Preface

Usage

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

Users

Technical Support Engineer

Maintenance Engineer

Note

Our company is providing a full range of technical support and services. Customer can contact our local office or customer service center for help.

The manual will update irregularly, due to the product upgrading or other reasons.

Unless otherwise agreed， the manual is only used as guide for users and any statements or information contained in this manual make no warranty expressed or implied.

Contents

1 Important Safety Precautions

1.1 General Information

- Please read the "safety precautions" carefully before installing and using this product to ensure correct and safe installation and use. Please keep this manual properly.
- UPS must be installed, tested and maintained by an engineer authorized by the manufacturer or its agent, otherwise it is possible to endanger personal safety and cause equipment failure. The damage to UPS caused thereon is excluded from the warranty.
- Under no circumstances shall equipment structure or components be dismantled or changed without the manufacturer's permission, otherwise the damage to UPS caused thereby shall not be covered by the warranty.
- Local regulations and laws shall be followed when using equipment. The safety precautions in the manual only supplement the local safety regulations.
- Due to product version upgrade or other reasons, the content of this document will be updated from time to time. Unless otherwise agreed, this document is used only as a guide, and all statements, information and recommendations in this document do not constitute any warranty, express or implied.

1.2 UPS Safety

- Before installing the equipment, wear insulating protective clothing, use insulating appliances, and remove conductive objects such as jewelry and watches to avoid electric shock or burns.
- The operating environment has a certain impact on the service life and reliability of UPS. The environmental requirements set in the manual must be followed when using and storing the equipment.
- Avoid using the equipment in direct sunlight, rain, or in environments with electrified dust.
- When placing UPS, maintain a safe distance around it to ensure ventilation. During operation of the system, do not block the vent.
- Do not allow liquids or other foreign objects to enter into the UPS cabinet or cabinet.
- Before using UPS, check whether the local distribution characteristics are consistent with the information of the product nameplate.
- As UPS is a large leakage current device, it is not recommended to install breakers with leakage protection function.
- Before connecting UPS, please further confirm whether the switch connecting the power supply of the UPS mains input/bypass power supply and the mains power are disconnected.
- When it is required to move or rewire UPS, make sure to disconnect AC input power supply, battery and other inputs, and UPS is fully powered down (more than 5min) before carrying out the corresponding operation, otherwise there may still be power in the port and inside of the equipment, and it is possible to cause a risk of electric shock.
- Before powering on, please confirm the correct grounding, and check wire connection and battery polarity to ensure correct connection. In order to ensure personal safety and the normal use of UPS, UPS shall be reliably grounded before use.
- UPS can be used for resistive and capacitive (such as computers), resistive and micro inductive load, not for pure capacitive and inductive load (such as motors, air conditioners and copiers) and half wave rectifier load.
- When cleaning the machine, please wipe it with a dry object. Under no circumstances shall water be used to clean electrical parts inside or outside the cabinet.
- After completion of maintenance operations, check immediately to ensure that no tools or other items are left in the cabinet.

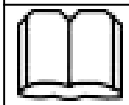
- In case of fire, please use dry powder extinguisher correctly for extinguishment. There is a danger of electric shock if liquid fire extinguishers are used.
- Do not close the breaker before the UPS installation is completed. Do not power on UPS without the permission of a qualified electrician.

1.3 Battery Safety

- Battery installation and maintenance shall only be performed by personnel with battery expertise.
- There is danger of electric shock and short circuit current in the battery. In order to avoid safety accidents, when installing or replacing the battery, please pay attention to the following matters: do not wear jewelry and watches and other conductive objects; use special insulation tools; use facial protection; wear protective insulating clothing; do not turn the battery upside down or tilt it; disconnect the input breaker of the battery.
- The installation environment of the battery must be far away from the hot area, and it is not allowed to use or keep the battery near the fire source. The battery or battery strings cannot be processed by fire, otherwise it is possible cause personal injury due to explosion.
- Environmental factors impact battery life. Elevated ambient temperatures, poor quality utility power, and frequent short duration discharges will shorten battery life.
- The batteries should be regularly replaced to ensure the normal operation of UPS and sufficient backup time.
- Do not use a battery that is not approved by the supplier, as it may adversely affect the operation of the system. Use of a non supplier approved battery will void the manufacturer warranty.
- Check the screws of the connecting parts of the battery regularly to make sure they are tight and not loose. If the screws become loose parts, they must be tightened immediately.
- Please do not short the positive and negative terminals of the battery, Otherwise it is possible to cause electric shock or fire.
- Do not touch the wiring terminal of the battery. The battery circuit is not isolated from the input voltage circuit, and there will be a high voltage hazard between the battery terminal and the ground.
- Do not open or damage the battery, otherwise it is possible to cause short circuit and battery leakage and the electrolyte in the battery may cause damage to the skin and eyes. In case of exposure into the electrolyte, wash immediately with plenty of water and go to the hospital for examination.

1.4 Description of Symbols

The following symbols used herein have the following meaning.

Symbols	Description
 **DANGER**	It is used to warn of emergency and dangerous situations which may lead to death or serious bodily injury if not avoided.
 **WARMING**	It is used to warn of potential dangerous situations which will lead to a certain degree of personal injury if not avoided.
 **CAUTION**	It is used to transmit the safety warning information of equipment or environmental, which may lead to equipment damage, data loss, equipment performance degradation or other unpredictable results if not avoided.
 **NOTICE**	It is used for further detailed description of the things, highlighting important/critical information, etc.

2 Product Introduction

2.1 Introduction

The UPS supplies stable and uninterrupted power for the important load. It can eliminate the power supply surge, instantaneous high/low voltage, harmonic and frequency offset pollution, to provide high quality electrical energy to customers.

2.2 System Configuration

The Tower UPS is configured by the following part: Rectifier, Charger, Inverter, Static Switch and Manual Bypass Switch. One or several battery strings should be installed to provide backup energy once the utility fails. The UPS structure is shown in Fig. 2-1.

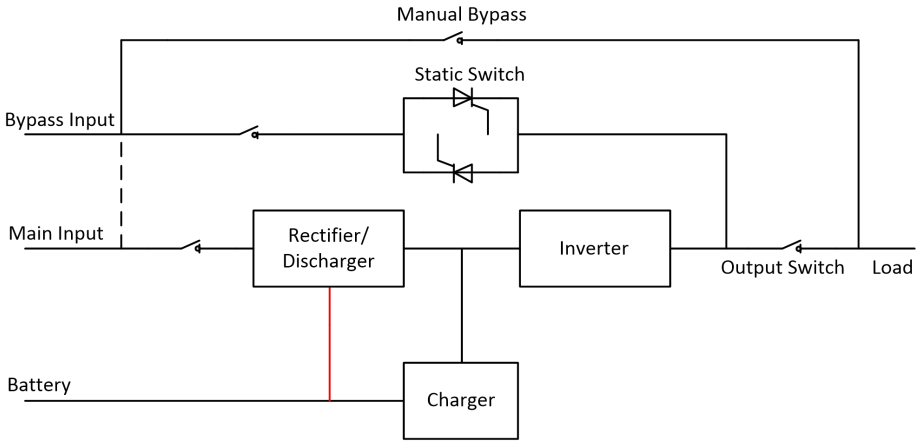


Fig. 2-1 UPS Configuration

2.3 Operation Mode

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

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

2.3.1 Normal Mode

When the UPS system is operating normally, the mains input is rectified to DC voltage via rectifier, and the DC voltage is converted to AC voltage by inverter. At the same time, the charger works for charging the battery.

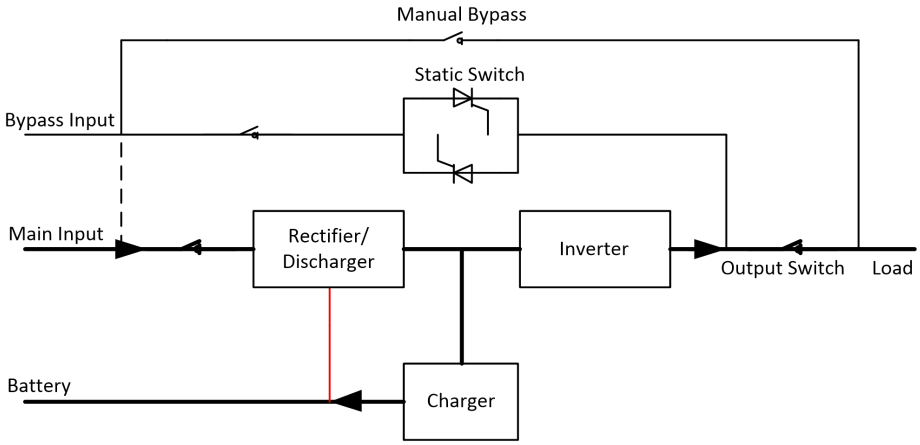


Fig 2-2 Normal mode operation diagram

2.3.2 Battery Mode

When the AC mains input power is abnormal, the inverter of UPS will switch to 'Battery mode', which obtain power from battery, and supply to AC load uninterruptedly. After restoration of the AC mains input power, the "Normal mode" operation will continue automatically without the necessity of user intervention.

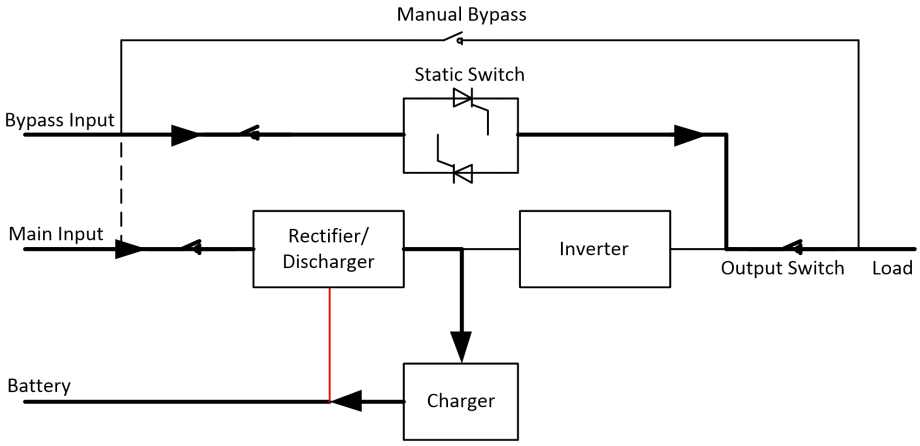


Fig 2-3 Battery mode operation diagram

Note

With the function of Battery cold start, the UPS can start without AC power. See more detail in section 5.1.2.

2.3.3 Bypass Mode

If the AC power is overload for inverter on normal mode, or if the inverter becomes abnormal, the UPS will switch the AC load from inverter to bypass. For the AC load, the switching process is uninterrupted, if the inverter is synchronized with bypass. However, if the inverter is unsynchronized with bypass, there will be a interruption, which is less than 3/4 cycle. This is to avoid large cross currents due to the paralleling of unsynchronized AC sources.

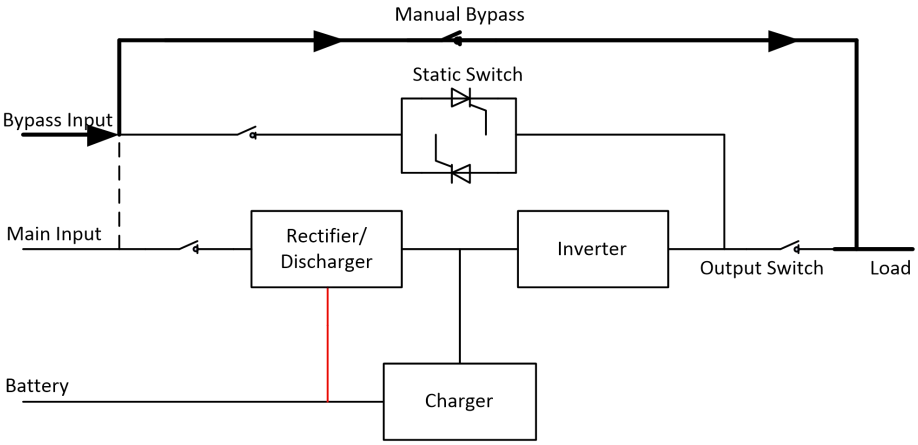


Fig. 2-4 Bypass mode operation diagram

2.3.4 Maintenance Mode (Manual Bypass)

A manual bypass switch is available to ensure continuity of supply to the critical load when the UPS becomes unavailable e.g. during a maintenance procedure. (See Fig.2-5).

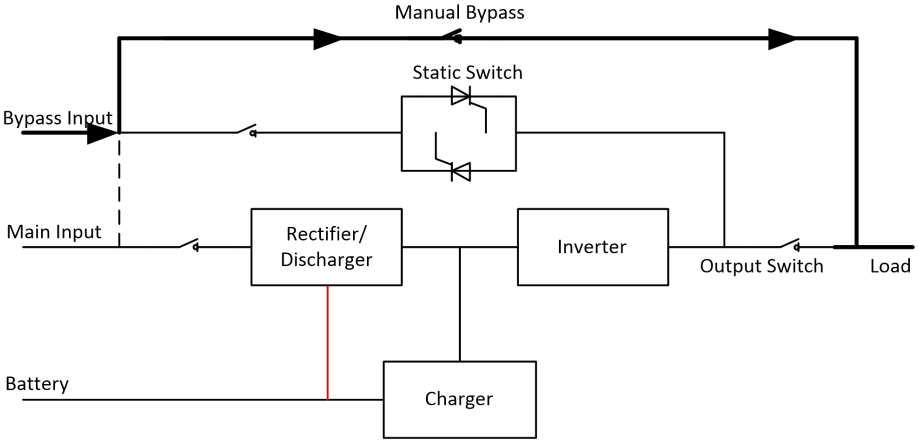


Fig .2-5 Maintenance mode operation diagram

	DANGER
	During Maintenance mode, dangerous voltages are present on the terminal of input, output and neutral, even with the LCD turned off.

2.3.5 ECO Mode

To improve system efficiency, UPS system can work in Bypass mode at normal time, and inverter is standby. When the bypass AC power is abnormal, The UPS transfers to ‘Battery mode’ or ‘Normal mode’ and the inverter powers the loads.

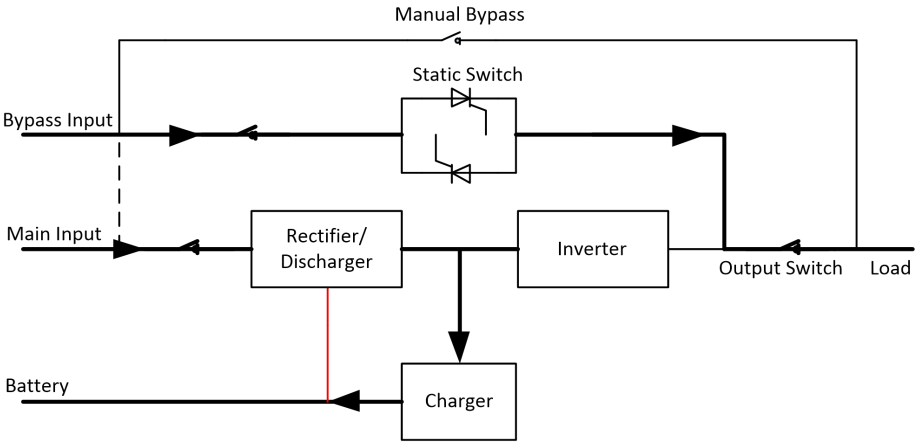


Fig.2-6 ECO Mode operation diagram

Note

There is a short interruption time (less than 4ms) when transfer from ECO mode to battery mode, it must be sure that the interruption has no effect on loads.

2.3.6 Auto-restart Mode

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

2.3.7 Frequency Converter Mode

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

2.3.8 Self Aging Mode

If users want to burn in UPS without load, could set the UPS as Self Aging Mode, in this mode, the current flow through rectifier, inverter, and back to input through bypass. It needs only 5% loss to burn in UPS with 100% load.

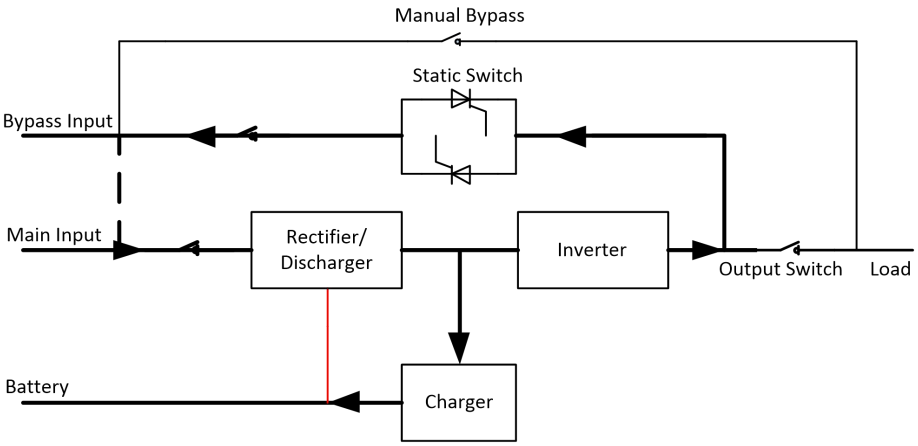


Fig.2-7 self aging operation diagram

2.4 UPS Structure

2.4.1 UPS Configuration

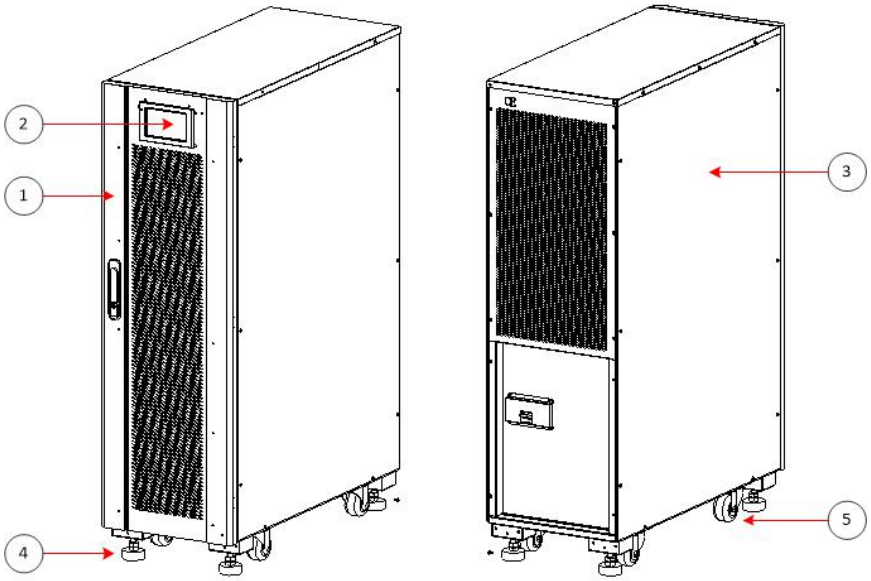
The UPS configuration is provided in Table 2.1.

Table2.1 UPS Configuration

Item	Components	Quantity	Remark
80-200k	Circuit Breakers	4	Standard
	Dual Input	1	Standard
	Parallel Card,	1	Optional
	Dry Contact Card	1	Standard

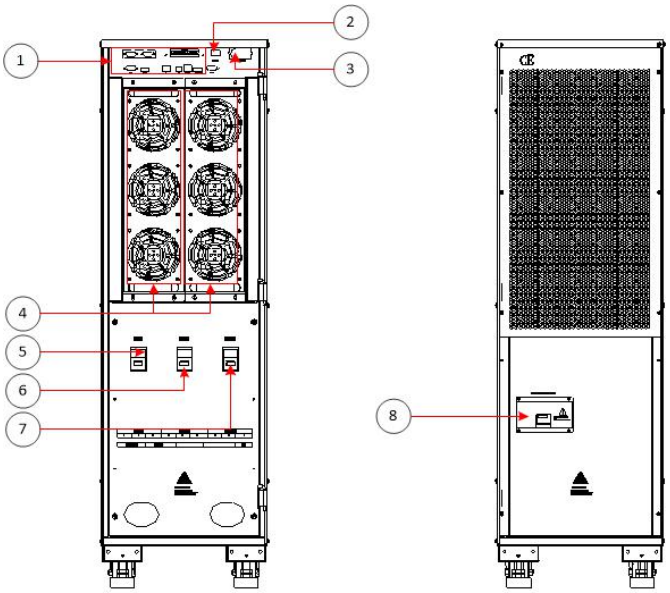
2.4.2 UPS Outlook

The outlook of 80kVA UPS is shown in Fig.2-8, and its functional components are shown in Fig. 2-9.



1	Front door	2	LCD
3	Cabinet	4	Supporting foot
5	Wheels		

Fig. 2-8 The outlook of 80kVA

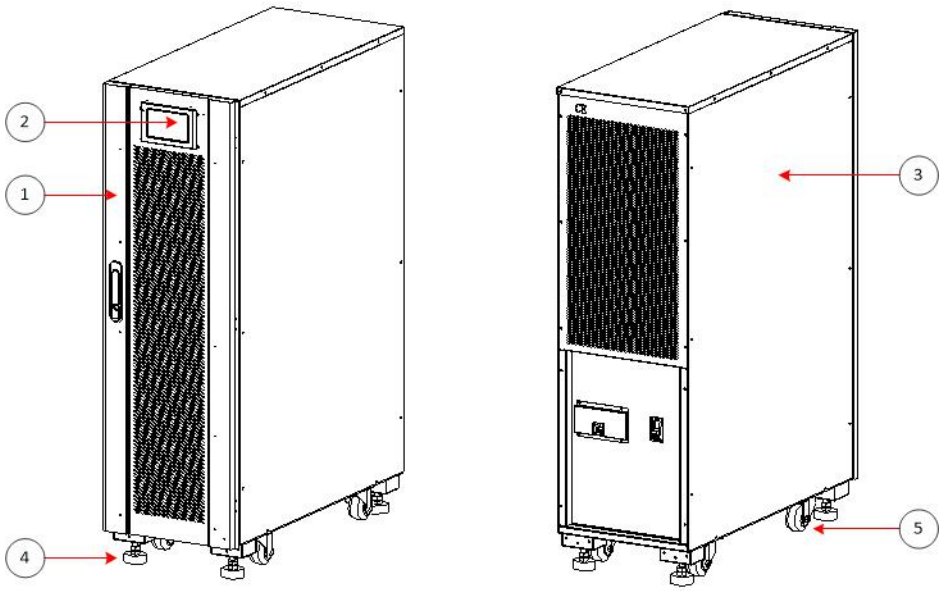


1	Communication ports	2	Cold start
3	Smart card slot	4	Power modules

5	Main input breaker	6	Bypass breaker
7	Output breaker	8	Maintenance bypass breaker

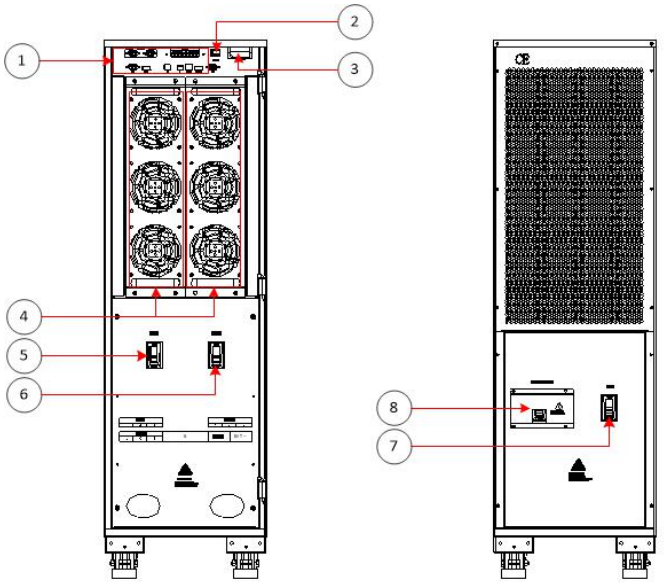
Fig. 2-9 The functional components of 80kVA

The outlook of 100/120kVA UPS is shown in Fig.2-10, and its functional components are shown in Fig. 2-11.



1	Front door	2	LCD
3	Cabinet	4	Supporting foot
5	Wheels		

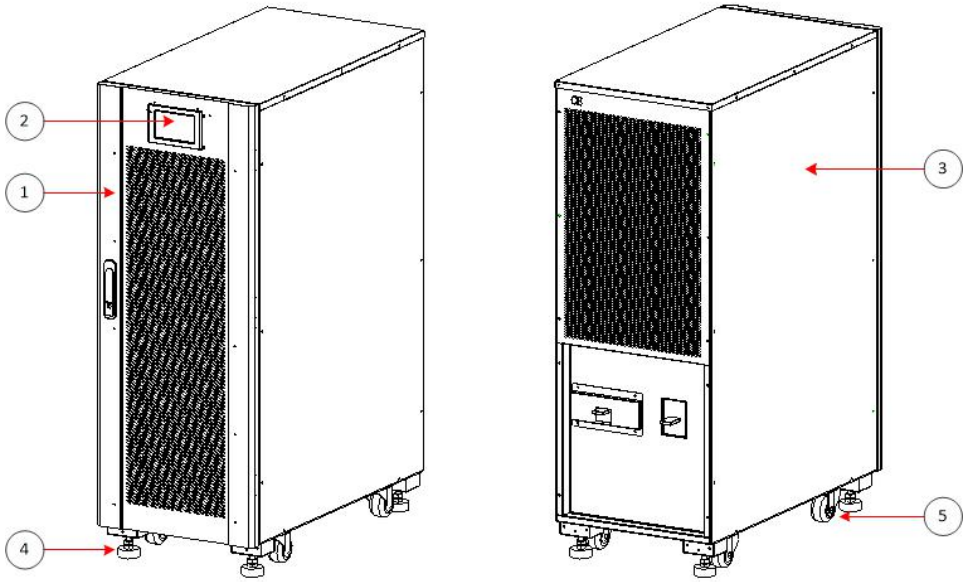
Fig. 2-10 The outlook of 100/120kVA



1	Communication ports	2	Cold start
3	Smart card slot	4	Power modules
5	Main input breaker	6	Bypass breaker
7	Output breaker	8	Maintenance bypass breaker

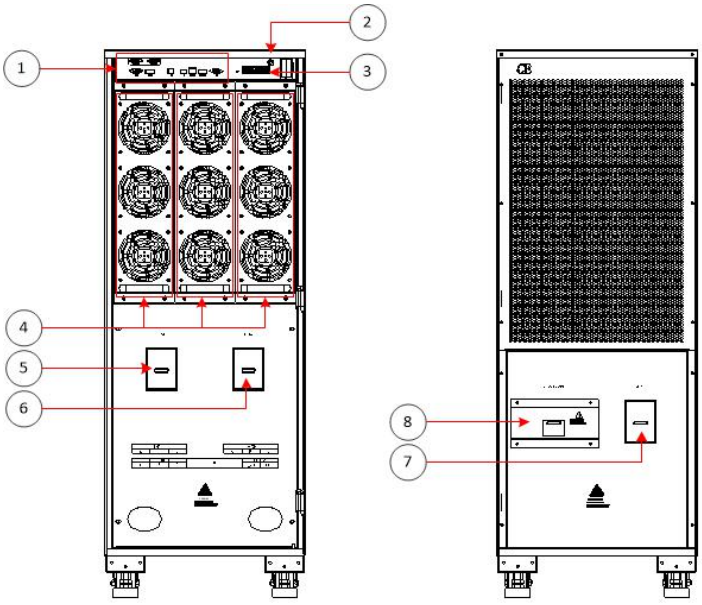
Fig. 2-11 The functional components of 100/120kVA

The outlook of 200kVA UPS is shown in Fig.2-12, and its functional components are shown in Fig. 2-13.



1	Front door	2	LCD
3	Cabinet	4	Supporting foot
5	Wheels		

Fig. 2-12 The outlook of 200kVA



1	Communication ports	2	Cold start
3	Smart card slot	4	Power modules
5	Main input breaker	6	Bypass breaker
7	Output breaker	8	Maintenance bypass breaker

Fig. 2-13 The functional components of 200kVA

3 Installation Instruction

3.1 Installation Preparations

3.1.1 Site Preparations

Installation weight and dimensions

Ensure the ground or installation platform can bear the weight of UPS, the battery and battery rack. The weight of the battery and the battery rack shall be calculated according to the actual use condition. The installation weight and dimensions of UPS are shown in Table 3-1.

Table 3-1 Installation weight and dimensions of UPS

Model	Dimensions (W x D x H)	Weight
80 kVA	360 mm × 850 mm × 1200 mm	156kg
100kVA	360 mm × 850 mm × 1200 mm	160kg
120 kVA	360 mm × 850 mm × 1200 mm	160kg
160 kVA	440 mm × 850 mm × 1250 mm	194kg
200 kVA	440 mm × 850 mm × 1250mm	200kg

Installation environment

- Do not install UPS in high, low temperature or humid environment that exceed the technical specifications (see Chapter 8 Technical Parameters for environmental specifications).
- Keep UPS away from water source, heat source and inflammable and explosive materials. Avoid installing UPS in the environment with direct sunlight, dust, volatile gas, corrosive substances and excessive salt. It is strictly prohibited to install UPS in the working environment with metal conductive dust.
- If the UPS is installed in an airtight room without ventilation, it needs to be equipped with an air conditioning system to ensure stable ambient temperature. The cooling capacity of air conditioning should be greater than the sum of the heating sources in the room. The maximum heating capacity of this series UPS is 5% of the rated power value.
- Clearance
- A certain amount of operation and ventilation space shall be reserved around the cabinet. Reserve at least 450 mm space for ventilation and operation d in the front, at least 300 mm space for operation in the top, and at least 300 mm space for ventilation at the back. If it is required to operate at the back, reserve at least 800 mm space. Take 80 kVA UPS as an example shown in Fig. 3-1.

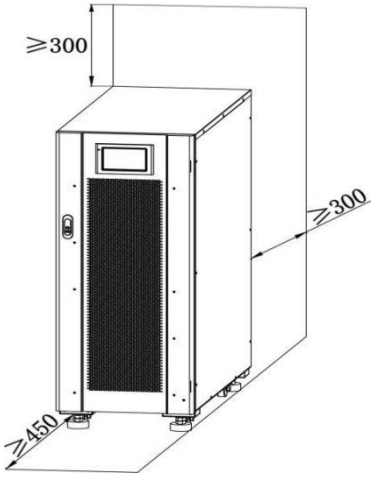


Fig. 3-1 Clearance of 80 kVA UPS (units : mm)

3.1.2 Installation Tools

	**DANGER**
	To ensure safety, installation tools for live operation shall be insulated.

Installation tools which may be used in installation process are shown in Table 3-2 and used as needed.

Table 3-2 Installation tools

Tool name	Main function		Tool name	Main function
Forklift	Handling		Nail hammer	Knock, install and remove components
Herringbone ladder	High-place operation		Rubber hammer	Knock and install components
Clip-on ammeter	Detect current		Percussion drill, drill bit	Drill
Multimeter	Check electrical connection and electrical parameters		Insulating tape	Electrical insulation
Cross screwdriver	Fasten screw		Heat-shrinkable tubing	Electrical insulation
Leveling instrument	Leveling		Heat gun	Heat heat-shrinkable tubing
Insulated monkey wrench	Tighten and loosen bolts		Electrician's knife	Wire stripping
Insulated torque wrench	Tighten and loosen bolts		Cable tie	Bundle
Crimping pliers	Cc cold-pressed terminal		Leather working gloves	Protect operator’s hands
Hydraulic clamp	Clamp OT terminal		Antistatic gloves	Anti-static
Diagonal pliers	Shear cables		Insulating gloves	Insulation
Wire stripper	Wire stripping			

3.1.3 Preparation of Power Cables

The recommended cable sizes are shown in Table 3-3, the requirements of cable terminals are shown in Table 3-4, and the recommended configurations of input-output breakers are shown in Table 3-5.

Table 3-3 Recommended cable sizes

Item			80 kVA	100 kVA	120 kVA	160 kVA	200 kVA
Mains input	Mains input current (A)		155	187	228	280	374
	Recommended diameter (mm^2)	A/B/C/N	4×50	4×70	4×70	4×95	4×120
Bypass input	Bypass input current (A)		122	153	182	230	306
	Recommended diameter (mm^2)	A/B/C/N	4×35	4×50	4×70	4×70	4×120
Output	Output current (A)		122	153	182	230	306
	Recommended diameter (mm^2)	A/B/C/N	4×35	4×50	4×70	4×70	4×120

Item			80 kVA	100 kVA	120 kVA	160 kVA	200 kVA
Battery input	Discharge current of 40 x 12V batteries (A)		177	221	266	331	442
	Recommended diameter (mm^2)	BAT+/BAT-/N	3×50	3×70	3×95	3×120	3×150
Grounding cable	Recommended diameter (mm^2)	PE	1×25	1×35	1×50	1×70	1×95

Note

- The cables recommended in Table 3-3 are only applicable to the following conditions:
- - Laying method: installed on the wall or floor (IEC60364-5-52)
- - Ambient temperature: 0 - 40 ℃
- - AC voltage loss is less than 3%, DC voltage loss is less than 1%. The DC and AC cables of in the table is not more than 20 m long and for 80 kVA ~ 200 kVA UPS, the AC cables is not more than 30 m long, and the DC cables is not greater than 40 m.
- - 105℃ copper core cable
- When the main and the bypass are same, the input cable is configured according to the mains input cable.
- The current value in the table refers to the data obtained at rated voltage 380V. The current value needs to be multiplied by 0.95 for the rated voltage 400V, and 0.92 for 415 V rated voltage.
- When the main load is non-linear load, the n-line section needs to be increased by 1.5-1.7 times.

	WARNING
	1>When OT terminals and DT terminals are selected, please strictly follow the parameters specifications as given in Table 3-4 to avoid short circuit. 2>When connecting the power cable, to comply with the torsion moment, given in table 3-4 to ensure the tightness of terminals, to avoid potential safety hazard.

Table 3-4 Requirements of cable terminals

Model	Interface description	Connection mode	Bolt specification	Bolt hole	Torque
80 kVA	Mains input	Cable crimping with DT Terminal	M8	9 mm	13 N·m
100/120 kVA		Cable crimping with DT Terminal	M10	11 mm	27 N·m
160/200 kVA		Cable crimping with DT Terminal	M12	13mm	42 N·m
80 kVA	Bypass input	Cable crimping with DT Terminal	M8	9 mm	13 N·m
100/120 kVA		Cable crimping with DT Terminal	M10	11 mm	27 N·m
160/200 kVA		Cable crimping with DT Terminal	M12	13 mm	42 N·m
80 kVA	Battery input	Cable crimping with DT Terminal	M8	9 mm	13 N·m
100/120 kVA		Cable crimping with DT Terminal	M10	11 mm	27 N·m
160/200 kVA		Cable crimping with DT Terminal	M12	13 mm	42N·m
80 kVA	Output	Cable crimping with DT Terminal	M8	9 mm	13 N·m
100/120 kVA		Cable crimping with DT Terminal	M10	11 mm	27 N·m
160/200 kVA		Cable crimping with DT Terminal	M12	13 mm	42 N·m
80 kVA	Protective grounding	Cable crimping with OT Terminal	M8	9 mm	13N·m
100/120 kVA		Cable crimping with DT Terminal	M8	9 mm	13N·m
160/200 kVA		Cable crimping with DT Terminal	M12	13 mm	42N·m

Table 3-5 Configurations of input-output breakers

Input-output breaker	80 kVA	100kVA	120 kVA	160 / 200 kVA
Mains input breaker (standard configuration)	160 A / 3P	200 A / 3P	250 A / 3P	400 A / 3P
Bypass input breaker (standard configuration)	160 A / 3P	200 A / 3P	250 A / 3P	400 A / 3P
Output breaker (standard configuration)	160 A / 3P	200 A / 3P	250 A / 3P	400 A / 3P
Battery input breaker (recommended)	DC 250 A / 3P	DC 250 A / 3P	DC 400 A / 3P	DC 630 A / 3P

Note

- The mains input breaker, the bypass input breaker and the output breaker are installed in this product as standard configuration.
- As UPS is a large leakage current device, it is not recommended to install breakers with leakage protection function.
- When the input front end is provided with multiple loads, the specification of circuit breaker for the front-level bus configuration must be greater than the specification of the mains input breaker and the bypass input breaker of UPS.
- When the input rear end is provided with multiple loads, the specification of circuit breaker for the front-level bus configuration must be smaller than the specification of the input breaker of UPS.

3.1.4 Unpacking

	CAUTION
	1>The equipment must be handled by specially trained personnel. 2>Handle the equipment with care, and the device. Any impact or fall may cause damage to the equipment.

Procedures:

Step 1: make sure the UPS package is not damaged. In case of any damage during transportation, please inform the carrier immediately.

Step 2: use the forklift to transport the equipment to the designated location.

Step 3: remove outer packing and remove buffer foam.

Step 4: remove the moisture barrier bag.

Step 5: check the integrity of the equipment.

Inspect the appearance of UPS, and check whether UPS is damaged during transportation. If yes, please notify the carrier immediately. Check whether the attached accessories are complete and correct according to the packing list. If the accessories are short or the model is not in accordance with the requirements, timely make on-site records and immediately contact the company or the local office.

Step 6: after confirming that the equipment is in good condition, remove the L-shaped angle support fixed by pallet for fixing the case, as shown in Fig. 3-2.

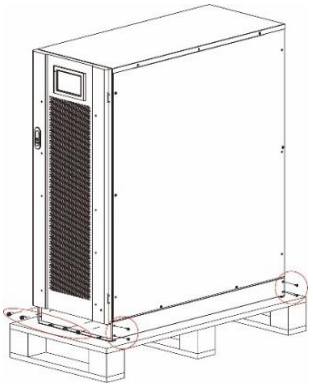


Fig. 3-2 Removal of L-shaped angle support

Step 7: turn the wrench counterclockwise to raise the four support feet at the bottom of UPS until all the four wheels at the bottom of the case are evenly landed and the support feet are completely suspended. See Fig. 3-3.

Fig. 3-3 Upward adjustment of support feet

Step 8: use the automatic lift forklift or other equipment to unload the machine, and move the equipment to the installation position by a roller.

3.2 Installation of Single UPS System

3.2.1 UPS Installation

Installation procedures:

Step 1: turn the wrench clockwise to lower the four support feet at the bottom of UPS until all the four wheels at the bottom of the case are suspended and the equipment is fully supported by the support feet.

Step 2: check the level of the case with the leveling instrument. If not, continue to adjust the support feet until reaching the level state.

3.2.2 Install Tightening Components

The tightening components are installed for vibration and impact resistance, and can be selectively installed according to the installation environment. The specific installation procedure is as follows:

Step 1: determine the installation position and position the mounting surface according to the hole size diagram. The hole size is shown in Fig. 3-4 and Fig. 3-5.

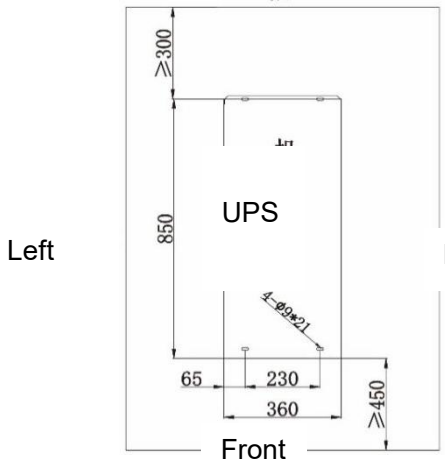


Fig. 3-4 Hole size of 80/100/120 kVA

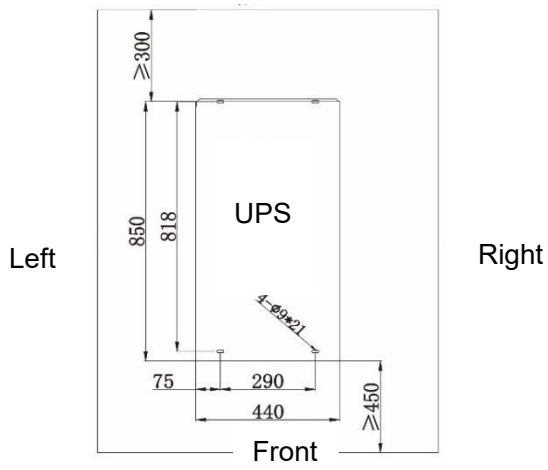


Fig. 3-5 Hole size of 160/200 kVA

Step 2: selectively install expansion bolt holes and expansion bolts according to the site conditions of installation foundation.

Step 3: handle the UPS to the installation position with the roller.

Step 4: turn the wrench clockwise to lower the four support feet at the bottom of UPS until all the four wheel at the bottom of the case are suspended and the equipment is fully supported by the support feet.

Step 5: open the front door and remove the cover panel of the distribution unit, as shown in Fig. 3-7.

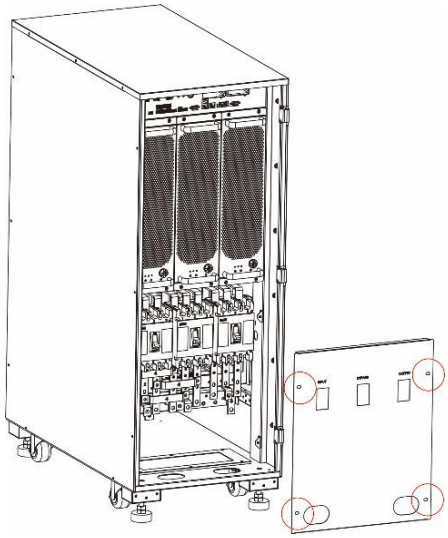


Fig. 3-7 Remove the cover of distribution unit

Step 6: secure the components to the case with 8 × M6 and 4 × M12 screws, as shown in Fig. 3-8.

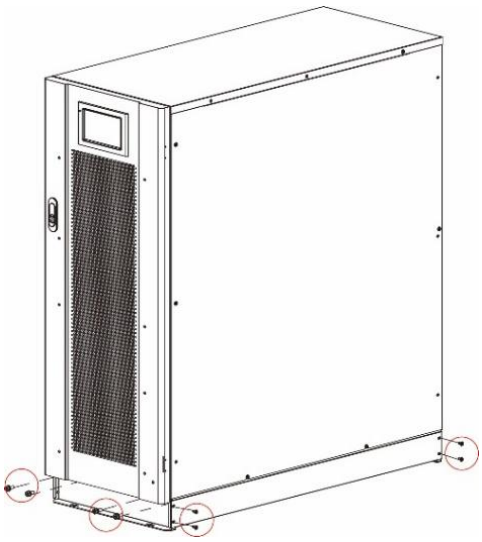


Fig. 3-8 Fix the tightening components on the case

Step 7: fine-tune the case so that the expansion bolts are aligned with the four holes.

Step 8: secure the tightening components in the front and back of the case to the ground with 4 M12×60 expansion bolts.

Step 9: close the front door and put the cover panel of the distribution unit back into the case.

3.2.3 Install Batteries

Please refer to the battery installation instructions shipped with the battery for methods.

After the battery is installed, check the voltage of a single battery, normal range: 10.5 V -13.5 V; Check the voltage difference between single cell in a series battery string, generally no more than 5%. If not, charge or replace the battery.

3.2.4 Connect Power Cables

Step 1: Open the front door and remove the cover plate of distribution unit, as shown in Fig. 3-7.

Step 2: connect power cables.

1>Connection of battery cable.

	CAUTION
	1>Battery voltage can be fatal. Please observe safety instruction during connecting cables. 2>Select total number of batteries from 32 to 40 (even number), and the number of positive and negative battery strings must be consistent. 3>Positive and negative battery strings must be equipped with a 3-channel battery breaker with limited current protection. 4>During wiring, ensure that the polarity of the cable connecting the battery terminal to the battery breaker and the battery breaker to the UPS terminal is correct.

The reference connection mode of the battery strings is shown in Fig. 3-9, where the N line of the battery is the reference potential leading from the connection point in the middle of positive and negative battery strings.

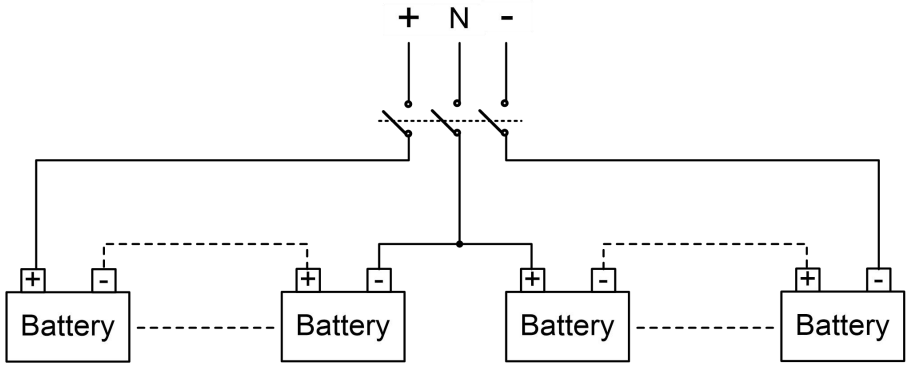
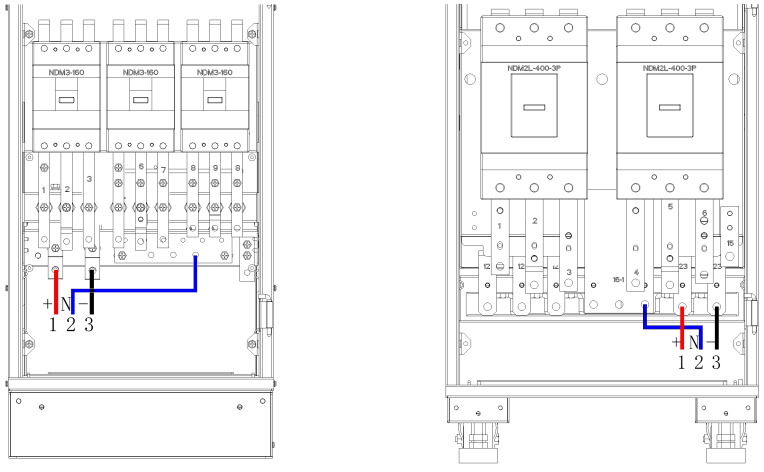


Fig. 3-9 Wiring diagram of battery strings

Connect the battery cable of the battery string to the +, N and - of the battery distribution terminal, as shown in Fig. 3-10.



80kVA 100/120/150/200kVA

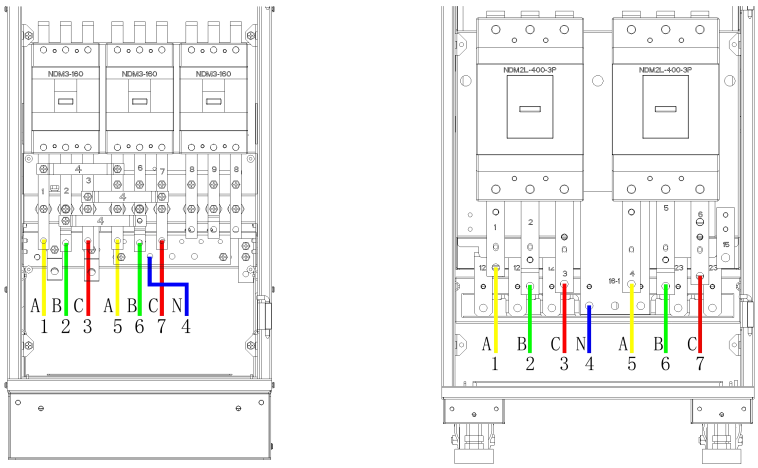
1 Battery input + 2 Battery input N 3 Battery input -

Fig. 3-10 Connection of battery cable

2>Connection of AC input cable

Different power supply for main and bypass

- Before performing the following steps, please measure with a multimeter to ensure that the three-phase terminals of the main circuit and the bypass circuit are not short-circuited.
- connect the mains input cables to the main distribution terminals A, B, C and N successively.
- connect the bypass input cables to the bypass distribution terminals A, B, C and N successively, as shown in Fig. 3-11.



80kVA　　100/120/150/200kVA

1	Main input A	2	Main input B
3	Main input C	4	Input N
5	Bypass input A	6	Bypass input B
7	Bypass input C	8	

Fig. 3-11　Connection of AC input cable

Same power supply for main and bypass

- Before performing the following steps, please measure with a multimeter to ensure that the three-phase terminals of the main circuit and the bypass circuit are not short-circuited.
- Install connection cables or copper bars between mains input and bypass input terminals, as shown in Fig. 3-12.

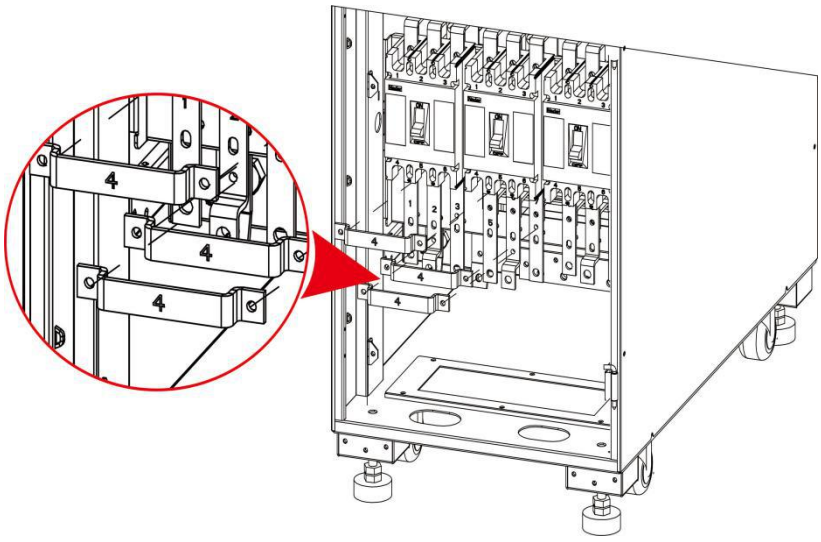
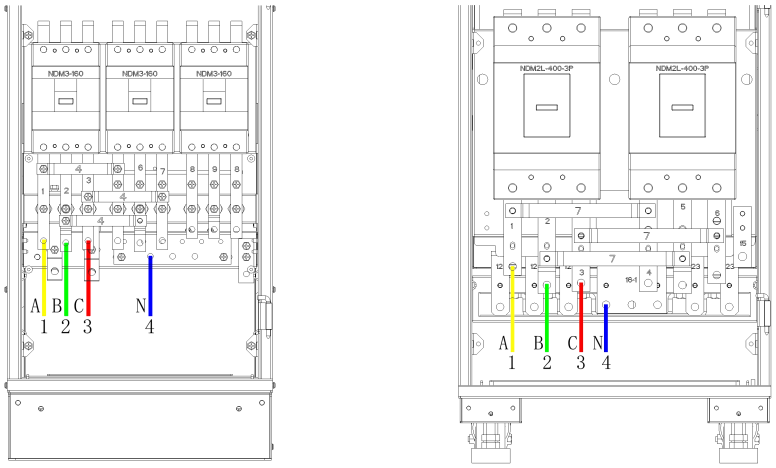


Fig. 3-12　Install copper bars

- connect the mains input cables to the main distribution terminals A, B, C and N successively, as shown in Fig. 3-13.



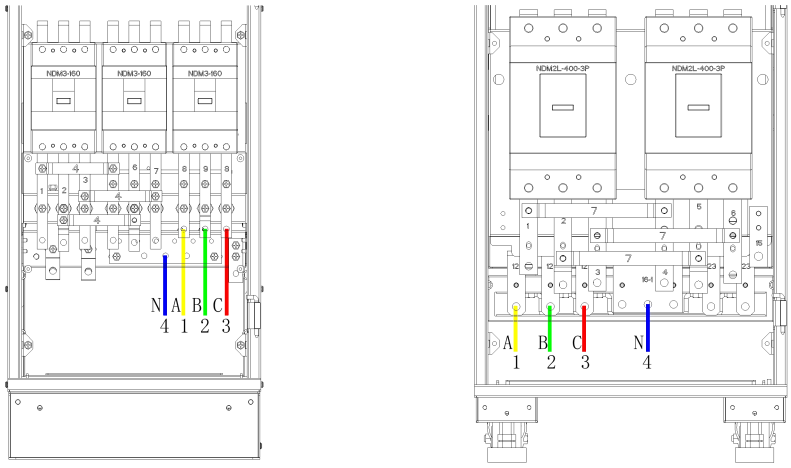
80kVA 100/120/150/200kVA

1	Main input A	2	Main input B
3	Main input C	4	Main input N

Fig. 3-12 Connection of AC input cable

3>Connection of AC output cable

Connect the output cables successively to the output distribution terminals A, B, C and N, as shown in Fig. 3-13.



80kVA 100/120/150/200kVA

Fig. 3-13 Connection of AC output cable

3.2.5 Connection Grounding cable

Connect the grounding cable of UPS as shown in Fig. 3-14. An additional M8 ground port is also reserved on the left side.

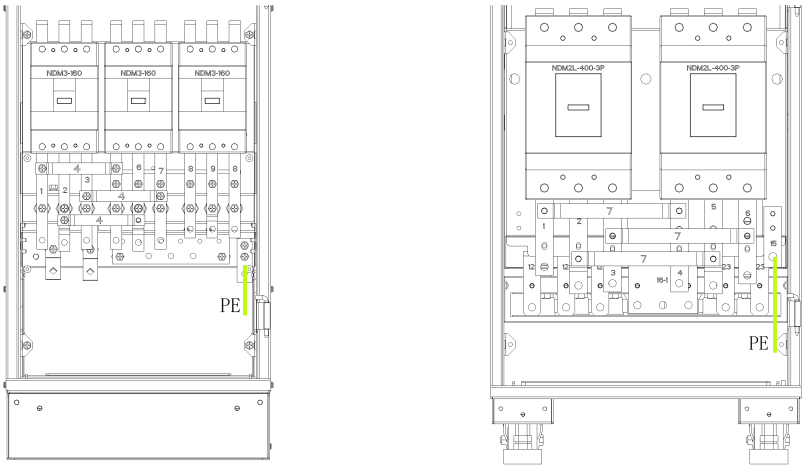


Fig. 3-14 Connection of ground cable

3.3 Installation of Parallel UPS System

3.3.1 Connect Power Cables

Wiring procedures:

As shown in the figure, respectively connect the mains power input, bypass input, output and battery of the UPS to be connected in parallel, and then connect the mains power, the bypass, the battery and the load respectively.

Step 1: properly install the AC input cables and the battery cables of each UPS in the parallel system as shown in 3.2.4.

Step 2: ground the single UPS of each parallel system separately. See 3.2.5 for the grounding method.

Step 3: connect the mains power input, bypass input, output and battery of UPS to be connected in parallel, and then connect the mains power, the bypass, the battery and the load respectively.

The power wiring diagram of the parallel system is shown in Fig. 3-15.

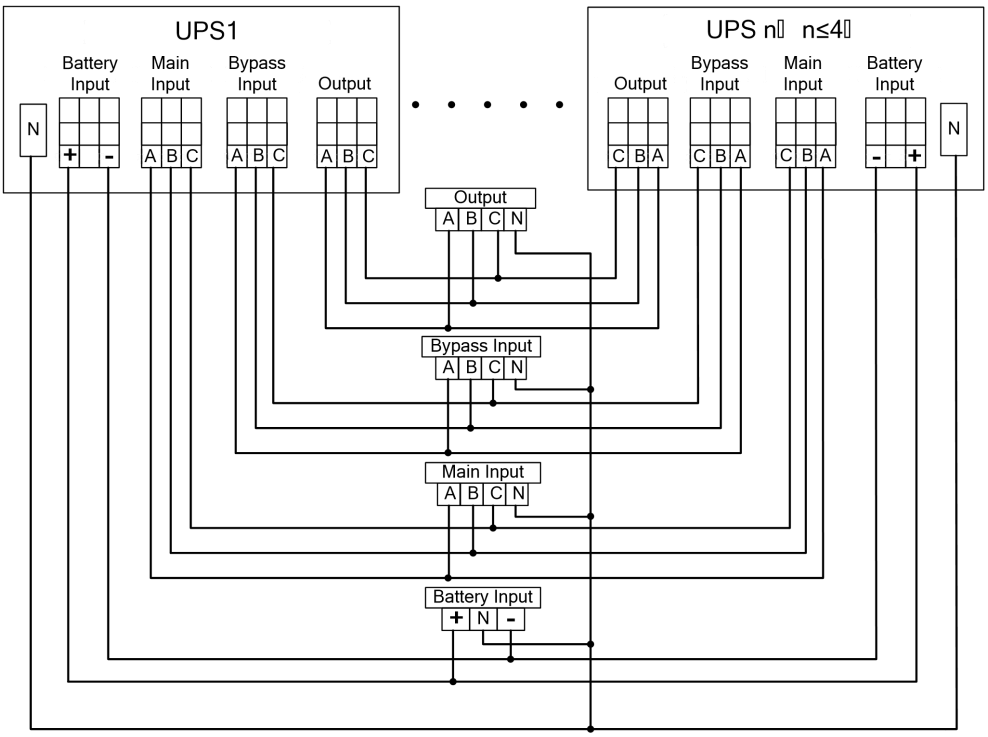


Fig. 3-15 Schematic diagram for power wiring diagram of parallel system

Note

If the parallel system shares the battery string, it is required to set to battery strings sharing in the system.

During wiring, connect the power cables with the distribution terminals of UPS one by one according to the screen-printed corresponding relationship.

The length and specification of each power cable should be as same as possible, including bypass input cable and UPS output cable, so as to achieve even current in bypass mode.

3.3.2 Connect Control Cables

Connect the parallel interface of single UPS of the parallel system to form a loop by the parallel control cable.

Exampling 1+1 parallel system, the wiring diagram is shown in Fig. 3-16. For three or more parallel system, the wiring diagram is shown in Fig. 3-17.

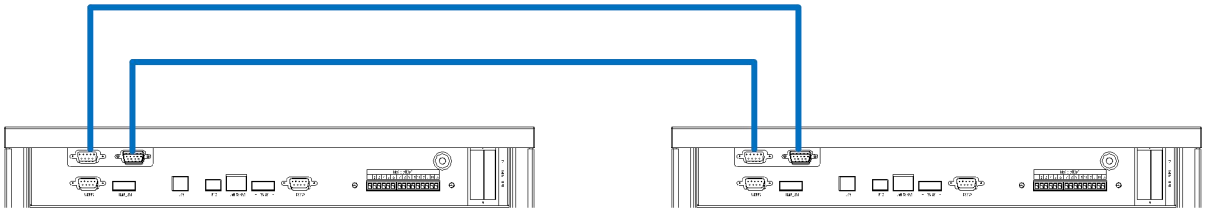


Fig. 3-16 Wring diagram for control cables of 1+1 parallel system

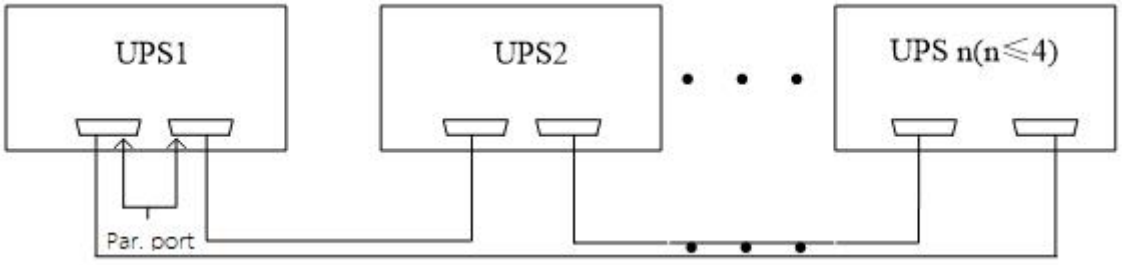
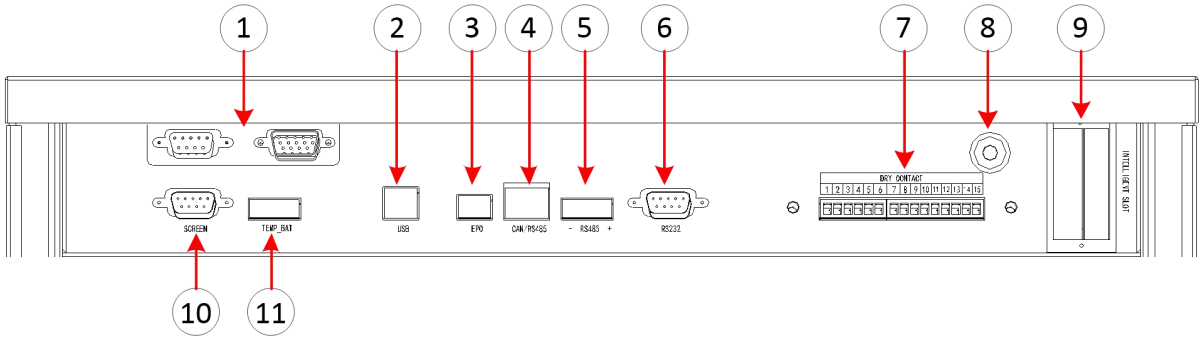


Fig. 3-17 Wring diagram for control cables of parallel system

3.4 Dry contact and Communication interface

The rear panel of the UPS provides dry contact interface and communication interface (RS232，RS485,SNMP ,Intelligent card interface and USB port)， as it is shown in Fig.3-18.



1	Parallel port	2	USB	3	EPO
4	CAN/RS485	5	RS485	6	RS232
7	Dry contact	8	Cold start	9	Intelligent card slot
10	Screen	11	Battery temperature compensation		

Fig. 3-18 Communication interface

3.4.1 Dry Contact Interface

Dry contact interface includes port J1-J18, which is shown in Fig. 3-18. And its function are shown in Table 3.6.

Table 3-6 Functions of the port

Port	Name	Function
1	IN_DRY1_NC	Input dry contact-1,1-2, (Normally closed)function is settable , Default: none
2	Vcc_GJ	VCC
3	IN_DRY2_NO	Input dry contact-2,3-4, (Normally open) function is settable , Default: None
4	GND	Ground for Vcc
5	IN_DRY3_NO	Input dry contact-3,5-6, (Normally open) function is settable , Default: None
6	GND	Ground for Vcc
7	OUT _DRY1_NO	Output dry contact-1, 7-9(Normally open) function is settable. Default: None If used for BCB_DRV,6-7, provide +15V voltage， 20mA drive signal
8	OUT _DRY1_NC	Output dry contact-1, 8-9(Normally closed) function is settable. Default: None
9	OUT _DRY1_GND	Common terminal for 7 and 8
10	OUT _DRY2_NO	Output dry contact-2, 10-12(Normally open), function is settable. Default: None
11	OUT _DRY2_NC	Output dry contact-2, 11-12(Normally closed), function is settable. Default: None
12	OUT _DRY2_GND	Common terminal for 10and 11,
13	OUT _DRY3_NO	Output dry contact-3, 13-15(Normally open), function is settable. Default: None

14	OUT _DRY3_NC	Output dry contact-3, 14-15 (Normally closed), function is settable. Default: None
15	OUT _DRY3_GND	Common terminal for 13 and 14

Note

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

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

The output dry contact interface: An auxiliary dry contact signal will be activated via the isolation of a relay.

3.4.2 Communication Interface

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

CAN/RS485: Provide serial data which can be used for communication with Li-battery BMS.

Optional smart cards: SNMP card, GPRS card and Wi-Fi card etc.

The smart cards are installed in the optional card slot of UPS, which support hot-plug and feature convenient installation. Proceed as follows:

Step 1: first remove the cover plate from the intelligent slot;

Step 2: insert the required smart card into the slot;

Step 3: lock the smart card with previously removed screws.

SNMP card is compatible with today's popular Internet software and firmware and network operating system and provide direct the direct Internet access function for UPS to provide instant UPS data and power supply information, and achieve communication and management by communication network management systems, the network communication of UPS and convenient centralized monitoring and management of each UPS. Please refer to supporting operation instruction for details.

4G card allows UPS to connect the Internet through 4G data (local SIM card is required), and the server for data communication, and UPS may be monitored online through computer or mobile phone. Please refer to supporting operation instruction for details.

GPRS card allows UPS to connect the Internet through GPRS data (local SIM card is required), and the server for data communication, and UPS may be monitored online through computer or mobile phone. Please refer to supporting operation instruction for details.

Wi-Fi card allows UPS to connect the Internet through Wi-Fi and the server for data communication, and UPS may be monitored online through computer or mobile phone. Please refer to supporting operation instruction for details.

4 LCD Panel

4.1 Introduction

This chapter introduces the functions and operation instructions of screen, and provide LCD display types, detailed menu information, prompt window information and UPS alarm information.

4.2 LCD panel for Cabinet

The structure of operation control and display panel for cabinet is shown in Fig.4-1. The operation control panel of UPS is located on the front panel of the cabinet. By operating the LCD, the UPS can be operated, controlled, and checked for all its parameters, operating status, and alarm information.

Fig.4-1 Control and display panel

The LCD panel for cabinet is divided into two functional areas: LED indicator,LCD touch screen.

4.2.1 LED Indicator

There are 2 color of LED indicator on the panel to indicate the operating status and fault. (See Fig.4-1).The description of indicators is shown in Table 4.1

Table 4.1 Status description of indicators

Indicators	State	Description
red	Steady red	UPS fault
	Flashing red	UPS alarming
green	Steady green	Power supply mode (mains mode, bypass mode, ECO mode, etc.)
No	None	Standby status or no starting

4.2.2 Alarm

There are two different types of audible alarm during UPS operation, as shown in Table 4.2.

Table 4.2 Description of audible alarm

Alarm	Description
Intermittent alarm	when system has general alarm (for example: AC fault),
Continuous alarm	When system has serious faults (for example: hardware fault)

	CAUTION
	When bypass frequency is over track, there is interruption time(less than 10ms) for transferring from bypass to inverter.

4.2.3 LCD Menu structure

The menu structure of the monitoring display interface is shown in Fig. 4-2.

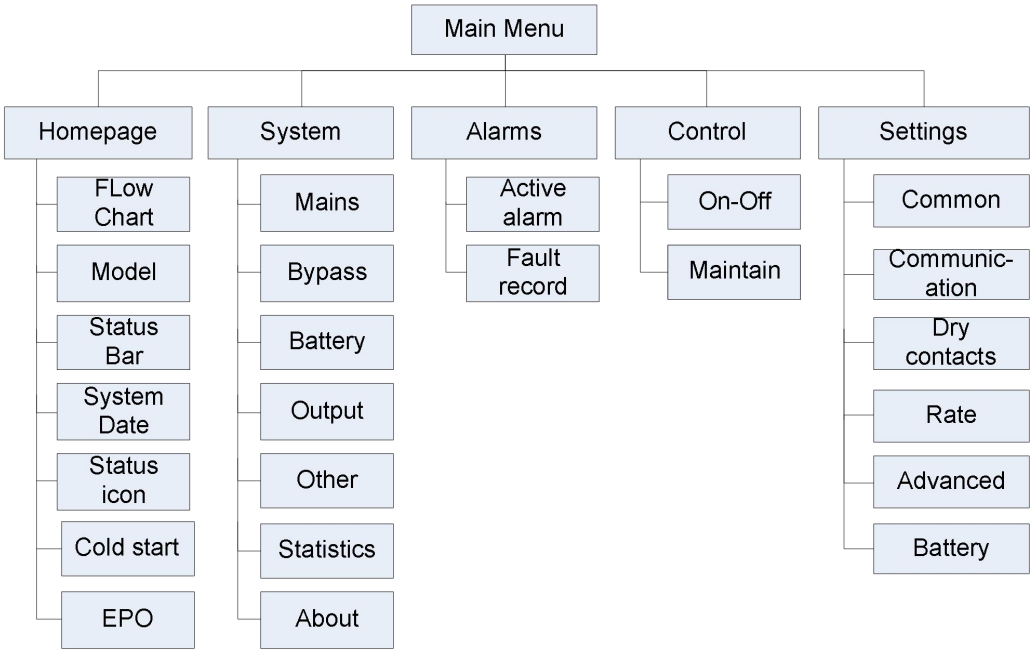


Fig. 4-2 Menu

4.2.4 Home page

About 3 seconds after the UPS is power on, the system enters the home page, following the welcome window. The home page is divided into four parts, including main menu, energy flow diagram, status bar and cold start button. The home page is shown in Fig. 4-3.

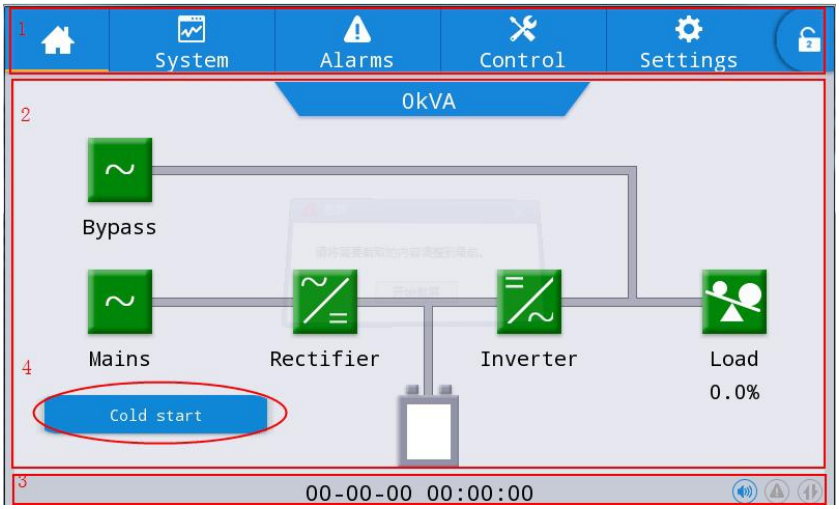


Fig. 4-3 Home page

Table 4-3 Function description of interface area

No.	Area	Function description
1	Main menu	Level 1 menu, including home page, system, alarm, control, settings, password login. The control and the settings are displayed in gray before login by password.
2	Energy flow diagram	Display the energy flow state of the cabinet. The specific status information can be viewed after clicking the corresponding working interface.

No.	Area	Function description
3	Status bar	Display operation status: working mode, system time, buzzer status, alarm status, HMI and monitoring communication status, USB status of the cabinet.
4	Cold start	Start up the UPS in battery mode. The icon will be hidden after two minutes.

Table 4-4 Description of icons in status bar

Icon	Function description
	Buzzer status, which becomes lit to indicate the buzzer enabled, and off to indicate the buzzer disabled
	Alarm status, which becomes lit to indicate an alarm, and off to indicate no alarm
	Password login/logout key. After clicking, enter user password or advanced password by the keyboard. The screen will be locked automatically.

Table 4-5 Description of password permissions

Password permissions	Default	Function description
User password	123456	Unlock On and OFF control right and the right of common settings and communication settings. It can be changed in "settings - common settings - user password".
Advanced password	Not opened	Unlock all control and setting rights. It can be used by qualified electricians only.

4.2.5 System

In the "System" information interface, the "Mains ", "Bypass ", "Battery ", "Output", "Other", "Statistics" and "About " information of the system can be inquired in the secondary menu at the left side.

Mains

The menu interface of the mains input is shown in Fig. 4-5, and displays information on three phases ABC from left to right. The interface description is shown in Table 4-6.

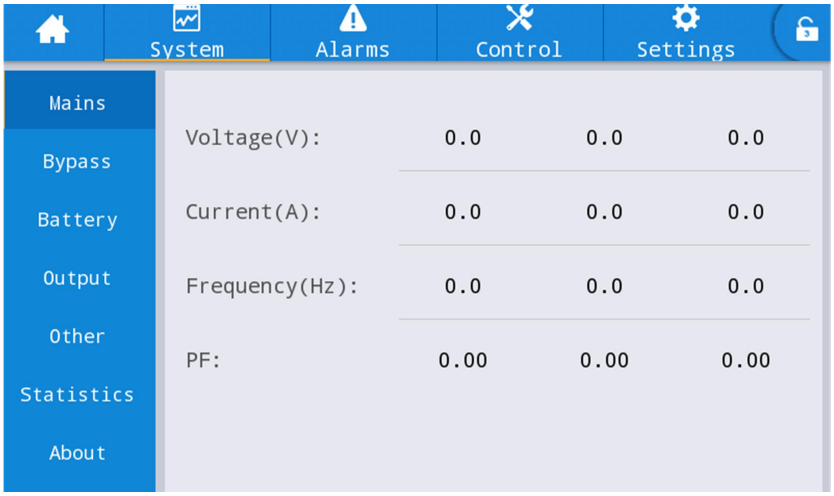


Fig. 4-4 Input interface

Table 4-6 Description of input interface

Display item	Description

Display item	Description
Voltage (V)	Mains input phase voltage
Current (A)	Mains input phase current
Frequency (Hz)	Mains input frequency
PF	Mains input Power factor

Bypass

The menu interface of the bypass input is shown in Fig. 4-5, and the interface description is shown in Table 4-7.

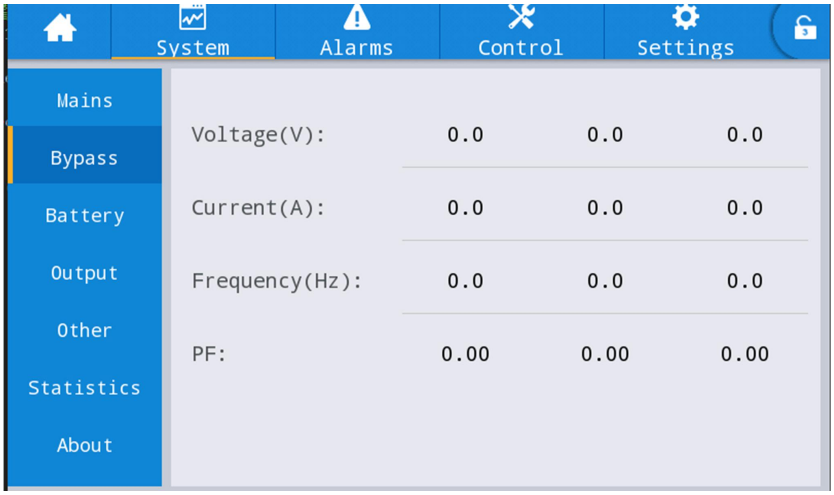


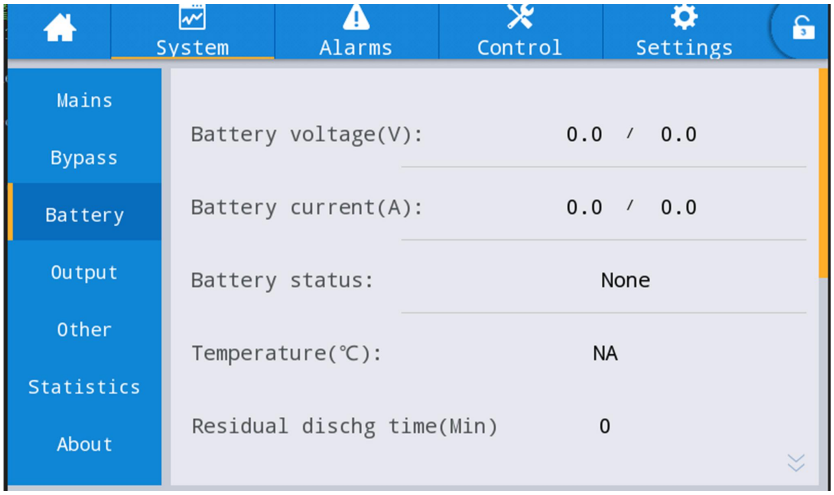
Fig. 4-5 Bypass interface

Table 4-7 Description of bypass interface

Display item	Description
Voltage (V)	Bypass input phase voltage
Current (A)	Bypass input phase current
Frequency (Hz)	Bypass input frequency
PF	Bypass input Power factor

Battery

The interface menu of battery input is shown in Fig. 4-6, and the interface description is shown in Table 4-8.



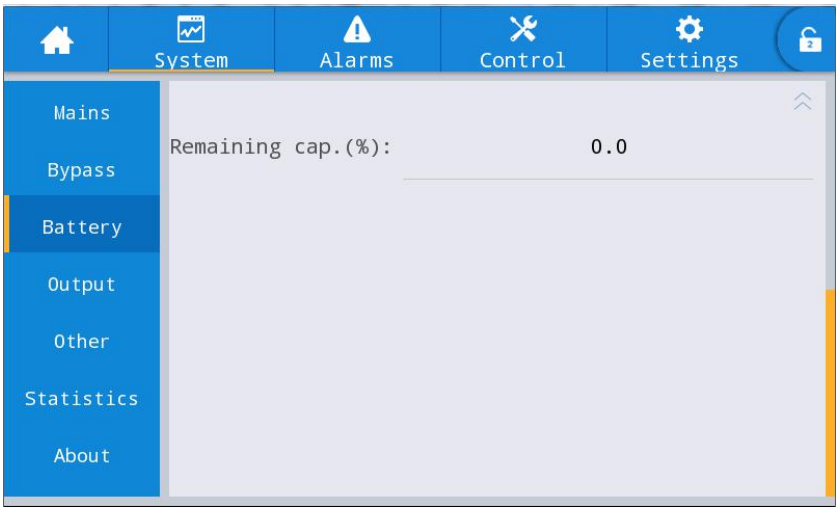


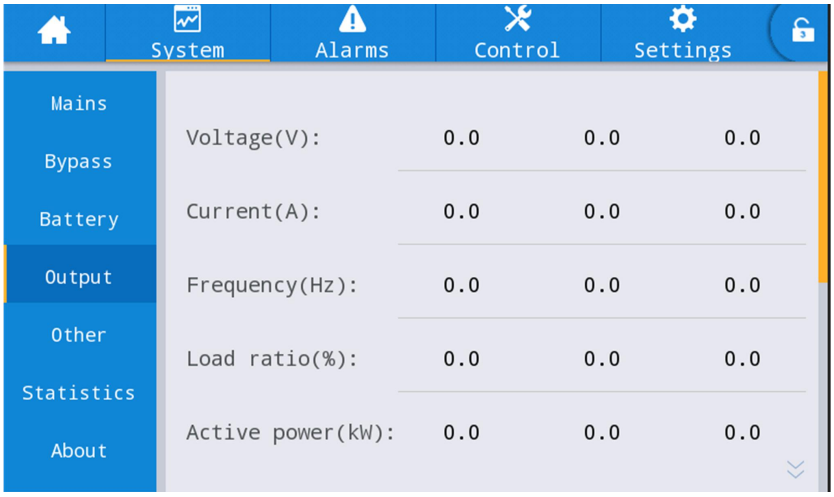
Fig. 4-6 Battery interface

Table 4-8 Description of battery interface

Display item	Description
Battery voltage (V)	Battery voltage
Battery Current (A)	Battery current
Battery status	Current battery status: idle, discharge, boost charge, floating charge, None
Temperature (℃)	Current operating temperature of battery (optional battery temperature sensor, display "NA" if not connected)
Backup time (min)	Estimated discharge time of the battery at the current load
Remaining cap. (%)	Current remaining capacity of battery

Output

The interface of output menu is shown in Fig. 4-7, and the interface description is shown in Table 4-9.



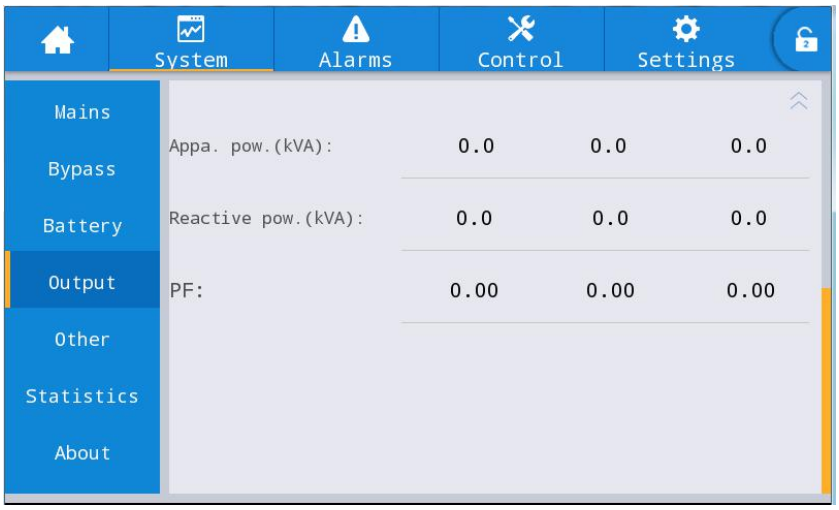


Fig. 4-7 Output interface

Table 4-9 Description of output interface

Display item	Description
Voltage (V)	AC output phase voltage.
Current (A)	AC output phase current.
Frequency (Hz)	AC output frequency.
Load ratio (%)	Load rate of each phase of the machine, i.e. the ratio of actual power to rated power.
Active power (kW)	Output active power of each phase of the UPS unit
Appa. pow. (kVA)	Output apparent power of each phase of the UPS unit
Reactive power(kVA)	Output reactive power of each phase of the UPS unit
PF	Output power factor of each phase of the UPS unit

Other

The interface of other menu is shown in Fig. 4-8, and the interface description is shown in Table 4-10.

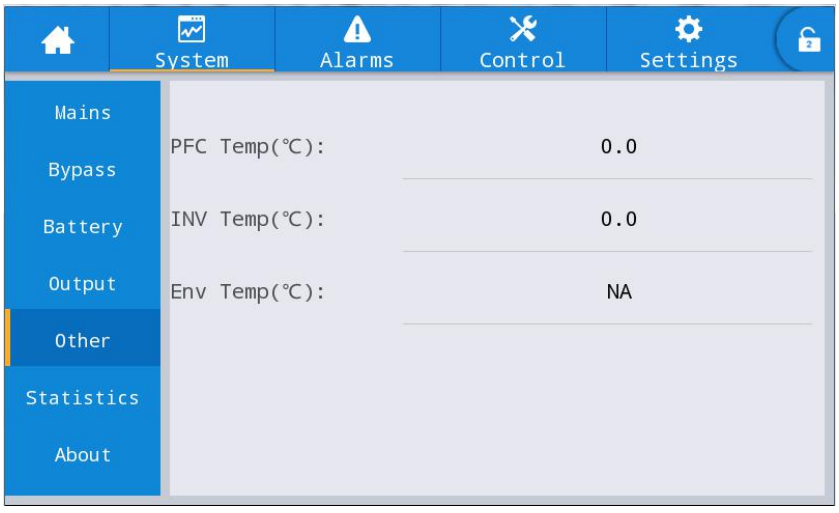


Fig. 4-8 Other interface

Table 4-10 Description of other interface

Display item	Description
PFC temperature	Rectifier temperature

Display item	Description
INV temperature	Inverter temperature
Environmental temperature	Environmental temperature(optional battery temperature sensor, display "NA" if not connected)

Statistics

The interface of statistics menu is shown in Fig. 4-9, and the interface description is shown in Table 4-11.

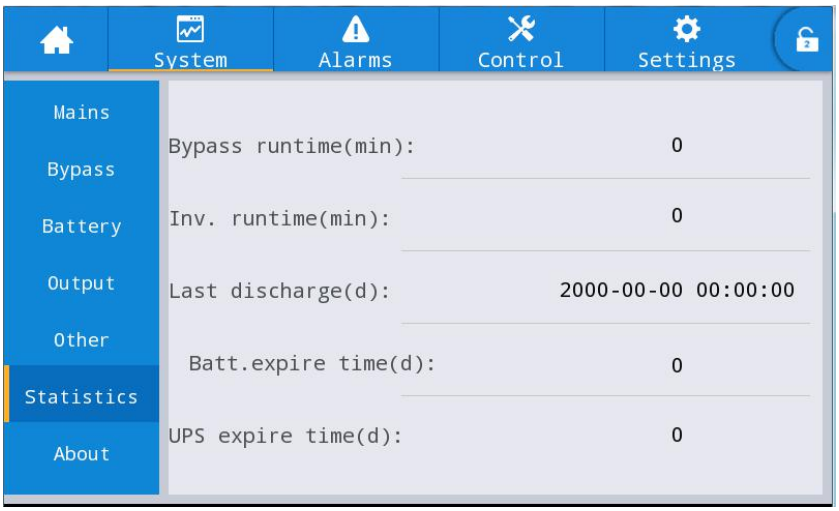


Fig. 4-9 Statistics interface

Table 4-11 Description of statistics interface

Display item	Description
Bypass runtime (min)	Accumulative operation time of UPS in bypass output status
Inv. Runtime (min)	Accumulative operation time of UPS in inverter output status
Last discharge (d)	Date of previous discharge status of UPS
Batt. expire time (d)	When the system time exceeds the warranty period, the status bar will prompt the warranty information of battery.
UPS expire time (d)	When the system time exceeds the warranty period, the status bar will prompt the warranty information of main machine.

About

The interface of "About" menu is shown in Fig. 4-10, and the interface description is shown in Table 4-12.

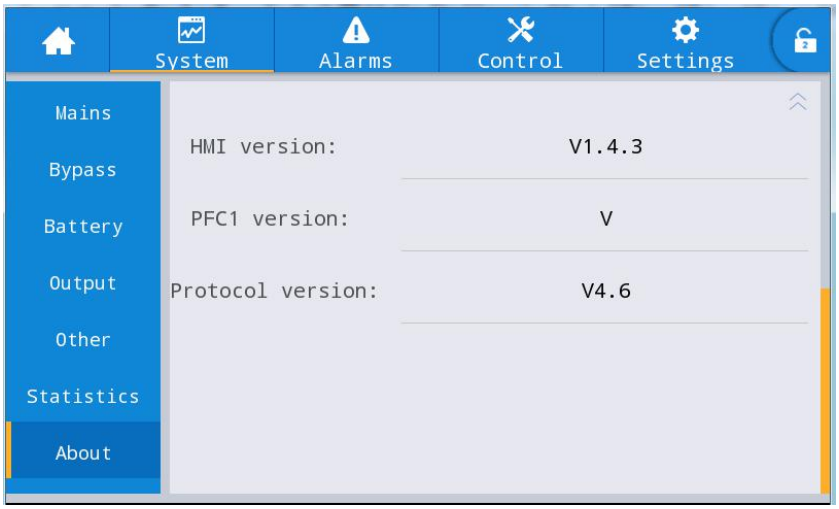


Fig. 4-10 About interface

Table 4-12 Description of Interface

Display item	Description
S/N	Production serial number of this machine.
TEL	Contact information of after-sales service providers.
Manufacturer	Manufacturer of this machine.
Website	Website of manufacturer of this unit.
HMI version	Program version of HMI display system.
PFC1 version	Program version of power rectifier system
Inv.1 version	Program version of power inverter system
Protocol version	Program version of LCD display system

4.2.6 Alarm

In the "Alarms" information interface, you can view "Active alarm" and "Fault record " from the secondary menu in the lower left corner. Click to select the type of alarm you want to view. The interface of alarm menu is shown in Fig. 4-11

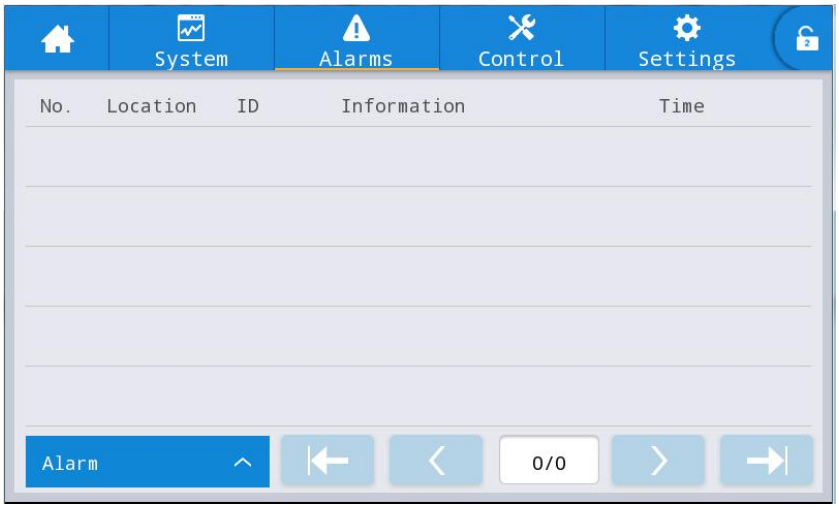


Fig. 4-11 Alarm menu interface

Active alarm

In "Active alarms" page, the current alarm code and information of the UPS are displayed, as shown in Table 4-13.

Table 4-13 Description of active alarm interface

Display item	Description
No.	Alarm number
Location	Display the cabinet number and module number of the current alarm source.
ID	Alarm code for program analysis.
Information	Current alarm name
Time	The current alarm is the current alarm information without time display.

History records

The "history record" display the UPS operating events and their occurrence time, such as alarms, faults, input power status and output power status. The interface description is shown in Table 4-14.

Table 4-14 Description of history record interface

Display item	Description
No.	Record number, which is listed in reverse order, that is to say the latest record is in the front.
Location	Displays the module number of the current record source.
ID	List code of fault, status or operation information for program analysis
Information	Current record name and record state (occurrence, disappearance).
Time	Record the time of occurrence or disappearance.

4.2.7 Control

In the "Control" information interface, you can select relevant operation from the left secondary menu, which contains "On-Off " and "Maintain".

On-Off

The interface of the “On-Off” menu is shown in Fig. 4-12, and the interface description is shown in Table 4-15.

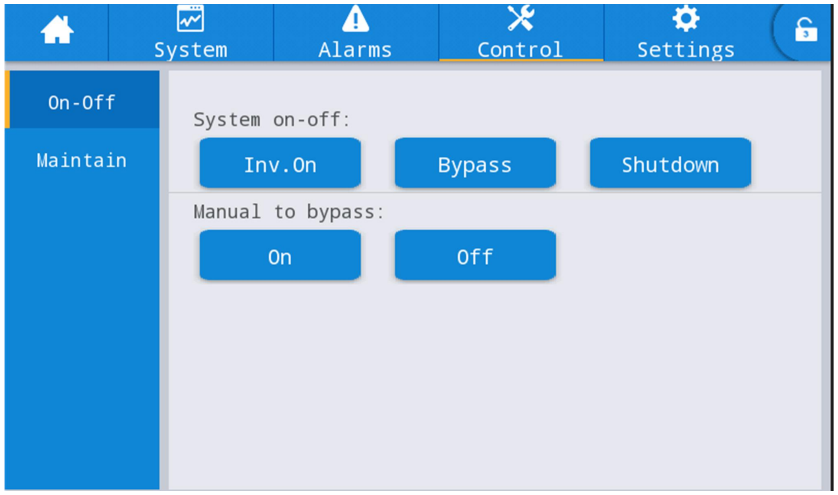


Fig. 4-12 On-Off interface

Table 4-15 Description of On-Off interface

Control item	Description

Control item	Description
System on-off	“Inv.On” -- Start up the inverter of UPS; “Bypass” -- Power off the inverter of UPS, and switch the output to bypass. “Shutdown” -- turn off the inverter and output.
Manual to bypass	“On” -- Switch the output from inverter to bypass, if the bypass is normal, and keep the inverter on standby. “Off” -- Switch the output from bypass to inverter. This command take effect only after the “Manual to bypass On” has been performed. Otherwise, this button will be gray.

Maintenance

The interface of maintenance menu is shown in Fig. 4-13, and the interface description is shown in Table 4-16.

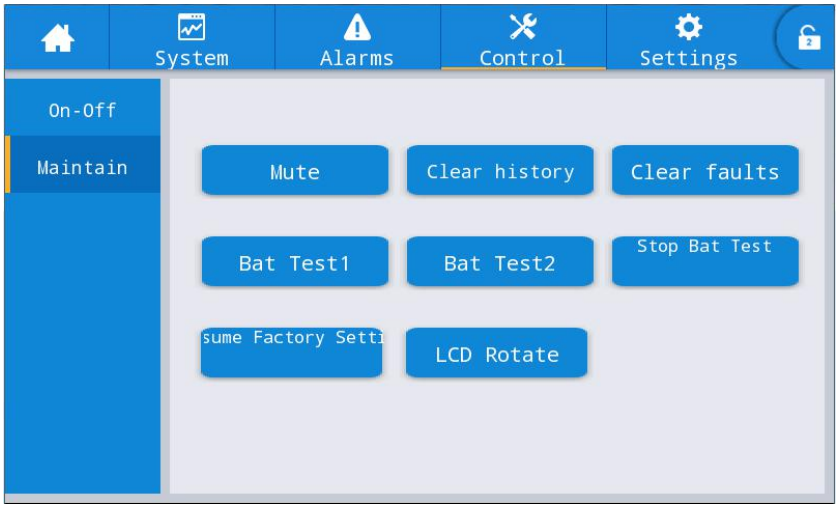


Fig. 4-13 Maintenance interface

Table 4-16 Description of maintenance interface

Control item	Description
Mute	Mute the buzzer
Clear history	Clear history
Faults Clear	Clear the fault
Bat Test1	This command will cause the UPS switches to battery mode to discharge 20 seconds to test whether the battery is normal. If the bypass is abnormal, or the battery capacity is lower than 25%, this command will not be taken effect.
Bat Test2	This command will cause the UPS switches to battery mode until the battery voltage is lower than DOD point. This test can activate battery by discharging deeply. If the bypass is abnormal, or the battery capacity is lower than 25%, this command will not be taken effect.
Stop Bat Test	Manually Stop the test including “Bat Test1” and “Bat Test2”.
Resume Factory Setting	Resume Factory Setting
LCD Rotate	LCD display direction switch

4.2.8 Settings

Common settings

The interface of common settings menu is shown in Fig. 4-14, and the interface description is shown in Table 4-17.

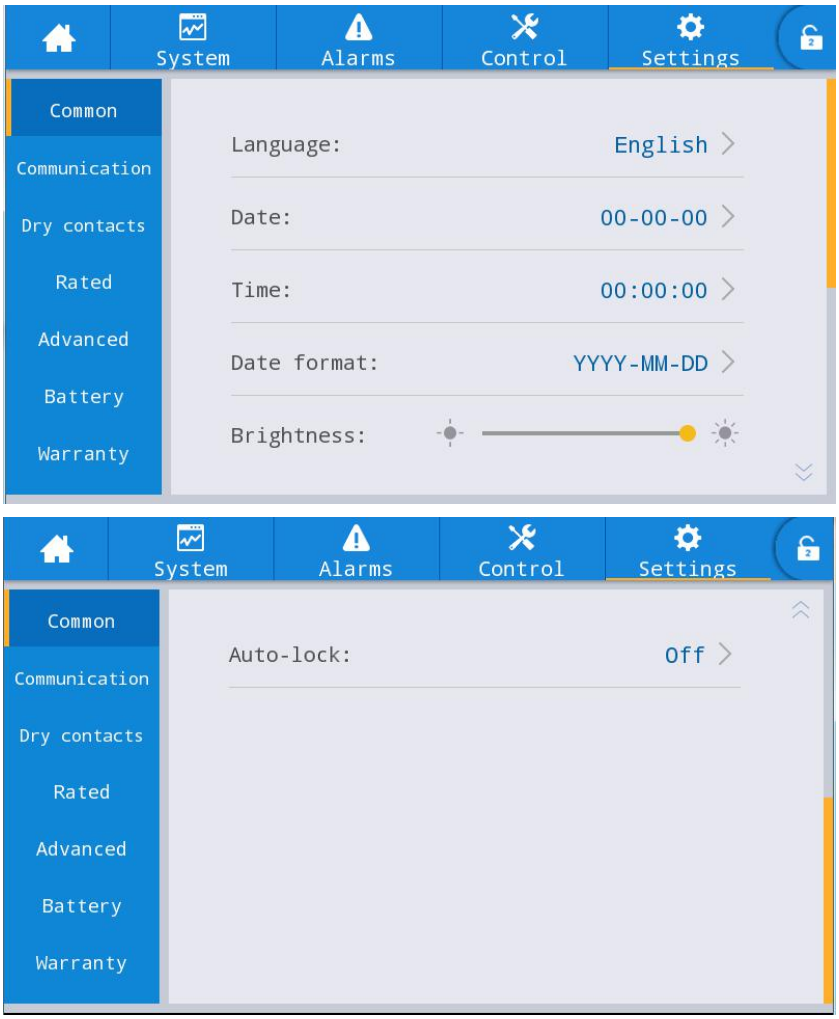


Fig. 4-14 Common setting interface

Table 4-17 Description of common setting interface

Setting item	Default	Options	Description
Language	English	English	Display in English.
YYYY-MM-DD	2016-01-01	2000-01-01~2099-12-31	Set the current date.
Time	00:00:00	00:00:00~23:59:59	Set the current time.
Date format	Y-M-D	Y-M-D, M-D-Y, D-M-Y	Support 3 formats: Y-M-D, M-D-Y, D-M-Y.
Brightness	100%	0% ~ 100%	Adjust backlight brightness by moving the slider.
Auto-lock	5 min	0 ~ 30 min	Set screen time out. 0 is set to keep the screen on.

Communication settings

The interface of the communication setting menu is shown in Fig. 4-15, and the interface description is shown in Table 4-18.

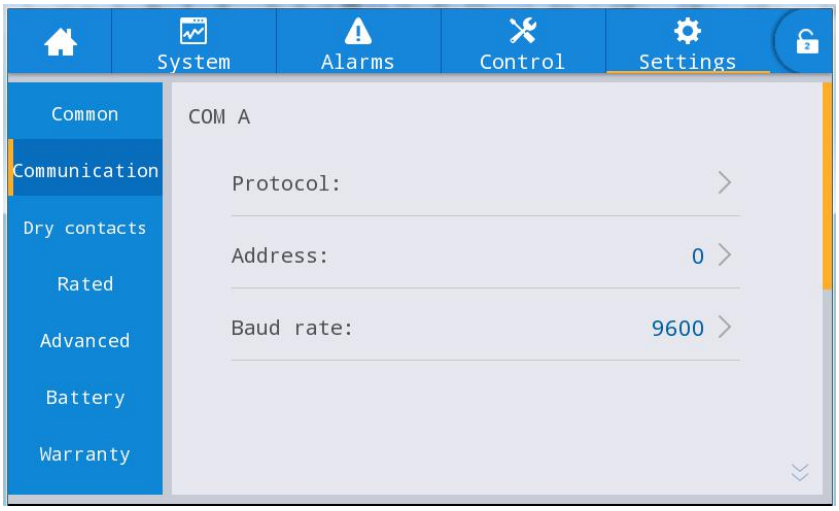


Fig. 4-15 Communication settings interface

Table 4-18 Description of communication settings interface

Setting item	Default	Options	Description
Protocol	MODBUS RTU	MODBUS RTU, EA	Settings such as Protocol, Address and Parity are set for serial ports, including USB interface, RS232 interface and RS485 interface. Users can make the corresponding settings according to the setting requirements of the monitoring software used, but ensure that the setting value in the monitoring software must be consistent with the value in the UPS communication settings.
Address	0	0~ 247	
Baud rate	9600	2400-19200	

Dry contact settings

The interface of dry contact setting menu is shown in Fig. 4-16, and the interface description is shown in Table 4-19.

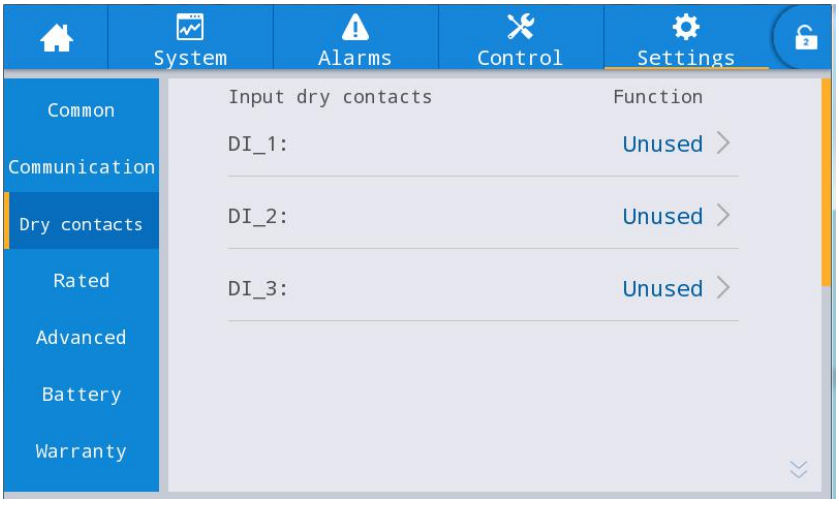


Fig. 4-16 Dry contact setting interface

Table 4-19 Description of dry contact setting interface

INTERFACE	Name	Function
Input Dry Contact DI_1 ~ DI_3	D.G.mode	Connection status of electric generator
	EPO	Emergency power off trigger signal. Only DI_1 can be configured for this function.
	BCB	Connection status of BCB (Battery current breaker). DI_2 and DI_3 are recommend to configured for this function.
	BCB status	BCB contact status, connect with the normally open signal of BCB. DI_2 and DI_3 are recommend to configured for this function.
	INV	Transfer from the bypass to inverter. This dry contact signal takes effect only when the UPS works in bypass mode and the inverter of UPS is standby.
	Bypass	Transfer from the inverter to bypass, if the bypass is normal.
	Fault clear	Fault clear
	Batt over charge	When this input dry contact is triggered, it means that the battery is over charging. The UPS will turn off the charger.
	Low batt.volt.	The battery voltage is low, the ups will get ready to shutdown or recharge.
Output Dry Contact DO_1~ DO_3	Grid Fault	Grid Fault warning.
	Low.Bat.vol	The battery voltage is low.
	Load on bypass	The UPS works in bypass mode.
	Load on INV	The UPS works in normal mode.
	Battery Mode	The UPS works in battery mode.
	General Alarm	General Alarm. This output dry contact will be triggered when the UPS generates one or more alarms.
	Output over load	The inverter of UPS is over load.
	BCB drive	This output dry contact can output a 15V/20mA drive signal for BCB control board when the UPS is discharge to EOD in battery mode. The BCB control board can use this signal to drive battery breaker off.

Rate parameters

The interface of the rate parameters menu is shown in Fig. 4-17, and the interface description is shown in Table 4-20.

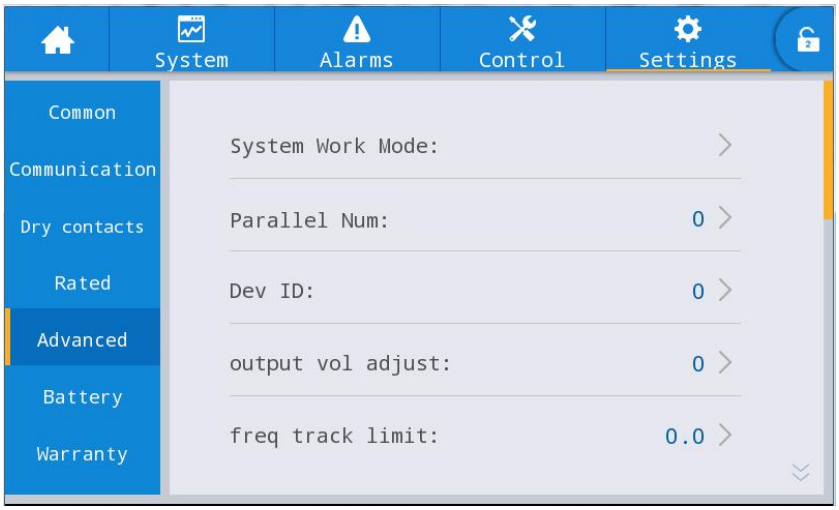
Fig. 4-17 Bypass parameters interface

Table 4-20 Description of bypass parameters interface

Setting item	Default	Options	Description
Rate output freq	50	50/60	Rate output frequence
Rate output voltage	220	100/110/120/127/200/208/220/230/240	Rate output voltage
Rate input freq	50	50/60	Rate input frequence
Rate input voltage	220	100/110/120/127/200/208/220/230/240	Rate input voltage

Advanced parameters

The interface of advanced parameters menu is shown in Fig. 4-18, and the interface description is shown in Table 4-21.



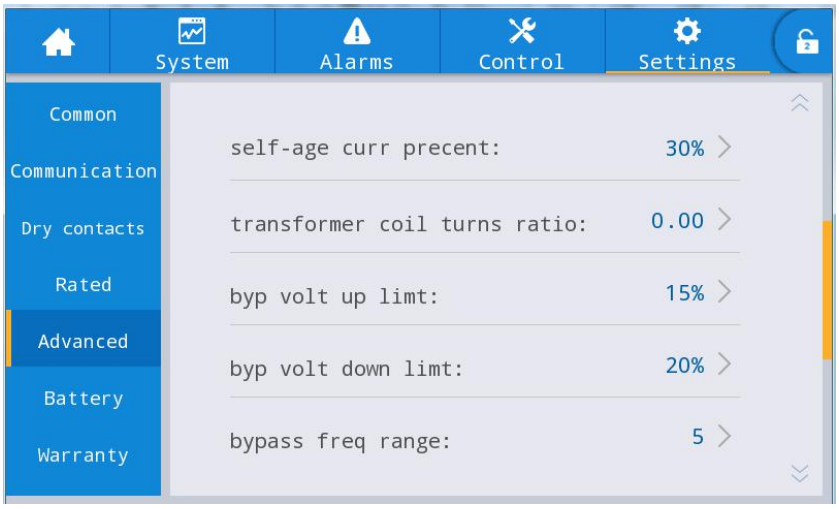


Fig. 4-18 Advanced parameters interface

Table 4-21 Description of advanced parameters interface

Setting item	Default	Options	Description
System Work Mode	Normal	Single/ECO/Self-load/ Parallel mode	Select the corresponding working mode according to user needs. It is normal working mode in general.
Parallel Number	1	1 ~ 4	Set according to the actual parallel numbers of the UPS system installed by the user.
Dev ID	1	1 ~ 16	Set device parallel ID
Output voltage adjust	0	-5.0 ~ 5.0	Fine tune the output voltage according to the customer's field power distribution.
Freq track limit	±3Hz	±0.5Hz ~ ±5Hz	Settable, ±0.5Hz ~ ±5Hz, default ±3Hz
Self-age curr precent (%)	80	30 ~ 100	It is percentage of output current in rated output current in self-aging mode.
Transformer coil turns ratio	1	settable	Set the output transformer coil turns ratio.
Byp volt up limt	+15%	+10%, +15%, +20%, +25%	Upper limit: +10%, +15%, +20%, +25%
Byp volt down limt	-20%	-10%, -15%, -20%, -30%, -40%	Lower limit: -10%, -15%, -20%, -30%, -40%
bypass frq range	±5.0	±1.0/±2.0/±3.0/±4.0/±5.0/± 6.0	Note that the bypass frequency range cannot be less than the ECO frequency range.
Frequency slew rate(Hz/S)	1	0.5-5.0	Frequency slew rate
Output with motor	Off	On/close	Output with motor or no

Battery parameters

The interface of battery parameters menu is shown in Fig. 4-19, and the interface description is shown in Table 4-22.

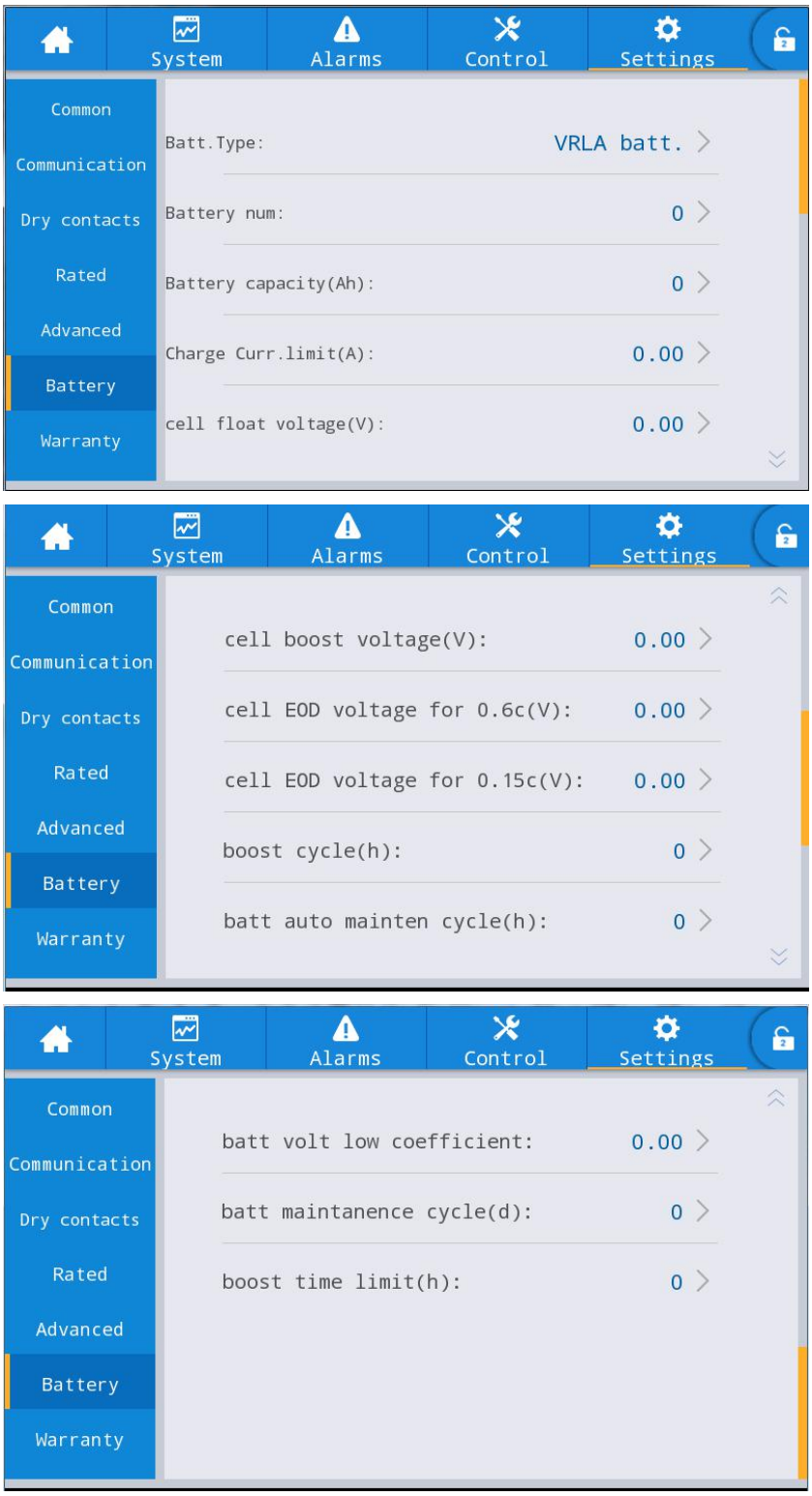


Fig. 4-19Battery parameters interface

Table 4-22 Description of battery parameters interface

Setting item	Default	Options	Description
Batt.Type	VRLA batt.	Lithium/VRLA	Battery type: VRLA battery and Lithium battery, The supported lithium battery type is 3.2 V lithium iron phosphate battery.
Battery number	40	settable	Actual batteries number of UPS system. The effective setting range is 32 ~ 40.

Setting item	Default	Options	Description
Battery capacity (Ah)	25	settable	Single battery capacity connected to the UPS system. This value will affect the residual discharge time value and the maximum charge current.
Charge curr.limit(A)	1	10	When the battery type is set to lead-acid battery, the actual charge current also be limited by “Battery capacity” value. The maximum charge current will not exceed to 0.2 times the “Battery capacity”.
Boost time limit	2	1-48	Set according to the needs.
Cell float voltage	2.25	2.10 ~ 2.35	Charging voltage of single cells under floating charge condition.
Cell boost voltage	2.25	2.20~2.45	Charging voltage of single cells under boost charge condition.
Cell EOD voltage for 0.6C	1.6	1.6~1.85	Set according to the needs.
Cell EOD voltage for 0.15C	1.8	1.65~1.9	Set according to the needs.
Boost cycle	1440	1~3000h	Set according to the needs.
Batt auto mainten cycle	2880	720~30000 h	This test will lead to the battery being partly discharged to activate battery until battery voltage is low. Bypass must be in normal condition, the battery capacity should be above 25%.
Batt volt low coefficent	1.1	1.05~1.25	Set according to the needs.
Batt mainten cycle	3000	0-3000d	Set according to the actual battery replacement time for the users.

Warranty parameters

The interface of warranty parameters menu is shown in Fig. 4-20, and the interface description is shown in Table 4-23.

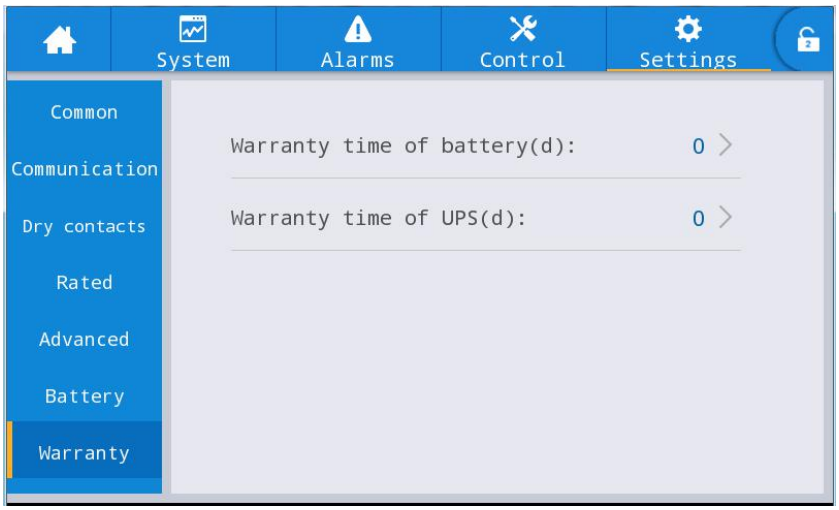


Fig. 4-20 warranty parameters interface

Table 4-23 Description of warranty parameters interface

Setting item	Default	Options	Description
Warranty time of battery (d)	395	settable	The time when the battery is out of warranty
Warranty time of UPS(d)	1125	settable	The time when the UPS is out of warranty

4.3 Event List

The following Table4.7 gives events of UPS History Log

Table 4.7 List of History Log

String Sequence	LCD Display	Explanation
230	Battery voltage low (DOD)	Battery voltage is low
231	Battery end of discharge (EOD)	Battery End Of Discharge
232	Bypass fail	Bypass Fail
233	Fan fail	Fan fail
245	UPS maintenance breaker close	Maintenance CB is Closed
336	System board and inverter module CAN communication abnormal	System board and inverter module CAN communication abnormal
337	Same address of multiple inverter	address of multiple inverter is same
352	CAN communication abnormal between system board	CAN communication abnormal between system board
366	Frequency beyond tracing range	Bypass Frequency Over Track Range
368	Bypass phase over voltage	Bypass voltage abnormal
369	Bypass phase under voltage	Bypass voltage abnormal
370	Bypass over frequency	Bypass frequency abnormal
371	Bypass under frequency	Bypass frequency abnormal
372	Bypass phase sequence error	Bypass voltage Sequence is reverse
373	Bypass phase loss	Utility (Grid) Abnormal
374	Bypass phase volt imbalance	Bypass voltage is not balance
375	Bypass voltage rapid inspection abnormal	Bypass voltage Sequence is reverse
376	Bypass overcurrent	Bypass overcurrent
377	ECO bypass overvoltage	Bypass voltage abnormal in ECO model
378	ECO bypass undervoltage rapidly	Bypass voltage abnormal in ECO model
379	ECO bypass overfrequence	Bypass frequence abnormal in ECO model
380	ECO bypass underfrequence	Bypass frequence abnormal in ECO model
381	ECO bypass undervoltage rapidly	Bypass under voltage rapidly in ECO model
382	ECO bypass phase sequence error	Bypass phase sequence error in ECO model
383	ECO bypass neutral loss	Bypass neutral loss in ECO model
396	Bypass radiator overtemperature	Bypass radiator over temperature
418	Battery maintenance reminder	Battery maintenance reminder
419	Battery discharging time ended	Battery discharging until time ended
420	Battery discharge voltage ended	Battery End Of Discharge
421	Battery over temperature	Battery over temperature
422	Battery under temperature	Battery under temperature
423	Battery self check fail	Battery Test fails
451	Bypass abnormal	Bypass voltage or frequence abnormal
452	Output abnormal	Output voltage or frequence abnormal
464	Input over voltage	Input voltage abnormal
465	Input under voltage	Input voltage abnormal
466	Input over frequency	Input frequency abnormal
467	Input under frequency	Input frequency abnormal
468	Input phase sequence error	Input phase sequence is reverse

String Sequence	LCD Display	Explanation
469	Input phase loss	Input phase loss
470	Input voltage imbalance	Input voltage is not balance
471	input voltage rapid inspection abnormal	Output shorted Circuit
472	Input over current	Input over current
473	Input current imbalance	Input current is not balance
474	Input null wire loss	Input Grid Neutral Lost
475	Input fuse failure	Input fuse failure
476	Input power limited	Input power limited
477	Frequent switching between grid and battery	Transfer times (from grid to battery) in 1 hour exceed the limit.
478	Input overload	Input overload
479	Reserved	
480	Battery disconnect	Battery cables Disconnected.
481	Battery overtemperature	Battery overtemperature
482	Battery self check fail	Battery Test fails
483	Battery overvoltage	Battery overvoltage
484	Battery undervoltage DOD	Battery voltage is lower than "low voltage warming" point when discharging
485	Battery undervoltage EOD	Battery voltage is lower than "end of discharge" point when discharging
486	Battery over-charging	Battery over-charging
487	Battery temperature low	Battery temperature low
488	Battery hardware overvoltage failure	Battery hardware overvoltage failure
489	Battery charging overcurrent	Battery charging overcurrent
490	Battery discharging overcurrent	Battery discharging overcurrent
491	Open circuit of charger switch	Charger relay is open
492	Charger switch short circuit	Charger relay short circuit
493	Battery discharge overtime	Battery discharge overtime
494	Reverse battery connection	Battery pole (positive and negative)are reverse
495	battery neutral Lost	battery neutral Lost
521	PFC soft start fail	PFC soft start fail
528	Rectifier IGBT module over temperature	Rectifier over temperature
529	Rectifier E2PROM read-write failure	Rectifier E2PROM read-write failure
546	Charger soft start fail	Charger soft start fail
547	Charger over voltage	Charger fail
548	Charger hardware overvoltage failure	Charger fail
549	Charger under-voltage	Charger fail
568	Lithium battery charge primary protection	The charge primary protection of Lithium battery BMS system has been triggered

String Sequence	LCD Display	Explanation
569	Lithium battery discharge primary protection	The discharge primary protection of Lithium battery BMS system has been triggered
570	Lithium battery charge secondary protection	The charge secondary protection of Lithium battery BMS system has been triggered
571	Lithium battery discharge secondary protection	The discharge secondary protection of Lithium battery BMS system has been triggered
572	Lithium battery charge tertiary protection	The charge tertiary protection of Lithium battery BMS system has been triggered
573	Lithium battery discharge tertiary protection	The discharge tertiary protection of Lithium battery BMS system has been triggered
574	Lithium battery charge warning	Lithium battery charge abnormal
575	Lithium battery discharge warning	Lithium battery discharge abnormal
576	Input abnormal	Input abnormal
592	Bus-bar short circuit	DC bus shorted Circuit
593	Bus-bar abnormal	Bus-bar abnormal
594	Bus-bar overvoltage	DC bus over Voltage
595	Bus-bar under voltage	DC bus under Voltage
596	Bus-bar voltage imbalance	DC bus voltage imbalance
608	Inverter overvoltage	Inverter overvoltage
609	Inverter under voltage	Inverter under voltage
610	Inverter voltage imbalance	Inverter voltage imbalance
611	DC component exceeded	DC component exceeded
612	Inverter module 105% overload	Inverter Over Load 105%Timeout
613	Inverter module 110% overload	Inverter Over Load 110%Timeout
614	Inverter module 125% overload	Inverter Over Load 125%Timeout
615	Inverter module 150% overload	Inverter Over Load 150%Timeout
616	Short circuit of inverter output	Output shorted Circuit
617	Inverter module overload alarm	Inverter Over load
626	BYP 125% overload	BYP Over Load 125%Timeout
627	BYP 135% overload	BYP Over Load 135%Timeout
628	BYP 150% overload	BYP Over Load 150%Timeout
629	BYP 200% overload	BYP Over Load 200%Timeout
630	Bypass overload alarm	Bypass Over load
640	Inverter soft start fail	Inverter soft start fail
641	Phase lock fail	Phase lock fail
642	Frequent switching between bypass and inverter	Transfer times (from inverter to bypass) in 1 hour exceed the limit.
643	Inverter soft start times reached	Inverter soft start times reached
644	Parallel operation current imbalance	Parallel operation current imbalance
645	Capture failure	Capture failure
646	Load strike	Load strike
647	Adjacent UPS request switching to bypass	Adjacent UPS request switching to bypass

String Sequence	LCD Display	Explanation
648	Parallel operation wire abnormal	Parallel cable in error
649	Driver connection failure	Driver connection failure
650	Synchronous square wave abnormal	Synchronous square wave abnormal
651	Inverter self check failure	Inverter self check failure
656	Inverter radiator over temperature	Inverter Over Temperature
657	Inverter E2PROM operation failure	Inverter E2PROM operation failure
658	Inverter DSP and monitor communication failure	Inverter DSP and monitor communication failure
663	Emergency shutdown	Emergency Power Off
672	Inverter relay open circuit	Inverter relay open circuit
673	Inverter relay short circuit	Inverter relay short circuit
676	SPI communication failure between rectifier and inverter	SPI communication failure between rectifier and inverter
688	Output overvoltage	Output overvoltage
689	Output undervoltage	Output undervoltage
704	inverter fast check fail	inverter fast check fail
705	inverter Negative power fault	inverter Negative power fault

5 Operations

5.1 UPS Start-up

5.1.1 Start from 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 and the UPS output is not shorted..

2.Close the output breaker and input breaker, and then the UPS starts initializing. If the system has dual inputs, close both of the input breaker and bypass breaker.

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

4.Notice the energy bar in the home page, and pay attention to the LED indicators.

5.After 30S, Bypass static switch closes, and the output is powered by bypass. Then the inverter is starting up. If the parameter “Input with transformer” is enable, the bypass will not work during starting up.

6.The UPS transfers from the bypass to inverter after the inverter goes normal.

7.The UPS is in Normal Mode. Close the battery circuit breakers and the UPS starts charging the battery.

8.The starting up done.

Note

- When the system starts, the stored setting will be loaded.
- Users can browse all incidents during the process of the starting up by checking the history record Log.

5.1.2 Start from Battery

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

1.Confirm the battery is correctly connected.

2.close the external battery breakers, and press the red button (located at the communication interface in front of UPS) after 60s. The UPS will be powered by the battery and the LCD enters the home page.

3.After that, press the button for cold start on the LCD, as shown in Fig. 5-1. The UPS will start up and the system transfers to battery mode in 30S.

4.Close the external output power supply isolation to supply the load, and the system is working on battery model.

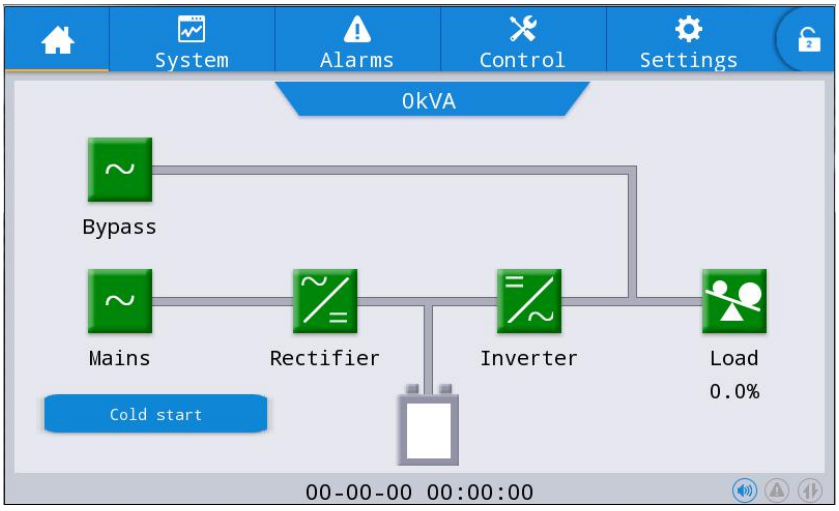


Fig. 5-1 The cold start button in LCD

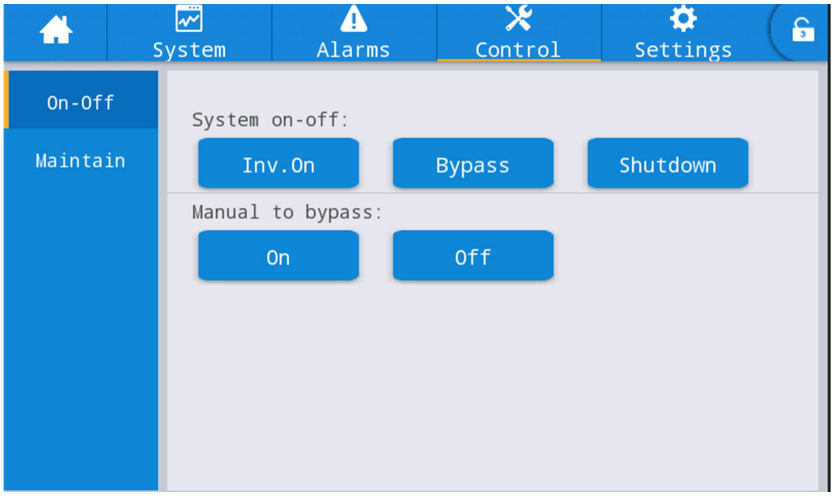
5.2 Procedure for Switching between Operation Modes

5.2.1 Switching the UPS into Battery Mode from Normal Mode

The UPS transfers to Battery model immediately after input breaker disconnects from the utility or the input AC power is abnormal.

5.2.2 Switching the UPS into Bypass Mode from Normal Mode

Follow the path by selecting the icon of "ON" to transfer the system to Bypass Mode, as shown in Fig. 5-2.



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

5.2.3 Switching the UPS into Normal Mode from Bypass Mode

Follow the path by selecting the icon of "Off", the system transfer to Normal Mode.

Note

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

5.2.4 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.

1.Transfer the UPS into Bypass mode following section 5.2.2.

2.Open the battery breaker and close the maintenance bypass breaker. Then the load will be powered through maintenance bypass and static bypass.

3.The load is powered through maintenance bypass.

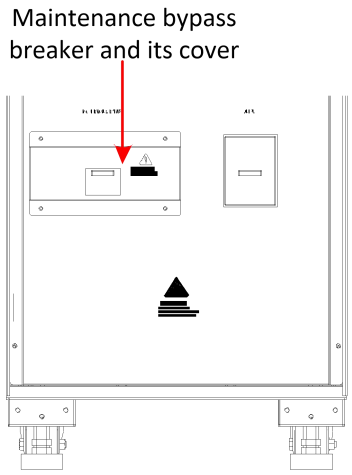


Fig.5-3 The cover of maintenance bypass breaker

	WARMING
	1>Once the cover on the maintenance bypass breaker is removed, the system will transfer to bypass mode automatically. 2>Before making this operation, confirm the messages on LCD display to be sure that bypass supply is regular and the inverter is synchronous with it, so as not to risk a short interruption in powering the load.

	DANGER
	1>Even with the LCD turned off, the terminals of input and output may be still energized . 2>If you need to maintain the power module, wait for 10 minutes to let the DC bus capacitor fully discharge before removing the cover.

5.2.5 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, close the bypass breaker and the bypass static switch will be turned on in 30S after the LCD touch screen goes on, the bypass energy bar is ok and the load is powered through maintenance bypass and static bypass.

2.Turn off the maintenance bypass switch and fix the protection cover, and then the load is powered through bypass. The rectifier starts followed by the inverter.

3.After 60S, the system transfers to Normal mode.

	WARMING
	The system will stay on bypass mode until the cover of maintenance bypass breaker is fixed.

5.3 Battery Maintenance

If the battery is not discharged for a long time, it is necessary to test the condition of the battery.

Enter the menu “maintain”，as is shown in Fig.5-2 and select the icon “Bat Test 2”，the system transfers into the Battery mode for discharging. The system will discharge the batteries until the alarm of “Battery low voltage” is given. Users can stop the discharging by the “Stop Bat Test” icon.

With the icon of “Bat Test 1”, batteries will be discharged for about 30 seconds, and then re-transfer to normal mode.

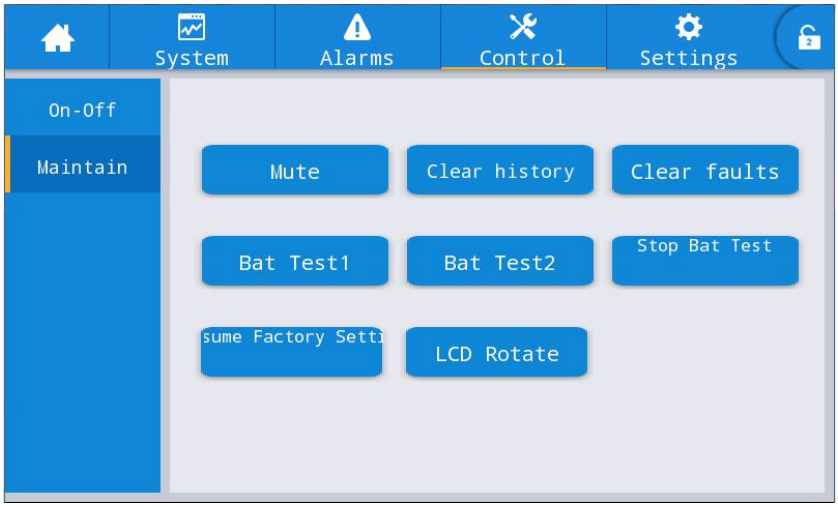


Fig. 5-4 Battery maintenance page

5.4 EPO

The EPO button located on the home page (see Fig.5-3) is designed to switch off the UPS in emergency conditions (e.g., fire, flood, etc.).To achieve this, just press the EPO button, and the system will turn off the rectifier, inverter and stop powering the load immediately (including the inverter and bypass output), and the battery stops charging or discharging.

If the input utility is present, the UPS control circuit will remain active; however, the output will be turned off. To completely isolate the UPS, users need to open the external mains input supply to the UPS

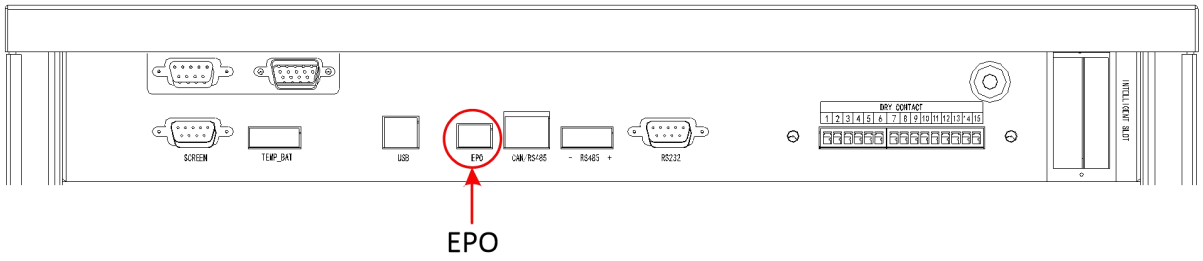


Fig. 5-5 EPO port in communication interface

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

6 Maintenance

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

6.1 Precautions

1.Only certified engineers are authorized to maintain the UPS.

2.The components or PCBs should be disassembled from top to bottom, so as to prevent any inclination from high gravity centre of the cabinet.

3.To ensure the safety before maintaining, measure the voltage between operating parts and the earth with multimeter to ensure the voltage is lower than hazardous voltage, i.e. DC voltage is lower than 60Vdc, and AC maximum voltage is lower than 42.4Vac.

4.Wait 10 minutes before opening the cover of the power module or the bypass after pulling out from the Cabinet.

6.2 Instruction for Maintaining UPS

For the maintenance of the UPS, please refer to chapter 5.2.4 for the instruction to transfer to maintenance bypass mode. After maintenance, re-transfer to normal mode according to chapter 5.2.5.

6.3 Instruction for Maintaining Battery string

For the Lead-Acid maintenance free battery, when maintenance the battery according to requirements, battery life can be prolonged. The battery life is mainly determined by the following factors:

1. Installation. The battery should be placed in dry and cool place with good ventilation. Avoid direct sunlight and keep away from heat source. When installing, ensure the correct connection to the batteries with same specification.

2. Temperature. The most suitable storage temperature is 20 ºC to 25ºC. The battery life will be shortened if the battery is used under high temperature or in deep discharging status. Refer to product manual for details.

3. Charging/discharging current. The best charging current for the lead-acid battery is 0.1C .The maximum current for the battery can be 0.3C.The suggested discharging current is 0.05C-3C.

4. Charging voltage. In most of the time, the battery is in standby state. When the utility is normal, the system will charge the battery in boost mode (Constant voltage with maximum limited) to full and then transfers to the state of float charge.

5. Discharge depth. Avoid deep discharging; which will greatly reduces the life time of the battery. When the UPS runs in battery mode with light load or no load for a long time, it will cause the battery to deep discharge.

6. Check periodically. Observe if any abnormality of the battery , measure if the voltage of each battery are in balance. Discharge the battery periodically.

	**WARMING**
	Daily inspection is very important! Check and confirm the battery connection is tightened regularly, and make sure there is no abnormal heat generated from the battery. If a battery has leakage or is damaged, it must be replaced, stored in a container resistant to sulfuric acid and disposed of in accordance with local regulations.

The waste lead-acid battery is a kind of hazardous waste and is one of the major contaminants controlled by government.

Therefore, its storage, transportation, use and disposal must comply with the national or local regulations and laws about the disposal of hazardous waste and waste batteries or other standards.

According to the national laws, the waste lead-acid battery should be recycled and reused, and it is prohibited to dispose of the batteries in other ways except recycling. Throwing away the waste lead-acid batteries at will or other improper disposal methods will cause severe environment pollution, and the person who does this will bear the corresponding legal responsibilities.

7 Product Specification

This chapter provides the specifications of the product, including environmental characteristics mechanical characteristics and electrical characteristics.

7.1 Applicable Standards

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

Table 7.1 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).

	WARMING
	This product conforms the EMC requirements for UPS in Category C3 and it is not suitable for medical equipment.

7.2 Environmental Characteristics

Table 7.2 Environmental Characteristics

Item	Unit	Requirements
Acoustic noise level at 1 meter	dB	<70dB
Altitude of Operation	m	≤1000,load derated 1% per 100m from 1000m and 2000m
Relative Humidity	%	0-95,non condensing
Operating Temperature	℃	0-40,Battery life is halved for every 10°C increase above 20°C
UPS Storage Temperature	℃	-40-70

7.3 Mechanical Characteristic

Table 7.3 Mechanical Characteristics for Cabinet

Model	Unit	80kVA	100kVA	120kVA	160kVA	200kVA
Dimension W×D×H	mm	360x800x1200	360x850x1200		440x850x1250	
Weight	kg	152	156	160	194	200
Color	N/A	BLACK,RAL 7021				
Protection Level IEC（60529）	N/A	IP20				

7.4 Electrical Characteristics

Model	80kVA	100kVA	120kVA	160kVA	200kVA
Power Rating	80kVA/80kW	100kVA/100kW	120kVA/120kW	160kVA/160kW	200kVA/200kW
Input Rectifier AC input Mains					
Phase	3 Phases + Neutral + Ground				
Rated Input Voltage	380/400/415 (three-phase and sharing neutral with the bypass input)				
Rated Frequency	50/60Hz				
Input Voltage Range	304~478Vac (Line-Line),full load 228V~304Vac (Line-Line),load decrease linearly according to the min phase voltage				
Input Frequency Range	40Hz～70Hz				
Input Power Factor	>0.99				
Input Current THDi	<3%(full linear load)				
Bypass Mains Input					
Rated Bypass Voltage	380/400/415Vac (Line-Line)				
Rated Frequency	50/60Hz				
Bypass Voltage Range	Selectable, default -20%～+15% Up limited: +10%, +15%, +20%, +25% Down limited: -10%, -15%, -20%, -30%, -40%				
Bypass Frequency Range	Selectable, ±1Hz, ±3Hz, ±5Hz				
Bypass Overload	125% long term operation 125%~130% 10min 130%~150% 1min 150%~400% 1s >400% , < 200ms				
Current rating of neutral cable	1.7×In				
Switch time (between bypass and inverter)	Synchronized transfer: 0ms				
Inverter Output					
Rated Inverter Voltage	380/400/415Vac (Line-Line)				
Rated Frequency	50/60Hz				
Output Power Factor	1				
Voltage precision	±1%(Linear Load)				
Frequency precision	0.1Hz				
Synchronized Range	Settable, ±0.5Hz ~ ±5Hz, default ±3Hz				
Synchronized Slew Rate	Settable, 0.5Hz/S ~ 3Hz/S, default 0.5Hz/S				
Transient Response	<5% for step load (20% - 80% -20%)				
Transient recovery	< 20ms for step load (20% - 100% -20%)				
Output Voltage THDu	<1% (full linear Load) <3% (full non-linear load according to IEC/EN62040-3)				
Inverter Overload	<110%, 60min; 110%~125%,10min; 125%~150%,1min; >150%,200ms				
Battery					
Long run model battery voltage	Rated：±240V default, ±120V～±240V				
Float charge voltage	2.25V/cell(selectable from 2.2V/cell～2.35V/cell) Constant current and floated voltage charge mode				

Model	80kVA	100kVA	120kVA	160kVA	200kVA
Equalized charge voltage	2.37V/cell(selectable from : 2.30V/cell~2.45V/cell) Floated current and constant voltage charge mode				
Temperature compensation	3.0 mV/℃/cl (selectable:0~5.0)				
Charger Voltage precision	≤1%				
Ripple current	≤5%				
Final discharging voltage EOD Voltage （Acid battery）	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 Max Current	30A	40A	40A	60A	60A
System					
Display	LCD+LED(5 inch touch screen)				
Normal mode Efficiency (dual conversion)	>95%				
Interface	Standard:RS232, RS485, USB Option: Programmable dry contact, SNMP, Parallel kit				

8 Software Download & Installation

Please follow steps below to download and install monitoring software :

1. Go to the website https://www.idbkmonitor.com.
2. Click UPSSmartView software icon and then choose your required OS to download the software.
3. Follow the on-screen instructions to install the software.