Quant

ELEVATING TECHNOLOGY

10-60KVA Rack UPS User Manual

POWER EDGE ONLINE UPS (10–60kVA 3-Phase Rack)	10kVA 3-Phase Tower	20kVA 3-Phase Tower
PE-R010-3X	PE-T010-3I-20B	PE-T020-3X
PE-R015-3X	PE-T010-3X	PE-T020-3X-40B
PE-R020-3X	PE-T010-3X-40B	PE-T020-3X-80B
PE-R030-3X	PE-T010-3X-80B	
PE-T040-3X		
PE-T060-3X		

30kVA 3-Phase Tower	40kVA 3-Phase Tower
PE-T030-3X	PE-T040-3I
PE-T030-3X-80B	PE-T040-3X-80B

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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 modular UPS 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.

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 is requirement is ignored.
Caution: 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 advised 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.
	**CAUTION**	Equipment damage, loss of data or poor performance may be caused, if this requirement is ignored.

SAFETY INSTRUCTION

Labels		Description
	**DANGER**	• Performed only by commissioning engineers. • This UPS is designed for commercial and industrial applications only, and is not intended for any use in life-support devices or system.
	**WARNING**	• Read all the warning labels carafully before operation, and follow the instructions.
	**CAUTION**	• ESD sensitive components inside the UPS, anti-ESD measure should be taken before handling.

MOVE & INSTALLATION

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

Labels		Description
	**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**	Don't start the system if any damage or abnormal parts founded. Contacting the UPS with wet material or hands may be subject to electric shock.
	**CAUTION**	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

DEBUG & OPERATE

Labels		Description
	**DANGER**	• 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. • Before moving or re-connecting the cables, make sure to cut off all the input power sources, and wait for at least 10 minutes for internal discharge. Use a multi-meter to measure the voltage on terminals and ensure the voltage is lower than 36V before operation.
	**WARNING**	• The earth leakage current of load will be carried by RCCB OR RCD. • Initial check and inspection should be performed after long time storing of UPS.

MAINTENANCE & REPLACEMENT

Labels		Description
	**DANGER**	• 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 be accessed by opening the protective cover with tools cannot be maintenance by user. • This UPS full complies with "IEC62040-1-1-General and 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.

BATTERY SAFETY

Labels	Description
 **DANGER**	• All the battery maintenance and servicing procedures involving internal access need special tools or keys and should be carried out only by trained personnel. • When connected together, the battery terminal voltage will exceed 400Vdc and is potentially lethal. • 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 paid to the recommendations concerning local environmental conditions and the provision of protective clothing, first aid and fire-fighting 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. • Replace the batteries only with the same type and the same number, or it may cause explosion or poor performance. • When connecting the battery, follow the precautions for high-voltage operation before accepting and using the battery, check the appearance of the batteries. 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 may be caused. • Before operating the battery, remove the finger ring, watch, necklace, bracelet and any other metal jewelry. • Wear rubber gloves. • Eye protection should be worn to prevent injury from accidental electrical arcs. • 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. • Don't 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 n 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

Labels	Description
 **WARNING**	• Dispose of used battery according to the local instructions.

NOTE

Labels		Description
	**NOTE**	• Represents a supplementary explanation or emphasis to the main text.

INSTALLATION

1.1 Introduction

This chapter introduces the relevant requirements for positioning and cabling of the UPS and related equipment.

Labels		Description
	**WARNING**	**Installation can only be done by authorized engineers** Do not apply electrical power to the UPS equipment before the commissioning engineer arrives at installation site. The UPS should be installed by a qualified engineer in accordance with the information contained in this chapter. All the equipment not referred to in this manual is shipped with details of its own mechanical and electrical installation information.
	**NOTE**	**3-Phase 4-Wire Input Power is required** The standard UPS system can be connected to TN, TT AC distribution system (IEC60364-3) of 3-phase 4-wire, and a 3-wire to 4-wire conversion transformer is provided as an optional part. 1-phase 3-wires is also provided as an optional part.
	**WARNING**	**Battery hazards** SPECIAL CARE SHOULD BE TAKEN WHEN WORKING WITH THE BATTERIES ASSOCIATED WITH THIS EQUIPMENT. When connecting the battery, the battery terminal voltage will exceed 400Vdc and is potentially lethal. • Eye protection should be worn to prevent injury from accidental electrical arcs. • Remove rings, watches and all metal objects. • Only use tools with insulated handles. • Wear rubber gloves. • 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 contactor with the skin, the affected area should be washed immediately with water.

1.2 Initial Inspections

Perform the following checking operations prior to the UPS installation.

1. While the cabinets are still on the truck, inspect the equipment and shipping container for any signs of damage or mishandling. Do not attempt to install the system if damage is apparent. If any damage is noted, file a damage claim with the shipping agency immediately and contact your supplier to inform them of the damage claim and the condition of the equipment.

2. Verify the product label and confirm the correctness of the equipment. The UPS model, capacity and main parameters are marked on the label.

3. Compare the contents of the shipment with the bill of lading.

LOCATION

1.3.1 UPS Location

The UPS is intended for indoor installation and should be located in a cool, dry and clean environment with adequate ventilation to keep the environmental parameters within the specified operating range (see Table.8-2). The Modular series UPS uses forced convection cooling by internal fans. Cooling air enters the module through ventilation grills located at the front part of the cabinet and exhausted through grills located in the rear part of the cabinet. Please do not block the ventilation holes. Note: The UPS should be installed on a cement surface or other surface that is not combustible.

1.3.2 External Battery Room

The battery will generate some amount of hydrogen and oxygen at the end of charging, so the fresh air volume of the battery installation environment must meet EN50272-2001 requirements. The ambient temperature of the battery must be stable. 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, and operation below this temperature will reduce the battery capacity. If the average operating temperature of battery is increased from 20°C to 30°C, then the service life of the battery will be reduced by 50%. If the operating temperature of the battery is above 40°C, then the battery service life will be decreased in exponent rate. In a normal installation, the battery temperature is maintained between 15°C and 25°C. Keep batteries away from heat sources or air outlets. 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.

1.3.3 Storage

If the system will not be installed immediately, it must be stored indoors in a clean, dry and cool location (see Table 8.1 on page 63). If the UPS includes batteries, either internally or in a battery cabinet, the batteries' requirements will dictate the storage conditions. Batteries should be unpacked, installed and charged as soon as possible after delivery.

Labels	Description
 **WARNING**	Risk of failure to properly charge batteries. It can cause permanent damage to the batteries and void the warranty. Batteries will self discharge during storage. Batteries must be recharged as recommended by the battery manufacturer. A notice of Charge Before Date is affixed to each unit that has batteries inside. The Charge Before Date is calculated based on the batteries being stored at 77 °F (25 °C). Storage at a higher temperature will increase the rate of self discharge, requiring earlier recharge. Consult the batterymanufacturer on how to determine when the batteries need to be recharged.

1.4 Positioning

Choose a location for the UPS that offers:

- Easy connection to inputs, outputs and auxiliary equipment.
- Enough space to service the UPS.
- Air circulation sufficient to expel the heat produced by the UPS.
- Protection against moisture and excessive humidity.
- l Protection against dust and other particulate matter.
- l Compliance with the fire prevention regulations and practices.
- l Operating environment temperature of 74 °F-80 °F (23 °C-27 °C) for maximum battery life.

LOCATION

1.4.1 System Cabinet

A UPS system comprises an UPS rack system, external battery cabinet, depending on the specific system requirement. All the UPS system cabinets used in the same installation site are of the same height and should be positioned side-by-side to achieve an aesthetically appealing effect. Refer to Chapter 7 Installation Drawing for the positioning of UPS cabinet.

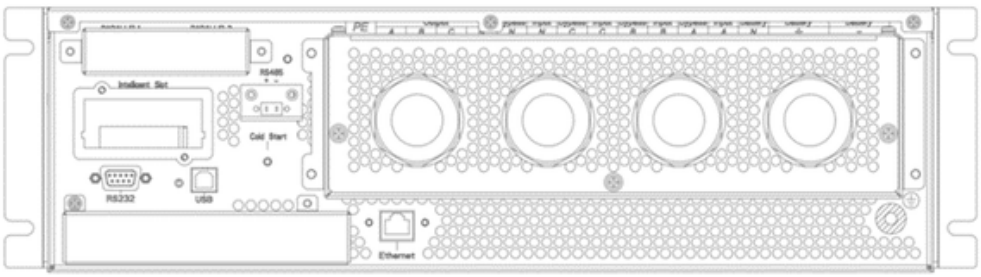
1.4.2 Moving the Cabinets

Labels		Description
	**WARNING**	Ensure that any lifting equipment used in moving the UPS cabinet has sufficient lifting capacity. The UPS is fitted with castors – take care to prevent movement when unbolting the equipment from its shipping pallet. Ensure adequate personnel and lifting aids are available when removing the shipping pallet. Ensure that the UPS weight is within the weight loading capacity range of any hoisting equipment. See Table.8-3 for UPS weight. UPS and optional cabinets can be handled bymeans of a fork lift or similar equipment. The UPS cabinet can also be moved by its castors whenmoving in a short distance.
	**NOTE**	Care must be taken when handling units fitted with batteries. Keep such moves to a minimum.

1.4.3 UPS Composition

The UPS structure is shown in Figure 1-1. The UPS configuration is provided in Table. 1-1

10-30kVA Front View



10-30kVA Back View

Figure1- 1: UPS Structure

LOCATION

1.4.4 Main Cabinet Installation

Two installation modes are available: Tower installation and Rack installation, depending on available space and user considerations. You can select an appropriate installation mode according to the actual conditions.

TOWER INSTALLATION

Various installation configurations are available: single UPS, single UPS with single or multiple battery cabinets. Their installation methods are all the same. Please prepare support bases and spacers before installation (1) Take out the support bases and spacers and then assemble the spacer and the support bases, shown as Figure 1-2.

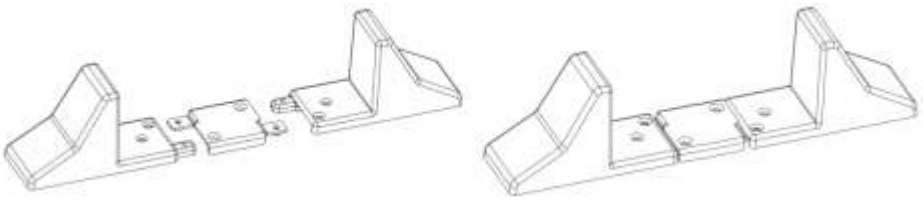


Figure1-2Support bases and spacers assembly

(2) Place the UPS on the support bases, shown as Figure 1-3

Figure 1-3 Tower installation

(1) In the LCD, click on "Set"-"Display Setting", and select UPS type and home type Vertical Display.As show below Figure 1-4 Tower Display Set.

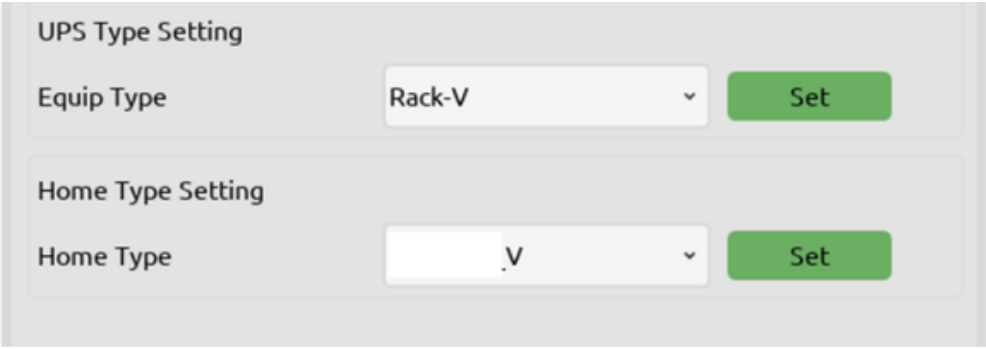


Figure 1-4 Tower Display Set

RACK INSTALLATION

Battery cabinets must be installed firstly because battery cabinets are too heavy. And two or more installation personnel are required to install them at the same time. Please install them from bottom to top.
(1) Install the guide rail
(2) Put the UPS and battery cabinet on the guide rail, fix the units to the service rack, shown as Figure1-5.

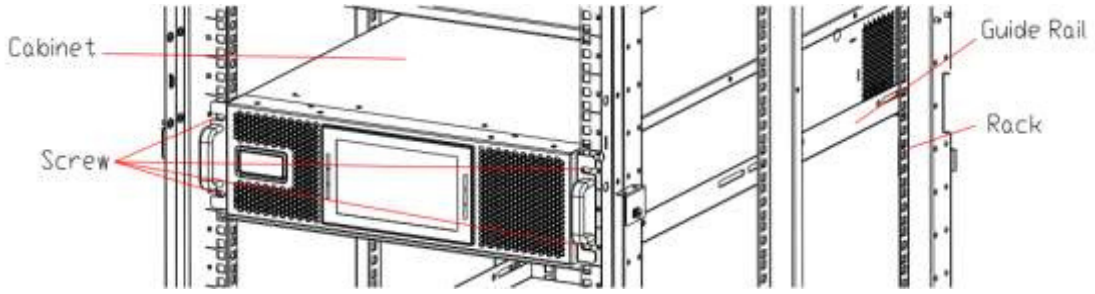


Figure 1-5 Rack Mounted Installation

1.4.5 Cable Entry

Cables can enter the rack UPS from back. The recommended installation practice is to connect cables through ellipse hole or circular cable protector on the removable plates to prevent foreign material or vermin entering the cabinet. Cable entry is followed as Figure1-6.

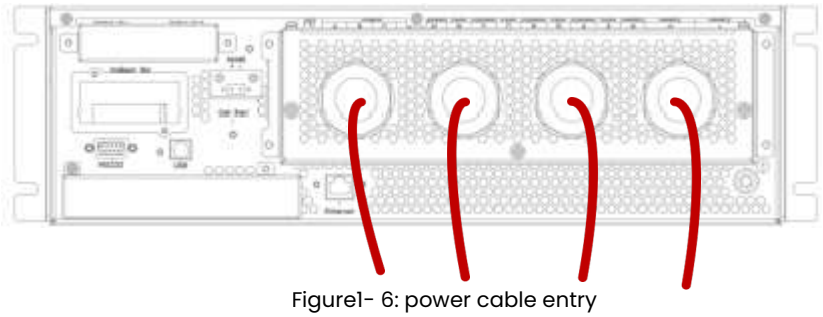


Figure1- 6: power cable entry

Labels	Description
NOTE	Cables connection should be followed as diagram on rear panel. Fix cables in rack UPS as Figure1-6 to make sure best ventilation. Enter through reserved entry cover if ellipse holes are not big enough, and block the remained space to protect UPS from rats.

1.5 External Protective Devices

For safety concerns, it is necessary to install external circuit breakers or other protective devices for the input AC supply of the UPS system. This section provides generic practical information for qualified installation engineers. The installation engineers should have the knowledge of the regulatory wiring standards, and of the equipment to be installed. To reduce the risk of fire, connect only to a circuit provided with branch circuit overcurrent protection in accordance with the NEC ANSI/NFPA70.

1.5.1 Input Supply of the UPS

Over currents

Install suitable protective devices in the distribution unit of the incoming mains supply, considering the power cable current-carrying capacity and overload capacity of the system (see Tab. 8-6). Generally, the magnetic circuit breaker with IEC60947-2 tripping curve C (normal) at the 125% of the current listed in Tab. 8-6 is recommended.

Split bypass: In case a split bypass is used, separate protective devices should be installed for the rectifier input and bypass input in the incoming mains distribution panel.

Labels	Description
NOTE	The rectifier input and bypass input must use the same neutral line. Earth Leakage, RCD devices: Any Residual Current Detector (RCD) installed upstream of the input supply: • Must be sensitive to DC unidirectional pulses (class A) in the network • Must be insensitive to transient current pulses, and • Must have an average sensitivity, adjustable between 0.3A and 1A

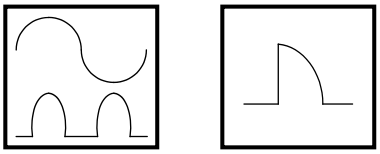


Figure1-7:The Symbols of RCCB

To avoid false alarms, the earth leakage monitoring devices (when used in the systems with the split bypass input or when used in parallel UPS configurations) must be located upstream of the common neutral sinking point. Alternatively, the device must monitor the combined four-wire rectifier and the split bypass input currents.

1.6 Power Cables

1.6.1 Power Cables

The selection of UPS system power cables should meet the requirements of Table 3B in IEC60950-1, and appropriate cables should be selected based on actual engineering applications. The maximum operating current of the UPS and the recommended cable diameter are shown in Table 1.1

Labels	Description
DANGER	FAILURE TO FOLLOW ADEQUATE EARTHING PROCEDURES CAN RESULT IN EMI, ELECTRIC SHOCK HAZARD, OR RISK OF FIRE, SHOULD AN EARTH FAULT OCCUR.

The UPS power cables are recommended in Table 1-1.

The UPS power cables are recommended in Table 1-1.

Contents	Main Input				Bypass Input				Output				Battery			PE
30 kVA (3/3)	A	B	C	N	A	B	C	N	A	B	C	N	BAT+	N	BAT-	PE
Current (A)	57				45				45				66			
Size (mm²)	10				6				6				6			10
20 kVA (3/3)	A	B	C	N	A	B	C	N	A	B	C	N	BAT+	N	BAT-	PE
Current (A)	38				30				30				44			
Size (mm²)	4				2.5				2.5				6			4
10 kVA (3/3)	A	B	C	N	A	B	C	N	A	B	C	N	BAT+	N	BAT-	PE
Current (A)	19				15				15				44			
Size (mm²)	1.5				1				1				6			1.5

Table 1-1 Recommended wire diameter of power cables

Contents	Main Input				Bypass Input		Output		Battery			PE
20/30 kVA (3/1)	A	B	C	N	L	N	L	N	BAT+	N	BAT-	PE
Current (A)	38				91		91		44			
Size (mm²)	4				16		16		6			16
10kVA (3/1)	A	B	C	N	L	N	L	N	BAT+	N	BAT-	PE
Current (A)	19				45		45		44			
Size (mm²)	1.5				6		6		6			6
20/30 kVA (1/1)	A	B	C	N	L	N	L	N	BAT+	N	BAT-	PE
Current (A)	114				91		91		44			
Size (mm²)	25				16		16		6			16
10kVA (1/1)	A	B	C	N	L	N	L	N	BAT+	N	BAT-	PE
Current (A)	57				45		45		44			
Size (mm²)	10				6		6		6			6

Labels	Description
NOTE	The cables recommended in Table 1-1 are only applicable to the following conditions: **1.**Ambient temperature: 30°C. **2.**AC voltage loss is less than 3%, DC voltage loss is less than 1%. The AC cable length of various UPS models in the table is no more than 50 meters, and the DC cable length is no more than 30 meters. If it exceeds, the cable specifications should be increased. **3.**90°C copper conductor soft cable When external conditions change, it is necessary to refer to IEC60364-5-52 and local relevant specifications for verification. The current value in the table is for the data when the rated line voltage is 380V. For 400V rated voltage, the current value needs to be multiplied by 0.95; for 415V rated voltage, the current value needs to be multiplied by 0.92. **4.**When the main load is non-linear load, the N line section needs to be increased to 1.5 times to 1.7 times. **5.**The default number of batteries for 10kVA is 20PCS. **6.**In 3/1 and 1/1 modes, 30kVA needs to be derated to 20kVA.

1.6.2 Specifications for Power Cables Terminal

Specifications for power cables connector are listed as Table 1-2.
Table 1-2 Requirements for power terminal

Port	Connection	Bolt	Torque Moment
Mains input	Cables crimped	M5	2.5Nm
	OT terminal		
Bypass Input	Cables crimped	M5	2.5Nm
	OT terminal		
Battery Input	Cables crimped	M6	2.0Nm
	OT terminal		
Output	Cables crimped	M5	2.5Nm
	OT terminal		
PE	Cables crimped	M5	2.5Nm
	OT terminal		

1.6.3 Circuit Breaker

The UPS system needs to be equipped with external distribution circuit breakers, including main input circuit breaker, bypass input circuit breaker (configured when split input is configured), output circuit breaker, maintenance bypass circuit breaker and battery output circuit breaker. The recommended circuit breaker specifications are shown in Table 1-3.

Model	Input	Bypass	Output	Battery
30 kVA (3/3)	63A/3P	63A/3P	63A/3P	DC 80A/3P
20 kVA (3/3)	50A/3P	50A/3P	50A/3P	DC 50A/3P
10 kVA (3/3)	32A/3P	32A/3P	32A/3P	DC 50A/3P
20/30 kVA (3/1)	50A/3P	100A/2P	100A/2P	DC 50A/3P
10 kVA (3/1)	32A/3P	63A/3P	63A/2P	DC 50A/3P
20/30 kVA (1/1)	125A/2P	100A/2P	100A/2P	DC 50A/3P
10 kVA (1/1)	80A/2P	63A/2P	63A/2P	DC 50A/3P

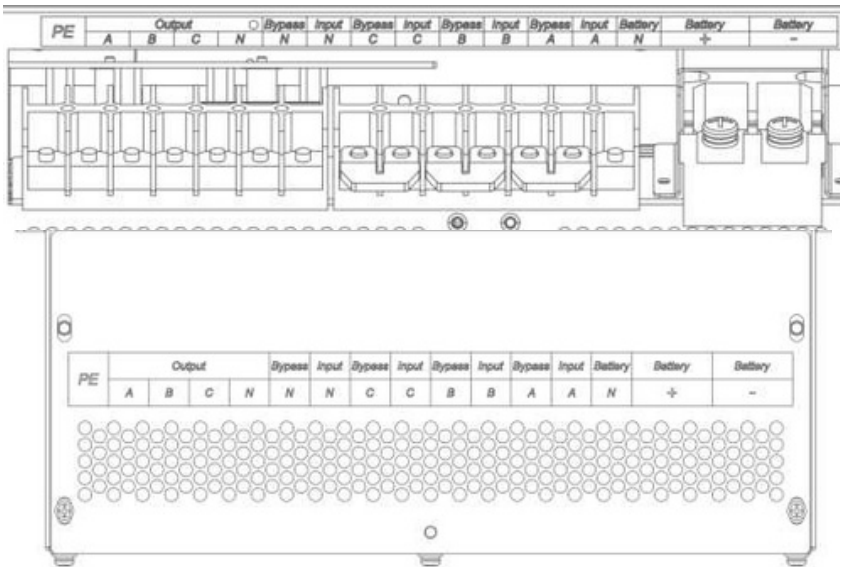
Table 1-3 Recommended circuit breaker specifications

Labels		Description
	NOTE	• The default number of batteries for 10kVA is 20PCS. • In 3/1 and 1/1 modes, 30kVA needs to be derated to 20kVA.
	DANGER	• It is not recommended to configure a circuit breaker with leakage protection function.

1.6.4 Cable Connections

The specific connection process is carried out as follows.

(1) Verify that all the switches of the UPS are completely open and the UPS internal maintenance bypass switch is open. Attach necessary warning signs to these switches to prevent unauthorized operation.
(2) Open the back door of the cabinet, remove the plastic cover. The input and output terminal, battery terminal and protective earth terminal are shown in Figure 1-8



10-30kVA connect terminals diagram
Figure 1-8 Connection terminals

(3) Connect the protective earth wire to protective earth terminal (PE).
(4) Connect the AC input supply cables to the main input terminal and AC output supply cables to the output terminal.
(5) Connect the battery cables to the battery terminal.
(6) Check to ensure there is no mistake and re-install all the protective covers.

Labels	Description
NOTE	• When connecting power cables, follow the torque torque given in Table 1-2 to ensure the tightness of the terminals and avoid potential safety hazards. • Before wiring the UPS, make sure you know the position and status of the switch connecting the UPS input to the mains power distribution. Make sure the switch is off and attach a warning sign to prevent others from operating the switch.

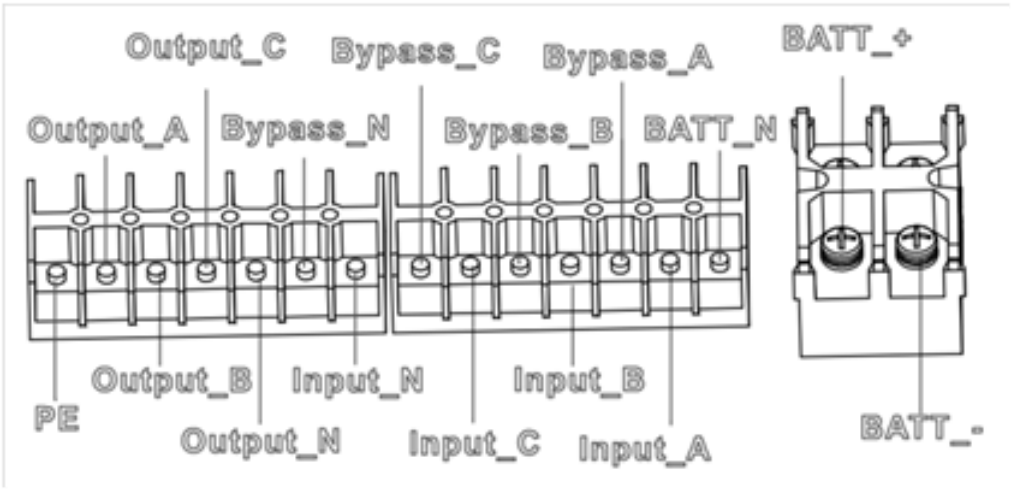
1.6.53/3&3/1&1/1 configuration

According to the needs of the user, distribution cable connection is divided into six types:
1.3-phase in and 3-phase out, common input/ split input;
2.3-phase in and 1-phase out, common input/ split input.
3.1-phase in and 1-phase out, common input/ split input;

Labels	Description
NOTE	• The derating setting needs to be set through UPSview software. Please contact the manufacturer's technical service department.

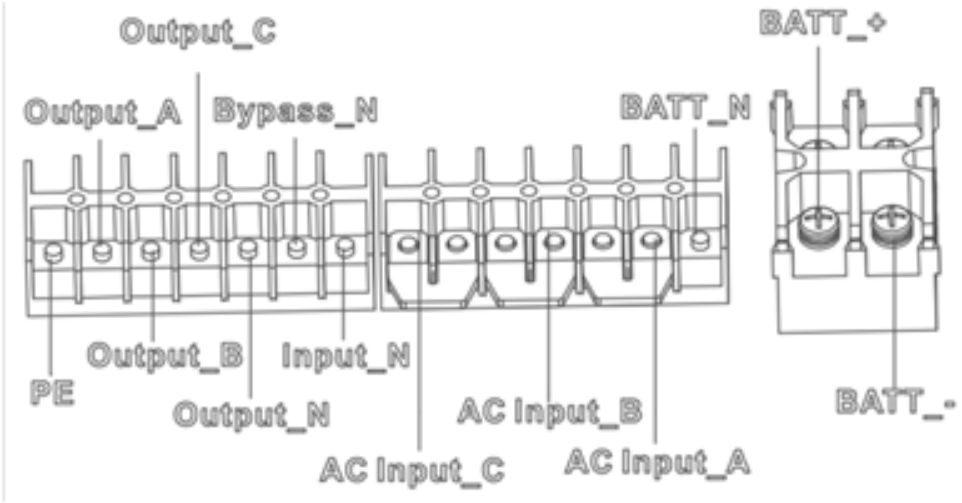
1.6.5.2 3-phase in and 1-phase out Split input

1. Connect the main input A, B, C and N cables to input_ A, B, C and N terminals of the UPS
2. Connect the bypass input A, B, C and N cables to Bypass_ A, B, C and N terminals of the UPS
3. Connect the output A, B, C and N cables to Output_ A, B, C and N terminals of the UPS ;
4. Connect the PE cable to the PE terminal of the UPS, as shown in Figure 1-9.



Common input(default)

1. Use short copper bar to short the input A and bypass A termianl, input B and bypass B terminal, input C and bypass C terminal of the UPS respectively;
2. Connect input A, B, C and N cable to Input_ A, B, C and N terminal of the UPS;
3.Connect output A, B, C and N cable to Output_ A, B, C and N terminal of the UPS ;
4.Connect the PE cable to the PE terminal of the UPS, as shown in Figure 1-10.



1.6.5.2 3-phase in and 1-phase out
Split input

1. Use 3/1 short copper bar to short the Bypass_A,B,C terminal,Output_A,B,C terminal and all N terminal respectively
2. Connect input A, B, C and N cable to Input_ A, B, C and N terminal of the UPS;
3. Connect the bypass input cable to the bypass short copper bar and N short copper bar ;
4. Connect the output cable to the output short copper bar and N short copper bar;
5. Connect the PE cable to the PE terminal of the UPS, as shown in Figure 1-11.

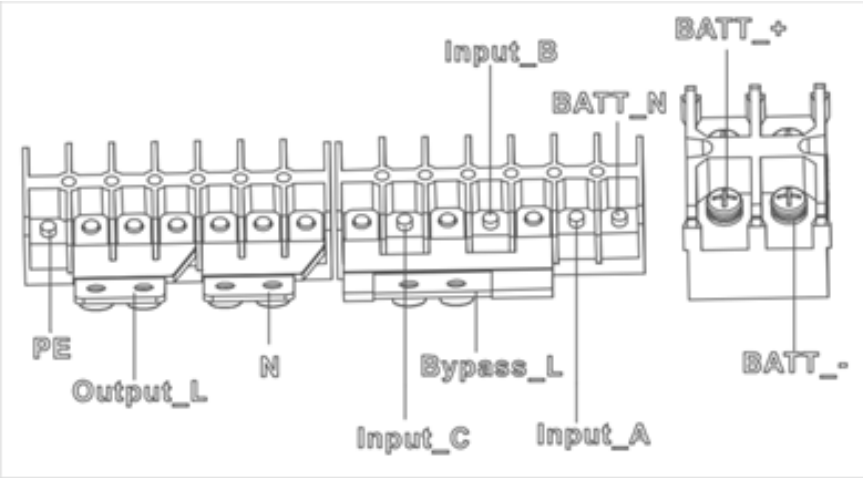


Figure 1-13 1-phase in and 1-phase out, split input

Common input(default)

1. Use 3/1 short copper bar to short the Bypass_A,B,C and Input_A terminal,Output_A,B,C terminal and all N terminal respectively
2. Connect input A, B, C and N cable to Input_ A, B, C and N terminal of the UPS;
3. Connect the output cable to the output short copper bar and N short copper bar;
4. Connect the PE cable to the PE terminal of the UPS, as shown in Figure 1-12.

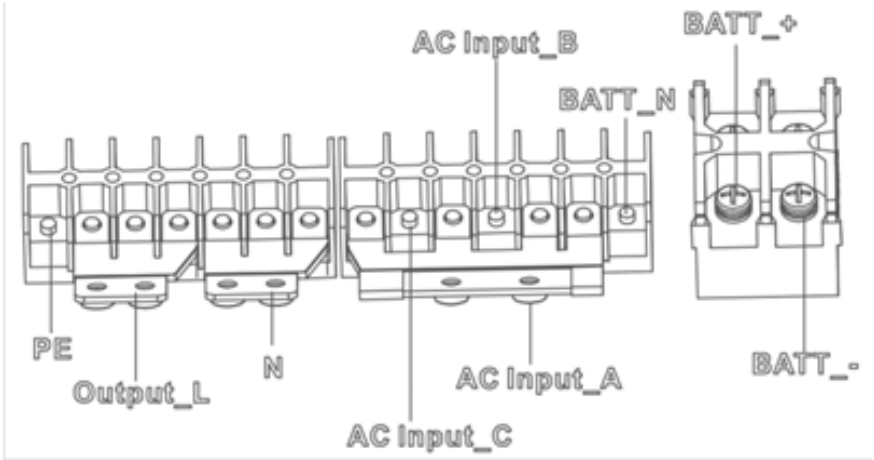


Figure 1-12 3-phase in and 1-phase out, common input

1.6.5.2 1-phase in and 1-phase out
Split input

1. Use 1/1 short copper bar to short the Bypass_A,B,C terminal,Output_A,B,C terminal ,Input_A,B,C terminal and all N terminal respectively;
2.Connect the main input cable to the input short copper bar and N short copper bar;
3.Connect the bypass input cable to the bypass short copper bar and N short copper bar;
4.Connect the output cable to the output short copper bar and N short copper bar;
5.Connect the PE cable to the PE terminal of the UPS, as shown in Figure 1-13.

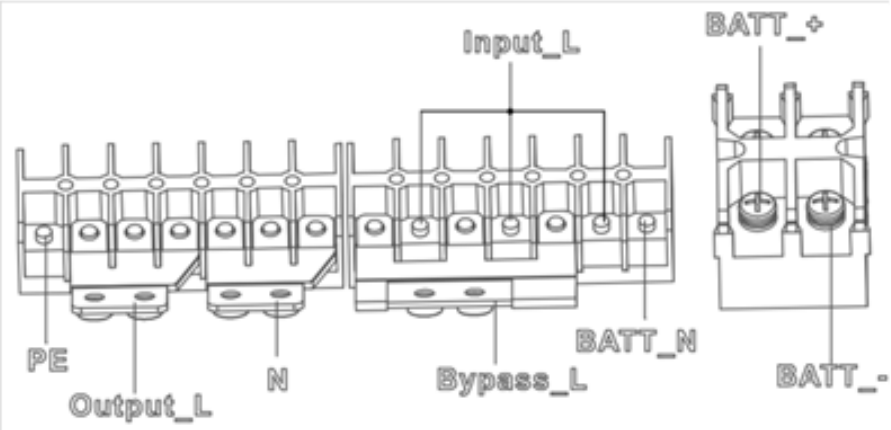
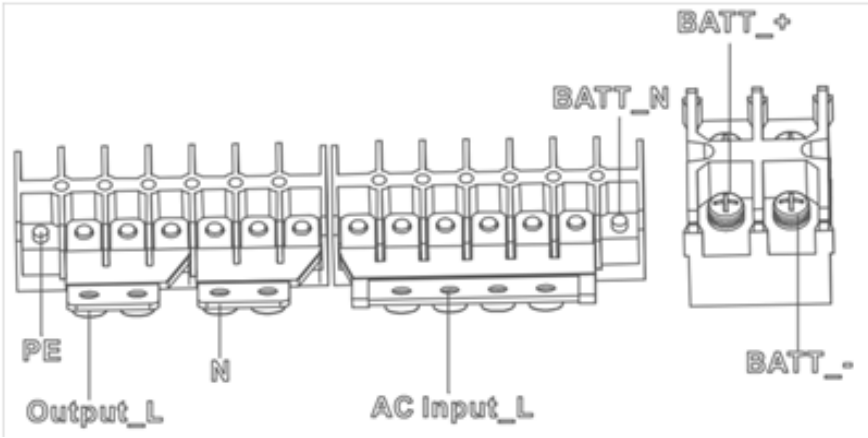


Figure 1-13 1-phase in and 1-phase out, split input

Common input(default)

1. Use 1/1 short copper bar to short the Bypass_A,B,C and Input_A,B,C terminal,Output_A,B,C terminal and all N terminal respectively
2. Connect the main input cable to the input short copper bar and N short copper bar;
3. Connect the output cable to the output short copper bar and N short copper bar;
4. Connect the PE cable to the PE terminal of the UPS, as shown in Figure 1-14.



1.7 Control Cabling and Communication

1.7.1 UPS Dry Contactor and Monitoring Board Features

Based on your site's specific needs, the UPS may require auxiliary connections to manage the battery system (the external battery circuit breaker, the battery temperature sensor), communicate with a personal computer or provide alarm signaling to the external devices or for the Remote Emergency Power Off (REPO). Terminations for these functions are located at the front of the static bypass assembly. The main features are:

- SNMP slot
- Environment and battery temperature input interface
- Generator input dry contactor interface
- Battery warning output dry contactor interface
- Battery circuit breaker interface
- Mains failure warning output dry contactor interface
- Intelligent slots intelligent card interface
- User communication interface (RS232,RS485,USB)
- Parallel ports (optional)

The UPS dry contactor board provides input dry contactors and output dry contactors.

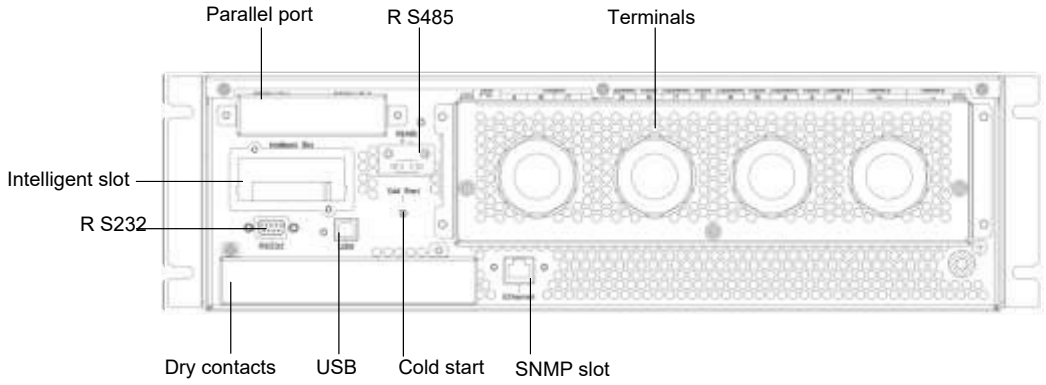


Figure 1-15 Dry contact&communication interface

1.7.2 Dry Contactor

The dry contact port includes 5 groups of interfaces, and their interface functions are shown in Table 1-4.

Interface location	Type	Function
EPO-1	REMOTE_EPO_NO	Trigger EPO when shorted to EPO-2
EPO-2	+24V_DRY	+24V
EPO-3	+24V_DRY	+24V
EPO-4	REMOTE_EPO_NC	EPO triggered when disconnected from EPO-3
TEMP-1	ENV_TEMP	Ambient temperature detection
TEMP-2	TEMP_COM	Temperature detection common terminal
TEMP-3	TEMP_COM	Temperature detection common terminal
TEMP-4	TEMP_BAT	Battery temperature detection
IP1-1	BCB_Status	Built-in input dry contact, function can be set.
		Default function: BCB Status and BCB Online are valid (when BCB Status is invalid, it will report that the battery is empty)
IP1-2	GND_DRY	+24V ground
IP2-3	BCB_Online	Built-in input dry contact, function can be set.
		Default function: BCB Status and BCB Online are valid (when BCB Status is invalid, it will report that the battery is empty)

Interface location	Type	Function
IP2-4	GND_DRY	+24V ground
IP3-5	GEN_CONNECTED	Built-in input dry contact, function can be set. Default function: engine access port
IP3-6	+24V_DRY	+24V
OP1-1	BAT_LOW_ALARM_NC	Built-in output dry contact (normally closed), function can be set. Default setting: low battery voltage alarm.
OP1-2	BAT_LOW_ALARM_NO	Built-in output dry contact (normally open), function can be set. Default setting: low battery voltage alarm
OP1-3	BAT_LOW_ALARM_GND	OP1-1 and OP1-2 common terminal
OP2-4	GENERAL_ALARM_NC	Built-in output dry contact (normally closed), function can be set. Default setting: Comprehensive alarm.
OP2-5	GENERAL_ALARM_NO	Built-in output dry contact (normally open), function can be set. Default setting: Comprehensive alarm
OP2-6	GENERAL_ALARM_GND	OP2-4 and OP2-5 common terminal
OP3-1	UTILITY_FAIL_NC	Built-in output dry contact (normally closed), function can be set. Default setting: Mains power abnormality alarm.
OP3-2	UTILITY_FAIL_NO	Built-in output dry contact (normally open), function can be set. Default setting: Mains power abnormality alarm
OP3-3	UTILITY_FAIL_GND	OP3-1 and OP3-2 common terminal
OP4-4	BCB Drive	Built-in output dry contact, function can be set. Default function: Battery CB trip signal (valid under EOD or EPO)
OP4-5	GND_DRY	+24V ground
OP4-6	+24V_DRY	+24V

Labels	Description
NOTE	• The settable functions of dry contacts can be set through the background monitoring software.

The default functions of each dry contact are described below.

Remote EPO Input Port
EPO is the remote EPO input interface. During normal operation, EPO_NC needs to be short-circuited to +24V. When EPO needs to be triggered, EPO_NC needs to be disconnected from +24V. The interface schematic diagram is as follows, the interface schematic diagram is shown in Figure 1-10, and the interface description is shown in Table 1-5.

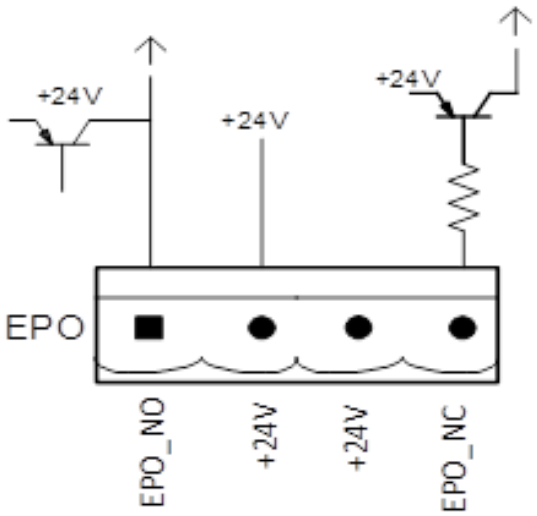


Figure 1-16 Schematic diagram of remote EPO input interface

Location	Type	Function
EPO-1	REMOTE_EPO_NC	EPO triggered when disconnected from EPO-2
EPO-2	+24V_DRY	+24V
EPO-3	+24V_DRY	+24V
EPO-4	REMOTE_EPO_NO	EPO is triggered when shorted to EPO-3

Table 1-5 Remote EPO input interface description

During normal operation of the UPS system, pins EPO-3 and EPO-4 need to be short-circuited and pins EPO-1 and EPO-2 disconnected. If EPO-3 and pins EPO-4 are disconnected or pins EPO-1 and EPO-2 are short-circuited, an emergency shutdown will be triggered.

Battery & ambient temperature detection dry contact
The temperature dry contact detects battery temperature and ambient temperature and is used for environmental monitoring and battery temperature compensation. The schematic diagram of the temperature detection interface is shown in Figure 1-11, and the interface description is shown in Table 1-6.

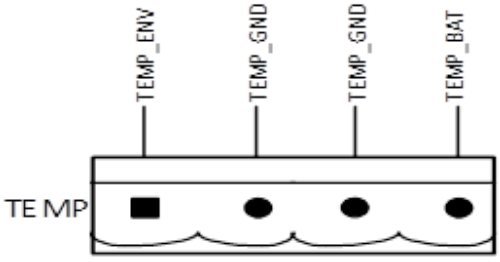


Figure 1-17 Temperature detection dry contact interface

Location	Type	Function
TEMP-1	TEMP_ENV	Ambient temperature detection
TEMP-2	TEMP_COM	Temperature detection common terminal
TEMP-3	TEMP_COM	Temperature detection common terminal
TEMP-4	ENV_TEMP	Battery temperature detection

Table 1-6 Description of input dry contact interfaces J2 and J3

Labels	Description
NOTE	Temperature detection requires the use of a specific temperature sensor (R25=5kohm, B25/50=3275). Please confirm with the manufacturer when ordering, or contact the office.

Generator Input Dry Contact

IP3 5-6 pins are the generator connection status interface. Connect pin 5 of IP3 to the +24V power supply, indicating that the generator has been connected to the system. The interface diagram is shown in Figure 1-12, and the interface description is shown in Table 1-7.

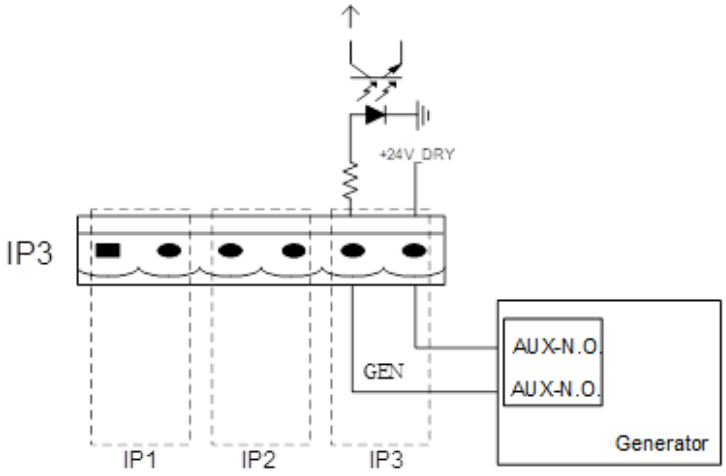


Figure 1-18 Generator access status interface and connection diagram

Location	Type	Function
IP3-5	GEN_CONNECTED	Built-in input dry contact, function can be set.
		Default function: generator access status port
IP3-6	+24V_DRY	+24V power supply

Table 1-7 Generator access status interface description

Location	Type	Function
TEMP-1	TEMP_ENV	Ambient temperature detection
TEMP-2	TEMP_COM	Temperature detection common terminal
TEMP-3	TEMP_COM	Temperature detection common terminal
TEMP-4	ENV_TEMP	Battery temperature detection

Table 1-6 Description of input dry contact interfaces J2 and J3

BCB Interface

IP1 and IP2 are battery switch (BCB) interfaces, and OP4 pins 4-6 are BCB breakout signal outputs. The interface diagram is shown in Figure 1-13, and the interface description is shown in Table 1-8.

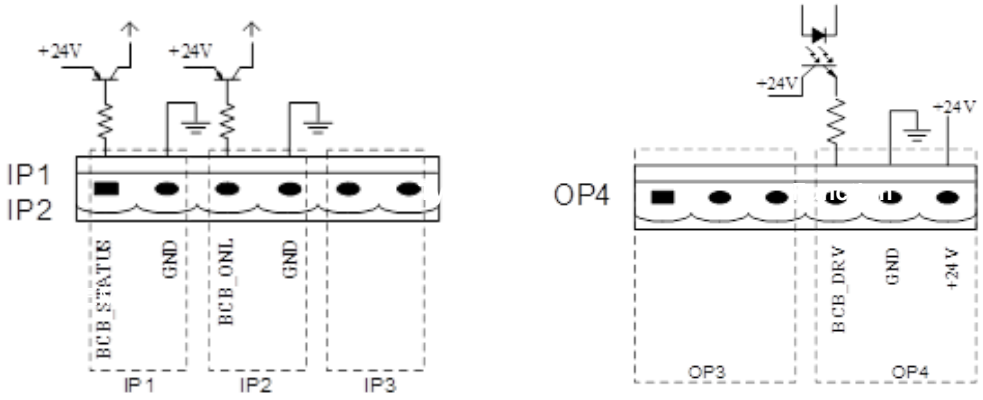


Figure 1-19 BCB interface

Location	Type	Function
IP1-1	BCB_Status	BCB contact status, connect to the normally open signal of BCB
IP1-2	GND_DRY	+24V ground
IP2-3	BCB_Online	BCB contact status, connected to the normally open signal of BCB
IP2-4	GND_DRY	+24V ground
OP4-4	BCB_DRV	BCB trip signal output, 24V level, maximum support 100mA
OP4-5	GND_DRY	+24V ground
OP4-6	+24V_DRY	+24V

Table 1-8 BCB interface description

Battery Voltage Low Alarm Output Dry Contact Interface

OP1 is the output dry contact interface, and OP1 1-3 pins are the output battery voltage alarm signal. When the battery voltage is lower than the set value, an auxiliary dry contact signal isolated by a relay will be provided. The interface diagram is shown in Figure 1-14, and the interface description is shown in Table 1-9.

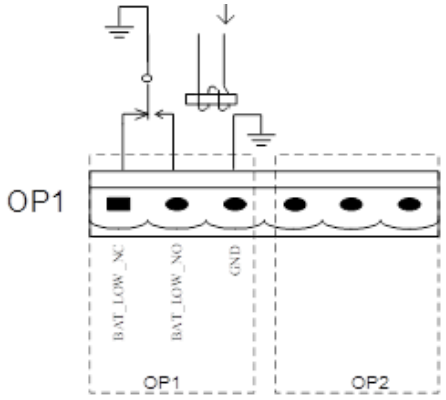


Figure 1-20 Schematic diagram of dry contact interface with similar battery voltage

Location	Type	Function
OP1-1	BAT_LOW_ALARM_NC	Battery voltage alarm relay (normally closed), disconnected when alarm occurs
OP1-2	BAT_LOW_ALARM_NO	Battery voltage alarm relay (normally open), closed when alarm occurs
OP1-3	BAT_LOW_ALARM_GND	OP1-1 and OP2-2 common terminal

Table 1-9 Battery voltage alarm dry contact interface description

General Alarm Output Dry Contact Interface

OP2 is a general alarm output dry contact interface. When one or more preset alarms are triggered, the system will send out a general alarm message and provide an auxiliary dry contact signal isolated by a relay. The interface diagram is shown in Figure 1-15, and the interface description is shown in Table 1-10.

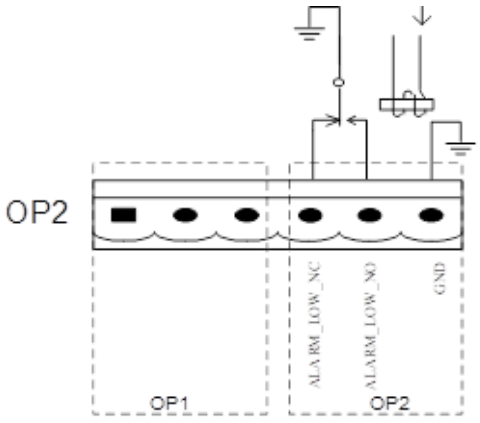


Figure 1-21 Schematic diagram of general alarm dry contact interface

Location	Type	Function
OP2-4	GENERAL_ALARM_NC	General alarm relay (normally closed), disconnected when alarm occurs
OP2-5	GENERAL_ALARM_NO	General alarm relay (normally open), closed when alarm occurs
OP2-6	GENERAL_ALARM_GND	OP2-4 and OP2-5 common terminal

Table 1-10 Comprehensive alarm dry contact interface description

Utility Fail Alarm Output Dry Contact Interface

J10 is the utility fault alarm output dry contact interface. When the utility fails, the system will send out a utility fault alarm message and provide an auxiliary dry contact signal isolated by a relay. The interface diagram is shown in Figure 1-16, and the interface description is shown in Table 1-11.

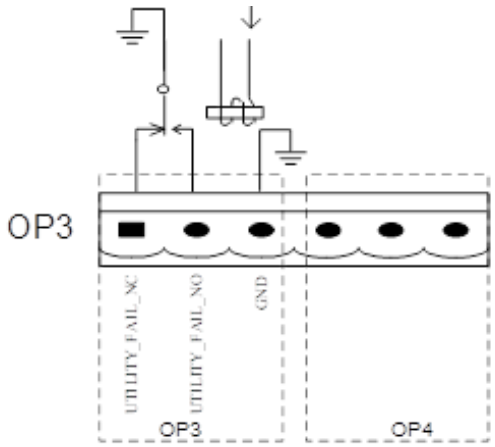


Figure 1-22 Mains fault alarm dry contact interface diagram

Location	Type	Function
OP3-1	UTILITY_FAIL_NC	Utility failure alarm relay (normally closed), disconnected when alarm occurs
OP3-2	UTILITY_FAIL_NO	Utility failure alarm relay (normally open), closed when alarm occurs
OP3-3	UTILITY_FAIL_GND	OP3-1and OP3-2 common terminal

Table 1-11 Mains fault alarm dry contact interface description

BATTERY INSTALLATION AND MAINTENANCE

2.1 General Recommendations

Take special care when operating the batteries of the UPS system. When all the batteries are connected, the battery voltage can exceed 400Vdc, which is potentially lethal.

Labels		Description
	**NOTE**	The precautions for battery installation, use and maintenance are to be provided by the batteries manufacturers. The precautions in this section include the key issues that must be considered during the installation design, which may be adjusted according to the specific local situations.
	**WARNING**	• The battery shall be installed and stored in a clean, cool and dry environment. • Do not install the battery in a sealed battery chamber or sealed room. The battery room ventilation shall at least meet the requirement of EN50272-2001. Otherwise, battery bulging, fire and even human injury may be caused. • The battery shall be installed far away from the heating source (e.g. transformer). Do not use or store the battery in the place near the heating source or burn the battery or place it into fire. Otherwise, battery leakage, bulging, fire or explosion may be caused. • Batteries shall be placed in such a manner that two bare live parts with the potential difference of more than 150V shall not be connected at the same time. If it is unavoidable, insulated terminal cover and insulated cables shall be used for connection. • 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.
	**DANGER**	• 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 may be caused. • Before operating the battery, remove the finger ring, watch, necklace, bracelet and any other metal jewelry • Wear rubber gloves. • Eye protection should be worn to prevent injury from accidental electrical arcs. • 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 contactor with the skin, the affected area should be washed immediately with water.

BATTERY INSTALLATION AND MAINTENANCE

2.1 General Recommendations

Take special care when operating the batteries of the UPS system. When all the batteries are connected, the battery voltage can exceed 400Vdc, which is potentially lethal.

Labels		Description
	**NOTE**	The precautions for battery installation, use and maintenance are to be provided by the batteries manufacturers. The precautions in this section include the key issues that must be considered during the installation design, which may be adjusted according to the specific local situations.
	**WARNING**	• The battery shall be installed and stored in a clean, cool and dry environment. • Do not install the battery in a sealed battery chamber or sealed room. The battery room ventilation shall at least meet the requirement of EN50272-2001. Otherwise, battery bulging, fire and even human injury may be caused. • The battery shall be installed far away from the heating source (e.g. transformer). Do not use or store the battery in the place near the heating source or burn the battery or place it into fire. Otherwise, battery leakage, bulging, fire or explosion may be caused. • Batteries shall be placed in such a manner that two bare live parts with the potential difference of more than 150V shall not be connected at the same time. If it is unavoidable, insulated terminal cover and insulated cables shall be used for connection. • 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.
	**DANGER**	• 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 may be caused. • Before operating the battery, remove the finger ring, watch, necklace, bracelet and any other metal jewelry • Wear rubber gloves. • Eye protection should be worn to prevent injury from accidental electrical arcs. • 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 contactor with the skin, the affected area should be washed immediately with water.

2.2 Battery Typologies

According to the requested configuration UPS may need batteries consisting of one or more strings of battery blocks installed on shelves in a locked cabinet or dedicated battery room.

Labels	Description
NOTE	The Traditional external battery cabinet can make use of each even number of batteries per string between 36 and 44. The default factory setting, if the unit is ordered w/o internal battery is 40. The cabinet is only for valve regulated maintenance-free lead-acid battery. CAUTION: The lead acid battery may cause chemistry hazard

2.2.1 Traditional Battery Installation

Only the qualified engineers are allowed to install and maintain mounted in a traditional battery cabinet or shelf. To ensure safety, install the external battery in a locked cabinet or dedicated battery room accessible just to service qualified personnel.

Please note that number of cells set via software must be consistent with the actual number of cells.
A minimum space of 10mm must be reserved on all vertical sides of the battery block to permit free air movement around the cells.

A certain clearance should be reserved between the top of the cells and the underside of the shelf above as this is necessary for monitoring and servicing the cells.
When installing the batteries always work from the bottom shelf upwards to prevent raising the center of gravity.

Install the batteries reliably and avoid vibration and mechanical bumping. The bending radius of cable should be more than 10D, where "D" is the outer diameter of cable. When connecting the cable, do not cross the battery cables and do not bind the battery cables together. The battery connection must be firm and reliable. After the connection, all the connections between the wiring terminals and the batteries must be corrected to meet the torque requirement provided in the specifications and user manuals of the battery manufacturers.

Each battery terminal should be insulated after its connection has been made.
Check if the battery is unexpectedly grounded. If the battery is unexpectedly grounded, remove the earth power supply. Contactoring any part of the grounded earth may be subject to electric shock.
Measure the battery voltage, and carry out battery voltage calibration after the UPS is started.
Diagram of batteries connection is shown as below:

BATTERY INSTALLATION AND MAINTENANCE

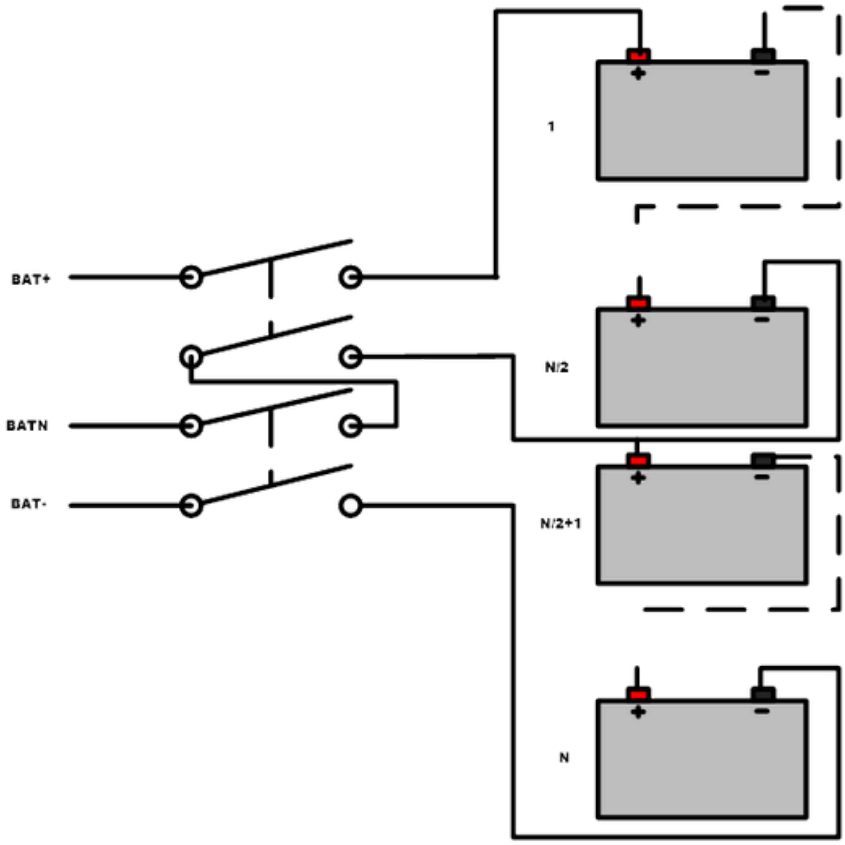


Figure2- 1: Diagram of Batteries Connection

Labels	Description
WARNING	• When using a traditional battery solution, always comply with the following precautions: • lDisconnect the charging power before connecting or disconnecting the cable of the battery terminals. • lDo not connect the cables between the UPS battery terminals and the batteries before getting the approval from the commissioning engineer. • lWhen connecting the cables between the battery terminals and the circuit breaker, always connect the circuit breaker end of the cable first. • lBe sure to connect the positive/negative terminals of the batteries to those of the circuit breakers and those of the circuit breakers to those of the UPS respectively with reference to the markings of positive/negative terminals. Reverse connection of battery polarities will result in explosion, fire accident, the damage of batteries and UPS, and human injury. • lThe battery connecting terminal shall not subject to any external force, such as the pulling force or twisting force of the cable. Otherwise, the internal connection of the battery may be damaged, and in severe case, the battery may catch fire. • lDo not connect power until the total voltage of the battery string is verified correct through measurement. • lDo not connect any conductor between the positive and negative terminals of the battery. • Do not close the battery circuit breakers before getting the approval from the commissioning engineer.

BATTERY INSTALLATION AND MAINTENANCE

2.3 Battery Maintenance

For the battery maintenance and precautions, please refer to IEEE-Std-1188-2005 and the relevant manuals provided by the battery manufacturers.

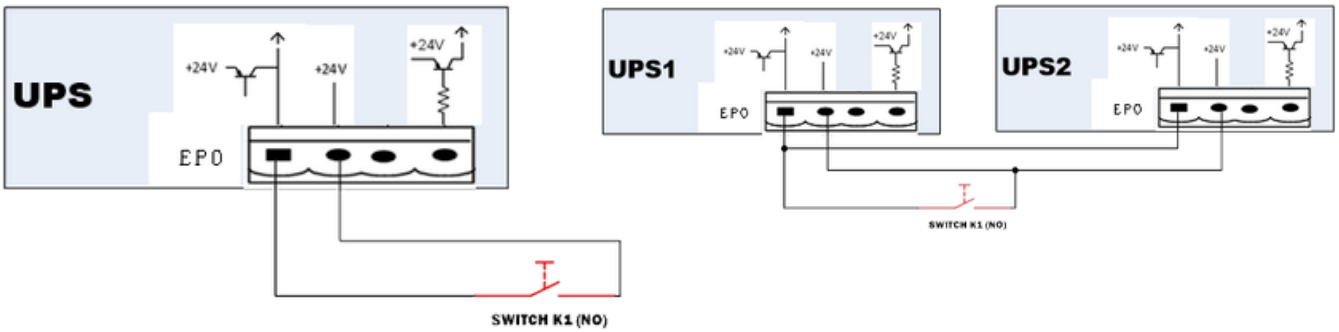
Labels	Description
WARNING	• Check to ensure that all the safety devices are in place and function normally. Check if the battery management parameter setting is normal particularly. • Measure and record the air temperature in the battery room. • Check if the battery terminals are damaged or have the symptom of heating, and if the shell or cover is damaged. • Please fasten every bolt on the terminal according to the fastening torque specified in the table below. • After 1-2 months of service, recheck to make sure that each screw has been fastened according to the specified torque. Otherwise there is risk of fire. • CAUTION: Use the battery with the same capacity and type, if battery is replaced by an incorrect type, it can cause explosion. • CAUTION: Dispose of used battery according to the local instructions

INSTALLATION OF UPS RACK SYSTEM

3.1 Overview

The single system should be installed according to the installation procedures of the UPS rack module system and the requirements in this Chapter. For single UPS installation the EPO button on the front panel of the UPS rack controls the emergency stop of UPS modules and bypass static switch and also supports remote emergency power off function that can be used to shut down the UPS rack module remotely.

Labels	Description
NOTE	• The remote EPO switch must provide normally open or normally closed dry contactor signals. • The open circuit voltage is 24Vdc, and the current is less than 20mA. • Normally closed EPO terminals: Pin 1 and pin 2 have been connected in factory and located on the dry contactor board. • Set EPO function as available with monitoring software on PC before using remote EPO function.



(a) Single unit (b) Parallel system

Figure 3- 1: Circuit diagram of EPO

3.2 Parallel UPS

3.2.1 Diagram of the parallel system

UPS can be scaled up to four times the stand-alone capacity by parallel 4 cabinets,The parallel structure diagram is shown in Figure 3-2.

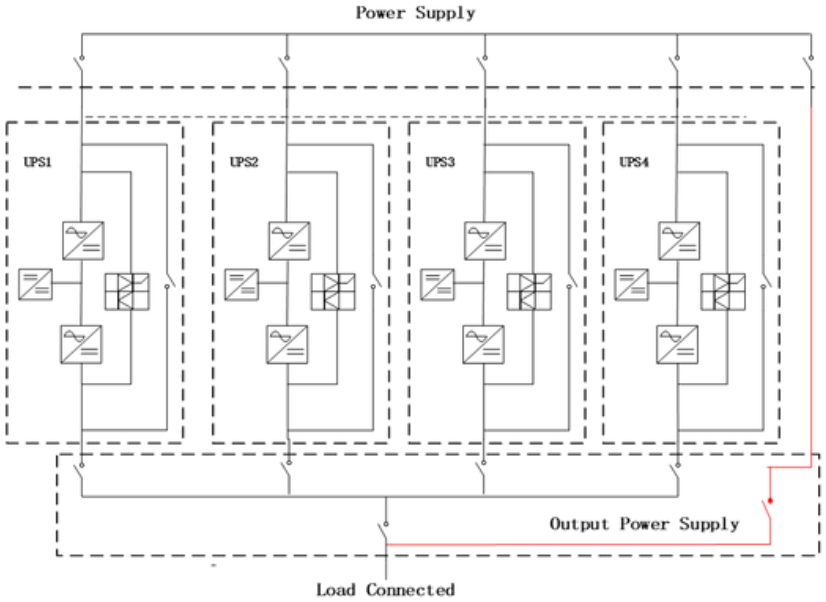


Figure 3-2 Parallel Structure

The system parallel board is located on the rear of the UPS cabinet,Its position is shown in Figure 3-3.

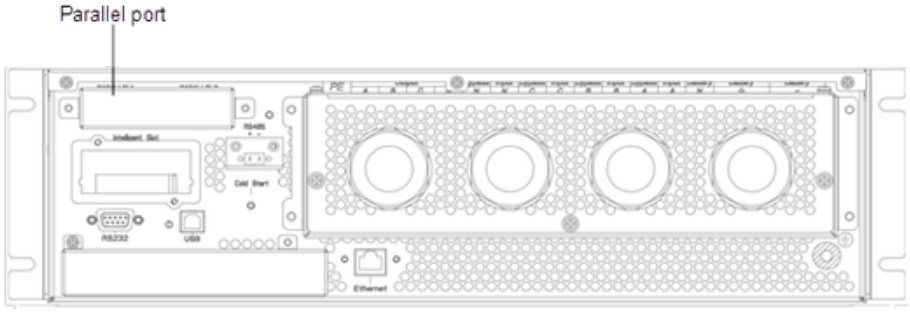
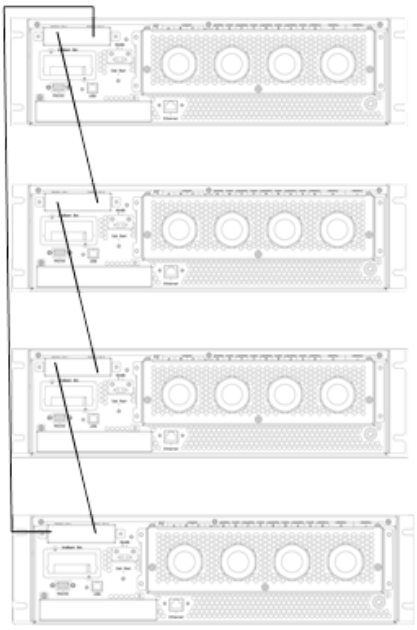


Figure3-3 Parallel board location

Open the cover of parallel board, connect the terminals in order with cables, connected into a ring. The connection is shown in Figure 3-4.



3.2.2 Parallel operation process

Short-circuit the main and bypass inputs of each UPS in the system (If the main side of different sources, then short circuit the main road, bypass and other UPS in the system of the main road, bypass together). Taking into account the bypass current sharing problem of the parallel system, the specifications and length of the input and output power lines of each UPS in the parallel system should be consistent.

If the customer needs to set the parallel parameters according to actual needs, please follow the steps below:

1. Set each UPS in the machine system one by one:In LCD screen or background software click "Set" "System Set", set to "Parallel" and select "United Number" and "Cabinet ID",In principle, the Cabinet ID starts from "0" and is continuous and must not be repeated. For example: a three-parallel system, the ID of one UPS is set to "0", and the other two are set to "1" and "2" in turn. The UPS and the code correspond freely, and no special requirement. All UPS output parameters must be consistent, otherwise they can't be paralleled.

All settings take effect after the UPS restarts. Background parallel parameter settings are shown in Figure.3-5.

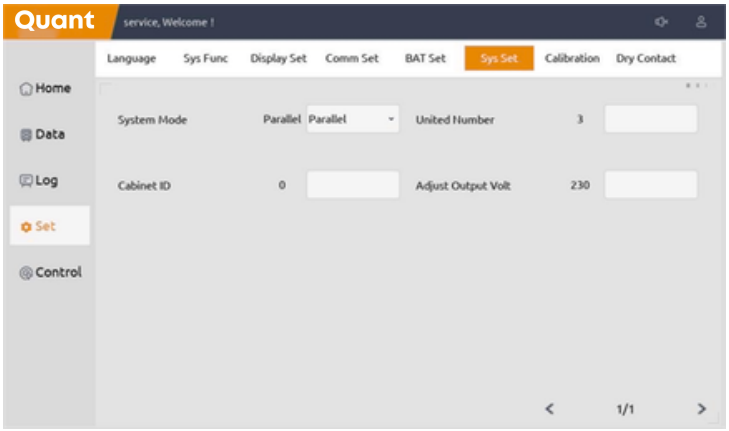


Figure 3-5 parallel setting

2. Depending on the number of parallel connections, the corresponding short-circuit pin status on the board is also different. Please consult the manufacturer. The parallel board is shown in the figure below.

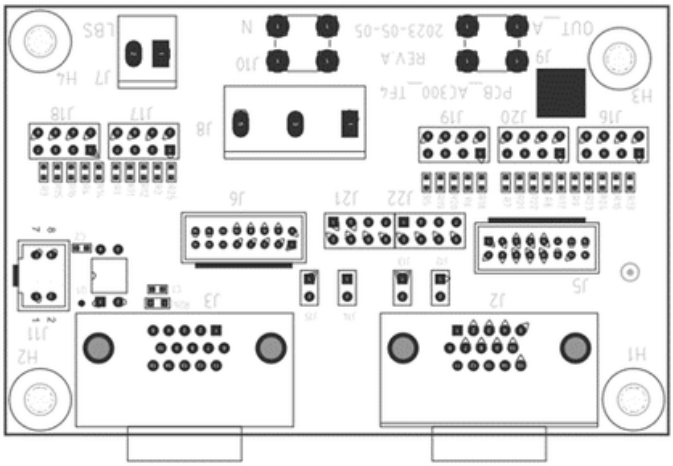


Figure 3-6 parallel borad

Labels		Description
	NOTE	• Note:Please contact the manufacturer for parallel set and follow the parallel setting manual. • After confirming that each single UPS is properly commissioned, debug the parallel system,the specific steps are as follows: • 1) Close the input and output breakers of one of the UPSs, and the UPS will power on and enter the bypass for power supply,The rectifier and inverter are turned on one after another and switched to the inverter power supply mode, test whether the output is normal; • 2) Close the input and output breaker of the second UPS, follow the above start-up operation steps, and the UPS will automatically enter the system,Check the LCD display UPS without warning and make sure that the UPS is working normally; • 3) And so on, continue to put the third or fourth UPS into the parallel system after turning on the inverter; • 4) With a certain load, each UPS should be able to share the load equally.
	WARNING	During the power-on process of the parallel system, make sure that the external output of each UPS is closed, and that all UPS inverter outputs are parallel.

INSTALLATION DRAWING

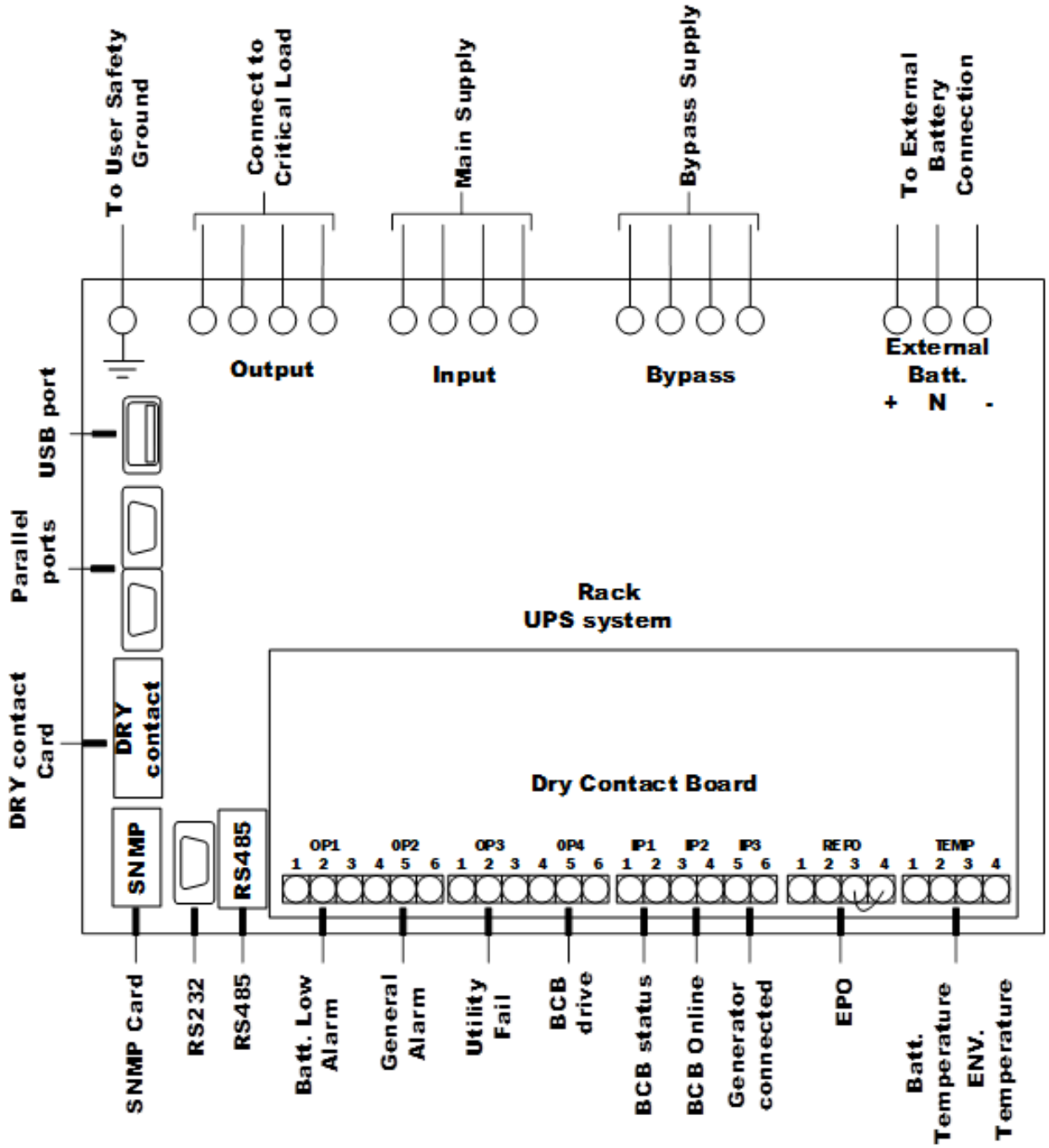


Figure 4- 1: Wiring Diagram

INSTALLATION DRAWING

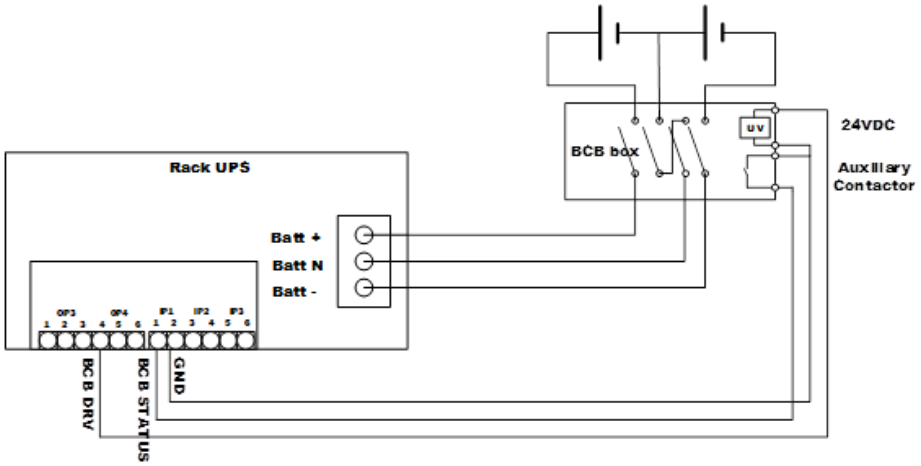


Figure4- 2: External Battery Connection

I External BCB interface:
BCB DRV (OP4-4): BCB drive signal
BCB STATUS (IP1-1): BCB contactor status, normally opened. Shorted to GND when activated
GND (IP1-2): common connection

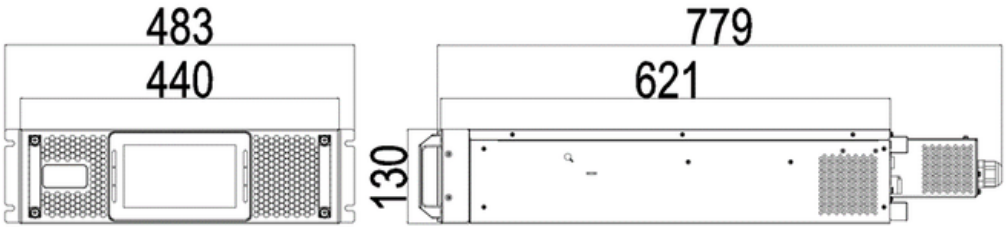


Figure4- 3: 10-30 kVA Rack UPS Dimensions

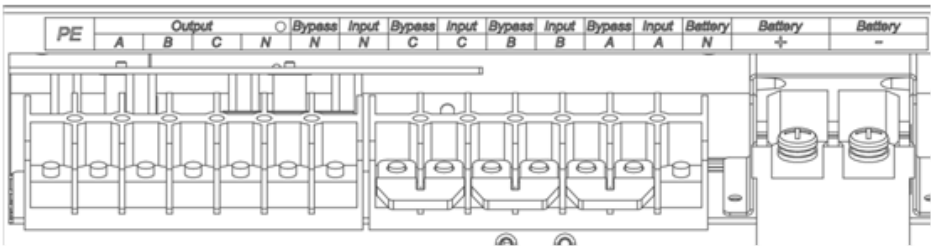


Figure 4-4 Power Connection of 10-30kVA Rack UPS

OPERATIONS

The components that can only be accessed by opening the protective cover with tools cannot be operated by user. Only qualified service personnel are authorized to remove such covers.

5.1 Introduction

The company's intelligent rack-mounted UPS series products adopt online dual conversion design, based on DSP full digital control, for heavy.

The load should provide a stable and uninterrupted power supply, which can eliminate surges, instantaneous high voltage, instantaneous low voltage and wire noise on the mains
Power supply pollution such as sound and frequency shift provides customers with high efficiency and high power density power supply guarantee.

Features
This product includes the following features:
1) Stronger load carrying capacity, output power factor is 1.
2) Compatible with 3/3, 3/1 and 1/1 modes
3) Can be inserted into a standard server rack
4) It has the function of parallel operation, and can realize 3+1 parallel redundant power supply at most
5) The full load efficiency of the whole machine reaches more than 96%, and the half load efficiency reaches 96.5%
6) The thickness is 3U, and it supports tower installation to meet different requirements of users
7) The operation panel adopts 7-inch LCD screen display, which is convenient for users to understand the working status and parameters of UPS more intuitively
8) Support only the front panel to maintain the dust screen (optional) and fan
9) Standard 232, USB, 485, cold start, dry contact, network interface, SNMP/AS400 expansion card slot
10) The number of battery cells can be set from 20-50 (10k) cells, 30-50 (20k/30k) cells, and a variety of battery management parameters can be set,
The maximum charging power is 100% of the output power
11) Fully digital intelligent battery management function to extend the service life of batteries
12) It has the function of self-test and automatic identification of fan failure
13) It has intelligent fan design, and the fan speed can be automatically adjusted according to the load state to reduce power consumption and noise
14) Provide EPO interface to realize remote shutdown function, making the operation more convenient
15) The use of DSP full digital control technology, the system stability is high, has self-protection and fault diagnosis capabilities

Labels		Description
	**NOTE**	When the UPS is operating in bypass mode or on maintenance bypass, the connected equipment is not protected from power failures or surges and sags.

5.2 1+1 Parallel System

Several "single unit" UPS may constitute a "1+1" system, where up to two single units operate together for the purpose of providing additional power or reliability or both. The load is equally shared between any paralleled UPSs.

5.2.1 Features of Parallel System

1. The hardware and firmware of single UPS units are completely compatible with the requirements of a parallel system. Parallel configuration can be achieved merely through settings in configuration software. The parameters settings for the UPS in parallel system shall be consistent.
2. Parallel control cables are connected in a ring, providing both performance and redundancy. Dual-bus control cables are connected between any two UPS of each bus. The intelligent paralleling logic provides the user with maximum flexibility. For example, shutting down or starting up UPS in a parallel system can be done in any sequence. Transfers between Normal and Bypass modes of operation are synchronized and self–recovering e.g. following overloads and their clearance.
3. The total load of the parallel system can be queried from each unit's LCD.

5.2.2 Parallel Requirements of UPS

In order to assure that all UPS are equally utilized and to comply with relevant wiring rules, the following requirements apply:
1. All UPS shall be of the same rating and must be connected to the same bypass source.
2. The bypass and the main input sources must be referenced to the same neutral potential.
3. Any RCD (Residual Current detecting device), if installed, must be of an appropriate setting and located upstream of the common neutral bonding point. Alternatively, the device must monitor the protective earth currents of the system. Refer to the High Leakage Current Warning in the first part of this manual.
4. The outputs of all UPS must be connected to a common output bus.

Labels	Description
NOTE	Optional isolation transformers are available for applications where sources do not share the same neutral reference or where the neutral is not available.

5.3 Operating Mode

The Rack UPS is an online, double-conversion, reverse-transfer UPS that permits operation in the following modes:

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

5.3.1 Normal Mode

The UPS turns the AC input into DC voltage (AC / DC) through the rectifier, and the DC voltage boost to the BUS voltage. When the system is connected to the external battery, part of the charger charges the battery (DC / DC), and the other part changes the inverter to the DC output (DC / AC) to provide high quality AC power for the load. The working principle of the normal mode is shown in Figure 5-1.

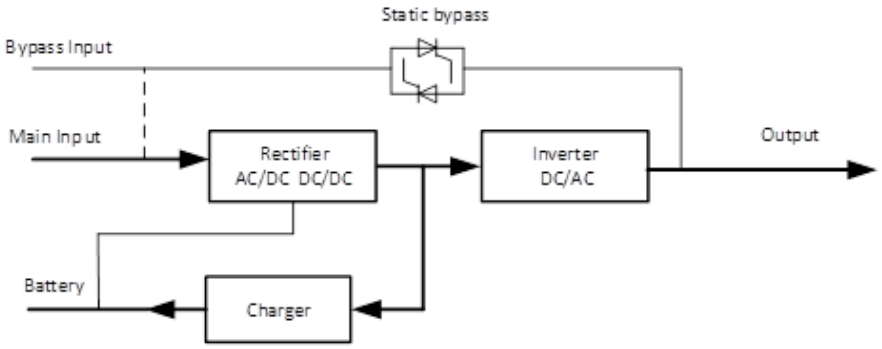


Figure 5-1 Normal mode schematic diagram

5.3.2 Battery Mode

Upon failure of the AC mains input power, the inverters will obtain power from the batteries, and supply AC power to the critical AC load. There is no interruption to the critical load. After restoration of the AC mains input power, UPS will transfer automatically to normal mode. Battery schematic diagram as shown below Figure 5-2.

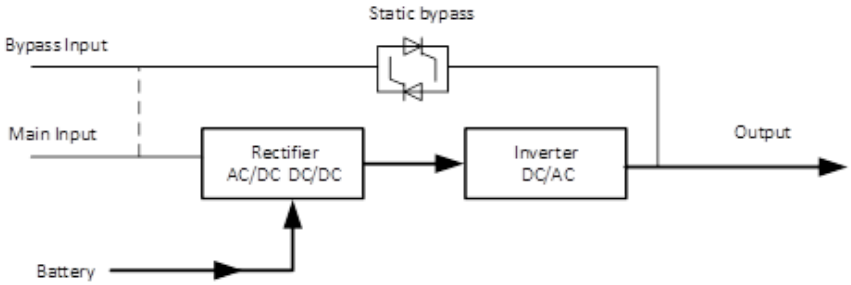


Figure 5-2 Battery mode schematic diagram

Labels	Description
NOTE	With the function of "Battery Cold Start", the UPS could start without utility.

5.3.3 Auto-Restart Mode

UPS provides automatic power-on function, that is, the mains power outage time is too long, the battery discharge to the EOD voltage causes the inverter to shut down. If the mains power recovery, UPS will automatically start UPS. The mode and the delay time are programmed by the commissioning engineer.

5.3.4 Bypass Mode

After the system is powered on, when the inverter is not turned on or the inverter is artificially turned off, the load is powered by the bypass. In the normal mode, if the UPS monitoring unit detects the system over temperature, overload or other shutdown failure of the inverter, the system will automatically switch to the bypass. In this condition, the mains directly supplies power to the load through the bypass static switch. In the bypass mode, the load power supply quality is not protected by UPS, and it is susceptible to power failure, voltage waveform or abnormal frequency conditions. Bypass mode schematic diagram is shown in Figure 5-3.

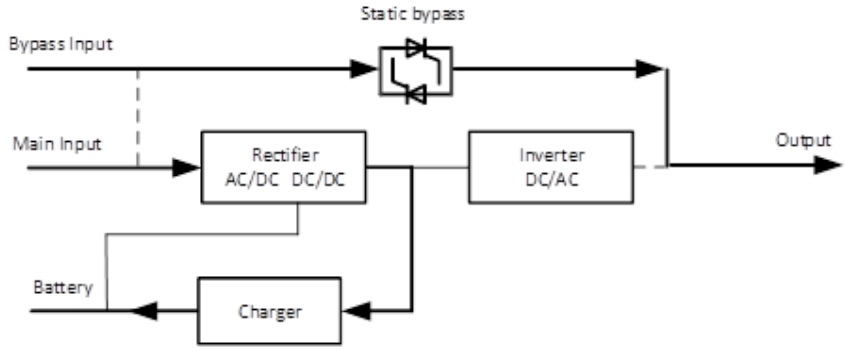


Figure 5-3 Bypass mode schematic diagram

5.3.5 Maintenance Mode (Manual Bypass)

When repairing the UPS system and battery or repairing the equipment failure, manually close the manual bypass switch, and the load is directly supplied by the mains power through the manual bypass to realize the emergency power supply to the load. Manual bypass mode schematic diagram is shown in Figure 5-4.

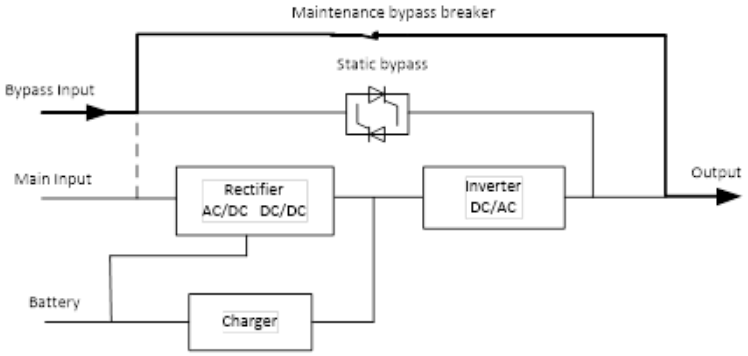
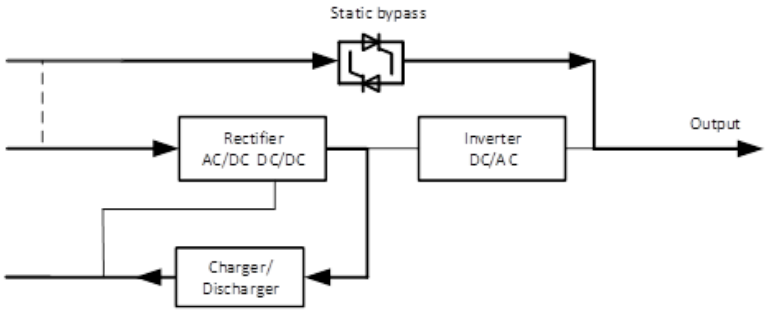


Figure 5-4 Maintenance mode schematic diagram

Labels	Description
NOTE	• The manual bypass of three phase rack UPS is not standard and requires additional options. • During Maintenance mode, dangerous voltages are present on the terminal of input, output and neutral.

5.3.6 Eco Mode

To improve system efficiency, UPS system works in Bypass Mode at normal time, and the inverter is standby, when the utility from the bypass fails, the UPS will transfer to Battery Mode and the inverter powers the load. ECO mode schematic diagram is show Figure 5-5



Labels	Description
NOTE	• There is a short interruption time (less than 10ms) when transferring from ECO mode to battery mode, it must be sure that the interruption has no effect on loads.

5.3.7 Source-share mode

If the UPS works properly and the AC input power of the rectifiers is insufficient, the UPS transfer to source-share mode. In this case, the power module obtains energy from both the mains and batteries, and the energy is converted into AC outputs over the inverter.Source-share mode schematic diagram is show Figure 5-6

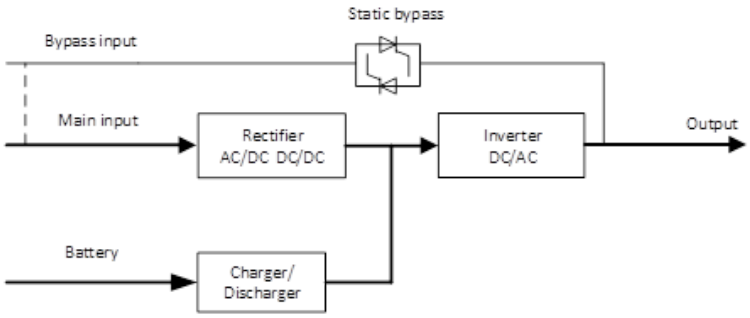


Figure 5-6 Source-share mode

5.4 Battery Management—Set During Commissioning

5.4.1 Normal Function

Constant Current Boost Charging

Current can be set up as 0%~20%, default setting is 10%.

Constant Voltage Boost Charging

Voltage of boost charging can be set as required by the type of battery.

For Valve Regulated Lead Acid (VRLA) batteries, maximum boost charge voltage should not exceed 2.4V / cell.

Float Charge

Voltage of float charging can be set as required by the type of battery.

For VRLA, float charge voltage should be between 2.2V to 2.3V, default setting is 2.25V.

Float Charge Temperature Compensation (optional)

A coefficient of temperature compensation can be set as required by the type of battery.

End of Discharge (EOD) Protection

If the battery voltage is lower than the EOD, the battery converter will shut down and the battery is isolated to avoidfurther battery discharge. EOD is adjustable from 1.6V to 1.75V per cell (VRLA).

5.4.2 Advanced Functions (Software Settings Performed by the Commissioning Engineer)

Battery self-test and self-service
At periodic intervals, 25% of the rated capacity of the battery will be discharged automatically, and the actual load must exceed 25% of the rated UPS (kVA) capacity. If the load is less than 25%, auto-discharge cannot be executed. The periodic interval can be set from 720 to 3000 hours.
Conditions: Battery at float charge for at least 5 hours, load equal to 25~100% of rated UPS capacity Trigger—Manually through the command of Battery Maintenance Test in LCD panel or automatically Battery self-test interval.

5.5 Battery Protection (Settings by Commissioning Engineer)

Battery Low Pre-warning
The battery undervoltage pre-warning occurs before the end of discharge. After this pre-warning, the battery should have the capacity for 3 remaining minutes discharging with full load.
End of discharge (EOD) protection
If the battery voltage is lower than the EOD, the battery converter will be shut down. EOD is adjustable from 1.6V to 1.75V per cell (VRLA).
Battery Disconnect Devices Alarm
The alarm occurs when the battery disconnect device disconnects. The external battery connects to the UPS through the external battery circuit breaker. The circuit breaker is manually closed and tripped by the UPS control circuit.

Labels	Description
 **DANGER**	Hazardous mains voltage and/or battery voltage present(s) behind the protective cover. The components that can only be accessed by opening the protective cover with tools cannot be operated by user. Only qualified service personnel are authorized to remove such covers.

6.1 Introduction

The Rack UPS operates in the following modes listed in table.6-1. This section describes various kinds of operating procedures under each operating mode, including transfer between operating modes, UPS setting and procedures for turning on/off inverter.
Tab.6-1: UPS Operating mode

Operating mode	Descriptions
Normal mode	UPS powers the load
Bypass mode	The load power supply is provided by the static bypass. This mode can be regarded as a temporary transition mode between the normal mode and maintenance bypass mode, or a temporary abnormal operating status
Battery mode	Mains input is abnormal, UPS transfer to battery mode and battery provide the power to load via PFC and inverter.
Maintenance mode	UPS Shuts down, the load is connected to the mains via Manual bypass. NOTE: in this mode the load is not protected against abnormal mains
ECO mode	The load power supply is provided by the static bypass while the inverter is standby. If mains input is abnormal, UPS transfer to inverter and inverter provide the power for load.

Note:

1. Refer to Chapter 7 Operator Control and Display Panel, for all the user operating keys and LED displays.
2. The audible alarm may annunciate at various points in these procedures.
3. The UPS function can be set via maintenance software. However, the setting and commissioning must be done by maintenance engineers trained.

6.2 UPS Startup

6.2.1 Startup 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 close the output breaker, input breaker, bypass input breaker, and then the system starts initializing;

3.The LCD in front of the UPS is lit up. The system enters the home page, as shown in Figure 4-2.

4. Notice the energy flowing diagram, the rectifier start and indicator flashes .

1. After about 30S, the rectifier start is completed, the bypass static switch is on, and the bypass indicator flashes.

2. After the bypass static switch is on, the inverter starts and the inverter indicator bar flashes.

3. After about 30S, when the inverter is running normally, the UPS switches from the bypass to the inverter, the bypass indicator bar is off, and the load indicator bar flashes.

4.Users can close the external or internal battery breaker, the load indicator bar flashes. Then start charge the battery. The startup has finished.

Labels	Description
NOTE	You can set the parameters of language, date and time through submenu. When the system starts, the stored setting will be defaulted. If you have already set these parameters, system default existing settings.Users can browse all events during the process of the starting up by checking the menu Log.

6.2.2 Start from battery

The start from battery refers to the battery cold start. The steps of the start-up are as follow:

1. Confirm the batteries are correctly connected, and then close the external battery circuit breakers.
2. Press and hold the red button of battery, as shown in Figure 6-1,battery supply power to UPS

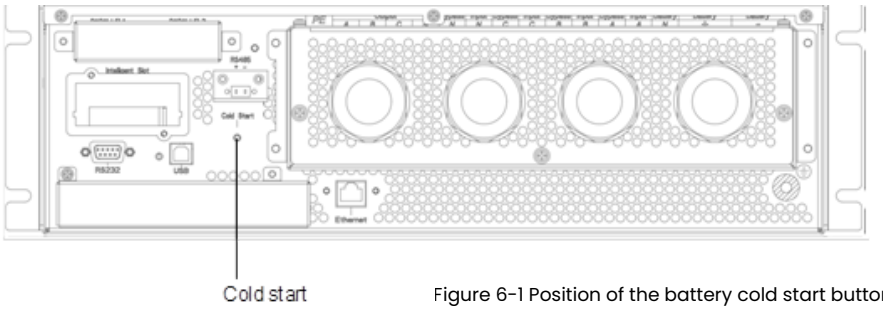


Figure 6-1 Position of the battery cold start button

3. Then UPS starts up after step 3 normal mode, the rectifier completes the start, and the inverter begins to start, and after 60 seconds, the inverter complete the start, UPS run in battery mode.
4. Close the external output power supply isolators to supply the loads, and the system is working in battery mode.

Attention: Press battery cold start button after 1 minute of battery access.

6.3 UPS Shut down

If want to shut down UPS completely, please first ensure the load is shut down correctly, and then turn off the external battery breaker, the main input breaker (internal or external), the bypass input breaker (internal or external, if have) one by one, the display screen will be off completely.

Note: If UPS in maintenance bypass mode, please also turn off the maintenance bypass breaker.

6.4 Procedure for Switching between Operation Modes

6.4.1 Switching the UPS from Normal Mode into Battery Mode

The UPS transfers to battery mode immediately after the utility (mains voltage) fails or drops down below the predefined limit.

6.4.2 Switching the UPS from Normal Mode into Bypass Mode

Enter the menu "Control", touch the icon "transfer to bypass" 

and the system should transfer to bypass mode.

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

6.4.3 Switching the UPS into Normal Mode from Bypass Mode

Enter the menu "Control", touch the icon "Ecs Manual Bypass" 

and the system should transfer to Normal mode.

Labels	Description
NOTE	Normally, the system will transfer to the normal mode automatically. This function is used when the frequency of the bypass is over track and when the system needs to transfer to Normal mode by manual.

6.4.4 Switching the UPS into Maintenance Bypass Mode from Normal Mode

These following procedures can transfer the load from the UPS inverter output to the maintenance bypass supply, which is used for maintaining the UPS.
Touching the icon “manual bypass” Transfer the UPS into Bypass mode as per the chapter 5.3.2. The load is switched to static bypass and the inverter is turned off.
Disconnect the battery breaker, connect the maintenance bypass breaker. And the load is powered through maintenance bypass and static bypass.
Disconnect the main, bypass, output breaker,The load is powered through maintenance bypass.

Labels		Description
	**NOTE**	• In manual bypass mode (The manual bypass supplies power to loads), dangerous voltages are present on terminal. • The UPS need to use external circuit breakers (Includes external input breaker, external bypass input breaker, external output breaker and external maintenance bypass breaker). • The manual bypass of three phase rack UPS is not standard and requires additional options.
	**WARNING**	Before making this operation, please read messages on LCD display to ensure that bypass supply is regular and the inverter is synchronous with it, so as not to risk a short interruption in powering the load.
	**DANGER**	Even with the LCD turned off, the terminals of input and output may be still energized. Wait for 10 minutes to let the DC bus capacitor fully discharge before removing the cover.

6.4.5 Switching the UPS into Normal Mode from Maintenance Bypass Mode

These following procedures can transfer the load from the Maintenance Bypass mode to inverter output.

1. After finish of maintenance. One by one to turn on the output breaker, the bypass input breaker, the input breaker and the external battery breaker. After 30S, the bypass indicator LED flashes and the load is powered through maintenance bypass breaker and static bypass.
2. Turn off the maintenance bypass breaker and fix the protection cover, and then the load is powered through static bypass. The rectifier starts after 30 seconds, inverter is starting. The inverter energy bar flashes and the inverter starts.
3. After 60 seconds, the system transfers to normal mode

Labels		Description
	**NOTE**	The manual bypass of three phase rack UPS is not standard and requires additional options.

6.5 Battery Maintenance

If batteries are not in use for a long time, it is necessary to test the condition of the battery. Two methods are provided:
Manual discharging test. Enter the "Control" menu, as is shown in Figure 5-2 and touch the icon "Battery maintenance" 

, the system transfers into battery mode for discharging. The system will stop discharging when batteries have 20% of capacity or in low voltage. Users can stop the discharging by touching the "Stop Test" icon 

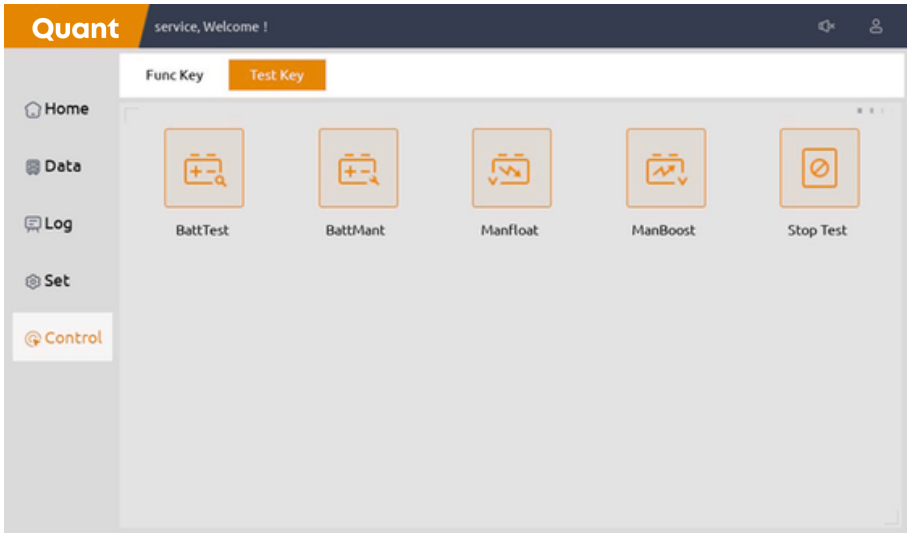


Figure 6-2 Battery maintenance

2) Auto discharging. The system can be set to discharge automatically per a certain time. The setting procedures are as follows.(this needs to be done by factory or connect the background monitor software operation).
a) Enable "battery auto discharge". Enter the "Set" page of the setting menu, tick "Battery Auto Discharge" and confirm.
b) Setting the period for "battery auto discharge". Enter the "Battery Set" page of the setting, set the period time in the item "Auto Maintenance Discharge Period" and confirm.

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

CONTROL AND DISPLAY PANEL

This chapter introduces the functions and operation instructions of the UPS operator control and display panel in detail, and provides LCD display information, including LCD display types, detailed menu information, UPS alarm list.

7.1 Introduction

The control and display panel is located on the front panel of the UPS. Through the LCD panel, the operator can operate and control the UPS, and check all measured parameters, UPS and battery status, event and history logs. The detailed description of control and display panel is shown in table.7-1.

Figure7- 1: UPS operator control and display panel

Table.7- 1: Description of UPS Operator Control and Display Panel

Indicator	Description	Indicator	Description
Green	System is working normally	Yellow	System warns (utility fails, over load, etc)
Red	System fails or fault		

7.1.1 Audible Alarm (buzzer)

There are two different types of audible alarm during UPS operation as shown in table.7-2.
Table.7- 2: Description of Audible Alarm

Alarm	Purpose
Two short, one long	when system has general alarm (for example: main input abnormal), this audible alarm can be heard
Continuous alarm	When system has serious faults (for example: fuse or hardware fault), this audible alarm can be heard

CONTROL AND DISPLAY PANEL

7.2 LCD Display

Following the self-check of UPS LCD display, the main LCD display is shown as Figure7-2, which can be divided into 4 display windows: system information, power flow, current record and main menu.

Figure7- 2: Main LCD Display

The description of main Menu is shown in table.7-3:

Items	Description
Menu	Main menu: Home, Cabinet,Module,Log,Set,Control,Scope
Mute on/off	Touch it if alarms to mute off. Touch again to mute on.
Login	Touch to enter in login window to log in or log out.
System information	2023/10/09 08:18:28--- System Date and Time
	Model:xxxxxx(S) --- (S): single mode, (P1): parallel mode, 1# unit
Output information	Output voltage and output load percent
Current alarms	Current alarms
Operation mode	Power flow of current system operation

CONTROL AND DISPLAY PANEL

Table.7- 3: Description of Menu

Menu	Description
Home	Return to main menu page
Data	Bypass, main, output, Load, battery information
Log	History LOG, Current Alarm
Set	Language, Sys Func, BAT set, Sys Set, Dry Contact
Control	Mute ON/OFF, Fault clear, Manual bypass, Manual transfer to inverter, Esc Manual bypass, Module “on/off” enable, clear battery history data, reset dust filter using time, battery test, battery maintenance, battery boost, battery float, stop test

The LCD menu tree is shown as below. Please refer to table. 7-3: Item Description of UPS Menu

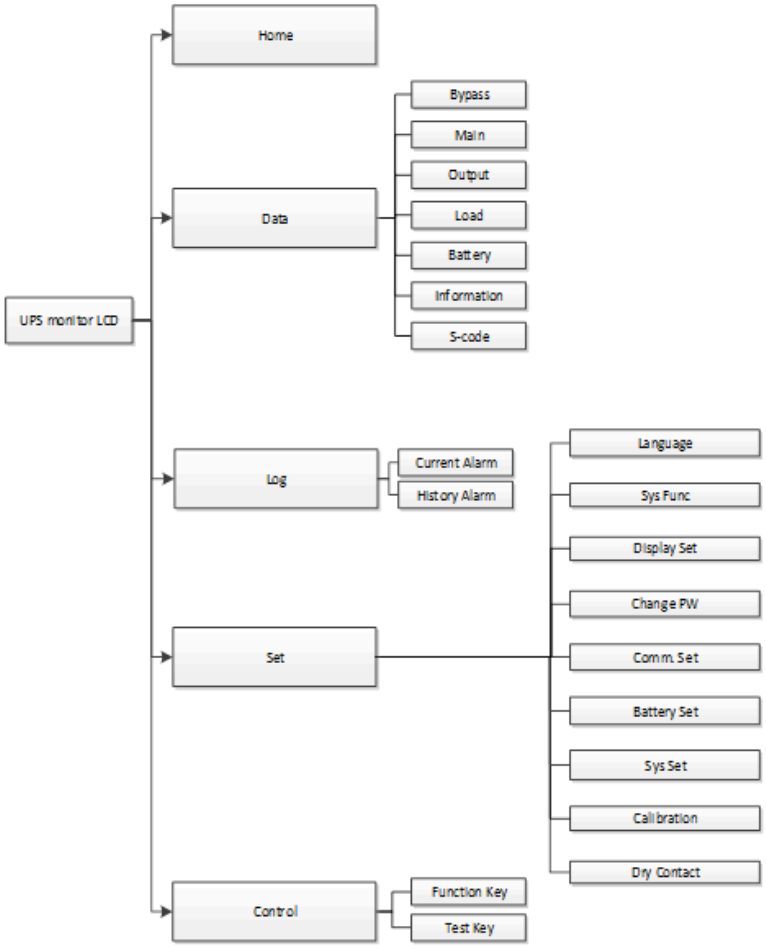


Figure7- 4: Menu Structure

7.2 LCD Display

Click on the icon in the upper right corner of the homepage to enter the user login interface, as shown in Figure 7-4. Enter the authorized account and password to log in to the system and perform corresponding permission operations.

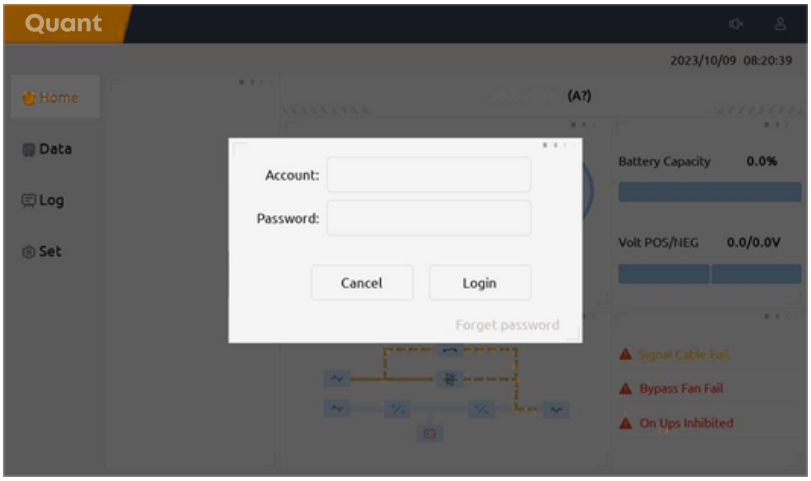


Figure 7-5 Login page

7.2.2 Data Menu

Touch the icon Data (at the left of the screen), and the system enters the page of the data menu, as it is shown in Figure 7-5.

Figure 7-6 Data menu

The data menu interface mainly consists of sub menus for bypass, main input, output, load, battery,information and Scode. Each sub-menu displays detection information for each part of the cabinet. The sub-menu of data is described in details below in Table 7-4.
Menu information can be displayed on the next page through the flip icon in the bottom right corner.

CONTROL AND DISPLAY PANEL

Sub-menu Name	Contents	Meaning
Bypass	V	Phase voltage
	A	Phase current
	Hz	Input frequency
	PF	Power factor
Main	V	Phase voltage
	A	Phase current
	Hz	Bypass frequency
	PF	Power factor
Output	V	Phase voltage
	A	Phase current
	Hz	Output frequency
	PF	Power factor
Load	kVA	Sout: Apparent Power
	kW	Pout: Active Power
	kVAr	Qout: Reactive power
	%	Load (The percentage of the UPS load)
Battery	Battery Number	Total number of battery connections per group
	Battery Status	Battery boost/float charging status
	Run time	Total battery run time
	V	Battery positive/negative Voltage
	A	Battery positive/negative Current
	Battery Capacity (%)	The percentage compared with new battery capacity
	Remain Time（Min）	Remaining battery backup time

Sub-menu Name	Contents	Meaning
Battery	Battery Temp.(℃)	Battery temperature
	Ambient Temp.(℃)	Environmental temperature
Information	DC BUS +/-(V)	Bus voltage(positive & negative)
	Battery +/-(V)	Battery voltage (positive & negative)
	Charger(V)	Charger voltage(positive & negative)
	Charger(A)	Charger current(positive & negative)
	Discharger(A)	Discharger current(positive & negative)
	INV Voltage(V)	Inverter phase A/B/C voltage
	Fan Run Time(H)	Total fan's running time
	Capacitor Run Time(H)	Total capacitor running time
	Air Inlet Temp.(℃)	Air inlet temperature
	Air Outlet Temp.(℃)	Air outlet temperature
	REC IGBT Temp.(℃)	REC IGBT temperature of the phase A/B/C
	INV IGBT Temp.(℃)	INV IGBRT temperature of the phase A/B/C
Scode	Fault Code	For the maintenance personnel

Table 7-4 Description of each sub-menu of Data

7.2.3 Set Menu

Touch the icon Set (At the left of the screen), and the system enters the page of the Setting, as is shown in Figure 4-6

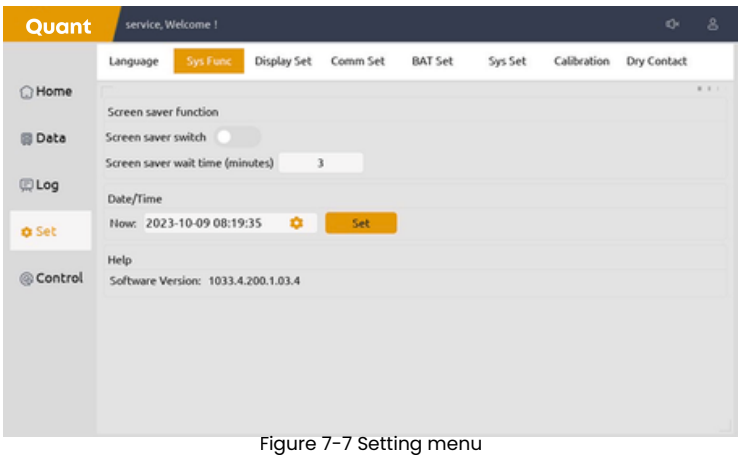


Figure 7-7 Setting menu

CONTROL AND DISPLAY PANEL

Under the setting menu, there are the following grading sub-menus, which are language setting, system function, network setting, general setting, communication setting, user setting, battery setting, system setting, rating setting, system code setting, calibration function and dry contact setting.
The setup subordinate sub-menu is shown in Table 7-4.

Sub-menu	Contents	Description
Language	Current language	Displays the currently selected language
	Optional language	Simplified Chinese, English and other languages for choice
Sys Func	System function setting	Setting screensaver, system time, check memory and software version
Display Set	Display Setting	Homepage UPS model, screen horizontal and vertical display
Change PW	Change password	Change the user login password
Comm Set	Comm. interface	Include RS232,RS485,USB
	Protocol	Include MEGA protocol、ModBus_ASCII protocol、ModBus_RTU protocol
	Baud-rate	Setting the baud-rate
	Device Address	Setting the Device address
Battery Set	Battery Number	Setting the number of the battery（12V）
	Battery Capacity	Setting of the AH of the 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 Voltage（0.6C）	EOD voltage for cell battery,@0.6C current
	EOD Voltage（0.15C）	EOD voltage for cell battery,@0.15C current
	Charge Current Percent Limit	Charge current (percentage of the rated current)
	Battery Temperature Compensate	Coefficient for battery temperature

CONTROL AND DISPLAY PANEL

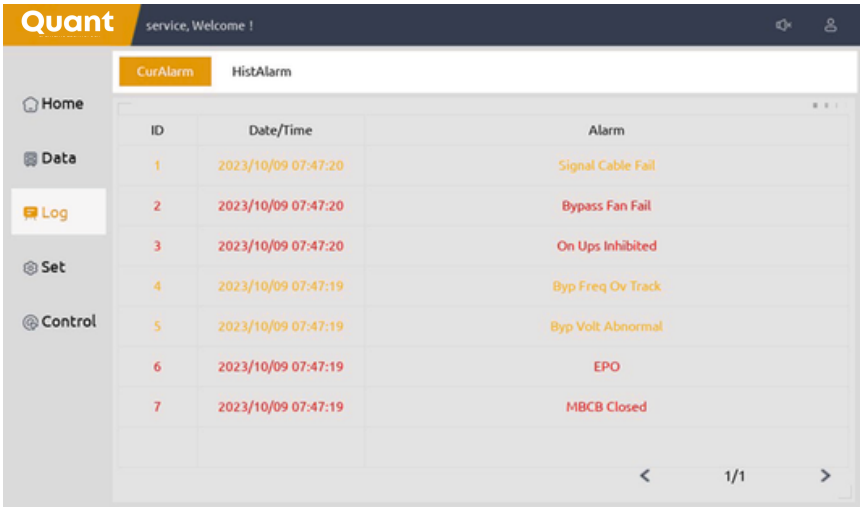
Sub-menu	Contents	Description
Sys Set	System Mode	Setting the system mode: Single , parallel, Single ECO, parallel ECO,LBS, parallel LBS
	United Number	Set the number of UPS in parallel system
	Cabinet ID	For parallel system, the ID starts from 0
	Output Voltage Adjustment	Setting the Output Voltage
Calibration	Calibration product parameters	Calibration the UPS output voltage
Dry contact	Configuration the dry contact	Configuration the dry contact

Table 7-4 Description of each sub-menu of Setting Menu

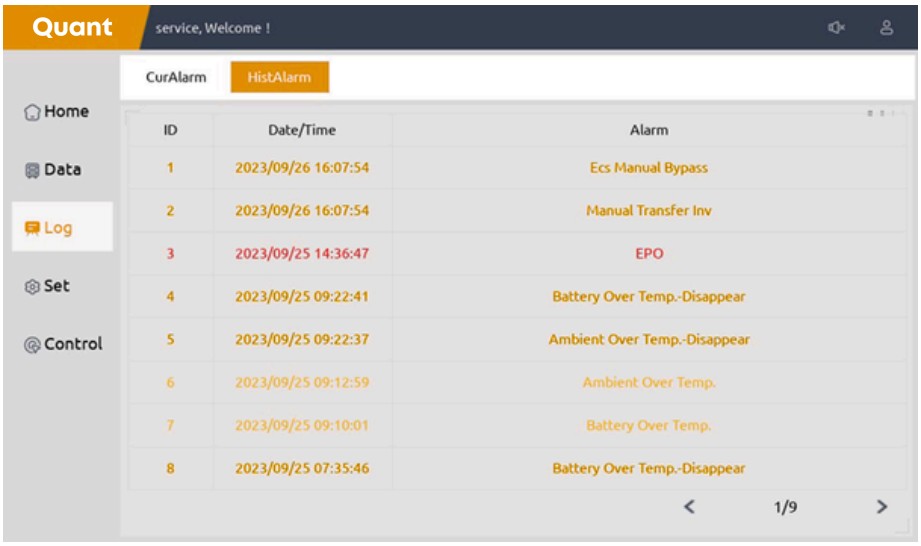
Labels		Description
	NOTE	1.Improper parameter settings may affect product performance, please ensure that operators receive appropriate training and authorization. 2.The C set for the battery is the ampere hour of the battery. If it is a 100AH battery, then C=100A. 3.Setting up projects may vary depending on different user permissions. For example, lithium battery settings, please contact the manufacturer
	WARNING	Ensure the number of the battery, set via the menu or the monitoring software, is completely equal to the real installed number. Otherwise it may cause serious damage to the batteries or the equipment.

7.2.4 Log Menu

Click on the icon on the left side of the LCD screen to enter the Log menu, where history is recorded by time. Display various events and alarm information that have occurred in the system in sequence, and record the time of their set and clear. The recording menu is divided into two menus: current alarm and historical alarm.



CONTROL AND DISPLAY PANEL



The Table 7-5 below displays all the events and gives a brief explanation

UPS events	Description
Fault Clear	Manually clear fault
Log Clear	Manually clear History log
Load On UPS	Inverter feeds load
Load On Bypass	Bypass feeds load
No Load	No load
Battery Boost	Charger is working in boost charging mode
Battery Float	Charger is working in float charging mode
Battery Discharge	Battery is discharging
Battery Connected	Battery is connected
Battery Not Connected	Battery is not connected.
Maintenance CB Closed	Manual maintenance breaker is closed
Maintenance CB Open	Manual maintenance breaker is opened
EPO	Emergency Power Off
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.
Generator Input	Generator is connected and a signal is sent to the UPS.

CONTROL AND DISPLAY PANEL

The Table 7-5 below displays all the events and gives a brief explanation

UPS events	Description
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.
Bypass Sequence Error	Bypass voltage Sequence is reverse. Check if input power cables are connected correctly.
Bypass Volt Abnormal	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 “Ip Neutral Lost”. If there is any relevant alarm, first clear this alarm.
	1. Then check and confirm if the bypass voltage and frequency displayed on the LCD are within the setting range. Note that the rated voltage and frequency are respectively specified by “Output Voltage” and “Output Frequency”.
	2. If the displayed voltage is abnormal, measure the actual bypass voltage and 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
Bypass Module Fail	Bypass Module Fails. This fault is locked until power off. Or bypass fans fail.
Bypass Module Over Load	Bypass current is over the limitation. If bypass current is under 125% of the rated current. The UPS alarms but has no action.
Bypass Over Load Tout	The bypass overload status continues and the overload times out.
Byp Freq Over Track	This alarm is triggered by an inverter software routine when the 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 “Byp Sequence Err” and “Input Neutral Lost”. If there is any relevant alarm, first clear this alarm.
	Then check and confirm if the bypass frequency displayed on the LCD are within the setting range. Note that the rated frequency are respectively specified by “Output Frequency”.
	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 Tx Times Lmt	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 Short Circuit	Output shorted Circuit. First 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 fault is solved, press “Fault Clear” to restart UPS.

CONTROL AND DISPLAY PANEL

The Table 7-5 below displays all the events and gives a brief explanation

UPS events	Description
Battery EOD	Inverter turned off due to low battery voltage. Check the mains power failure status and recover the mains power in time
Battery Test	System transfer to battery mode for 20 seconds to check if batteries are normal
Battery Test OK	Battery Test OK
Battery Maintenance	System transfer to battery mode until battery voltage is down to 1.1*EOD voltage to maintain battery string
Battery Maintenance OK	Battery maintenance succeed
Module inserted	Power Module is inserted in system.
Module Exit	Power Module is pulled out from system.
Rectifier Fail	The N# Power Module Rectifier Fail, The rectifier is fault and results in rectifier shutdown and battery discharging.
Inverter Fail	The N# Power Module Inverter Fail. The inverter output voltage is abnormal and the load transfers to bypass.
Rectifier Over Temp.	The N# Power Module Rectifier Over Temperature. The 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 recovers automatically after the over temperature signal disappears.
	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.
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 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.

CONTROL AND DISPLAY PANEL

The Table 7-5 below displays all the events and gives a brief explanation

Inverter Overload Tout	N# Power Module Inverter Over Load Timeout. The UPS overload status continues and the overload times out.
	Note: The highest loaded phase will indicate overload timing-out first. When the timer is active, then the alarm “unit 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 Temp.	The N# Power Module Inverter Over Temperature.
	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 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.
Manual Transfer Byp	Transfer to bypass manually
Esc Manual Bypass	Escape from “transfer to bypass manually” command. If UPS has been transferred to bypass manually, this command enable UPS to transfer to inverter.
Battery Volt Low	Battery Voltage is Low. Before the end of discharging, battery voltage is low warning should occur. After this pre-warning, battery should have the capacity for 3 minutes discharging with full load.
Battery Reverse	Battery cables are connected not correctly.
Inverter Protect	The N# Power Module Inverter Protect. Check: 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.
Input Neutral Lost	The mains neutral wire is lost or not detected. For 3 phases UPS, it’s recommended that user use a 3-poles breaker or switch between input power and UPS.
Bypass Fan Fail	At least one of bypass module Fans Fails
Manual Shutdown	The N# Power Module is manually shutdown. The power module shuts down rectifier and inverter, and there’s on inverter output.
Manual Boost Charge	Manually force the Charger work in boost charge mode.
Manual Float Charge	Manually force the charger work in float charge mode.

CONTROL AND DISPLAY PANEL

The Table 7-5 below displays all the events and gives a brief explanation

UPS events	Description
UPS Locked	Forbidden to shutdown UPS power module manually.
Parallel Cable Error	Parallel cables error. Check:
	If one or more parallel cables are disconnected or not connected correctly
	If parallel cable round is disconnected
	If parallel cable is OK
Lost N+X Redundant	Lost N+X Redundant. There is no X redundant powers module in system.
EOD Sys Inhibited	System is inhibited to supply after the battery is EOD (end of discharging)
Battery Test Fail	Battery Test Fail. Check if UPS is normal and battery voltage is over 90% of float voltage.
Battery Maintenance Fail	Check
	If UPS is normal and not any alarms
	If the battery voltage is over 90% of float voltage
	If load is over 25%
Ambient Over Temp	Ambient temperature is over the limit of UPS. Air conditioners are required to regulate ambient temperature.
REC CAN Fail	Rectifier CAN bus communication is abnormal. Please check if communication cables are not connected correctly.
INV IO CAN Fail	IO signal communication of inverter CAN bus is abnormal. Please check if communication cables are not connected correctly.
INV DATA CAN Fail	DATA communication of inverter CAN bus is abnormal. Please check if communication cables are not connected correctly.
Power Share Fail	The difference of two or more power modules' output current in system is over limitation. Please adjust output voltage of power modules and restart UPS.
Sync Pulse Fail	Synchronization signal between modules is abnormal. Please check if communication cables are not connected correctly.
Input Volt Detect Fail	Input voltage of N# power module is abnormal.
	Please check if the input cables are connected correctly.
	Please check if input fuses are broken.

CONTROL AND DISPLAY PANEL

The Table 7-5 below displays all the events and gives a brief explanation

UPS events	Description
Battery Volt Detect Fail	Battery voltage is abnormal.
	Please check if batteries are normal.
	Please check if battery fuses are broken on input power board.
Output Volt Fail	Output voltage is abnormal.
Bypass Volt Detect Fail	Bypass voltage is abnormal.
	Please check if bypass breaker is closed and is good.
	Please check if bypass cables are connected correctly.
INV Bridge Fail	Inverter IGBTs are broken and opened.
Outlet Temp Error	Outlet temperature of power module is over the limitation.
	Please check if fans are abnormal.
	Please check if PFC or inverter inductors are abnormal.
	Please check if air passage is blocked.
	Please check if ambient temperature is too high.
Input Curr Unbalance	The difference of input current between every two phases is over 40% of rated current.
	Please check if rectifier's fuses, diode, IGBT or PFC diodes are broken.
	Please check if input voltage is abnormal.
DC Bus Over Volt	Voltage of DC bus capacitors is over limitation. UPS shutdown rectifier and inverter.
REC Soft Start Fail	While soft start procedures are finished, DC bus voltage is lower than the limitation of calculation according utility voltage. Please check 1. Whether rectifier diodes are broken 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
Relay Connect Fail	Inverter relays are opened and cannot work or fuses are broken.
Relay Short Circuit	Inverter relays are shorted and cannot be released.

CONTROL AND DISPLAY PANEL

The Table 7-5 below displays all the events and gives a brief explanation

UPS events	Description
PWM Sync Fail	PWM synchronizing signal is abnormal
Intelligent Sleep	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 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 INV	Manually transfer UPS to inverter. It's used to transfer UPS to inverter when bypass is over tracking. The interrupt time could be over 20ms.
Input Over Curr Tout	Input over current timeout and UPS transfer to battery mode.
	Please check if input voltage is too low and output load is big. Please regulate input voltage to be higher if it's possible or disconnect some loads.
No Inlet Temp. Sensor	Inlet temperature sensor is not connected correctly.
No Outlet Temp. Sensor	Outlet temperature sensor is not connected correctly.
Inlet Over Temp.	Inlet air is over temperature. Make sure that the operation temperature of UPS is between 0-40°C.
Capacitor Time Reset	Reset timing of DC bus capacitors.
Fan Time Reset	Reset timing of fans.
Battery History Reset	Reset battery history data.
Byp Fan Time Reset	Reset timing of bypass fans.
Battery Over Temp.	Battery is over temperature. It's optional.
Bypass Fan Expired	Working life of bypass fans is expired, and it's recommended that the fans are replaced with new fans. It must be activated via software.
Capacitor Expired	Working life of capacitors is expired, and it's recommended that the capacitors are replaced with new capacitors. It must be activated via software.
Fan Expired	Working life of power modules' fans is expired, and it's recommended that the fans are replaced with new fans. It must be activated via software.
INV IGBT Driver Block	Inverter IGBTs are shutdown.
	Please check if power modules are inserted in cabinet correctly.
	Please check if fuses between rectifier and inverter are broken.
Battery Expired	Working life of batteries is expired, and it's recommended that the batteries are replaced with new batteries. It must be activated via software.

CONTROL AND DISPLAY PANEL

The Table 7-5 below displays all the events and gives a brief explanation

UPS events	Description
Bypass CAN Fail	The CAN bus between bypass module and cabinet is abnormal.
Dust Filter Expired	Dust filter need to be clear or replaced with a new one
Stop Test	Manually stop battery test or battery maintenance, UPS transfer back to normal mode.
Wave Trigger	Waveform has been saved while UPS fail
Bypass CAN Fail	Bypass and cabinet communicate with each other via CAN bus. Check
	If connector or signal cable is abnormal.
	If monitoring board is abnormal.
Firmware Error	Manufacturer used only.
System Setting Error	Manufacturer used only.
Bypass Over Temp.	Bypass module is over temperature. Please check
	If bypass load is overload
	If ambient temperature is over 40°C
	If bypass SCRs are assembled correctly
	If bypass fans are normal
Module ID Duplicate	At least two modules are set as same ID on the power connector board, please set the ID as correct sequence

Labels	Description
NOTE	Different colors of the words represent different level of events: (a)Green, an event occurs or disappear; (b)Yellow, warning occurs; (c) Red, faults happen.

7.2.5 Control Menu

Touch the icon 

(at the left of the screen), and the system enters the page of the "Control", The control menu include "Func Button" & "Test Command", as it is shown in Figure 7-9& Figure 7-10.

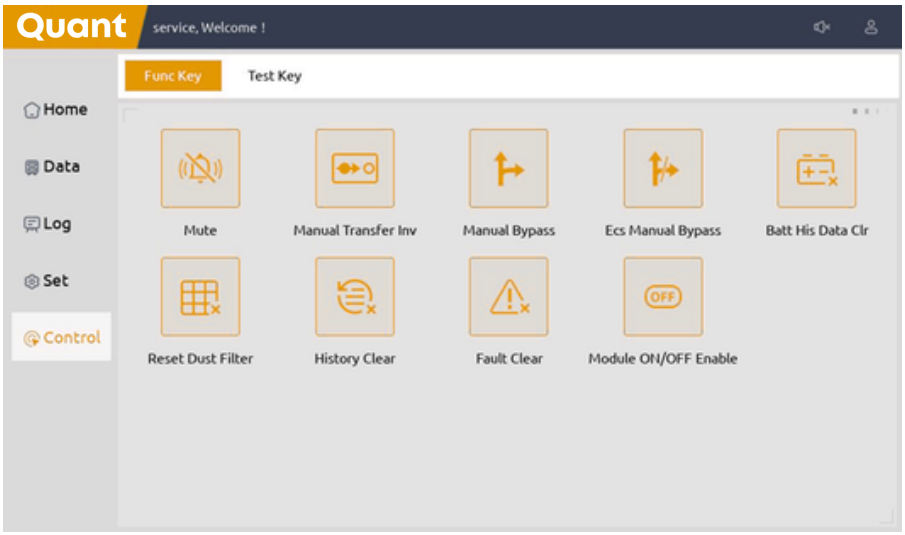


Figure 7-9 Control-Function Button menu

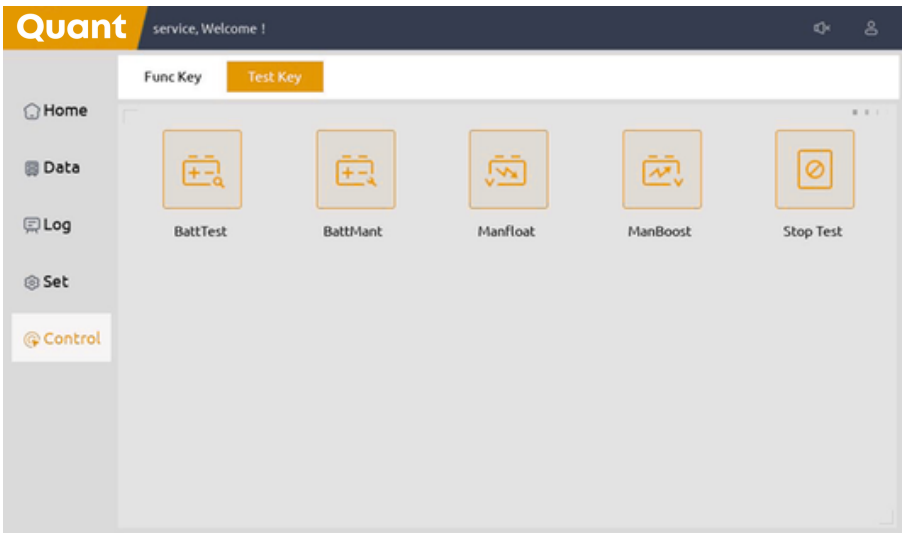
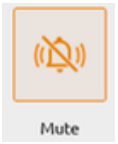


Figure 7-10 Control-Test Command menu

The "Control" menu includes "Func Button" and "Test Command". The contents are described in details below.

Function Button

Mute and Unmute

Mute or unmute alarm of the system by touching the icon . 

Fault Clear

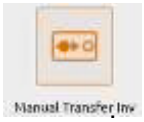
Clear the faults by touching the icon 

Manual Bypass and ESC Manual Bypass

Transfer to bypass mode or cancel this command by touching 

or 

the icon Manual Transfer Inv

Transfer the bypass mode to Inverter Mode by touching the 

icon Battery History Data Clear

Clear the battery history data by touching the icon 

, the history data includes the times of discharge, days for running and hours of discharging.

Reset Dust Filter

Reset the time of dust filter using by touching the 

, it includes the days of using and icon maintenance period.

Test Command 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 transfer to the battery mode. This function 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 

, the system starts boost charging.

Battery Float

By touching the icon  , the system starts float charging.

Stop Test

By touching the icon , the system stops battery test or battery maintenance.

PRODUCT SPECIFICATION

This chapter provides UPS product specification.

8.1 Applicable Standards

The UPS has been designed to conform to the following European and international standards:
Table.8- 1: Compliance with European and International Standards

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

8.2 Environmental Characteristics

Table.8- 2: Environmental Properties

Items	Unit	Requirements
Acoustic noise level at 1 meter	dB	10/20KVA：68dB @ 100% load, 65dB @ 45% load
		30KVA：74dB @ 100% load, 70dB @ 45% load
Altitude of Operation	m	≤3000m above sea level, derate power by 2% per 100m between 3000m and 4000m
Relative Humidity	%RH	0 to 95%, non condensation
Operating Temperature	°C	0 to 40 deg , Battery life is halved for every 10°C increase above 20°C
UPS Storage-Transport Temperature	°C	-25~70
Recommended Battery Storage Temperature	°C	-20~30 (20°C for optimum battery storage)

PRODUCT SPECIFICATION

8.3 Mechanical Characteristics

Table.8- 3: Mechanical Properties

Cabinet Specification	Unit	10 kVA	20 kVA	30kVA
Mechanical Dimension, W×D×H	mm	440*621*130		
Weight	kg	21.4	22.4	22.7
Color	N/A	Black		
Protection Level, IEC(60529)	N/A	IP20		

Labels		Description
	NOTE	Wheels or holders of cabinets are not included in dimension. Please refer to Chapter 4 to get detailed dimension.

8.4 Input Characteristics

Table.8- 4: Mains input

Items	Unit	Parameter
Rated AC Input Voltage	Vac	380/400/415(three-phase and sharing neutral with the bypass input)
Input voltage range	Vac	304~478Vac (L-L) full load
		228V~304Vac (L-L) power derate from 100% to 50%
Frequency	Hz	50/60(range: 40Hz～70Hz)
Power factor	kW/kVA, full load	0.99
THD	THDI%	<2% (100% linear load)

8.5 Battery Characteristics

Table.8- 5: Battery Information

Items	Unit	Parameters
Battery bus voltage	Vdc	20-30kVA:Nominal: ±192-264V
		10kVA:Nominal: ±120-264V
Quantity of lead-acid cells	Nominal	480V=40*6cell(12V)
		240V=20*6cell(12V)
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 from : 0~-5.0, 25°C or 30°C, or inhibit)
Ripple voltage	%V float	≤1
Ripple current	%C10	≤5
Boost charge voltage	V/cell (VRLA)	2.4V/cell(selectable from : 2.30V/cell～2.45V/cell)
		Constant current and constant voltage charge mode
End of discharging voltage	V/cell (VRLA)	1.65V/cell(selectable from : 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 Charging Power	kW	50%* UPS capacity (selectable from : 1~50%* UPS capacity)

Labels		Description
	**NOTE**	The default setting is 40 PCS when the UPS leaves the factory. Please check the battery voltage marked on the nameplate of the UPS. If the setting is 20~50 PCS when used on site, please set it successfully before connecting the battery, otherwise there is a risk of damage to the battery pack. For specific operation steps of setting the number of battery sections, please contact the customer service number of the manufacturer.

PRODUCT SPECIFICATION

8.6 Output Characteristics

Table.8- 6: Inverter Output (to Critical Load)

Rated capacity (kVA)	Unit	10/20/30kVA
Rated AC voltage	Vac	380/400/415(three-phase four-wire and sharing neutral with the bypass)
Frequency	Hz	50/60
overload	%	110% load, 1 hour
		125% load, 10min
		150% load, 1min
		>150% load, 200ms
Fault current	%	300% short current limitation for 200ms
Non linear load	%	100%
Capability		
Neutral current capability	%	170%
Steady state voltage stability	%	±1(balanced load)
		±1.5(100% unbalance load)
Transient voltage response	%	±5
THDu	%	<1(linear load) , <5(non linear load)
Synchronization Window	-	Rated frequency ±2Hz(selectable: ±1~±5Hz)
Max change rate of synch frequency	Hz/s	1: selectable: 0.1~5
Inverter voltage range	%V(ac)	±5

8.7 Bypass Characteristics

Table.8- 7: Bypass Input

Rated capacity(kVA)	Unit	10 kVA	20 kVA	30 kVA
Rated AC Voltage	Vac	380/400/415(L-L)		
		three-phase four-wire, sharing neutral with the rectifier input and providing neutral reference for the output		
Rated current	A	19-58		
Overload	%	<125%, long term		
		125%-130%, 10mins		
		130%-150%, 1min		
		>150%, 200-400ms		
Current rating of neutral cable	A	1.7×In		
Frequency	Hz	50/60		
Switch time (between bypass and inverter)	ms	Synchronized switch: 0ms		
Bypass voltage tolerance	% Vac	Upper limit: +10,+15,+20, +25, default: +15		
		Lower limit: -10, -20, -30 or -40, default:-20		
Bypass frequency tolerance	%	±1, ±3, ±5 settable		

8.8 Efficiency

Table.8- 8: Efficiency

Rated Efficiency (kVA)	Unit	10/20/30 kVA
Efficiency		
Normal mode(double conversion)	%	96.6max
ECO mode	%	99
Battery discharging efficiency (DC/AC) (battery at nominal voltage 480Vdc and full-rated linear load)		
Battery mode	%	96.50%

ANNEX A. PARALLEL SETTING

If finish connecting all parallel cables and connection, set each unit in parallel system via software:

Enter in " Set → SysSet" to set "system Mode" as parallel.
Set "Unit Number" according to actual system.
Set "Cabinet ID" as "0 or 1, 2...8", make sure that all unit ID are different. For example, 4 units are in parallel system, set the ID as 0, 1, 2, 3.