System transfer to battery mode until to be 1.1*EOD voltage to		
20	Maintenance	maintenance battery string		
20	Battery	Battery maintenance succeed		
29	Maintenance OK			
30	Module inserted	Power Module is inserted in system.		
31	Module Exit	Power Module is pulled out from system.		
32	Rectifier Fail	The N# Power Module Rectifier Fail, The rectifier is fault and		
52		results in rectifier shutdown and battery discharging.		
33	Inverter Fail	The N# Power Module Inverter Fail. The inverter output voltage is		
55		abnormal and the load transfers to bypass.		
	Rectifier Over	The N# Power Module Rectifier Over Temperature. The		
	Temp.	temperature of the rectifier IGBTs is too high to keep rectifier		
		running. This alarm is triggered by the signal from the temperature		
		monitoring device mounted in the rectifier IGBTs. The UPS		
34		recovers automatically after the over temperature signal disappears.		
54		If over temperature exists, check:		
		1. Whether the ambient temperature is too high.		
		2. Whether the ventilation channel is blocked.		
		3. Whether fan fault happens.		
		4. Whether the input voltage is too low.		
35	Fan Fail	At least one fan fails in the N# power module.		
	Output Over load	The N# Power Module Output Over Load. This alarm appears when		
		the load rises above 100% of nominal rating. The alarm		
		automatically resets once the overload condition is removed.		
		1. Check which phase has overload through the load (%) displayed		
36		in LCD so as to confirm if this alarm is true.		
		2. If this alarm is true, measure the actual output current to confirm		
		if the displayed value is correct.		
		Disconnect non-critical load. In parallel system, this alarm will be		
		triggered if the load is severely imbalanced.		
	Inverter Overload	N# Power Module Inverter Over Load Timeout. The UPS overload		
	Tout	status continues and the overload times out.		
		Note:		
		The highest loaded phase will indicate overload timing-out first.		
37		When the timer is active, then the alarm "module over load" should		
		also be active as the load is above nominal.		
		When the time has expired, the inverter Switch is opened and the		
		load transferred to bypass.		
		If the load decreases to lower than 95%, after 2 minutes, the system		
		will transfer back to inverter mode. Check the load (%) displayed in		

		LCD so as to confirm if this alarm is true. If LCD displays that
		overload happens, then check the actual load and confirm if the
		UPS has over load before alarm happens.
	Inverter Over	The N# Power Module Inverter Over Temperature.
	Temp.	The temperature of the inverter heat sink is too high to keep
		inverter running. This alarm is triggered by the signal from the
		temperature monitoring device mounted in the inverter IGBTs. The
		UPS recovers automatically after the over temperature signal
38		disappears.
		If over temperature exists, check:
		Whether the ambient temperature is too high.
		Whether the ventilation channel is blocked.
		Whether fan fault happens.
		Whether inverter overload time is out.
		Inhibit system transfer from bypass to UPS (inverter). Check:
20	On LIDS Inhibited	Whether the power module's capacity is big enough for load.
39	On UPS minuted	Whether the rectifier is ready.
		Whether the bypass voltage is normal.
40	Manual Transfer	Transfer to hypass manually
40	Вур	
	Esc Manual	Escape from "transfer to bypass manually" command. If UPS has
41	Bypass	been transferred to bypass manually, this command enable UPS to
	Dypuss	transfer to inverter.
		Battery Voltage is Low. Before the end of discharging, battery
42	Battery Volt Low	voltage is low warning should occur. After this pre-warning, battery
		should have the capacity for 3 minutes discharging with full load.
43	Battery Reverse	Battery cables are connected not correctly.
		The N# Power Module Inverter Protect. Check:
44	Inverter Protect	Whether inverter voltage is abnormal
		Whether inverter voltage is much different from other modules, if
		yes, please adjust inverter voltage of the power module separately.
		The mains neutral wire is lost or not detected. For 3 phases UPS,
45	Input Neutral Lost	it's recommended that user use a 3-poles breaker or switch between
		input power and UPS.
46	Bypass Fan Fail	At least one of bypass module Fans Fails
47	Manual Shutdown	The N# Power Module is manually shutdown. The power module
.,		shuts down rectifier and inverter, and there's on inverter output.
48	Manual Boost	Manually force the Charger work in boost charge mode.
	Charge	
49	Manual Float	Manually force the charger work in float charge mode.
	Charge	
50	UPS Locked	Forbidden to shutdown UPS power module manually.
	Parallel Cable	Parallel cables error. Check:
51	Error	If one or more parallel cables are disconnected or not connected
		correctly

		If parallel cable round is disconnected
		If parallel cable is OK
52	Lost N+X	Lost N+X Redundant. There is no X redundant powers module in
55	Redundant	system.
54	FOD Sys Inhibited	System is inhibited to supply after the battery is EOD (end of
54	EOD Sys minored	discharging)
55	Pottory Test Fail	Battery Test Fail. Check if UPS is normal and battery voltage is
55	Dattery Test Fall	over 90% of float voltage.
		Check
56	Battery	If UPS is normal and not any alarms
50	Maintenance Fail	If the battery voltage is over 90% of float voltage
		If load is over 25%
57	Ambient Over	Ambient temperature is over the limit of UPS. Air conditioners are
57	Temp	required to regulate ambient temperature.
58	REC CAN Fail	Rectifier CAN bus communication is abnormal. Please check if
50		communication cables are not connected correctly.
59	INV IO CAN Fail	IO signal communication of inverter CAN bus is abnormal. Please
		check if communication cables are not connected correctly.
60	INV DATA CAN	DATA communication of inverter CAN bus is abnormal. Please
00	Fail	check if communication cables are not connected correctly.
		The difference of two or more power modules' output current in
61	Power Share Fail	system is over limitation. Please adjust output voltage of power
		modules and restart UPS.
62	Sync Pulse Fail	Synchronization signal between modules is abnormal. Please check
		if communication cables are not connected correctly.
		Input voltage of N# power module is abnormal.
63	Input Volt Detect	Please check if the input cables are connected correctly.
	Fail	Please check if input fuses are broken.
		Please check if utility is normal.
<i>с</i> 1	Battery Volt Detect	Battery voltage is abnormal.
64	Fail	Please check if batteries are normal.
65		Please check if battery fuses are broken on input power board.
65	Output Volt Fail	Output voltage is abnormal.
	Bypass Volt Detect	Bypass voltage is abnormal.
66	Fail	Please check if bypass breaker is closed and is good.
(7		Please check if bypass cables are connected correctly.
67	INV Bridge Fail	Inverter IGB is are broken and opened.
		Outlet temperature of power module is over the limitation.
69	Outlat Tame Emer	Please check if faits are abnormal.
08	Outlet Temp Error	Please check if PFC or inverter inductors are abnormal.
		Please check if ambient temperature is too bigh
		The difference of input summer between such the stars is the
60	Input Curr	40% of rated current
09	Unbalance	14070 OF Lated Current. Diange abaak if reatifier's fuses, diade, LODT or DEC diades are
		riease check in recurrent's fuses, diode, IGBT of PFC diodes are

		broken.
		Please check if input voltage is abnormal.
70	DC Due Over Velt	Voltage of DC bus capacitors is over limitation. UPS shutdown
70	DC Bus Over voit	rectifier and inverter.
		While soft start procedures are finished, DC bus voltage is lower
		than the limitation of calculation according utility voltage. Please
		check
71	REC Soft Start	1. Whether rectifier diodes are broken
/1	Fail	2. Whether PFC IGBTs are broken
		3. Whether PFC diodes are broken
		4. Whether drivers of SCR or IGBT are abnormal
		5. Whether soft start resistors or relay are abnormal
72	Relay Connect Fail	Inverter relays are opened and cannot work or fuses are broken.
73	Relay Short Circuit	Inverter relays are shorted and cannot be released.
74	PWM Sync Fail	PWM synchronizing signal is abnormal
		UPS works in intelligent sleep mode. In this mode, the power
		modules will be standby in turn. It will be more reliability and
		higher efficiency. It must be confirmed that remained power
75	Intelligent Sleep	modules' capacity is big enough to feed load. It must be conformed
		that working modules' capacity is big enough if user add more load
		to UPS. It's recommended that sleeping power modules are waken
		up if the capacity of new added loads is not sure.
	Manual Transfer to	Manually transfer UPS to inverter. It's used to transfer UPS to
76	INV	inverter when bypass is over track. The interrupt time could be over
		20ms.
		Input over current timeout and UPS transfer to battery mode.
77	Input Over Curr	Please check if input voltage is too low and output load is big.
	Tout	Please regulate input voltage to be higher if it's possible or
		disconnect some loads.
78	No Inlet Temp.	Inlet temperature sensor is not connected correctly.
	Sensor	
79	No Outlet Temp.	Outlet temperature sensor is not connected correctly.
	Sensor	Inter in its second successful Matter successful the second is a
80	Inlet Over Temp.	tomperature of LDS is between 0.40 %
	Canagitor Time	temperature of OFS is between 0-40 C.
81	Capacitor Time	Reset timing of DC bus capacitors.
82	Fan Time Reset	Reset timing of fans
02	Battery History	
83	Reset	Reset battery history data.
	Byp Fan Time	
84	Reset	Reset timing of bypass fans.
	Battery Over	
85	Temp.	Battery is over temperature. It's optional.

	Dunges Fon	Working life of bypass fans is expired, and it's recommended that	
86	Expired	the fans are replaced with new fans. It must be activated via	
	Expired	software.	
		Working life of capacitors is expired, and it's recommended that the	
87	Capacitor Expired	capacitors are replaced with new capacitors. It must be activated via	
		software.	
		Working life of power modules' fans is expired, and it's	
88	Fan Expired	recommended that the fans are replaced with new fans. It must be	
		activated via software.	
	INIV ICPT Driver	Inverter IGBTs are shutdown.	
89	Plack	Please check if power modules are inserted in cabinet correctly.	
	DIOCK	Please check if fuses between rectifier and inverter are broken.	
		Working life of batteries is expired, and it's recommended that the	
90	Battery Expired	batteries are replaced with new batteries. It must be activated via	
		software.	
91	Bypass CAN Fail	The CAN bus between bypass module and cabinet is abnormal.	
92	Dust Filter Expired	Dust filter need to be clear or replaced with a new one	
102	Wave Trigger	Waveform has been saved while UPS fail	
		Bypass and cabinet communicate with each other via CAN bus.	
103	Bypass CAN Fail	Check	
105		If connector or signal cable is abnormal.	
		If monitoring board is abnormal.	
105	Firmware Error	Manufacturer used only.	
106	System Setting	Manufacturer used only	
100	Error		
		Bypass module is over temperature. Please check	
	Bypass Over Temp.	If bypass load is overload	
107		If ambient temperature is over 40 $^{\circ}$ C	
		If bypass SCRs are assembled correctly	
		If bypass fans are normal	
108	Module ID	At least two modules are set as same ID on the power connector	
100	Duplicate	board, please set the ID as correct sequence	

Note

Different colors of the words represent different level of events:

(a)Green, an event occurs;

(b)Grey, the event occurs then clears;

(c)Yellow, warning occurs;

(d) Red, faults happen.

3.2.5 Operate

Touch the icon (At the bottom of the screen), and the system enters the page of the "Operate", as it is shown inFigure3-10.



Figure3-100perate menu

The "Operate" menu includes FUNCTIONBUTTON and TESTCOMMAND. The contents are described in details below.

FUNTION BUTTON

• Clear/Restore Buzzing

Mute or Restorebuzzing of the system by touching the icon

• Fault Clear

Clear the faults by touching the icon

• Transfer to and ESC Bypass

Transfer tobypass mode or cancel this command by touching the icon

• Transfer to Inverter

Transfer the bypass mode to Inverter Mode by touching the icon

• Enable Module "OFF" Button

Enable the switch for powering off the Power Module by touching the icon

• Reset Battery History Data

Reset the battery history data by touching the icon Reset Battery History data includes the times of discharge, days for running and hours of discharging.

• Reset Dust filter Using Time

Reset the time of dust filter using by touching the icon rest Dust Filter Using Test, it includes the days of using and maintenance period.

TEST COMMAND

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Battery Test

By touching the icon **the system transfer to the Battery mode to test the condition of the battery.** Ensure the bypass is working normally and the capacity of the battery is no less than 25%.

Battery Maintenance

By touching the icon , the system transfers to the Battery mode. Thisfunction is used for maintaining the battery, which requires the normality of the bypass and minimum capacity of 25% for the battery.

Battery Boost

By touching the icon Battery Maintenance, the system starts boost charging.

Battery Float

By touching the icon Battery Float , the system starts float charging.

• Stop Test

By touching the icon stops battery test or battery maintenance.

3.2.6 Scope

Touch the icon scope, (At the bottom right of the screen), and the system enters the page of theScope, as it is shown inFigure 3-11.



Figure3-11Scope Menu

Users can view the waves for output voltage, output current and bypass voltage by touching the corresponding icon in the left side of the interface. The waves can be zoomed in and zoom out.



Touch the icon to display the 3 phase output voltage.

Touch the icon to display the 3 phase output current.

• Touch the icon to display the 3 phase bypass voltage.

Touch the icon to zoom in the wave.

• Zoom Out Touch the icon to zoom out wave.

4 **Operations**

4.1 UPS Start-up

4.1.1 Start in Normal Mode

The UPS must be started up by commissioning engineer after the completeness of installation. The steps below must be followed:

- 1) Ensure all the circuit breakers are open.
- 2) One by one to turn on the output breaker (Q4), input breaker (Q1), bypass input breaker (Q2), and then the system starts initializing (4-slot cabinet and 6-slot cabinet only have a manual bypass breaker, so need to used external circuit breakers).
- 3) The LCD in front of the cabinet is lit up. The system enters the home page, as shown in Figure 3-2.
- 4) Notice the energy bar in the home page, and pay attention to the LED indicators. The rectifier flashes indicating the rectifier is starting up. The LED indicators are listed below in Table 4-1. Table 4-1 Rectifier starting up

ruble i inteetiner blarting up					
Indicator	Status	Indicator	Status		
Rectifier	green flashing	Inverter	off		
Battery	red	Load	off		
Bypass	off	Status	red		

5) After 30S, the rectifier indicator goes steady green, presenting the finishing of rectification and bypass static switch closes then the inverter is starting up. The LED indicators are listed below inTable 4-2.

Table	4-2In	verter	starting	up
-------	-------	--------	----------	----

Indicator	Status	Indicator	Status
Rectifier	green	Inverter	green flashing

Indicator	Status	Indicator	Status
Battery	red	Load	green
Bypass	green	Status	red

6) TheUPS transfers from the bypass to inverter after the inverter goes normal. The LED indicators are listed below in Table 4-3.

Table 4-3Supplying the load						
Indicator	Status	Indicator	Status			
Rectifier	green	Inverter	green			
Battery	red	Load	green			
Bypass	off	Status	red			

ı.

7) The UPS is in Normal Mode. Close the battery circuit breakers and the UPS starts charging the battery. The LED indicators are listed below in Table 4-4.

Indicator	Status	Indicator	Status
Rectifier	green	Inverter	green
Battery	green	Load	green
Bypass	off	Status	green

Table 4-4Normal mode



- When the system starts, the stored setting will be loaded.
- Users can browse all events during the process of the starting up by checking the menuLog.
- Users can check the information of the power module by the keys in the front of it.

4.1.2 Start from Battery

The start from battery is referring to battery cold start. Thesteps for the start-up are as follows:

- 1) Confirm the battery is correctlyconnected; turn on the external battery circuitbreakers.
- 2) Press the red button for the battery cold start (as shown inFigure4-1). The system is then powered by the battery.



Figure 4-1 The position of the battery cold start button

- 3) Afterthat, the system is starting up following steps 3 inchapter 4.1.1 and the system transfers to battery mode in 30S.
- 4) Turn on the external output power supply isolation to supply the load, and the system is working on battery model.

📄 Note

The battery cold start function is optional in 2-slot cabinet and 4-slot cabinet, standard in 6-slot cabinet and 10-slot cabinet.

4.2 Procedure for Switching between Operation Modes

4.2.1 Switching the UPS into Battery Mode from Normal Mode

The UPS transfers to Battery model immediately after the utility (mains voltage) is failed or drops down below the predefined limit.

4.2.2 Switching the UPS from Normal Mode into Bypass Mode

- 1) Enter the menu Operate, touch the icon "transfer to bypass" and the system transfers to bypass mode ;
- 2) Press and hold the BYPkey on the operator control panel for longer than two seconds and the system transfers to bypass mode. This needs to enable the switch behind the front door. As shown inFigure4-2.





Ensure the bypass is working normally before transferring to bypass mode. Or it may cause failure.

4.2.3 Switching the UPS into Normal ModefromBypass Mode

Two ways to transfer the UPS into Normalmode from Bypass Mode:

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(a) Enter the menu Operate, touch the icon transfer to inverter and the system transfers to bypass mode.



(b) Press and hold the INV key on the operator control panel for longer than two seconds and the system transfers to Normal mode.

Note

Normally, the system will transfer to the Normal mode automatically. This function is used when the frequency of the bypass is overtrack and when the system needs to transfer to Normalmode by manual.

4.2.4 Switching the UPS fromNormal Mode into Maintenance BypassMode

These following procedures can transfer the load from the UPS inverter output to the maintenance bypass supply, which is used for maintaining.

- Transfer the UPS into Bypass mode following section 5.2.2. 1)
- The inverter indicator LED goes out, status indicator LED goes out, the buzzer alarm, 2) theinverter shutdown. The bypass supplies power to loads.
- Turn off the external battery breaker and turn on the maintenance bypass breaker. And the 3) load is powered through maintenance bypass and static bypass.
- One by one to turn off the inputbreaker (Q1), bypass input breaker (Q2), output breaker (Q4), 4) and then the system shutdown (4-slot cabinet and 6-slot cabinet only have a manual bypass breaker, so need to usedexternal circuit breakers). The maintenance bypass supplies power to loads.

Note

- 2-slot cabinetand 6-slotcabinetonly have a manual bypass breaker. In manual bypass mode (The manual bypass supplies power to loads), dangerous voltages are present on terminal and internal Copper bar.
- 2-slot cabinetand 6-slotcabinetneed to use external circuit breakers(Includes external input breaker, external bypass input breaker, external output breaker and external maintenance bypass breaker).

Warning

Before making this operation, read messages on LCD display to be sure that bypass supply is regular and the inverter is synchronous with it, so as not to risk a short interruption in powering the load.



If you need to maintain the power module, wait for 10 minutes to let the DC bus capacitor fully discharge before removing the cover.

4.2.5 Switching the UPS into Normal ModefromMaintenance BypassMode

These following procedures can transfer the load from the Maintenance Bypassto inverter output.

- One by one to turn on the output breaker (Q4), input breaker (Q1), bypass input breaker (Q2), 1) and then the system starts initializing.
- 2) After 30S, the static bypass turns on, the bypass indicator LED goes green, and the load is powered through maintenance bypass and static bypass.

- 3) Turn on the external battery breaker.
- 4) Turn off the maintenancebypassbreaker and the load is powered through static bypass.
- 5) After 30S, the rectifier starts, the rectifier indicator LED goes green, and then inverter starts.
- 6) After 60S, the system transfers to Normal mode.

Note Note

voltag

2-slot cabinetand 6-slotcabinet operation, please refer to chapter5.3.2.

4.3 Battery Manual

If the battery is not in use for a long time, it is necessary to test the condition of the battery. Two methods are provided:

1) Manual Discharging test. Enter the menu Operate, as is shown in Figure 4-3 and touch the icon

"Battery maintenance" **Extremy Maintenance**, the system transfers into the Battery mode for discharging. The system will stop discharging when the battery will have 20% of capacity or in low

Users can stop the discharging by touching the "StopTest" icon								
	SYSTEM OPERATE							
FUNCTIO	N BUTTON		TEST COMMAND					
ESC Mute	Fault Clear		Battery Test	Battery Maintenance				
B I Transfer to Bypass	I O Transfer to Inverter		Battery Boost	Battery Float				
Enable Module "OFF" Button	Reset Battery History Data		Stop Test					
Reset Dust Filter Using Time								
Home Cabinet	Module	etting	Log	Operate Scope				

Figure4-3Battery maintenance

- 2) Auto discharging. Thesystem cansmaintenance the battery automatically when the setting is done. The setting procedures are as follows.
 - (a) Enable battery auto discharge. Enter the "CONFIGURE" page of the menu Setting, tickthe "Battery Auto Discharge" and confirm (This needs to be done by factory).
 - (b) Setting period for battery auto discharge. Enter the "BATTERY "page of the Setting (SeeFigure4-4), Set the period time in the item "Auto Maintenance Discharge Period" and confirm.

Battery Number	[]	DATE & TIME		
Battery Capacity	AH]			
Float Charge Voltage / Cell	V	LANGUAGE		
Boost Charge Voltage / Cell	V	сомм.		
EOD Voltage / Cell, @ 0.6C Current	V	· · · · · · · · · · · · · · · · · · ·		
EOD Voltage / Cell, @ 0.15C Current	EOD Voltage / Cell, @ 0.15C Current V USER			
Charge Current Percent Limit	%	BATTERY		
Battery Temperature Compensate	mV/°C			
Boost Charge Time Limit	Hour	SERVICE		
Auto Boost Period	Hour			
Auto Maintenance Discharge Period 6480	Hour	RATE		
Please Confirm Settings	×	CONFIGURE		
Home Cabinet Module Setting	Oper	ate Scope		

Figure4-4Setting period for battery auto discharge

Warning

The load for the auto maintenance discharge should be 20%-100%, if not, the system will not start the process automatically.

4.4 EPO

The EPO button located in the operator control and display panel (with cover to avoid disoperation, seeFigure4-5) is designed to switch off the UPS in emergency conditions (e.g., fire, flood, etc.).To

achieve this, just press the EPO button, and the system will turn off the rectifier, inverter and stop powering the load immediately (including the inverter and bypass), and the battery stops charging or discharging.

If the input utility is present, the UPS control circuit will remain active; however, the output will be turned off. To completely isolate the UPS, users need to turn off the external mains input supply to the UPS. Users can restart the UPS by powering the UPS again.

Warning When the EPO is triggered, the load is not powered by the UPS. Be careful to use the EPO

function.





4.5 Installation of Parallel Operation System

The UPS system can have three cabinets in parallel. Two UPS cabinets are connected as is shown inFigure4-6.



Figure4-6Parallel diagram

The parallel interfaces of 2-slot cabinet- 6-slotcabinet are located in the front panel of the cabinet, the 10-slotcabinet are located inside the cabinet, open the panel can see. The parallel terminalis shown inFigure4-7.



(a) The parallel interfaces of 2-slot cabinet- 6-slotcabinet



(b) The parallel interfaces of 10-slotcabinet

Figure4-7Location of the Parallel interface

The control cables for the parallel operation must be connected with all single devices to form a closed loop, as is shown inFigure4-8.



Figure4-8Parallel connection

For more details of parallel operation, please refer to the "Instruction for ParallelOperation".

5 Maintenance

This chapter introduces UPS maintenance, including the maintenance instructions of power module, monitor unitand bypass unit and the replacement method of dust filter.

5.1 Precautions

Only maintaining engineers can maintain the power module, monitor unitand bypass unit.

- 1) The power module should be disassembled from top to bottom, so as to prevent any inclination from high gravity center of the cabinet.
- 2) To ensure the safety before maintaining power module and monitorunit, use a multimeter to measure the voltage between operating parts and the earth to ensure the voltage is lower than hazardous voltage, i.e. DC voltage is lower than 36Vdc, and AC maximum voltage is lower than 30Vac.
- Monitor unit and bypass unitis not recommended to hot swap; only when UPS is in Maintenance Bypass Mode or UPS is completely powered off, the monitor unit and bypass unitcan be disassembled.
- 4) Wait 10 minutes before opening the cover of the power module after pulling out from the Cabinet.

5.2 Instruction for MaintainingPower module

Confirm the UPS is operating in Normal Mode and the bypass is working normally before pulling out the power module needed to be repaired.

- 1) Ensure the remaining power module will not be overloaded.
- 2) Power off the power module:
 - a) Enable.LCD panel->Menu Operate ->Enable Module "OFF" icon
 - b) Press the "OFF" button on the power module panel for 3 seconds, the power module quits from the system.
- 3) Remove the mounting screw on the two front sides of the power module and pull out the power module by two persons.
- 4) Wait 10minutes before opening the cover for repairing.
- 5) After the repairing is done, push the power module into the cabinet and the power module will automatically join the system.

5.3 Instruction for Maintainingmonitor unit and bypass unit

5.3.1 Maintainingmonitor unit and bypass unit for 2-slotcabinet

Confirm the UPS is operating in Normal mode and the bypass is working normally

- 1) Transfer the system to bypass mode through the LCD control panel(Refer to chapter 4.2.2).
- 2) Turn on the maintenance bypass breaker. The load is powered through maintenance bypass and static bypass.
- 3) One by one to turn off the battery breaker, input breaker, bypass input breaker and output breaker. The load is powered through maintenance bypass.
- 4) Take out two power modules, which are close to the monitoring unit and the bypass unit, can be taken to repair the monitoring and the bypass unit.
- 5) After the completion of maintenance, insert power module and tighten the screws on both sides of the power module.
- 6) One by one to turn on the output breaker, bypass input breaker, input breaker and battery breaker.
- 7) After 2 minutes, the bypass indicator LED goes green, and the load is powered through

maintenance bypass and static bypass.

- 8) Turn off the maintenance bypass breaker.
- 9) After 30S, the rectifier starts, the rectifier indicator LED goes green, and then inverter starts.
- 10) After 60S, the system transfers to Normal mode.

5.3.2 Maintainingmonitor unit and bypass unit for 4-slotcabinet and 6-slotcabinet

Confirm the UPS is operating in Normal mode and the bypass is working normally

- 1) Transfer the system to bypass mode through the LCD control panel (Refer to chapter 4.2.2).
- 2) Turn on the manual bypass breaker.
- 3) Turn on the external maintenance bypass breaker.
- 4) One by one to turn off the battery breaker, external input breaker, external bypass input breaker, and external output breaker. The load is powered through external maintenance bypass.
- 5) Take out two power modules, which are close to the monitoring unit and the bypass unit (4-slotcabinet). Take out the panel at the top of the bypass unit(6-slotcabinet), can be taken to repair the monitoring and the bypass unit;
- 6) After the completion of maintenance, insert power module and tighten the screws on both sides of the power module.
- 7) One by one to turn on the external output breaker, external bypass input breaker, external input breaker and battery breaker.
- 8) After 2 minutes, the bypass indicator LED goes green, and the load is powered through external maintenance bypass, manual bypass and static bypass.
- 9) Turn off the external maintenance bypass breaker. The load is powered through manual bypass and static bypass.
- 10) Turn off the manual bypass breaker.
- 11) After 30S, the rectifier starts, the rectifier indicator LED goes green, and then inverter starts.
- 12) After 60S, the system transfers to Normal mode.

5.3.3 Maintainingmonitor unit and bypass unit for 10-slotcabinet

Confirm the UPS is operating in Normal mode and the bypass is working normally

- 1) Transfer the system to bypass mode through the LCD control panel (Refer to chapter 4.2.2).
- 2) Turn on the maintenance bypass breaker. The load is powered through maintenance bypass and static bypass.
- 3) One by one to turn off the battery breaker, input breaker, bypass input breaker and output breaker. The load is powered through maintenance bypass.
- 4) Take out the panel above the monitoring unit, and can repair the monitoring unit
- 5) Take out the panel at the top of the bypass unit and the right side door panel of the cabinet, and repair the bypass unit.
- 6) After the completion of maintenance, install panel and tighten the screws.
- 7) One by one to turn on the output breaker, bypass input breaker, input breaker and battery breaker.
- 8) After 2 minutes, the bypass indicator LED goes green, and the load is powered through maintenance bypass and static bypass.
- 9) Turn off the maintenance bypass breaker.
- 10) After 30S, the rectifier starts, the rectifier indicator LED goes green, and then inverter starts.
- 11) After 60S, the system transfers to Normal mode.

5.4 Battery Setting

The setting of battery needs to be done after the first time of powering off or any changes done on the batteries.

The battery configure ration can be done through the LCD control panel (Figure5-1) or though monitoring software (Figure5-2).



Figure5-1Configuration through LCD control panel

MainIpData	System Setting Battery Setting Customization	WarningSet DryContactSe	et	
OutputData		manufacture descent manufacture entertaine		
BatteryData	Battery Type	VRLA	VRLA 🔻	
CabStatus				
UnitStatus	Battery Number	32.	40 💌	
HisLogDown	Battery AH	100		
SCodeDown		-	-	_
RateSetting	Float Charge Voltage/Cell(V)	2.28	2.25	
ServSetting	Boost Charge Voltage/Cell(V)	2.30	2.35	
DetectAdjust	FOD Voltage/Call @ 0.6C Current(0)	1.45	1.65	
ControlCmd	EOD vonage/cei, @ 0.00 Current(v)	1.00	1.02	
FwProgram	EOD Voltage/Cell, @ 0.15C Current(V)	1.75	1.75 💌	
Help			0.1	
About			Set	
			Ĩ	
UPS type RMM000	Protocol MODBUS_ASCI	Address		200
Baud rate 9600	Port No. COMS	Disconnect		Ser Co

Figure5-2Configuration through monitoring software

5.4.1 Setting of Battery Type

The battery type can be only set through the monitoring software. The system at present supports lead acid battery and Lithium iron phosphate battery (LFPB).

5.4.2 Setting of Battery Number

1) Setting battery number forLead- Acid battery

The nominal voltage of one block battery is 12V and for each block of battery, it consists of 6 cells (each cell of 2V). For the setting, as is shown in Figure5-1, if the battery is 40, it means that there are 40 blocks of batteries and both the positive and negative are 20 blocks of batteries. In the case of cell battery of 2V (usually with large capacity) is used, battery number should be the same as the block battery. The cell battery actually in use should be 240 cells (6*40), with both and positive and negative of 120 cells.

The battery number setting range is 36-44

2) Setting battery number for LFPB

For the cell of each LFPB, the cell voltage is 3.2V; each battery block consists of 1 cell. In total, if 40 blocks of Lead- Acid battery are used, for the LFPB, the number will be 150. Both the positive and negative are 75 cells.

The battery number setting range is 140-180. The lowest EOD voltage for the LFPB will be 360V and highest voltage can be 620V.

5.4.3 Battery Capacity Setting

Battery Capacity Setting sets the capacity value of the battery block .For example, if the system uses 40 blocks of 12V/100AH batteries, the Battery Capacity Setting shouldset to 100 Ah. If 240 cells of 2V/100AH are used, the Battery Capacity Setting should be set to 1000 Ah. In case of there are more than one strings of battery in parallel, the battery capacity setting value

will be the times of the single string. For instance, if the configuration is two strings of 40 blocks of 12V/100AH batteries, the battery capacity setting should be set to 200AH.

The system sets current limits according to the battery capacity set. For the Lead-Acid battery, the current limit is 0.2C, and for the LFPB, the current is 0.3C. For instance, the 500kVA is configured to 40 blocks of 12V/500AH batteries, which can provides total max charging current of 160A.Due to the current limits(0.2C), the max charging current will be 100A(0.2*500A).

5.4.4 Float and Boost Charge Setting

In boost charging, the system charges the batteries with constant current. After the period, the system will enter the float charging.

For the Lead-Acid battery ,the default float charge voltage per cell is 2.25V, boost charge voltage is 2.35V;

For the LFPB, the default float and boost charge voltage per cell is 3.45V

5.4.5 EOD Voltage Setting

The EOD voltage 0.6C is the EOD voltage when the discharging current is larger than 0.6C; EOD voltage 0.15C is the EOD voltage when the discharging current is less than 0.15C.EOD voltage decreases linearly as the EOD voltage Current increases from 0.15C and 0.6C, as shown inFigure 5-3.



Figure5-3EOD voltage

For Lead-Acid battery, the cell voltage is suggested to set to 1.65V/cell at 0.6C, and set to 1.75V at 0.15C

For the LFPB battery, the cell voltage is suggested to set to 2.7V/cell at both 0.6C and 0.15C.

5.4.6 Charging Current Percent Limit

This setting is for limiting the charging power, max current limit can be20% of the rated active power. The max current that one power module can give according to the current limit (in percentage) is shown inTable 5-1.

Theactual charging current is also limited to the battery capacity. Refer to chapter 5.4.3.

Current limit (0/)	Max chargin	ng current(A)
Current Innit (%)	40KVA powermodule	50KVA power module
1	0.7	0.8
2	1.2	1.6
3	1.9	2.4
4	2.5	3.2
5	3.1	4.0
6	3.7	4.8
7	4.4	5.6
8	5.1	6.4
9	5.6	7.2
10	6.3	8.0
11	6.9	8.8
12	7.5	9.6
13	8.1	10.4
14	8.8	11.2
15	9.3	12.0
16	10.0	12.8
17	10.7	13.6
18	11.2	14.4
19	11.9	15.2
20	12.5	16.0

Table 5-1Current limit for per power module

5.4.7 Battery Temperature Compensate

This is for setting the temperature compensate coefficient. Based on 25° C, when the temperature is higher than that, the discharging voltage goes lower; When the temperature is lower than that, the discharging voltage goes higher.

5.4.8 Boost Charge Time Limit

This is for setting the Boost Charge time. The system transfers to float charge when the boost Charge time has passed. The setting range can be 1-48h.

5.4.9 Auto Boost Period

This is for setting the Auto boost period time. The system boost charges the battery when the reaching the Auto boost period. It is suggested to boost charge the battery every three month, set the period to 4320h.

5.4.10 Auto maintenance Discharge Period

The system discharges the battery when the reaching the Auto maintenance discharge period. This function should be enabled by checking the AutoMaint(RateSetting->SysCodeSetting1) through the monitoring software, as shown inFigure5-4.

			CHS		ENGLISH		
Home ≏ BypassData	RateSettings		220		Syscode Setting1		
MainIpData OutputData	InputFreq		50	-	📕 Derate(0)	📕 FreqSelfAdpi(6)	📕 InhibitAdj(C)
BatteryData	OutputVolt		220	•	= 33/31(1)	LogoType(7)	📕 DcBusLevel/D)
	OutputFreq		50	•	AutoBoost(2)	RecCtrWay(3)	PFEzterm(E)
HisLogDown SCodeDown					RmOrHt(4)	 Energy AllowDcOvRst(A 	() Reserved(r)
RateSetting ServSetting					NotTxTLmt(5)	🔲 OvLdToutEzi(B)	Set by bit
FwProgram						Set	
UPS type RMX(20-6	00kVA) 🔻	Protocol	MODBU	S_ASCII	 Address 1 		3500
Baud rate Auto	•	Port No.			• Con	nect	:O2

Figure 5-4 Enable the Auto maintenance Discharge period

The EOD voltage of Auto maintenance Discharge is 1.05 times of the normal EOD voltage.

5.4.11 Warnings for Battery and Environment Temperature Overheat

This function can be set through the monitoring software. The system will read the temperature information of the battery and environmentand give warning of overheat. The set range is 25-70 °C.

The temperature sensor should be placed through the Dry Contact.

5.5 Replacing Dust Filter (optional)

There are 3~4 dust filters on the back of UPS' front door, each filter is held in place by a bracket on either side of each filter. The procedure of replacing each filter is as follows:

- 1. Open the front door and locate the filters on the back side of the front door.
- 2. Remove one bracket.
- 3. Remove the dust filter to be replaced and insert the clean one.
- 4. Reinstall the bracket.

6 Product Specification

This chapter provides the specifications of the product, includingenvironmentalcharacteristicsmechanicalcharacteristics and electrical characteristics.

6.1 Applicable Standards

The UPS has been designed to conform to the following European and international standards:

Item	Normative reference		
General safety requirements for UPS used	EN50091_1_1/IEC62040_1_1/AS 62040_1_1		
in operator access areas			
Electromagnetic compatibility (EMC)	EN50001.2/IEC62040.2/AS.62040.2.(C2)		
requirements for UPS	EN30091-2/1EC02040-2/AS 02040-2 (C3)		
Method of specifying the performance and	EN50091-3/IEC62040-3/AS 62040-3 (VFI SS		
test requirements of UPS	111)		

Table 6-1Compliance with European and International Standards

Note

The above mentioned product standards incorporate relevant compliance clauses with generic IEC and EN standards for safety (IEC/EN/AS60950), electromagnetic emission and immunity (IEC/EN/AS61000 series) and construction (IEC/EN/AS60146 series and 60950).

6.2 Environmental Characteristics

Table 6-2E	Environmental	Characteristics

Item	Unit	Requirements	
Acoustic noise level at 1 meter	dB	65dB @ 100% load, 62dB @ 45% load	
Altitude of Operation	m	≤1000,load derated 1% per 100mfrom1000m and 2000m	
Relative Humidity	%RH	0-95,non-condensing	
Operating Temperature	°C	0-40,Battery life is halved for every 10 °C increase above 20 °C	
UPS Storage Temperature	°C	-40-70	
Recommended battery storage temperature	°C	-20~30	

6.3 Mechanical Characteristic

Model	Unit	2-slot	4-slot	6-slot	10-slot	
		Cabinet	Cabinet	Cabinet	Cabinet	
Mechanical Dimension (W*D*H)	mm	600*980*1150	650*960*1600	650*970*2000	1300*1100*2000	
Weight	kg	120	170	220	450	
color	N/A	Black				
Protection Level, (IEC60529)	N/A	IP20				

Table 6-3Mechanical Characteristics for Cabinet

Table 6-4Mechanical Characteristics for power module

Model	Unit	40kVA power module	50kVA power module
Mechanical Dimension (W*D*H)	mm	510*700*178	510*700*178
Weight	kg	44	45

6.4 Electrical Characteristics

6.4.1 Electrical Characteristics (Input Rectifier)

Table 6-5 Rectifier AC input (Mains)			
Item	Unit	Parameter	
Grid System	/	3 Phases + Neutral + Ground	
Rated AC Input Voltage	Vac	380/400/415(three-phase and sharing neutral with	
		the bypass input)	
Rated Frequency	Vac	50/60Hz	
Input voltage range	Vac	304~478Vac (Line-Line),full load	
		228V~304Vac (Line-Line),load decrease linearly	
		according to the min phase voltage	
Input Frequency range	Hz	40~70	
Input Power factor	PF	>0.99	
THDI	THDI%	<3% (full Linear Load)	

Table 6-5Rectifier AC input (Mains)
Table 6-6Battery				
Items	Unit	Parameters		
Battery bus voltage	Vdc	Rated: ±240V		
Quantity of lead-acid cells	Nominal	40=[1 battery(12V)],240=[1 battery(2V)]		
Float charge voltage	V/cell (VRLA)	2.25V/cell(selectable from 2.2V/cell~2.35V/cell) Constant current and constant voltage charge mode		
Temperature compensation	mV/°C/cl	3.0(selectable:0~5.0)		
Ripple voltage	%	≤1		
Ripple current	%	≤5		
Equalized charge voltage	VRLA	2.4V/cell(selectable from : 2.30V/cell~2.45V/cell) Constant current and constant voltage charge mode		
Final discharging voltage	V/cell (VRLA)	 1.65V/cell(selectablefrom: 1.60V/cell~1.750V/cell) @0.6C discharge current 1.75V/cell (selectable from: 1.65V/cell~1.8V/cell) @0.15C discharge current (EOD voltage changes linearly within the set range according to discharge current) 		
Battery Charge	V/cell	2.4V/cell(selectable from : 2.3V/cell~2.45V/cell) Constant current and constant voltage charge mode		
Battery Charging Power Max Current	kW	10%* UPS capacity (selectable from : 1~20%* UPS capacity)		

6.4.2 Electrical Characteristics(Intermediate DC Link)

6.4.3 Electrical Characteristics(Inverter Output)

Table 6-7 Inverter Output (To critical load)				
Item	Unit	Value		
Rated capacity	KVA	40-500kVA		
Rated AC voltage	Vac	380/400/415 (Line-Line)		
Rated Frequency	Hz	50/60		
Frequency Regulation	Hz	50/60Hz±0.1%		
Voltage precision	%	$\pm 1.5(0 \sim 100\%$ linear load)		
Overload	/	110%, 60min; 125%,10min; 150%,1min; >150%,200ms		
Synchronized Range	Hz	Settable, ± 0.5 Hz ~ ± 5 Hz, default ± 3 Hz		
Synchronized Slew Rate	Hz	Settable, 0.5Hz/S ~ 3Hz/S, default 0.5Hz/S		
Output Power Factor	PF	0.9		
Transient Response	%	<5% for step load (20% - 80% -20%)		
Transient recovery		< 30ms for step load (0% - 100% -0%)		
Output Voltage		<1% from 0% to 100% linear load		

Item	Unit	2-slot Cabinet and 4-slot Cabinet	6-slot Cabinet and 10-slot Cabinet	
Rated AC voltage	Vac	380/400/415 (three-phase four-wire and sharing neutral with the bypass)		
Rated Current	А	91~758(Table3-2)		
Overload	%	125%, Long term operation 125%~130%, for 10 min 130%~150%, for 1 min >150%,300ms	110%, Long term operation 110%~125%, for 5 min 125%~150%, for 1 min >150%,1S	
Current rating of neutral cable	А	1.7×In		
Rated frequency	Hz	50/60		
Switch time (between bypass and inverter)	ms	Synchronized transfer: Oms		
Bypass voltage range	%	Settable, default -20%~+15% Up limited: +10%, +15%, +20%, +25% Down limited: -10%, -15%, -20%, -30%, -40%		
Bypassfrequency range	Hz	Settable, ± 1 Hz, ± 3 Hz, ± 5 Hz		
Synchronized Range	Hz	Settable ±0.5Hz~±5Hz,default ±3Hz		

6.5 Efficiency

Table 6-9Efficiency				
Item	Unit	Value		
Overall efficiency				
Normal mode(dual conversion)	%	>96		
ECO mode	%	>99		
Battery discharging efficiency (battery at nominal voltage 480Vdc and full-rated linear load)				
Battery mode	%	>96		

6.6 Display and Interface

Table 6-10Display and Interface		
Display	LED + LCD +Color touch screen	
Interface	Standard:RS232, RS485, USB, Dry Contact Option: SNMP,AS/400	