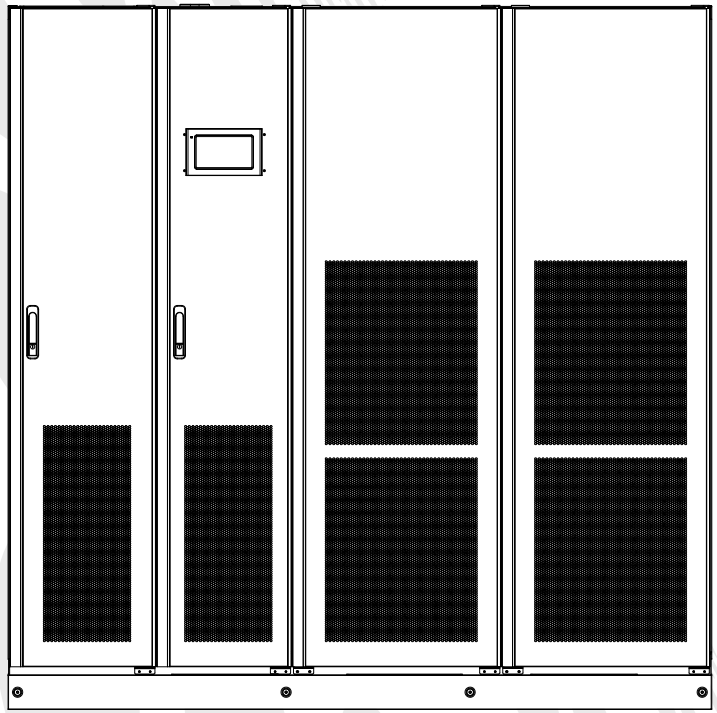
User Manual

On-Line UPS

Three phase

200 kVA-1200 kVA



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1 Safety Information

1. 1 General Information

- Before installing and using this product, please read Safety Information carefully to ensure correct and safe installation and use, and keep this manual properly.
- UPS must be installed, adjusted 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 hereon will excluded from the warranty scope.
- In no event is it allowed to dismantle or change the structure or components of the equipment without the manufacturer's permission, otherwise the damage to UPS caused hereon will excluded from the warranty scope.
- Local laws and regulations should be observed during use of the equipment. The safety instructions provided herein are only supplementary to local safety codes.
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1. 2 UPS Safety

- Before installing the equipment, wear insulating protective clothing and insulating appliances, and remove easily conductive objects such as jewelry and watches to avoid electric shock or burns.
- The service environment has a certain impact on the service life and reliability of UPS, and the use and storage of equipment must follow the requirements set in the manual.
- Avoid using the equipment in the environment with direct sunlight, rain or dust containing electric charge.
- During storage of UPS, keep a safe distance around it to ensure ventilation. Do not block the air vent while the system is running.
- Do not allow liquids or other foreign objects into the UPS cabinet or case.
- Before using UPS, check whether the local power characteristics are consistent with the information on the product nameplate.
- UPS is a large leakage current equipment, and it is not recommended to conFig. an air switch with leakage protection function.
- Before wiring UPS, please further confirm whether the mains input power supply, bypass power supply, battery switch and mains power distribution switch are disconnected.
- When it is required to move or rewire UPS, AC input power, battery and other input must be disconnected, and the corresponding operation should be carried out after UPS is fully powered down (more than 9min), otherwise there may still be power on the port and inside of the device, which may cause risk of electric shock.
- Before powering on, please make sure the equipment is properly grounded, and check the connection and battery polarity to make sure they are correct. In order to ensure personal safety and the normal use of UPS, UPS should be reliably grounded before use.
- UPS can be used for resistance-capacitance (such as computer), resistance-resistance and micro-inductive load, and not for half-wave rectifying load.
- When the equipment is cleaned, please wipe it with dry articles. Do not use water to clean the internal and external electrical components of the cabinet under any circumstances.

- Check immediately after the maintenance operation to ensure that no tools or other items are left in the cabinet.
- In case of fire, please use the dry powder extinguisher correctly. It is possible to cause the risk of electric shock if a liquid fire extinguisher is used.
- Do not close the switch until the UPS installation is complete. Do not power on UPS without the permission of an authorized engineer.

1. 3 Battery Safety

- The battery can only be installed and maintained by personnel with battery expertise.
- The battery has electric shock hazard and short circuit current hazard. In order to avoid safety accidents, when installing or replacing the battery, please pay attention to the following matters: do not wear jewelry, watch and other conductive objects; use special insulation tools; use facial protection; wear protective insulating clothing; do not invert or tilt the battery; and keep the battery input switch disconnected.
- The installation environment of the battery must be far away from the hot area. It is not allowed to use or keep the battery near the fire source. The battery or battery pack cannot be disposed by fire, otherwise it possible to cause explosion and personal injury.
- The battery life decreases with the increase of ambient temperature. The batteries should be installed and stored in cool and dry environment.
- Regular battery replacement can ensure that the UPS works properly and can ensure adequate backup time.
- Check the screws of battery connection parts regularly to make sure they are tight. The loosening must be tightened immediately.
- Please do not short the positive and negative electrode of the battery, otherwise it is possible to cause electric shock or fire.
- Do not touch the battery terminals. If the battery circuit is not isolated from the input voltage circuit, it is possible to cause high voltage hazard between the battery terminal and the earth.
- Do not open or damage the battery, otherwise it is possible to cause the short circuit and leakage of the battery. Battery electrolyte may cause damage to the skin and eyes.

1. 4 Symbol Descriptions

The following symbols may be used in this manual, which have the following meanings.

Symbol	Descriptions
 DANGER	Used to warn of urgent dangerous situations. If not avoided, it is possible to result in death or serious personal injury.
 WARNING	Used to warn of potentially dangerous situations. If not avoided, it is possible to result in a certain degree of personal injury.
 CAUTION	Used to provide the safety warning information of the equipment or environment. If not avoided, it is possible to cause equipment damage, data loss, equipment performance degradation or other unpredictable results.
 NOTE	Used to elaborate further what is being described, highlight important/key information, etc.

2 Product Overview

2. 1 Product Description

This series of UPS is our high-end online UPS power supply products, which can provide continuous three-phase alternating current, and solve the users' 9 major power supply problems. The whole equipment adopts modular design, and is easy to upgrade, expand and maintain. This series of products have excellent electrical performance, high system reliability, perfect software and firmware protection functions, and can adapt to different power grid environment to provide safe and reliable power supply guarantee for various loads.

2. 2 Model Description

This manual mainly involves the following product models:
200 kVA/250 kVA/300 kVA/400 kVA/500 kVA/600 kVA/750 kVA/900 kVA/1000 kVA, 1200 kVA. This series of equipment is divided into standard model and full-equipped model, where 200 kVA/250 kVA/300 kVA models are full-equipped models, 400 kVA/500 kVA/600 kVA and higher power models include standard models and full-equipped models. The full-equipped model includes a main switch, a bypass switch, an output switch and a maintenance bypass switch. UPS model description is shown in Table 2-1.

Table 2-1 Model description of UPS

Model	**Configuration**
200 kVA	Full-equipped
250 kVA	Full-equipped
300 kVA	Full-equipped
400 kVA	Standard and full-equipped
500 kVA	Standard and full-equipped
600 kVA	Standard and full-equipped
750 kVA	Standard and full-equipped
900 kVA	Standard and full-equipped
1000 kVA	Standard and full-equipped
1200 kVA	Standard and full-equipped

2. 3 Working Principles

2. 3. 1 Functional Block Diagram

This series of UPS adopts online double transformation design, based on DSP digital control, provides the customers with high efficiency, high power density power supply guarantee. Its functional block diagram is shown in Fig. 2-1.

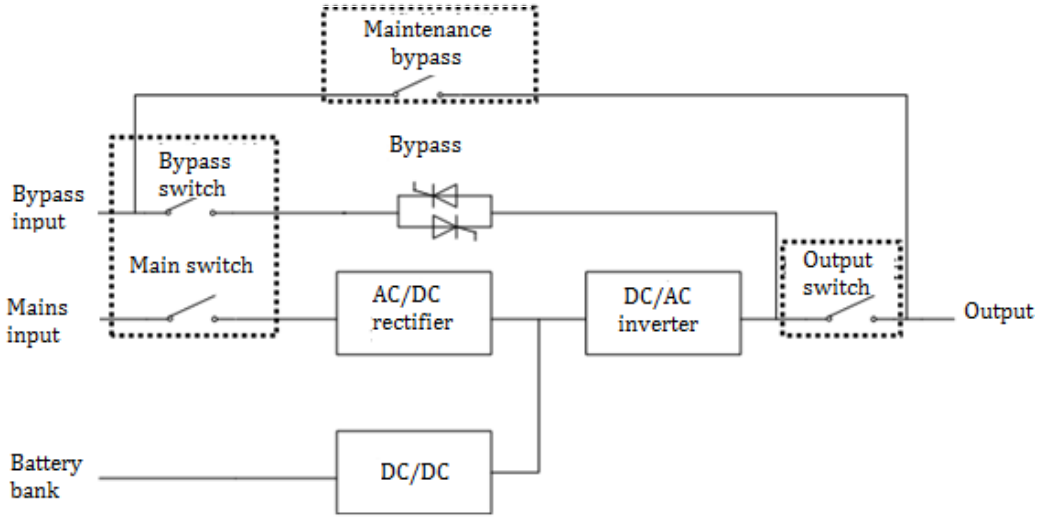


Fig. 2-1. Functional block diagram

Note:

The functional block diagram shows the full-equipped model, while the standard matched model has no components shown in the dotted line (the components shown in dotted line includes: maintenance bypass switch, main switch, bypass switch and output switch).

2. 3. 2 Operation Modes

Normal mode

The UPS rectifier is supplied with AC power by the mains, and the inverter is supplied with DC power by the rectifier, which provides continuous and uninterrupted AC power for the load. Meanwhile, the rectifier supplies a uniform charging current or floating charging voltage to the battery. The schematic diagram of normal mode is shown in Fig. 2-2.

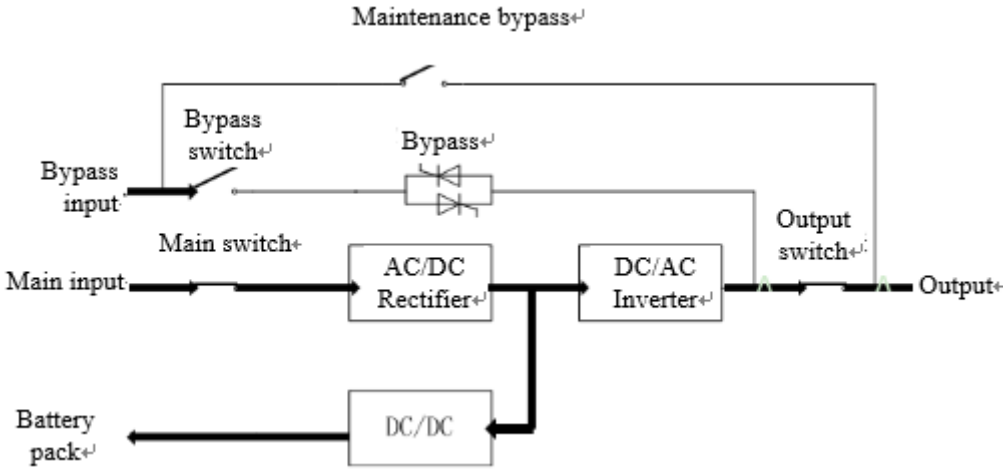


Fig. 2-2 Schematic diagram of normal mode

Bypass mode

In the inverter power supply mode, if the inverter fails, after the overload time of the inverter or the bypass is manually switched, the static switch will switch the power supply of the load from the inverter power supply to the static bypass power supply without interruption of the power supply of the load. The operating principle of the bypass mode is shown in Fig. 2-3.

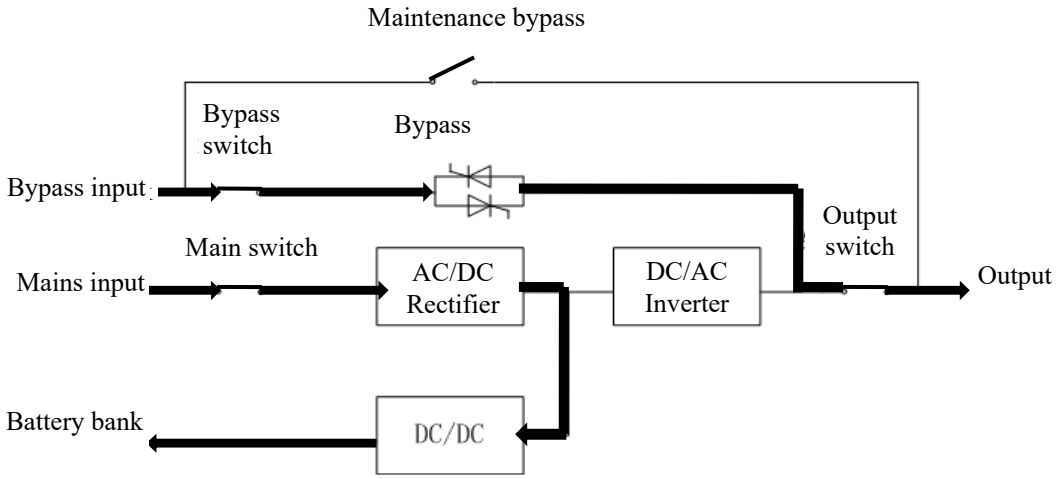


Fig. 2-3 Schematic diagram of bypass mode

Battery mode

The battery mode refers to the operation mode where the battery provides backup power to the load through the inverter. When the mains power fails, the system automatically operates in the battery mode, and the battery DC voltage is converted into pure and stable sinusoidal AC power supply for the load by the inverter. After the mains power supply is restored, the system will automatically switch back to the normal mode without any manual intervention, and interruption of the power supply for the load. If the mains is not restored after the battery backup time, the system will automatically switch to bypass mode without interruption.

The operating principle of the battery mode is shown in Fig. 2-4.

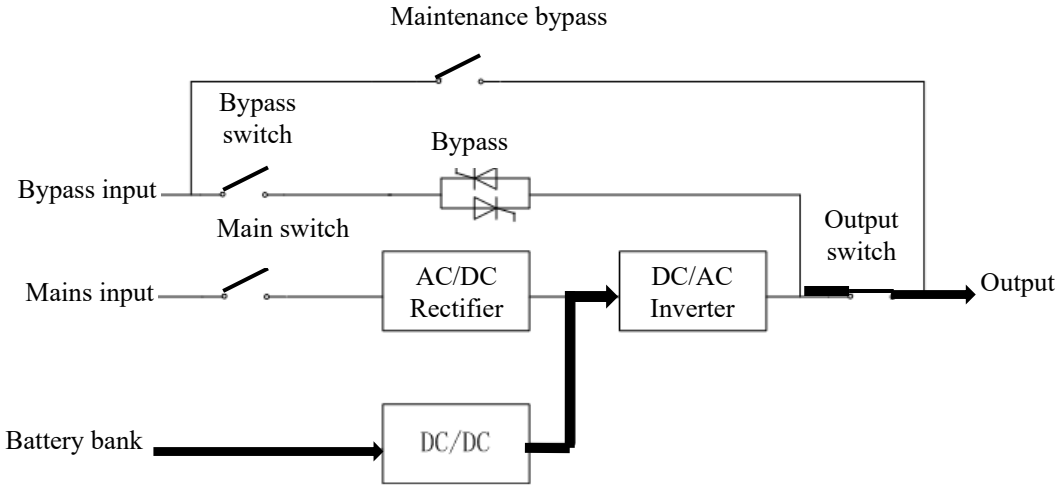


Fig. 2-4 Schematic diagram of battery mode

Maintenance bypass mode

The maintenance bypass mode refers to the mode in which the power is supplied to the load through the maintenance switch. If it is required to maintain or repair UPS after disconnection of the power supply, the maintenance mode may be used according to the operation steps. When UPS is working in the maintenance

bypass mode, the UPS can be completely powered down, and the PCBA board and dual-conversion power devices are not live. The operating principle of maintenance bypass mode is shown in Fig. 2-5.

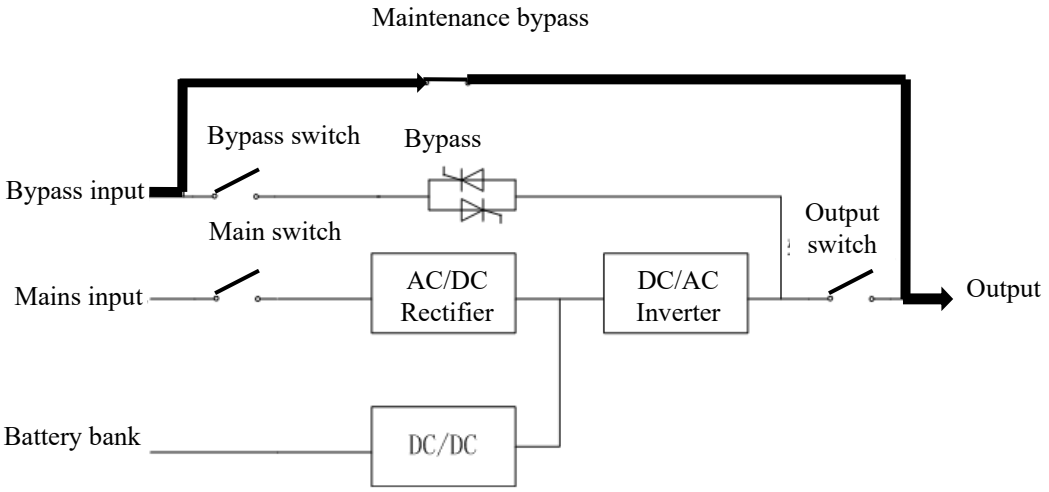


Fig. 2-5 Schematic diagram of maintenance bypass mode

ECO mode

ECO mode is the economic operation mode of UPS, which can be set through LCD interface. In ECO mode, when the bypass range is within the working range of ECO, the power is supplied for the load by the bypass and the inverter is in standby state. When the bypass range exceeds the ECO working range, the power supply will be switched for the load from bypass power supply to inverter power supply. ECO mode has higher system efficiency. The operating principle of ECO mode is shown in Fig. 2-6.

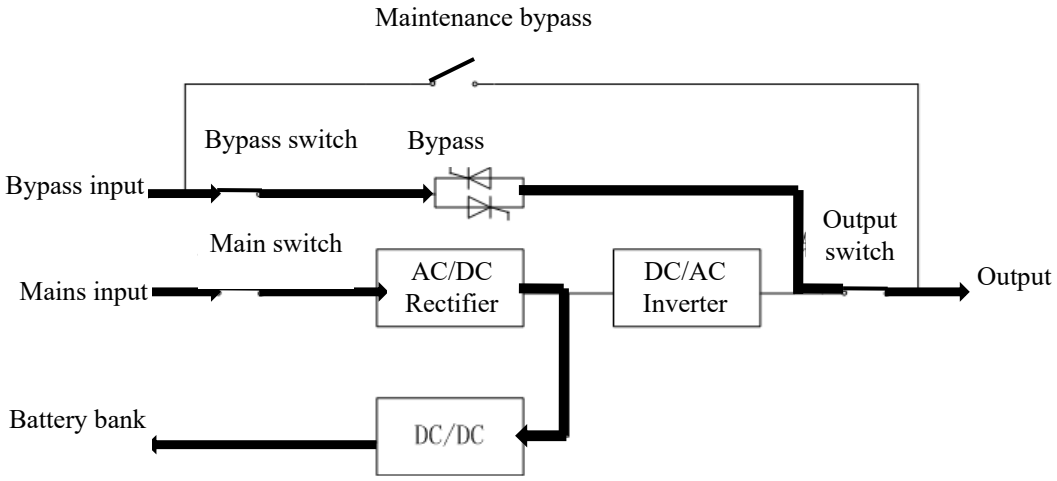


Fig. 2-6 Schematic diagram of ECO mode

Mains-battery combination mode

When UPS is in normal operation, the load power exceeds the supply capacity of the mains for a short time, and the battery will invert with the mains to supply the load.

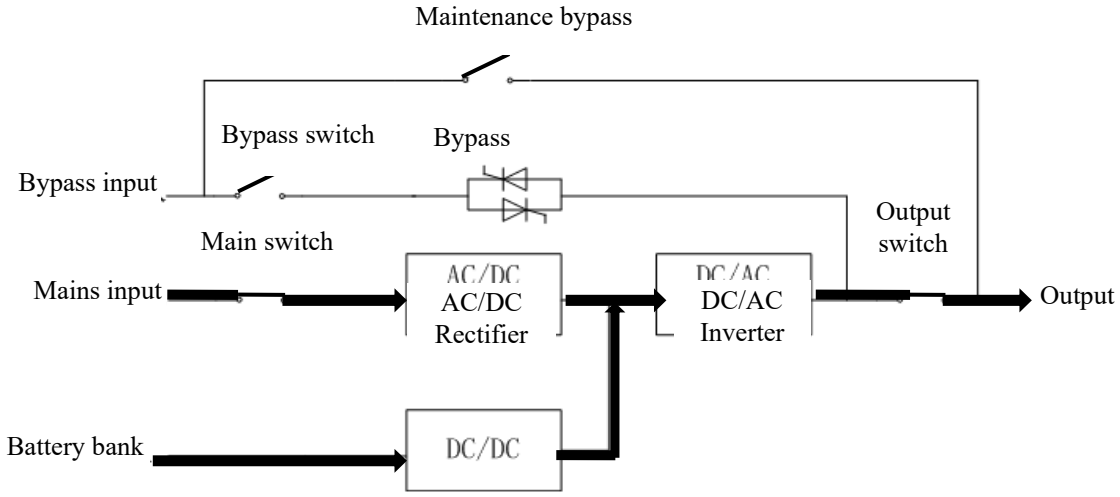


Fig. 2-7 Schematic diagram of mains-battery combination mode

2. 4 System Structure

Note:

This section describes the system structure, appearance and functional parts of all models. This series of equipment can be divided into standard model and full-equipped model where 200 kVA/250 kVA/300 kVA are fully equipped, 400 kVA/500 kVA/600 kVA and higher power models include standard and fully equipped models. The fully equipped models include main switch, bypass switch, output switch and maintenance bypass switch.

2. 4. 1 System Structure of 200 kVA/250 kVA/300 kVA

The appearance of 200 kVA/250 kVA/300 kVA models is shown in Fig. 2-8.

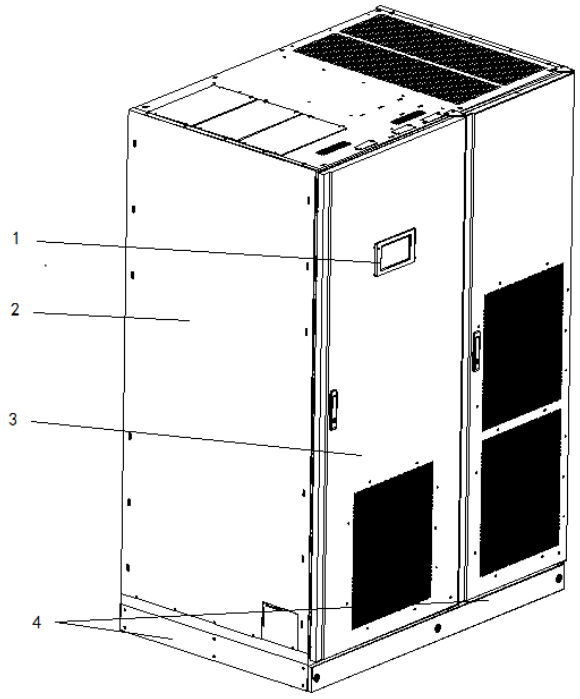


Fig. 2-8 Appearance of 200 kVA/250 kVA/300 kVA models

1	Monitoring display unit	2	Case	3	Front
4	Bottom baffle				

The functional parts of 200 kVA/250 kVA/300 kVA models are shown in Fig. 2-9, which shows the state of UPS after the front door plate is opened.

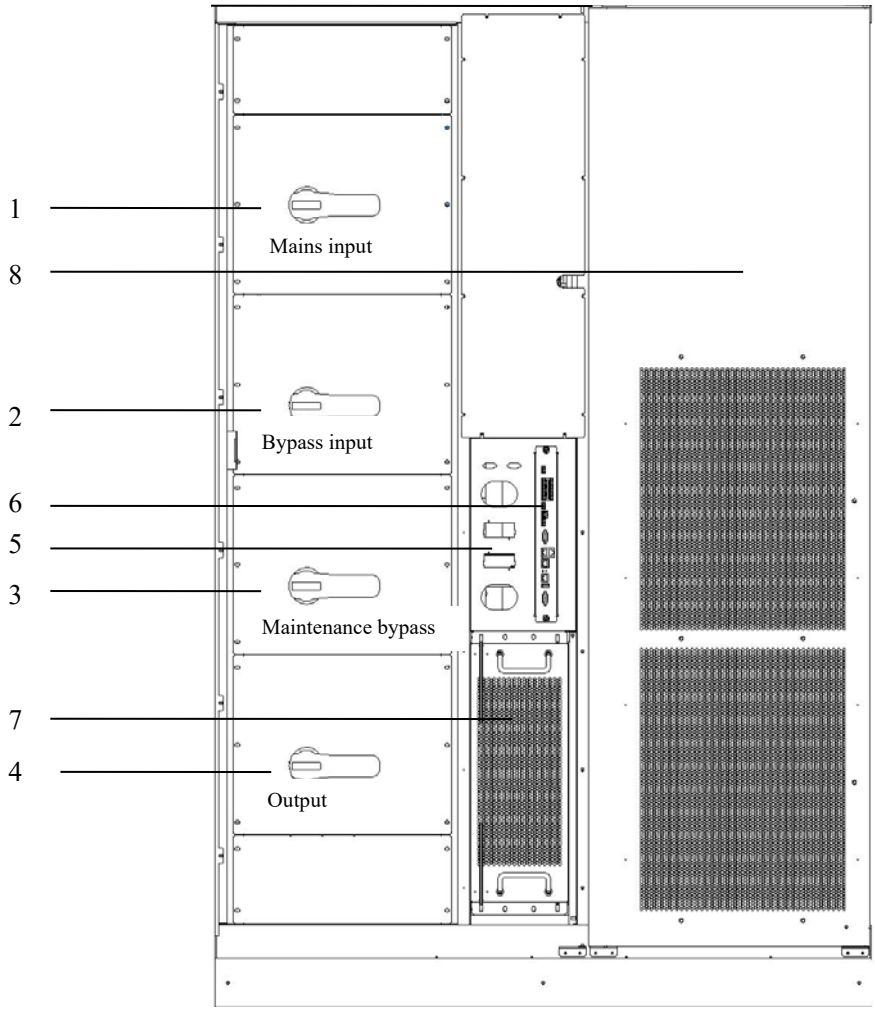


Fig. 2-9 Functional parts of 200 kVA/250 kVA/300 kVA (front view)

1	Mains input switch	2	Bypass input switch	3	Bypass maintenance switch
4	System output switch	5	Smart card slot	6	Communication unit
7	Independent bypass module	8	Power unit		

2. 4. 2 System Structure of 400 kVA/500 kVA/600 kVA

The appearance of 400 kVA/500 kVA/600 kVAmodels is shown in Fig. 2-10.

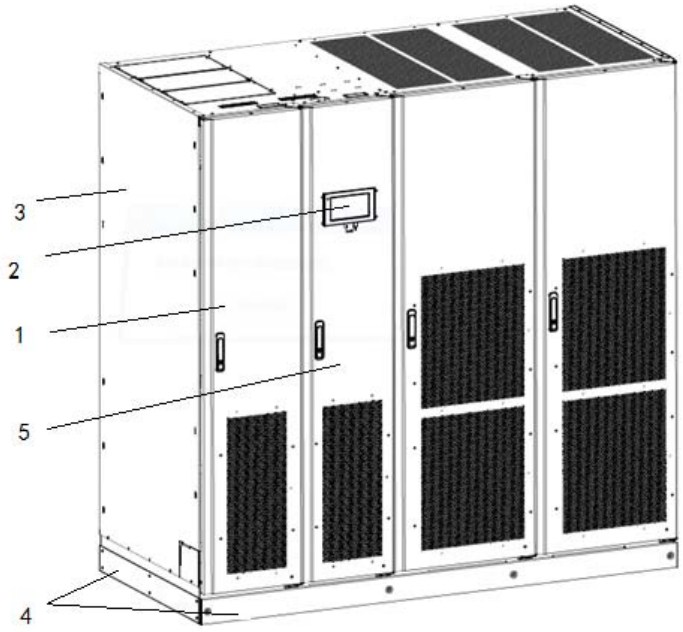


Fig. 2-10 Appearance of 400 kVA/500 kVA/600 kVA

1	Wiring cabinet	2	Monitoring display unit	3	Case
4	Bottom baffle	5	Bypass cabinet		

The functional parts of standard 400 kVA/500 kVA/600 kVA models are shown in Fig. 2-11, where Fig. 2-11 shows the state of UPS after the wiring cabinet and door panel of the bypass cabinet are opened (if the user selects the fully equipped model of this power segment, the wiring cabinet will be replaced by the distribution cabinet. The appearance can be referred in the left side of the distribution switch shown in Fig. 2-9).

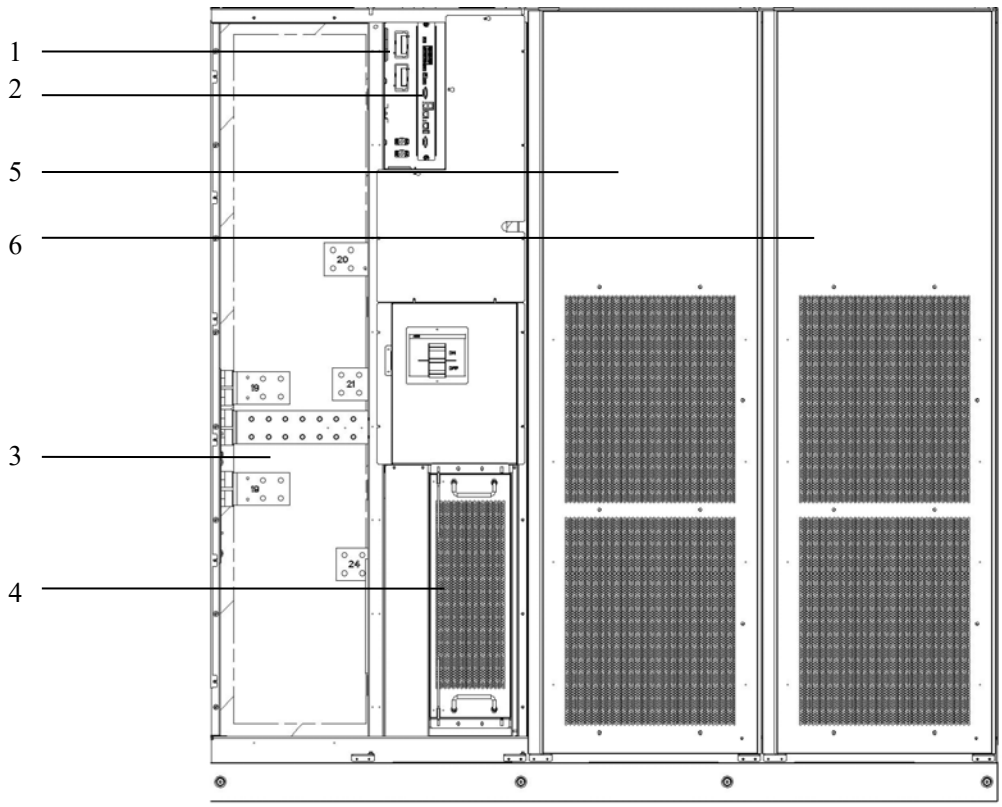


Fig.2-11 Functional parts of 400 kVA/500 kVA/600 kVA (front view)

1	Smart card slot	2	Communication interface	3	Wiring cabinet
4	Independent bypass module	5	Power unit 1	6	Power unit 2

2. 4. 3 System Structure of 750 kVA/900 kVA

The appearance of 750 kVA/900 kVA is shown in Fig. 2-12.

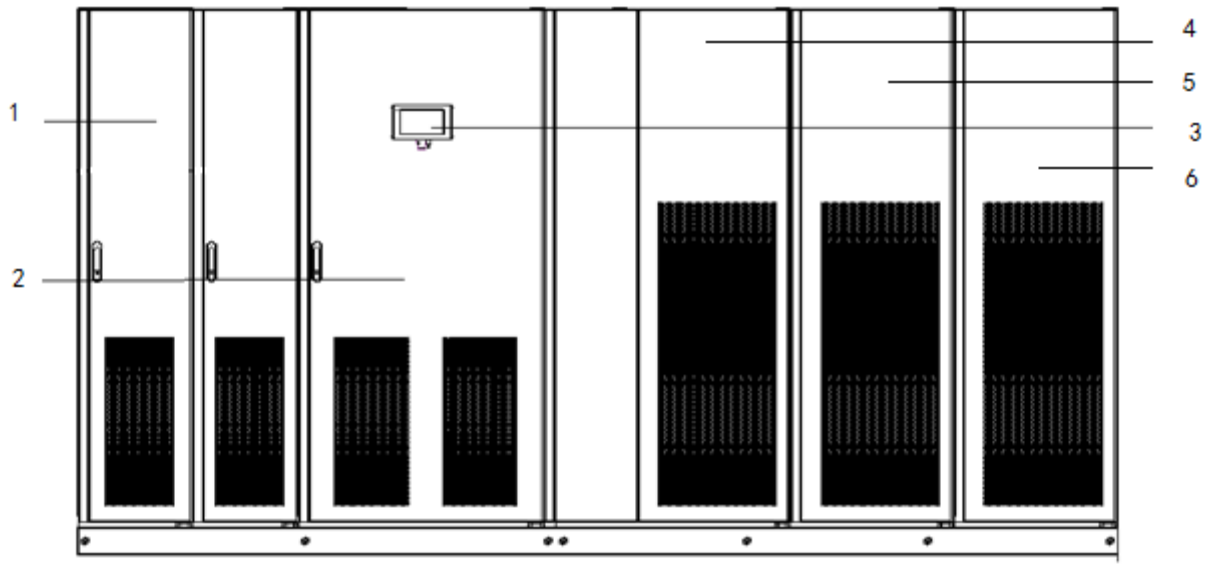


Fig. 2-12 Appearance of 750 kVA/900 kVA (front view)

1	Wiring cabinet	2	Bypass cabinet	3	Monitoring display unit
4	Power module 1	5	Power module 2	6	Power module 3

2. 4. 4 System Structure of 1000k/1200 kVA

The appearance of 1000k/1200 kVA is shown in Fig. 2-13.

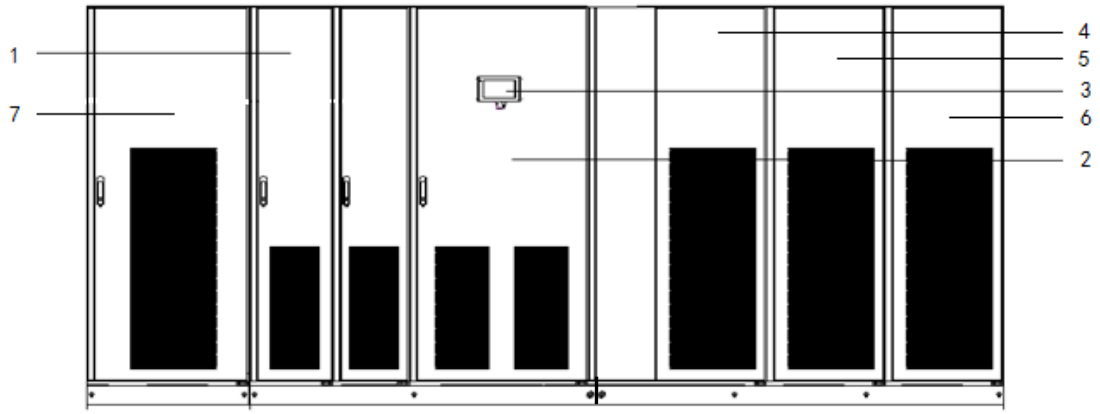


Fig. 2-13 Appearance of 1000k/1200 kVA (front view)

1	Wiring cabinet	2	Bypass cabinet	3	Monitoring display unit
4	Power module 1	5	Power module 2	6	Power module 3
7	Power module 4				

2. 5 Optional Accessories

Various optional accessories are provided for EA990super series UPS, as shown in Table 2-2, to meet different configuration requirements of the users.

Table 2-2 Optional accessories of 200 kVA-1200 kVA UPS

Optional accessories	Function
WIFI card	Used for remote monitoring via WIFI network. Monitoring operation status, issuing emergency orders, reporting system information and other functions.
GPRS card	Used for remote monitoring via GPRS data network. Monitoring operation status, issuing emergency orders, reporting system information and other functions.
SNMP card	Used for remote monitoring through SNMP data network. Monitoring operation status, issuing emergency orders, reporting system information and other functions.
Lightning protector	Used to prevent lightning current from entering the UPS from the power grid, and protect the UPS
Battery inspector	Used to test the voltage and temperature of single battery and the charging and discharging current of the battery pack, and communicate with host computer through MODBUS communication protocol.
Battery cold starting assembly	When the mains is unavailable, the battery can be switched on inversely.
Battery temperature sensor	Used for test the battery temperature, and make the charging voltage compensation according to the change of the ambient temperature of the battery to extend the battery life.
Parallel operation kit	Used for parallel functions between single unit.
LBS synchronous controller	Used to realize phase synchronization of output voltage of two independent UPS systems.
Watertight baffle	Used to protect the upper air outlet of the equipment, prevent the short circuit of the equipment caused by the rainwater.

3 Installation

3. 1 Installation Preparation

3. 1. 1 Site Preparation

Installation weight and dimensions

Ensure that t that the ground and installation platform can bear the weight of UPS, batteries and battery rack. The weight of the batteries and battery rack should be calculated according to actual usage. Ensure that the elevator and other transportation equipment can withstand the weight of UPS and its equipment dimension. The installation weight and dimension of UPS are shown in Table 3-1.

Table 3-1 Installation weight and dimension of UPS

Capacity	Dimension (W x D x H)	Net weight (full-equipped)	Net weight (standard)
200/250/300 kVA	1350mm×900mm×1950mm	900 kg	880kg
400/500/600 kVA	1950mm×900mm×1950mm	1650 kg	1600 kg
750/900 kVA	3700mm×900mm×1950mm	2350 kg	2300 kg
1000/1200 kVA	4500mm×900mm×1950mm	2990 kg	2950 kg

Installation environment

- Do not install UPS in high, low temperature or damp places beyond the technical specifications (see the section of technical parameters for environmental specifications).
- Keep UPS away from water source, heat source and inflammable and explosive articles. Avoid installing UPS in the environment with direct sunlight, dust, volatile gases, corrosive substances and excessive salt content. It is forbidden to install UPS in the working environment with metal conductive dust.
- The optimal operating temperature of valve controlled sealed lead-acid battery is 20℃ ~ 30℃, and it is possible to reduce the battery service life when the temperature is higher than 30℃, and shorten the battery standby time when the temperature is lower than 20℃.

Clearance

The cabinet adopts forced cooling measures to cool internal components. The air inlet is at the front of the cabinet and the outlet is at the top. To ensure good air circulation, gaps must be reserved between the front and top of each cabinet. The gaps reserved around the UPS cabinet are shown in Table 3-2. See Table 3-2 and Fig. 3-1 for the gaps.

Table 3-2 Clearance dimensions

Top of cabinet	Min. 500 mm clearance is left for air circulation at the top of the cabinet
Front of cabinet	At least 1000 mm working space
Rear of cabinet	Not required
Right side of cabinet	Not reserved, 500 mm space recommended
Left side of cabinet	Not required

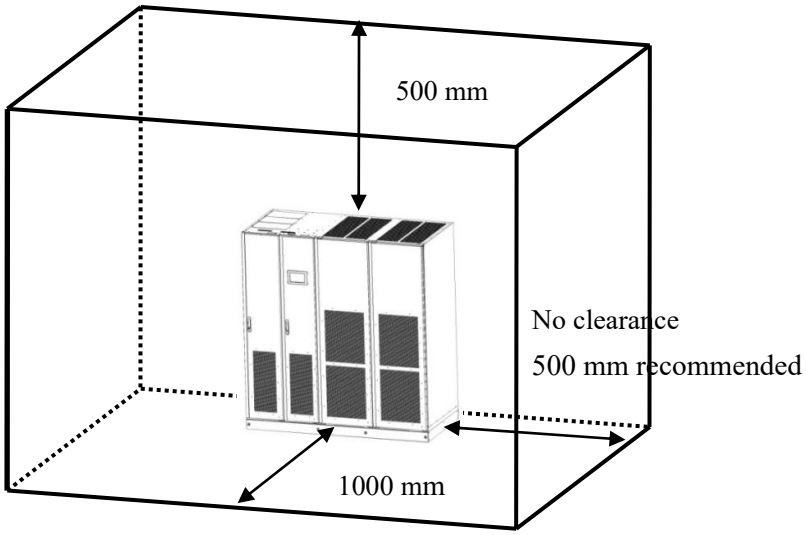


Fig. 3-1 Clearance dimensions

If the user buys 1000 kVA/1200 kVA, same clearance is reserved at left and right sides.

3. 1. 2 Installation Tools

To ensure safety, the installation tools for hot-line work should be insulated. The installation tools that may be involved in the installation process are shown in Table 3-3 and are used as needed.

Table 3-3 Installation tools

Tool name	Main function		Tool name	Main function
Forklift	Handle UPS		Nail hammer	Knock, install and remove components
Herringbone ladder	High-place operation		Rubber hammer	Knock and install components
Clip-on ammeter	Current test		Cable drilling tool, drill	Drill
Multimeter	Test electrical connection and electrical parameter		Insulating tape	Electrical insulation
Cross screwdriver	Tighten screws		Heat-shrinkable T bush	electrical insulation
Levelling instrument	Levelling		Heat gun	Heat heat-shrinkable T bush
Insulated monkey wrench	Tighten and loosen bolts		Electrician's knife	Wire stripping
Insulated torque spanner	Tighten and loosen bolts		Cable ties	Cable tying
Crimping pliers	Connect cold-pressed terminal		Leather working gloves	Protect the operator’s hands
Hydraulic tongs	Connect OT terminal		Anti-static gloves	Anti-static
Diagonal pliers	Cut cables		Insulating gloves	Insulating
Wire stripper	Wire stripping		Insulating shielding shoes	Protect the operator

3. 1. 3 Preparation of Power Cables

Recommended cable diameters for UPS power cables are shown in Table 3-4, and requirements for power cable bolts are shown in Table 3-5.

Table 3-4 Recommended cable diameters for power cables

Item			**200 kVA**	**250 kVA**	**300 kVA**	**400 kVA**	**500 kVA**
Mains input	Mains input current (A)		332	414	452	664	828
	Recommended cable diameter (mm^2)	A/B/C/N	1×120	1×185	1×185	2×120	2×185
	Recommended terminal	A/B/C/N	DT120-14	DT185-16	DT185-16	DT120-14	DT185-16
Bypass input	Bypass input current (A)		290	361	434	607	759
	Recommended cable diameter (mm^2)	A/B/C/N	1×120	1×150	1×185	2×120	2×150
	Recommended terminal	A/B/C/N	DT120-14	DT150-14	DT185-16	DT120-14	DT150-14
Output	Output current (A)		290	361	434	580	722
	Recommended cable diameter (mm^2)	A/B/C/N	1×120	1×150	1×185	2×120	2×150
	Recommended terminal	A/B/C/N	DT120-14	DT150-14	DT185-16	DT120-14	DT150-14
Battery input	Nominal discharge current (A) of 4 x 12V battery		448	559	605	896	1118
	Recommended cable diameter (mm^2)	BAT+/BAT-	1×185	2×95	2×95	2×185	2*240
	Recommended terminal	BAT+/BAT-	DT185-16	DT95-12	DT95-12	DT185-16	DT240-16
Ground wire	Recommended cable (mm^2)	PE	1×70	1×70	1×95	1×150	1×185
	Recommended terminal	PE	DT70-12	DT70-12	DT95-12	DT150-14	DT185-16
Item			**600 kVA**	**750 kVA**	**900 kVA**	**1000 kVA**	**1200 kVA**
Main	Mains input current (A)		904	1242	1356	1656	1808
	Recommended cable diameter (mm^2)	A/B/C/N	2×185	2×185	3×240	4×240	4×300
	Recommended terminal	A/B/C/N	DT185-16	DT185-16	DT240-16	DT240-16	DT300-20
Bypass input	Bypass input current (A)		868	1083	1302	1444	1736
	Recommended cable diameter (mm^2)	A/B/C/N	2×185	3×150	3×240	4×240	4×300
	Recommended terminal	A/B/C/N	DT185-16	DT150-14	DT240-16	DT240-16	DT300-20

Output	Output current (A)		868	1083	1302	1444	1736
	Recommended cable diameter (mm^2)	A/B/C/N	2×185	3×150	3×240	4×240	4×300
	Recommended terminal	A/B/C/N	DT185-16	DT150-14	DT240-16	DT240-16	DT300-20
Battery input	Nominal discharge current (A) of 40*12V battery		1210	1677	1815	2236	2420
	Recommended cable diameter (mm^2)	BAT+/BAT-	1210	1677	1815	2236	2420
	Recommended terminal	BAT+/BAT-	DT300-20	DT240-16	DT240-16	DT300-20	DT300-20
Ground wire	Recommended cable (mm^2)	PE	1×185	1×240	1×240	1×300	1×300
	Recommended terminal	PE	DT185-16	DT185-16	DT240-16	DT240-16	DT300-20

Note:

The recommended cables in Table 3-4 are only applicable to the following service conditions:

- Installation mode: bridge installation (iec60364-5-52).
- Ambient temperature: 30℃.
- Cable type: XLPE/EPR insulation, 90℃ PVC sheath, flexible wire with copper conductor.
- For same power supply is used for main circuit and bypass, the input cable is conFig.d according to the mains input cable.
- The current value in the data calculated at rated voltage 230V. The current value should be multiplied by 1.05 for rated voltage 220V and 0.96 for rated voltage 240V.
- When the main load is nonlinear load, the section of Null line should be increased by 1.5 ~ 1.7 times.

Table 3-5 Requirement of power cable bolt

	Model	**Terminal hole/ bolt diameter (9 mm)**	**Specification of screws**	**Quantity of screws**
Main Copper platoon Bypass Copper platoon Output Copper platoon Battery Copper platoon	200 kVA	12	M10*40	52
	250 kVA			
	300 kVA			
	400 kVA	14	M12*40	52 for power distribution 61 for no power distribution
	500 kVA			
	600 kVA			
	750 kVA	16	M16*40	52 for power distribution 61 for no power distribution
	900 kVA			
	1000 kVA	18	M18*40	52 for power distribution 61 for no power distribution
	1200 kVA			
Null line	200 kVA	9	M8*40	9
	250 kVA			
	300 kVA			

	400 kVA	11	M10*40	9 for power distribution 16 for no power distribution
	500 kVA			
	600 kVA			
	750 kVA	16	M16*40	9 for power distribution 16 for no power distribution
	900 kVA			
	1000 kVA	18	M18*40	9 for power distribution 16 for no power distribution
	1200 kVA			
Ground wire	200 kVA	9	M8*40	5
	250 kVA			
	300 kVA			
	400 kVA	11	M10*40	5 for power distribution 8 for no power distribution
	500 kVA			
	600 kVA			
	750 kVA	16	M16*40	5 for power distribution 8 for no power distribution
	900 kVA			
	1000 kVA	18	M18*40	5 for power distribution 8 for no power distribution
	1200 kVA			

Note:

- The fully equipped model can be purchased, and includes built-in mains input air switch, bypass input air switch, maintenance air switch and output air switch.
- UPS is a large leakage current equipment, it is not recommended to conFig. an air switch with leakage protection function.
- When the input front end has multi-stage load, the specification of the circuit breaker conFig.d in the front bus must be larger than that of the mains input air switch of UPS and the bypass input air switch.
- When the output rear end has multi-stage load, the setting current of the circuit breaker installed on the rear-level branch shall not be more than 50% of the rated current of the output air switch of UPS. Table 3-6 shows the recommended circuit breakers.

Table 3-6 Recommended circuit breakers

Model	**200 kVA**	**250 kVA**	**300 kVA**	**400 kVA**	**500 kVA**	**600 kVA**
Input circuit breaker	500	500	630	800	1000	1000
Output circuit breaker	500	500	630	800	1000	1000
Bypass circuit breaker	500	500	630	800	1000	1000
Battery circuit breaker	800	800	1000	1400	1600	1600

3. 1. 4 Unpacking

CAUTION

- The equipment must be handled by professionally trained personnel.
- Carefully move the equipment to ensure that it is stable. Any impact or fall may cause damage to the equipment.

Specific operation procedures:

Step 1: make sure the UPS package is not damaged. If there is any damage in transit, please inform the carrier immediately.

Step 2: use the forklift to transport the equipment to the designated location (move to the installation site or closer to the installation site if possible). The position of the forklift is shown in Fig. 3-2

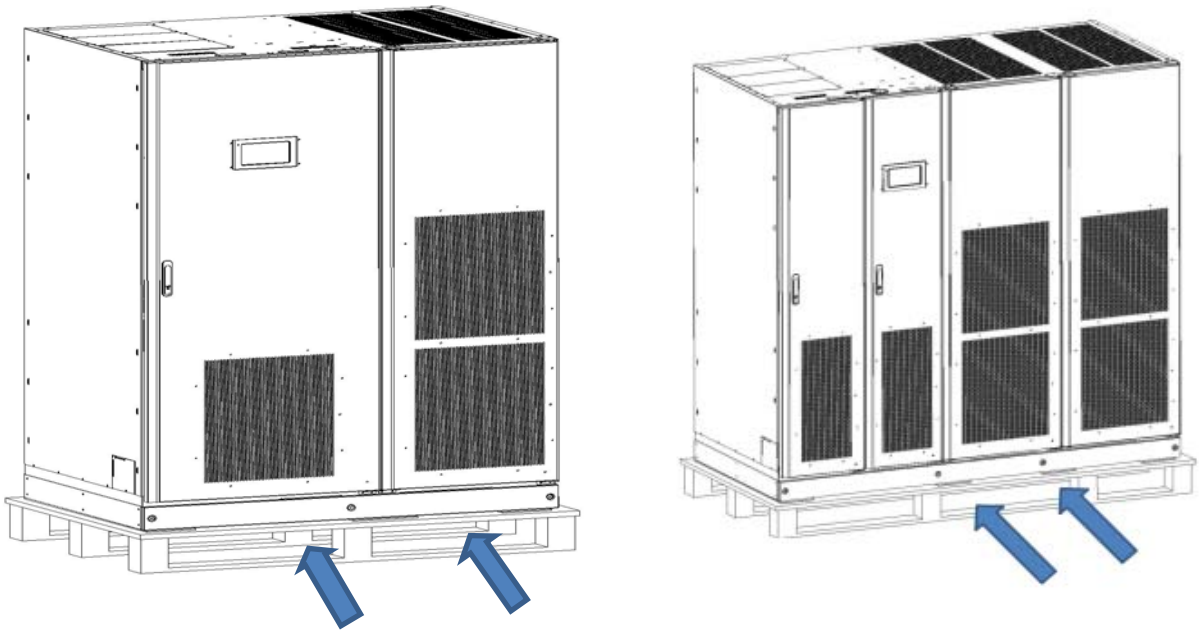


Fig. 3-2 Position of forklift

Step 3: remove the packaging and buffer foam.

Step 4: remove moisture bags.

Step 5: check the equipment.

Visually inspect the appearance of UPS, check whether UPS is damaged during transportation, and unpack to whether all items are complete. Complete items are shown in Table 3-7.

Table 3-7 Complete items

1. UPS main equipment	2. RS232 communication cable	3.Communication light disk
4. Key	5. User manual	6. Warranty card

UPS main equipment, RS232 communication cable, communication light disk, key, user manual, warranty card. In case of any damage or shortage, please inform the carrier immediately. Check whether the attached accessories are complete and correct against the shipping packing list. If the attached accessories are missing or the model does not match, make the field record in time and contact the company or the local office immediately.

3. 2 Installation of Single UPS

3. 2. 1 Installation of UPS

Specific installation procedures:

Step 1: after confirming that the equipment is in good condition, remove the bottom baffles around the bottom of the case, as shown in Fig. 3-3 (take 400 kVA/500 kVA/600 kVA models as an example).

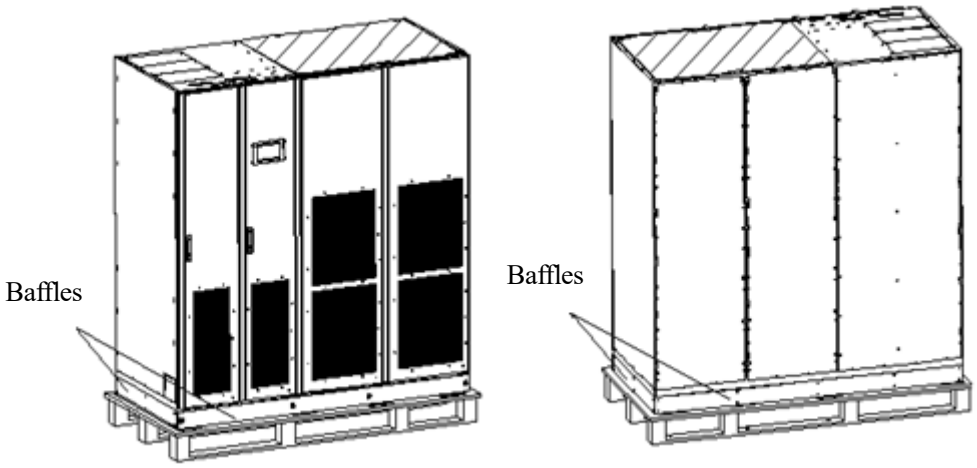


Fig. 3-3 Remove four baffles

Step 2: remove the screws between the equipment and the bottom pallet. See Fig. 3-4 (take 400 kVA/500 kVA/600 kVA model as an example).

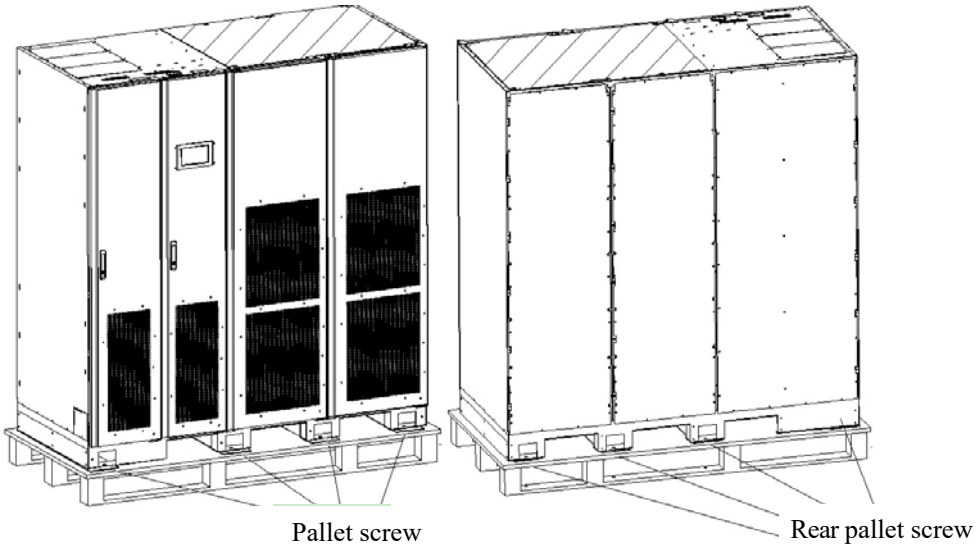


Fig. 3-4 Remove pallet screws

Step 3: lift the cabinet with an automatic fork lift truck and when the bottom of the cabinet is about 5mm away from the pallet, remove the pallet. Pay attention to the center of gravity. The center of gravity of 200 kVA/250 kVA/300 kVA UPS model is shown in Fig. 3-5, and center of gravity of 400 kVA/500 kVA/600 kVA UPS model is shown in Fig. 3-6.

CAUTION

- The cabinet must be lifted by the forklift, otherwise the cabinet may be damaged.
- When the forklift is used from the front, and the arm length of the forklift should be larger than the width of the equipment. The forklift shall have the arm with more than 200mm internal width and less than 700mm outer diameter for 200 kVA/250 kVA/300 kVA UPS and the arm with more than 700mm internal width and less than 1300mm outer diameter for 400 kVA/500 kVA/600 kVA UPS.
- When the forklift is used from the side, the arm of the forklift should be larger than the length of the forklift, the inner width of the arm should be larger than 200mm, and the outer diameter should be less than 600mm.
- The lifting weight of the forklift should be greater than the equipment weight.

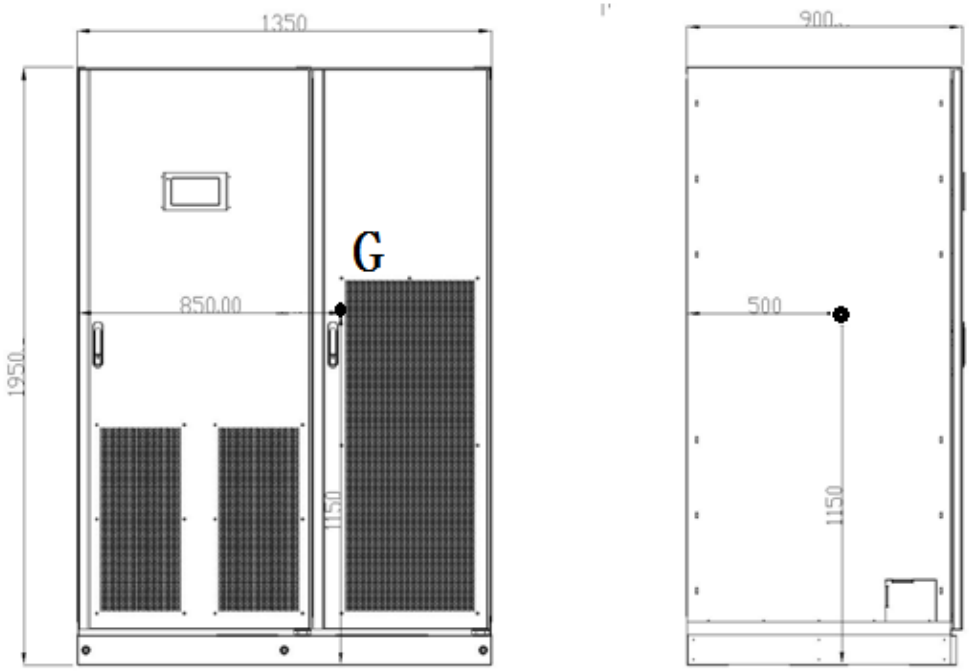


Fig. 3-5 Center of gravity of 200 kVA/250 kVA/300 kVA UPS

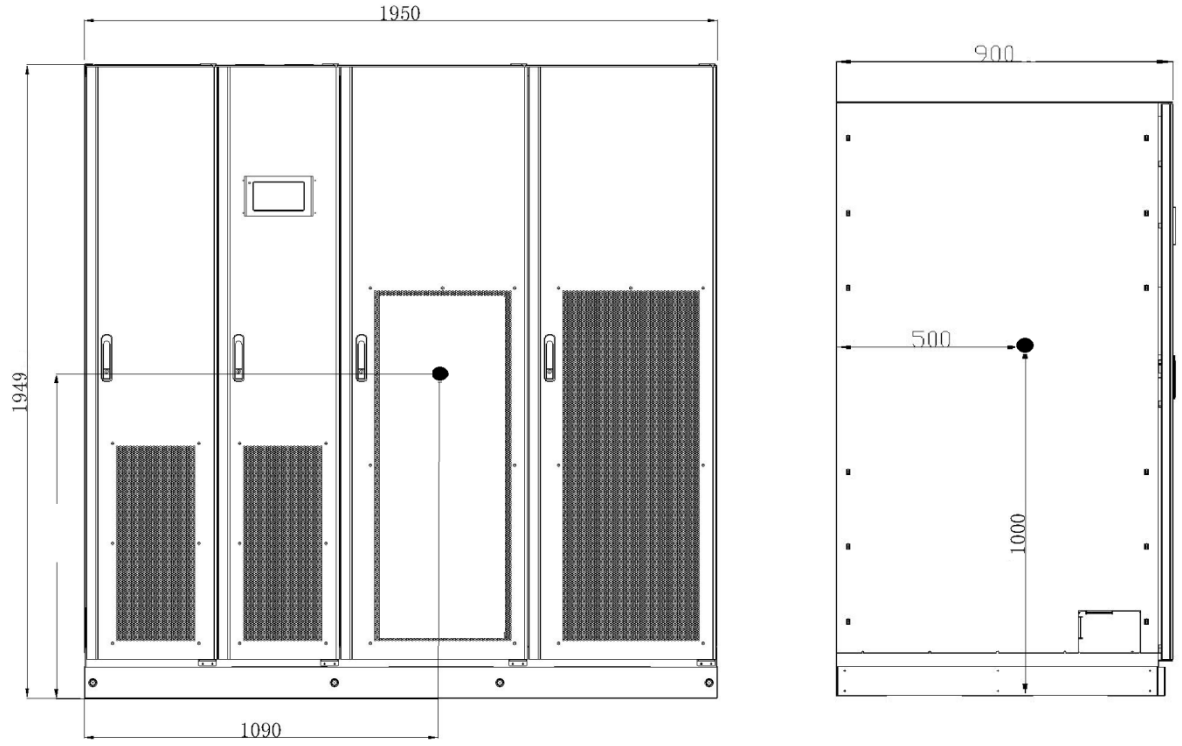


Fig. 3-6 Center of gravity of 400 kVA/500 kVA/600 kVA UPS

Step 4: slowly lower the cabinet until it touches the ground.

3. 2. 2 Installation of Fixture

The fixture assembly is installed to provide anti-seismic and shock proof function, and may be selectively installed according to the installation environment. The specific instillation procedures are given below:

Step 1: determine the installation location and set up the steel groove and other fixtures at the installation site according to the hole location and size diagram. The hole location and size is shown in Fig. 3-7 and Fig. 3-8.

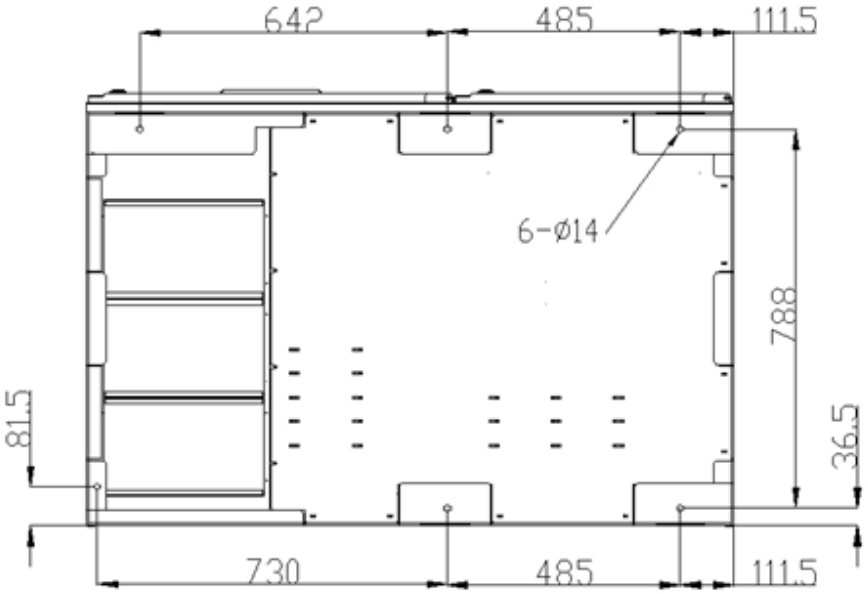


Fig. 3-7 Location and size of 6 holes for 200 kVA/250 kVA/300 kVA (bottom view)

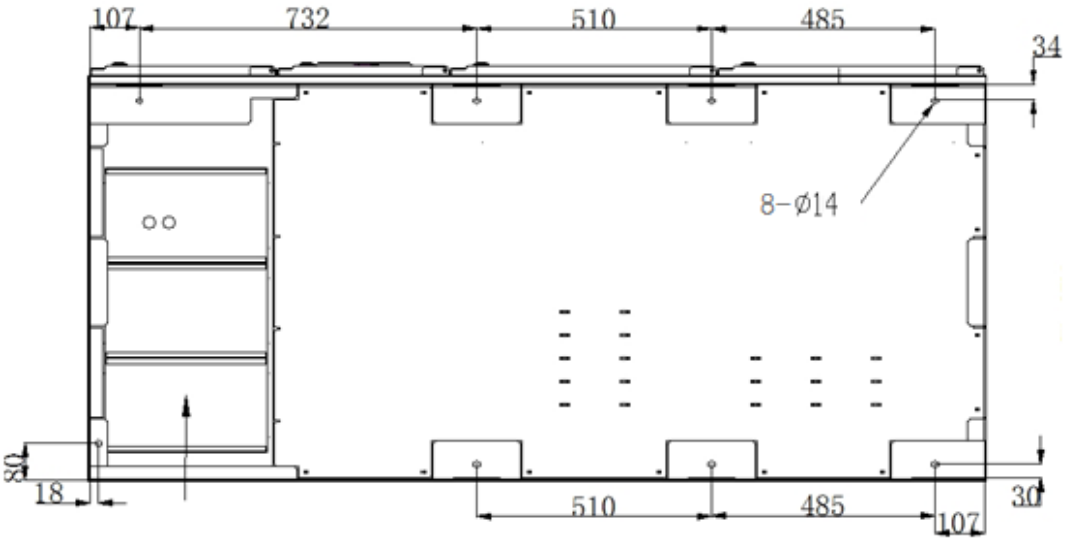


Fig. 3-8 Location and size of 8 holes for 400 kVA/500 kVA/600 kVA (bottom view)

Step 2: locate the UPS to the final installation location.

Step 3: lift the equipment with the forklift until the bottom of the case is suspended.

Step 4: finely adjust the case to align the expansion bolts with the holes below.

Step 5: fix the front and back bolts of the case to the ground with expansion bolts.

Step 6: reinstall the removed bottom baffle to the bottom side of the equipment.

3.2. 3 Installation of Battery

CAUTION

During the installation design of UPS system, please use batteries approved by supplier. Without permission, it is forbidden to use batteries of other brands because UPS is excluded from the warranty for damage of UPS caused by batteries of other brands. If the batteries of other brands are used, please contact local distributor.

For the installation method, please see the battery installation instructions shipped with the battery.

3. 2. 4 Connection of Power Cable

Step 1: open the front door of the input/output wiring cabinet (for the fully equipped model, continue to remove the distribution switch baffle, as shown in Fig. 3-9 and Fig. 3-10).

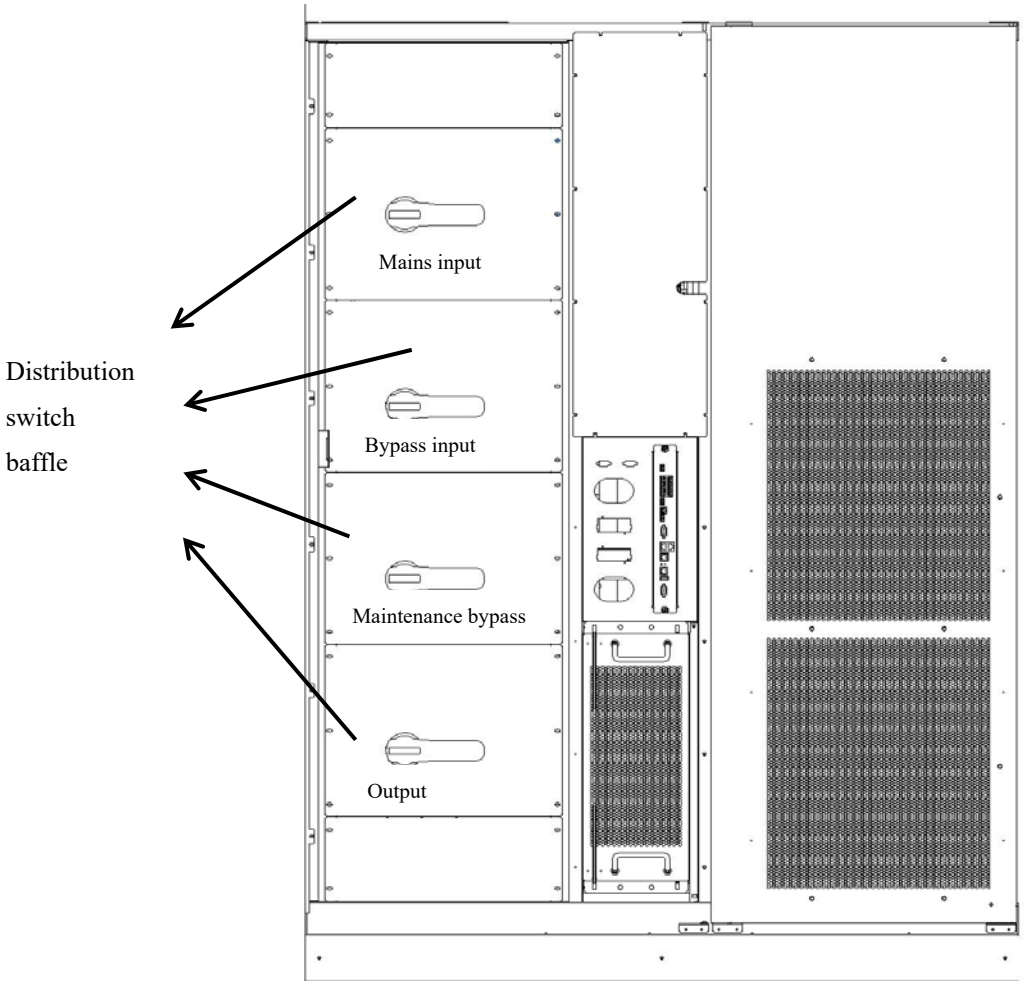


Fig. 3-9 Distribution switch baffle of full equipped 200 kVA/250 kVA/300 kVA

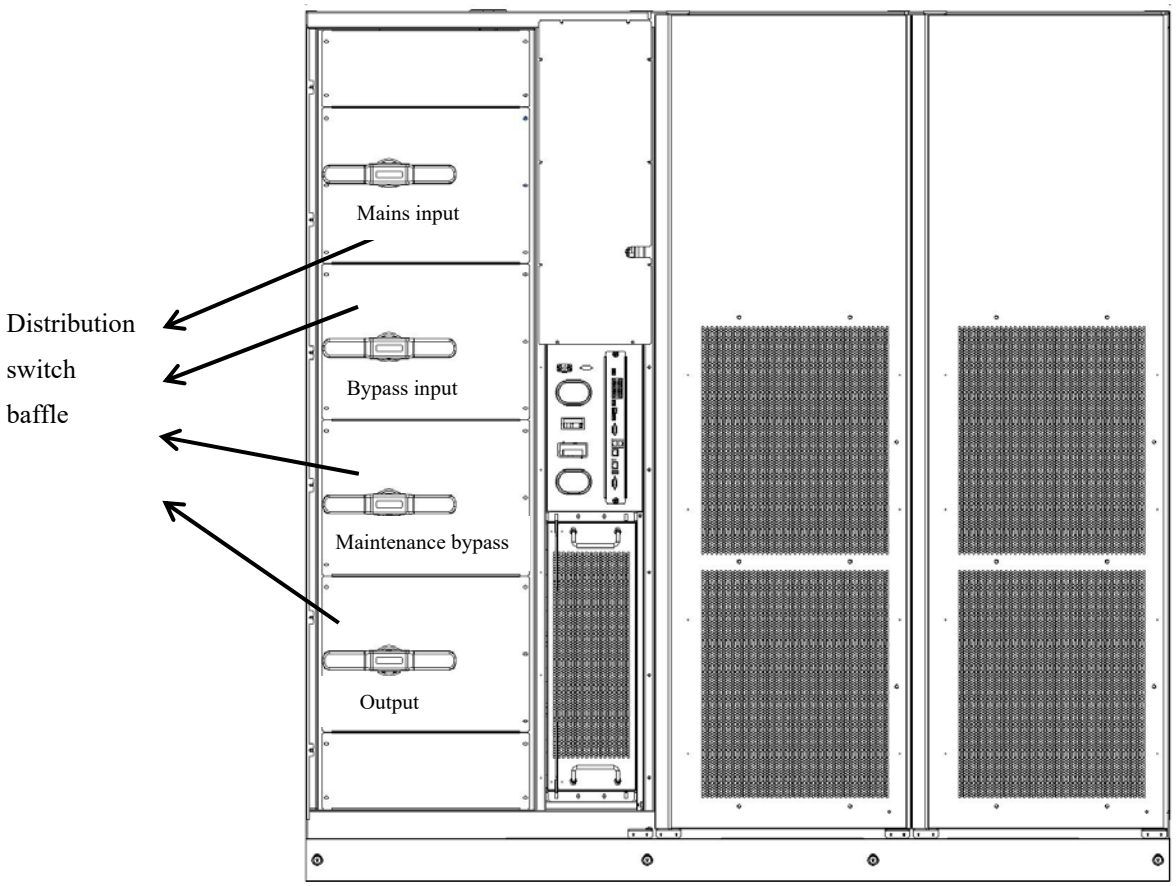


Fig. 3-10 Distribution switch baffle of full equipped 400 kVA/500 kVA/600 kVA

Step 2: connect the power cable.

1. Remove the cable entry baffles at the top and bottom of the equipment and the front baffle of the wiring cabinet. The position of the baffles is shown in Fig. 3-11.

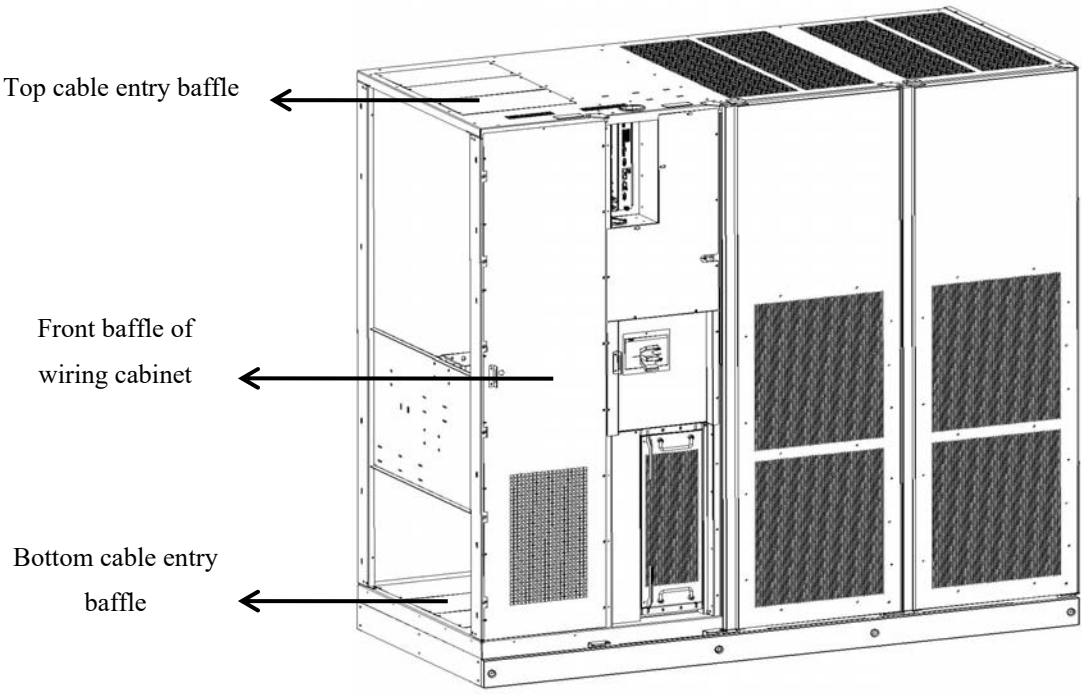


Fig. 3-11 Top and bottom cable ery baffle and front baffle of the wiring cabinet

When UPS cabinets are transported, paper shields are installed on the ventilation grille at the top. Do not remove debris shields until installation is complete. However, remove the debris shields before operating UPS. After removing the debris shield, do not place any item on the ventilation grille of the cabinet.

2. Lay input and output cables from the top or bottom of the cabinet to the UPS terminal. The location information of the terminals is shown in Fig. 3-12, Fig. 3-13, Fig. 3-14, Fig. 3-15, Fig. 3-16, and Fig. 3-17.

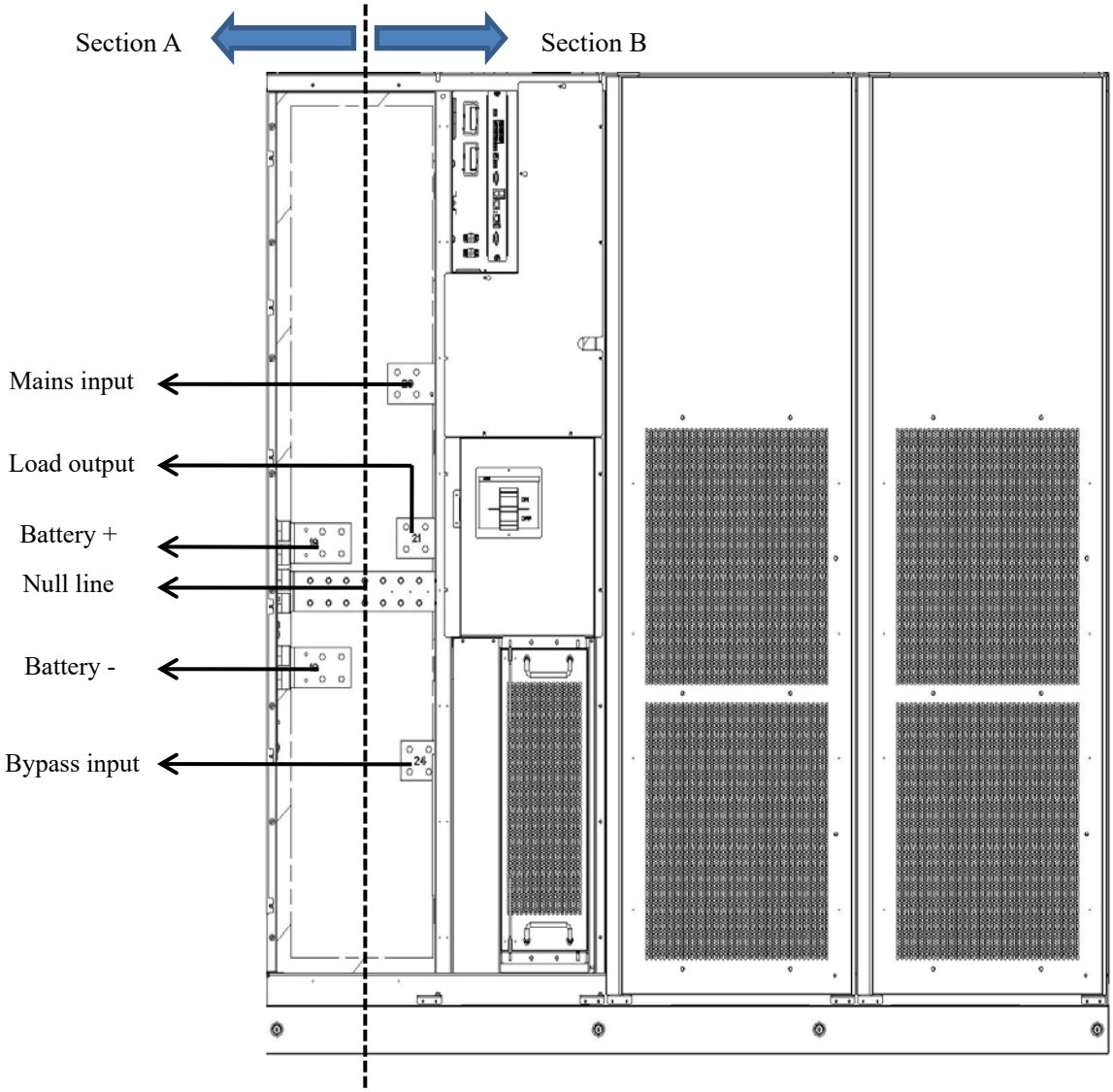


Fig. 3-12 Terminal location in the wiring cabinet for standard 400 kVA/500 kVA/600 kVA (front view) UPS

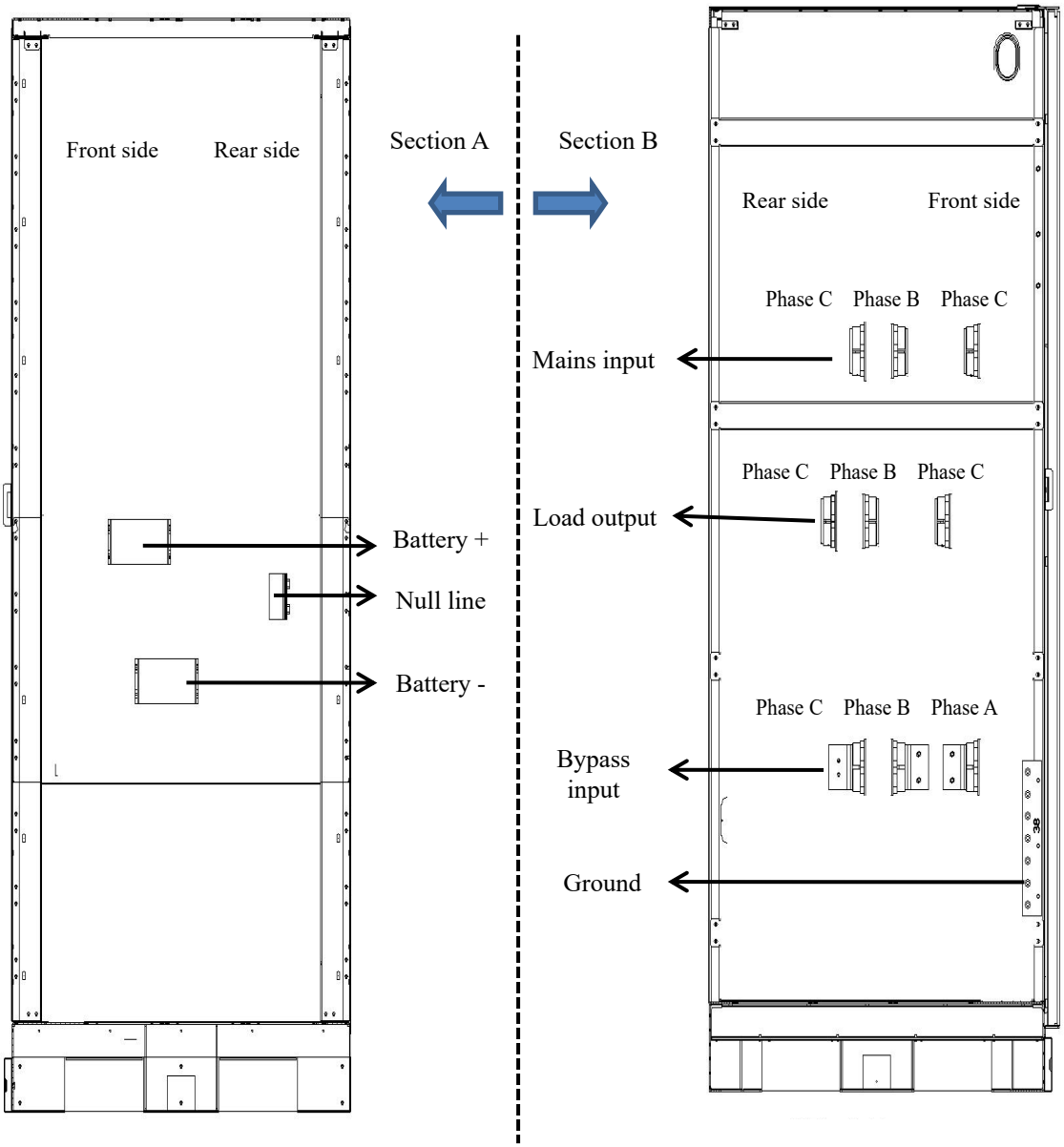


Fig. 3-13 Terminal location in the wiring cabinet for standard 400 kVA/500 kVA/600 kVA (sectional view) UPS

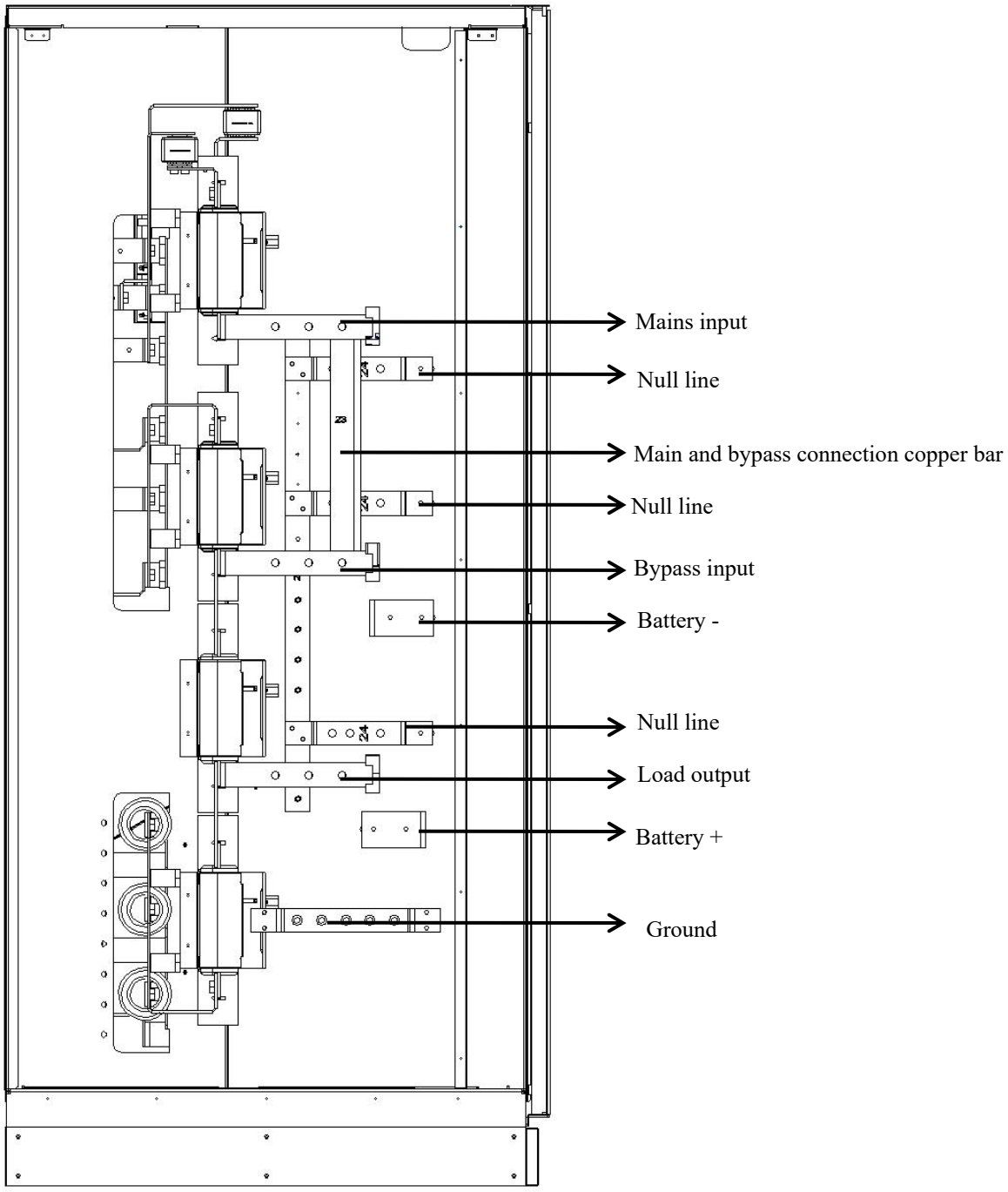


Fig. 3-14 Terminal location in the wiring cabinet for full equipped 200 kVA/250 kVA/300 kVA (right view) UPS

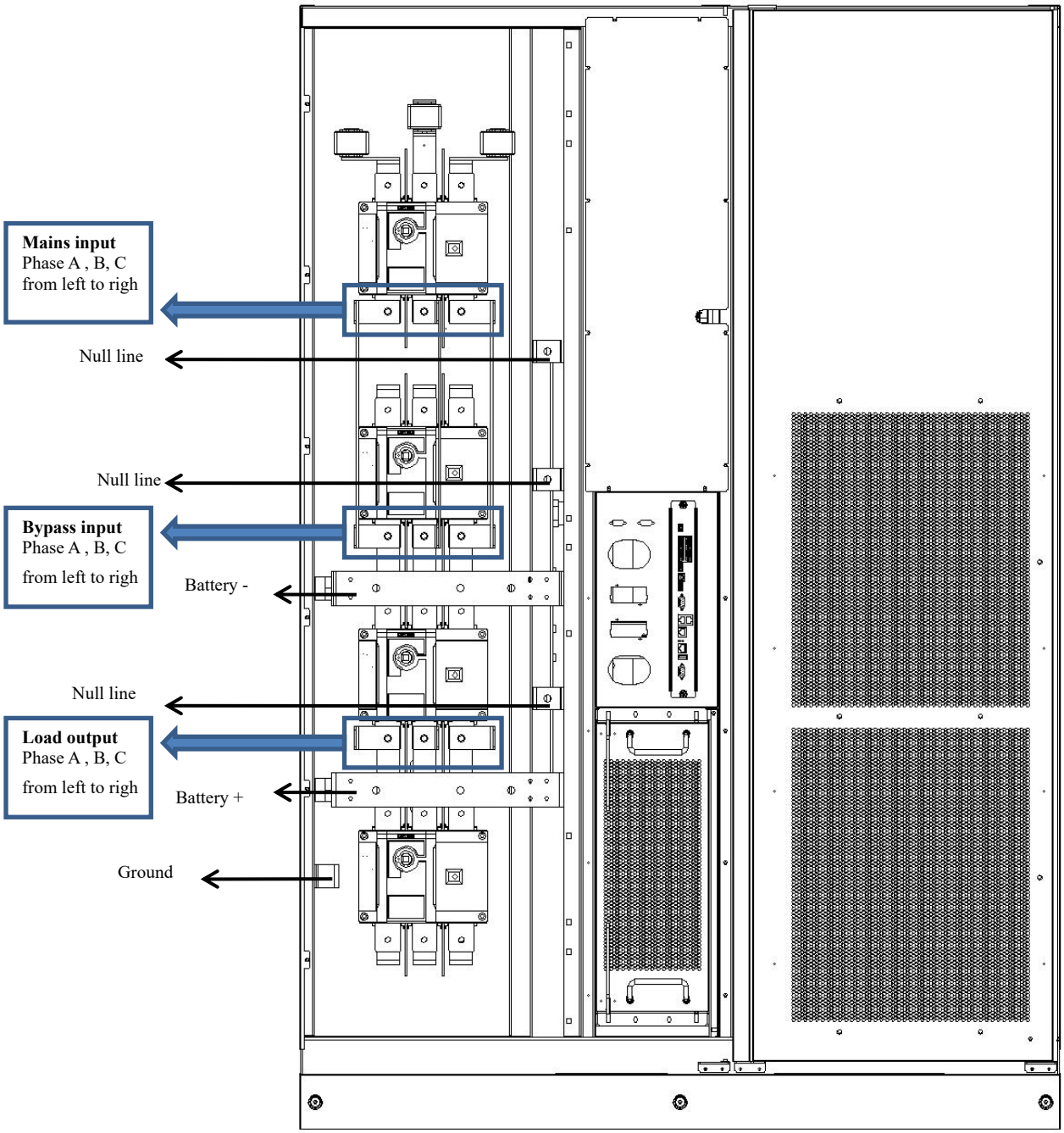


Fig. 3-15 Terminal location in the wiring cabinet for full equipped 200 kVA/250 kVA/300 kVA (front view) UPS

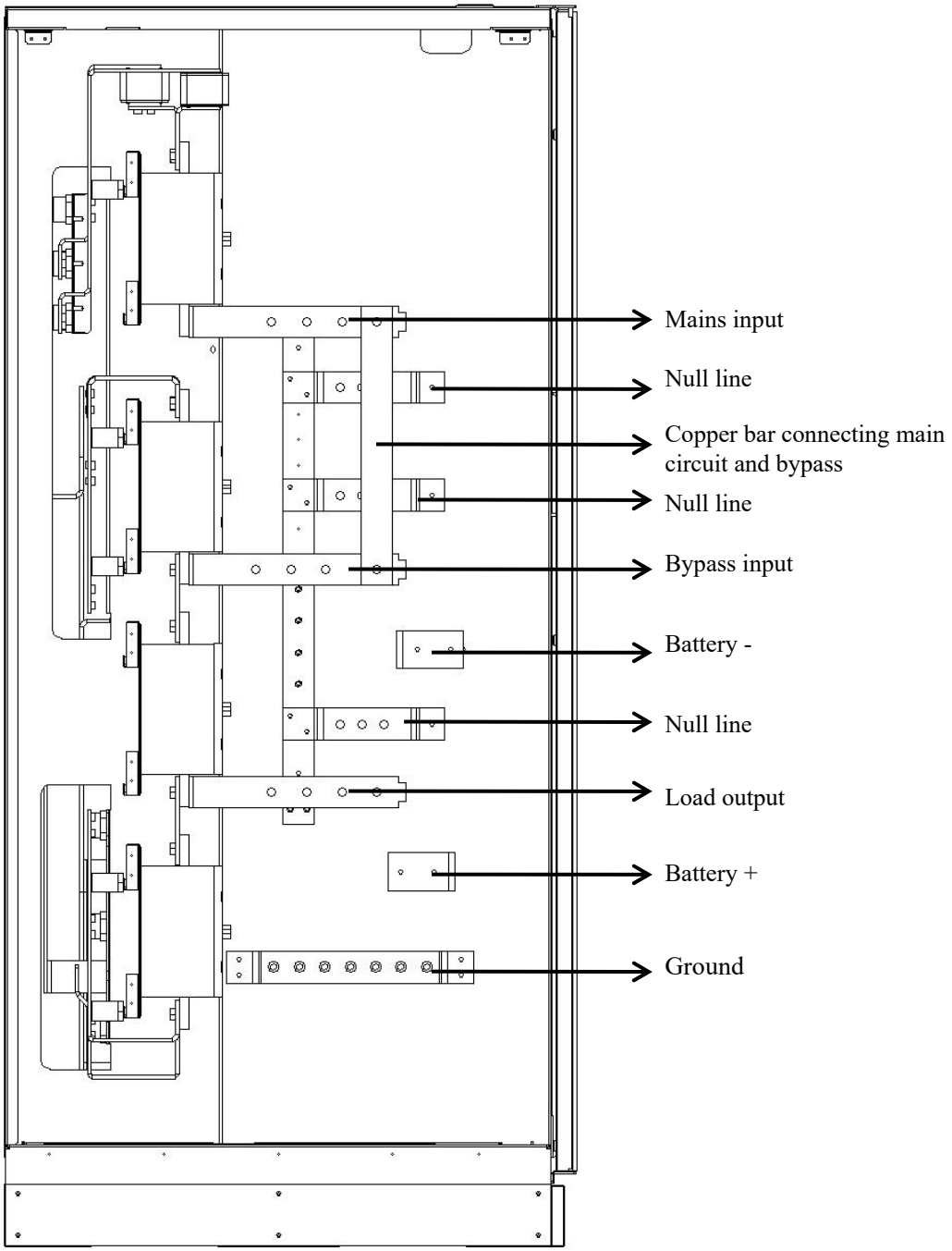


Fig. 3-16 Terminal location in the wiring cabinet for full equipped 400 kVA/500 kVA/600 kVA (right view) UPS

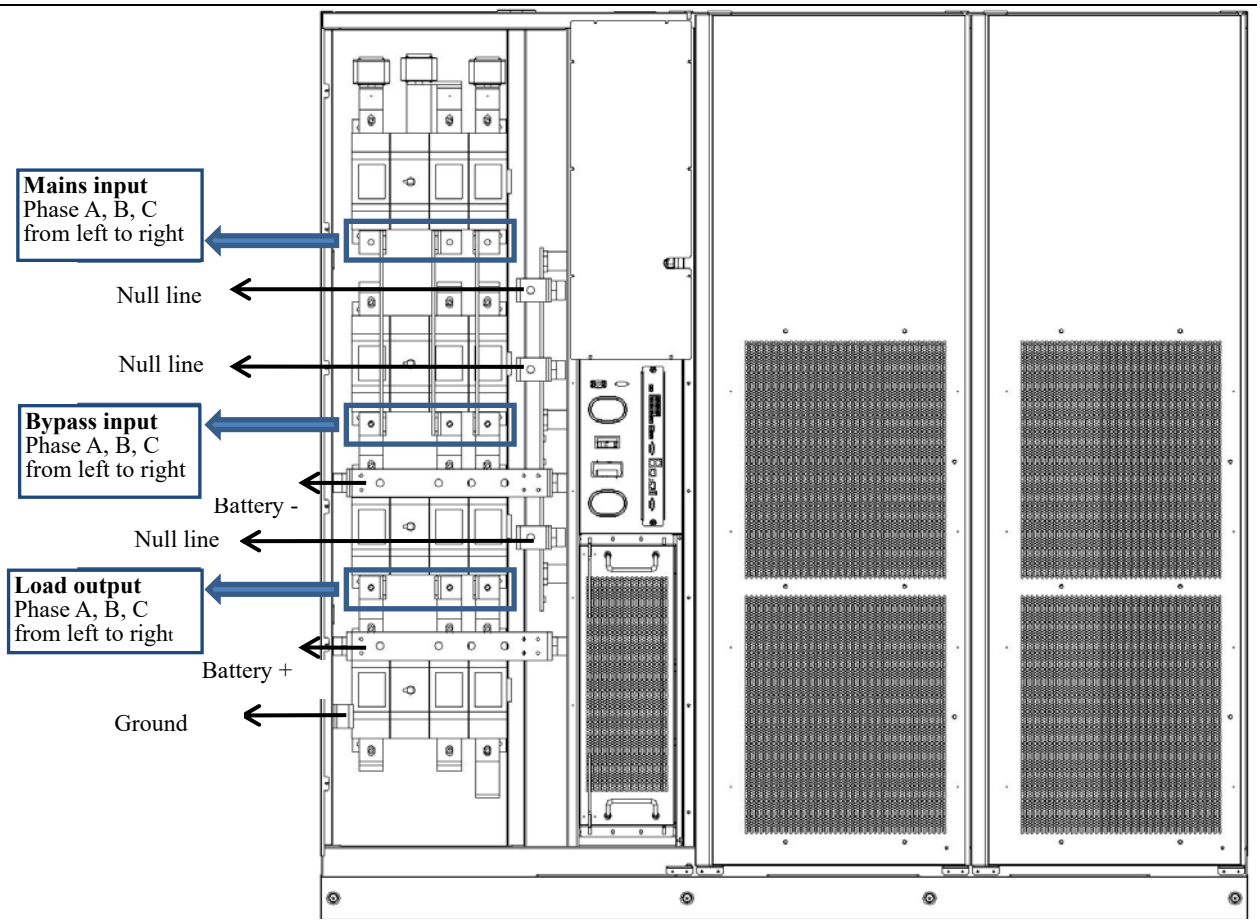


Fig. 3-17 Terminal location in the wiring cabinet for full equipped 400 kVA/500 kVA/600 kVA (front view) UPS

3. According to the position of the terminal, the top or bottom incoming mode can be used (depending on the actual situation).
4. Connect the ground cable.
5. Connect the phae A, phae B, phae C and N line of mains input to the mains input terminal in the UPS cabinet.
6. Connect the phae A, phae B, phae C of the by-pass input and the N-line to the by-pass input terminal in the UPS cabinet.
7. Connect the phae A, phae B, phae C of the load and the N-line to the output terminal in the UPS cabinet.
8. Connect the positive and negative pole of the battery pack to the positive and negative terminals of the battery in the UPS cabinet.

CAUTION

Different power supply for main circuit and bypass

- For the fully equipped mode, it should be noted that after removing the copper plate connecting with the main circuit and the bypass before Steps 5 and 6.
- For the standard mode, directly complete Steps 5 and 6.
- Same power supply for main circuit and bypass
- For the fully equipped mode, without need to remove copper plate connecting with the main circuit and the bypass, connect the AC input cable directly to the mains input terminal.
- For the standard mode, a short jumper is added for the mains input and the bypass input.
- The voltage of the battery pack is lethal and must be equipped with the battery switch current limit protection. Connect the cable according to the safety instruction.
- During wiring, ensure the correct connection polarity of the cables from the battery terminal and the battery

switch and the battery switch to the UPS terminal, and do not avoid reverse connection.

3.2.5 Communication Signal Interface

General

This series of UPS integrates communication slot, RS485 interface, parallel operation interface, and basic dry contact access and other communication signal interfaces.

Functional parts and communication signal interfaces are shown in Fig. 3-18.

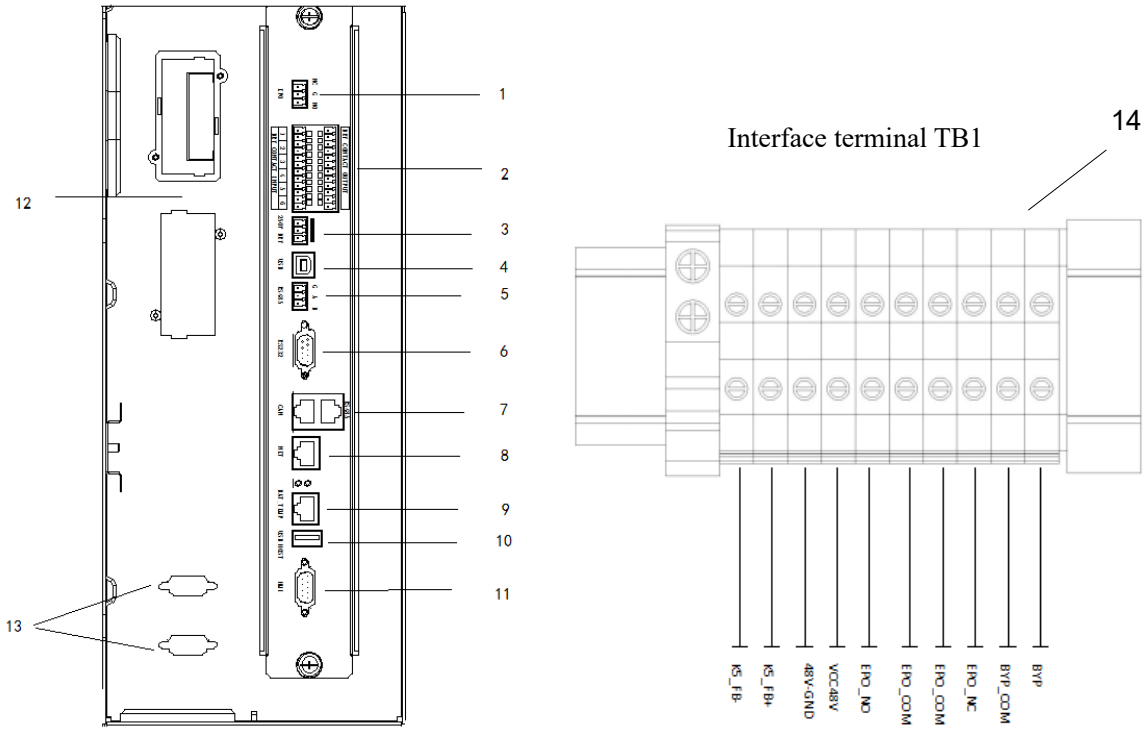


Fig. 3-18 Diagram of functional units and communication signal interfaces

1	EPO interface (unavailable for this model)	2	Dry contact interface	3	Dry contact output interface
4	USB interface	5	RS485 interface	6	RS232 interface
7	Battery inspector interface	8	NET interface	9	Battery temperature sensor interface
10	USB HOST interface	11	Monitoring display unit interface	12	Smart card slot
13	Parallel operation interface	14	Interface terminal TB1		

Parallel operation interface

For parallel operation, use parallel operation control cable to connect the parallel operation interface of each UPS into a ring. The single UPS does not need to connect the parallel operation signal interface between the host. When multiple UPS form a parallel operation system, N parallel control cables (the parallel operation of up to 4 sets of the equipment can be achieved) are required to connect N UPS to ensure that each UPS is connected at least two parallel operation control cables to improve the reliability of the parallel operation.

Dry contact interface

By the dry contact interface of UPS, functions, such status monitoring of external devices, management of battery system, the provision of warning signals to external devices and realization of remote emergency shutdown etc., can be realized. The dry contact interface of the equipment can be customized, which is the default configuration upon delivery. The default configuration of the input dry contact upon delivery is DI_1 for oil machine mode, DI_2 for battery switch

state, DI_3 for the output switch state of the power distribution cabinet, DI_4 for the maintenance switch state of the power distribution cabinet, DI_5 for undefined, and DI_6 for the trigger signal of self-aging firmware. The default configuration of output dry contact is DO_1 for bypass power supply, DO_2 for battery power supply, for DO_3: battery under-voltage DOD, DO_4 for fan failure, DO_5 for undefined, and DO_6 for strong point output: time-based powering off. The user-defined dry contacts and corresponding functions are shown in Table 3-7.

Table 3-7 Functions of dry contacts

Dry contact	Signal description	Status description	Function description
Input dry contact DI_1 ~ DI_6 (DI_6 is the firmware trigger signal of self-aging mode, which cannot be set by the user.	Battery ground fault	Initial state is open and the open status means no battery earth fault, and the close status means battery earth fault.	Battery grounding status detection, grounding failure UPS will gives an alarm in case of grounding failure.
	Oil machine model	Initial state is open and the open status means non-oil machine model, and the close status means oil machine model.	Oil machine working state detection. UPS improves the relevant adaptability in oil machine mode.
	Battery switch state	Initial state is close and the open status means the battery switch opened, and the close status means the battery switch closed.	Status detection. UPS will give an alarm when the battery switch is disconnected.
	Output switch state of distribution cabinet	Initial state is close and the close status means the output switch of distribution cabinet closed, and the open status means the output switch of distribution cabinet opened.	Status detection. UPS will give an alarm when the output switch of the power distribution cabinet is disconnected.
	Maintenance switch state of distribution cabinet	Initial state is open and the open means the maintenance switch of distribution cabinet opened, and the close means the maintenance switch of distribution cabinet closed.	Status detection. UPS will switch to the bypass and give an alarm when the maintenance switch of the power distribution cabinet is disconnected.
	Bypass switch state of distribution cabinet	Initial state is close and the close means the bypass switch of distribution cabinet closed, and the open status means the bypass switch of distribution cabinet opened.	Status detection, UPS will give an alarm when the bypass switch of the power distribution cabinet is disconnected.
	AC lightning protector status	Initial state is open and the close status means the lightning protector failed, and the open status means the lightning protector normal.	Status detection. The UPS will give an alarm in case of lightning protector fails.

Dry contact	Signal description	Status description	Function description
	External transformer over-temperature	Initial state is open and the close status means the external transformer over-temperature, and the open status means the normal temperature of the external transformer.	Status detection. An alarm is given in case of over-temperature in the external transformer
Output dry contact DO_1 ~ DO_6	Emergency alarm	Initial state is close and the close status means no emergency alarm of UPS, and the open status means the emergency alarm of UPS.	Output status information for the fault alarm of the equipment.
	Secondary alarm	Initial state is close and the close status means no secondary alarm of UPS, and the open status means the secondary alarm of UPS.	Output status information for the non-fault alarm of the equipment.
	Bypass power supply	Initial state is close and the close status means non-bypass power supply of UPS, and the open status means the bypass power supply of UPS.	Output the status information of the bypass power supply
	Battery power supply	Initial state is close and the close status means non-battery power supply of UPS, and the open status means the battery power supply of UPS.	Output the status information of the battery power supply
	Battery under-voltage DOD	Initial state is close and the close status means normal battery voltage of UPS, and the open status means the battery under-voltage of UPS.	Output the status information of the battery under-voltage
	Battery under-voltage EOD	Initial state is close and the close status means normal battery operation of UPS, and the open status means the battery discharge ended	Output the status information of the battery discharge
	Oil-machine control	Initial state is close and the close status means non-oil-machine control of UPS, and the open status means the oil-machine control of UPS	Main circuit input abnormal. Output oil-machine starting signal in battery mode.

Dry contact	Signal description	Status description	Function description
	Battery switch tripping	Initial state is close and the close status means the battery switch not tripped, and the open status means the battery switch tripped,	Act to open the battery switch so as to protect the battery before battery EOD powering off
	Bypass failure	Initial state is close and the close status means no bypass failure, and the open status means the bypass failure	Output the status information of the battery failure
	Fan failure	Initial state is close and the close status means no fan failure, and the open status means the fan failure	Output the status information of the fan failure
	Time-based powering off	Initial state is close and the close status means no time-based powering off, and the open status means the time-based powering off	Power failure in both main circuit and bypass. The battery supplies power to DOD, and the action signal is output.
Interface terminal TB1	BYP	Forcedly enable the bypass	Prevent the operation failure of UPS due to abnormal communication. By this function, the UPS may be forcedly switched to the bypass.
	BYP_COM	Forcedly switch the bypass enabling circuit	
	EPO_NO	Remote EPO opened normally	Remote EPO function
	EPO_NC	Remote EPO closed normally	
	EPO_COM	Remote EPO public terminal	
	VCC+48V	Externally connect with the positive pole of 48V battery	Used for external connection of the contactor.
	48V-GND	Externally connect with the negative pole of 48V battery	
	K5_FB+	External connect with the contact of the contactor	
	K5_FB-	External connect with the contact of the contactor	

Note:

- DI_1 ~ DI_6 refer to input dry contact interface 1 ~ 6, and DO_1 ~ DO_6 refer to output dry contact interface 1 ~ 6.
- No refers to normal open terminal and NC refers to the normal close terminal.
- The output dry contact DO_6 is a high-voltage output dry contact port, which can withstand up to 250Vac, and provides NC and NO interfaces.
- When the dry contact signal line of the external equipment is connected to the dry contact interface of UPS, it is necessary to ensure that the dry contact name on both ends of the cable corresponds to each other completely.
- When connecting remote EPO, NO signal terminal is recommended to avoid UPS power failure caused by

abnormal connection cable. In order to avoid misoperation, emergency stop button shall be protected by anti-misoperation cover plate, and connecting cable shall be protected through pipe. It is recommended that the cable diameter is not less than 1.5 mm^2.

- If the normally closed remote EPO contact is not used, the pins EPO_NC and EPO_COM on TB1 must be shorted by the jumper.
- The input dry contact DI_6 is the firmware trigger signal of self-aging mode, which cannot be set by the user.
- For the external battery switch, the output switch, the maintenance bypass switch, the auxiliary switch contact should be connected to the input dry contact to show the switch status.

Communication signal interface

The communication with external devices can be realized through the communication signal interface, so as to monitor and manage UPS and other functional interaction. The functions of the communication signal interfaces are shown in Table 3-8.

Table 3-8 Function of communication signal interfaces

Signal interface	Panel silk-screen	Function description
USB interface	USB	Connect to local host via USB to locally monitor communication.
RS485 interface	RS485	Connect to local host via RS485 to locally monitor communication.
RS232 interface	RS232	Connect to local host via RS232 to locally monitor communication.
Battery inspector interface	RS485	Connect the battery inspector by RS485 to achieve the status inspection of the single battery
	CAN	Connect the battery inspector by CAN to achieve the status inspection of the single battery
NET interface	NET	Connect the local host through NET network port to debug and conFig. UPS.
Battery temperature sensor interface	BAT TEMP	Connect the battery temperature sensor through RJ45 interface to realize the detection of battery temperature.
USB device interface	USB HOST	Connect USB device (USB disk, etc.) through USB to upload program to realize online program upgrade, or download history log.
Monitoring display unit interface	HMI	Connect the monitoring display unit by DB9 interface to realize the control and state display of UPS.

Optional function card for smart card slots

Optional smart cards: SNMP card, GPRS card, WIFI card, etc.

The smart card is installed in the optional card slot of UPS, which supports hot plugging and features easy installation. The operation procedures are as follows:

Step 1: insert the required smart card into the slot.

Step 2: lock the smart card with the previously removed screws.

- SNMP card is compatible with today's popular Internet software and firmware and network operating system so that the UPS has function to directly access the Internet and provide real-time UPS data and power supply information. Through various network management systems for communication and management, the network communication can be realized for multiple UPSs to facilitate centralized monitoring and management of each UPS. Please refer to the attached operating instructions for details.
- GPRS card allows UPS to access the Internet and perform data connection with the server through GPRS

data (local SIM card is required). UPS can be monitored online through computer or mobile phone. For details, please refer to the attached operating instructions.

- WIFI card allows UPS to access the Internet and perform data connection with the server through WIFI. UPS can be monitored online through computer or mobile phone. For details, please refer to the attached operating instructions.

3.3 Installation of Parallel UPS

3.3.1 Connection of Power Cable

The specific wiring process is described as follows: as shown in Fig. 3-19.

Step 1: properly install the AC input cable and battery cable of each UPS for the parallel system according to 3.2.4.

Step 2: ground the individual equipment of each parallel system separately.

Step 3: connect the mains input of UPS to mains 1 and 2 respectively, and connect the batteries to the battery pack 1 and the battery pack 2 respectively. Connect the bypass input and the load output in parallel, and respectively connect bypass power supply and load.

The wiring diagram for power cable of parallel system is shown in Fig. 3-19.

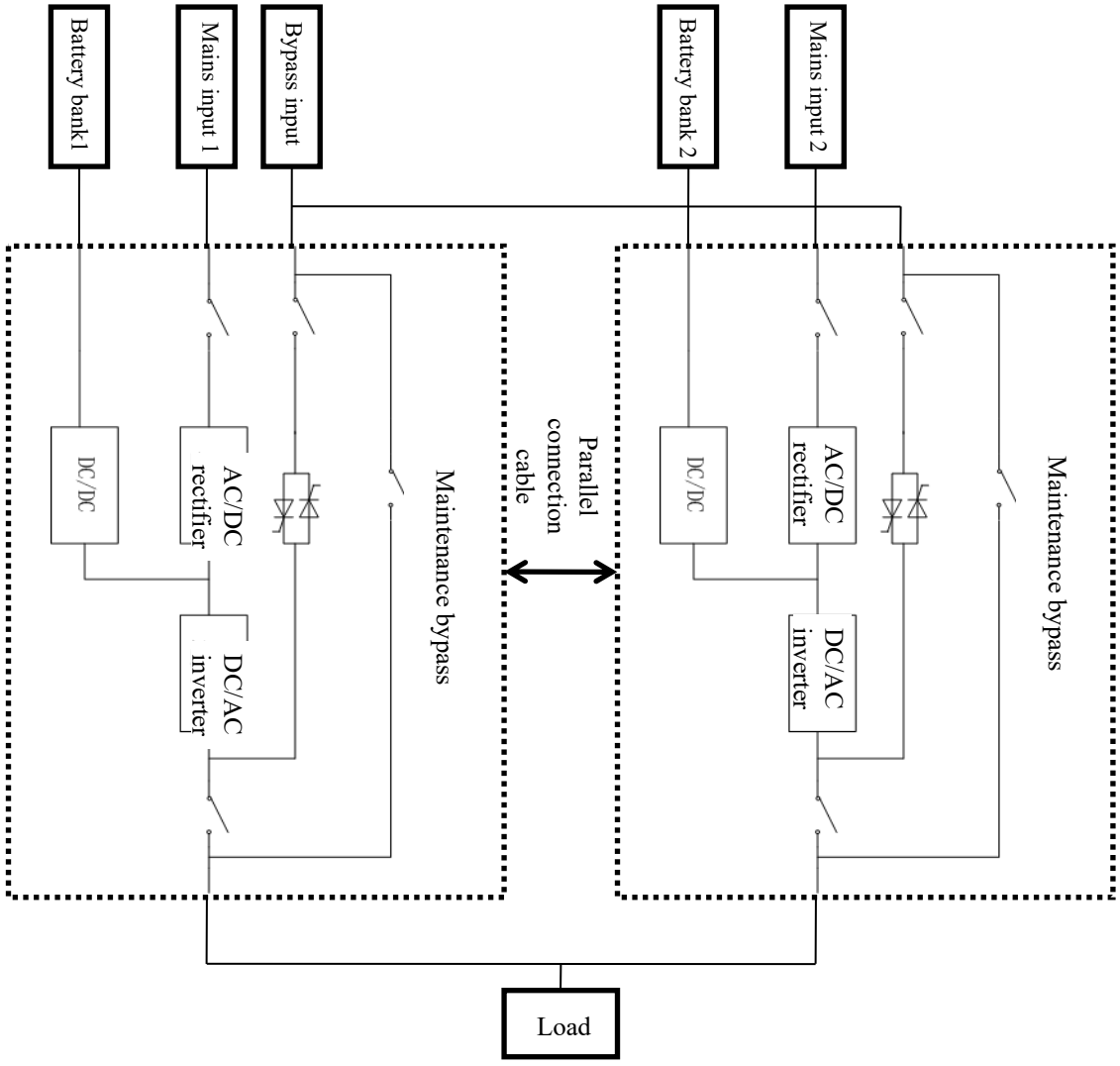


Fig. 3-19 Wiring diagram for power cable of parallel system

Note:

- If the parallel system shares the battery pack, it is required to be set a shared battery pack in the system.
- During wiring, use the power cables to connect the distribution terminals of each UPS one by one according to the corresponding relationship of silk screen identification.
- Use same length and specification of the power cable as far as possible, so that the bypass mode can achieve the current sharing effect. See Fig. 3-20.

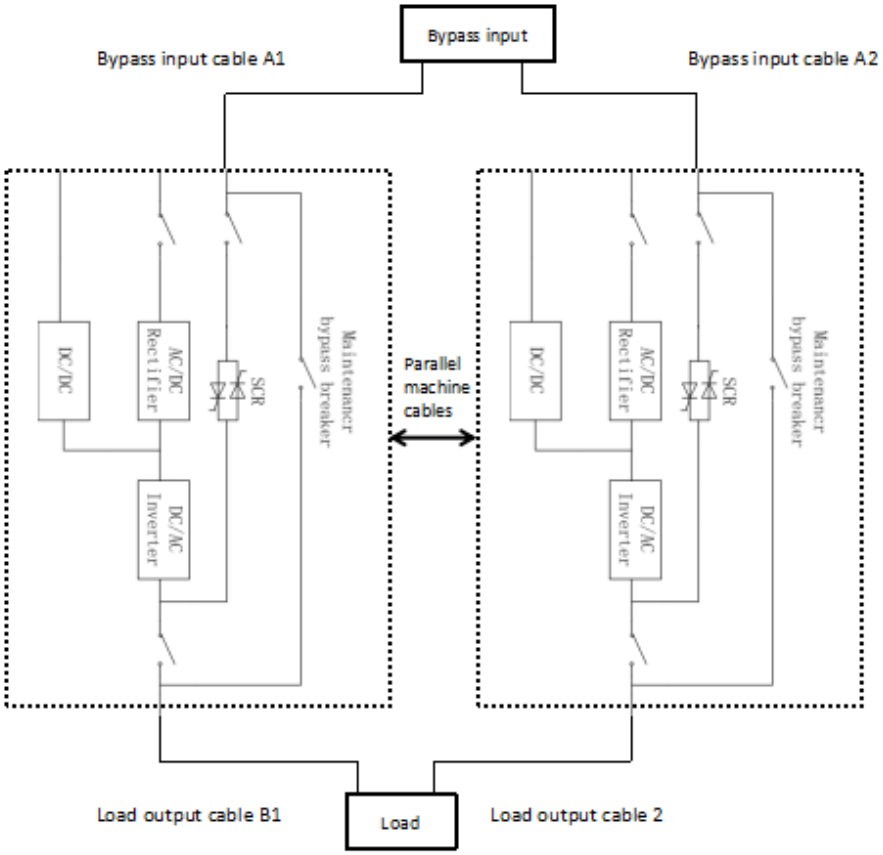


Fig. 3-20 Bypass current equalizing cable connection

3.3.2 Connection of Control Cable

Connection of parallel control cable

Use the parallel control cable to connect the parallel interface of each UPS in the parallel system into a loop. Taking the 3-equipment parallel system as an example, the wiring diagram is shown in Fig. 3-21.

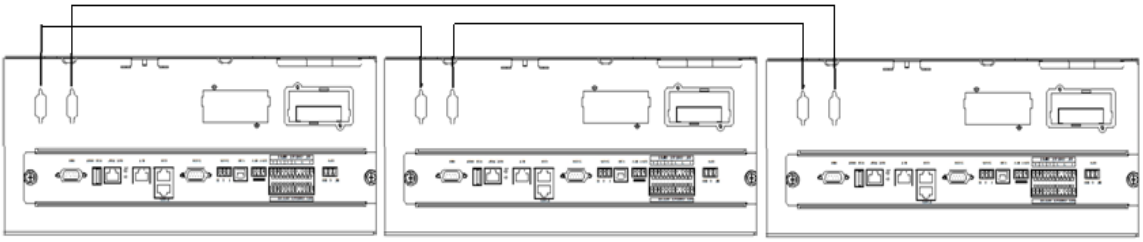


Fig. 3-21 Wiring diagram for 3 parallel UPS units

Connection of other control cable

According to "3.2.5 Communication Signal Interface", connect the control cables of each single UPS in the parallel system.

Schematic diagram of EPO wiring is shown in Fig. 3-22 and Fig.3-23

Fig. 3-22 shows the separate EPO control wiring diagram of the parallel system, that is, when EPO isperformed on one of the UPS, other UPS are normally running.

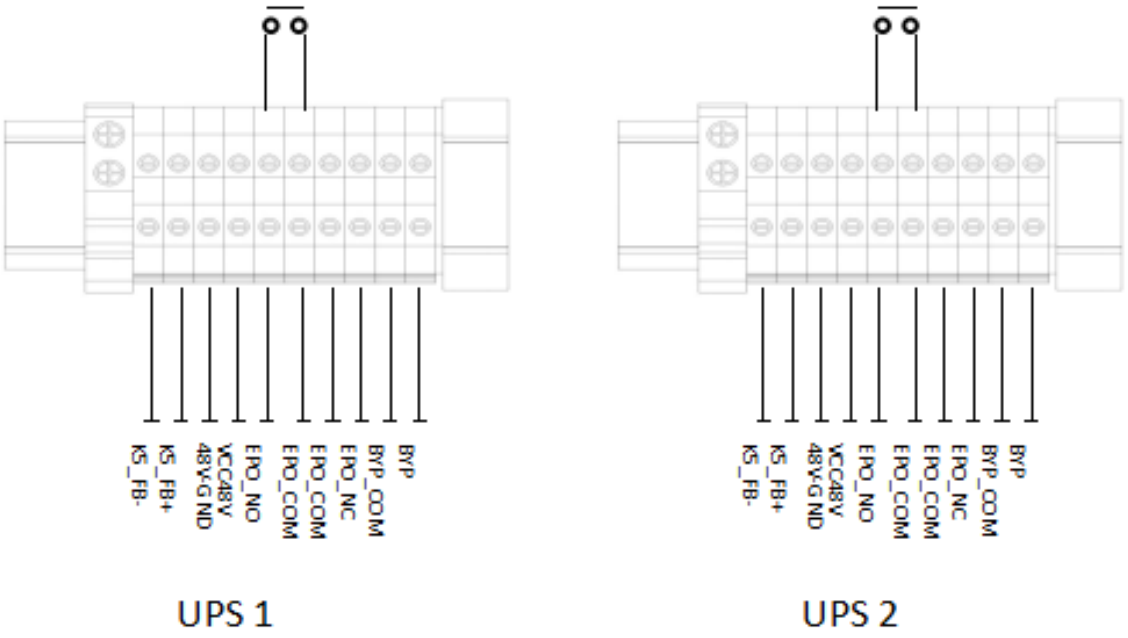


Fig.3-22 EPO separate control wiring diagram of the parallel system

Fig.3-23 is the EPO general control wiring diagram of the parallel machine system, that is, all UPS in the parallel machine system are shut down in an emergency when EPO operation is carried out on the parallel machine system

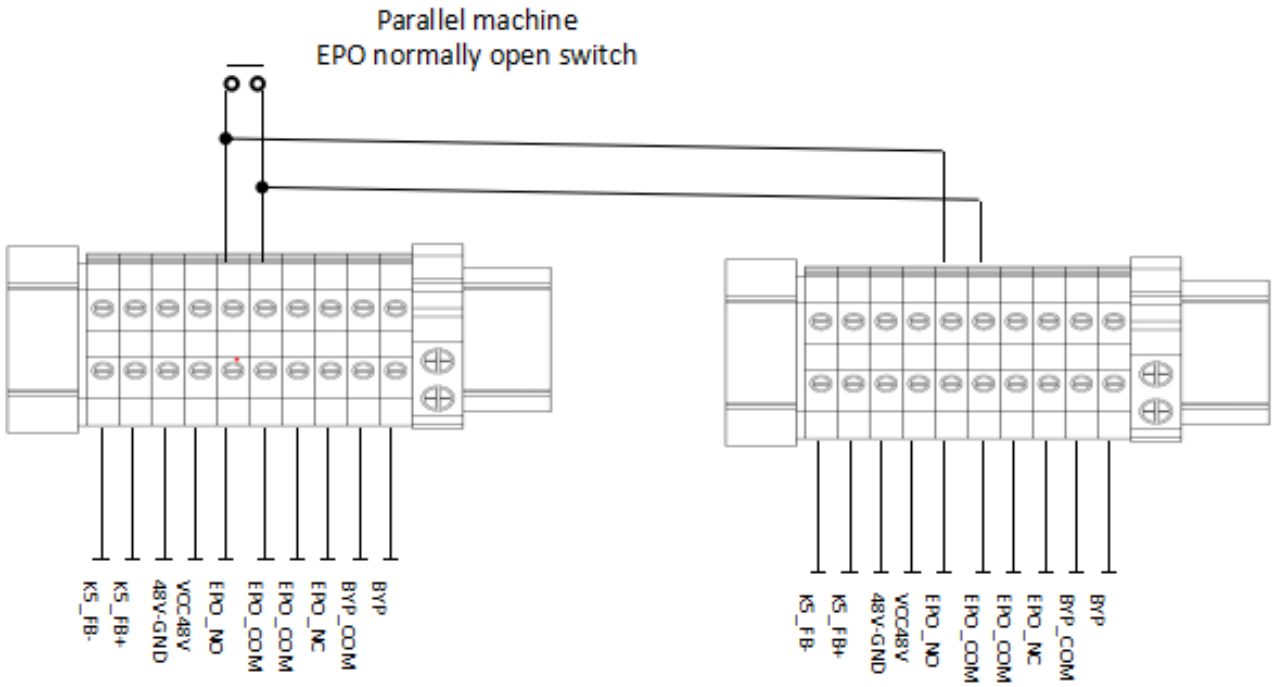


Fig. 3-23 EPO general control wiring diagram of the parallel machine system

The wiring diagram for auxiliary contact of the battery switch is shown in Fig. 3-24

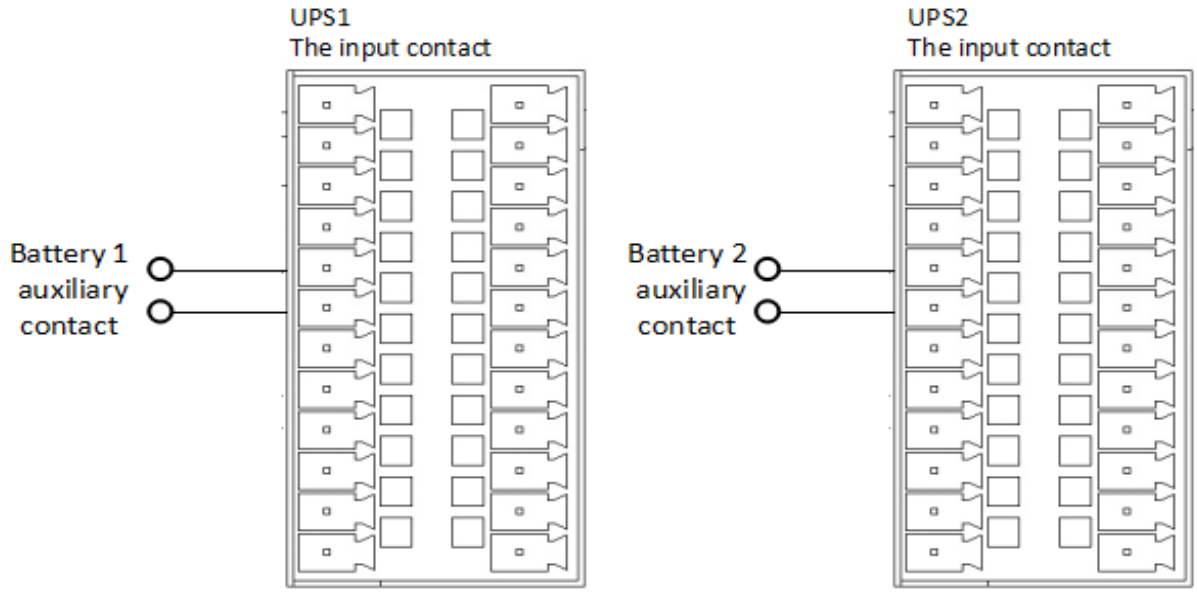


Fig. 3-24 wiring diagram of auxiliary contact of battery switch

The wiring diagram of forced bypass dry contact is shown in Fig. 3-25.

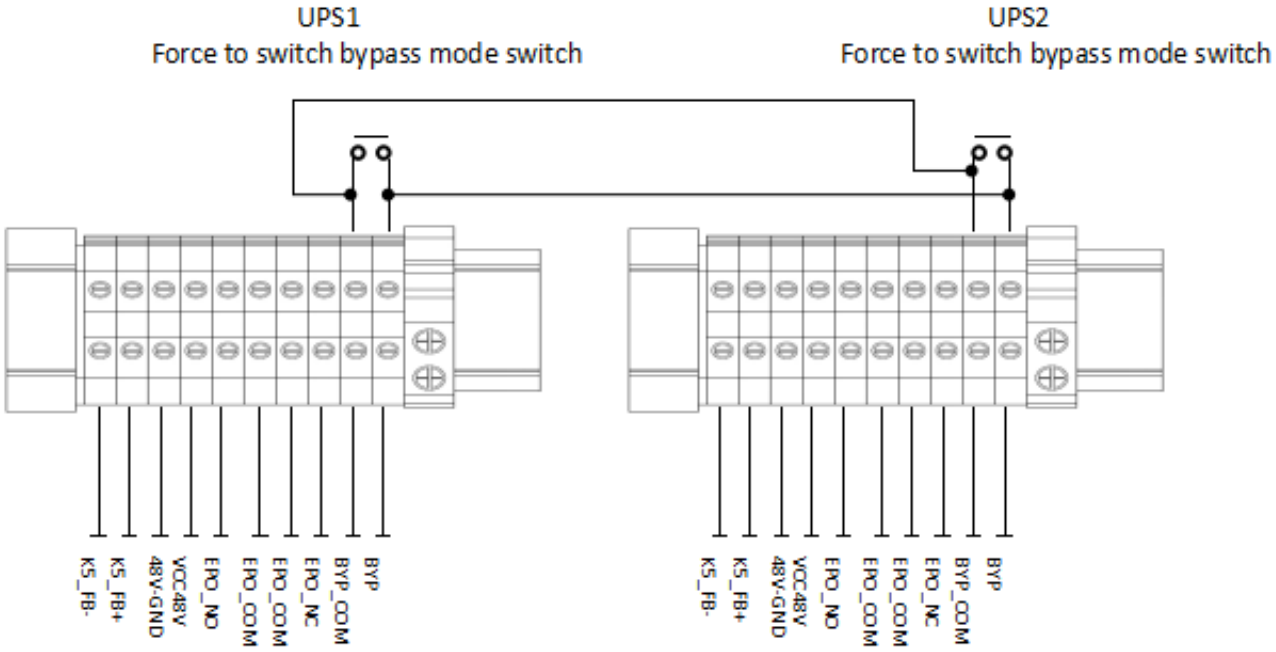


Fig. 3-25 wiring diagram of forced bypass dry contact

3.4 Installation Inspection

The inspection items and acceptance criteria are shown in Table 3-9.

Table 3-9 Inspection items and acceptance criteria

No.	Inspection items	Acceptance criteria
1	Inspect whether the system configurations are consistent with the shipped those	The field system model and number of units should be consistent with those specified in the contract.

No.	Inspection items	Acceptance criteria
2	Inspect whether during the cable layout, the wiring of other systems is considered.	Reasonable layout of cables, and compliance with construction requirements.
3	Check whether the input cable, the output cable and the interbattery connection cable are tightly connected.	All cable connections should not be loose. During tightening the screws, make sure that the spring pad is flattened to prevent falling off or safety accidents, and ensure that there is no circuit breaking or hidden danger.
4	If a remote management device is used, inspect whether the connection of the relevant serial port (which supports security protection mechanism) is correct.	The control cable must be properly connected and tightened.
5	Check cable markings for clarity and accuracy.	Both ends of the cable should be labeled, and the label should be concise and easy to understand.
6	Check whether the ground wire of UPS is connected to the ground wire row of the machine room, and whether the ground wire connection is reliable.	Lead to the grounding bar in the machine room, and connect firmly.
7	Check each cable connection.	Check for correct cable connection according to the circuit diagram
8	Check whether the input wire and null wire are inverted.	Live and null wires must be correctly connected.
9	For single UPS, check whether the phase sequence of input line is correct; for parallel UPS, check whether the main and bypass inputs and outputs of each UPS are consistent with phase sequence.	For single UPS, input phase sequence of UPS is correct; for parallel UPS, the main and bypass inputs and outputs of each UPS are consistent with phase sequence.
10	Check the running environment.	Remove electrical conductive dust and other sundries inside and outside cabinet.
11	Check the short circuit between copper bars.	Use a multimeter to measure the short circuit between copper bars.

4 Monitoring Display Interface

4.1 Description of Monitoring Display Panel

The monitoring display panel is used to set the functional parameters of UPS, control the operating state of UPS and monitor the operation of UPS. This chapter will introduce the use and functions of the monitoring panel. Taking EA99500-SP as an example, the position of the monitoring panel is shown in Fig. 4-1:

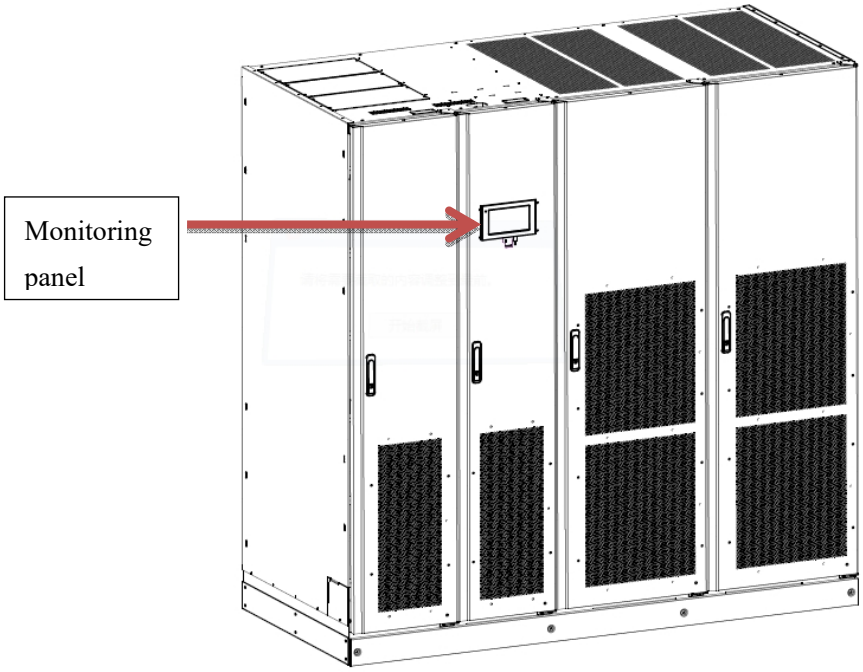


Fig. 4-1 Monitoring panel

4.1.1 Appearance of Monitoring Panel

The appearance of the monitoring panel is shown in Fig. 4-2:

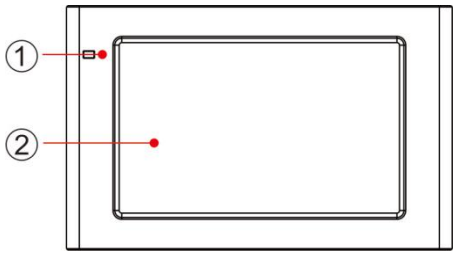


Fig. 4-2 Schematic diagram for monitoring display unit panel

①LED indicator light ②LCD display touch screen

4.1.2 LCD and Indicator Lamp

The monitoring display unit displays all kinds of operation information and alarm information of UPS in real time through LCD, and can set and manage parameters of UPS through LCD.

The indicator light status of the monitoring display unit is shown in Table 4-1.

Table 4-1 Indicator light status

Indicator light	Color	Status	Description
Indicator light	Red	Always illuminated	UPS failure
	Red	Flash	UPS alarm
	Green	Illuminated	Power supply mode (mains mode, bypass mode, ECO mode, etc.)
	None	Off	Not started or in standby mode

4.2 Menu Structure

Note:

The menu contents in this section include user right and maintenance engineer right. After logging in the user password, only some menu functions are displayed. Therefore, the users should change and set UPS according to the actual situation.

The menu structure of the monitoring display interface is shown in Fig. 4-3.

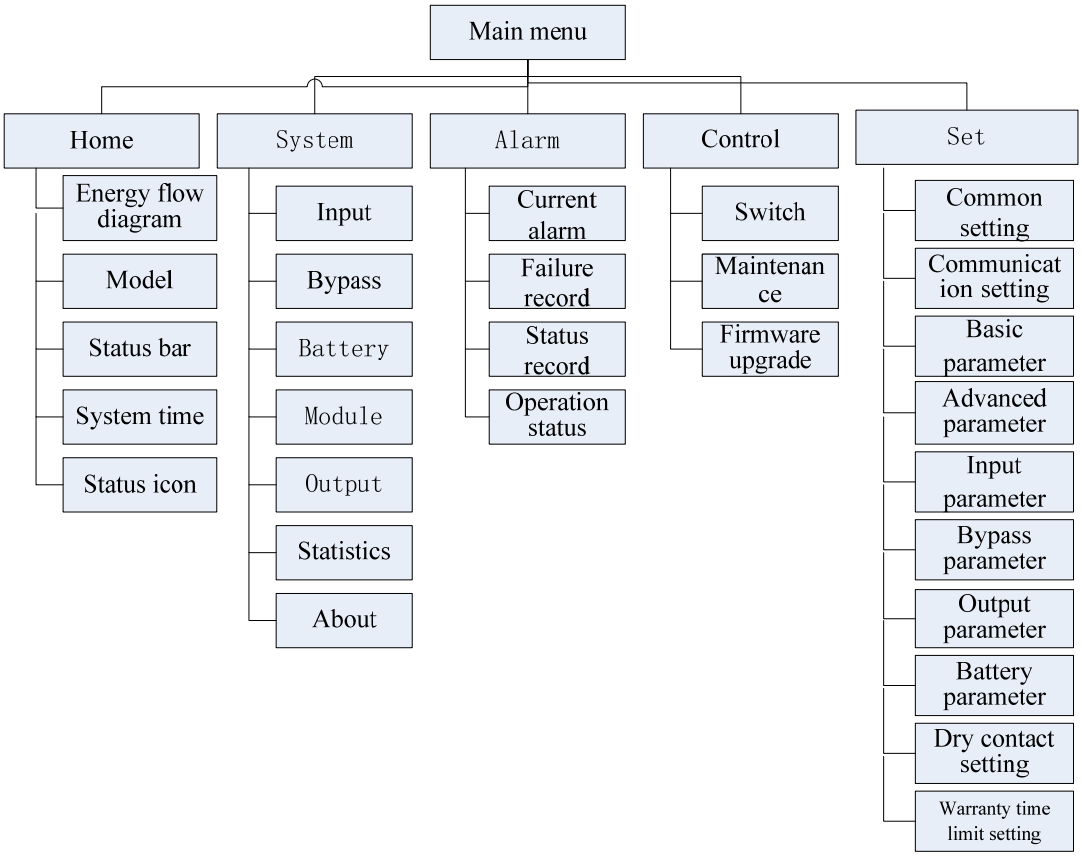


Fig. 4-3 Menu structure

4.2.1 Starting for First Time

Upon starting for first time, or restarting after restoring factory setting, Quick Settings are available, as shown in Fig. 4-4. The specific quick setting interfaces include language setting, display setting, system setting 1 and system setting 2. You can also skip the quick setting directly. Please refer to "4.2.6 Settings" for instructions and suggestions on setting items.

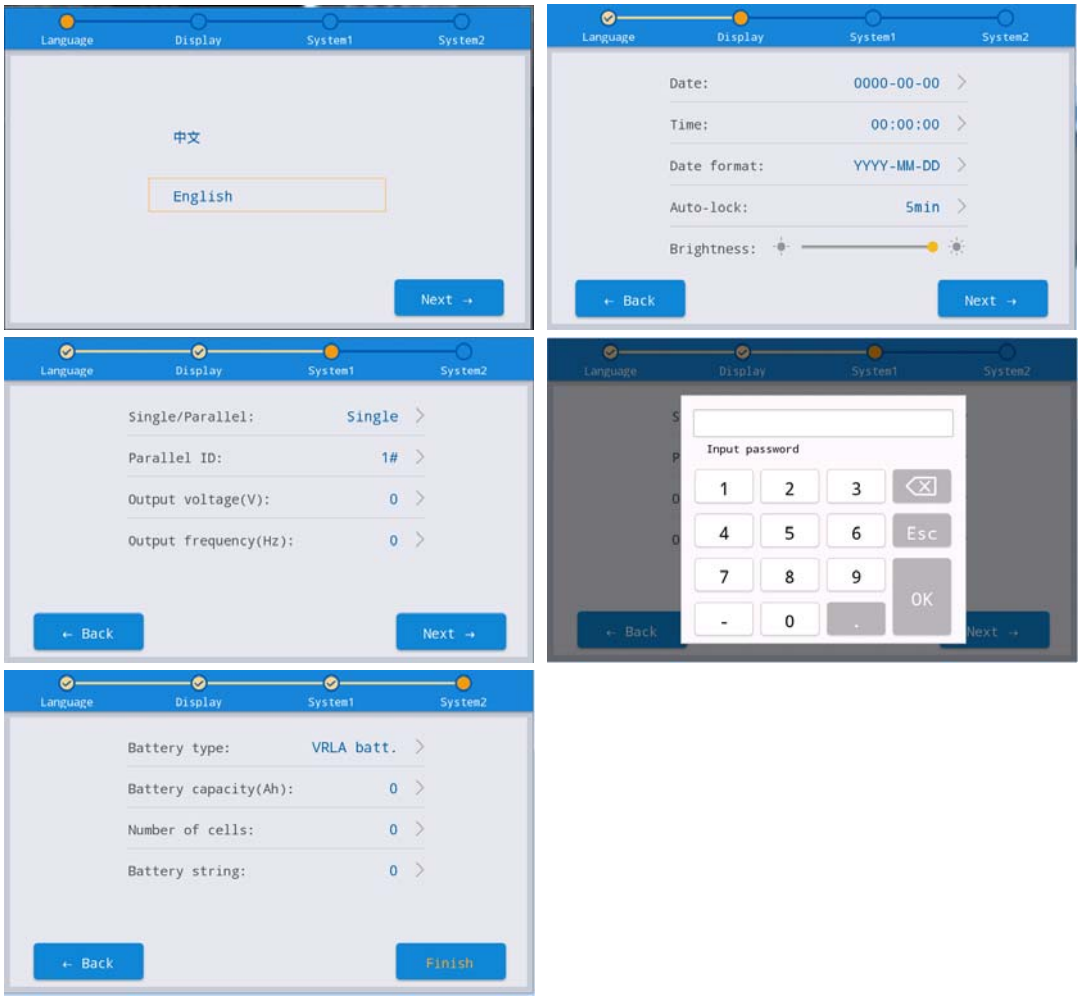


Fig. 4-4 quick settings

Enter the home page after the quick setting.

4.2.2 Home

The monitoring home page is divided into three parts: main menu, energy flow diagram and status bar. The main interface is shown in Fig. 4-5:

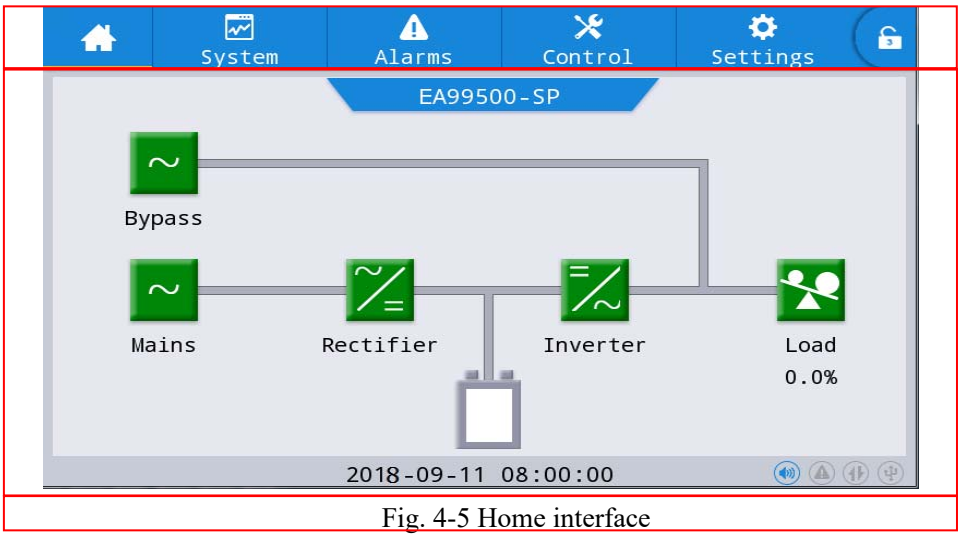


Fig. 4-5 Home interface

Table 4-2 Function description of interface area

No.	Area	Function description
1	Main menu	Level 1 menu, including home page, system, alarm, control, settings, password login, where the control and settings are in gray before login in the password.
2	Energy flow diagram	Display the energy flow status of the cabinet. Click the corresponding work interface to enter the viewable status information.
3	Status bar	Display the working status, system time, buzzer status, Alarm statuss, HMI and monitoring communication status, USB status of the cabinet.

Table 4-3 Status bar icon description

Icon	Function description
	Beeper state. ON means the beeper enabled, and OFF means the beeper disenabled.
	Alarm status. On means the current alarm, and Off means no alarm currently .
	HMI communication status: On indicates normal communication between HMI and monitoring module; Off indicates abnormal communication between HMI and monitoring module.
	USB connection state. On indicates that the USB device is connected normally, and Off indicates that the USB device is not connected or the connection is abnormal.
	Password login/logout key. Click to enter the user password or maintenance password on the keyboard. It will be locked automatically after screen locking.

Table 4-4 Description of password permissions

Password permissions	Default	Function description
User password	123456	Unlock the ON/OFF control right, unlock common settings and communication setting right. It can be modified in "Settings - Common - User password", as shown in Fig. 4-6.
Maintenance password	Not open	Unlock all controls and setting rights. Used only by qualified authorized professional engineers.

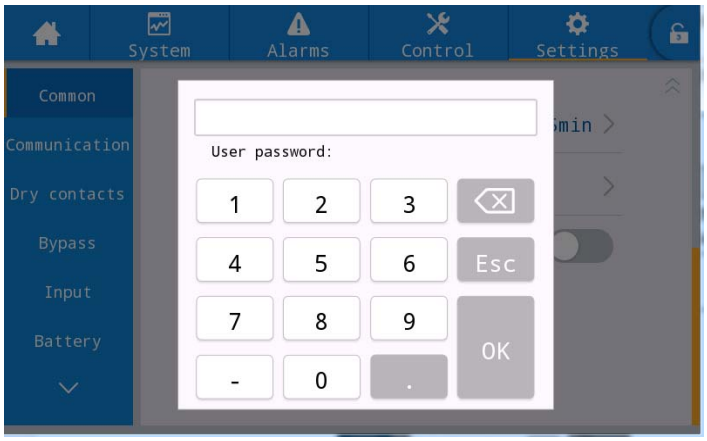


Fig. 4-6 user password settings

4.2.3 System

In the system" information interface, you can query the "Mains", "Bypass", "Battery", "Module", "Output", "Statistics" and "About" information of the system in the two-level menu on the left.

Mains

The mains input menu interface is shown in Fig. 4-7, and ABC three-phase information is shown from left to right respectively. The interface description is shown in Table 4-5.

Fig. 4-7 Input interface

Table 4-5 Description of input interface

Display item	Description
Voltage (V)	Phase voltage of mains input
Current (A)	Phase current of mains input
Frequency (Hz)	Frequency of mains input

Bypass

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

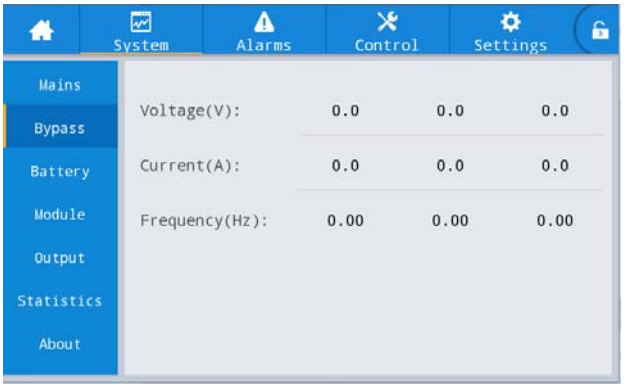


Fig. 4-8 Bypass interface

Table 4-6 Description of bypass interface

Display item	Description
Voltage (V)	Phase voltage of bypass input
Current (A)	Phase current of bypass input
Frequency (Hz)	Frequency of bypass input

Battery

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

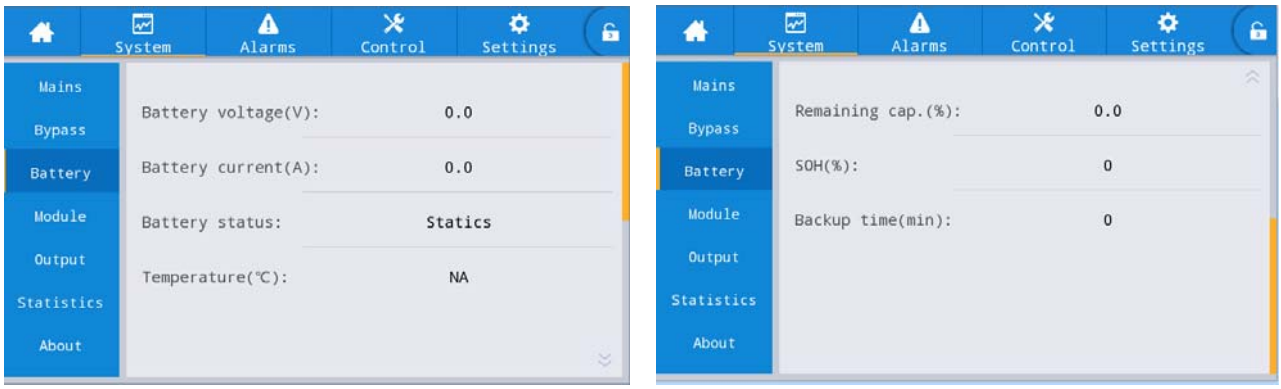


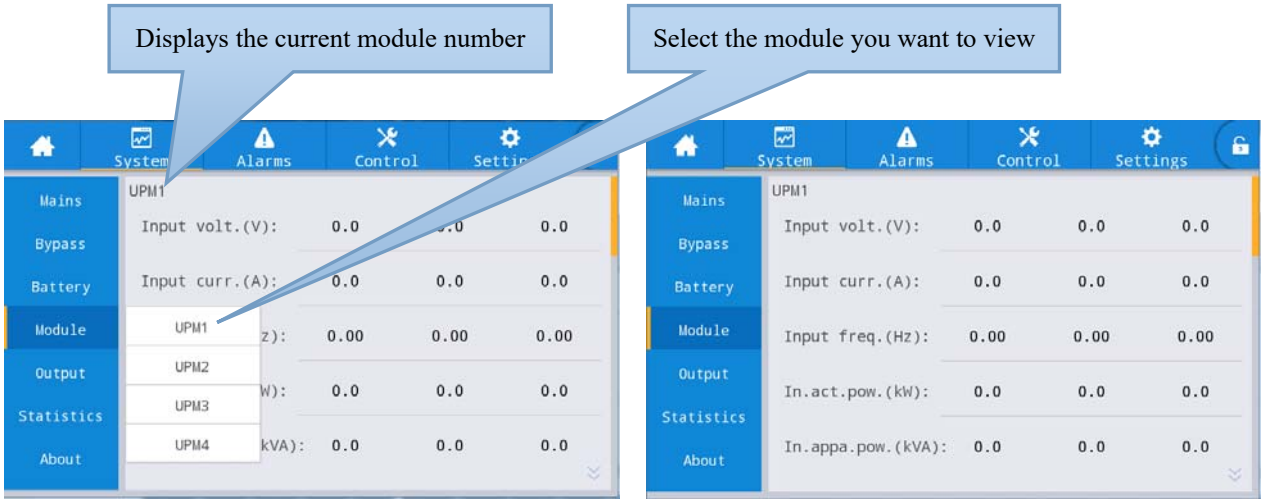
Fig. 4-9 Battery interface

Table 4-7 Description of battery interface

Display item	Description
Battery voltage (V)	Voltage of battery pack
Battery current (A)	Current of battery pack
Battery status	Current battery status: standby, charging, discharging
Remaining cap.(%)	Current residual battery capacity
Backup time (min)	Estimated discharging time of battery at current load
Temperature (℃)	Current operation temperature of battery (battery temperature sensor is required, and "NA" is displayed when not connected).
SOH (%)	Percent of battery health

Module

The built-in information of each power module is displayed. The module menu interface is shown in Fig. 4-10, and the interface description is shown in Table 4-8.



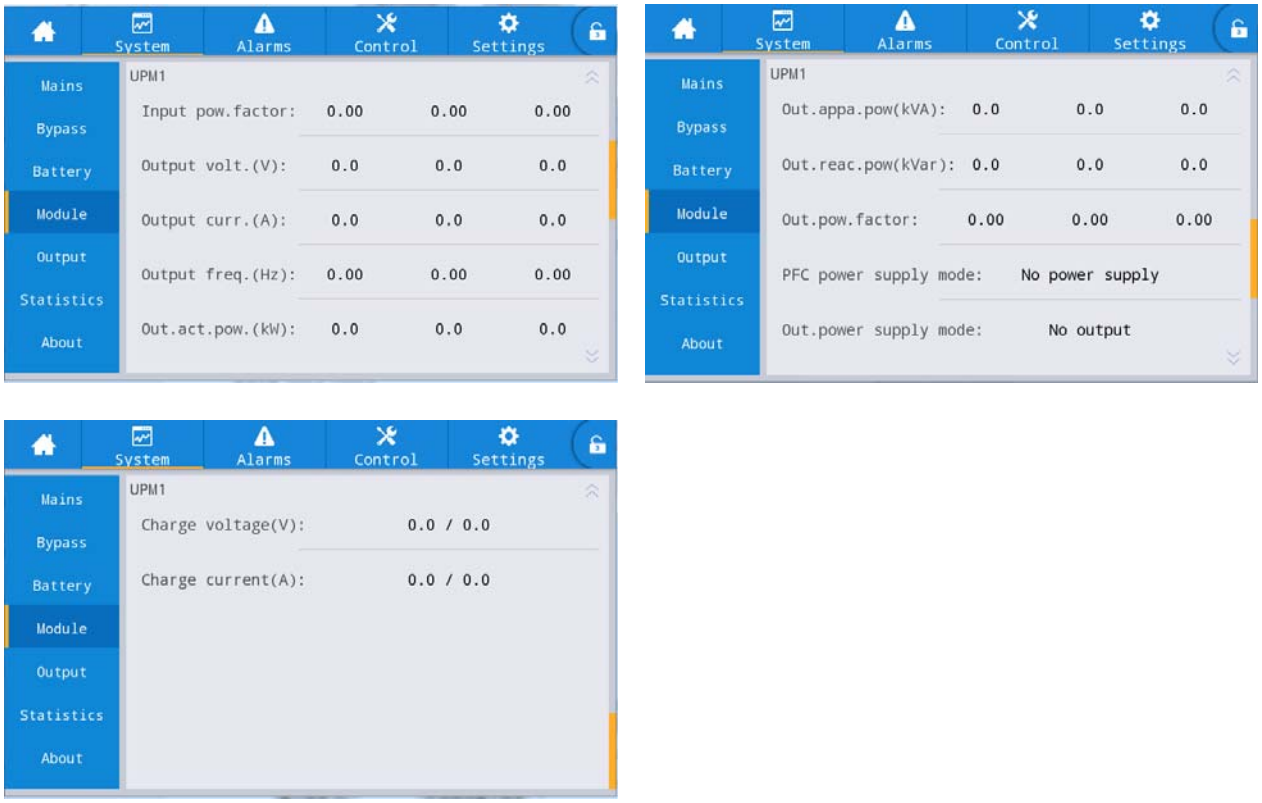


Fig. 4-10 Module interface

Table 4-8 Description of module interface

Display item	Description
Input volt.(V)	Input phase voltage of selected module of selected module
Input curr.(A)	Input phase current of selected module
Input freq.(Hz)	Input frequency of selected module
In.act.pow.(kW)	Input active power of selected module
In.appa.pow.(kVA)	Input apparent power of selected module
Input pow.factor	The ratio of input active power to input apparent power of selected module
Output volt.(V)	Output phase voltage of selected module
Output curr.(A)	Output phase current of selected module
Output freq.(Hz)	Output frequency of selected module
Out.act.pow.(kW)	Output active power of selected module
Out.appa.pow (kVA)	Output apparent power of selected module
Out.reac.pow(kVar)	Output reactive power of selected module
Out.pow.factor	Ratio of active power output to apparent power output of selected module
PFC power supply mode	Rectifier work mode: no power supply, mains supply, battery power supply, combined power supply.
Charge voltage (V)	Measured charging voltage of selected module
Charge current (A)	Measured charging current of selected module

Output

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

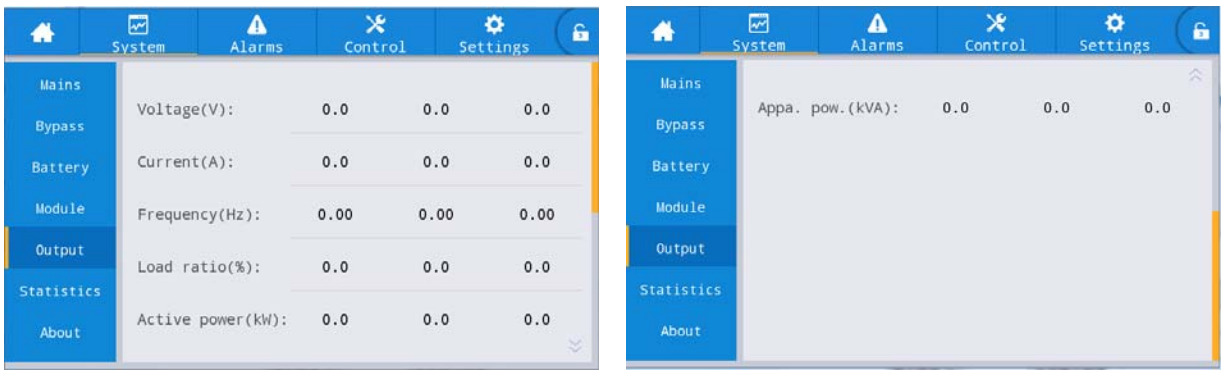


Fig. 4-11 Output interface

Table 4-9 Output interface description

Display item	Description
Voltage (V)	AC output phase voltage
Current (A)	AC output phase current
Frequency (Hz)	AC output frequency
Load ratio (%)	Ratio of all load for UPS, i.e. ratio of actual power to rated power
Active power (kW)	Output active power of UPS
Appa. pow.(kVA)	Output apparent power of UPS

Statistics

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

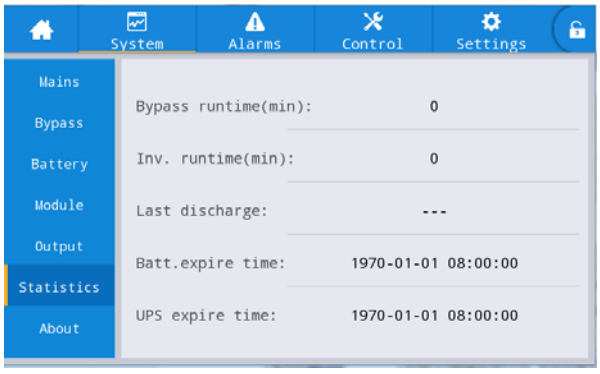


Fig. 4-12 Statistical interface

Table 4-10 Description of statistical interface

Display item	Description
Bypass runtime (min)	Accumulative running time of UPS in the by-pass output state
Inv. runtime (min)	Accumulative running time of UPS in the inverter output state
Last discharge	Date and time of the last time UPS discharging
Batt.expire time	The system time exceeds the warranty time limit, and the status bar prompts the battery warranty information.
UPS expire time	The system time exceeds the warranty time limit, and the status bar prompts the UPS warranty information.

About

The about menu interface is shown in Fig. 4-13, and the interface description is shown in Table 4-11.

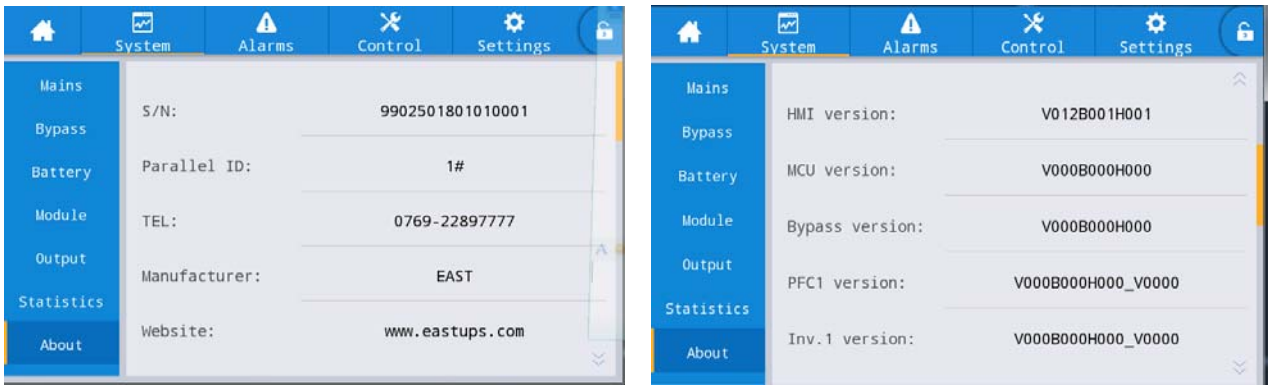


Fig. 4-13 About interface

Table 4-11 Description of about interface

Display item	Description
S/N	Serial number of UPS
Parallel ID	Used for differentiating the cabinet in the parallel system
TEL	Telephone of after-sale service supplier
Manufacturer	Manufacture of UPS
Website	Website of manufacturer
HMI version	program version of HMI display system
MCU version	program version of monitoring system
Bypass version	program version of power bypass system
PFC1 version	program version of power rectifier system
Inv.1 version	program version of power inverter system

4.2.4 Alarms

In the "Alarms" information interface, you can select "Active alarm", "Fault record", "Status record" and "Operating record" from the second-level menu in the lower left corner. The alarm menu interface is shown in Fig. 4-14.

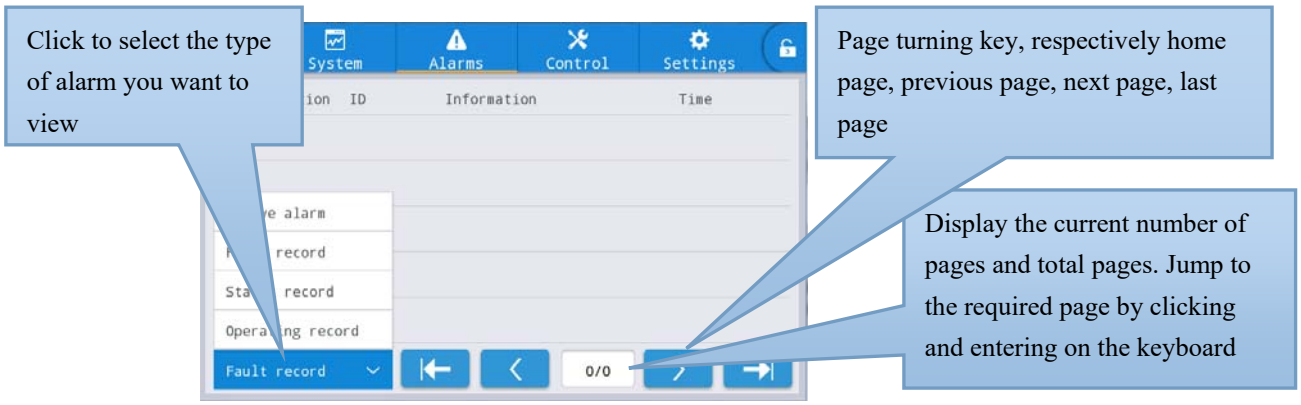


Fig. 4-14 Alarm menu interface

Active alarm

The active alarm interface displays the relevant information of the current UPS system in alarm, as shown in Fig. 4-15, and the interface description is shown in Table 4-12.

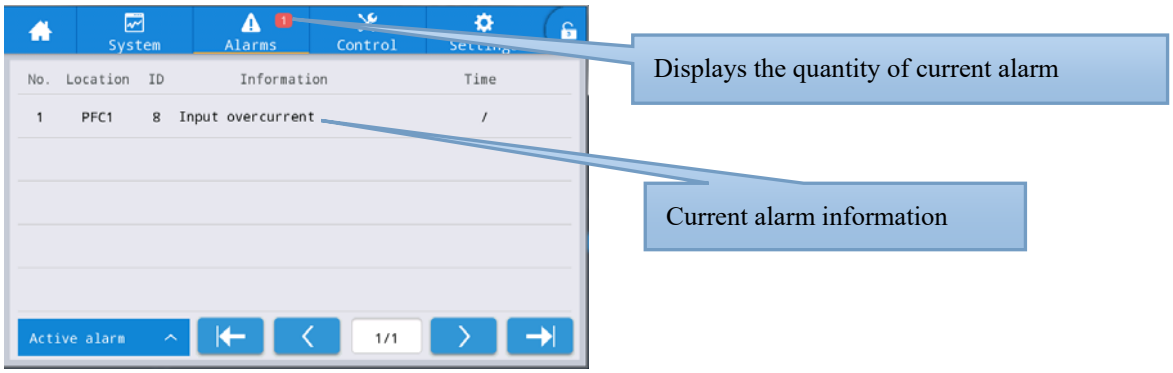


Fig. 4-15 Current alarm interface

Table 4-12 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, used to analyze the program.
Information	Current alarm name
Time	The current alarm is for the information of the alarm that the UPS is giving, and the time is not displayed.

History record

The history log is divided into "Fault record", "Status record" and "Operating record". Taking the fault record as an example, the history log interface is shown in Fig. 4-16, and the interface description is shown in Table 4-13.

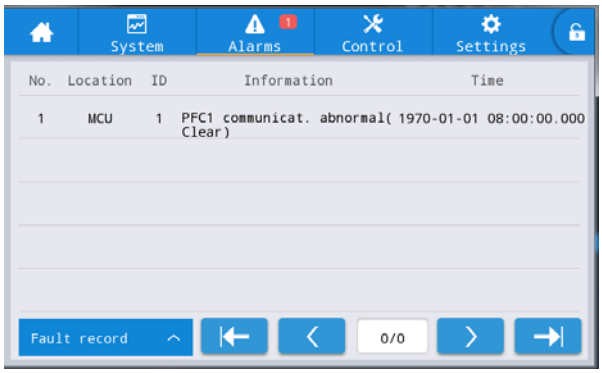


Fig. 4-16 History log interface

Table 4-13 Description of history log interface

Display item	Description
No.	Record number. The records are in reverse order, meaning the most recent records come first.
Location	Display the module number of the current record source.
ID	A numbered list of fault, status, or operational information, used for analyzing programs.
Information	Current record name and record status (occurrence and disappearance)
Time	Record occurrence and disappearance time

4.2.5 Control

In the "Control" information interface, you can select relevant operations from the secondary menu on the left, which includes "On-Off", "Maintain" and "Upgrade".

On-Off

The On-Off menu interface is shown in Fig. 4-17, and interface description is shown in Table 4-14.

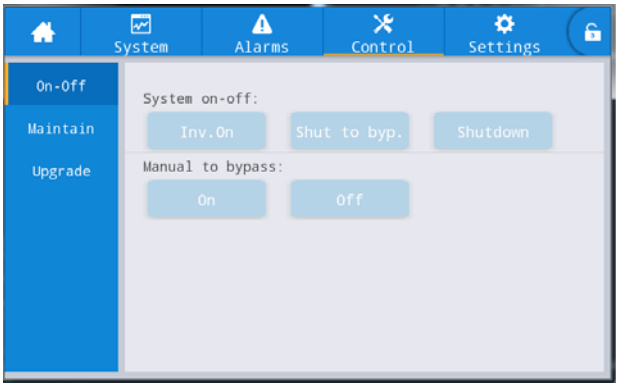


Fig. 4-17 On-Off interface

Table 4-14 Description of On-Off interface

Control item	Description
System On-Off	Including “Inv.On” “Shut to byp.”, “Shutdown”. Gray when clicking is invalid.
Manual to bypass	Including “On” and “Off”, Gray when clicking is invalid. If the bypass is abnormal, the UIPS does not switch to the bypass.

Maintenance

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

Fig. 4-18 Maintenance interface

Table 4-15 Description of maintenance interface

Control item	Description
UPM on-off	Control On and Off of each online module
Charger on-off	Control On and Off of each online module charger
Equalized-float charging	Including the forced equalizing charge, forced floating charge, cancel forced equalizing and floating charge. Generally only used when battery abnormality is checked for maintenance.
Self-check	Including self-check by time, self-check by voltage, SOH calibration, cancel self- check.
Maintain	Including factory recovery, buzzer mute, clear record, clear fault.
USB operations	Including export history (export Excel document), import LOGO (import boot animation).

Firmware upgrade

The firmware upgrade menu interface is shown in Fig. 4-19, and the interface description is shown in Table 4-17.

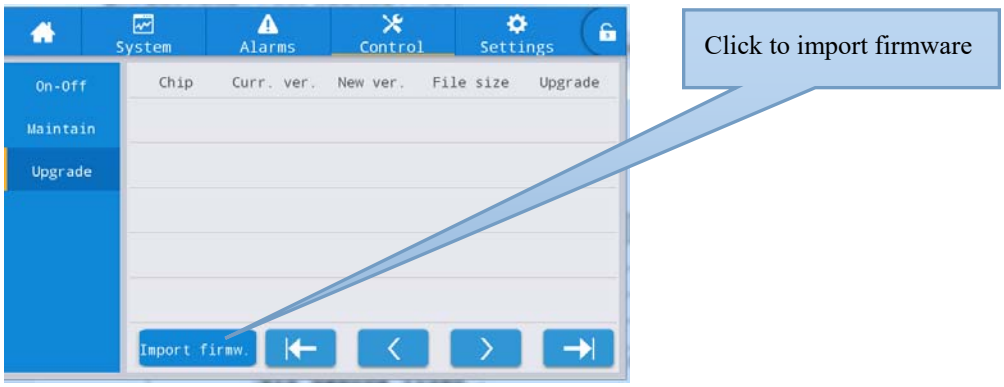


Fig. 4-19 Firmware upgrade interface

Table 4-17 Description of firmware upgrade interface

Display item	Description
Chip	Display online chip name.
Curr. ver.	Display the current program version of the chip.
New ver.	Chip program version of firmware package.
File size	Chip program file size of firmware package.
Upgrade	When the chip file of the firmware package is verified successfully, the upgrade key is displayed and clicked to upgrade. When file validation fails, the upgrade key is hid, and do not allow upgrade.

4.2.6 Settings

Common setting

The common setting menu interface is shown in Fig. 4-20, and interface description is shown in Table 4-18

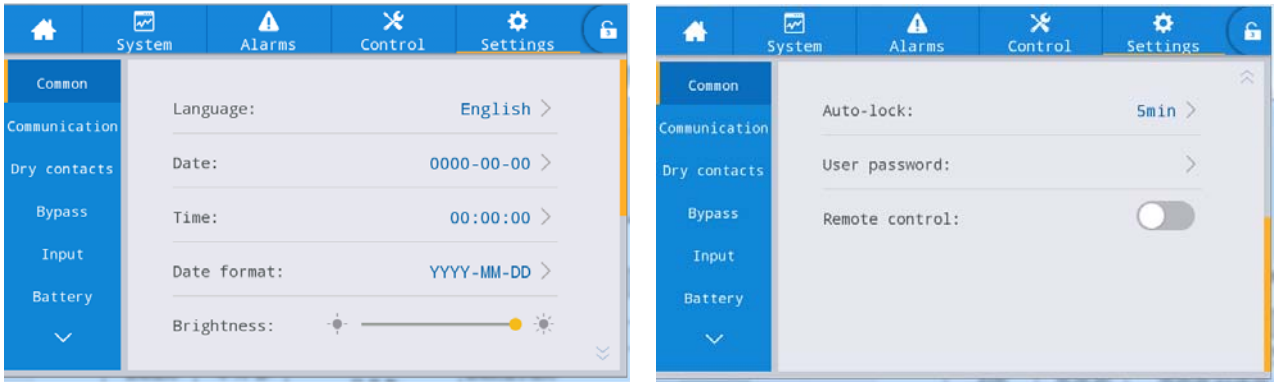


Fig. 4-20 Common setting interface

Table 4-18 Description of common setting interface

Setting item	Default	Selectable value	Description
Date	2016-01-01	2000-01-01~2099-12-31	Set current date
Time	00:00:00	00:00:00 ~ 23:59:59	Set current time
Date format	Y-M-D	Y-M-D, M-D-Y, D-M-Y	Date display format
Brightness	Maximum	0% ~ 100%	Adjust backlight brightness and slide it for adjustment.
Auto-lock	5min	0 ~ 30min	The time required for screensaver. 0 indicate no screensaver
User password	123456	0 ~ 99999999	The users can change the password, password can be set to 1 to 8 digits or letters or their combination
Remote control	Off	On/Off	For the user version MODBUS protocol 03 function code settings table; if enabled, the control items "Buzzer Off", "System on-off" and system clock in the table support remote setting; if disenabled, remote control is not supported

Communication

The communication setting menu interface is shown in Fig. 4-21, and the interface description is shown in Table 4-19.

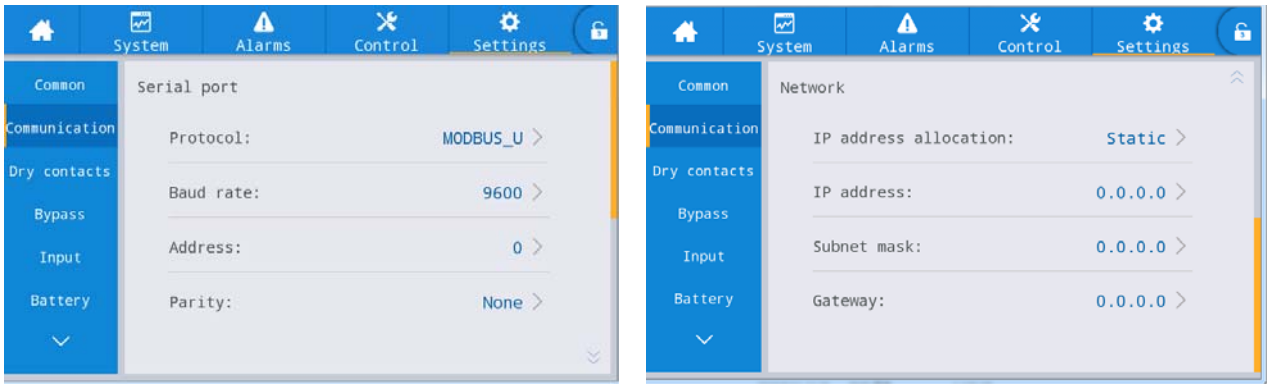


Fig. 4-21 Communication setting interface

Table 4-19 Description of communication setting interface

Setting item	Default	Selectable value	Description
Protocol	MODBUS_U	MODBUS_U/ MODBUS_R/ MEGATEC	Protocol, baud rate, address, verification and other settings are set for serial ports, including USB interface, RS232 interface, RS485 interface. The users can set corresponding settings according to the requirements of monitoring software, but the settings in monitoring software should be consistent with those in UPS communication settings
Baud rate	9600	2400/4800/9600/14400 /19200/38400	
Address	1	1 ~ 247	
Parity	None	None/Odd/Even	
IP address allocation	Auto (DHCP)	Auto (DHCP)/Static	IP allocation mode, IP address, subnet mask, gateway and other settings are set for the network port. When UPS connects to the router, it can be set to dynamic and the router will automatically allocate the address. When UPS is connected directly to the computer, it is necessary to select static allocation, and set the IP address of UPS in the same network segment with the IP address of the computer in different value, and the subnet mask and gateway information are consistent
IP address	0.0.0.0	0.0.0.0~255.255.255.255	
Subnet mask	0.0.0.0	0.0.0.0~255.255.255.255	
Gateway	0.0.0.0	0.0.0.0~255.255.255.255	

Dry contacts

The dry contact setting menu interface is shown in Fig. 4-22, and the interface description is shown in Table 4-20.

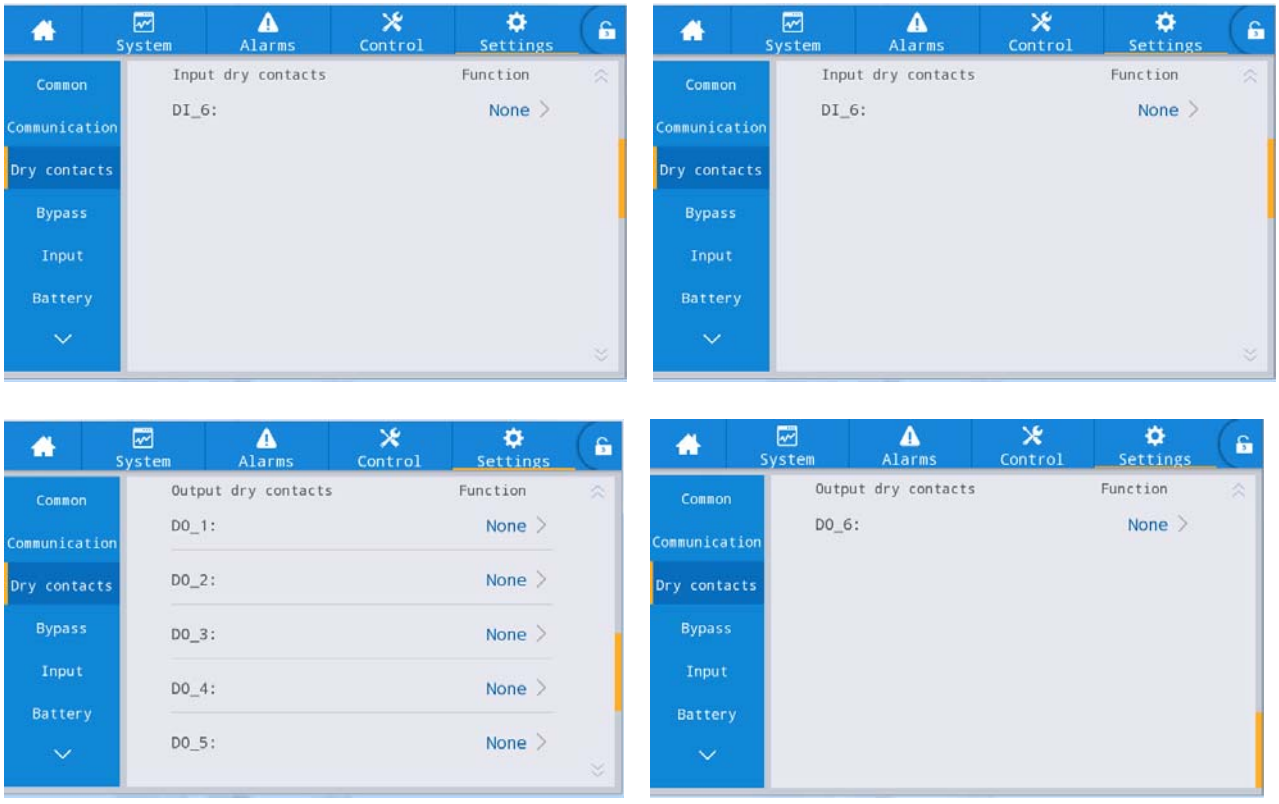


Fig. 4-22 Dry contact setting menu interface

Table 4-20 Description of dry contact setting interface

Setting item	Default	Selectable value	Description
DI_1~DI_6	No	None/Battery ground fault/D.G.mode/ Battery breaker/PDC output breaker/ PDC mainten. breaker/ PDC bypass breaker/ AC SPD switch/Ex.transfor.overtemp.	For 6 external input dry contact interfaces, when configuring dry contact, the relevant dry contact shall be set, and if the dry contact is not used, set to "None", otherwise it will affect the normal operation of UPS.
DO_1~DO_6	No	Critical alarm/Minor alarm/Bypass power supply/Battery power supply/ Low batt.volt.(DOD)/Low batt.volt.(EOD) /D.G.control/Batt. breaker release/ Bypass fault/Fan fault/ Time-share power down	For 6 external output dry contact interfaces, when configuring dry contact, the relevant dry contact shall be set, and if the dry contact is not used, set to "None", otherwise it will affect the normal operation of UPS.

Bypass

The bypass parameter menu interface is shown in Fig. 4-23, and the interface description is shown in Table 4-21.

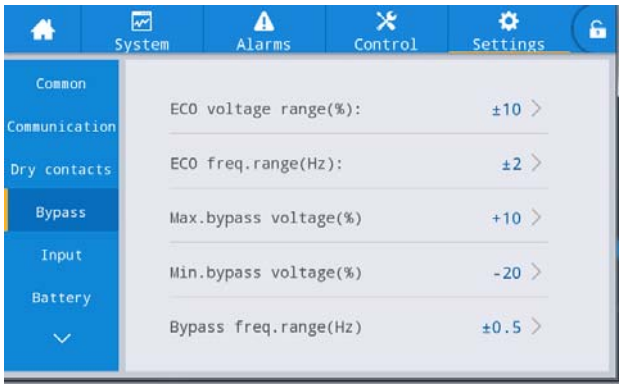


Fig. 4-23 Bypass parameter interface

Table 4-21 Description of bypass parameter interface

Setting item	Default	Selectable value	Description
ECO voltage range (%)	±10	±5/±6/±7/±8/±9/±10	When the deviation of bypass voltage relative to the rated voltage exceeds the set value, the system determines that ECO voltage is abnormal, and the system turns the inverter for power supply. Note that the ECO frequency range cannot be greater than the bypass frequency range. For example, if the bypass frequency range is set as ±2HZ, then the ECO frequency range can only be set to ±1HZ and ±2HZ.
ECO freq. range (Hz)	±2	±1/±2/±3	
Max. bypass voltage (%)	+15	+10/+15/+20/+25	The maximum settings range from 88V to 276V. Generally set to the the acceptable voltage range of the user's electrical equipment .
Min. bypass voltage (%)	-20	-10/-20/-30/-40/-50/-60	

Setting item	Default	Selectable value	Description
Bypass freq. range (Hz)	±5.0	±1.0/±2.0/±3.0/±4.0/±5.0/±6.0	Note that the bypass frequency range cannot be less than ECO frequency range.

Input

The input parameters menu interface is shown in Fig. 4-24, and the interface description is shown in Table 4-22.

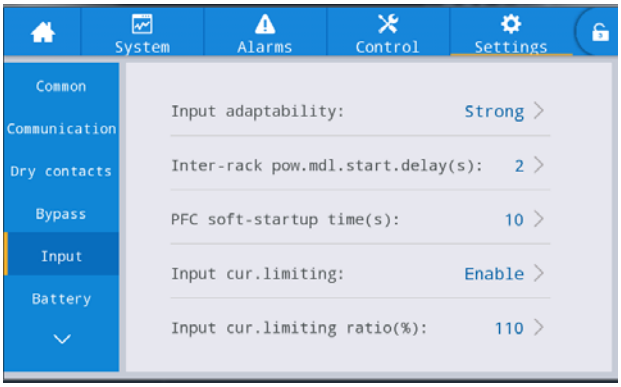


Fig. 4-24 Input parameters interface

Table 4-22 Description of input parameters interface

Setting item	Default	Selectable value	Description
Input adaptability	Strong	Strong/Weak	The strong input adaptation mode is applicable to the oil machine or the input source with high frequency oscillation of the input current. In this mode, THDi is slightly worse, but the system is more stable. The weak input adaptation mode is suitable for input sources with better performance, such as mains and AC voltage source, etc., in which the input THDi is better.
Inter-rack pow.mdl.start.delay (s)	2	2 ~ 120	By setting the start delay of inter-rack intelligent generators, during the process of switching battery inverter to main inverter for power supply, the time interval of each rack switching to main power supply in turn is controlled to reduce the impact of UPS on generators or power grid.
PFC soft-startup time (s)	10	0 ~ 60	
Input cur. limiting	Enable	Disable/Enable	Set up whether the UPS system controls the input current limit according to the actual requirements of customers to protect the generator equipment.
Input cur. limiting ratio (%)	110	10 ~ 110	When you select "Input cur. limiting" to "Enable", you can change the current limit of the mains input by setting the input current limit. The unit is the percentage of the input rated current, ranging from 50% to 200%. Set it according to the output capacity of generator equipment.

Battery

The battery parameters menu interface is shown in Fig. 4-25, and the interface description is shown in Table 4-23.

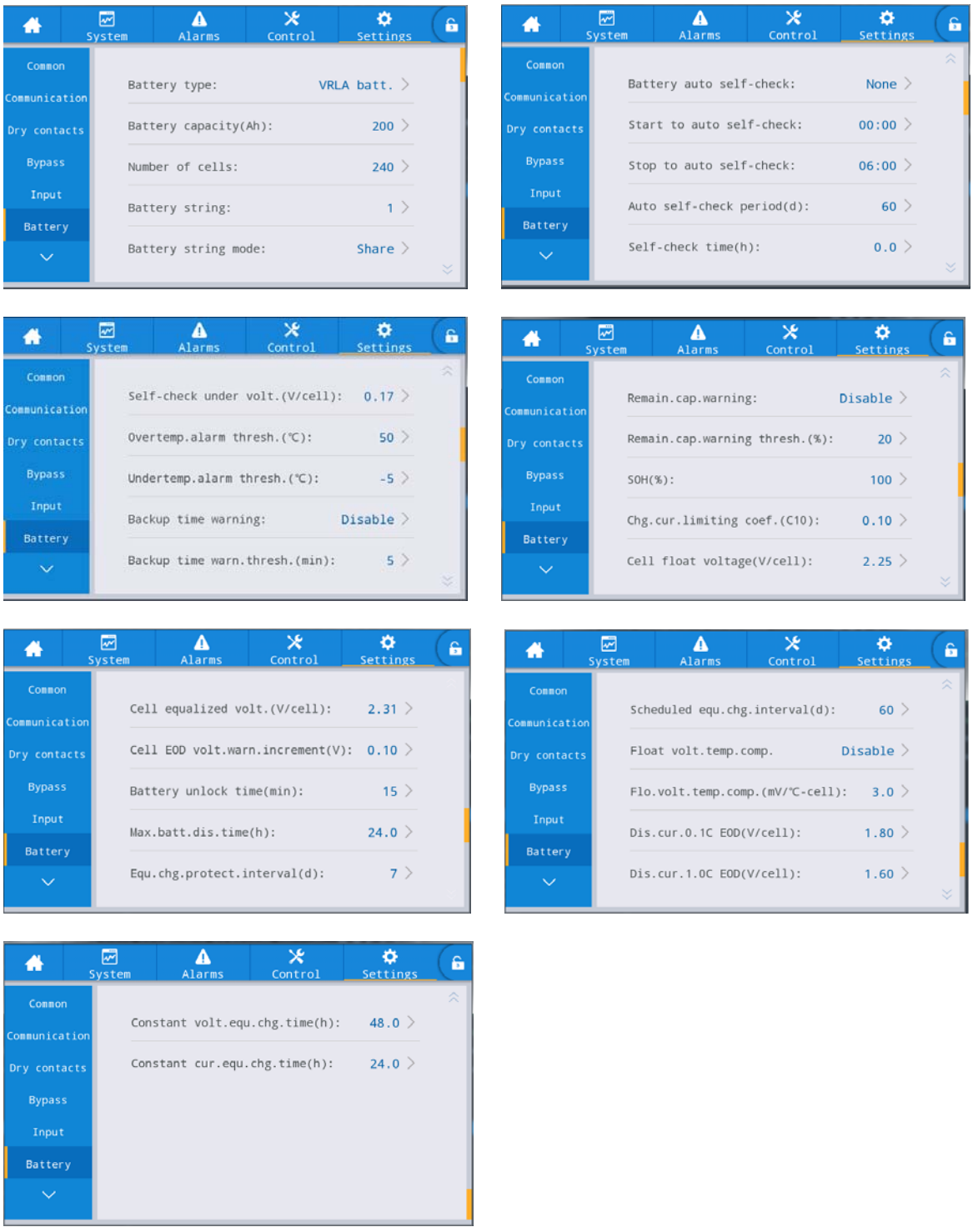


Fig. 4-25 Battery parameter interface

Table 4-23 Description of battery parameter interface

Setting item	Default	Description
Battery type	VRLA batt.	Setting prohibited
Battery capacity (Ah)	100	Settable to 5 ~ 3000Ah

Setting item	Default	Description
Number of cells	240	Settable to 228 ~ 252. The set value must be integer multiple of 6.
Battery string	1	Settable to 1 ~ 10
Battery string mode	Share	Settable to share/Separate
Battery auto self-check	None	Settable to None/By time/By volt.
Start to auto self-check	00:00	Settable to 0 ~ 23 (h), 0 ~ 59 (min)
Stop to auto self-check	06:00	Settable to 0 ~ 23
Stop minute to auto self-check	0	Settable to 0 ~ 59
Auto self-check period (d)	60	Settable to 30 ~ 90d
Self-check time (h)	0.0	Settable to 0 ~ 23.0h
Self-check under volt.(V/cell)	1.70	Settable to 1.60 ~ 1.90V/cell
Backup time warning	Disable	Settable to Disable/Enable
Backup time warn. thresh. (min)	5	Settable to 3 ~ 30 min
Remain. cap. warning	Disable	Settable to Disable/Enable
Remain. cap. warning thresh. (%)	20	Settable to 5 ~ 50%
SOH (%)	100	Settable to 0 ~ 100%
Chg. cur. limiting coef. (C10)	0.10	Settable to .05 ~ 0.30 C10
Cell float voltage (V/cell)	2.25	Settable to 2.23 ~ 2.27V/cell
Cell equalized volt. (V/cell)	2.35	Settable to 2.30 ~ 2.40V/cell
Cell EOD volt. warn. increment (V)	0.10	Settable to 0 ~ 0.20V
Battery unlock time (min)	15	Settable to 1 ~ 60min
Max. batt. dis. time (h)	24.0	Settable to 0 ~ 48.0h
Equ. chg. protect. interval (d)	7	Settable to 0 ~ 15d
Scheduled equ. chg. interval (d)	60	Settable to 30 ~ 180d
Float volt. temp. comp.	Disable	Settable to Disable/Enable
Flo. volt. temp. comp. (mV/℃-cell)	3.0	Settable to 0 ~ 6.0mV/℃-cell
Dis. cur. 0.1C EOD (V/cell)	1.80	Settable to 1.75 ~ 1.90V/cell
Dis. cur. 1.0C EOD (V/cell)	1.60	Settable to 1.60 ~ 1.75V/cell
Constant volt. equ. chg. time (h)	48.0	Settable to 0 ~ 100.0h
Constant cur. equ. chg. time (h)	24.0	Settable to 0 ~ 100.0h

Output

The output parameter menu interface is shown in Fig. 4-26, and the interface description is shown in Table 4-24.

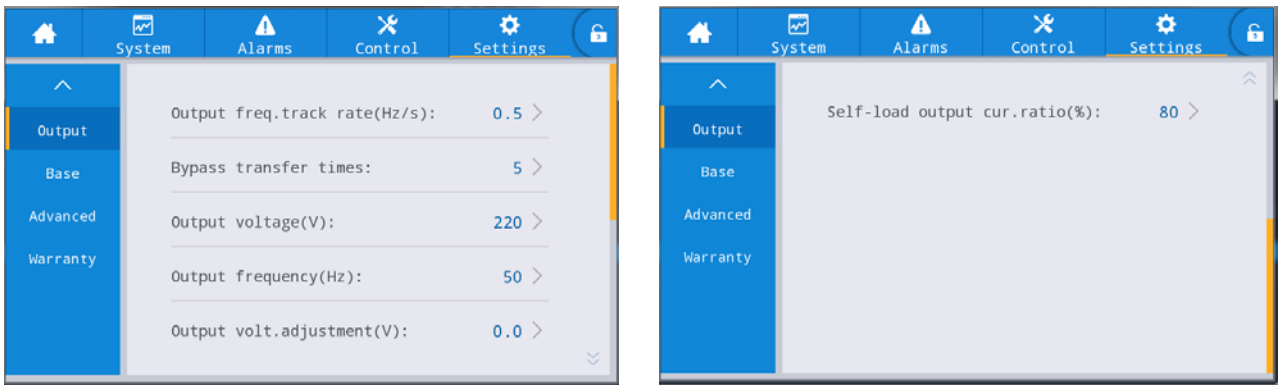


Fig. 4-26 Output parameter interface

Table 4-24 Description of output parameter interface

Setting item	Default	Settable value	Description
Output freq.track rate (Hz/s)	0.5	0.1 ~ 2.0	Set it according to load capacity. If the tracking rate is too mall, when the bypass frequency changes, it is possible that the working frequency of the inverter is out of sync with the bypass frequency
Bypass transfer times	5	1 ~ 10	Settable to 1 ~ 10 times, defaulting to 5 times. If the bypass switching times reach the set value within one hour, the system will be locked. If the system is in normal mode, the system will be locked to supply the power by the bypass output end. If the system in ECO mode, the system will be locked to supply the power by the inverter output end. After one hour, the lock is automatically released. The users can also release the lock by [Control]→[Maintain]→[Clear faults], as shown in Fig. 4-27.
Output voltage (V)	230	220/230/240	The user shall set it according to the output voltage amplitude acceptable to the load, which shall be set in the status of no output
Output frequency (Hz)	50	50/60	The user shall set it according to the output voltage frequency acceptable to the load, which shall be set in the shutdown state
Output volt.adjustment (V)	0.0	-5.0 ~ 5.0	Fine-tune the output voltage according to the customer's field distribution situation
Self-load output cur.ratio (%)	80	20 ~ 100	The percentage of output current to the rated output current in the self-aging mode

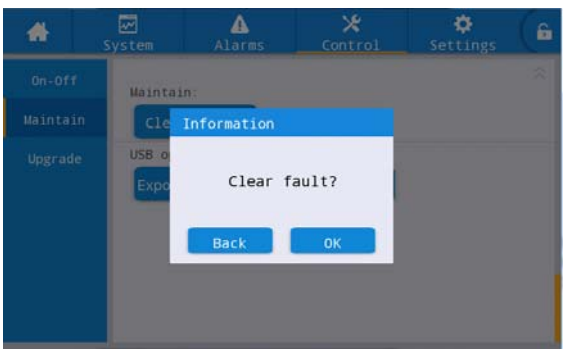


Fig. 4-27 Clear fault

Base

The basic parameter menu interface is shown in Fig. 4-28, and the interface description is shown in Table 4-25.

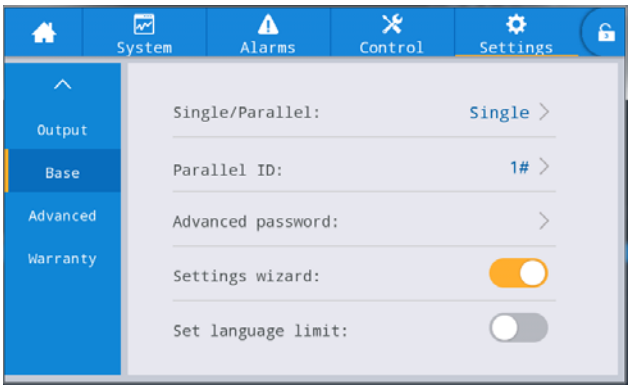


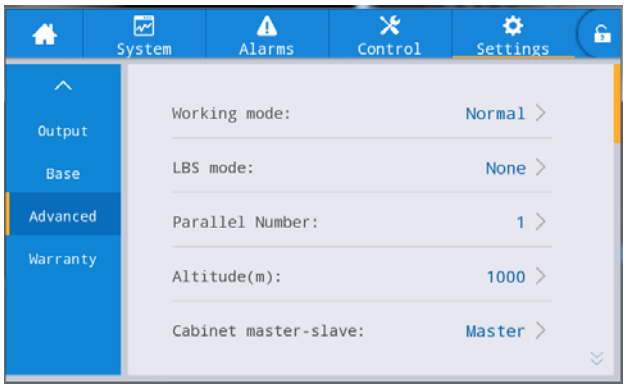
Fig. 4-28 Basic parameter interface

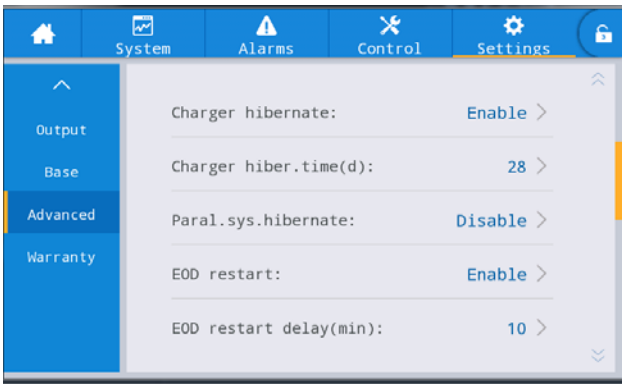
Table 4-25 Description of basic parameter interface

Setting item	Default	Settable value	Description
Single/Parallel	Single	Single/Parallel	Set it according to the number of actual online racks in the set system, select "Single" when only 1 rack is working, and select "Parallel" when more than 2 racks are working.
Parallel ID	1#	1 ~ 4	In the parallel system, each single UPS shall to be numbered in different digit.
Advanced password	/	0 ~ 99999999	Authorized professional engineers can use and change the password. The password can be set to 1-8 digits and is different from the user password. The customers need to consult the supplier if they want to know the password.
Settings wizard	On	On/Off	After enabling, enter the quick setting interface upon starting for next time.
Set language limit	Off	On/Off	After enabling, the language is limited to English and cannot be set.

Advanced

The advanced parameter menu interface is shown in Fig. 4-29, and the interface description is shown in Table 4-26.





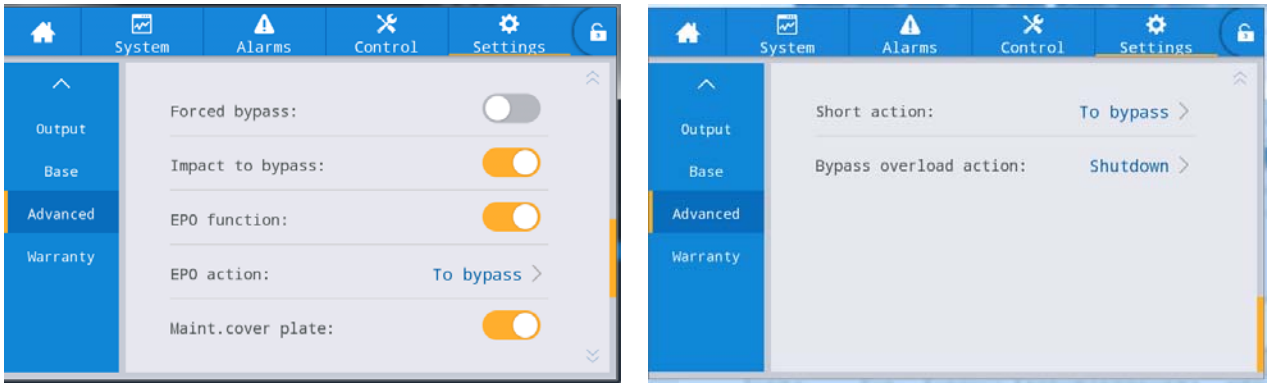


Fig. 4-29 Advanced parameter interface

Table 4-26 Description of advanced parameter interface

Setting item	Default	Settable value	Description
Working mode	Normal	Normal/ECO/ Self-load/Converter	Select the corresponding operating mode according to customer requirements, and generally select the normal operating mode
LBS mode	None	None/Master/Slave	If the customer needs to use the double bus system, it can be set according to the actual situation
Parallel Number	1	1 ~ 4	Set according to the actual number of racks for the UPS system installed by the customer on site
Altitude (m)	1000	0 ~ 3000	Set it according to the actual site situation of the customer, and it is determined by the output capacity whether to conduct automatic derating according to the setting value. See the derating description of technical parameters in chapter 8 for details
Cabinet master-slave	Master	Master/Slave	This setting item does not need to be set and is automatically assigned by the system upon parallel operation.
Charger hibernate	Enable	Disable/Enable	If it is set to Enable, the charger will enter the sleep status when it meets the sleep condition; if it is set to disabled, the charger will not enter the sleep status
Charger hiber.time (d)	28	28 ~ 60	When the "Charger hibernate" function is set to Enable, after the charger enters the sleep status, it will exit the sleep status if the set time is reached.
Paral.sys.hibernate	Disable	Disable/Enable	According to system configuration and customer requirements, smart parallel sleep mode can be set so that the parallel system can automatically decide the number of UPS or modules put into operation according to the current total load and stop and make the redundant UPS in the sleep status to achieve safe operation and energy-saving if redundant power supply is guaranteed.

Setting item	Default	Settable value	Description
EOD restart	Enable	Disable/Enable	The system supplies the power by the battery inverter after failure of the mains. If it is set to Enable, when the system stops due to voltage under-voltage (EOD), the bypass power supply is not valuable, and the system output is powered down, the system will be automatically restarted upon recovery of the mains. If it is set to Disable, the user is required to manually clear the fault, manually start the system, or set to the enabling by modification of EOD self-recovery after shutdown setting
EOD restart delay (min)	10	1 ~ 1440	If “EOD restart” is set to Enable, when the power of the system EOD fails and is recovered, after the set delay, the system will automatically start the inverter output.
Forced bypass	Off	Off/On	If it is set to be on, although the bypass voltage is abnormal, the UPS system supplies the power in the bypass mode when the UPS system requires supply of the power by the bypass output. When the bypass is extra-high voltage, the system cannot supply the power in the bypass mode.
Impact to bypass	On	On/Off	If it is set to be on, when the output voltage of the UPS system is decreased quickly due to impact load, the system will supply the power in the bypass mode for a short time.
EPO function	On	On/Off	Set whether to enable emergency shutdown function according to the actual requirements of customers
EPO action	To bypass	To bypass/ Shutdown	According to the customer's actual requirements, when EPO alarm is triggered, the corresponding action of UPS system is to switch to the bypass or disconnect the output. Under normal circumstances, please choose output disconnected
Maint.cover plate	On	On/Off	If it is set to On, the system will test the installation status of the maintenance cover plate
Short action	To bypass	To bypass/ Shutdown	When the output of the UPS system is shorted, the UPS system will switch to the bypass or disconnect the output
Bypass overload action	Shutdown	Shutdown/None	After the bypass overload time, the UPS system will disconnect the output or do not work. This setting may be changed with the authorization of the manufacturer, otherwise, the warranty will come invalid. If selected to “None”, it is possible to cause damage to the bypass device due to failure to timely protect the bypass.

Warranty

The warranty setting interface is shown in Fig. 4-30, and the interface description is shown in Table 4-27.

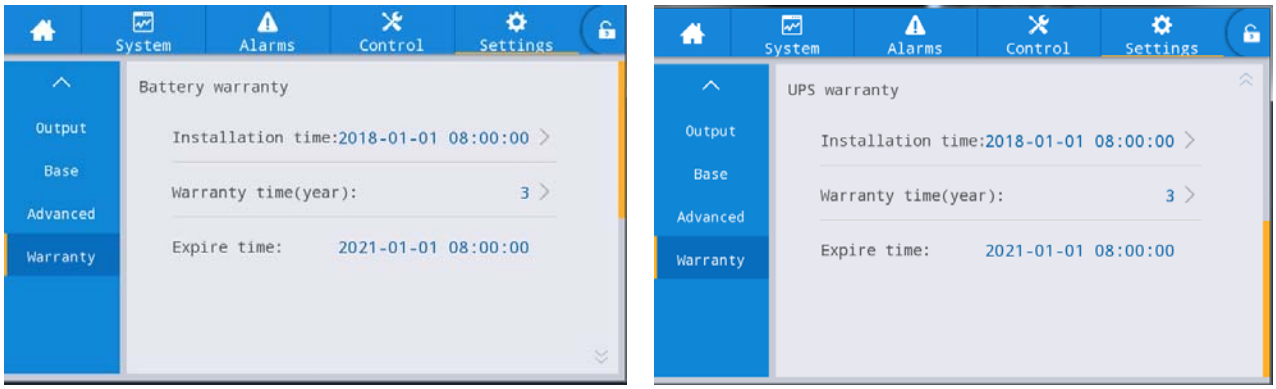


Fig. 4-30 Warranty time limit interface

Table 4-27 Description of warranty interface

Setting item	Default	Settable value	Description
Battery installation time	2018-01-01 00:00:00	Arbitrary value	Click the pop-up to confirm the update to the current time.
Battery warranty time (year)	3	1 ~ 50	Set it according to the customer's actual battery warranty period
Batt.Expire time (not settable)	2021-01-01 00:00:00	Not settable	Automatically generate the warranty time limit according to the installation time and quality warranty period. When the system time exceeds the warranty time limit, the status bar of the home page displays the information on the warranty time limit.
UPS installation time	2018-01-01 00:00:00	Arbitrary value	Click the pop-up to confirm the update to the current time.
UPS warranty time (year)	3	1 ~ 50	Set it according to the UPS’s actual warranty period.
UPS Expire time (not settable)	2021-01-01 00:00:00	Not settable	Automatically generate the warranty time limit according to the installation time and quality warranty period. When the system time exceeds the warranty time limit, the status bar of the home page displays the information on the warranty time limit.

5 Operation

5.1 Turn On the UPS

This chapter describes the operation method of the UPS.

	CAUTION
⚠	• Before UPS is started, ensure that all installation work has been completed and the first start has been completed by a qualified electrician. During starting for first time, check all electrical connections to ensure correct installation and proper operation of the system. • Before starting, make sure to set the [Output voltage] and the [output frequency] in the [Output] of the [Settings] interface. • Before starting, make sure to set [battery type], [battery capacity], [Number of cells] and [Battery string] in the [Settings] interface to ensure that the set parameters match those of the connected battery pack. • Read this section of this manual and have a thorough understanding of UPS operations before operating the UPS.

Operation procedures:

Step 1: Check whether the mains input switch, the bypass input switch, the system output switch, the maintenance bypass switch and the battery circuit breaker switch are disconnected before starting. If the switches are closed, disconnect the switches first to ensure that the UPS is free of power before starting.

🕮 **Note:**

When choosing this series of UPS, the users can choose standard or full-equipped models. The input switch, bypass switch, battery switch, system output switch and maintenance bypass switch described in this chapter are the accessories of full-equipped models. If the user chooses a full equipped UPS model, complete all following steps. If the user chooses the standard model UPS, the specific operation steps shall be determined according to the actual site environment and shall be conducted under the guidance of the authorized engineers.

Step 2: Close the mains input switch and the bypass input switch. The system starts to initialize while the company’s LOGO and the initialization progress bar are displayed on the monitor screen. The system is in standby mode.

Step 3: After the monitoring starts normally, upon starting for first time, relevant parameters can be set through quick setting instructions. When the system starts again, the system defaults to the latest setting. Please refer to the Section 4.2.1 quick settings for specific operation interface.

Step 4: After the quick setting is completed, if there is no abnormal alarm on the alarm display interface, continue to execute the following steps. If there is an abnormal alarm on the display interface (at this time, because the battery is not connected, the alarm "Battery disconnected" is a normal alarm), clear all abnormal alarms.

Step 5: Turn on the rectifier and inverter. If the control bar of the monitoring display interface is gray and not optional, first unlock it: click the password lock at the upper right corner of the display interface while the system will pop up the unlocking window, and enter the password to unlock it (if the user does not change the initial password, the initial password is "123456"), as shown in Fig. 5-1.

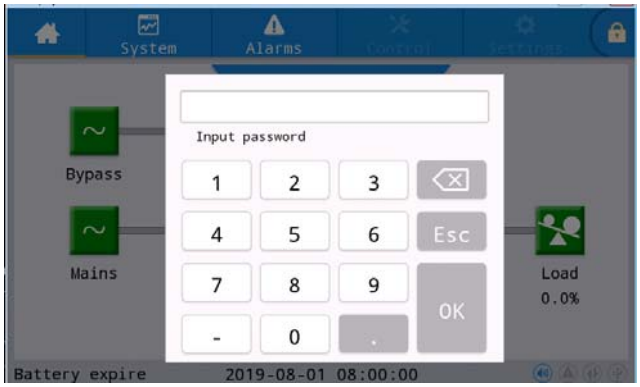


Fig. 5-1 Unlocking interface

After unlocking, select [Control] from the main menu of monitoring display unit, click [Inv.On], and after selecting and confirming, complete the starting operation of the rectifier and the inverter, as shown in Fig. 5-2.

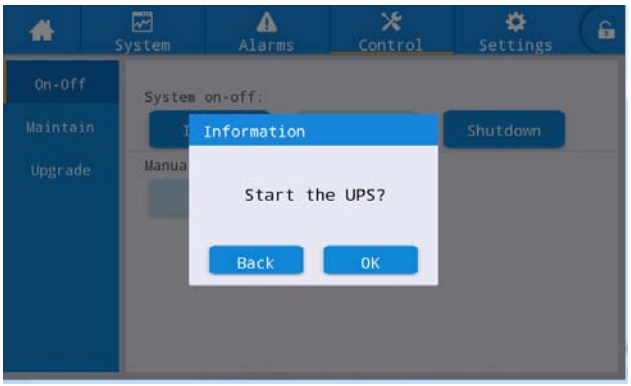


Fig. 5-2 Starting operation

Step 6: After completing the startup steps, check the energy flow diagram on the home page to confirm whether UPS has completed the startup process, as shown in Fig. 5-3. The user can confirm whether the three-phase output voltage and frequency of UPS are normal by the real-time data displayed in the monitoring and display interface [System]→[Output], and test whether the effective value and frequency of the three-phase output voltage are normal with a multimeter, as shown in Fig. 5-4.

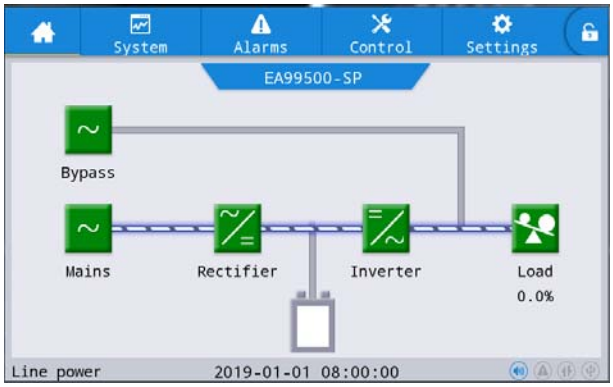


Fig. 5-3 Display of energy flow on home page after starting rectifier and inverter

Fig. 5-4 Output information

Step 7: Check whether the actual number of battery pack is consistent with the number of cells set in the monitoring display interface; Then, measure by the multimeter whether the voltage of the battery pack is greater than a certain value (for 12V battery, 11.4v × cell number) to prove that the battery pack is connected properly. After confirming that the battery pack is connected properly, close the input switch of the battery pack (if there are multiple battery packs, close the switch of each battery pack first, and then close the main switch between the battery pack and the UPS). The battery self-test checks whether the battery is working normally.

Step 8: Close the system output switch so that UPS supplies the power to the load.

Note:

If UPS is already powered on or in bypass power supply mode, and it is necessary to turn on the inverter power supply mode, complete Step only after confirmg that there is no abnormal alarm; If the UPS is completely powered down, complete all mentioned-above steps.

5.2 Manually Open and Close Bypass

	CAUTION
⚠	• In bypass power supply mode, when the input voltage or the frequency range exceeds the set value of the system, it may lead to no system output and load power failure. • Before manually switching to the bypass, make sure to confirm that the bypass is normal. If the bypass is abnormal, manually switching the bypass will be invalid and the previous state will be retained.

5.2.1 Manually Open Bypass

The bypass is manually opened as described below:

Step 1: Manually switch to bypass

If the "Control" on the main menu of the monitoring display unit is gray, unlock it first: chick the password lock on the upper right corner of the display interface while the system will pop up the unlock window and enter the password to complete the unlocking.

Select [Control] from the main menu of the monitoring display unit, and click “On” on “Manual to bypass”. Confirm the operation to complete manually switching to bypass power supply mode, as shown in Fig. 5-5.

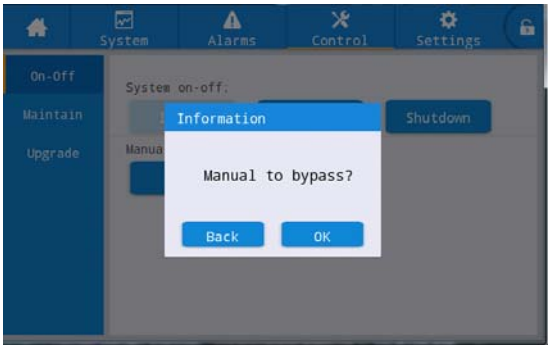


Fig. 5-5 Manually switch to bypass

After completing the operation steps, check the energy flow diagram on the main page. When the energy flow diagram is shown in Fig. 5-6, the UPS successfully enters the bypass power supply mode.

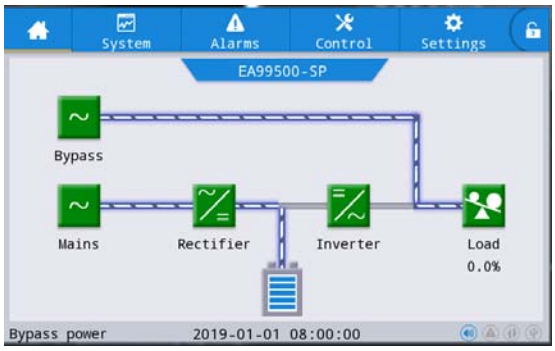


Fig. 5-6 Bypass mode

5.2.2 Manually Close Bypass

The bypass is manually closed as described below:

Step 1: Manually close the bypass

If the "Control" on the main menu of the monitoring display unit is gray, unlock it first: chick the password lock on the upper right corner of the display interface while the system will pop up the unlock window and enter the password to complete the unlocking.

Select the "Control" from the main menu of the monitoring display unit, and click [Off] on "Manual to bypass". After completing the operation steps, check the energy flow diagram on the main page. When the energy flow diagram is shown in Fig. 5-3, that is, UPS successfully switches from the bypass mode to the mains mode.

5.3 Turn Off the UPS

	CAUTION
⚠	• When selecting "Shut to bypass", if the system bypass is normal and the UPS inverter is turned off, the system will enter the bypass power supply mode; If the system bypass is abnormal, the system enters non-output mode after the inverter shuts down, and the system outputs is disconnected. • When selecting "Shutdown", the system enters non-output mode after the inverter shuts down, and the system outputs is disconnected. • Before shutdown, make sure that the user's equipment (i.e., UPS load) has been turned off or can withstand power failure condition at any time.

Operation procedures:

Step 1: Turn off the UPS

If the "Control" on the main menu of the monitoring display unit is gray, unlock it first: chick the password lock on the upper right corner of the display interface while the system will pop up the unlock window and enter the password to complete the unlocking.

Select the "Control" from the main menu of monitoring display unit, click "Shut to bypass", and select "Ok" to complete the operation of UPS shutdown, as shown in Fig. 5-7.

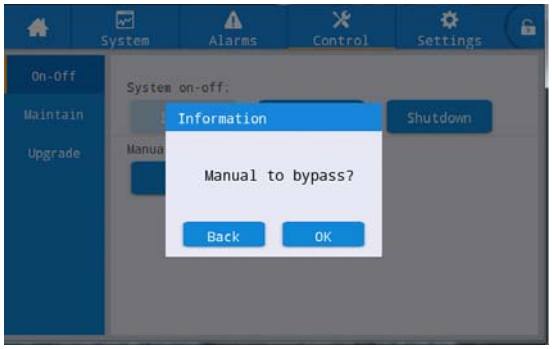


Fig. 5-7 Power off inverter

Step 2: After the UPS is powered off, if the system bypass is normal, after the inverter is shut down, UPS enters the bypass power supply mode. If the system bypass is abnormal, after shutdown, the UPS will enter no-output mode, resulting in load power failure.

Step 3: After the UPS is powered off, disconnect the output switch.

Step 4: Disconnect the battery pack switch (if there are multiple battery packs, first disconnect the main switch between the battery pack and the UPS, and then disconnect the switch of each battery pack).

Step 5: Disconnect the mains input switch and the bypass input switch.

Note:

If it is required only to turn off the UPS inverter and turn the system to bypass power supply, after confirming that there is no abnormal alarm at present, only perform step 1. If the entire UPS needs to be powered down completely, complete all mentioned-above steps.

5.4 ECO Operating Mode

	CAUTION
	• In ECO mode, the bypass power supply takes precedence over the inverter power supply. When the bypass loses power, the system will switch to the inverter power supply intermittently. The off-time is less than 2ms in typical working conditions and 10ms in bad working conditions is less than 10ms.ECO mode should not be used when the power grid fluctuates greatly or the generator is used for power supply.

Select the ECO operating mode.

Operation procedures:

Step 1: Set ECO as operating mode.

If the "Control" on the main menu of the monitoring display unit is gray, unlock it first: chick the password lock on the upper right corner of the display interface while the system will pop up the unlock window and enter the password to complete the unlocking.

In the main menu of the monitoring display unit, click [Settings]→[Advanced]→[Working mode]→[ECO], as shown in Fig. 5-8.

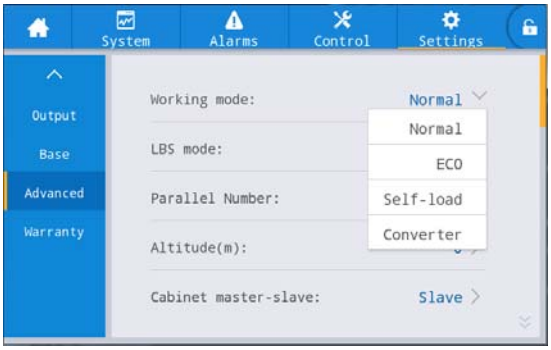


Fig. 5-8 ECO mode

After completing the operation, observe the energy flow diagram of the home page. When the energy flow diagram is shown in Fig. 5-9 the current working mode of UPS is ECO mode.

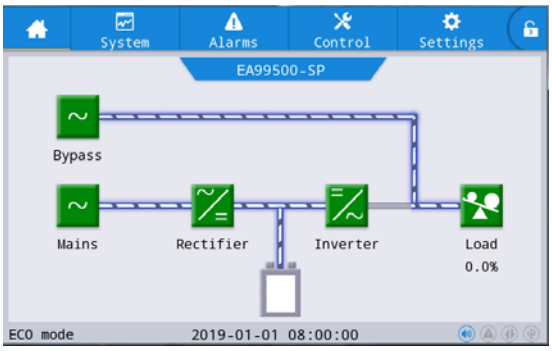


Fig. 5-9 Energy flow diagram of ECO mode

Exit ECO operating mode.

Operation procedures:

Step 1: Set normal operating mode

If the "Control" on the main menu of the monitoring display unit is gray, unlock it first: chick the password lock on the upper right corner of the display interface while the system will pop up the unlock window and enter the password to complete the unlocking.

In the main menu of monitoring display unit, click [Settings]→[Advanced]→[Working mode]→[Normal], as shown in Fig. 5-8.

5.5 Emergency Power Off (EPO)

	CAUTION
⚠	• In default setting, the operation of EPO causes switching UPS to bypass output to prevent accidental power outages. If UPS have no output directly by the EPO operation, set "EPO action" to "Shutdown". • After closing the emergency power off (EPO) button, it possible to cause no output of UPS and the power failure of the load. Therefore, only use this feature if it is really required to disconnect power supply from the key loads. • In case of rupture, spontaneous combustion,electric leakage or fire, earthquake or other serious disasters, the users shall perform emergency shutdown EPO operation and disconnect the power distribution switch of the equipment including (mains input switch, bypass input switch, battery switch), on the premise of ensuring their own safety.

Operation procedures:

Step 1: Disconnect the external EPO switch connected the dry contact (if EPO is connected by normally open NO, then close the EPO switch), while the UPS will enter an emergency shutdown status. At this time, an alarm is displayed in the monitoring display interface.

5.6 EPO Recovery

Operation procedures:

Step 1: Close the external EPO switch connected the dry contact (if EPO is connected by normally open NO, then close the EPO switch), and Verify that the external EPO switch connected the dry contact is in a non-emergency shutdown status.

Step 2: Clear the emergency shutdown alarm of the system. Clear the fault removal on the monitoring display interface: select [Control]→[Maintain]→[Clear fault] in the main menu of the monitoring display unit, and after the prompt dialog box pops up, select confirm to clear the emergency shutdown alarm, as shown in Fig. 5-10.

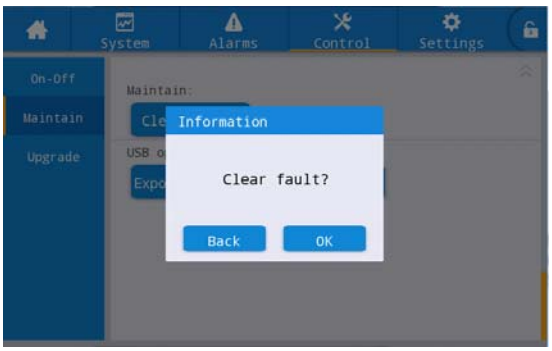


Fig. 5-10 Fault clearing interface

Step 3: Check the current alarm and confirm that the emergency power off alarm disappears. If the system bypass input is normal, UPS will switch to the bypass mode for power supply.

Step 4: Start the inverter. Please refer to Steps 5 ~ 7 in Section 5.1 "Turn on the UPS" for specific operation.

5.7 Switch to Maintenance Bypass

	CAUTION
⚠	• Only authorized and qualified maintenance personnel can perform UPS repairs or maintenance under the maintenance bypass. • Operation of switching the maintenance bypass must be carried out in strict accordance with the following steps, otherwise it is possible to cause electric shock risk. • Operation of switching the maintenance bypass must be carried out in strict accordance with the following steps, otherwise it is possible to cause the power failure of the load. • In the maintenance bypass mode, the mains power supply is directly to the load by the maintenance bypass. If the mains is abnormal, the load may be power down.

If the UPS is powered down for maintenance, after switching to the maintenance bypass mode, AC input source supplies the power for the key loan by the maintenance bypass. The specific operation procedures are as follows:

Step 1: Manually switch to the bypass

If the "Control" on the main menu of the monitoring display unit is gray, unlock it first: chick the password lock on the upper right corner of the display interface while the system will pop up the unlock window and enter the password to complete the unlocking.

Select "Control" in the main menu of the monitoring display unit, and click “On” on “Manual to bypass”. confirm

the selection to complete the operation of "Manual to bypass", as shown in Fig. 5-5.

Check whether the manually switching to bypass is completed. The energy flow diagram of the home page should be shown in Fig. 5-6 when UPS is switched to the bypass mode.

Step 2: Close the maintenance bypass switch.

Make sure UPS is witched to bypass mode before closing the maintenance switch. After confirmation, manually close the UPS maintenance bypass switch. At this time, the maintenance bypass and the UPS system bypass are in parallel to supply power to the load.

Step 3: Power down the UPS

1. If the "Control" on the main menu of the monitoring display unit is gray, unlock it first: chick the password lock on the upper right corner of the display interface while the system will pop up the unlock window and enter the password to complete the unlocking.
2. Select "Control" in the main menu of monitoring display unit, click “Shut to bypass", and select "Ok" to complete the operation of UPS shutdown, as shown in Fig. 5-7
3. After UPS is powered off, disconnect the output switch.
4. Disconnect the switch of battery pack (if there are battery packs, first disconnect the main switch between the battery pack and UPS, and then disconnect the switch of each battery pack).
5. Disconnect the mains input switch and the bypass input switch.

Step 4: Maintain or repair the UPS

After completion of Steps 1 ~ 3, do no dissemble and replace the machine module till the capacitor is fully discharged.

Note:

1. The mains input and the battery input of the equipment must be disconnected, and the capacitor is discharged to the safe voltage before the operation.
2. When touching internal module components of UPS, wear insulating gloves or measure voltage with the multimeter to prevent electric shock hazard.

5.8 Exit from Maintenance Bypass to Mains Mode

	CAUTION
⚠	• If the UPS module or parts are removed or replaced, check whether the installation is correct before starting up. • Before change from the maintenance bypass to the mains mode, it is necessary to confirm whether the system bypass input and output are normal. • The following steps must be followed strictly, otherwise it is possible to cause electric shock. • The following steps must be followed strictly, otherwise it is possible to cause the power failure of the load. • The following steps must be followed strictly, otherwise it is possible to cause the failure in the equipment.

Operation procedures:

Step 1: Power on the UPS

1. Check whether the UPS input switch, bypass input switch, system output switch and battery circuit breaker switch are disconnected before starting. If the switches are closed, disconnect the switches first to ensure that the UPS is electrically neutral before starting.
2. Close the input switch and the bypass input switch. The system starts to initialize while the company’s LOGO and the initialization progress bar are displayed on the monitor screen. The system is in standby mode.

3. After the monitoring starts normally, upon starting for first time, relevant parameters can be set through quick setting instructions. When the system starts again, the system defaults to the latest setting. Please refer to the Section 4.2.1 quick settings for specific operation interface.
4. After the quick setting is completed, if there is no abnormal alarm on the alarm display interface, continue to execute the following steps. If there is an abnormal alarm on the display interface (at this time, because the battery is not connected, the alarm "Battery disconnected" is a normal alarm), clear all abnormal alarms.
5. Step 5: turn on the rectifier and inverter. If the control bar of the monitoring display interface is gray and not optional, first unlock it: click the password lock at the upper right corner of the display interface while the system will pop up the unlocking window, and enter the password to unlock it (if the user does not change the initial password, the initial password is "123456"), as shown in Fig. 5-1.
   After unlocking, select [Control] from the main menu of monitoring display unit, click [Inv.On], and after selecting and confirming, complete the starting operation of the rectifier and the inverter, as shown in Fig. 5-2.
6. After completing the startup steps, check the energy flow diagram on the home page to confirm whether UPS has completed the startup process, as shown in Fig. 5-3. The user can confirm whether the three-phase output voltage and frequency of UPS are normal by the real-time data displayed in the monitoring and display interface [System]→[Output], and test whether the effective value and frequency of the three-phase output voltage are normal with a multimeter, as shown in Fig. 5-4.
7. Check whether the actual number of battery pack is consistent with the number of cells set in the monitoring display interface; Then, measure by the multimeter whether the voltage of the battery pack is greater than a certain value (for 12V battery, 11.4v × cell number) to prove that the battery pack is connected properly. After confirming that the battery pack is connected properly, close the input switch of the battery pack (if there are multiple battery packs, close the switch of each battery pack first, and then close the main switch between the battery pack and UPS). The battery self-test checks whether the battery is working normally.

Step 2: Manually switch to bypass

1. If the "Control" on the main menu of the monitoring display unit is gray, unlock it first: chick the password lock on the upper right corner of the display interface while the system will pop up the unlock window and enter the password to complete the unlocking.
2. Select [Control] from the main menu of the monitoring display unit, and click “On” on “Manual to bypass”. Confirm the operation to complete manually switching to bypass power supply mode, as shown in Fig. 5-5.
3. Check whether the manually switching to bypass is completed. The energy flow diagram of the home page should be shown in Fig. 5-6 when UPS is switched to the bypass mode.

Step 3: Close the system output switch. The UPS must be switched to the bypass mode before closing the system output switch. After confirmation, manually close the system output switch of UPS. At this time, the maintenance bypass and the static bypass of UPS are in parallel to supply power to the load.

Step 4: Disconnect the maintenance switch

Step 5: Manually switch from the bypass mode to the mains mode

1. If the "Control" on the main menu of the monitoring display unit is gray, unlock it first: chick the password lock on the upper right corner of the display interface while the system will pop up the unlock window and enter the password to complete the unlocking.
2. Select the "Control" from the main menu of the monitoring display unit, and click “Off” on “Manual to bypass”". After completing the operation steps, check the energy flow diagram on the main page. When the energy flow diagram is shown in Fig. 5-3, that is, UPS successfully switches from the bypass mode to the mains mode.

5.9 Operation of Parallel UPS System

5.9.1 Start Up Parallel System

	CAUTION
⚠	• Before installation and wiring on site, make sure all switches on the UPS are disconnected. • Before starting the equipment, check whether installation and wiring of the system are perfect, whether all the screws are locked, whether the wiring is correct. • After the parallel system is turned on normally, do not operate the "Control" menu bar of UPS without the permission of the relevant authorized engineer. • Do not operate the emergency shutdown EPO button in a non-emergency situation after the system is started normally. • When the single unit of the parallel system is maintained, confirm that the capacitor voltage of the failed UPS is below the safe voltage before operation.

Step 1: Establish the parallel system

For establishment of the parallel system of the UPS needing parallel operation, please refer to "Section 3.3 Installation of Parallel UPS" for installation mode. Connect the power cables and the control cables. If the battery packs are independent, they can be connected separately.

Step 2: Confirm the wiring.

Use the multimeter to confirm again that the cables are connected in accordance with the requirements, and confirm that the wiring is correct.

Step 3: Confirm parallel signal

After the connection is confirmed, close the mains input switches of all UPS. If the communication line for parallel operation is not connected, "Parallel line abnormal" fault will be reported. Therefore, make sure to confirm that there is no "Parallel line abnormal" fault in each UPS.

Step 4: Confirm software version

confirm the program versions of all UPSs: access the About interface of the system menu, and click the About interface to confirm display version, monitor version, rectifier version and inverter version to ensure that the program version of all UPSs is consistent.

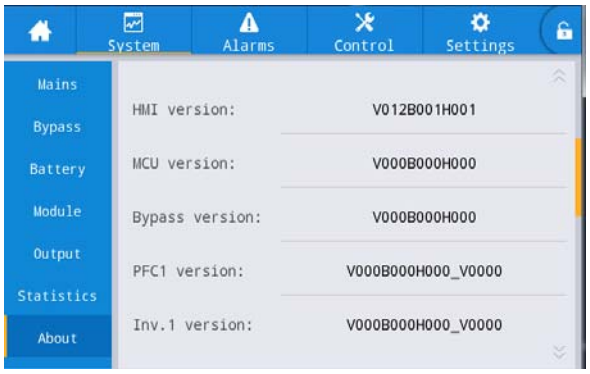


Fig. 5-11 About interface

Step 5: Confirm the parameters

Check whether the advanced parameters, input parameters, output parameters, bypass parameters and battery parameters of all UPS are consistent (the setting of the battery pack is consistent when it is set to shared, and it is set to independent, the battery is specifically set according to the equipment configuration). Refer to the function introduction of "4.2.6 Settings" for setting each parameter.

Step 6: Debug single UPS

After confirming the parameters, disconnect the mains input, bypass input, output switch, the battery and system output switch of all UPSs to debug single UPS orderly and confirm that UPS is in good condition. Record the output voltage of UPS, compare the three-phase output voltage of UPS, and confirm the effective difference of three-phase voltage between any two UPSs. After confirmation, power off the UPS and disconnect all switches of UPS. Refer to Chapter 5.1 ~ 5.9 for specific debugging steps of single UPS.

Step 7: Start the parallel system

Confirm the main circuit and bypass of the system, and then close the output air switch of all UPSs, and then start each UPS separately. The starting operation of the parallel system is consistent with that of a single UPS.

Step 8: Add the battery

Check the monitoring homepage to confirm that all UPSs have been switched to the inverter mode. After the system output is normal, add the battery pack and close the battery switch. If the batteries are independent, close the battery switch of each UPS respectively. The "Battery disconnected" disappears from the alarm bar of e each UPS 3min after closing. The main page can be observed and monitored to confirm that the battery is connected properly. Observe the energy flow diagram on the home to confirm that the battery is connected properly.

Step 9: Test switching

1. Disconnect the mains input switch of each UPS, and check whether all UPSs are normally switched to the battery mode through the home of the monitoring panel.
2. Close the mains input switch of each UPS, enable [Shut to bypass], and observe whether all UPSs can normally switch to the bypass mode through the home of the monitoring panel.

Step 10: Close the main output switch

Switch each UPS back to the inverter mode, then close the main output switch, observe the load in the energy flow diagram in the home, the load is displayed a certain percentage of value, and in this method, the whole parallel system startup process has been completed.

5.9.2 Shut Down Parallel System

Operation procedures:

Step 1: Turn off all loads.

Step 2: Perform "Shutdown" operation for each UPS, and the shutdown operation procedure is same with that of a single UPS.

Step 3: Approximately 5 min after completion of Step 2, turn off the main output switch, and the output switch, battery switch, bypass input switch and mains input switch of each UPS successively. In this way, the whole equipment is powered down.

5.9.3 Emergency Power Off (EPO)

In addition to emergency shutdown and switching to bypass and disconnection of output after shutdown, users can choose to perform EPO operation on the failed UPS or EPO operation on all the UPS of the parallel system. Specific wiring modes are shown in Fig. 3-22 and 3-23.

5.9.4 Single UPS Exits from Maintenance

Operation procedures:

Step 1: When UPS fails, output will be automatically disconnected and the failed UPS will exit from the parallel system. Other UPS will continue to supply power to the system. If it is required to maintain the UPS that is working normally, perform “Shutdown” operation.

Step 2: Disconnect the output switch of the UPS to be maintained.
Step 3: Disconnect the battery switch of the UPS to be maintained (if there are multiple battery packs, disconnect the main switch between the battery pack and the UPS first, and then disconnect the switch of each battery pack).
Step 4: Disconnect the mains input switch and bypass input switch of the UPS to be maintained.
Step 5: The UPS to be maintained is isolated from the system after the completion of Step 4, and the maintenance operation can be performed after the capacitor voltage falls below the safe voltage.

5.9.5 Add a Single UPS After Maintenance

Operation procedures:
Step 1: After UPS maintenance is completed, close the mains input switch, bypass input switch, output switch and battery switch of UPS.
Step 2: Confirm that the option of [Single/Parallel] in the basic parameter setting is set to [Parallel] according to Step 5.1, power on the equipment in the LCD panel.
Step 2: After the added UPS is fully started, the added UPS should share the load equally with other UPS of in the parallel system, and confirm whether the load of the UPS shown in energy flow diagram of the home is consistent with that of other UPS. If so, it means that the process of adding the single UPS after the maintenance has been completed.

6 Maintenance

The parts and components in the UPS cabinet are fixed to a solid metal frame, and all maintainable parts and components are located for easy disassembly with minimal decomposition. This design allows authorized maintenance personnel to perform routine maintenance and repairs quickly. In order to ensure the normal operation of UPS system, a regular performance inspection plan must be made. Regular routine operation inspection and system parameter inspection can ensure that the system runs efficiently without failure for many years.

6.1 Important Safety Information

The UPS system is used to supply the power for the equipment even in the event of failure in the mains. The UPS module is internally safe only when the main switch, the bypass switch, the output switch and the battery switch are disconnected and the electrolytic capacitor is discharged fully. After disconnecting all switches except for the maintenance switch, the maintenance personnel should wait for at least 5 minutes for the capacitor to be discharged before approaching the interior of the UPS module.

	CAUTION
⚠	• Only maintenance personnel authorized and trained by us can carry out repair and maintenance. • Lethal voltage exists. This equipment cannot be used when the cabinet door is opened or the protective plate is removed.

- Since the battery pack is an energy source, after disconnecting the battery switch, the energy in the battery pack will not be released. Therefore, do not touch any internal area of the battery pack. There is always voltage inside the battery pack. If you need to replace the battery, contact your supplier.
- If it is really required to maintain the battery pack, please refer to the battery maintenance instructions in the battery manufacturer's operation manual, or contact your maintenance representative. When operating on or around the battery, please follow the following rules:
- Remove watch, ring, or other metal object.
- Use a tool with an insulated handle.
- Wear rubber gloves and shoes.
- Do not place tools or metal parts on top of the battery or battery case.
- Disconnect the charging power supply before connecting or disconnecting the terminals.
- Check whether the battery is inadvertently grounded, and if so, remove the grounding source. Contacting with any part of a grounded battery can cause an electric shock. If such grounding sources is removed during installation and maintenance, it is possible to reduce the risk of electric shock.
- Replace the battery with the same number and model of sealed lead-acid battery.
- The batteries must be properly disposed, and please refer to local disposal requirements.

6.2 Room Management

Room management includes environment safety management and equipment management

1. The basic task of environmental safety management is to ensure that the environment temperature, relative humidity, cleanliness, electrostatic interference, noise, strong electromagnetic interference and other elements meet the requirements, ensure the stable performance and reliable operation of power equipment, safe production, and the normal power supply of electrical equipment.

2. The basic requirements of equipment management are as follows: ensure the mechanical performance of the equipment is intact, the electrical performance of the equipment meets the standard requirements, the operation of the equipment is stable and reliable, and the technical data and original records related to the equipment are complete.

6.3 Preventative Maintenance

6.3.1 Monthly Maintenance

- Check the operation conditions of the equipment, including ambient temperature, humidity, input and output voltage, frequency, load type, load rate, various alarm information, etc.
- Check UPS for any abnormal sound. If yes, identify the source of abnormal sound, especially the fan, the power unit and the bypass unit. If the reason cannot be identified, contact the customer service center in time.
- Check whether the input and output connection terminals of the equipment are firm, the connection cables are intact, aging or damaged. If damaged, analyze the cause of damage and pay special attention to rat prevention.
- Check the UPS monitoring panel to confirm that all graphical display units on the monitoring panel are in normal operation, and all operating parameters of the power supply are within the normal range, and there is no fault or alarm information in the displayed records.
- Clean and dedust the equipment.
- Observe whether there is any change in the load of UPS, and check and record increase and decrease of the load regularly.
- Check and record the operating environment temperature and humidity of UPS.
- Check that the UPS parameters are conFig.d correctly.
- Fill in UPS maintenance report form, classify and deal with abnormal situation and alarm.
- Export alarm information from the system and analyze the alarm information, and the output alarm analysis report.

6.3.2 Quarterly Maintenance

Repeat monthly maintenance.

- Thoroughly dedust and clean UPS, especially the dust accumulating on the fans and air inlet and outlet.
- Check input and output cables and terminals for aging, breakage, burning and loosening. Reinforce all input-output terminals if necessary.
- If conditions permit, the internal key components of UPS shall be inspected, mainly including the following components:
- Electrolytic capacitor: check for leakage, bleeding and expansion.
- Transformer and inductance: check for color change caused by overheating, and delamination.
- Cable and wiring: check whether the sheath of the connecting cable is damaged, cracked and scraped, reinforce the connecting terminals of all power cables, and check whether the cables between the boards are firmly installed.
- Printed circuit board: check the cleanliness of printed circuit board and circuit integrity, pay attention to check for color change caused by overheating, and whether the components on the circuit board are intact, damaged and corroded.
- Check whether input, output, battery, load voltage and current are consistent with system requirements and those displayed on LCD with the multimeter and the clamp current meter.

6.3.3 Annual Maintenance

Repeat all quarterly maintenance and inspections.

In order to prevent the system failure resulting from working wear and tear of some components, it is recommended that the key components used in the UPS system be checked regularly and replaced within their expected service life.

Table 6-1 Recommended replacement period for key components

Key components	Recommended replacement period	Recommended inspection period
Electrolytic capacitor	3-5 years	1 year
Fan	5-6year	1 year
Valve-controlled lead-acid battery	3-4 years	6 months

6.4 Battery Maintenance

6.4.1 Battery Charge and Discharge

The battery pack is an important component to ensure uninterrupted power supply of UPS. When the mains power works normally, the UPS system will charge the battery in floating or equalization mode. In case of power failure, the battery will supply the power to the user's equipment through the inverter.

6.4.2 Selection of Battery

1. The battery capacity is selected by the current required for the electrical equipment of the power system and the expected battery discharge time. For example, the battery discharge current of the power system is 100A, and it is expected that the battery will continue to supply power for 2h in case of AC power failure, theoretical battery capacity required for the system is discharge current of battery × power supply time after AC power failure = 200Ah, and the required actual required battery capacity is the theoretical battery capacity plus allowance. The battery capacity is selected in the principle that the selected battery capacity is not higher than 120% of the required capacity of electrical equipment.
2. Don not use the batteries with different capacities in series, and the batteries of different voltages in parallel.
3. Do not use battery groups with different capacities in parallel (the internal resistance of the battery is different, and the capacity cannot be saturated simultaneously due to different currents in the charging process, which causes over-charge and under-charge for two batteries, and mutual discharging of the batteries in the process of discharging.

6.4.3 Considerations During Use and Maintenance of Battery

1. The use temperature of the battery is 0 ~ 40 ℃, the service life of the battery is inversely proportional with battery temperature, so cooling should be fully considered during using to prevent the temperature rise of the battery (with the temperature rise of the battery, the corrosion of the polar plate by sulfuric acid is aggravated, shortening the service life of the battery). If conditions permit, the room should be equipped with an air conditioner, in order to prolong the service life of the battery.
2. After installation, the batteries which are used for the first time or have not been used for a long time must be charged before using.
3. Regularly check and tighten the connection parts and connection wires of the battery pack to prevent accidents.

7 Troubleshooting

Please refer to Table 7-1 for the common failure removal method.

Table 7-1 Common failure and removal method

Problems	Possible cause	Solution
Rectifier failure	Input AC voltage beyond standard	Confirm whether the input distribution voltage is abnormal
	Abnormal phase sequence of three-phase input of UPS	Check whether phase sequence of three-phase input of UPS is correct
	Wave-based current limit and over-current failure of rectifier	Check the failure record list in the display panel to see if there is any failure. If yes, access the control interface to clear the failure
	Frequent switching between the mains and the battery	Access the control interface to clear the failure
	Power unit failed	Replace the power unit
Inverter failure, and UPS switching to bypass power supply	Output overload or short circuit protection	Reduce the load, or remove the short circuit of the load
	Overheat protection of UPS	Install the air conditioner or ventilation facilities for the machine room to ensure the normal temperature of the machine room
	Wave-based current limit and over-current failure of inverter	Check the failure record list in the display panel to see if there is any failure. If yes, access the control interface to clear the failure
	Power unit failed	Replace the power unit
AC system failing to switch to battery mode	Wave-based current limit and over-current failure of charger	Check the failure record list in the display panel to see if there is any failure. If yes, access the control interface to clear the failure
	Improper battery connection	Check whether the battery is connected reversely or not connected
	Battery undervoltage	Check the battery for any quality problems
	Power unit failed	Replace the power unit
Bypass failure	Abnormal bypass frequency	Check whether the bypass input frequency is abnormal
	Abnormal bypass voltage	Check whether the bypass input voltage is abnormal
	Short circuit or open circuit of bypass SCR	Check bypass SCR and insurance for short circuit or open circuit

Note:

For the replacement and maintenance of the components specified in Chapter 7 Troubleshooting and Appendix 2 Alarm List, please consult the maintenance engineer.

8 Technical Parameters

8.1 Models

Rated capacity	Frequency	Rated capacity	Frequency
200 kVA/200 kW	50/60 Hz	600 kVA/540 kW	50/60 Hz
250 kVA/250 kW	50/60 Hz	750 kVA/750 kW	50/60 Hz
300 kVA/270 kW	50/60 Hz	900 kVA/810 kW	50/60 Hz
400 kVA/400 kW	50/60 Hz	1000 kVA/1000 kW	50/60 Hz
500 kVA/500 kW	50/60 Hz	1200 kVA/1080 kW	50/60 Hz

8.2 Single Module

8.2.1 UPS System Input

Input	Parameters
Input phase number	Three phase five wires (3Φ+N+PE)
Rated input voltage	380/400/415 Vac
Variable range of input voltage	260 ~ 460 Vac
Variable range of input frequency	40 ~ 70 Hz
Input power factor	≥ 0.99
Battery voltage	480 Vdc (456/468/492/504 Vdc optional)
Cell number	12 V x 40 cells (38/39/41/42 optional)

8.2.2 UPS System Output

Output	Parameters
Output phase number	Three phase five wires (3Φ+N+PE)
Rated output voltage	380/400/415 Vac
Output voltage regulated accuracy	≤ 1%
Accuracy of output frequency	Mains mode: synchronous state, tracking bypass input 50/60hz;Battery mode: 50/60 Hz ± 0.05%
Inverter overload capacity	100% < Load ≤ 105% overload alarm, loading for long term 105% < Load ≤ 110% switch the bypass after 60 minutes 110% < Load ≤ 125% switch the bypass after 10 minutes 125% < Load ≤ 150% switch the bypass after 1 minutes 150% < Load switch the bypass after 0.2s

8.2.3 Operating Environment

Operating environment	Parameters
Operating temperature	0℃ ~ 40℃, derated at 3% per 1℃ in case of 40℃ ~ 50℃
Storage and transport temperature	-25℃ ~ 60℃
Relative humidity (RH)	5% ~ 95% RH (non-condensing)
Altitude	≤ 1000 m, derating 1% per 100 m in case of more than 1000 m
Protection grade	IP 20
Noise level at 1 m	≤ 70 dB

8.2.4 System

System	
Maximum of parallel UPSs	4
Switching time	0 ms
Protection function	Phase loss protection, phase sequence error protection, short circuit protection, overload protection, overwet protection, battery undervoltage protection, output voltage protection, fan failure protection
Communication interface	Standard: CAN, RS232, RS485, USB, LBS, RJ45, dual smart card slot, 6-in and 6-out programmable dry contacts Optional: parallel card, SNMP card, GPRS card, Wi-Fi card
Display	7 inch LCD touchscreen

Appendix 1 Alarm List

Alarm code	Description	Corrective action
111	Mains abnormal during quick inspection	Check whether the mains is normal, the sampling line is connected and the sampling is normal
118/119/120	Overvoltage at instantaneous input value (A B C)	Check whether the mains is normal and sampling is normal
121/122/123	Undervoltage at instantaneous input value (A B C)	Check whether the mains is normal, the sampling line is connected and the sampling is normal
100/101/102	Effective value overvoltage of input (A B C)	Check whether the power supply is normal and sampling is normal
103/104/105	Effective value undervoltage of input (A B C)	Check whether the mains is normal, the sampling line is connected and the sampling is normal
106	Input over-frequency	Check whether the mains frequency is normal
107	Input under-frequency	Check whether the mains frequency is normal
109	Input voltage unbalance	Check whether the mains is normal, the sampling line is connected and the sampling is normal
124	Input phase loss	Check whether the mains is normal, the sampling line is connected and the sampling is normal
108	Reverse input phase sequence	Check whether the phase sequence of the mains is inverted, the sampling line is inverted and the sampling is normal
124	Abnormal input phase lock	Check whether the phase sequence of the mains is inverted, and the program is abnormal.
514	Soft starting of PFC failed	1. Check whether CPLD is driven 2. Check whether the conditions are satisfied by the PFC soft start-up program
112/115/113/116/114/117	Rectifier over-current (A1A2B1B2C1C2)	1. Check the connection of Hall line; 2. Check the given limit of electric current loop
418/419/420/421/422/423	Quick over-current of rectifier software (A1A2B1B2C1C2)	1. Check the connection of Hall line; 2. Check whether the sampling is normal 3. Check over-current point setting 4. Check the software for erroneous judgment
424/425/426/427/428/429	Wave-based current limit failure of rectifier hardware	1. Confirm whether the hardware is normal; 2. Confirm whether CPLD is normal; 3. Confirm whether DSP program is abnormal;
412/413/414/415/416/417	Alarm of rectifier wave-based current limit hardware	1. Check whether the waveform is true or false; 2. Confirm whether the hardware is normal; 3. Confirm whether CPLD is normal; 4. Confirm whether DSP program is abnormal;
110	Input current unbalance (alarm)	1. Confirm the loading condition, whether the current sampling is abnormal, and whether the DSP program judgment the condition is reasonable;

		2. Whether the control loop is normal;
404	Frequent switching the mains and the battery (locking)	1. Confirm the switching times and whether it is locked in battery mode;
515	Failure of mains contact	Confirm whether the contactor drive signal and feedback signal are corresponding
500/501/502/503/504/505	Rectifier IGBT over-temperature (A1A2B1B2C1C2)	1. Check whether the sampling is abnormal and the terminals are loose; 2. Check the temperature calculation of the program;
520	Emergency shutdown	1. Check whether the EPO terminals are connected 2. Check the dry contacts and connection for correct setting
516	CPLD software version error	Check the CPLD software version number
517	DSP software version error	Check the DSP software version number
518	Inconformity between software version and hardware version	Check hardware and software version number
508	DSP and CPLD communication failure	1. Check whether the communication circuit is abnormal; 2. Check whether the communication part of the program is abnormal;
512	Failure of auxiliary power supply 1	1. Check the open circuit of the fuse 2. Check the 15V voltage of the power panel is abnormal; 3. Check whether the power supply of the fan on the power board is abnormal. 4. Check the software for testing and judgment problem;
513	Failure of auxiliary power supply 2	1. Check the open circuit of the fuse 2. Check the 15V voltage of the power panel is abnormal; 3. Check whether the power supply of the fan on the power board is abnormal. 4. Check the software for testing and judgment problem;
521/522/523/524	Failure of driver connecting cable (ABCN)	1. Check whether the drive wire is connected; 2. Check whether the drive wire is damaged 3. Check software judgment
525	SPI communication failure of rectifier and inverter	1. Abnormal communication is normal in the recording program. 2. Caused by program burning failed 3. Caused by hardware circuit 4. Check the program
506	EEPROM reading and writing	1. Hardware circuit connect

	failure	2. Check the program
218	Shorted bus	1. Check whether there is a real short circuit and check the wiring 2. Check whether it is caused by software misjudgment
212/213/221/222	Quick overvoltage of bus software (PFC_P/PFC_N/BOOST_P/BOOST_N)	1. Check whether sampling is normal; 2. Check whether the setting of software protection point is reasonable; 3. Check whether the control is normal
215/216	Quick undervoltage of bus software (PFC_P/PFC_N/BOOST_P/BOOST_N)	1. Check whether sampling is normal; 2. Check whether the setting of software protection point is reasonable; 3. Check whether the control is normal
200/201/224/225	Bus overvoltage (PFC_P/PFC_N/BOOST_P/BOOST_N)	1. Check whether sampling is normal; 2. Check whether the setting of software protection point is reasonable; 3. Check whether the control is normal
203/204/226/227	Bus undervoltage (PFC_P/PFC_N/BOOST_P/BOOST_N)	1. Check whether sampling is normal; 2. Check whether the setting of software protection point is reasonable; 3. Check whether the control is normal
206	Voltage unbalance of positive and negative bus	1. Check whether sampling is normal; 2. Check whether the setting of software protection point is reasonable; 3. Check whether the control is normal
430	Soft starting failure of bus hardware	1. Check whether the program driver is transmitted 2. Check whether the hardware end receives the driver 3. Check whether the program judgment conditions are met 4. Check whether the bus is mounted when the hardware is started;
209/223	Bus hardware overvoltage (PFC_BUS/BOOST_BUS)	1. Check whether sampling is normal; 2. Check whether CPLD judgment and DSP communication are normal; 3. Check whether the control is normal
334	Battery contact failure	Confirm whether the contactor drive signal and feedback signal are corresponding
338	Abnormal battery connection (reverse connection)	1. Check whether the battery is connected reversely 2. Check whether the sampling line is connected reversely 3. Check whether sampling is normal;
339	Abnormal battery connection (not connected)	1. Check whether the battery is connected reversely 2. Check whether the sampling line is connected

		reversely 3. Check whether sampling is normal; 4. Check that dry contact settings are normal
328	Battery overvoltage	1. Check whether the quantity of connected cells is out of range 2. Check whether the quantity of connected cells is correct 3. Check whether sampling circuit is abnormal 4. Check whether program judgment condition is reasonable.
311	Battery under-voltage alarm (DOD)	1. Check whether the battery discharge voltage is reached 2. Check whether sampling is normal; 3. Check whether DOD increase is set 4. Check whether program judgment condition is reasonable.
312	Battery EOD undervoltage	1. Check whether voltage sampling is abnormal; 2. Check whether the battery is aging and damaged 3. Check whether the battery is fully discharged 4. Check the program
333	Battery ground fault	Check the connection of the dry contact
300	Battery overtemperature	1. Check whether the battery is over-temperature 2. Check whether the monitoring sampling is normal; 3. Check whether communication is abnormal between the monitor and DSP; 4. Check whether DSP processing is abnormal
320	Charger overvoltage	1. Check whether the battery charging voltage sampling is normal; 2. Check the program
341	Overvoltage failure of charger hardware	1. Check whether the battery charging voltage sampling is normal; 2. Check whether CPLD judgment and DSP communication are normal 3. Check program control for exceptions
322	Charging over-current	1. Check whether Hall is connected. 2. Check whether sampling is abnormal. 3. Check the program and the control are abnormal.
348	Charger over-temperature	1. Check whether sampling is abnormal and the terminals are loose 2. Check the temperature calculation of the program
355/356	Wave-based current limit failure of charger hardware (BAT1/BAT2)	1. Check whether sampling is abnormal and the terminals are loose 2. Check whether CPLD judgment and DSP communication are normal

316/317	Wave-based current limit alarm of charger (BAT1/BAT2)	1. Check whether sampling is abnormal and the terminals are loose 2. Check whether CPLD judgment and DSP communication are normal
319	Instantaneous over-current of charger (software)	1. Check whether sampling is abnormal and the terminals are loose 2. Check whether charge control is reasonable.
335	Soft starting failure of charger	1. Check whether the charging voltage sampling line is connected wrongly or reversely; 2. Check whether sampling is normal 3. Check whether CPLD is normal 4. Check whether DSP is reasonable.
432/433	Quick over-current of balance bridge arm	1. Check whether sampling is abnormal and the terminals are loose 2. Check whether DSP judgment is reasonable.
434/435	Over-current of balance bridge arm (BAT1/BAT2)	1. Check whether sampling is abnormal and the terminals are loose 2. Check whether DSP judgment is reasonable.
438/439	Wave-based current limit failure of balance bridge arm hardware (BAT1/BAT2)	1. Check whether sampling is abnormal and the terminals are loose 2. Check whether CPLD judgment and DSP communication are normal
436/437	Wave-based current limit alarm of balance bridge arm hardware	1. Check whether sampling is abnormal and the terminals are loose 2. Check whether CPLD judgment and DSP communication are normal
526/527	Over-temperature of balance bridge arm	1. Check whether sampling is abnormal and the terminals are loose 2. Check the temperature calculation of the program
1081	POWEROK failure	1. Use the oscilloscope to test whether the POWEROK signal transmitted to CPLD is normal;
1025	Fan failure	1. Check that all fans are working properly
1033	E2PROM reading and writing failure	1. Contact the engineer
1034	DSP and CPLD communication failure	1. Observe whether the breathing lamp of DSP is normal
1028	Control CAN communication failure	1. Check whether the control CAN wiring is normal;
1029	Monitor CAN communication failure	1. Check whether the control CAN wiring is normal; 2. Check if ID of each module conflicts
1076	SPI communication failure between rectifier and inverter	1. Observe whether breathing lamps of the rectifier DSP and inverter DSP are normal; 2. Check whether the program of the rectifier and the inverter is upgraded.
1030	CPLD software version error	1. Contact the engineer

810/811/812	Instantaneous over-voltage of inverter (A B C)	1. Check inverter IGBT drivers 2. Check bypass SCR driver and SCR 3. Check for impact load
800/801/802	Over-voltage of inverter (A B C)	1. Check whether the inverter voltage sampling is normal 2. Check whether the bypass voltage is normal
803/804/805	Undervoltage of inverter (A B C)	1. Check whether the inverter voltage sampling is normal 2. Check whether the bypass voltage is normal
718	Inverter over-frequency	1. Check whether the inverter voltage sampling is normal 2. Check whether the bypass voltage is normal
719	Inverter under-frequency	1. Check whether the inverter voltage sampling is normal 2. Check whether the bypass voltage is normal
807/808/809	Over-sized AC component of inverter	1. Check whether the DC component sampling circuit of the inverter voltage of the bypass board is normal;
1027	Inverter contactor failure	1. Check contactor drive signal and state feedback signal 2. Check whether the contactor is stuck
1000/1001/1002	Inverter over-temperature (A B C)	1. Check that all fans are working properly 2. Check whether the IGBT driver is normal 3. Check whether inductance current sampling is normal 4. Check whether temperature sampling is normal
1048/1049/1050	Wave-based current limit failure of inverter (A B C)	1. Check for overload or impact load 2. Check whether inductance current sampling is normal 3. Check whether the inverter voltage, inductance current and bus voltage sampling are normal 4. Check whether IGBT and its driver are normal
1014/1015/1016	Wave-based current limit alarm of inverter (A B C)	1. Check for overload or impact load 2. Check whether inductance current sampling is normal 3. Check whether the inverter voltage, inductance current and bus voltage sampling are normal 4. Check whether IGBT and its driver are normal
1073/1074/1075	Quick over-current of inverter (A B C)	1. Check whether inductance current sampling is normal 2. Check for overload or impact load 3. Check whether IGBT and its driver are normal 4. Check whether the setting of quick over-current point is normal;

		5. Check CPLD version
900	Soft starting failure of inverter	1. Check whether the inverter voltage and output voltage sampling are normal
905	Self-inspection failure of inverter	1. Check whether inverter voltage and DC component sampling circuit are normal
901	Phase lock failure	1. Use the oscilloscope to test whether TP20 synchronous square wave signal is normal;
1068	Abnormal synchronous square wave	1. Use the oscilloscope to test whether TP20 synchronous square wave signal is normal;
205	Bus undervoltage (P N)	1. Check whether the bus voltage sampling is normal
1039	Emergency shutdown	1. Check for EPO
1077/1078/1079	Inverter output shorted (A B C AB BC CA)	1. Check whether the output is shorted 2. Check whether inductance current sampling is normal
1111	Load impact	1. Check output for impact load 2. Check whether the output voltage, inductance current and bus voltage sampling is normal
1071	Inverter overload alarm	1. Check for overload 2. Check whether the output voltage, inductance current and bus voltage sampling is normal
707	105% inverter overload time out	1. Check for overload 2. Check whether the output voltage, inductance current and bus voltage sampling is normal
708	110% inverter overload time out	1. Check for overload 2. Check whether the output voltage, inductance current and bus voltage sampling is normal
709	125% inverter overload time out	1. Check for overload 2. Check whether the output voltage, inductance current and bus voltage sampling is normal
710	150%inverter overload time out	1. Check for overload 2. Check whether the output voltage, inductance current and bus voltage sampling is normal
700/701/702	Output over-voltage (A B C)	1. Check whether the output voltage sampling is normal
703/704/705	Output under-voltage	1. Check whether the output voltage sampling is normal
600/601/602	Bypass over-voltage (A B C)	1. Check whether the bypass voltage sampling is normal
603/604/605	Bypass under-voltage (A B C)	1. Check whether the bypass voltage sampling is normal
607	Bypass over-frequency	1. Check whether the bypass voltage sampling is normal

608	Bypass under-frequency	1. Check whether the bypass voltage sampling is normal
617	Reverse bypass phase sequence	1. Check whether the bypass voltage for inverted sequence 2. Check whether the bypass voltage sampling line is reversed
600/601/602	Effective value overvoltage of bypass (A B C)	Abnormal bypass input or abnormal sampling
603/604/605	Effective value under-voltage of bypass (A B C)	Abnormal bypass input or abnormal sampling
607	Bypass over-frequency	Abnormal bypass input or abnormal sampling
608	Bypass under-frequency	Abnormal bypass input or abnormal sampling
614/615/616	Bypass phase loss	Abnormal bypass input or abnormal sampling
655	Bypass overload alarm	Bypass overload or abnormal sampling
628	Bypass overload 135%	Bypass overload or abnormal sampling
629	Bypass overload 150%	Bypass overload or abnormal sampling
656/657/658	ECO over-voltage (A B C)	Bypass beyond upper and lower limit of ECO
659/660/661	ECO under-voltage (A B C)	Bypass beyond upper and lower limit of ECO
662	ECO frequency over-voltage	Bypass beyond upper and lower limit of ECO
663	ECO frequency under-voltage	Bypass beyond upper and lower limit of ECO
648	Quick over-voltage of bypass	Abnormal bypass or RCD load overload
639	Quick power failure of bypass	Load impact, or quick power failure
651	Quick under-voltage of bypass	Load impact, or quick power failure
700/701/702	Effective value overvoltage of output (A B C)	Abnormal inverter output or abnormal sampling
703/704/705	Effective value undervoltage of bypass (A B C)	Abnormal inverter output or abnormal sampling
718	Output over-frequency	Abnormal inverter output
719	Output under-frequency	Abnormal inverter output
1108	Output overload alarm	Output overload or abnormal sampling
1060	Total output overload 105% alarm of inverter	Output overload or abnormal sampling
1061	Total output overload 110% alarm of inverter	Output overload or abnormal sampling
1062	Total output overload 125% alarm of inverter	Output overload or abnormal sampling
1063	Total output overload 150% alarm of inverter	Output overload or abnormal sampling
720	Quick power failure of (inverter) output	Load impact, or quick power failure
712	Quick over-voltage of (inverter) output	Abnormal output

715	Quick under-voltage of (inverter) output	Load impact, or quick power failure
1111	Switching load impact to bypass	Load impact, or short circuit
330	Backup time pre-alarm	Normal battery discharge, or battery management calculation error
331	Remaining capacity pre-alarm	Normal battery discharge, or battery management calculation error
654	Phase lock failure	Abnormal bypass phase lock, abnormal output phase lock, or abnormal inverter output lock bypass
1109	System self-inspection failure	Possible cause for failure upon powering on for first time 1. No UPM online (communication failure or no UPM) 2. All UPM setting disenabled in the monitoring panel 3. Failure to start due to the failure of any UPM during starting.
1100	Abnormal CAN communication between system board and inverter module	Communication failure. Check whether the connecting wire is disconnected, the wire jumper of the pull-down resistor of CAN communication bus is normal, and the inverter DSP of UPM is halted abnormally or powered down.
1200	Abnormal CAN communication between parallel system boards	1. Communication failure. Check whether the connecting wire is disconnected, the wire jumper of the pull-down resistor of CAN communication bus is normal, and the inverter DSP of UPM is halted abnormally or powered down. 2. Check for same ID of rack
636	Bypass EEPROM operation failure	If conditions permit, try several times to repeatedly power up and down, see whether the fault has been reported always, and test whether the hardware chip is normal
638	Emergency shutdown	Check for external emergency stop dry contact trigger signal and check for manual EPO in the advanced setting of the panel
642/643	Bypass fan failure	Fan failure, or improper fan cables
619/620/621	Open circuit failure of bypass SCR\ fuse	Open circuit of bypass SCR or fuse
622/623/624	Short circuit failure of bypass SCR	Starting for short circuit of bypass SCR or inverter contactor
625/626	Auxiliary power supply failure of bypass	Abnormal auxiliary power supply of bypass