User Manual

Uninterruptible Power System

(100-1200kVA)

Preface

Usage

The manual contains information on main character, performance, operation principle, installation, use, operation and maintenance of tower UPS.

Users

Technical support engineer

Maintenance engineer

Note

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

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

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

Content

1. Safety Precautions

Before carrying out transportation, installation, operation, and maintenance, please read the instruction manual carefully and follow all safety precautions in the manual. If ignored, it may cause personal injury or equipment damage, or even death.
Our company will not be responsible for any injuries or equipment damage caused by your company or your customers' failure to comply with the safety precautions in the instruction manual.

Safety Message Definition

Danger: Serious human injury or even death may be caused, if this requirement is ignored.
Warning: Human injury or equipment damage may be caused, if this is requirement is ignored.
Attention: Moderate personal injury may be caused, if this requirement is ignored.
Commissioning Engineer: refers to the staff who operate this equipment must have received professional electrical training and safety knowledge training and passed the examination. They are familiar with the installation, commissioning, operation and maintenance steps and requirements of this equipment, and can avoid various emergencies.

Warning Label

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

Labels	Description
 Danger	Serious human injury or even death may be caused, if this requirement is ignored.
 Warning	Human injury or equipment damage may be caused, if this is requirement is ignored.
 Attention	Moderate personal injury may be caused, if this requirement is ignored.

Safety Instruction

 Danger	✧ Performed only by commissioning engineers. ✧ UPS is only for commercial and industrial purposes and cannot be used as a power source for any life support equipment.
 Warning	✧ Read all the warning labels carefully before operation, and follow the instructions.
	✧ When the machine is running, the heat sink base may generate high temperatures. Do not touch it to avoid burns.
	✧ ESD sensitive components inside the UPS, anti-ESD measure should be taken before handling.

Move & Installation

 Danger	✧ Keep the equipment away from heat source or air outlets. ✧ In case of fire, use dry powder extinguisher only, any liquid extinguisher can result in electric shock.
 Warning	✧ It is prohibited to install the UPS on flammable objects, and avoid close contact with or adhesion of the UPS to flammable objects. ✧ Please connect the braking options (braking resistor, braking unit or feedback unit) according to the wiring diagram. ✧ Don't start the system if any damage or abnormal parts founded. ✧ Contacting the UPS with wet material or hands may be subject to electric shock.
 Attention	✧ Use proper facilities to handle and install the UPS. Shielding shoes, protective clothes and other protective facilities are necessary to avoid injury. ✧ During positioning, keep the UPS way from shock or vibration. ✧ Install the UPS in proper environment, more detail in section 3.1.1. ✧ Prevent screws, cables, and other conductive objects from falling into the UPS.

Debug & Operate

 Danger	✧ Before connecting to the input power (including AC mains and battery), please confirm that it is properly grounded, and check that the wiring and battery polarity are connected correctly. Equipment grounding must comply with local electrical codes. ✧ When the UPS needs to be moved or rewired, in addition to paying attention to the above matters, the following work must also be confirmed: ✧ All input power has been disconnected. Including main power supply and control power supply. ✧ The UPS has been completely shut down for more than 10 minutes, and the measured output voltage is lower than 36V.
 Attention	✧ Do not frequently open and close the UPS input power. ✧ Please note that the ground leakage current will also flow through RCCB or RCD. ✧ Initial check and inspection should be performed after long time storing of UPS.

Maintenance & Component replacement

 Danger	✧ All the equipment maintenance and servicing procedures involving internal access need special tools and should be carried out only by trained personnel. The components that need be accessed by opening the protective cover with tools cannot be maintenance by user. ✧ The UPS fully meets the safety requirements for equipment in the operating area. There is dangerous voltage inside the UPS, but it is not accessible to non-maintenance personnel. Since components with dangerous voltages can only be accessed after using a tool to open the protective cover, the possibility of contact with high voltage is minimized. If the equipment is operated in accordance with general guidelines and the procedures recommended in this manual, there will be no danger. ✧ During maintenance and component replacement, measures must be taken to prevent screws, cables and other conductive objects from entering the UPS.

 Attention	✧ Please tighten the screws with appropriate torque. ✧ It is necessary to avoid the UPS and components coming into contact or being attached with flammable items. ✧ Anti-static measures must be taken for the UPS and internal components.

Battery Safety

 Danger	✧ All the battery maintenance and servicing procedures involving internal access need special tools or keys and should be carried out only by trained personnel. ✧ The use of batteries requires special care. After the battery is connected, the battery terminal voltage will exceed 400Vdc, and personal contact may be fatal. ✧ Battery manufacturers supply details of the necessary precautions to be observed when working on, or in the vicinity of a large bank of battery cells. These precautions should be followed implicitly at all times. Particular attention should be paid to the recommendations concerning local environmental conditions and the provision of protective clothing, first aid and fire-fighting facilities. ✧ Battery life shortens as the ambient temperature increases. Regular battery replacement can ensure that the UPS works properly and ensures sufficient backup time. ✧ Replace the batteries only with the same type and the same number. ✧ When connecting the battery, the battery terminal voltage will exceed the dangerous voltage of 400Vdc. To avoid electric shock accidents, please observe the following warnings when replacing the battery: 1. Eye protection should be worn to prevent injury from accidental electrical arcs; 2. Do not wear a watch. Rings or similar metal objects; 3. Use insulated tools; 4. Wear protective work clothes and rubber gloves; 5. Do not place metal tools or similar metal parts on the battery; 6. Before removing the battery terminals, you must first disconnect the load connected to the battery; 7. Please do not expose the battery to fire. It may cause an explosion and endanger personal safety; 8. Please do not short-circuit the positive and negative terminals of the battery, as it may cause electric shock or fire; 9. If your skin comes into contact with electrolyte, rinse with water immediately.

Disposal

 Warning	✧ The components inside the UPS contain heavy metals, and the UPS must be treated as industrial waste after scrapping.

Label Description

Label	Description
 Note	Indicates supplementary explanation or emphasis on the manual.

2. Overview

2.1. Product Description

Our company's intelligent modular UPS series products adopt an online double-conversion design and are based on DSP full digital control to provide stable and uninterrupted power for important loads. It can eliminate "power pollution" such as power surge, instantaneous high voltage, low voltage, wire noise and frequency offset on the mains, and provide customers with high-efficiency, high-power density power supply guarantee.

2.2. UPS Power Module Diagram

Figure 2-1 is the system structure diagram of a UPS single module. UPS power modules are mainly composed of rectifiers and inverters. Among them, the rectifier converts AC input into DC, the inverter converts DC into AC and the charger charges the external battery.

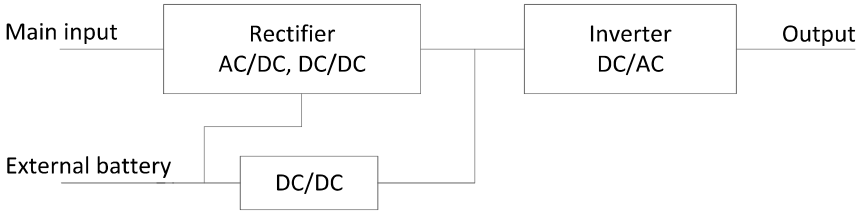


Figure 2-1Power Module Block Diagram

2.3. System Composition

The UPS is configured with the following parts: main input, static bypass, maintenance bypass and external battery, the system structure is shown in Figure 2-2.
The main conversion circuit is connected in parallel by 2 UPS power units, mainly including AC-DC-AC structure composed of rectifier (REC) and inverter (INV). The bypass static switch consists of SCR connected in reverse parallel, and the utility power can be supplied directly to the load through the bypass static switch. The maintenance bypass switch is a circuit breaker, and the maintenance bypass switch can be used to ensure the uninterrupted power supply to the load when repairing the UPS. When the utility power is cut off, the external battery pack will supply power to the load through the inverter.

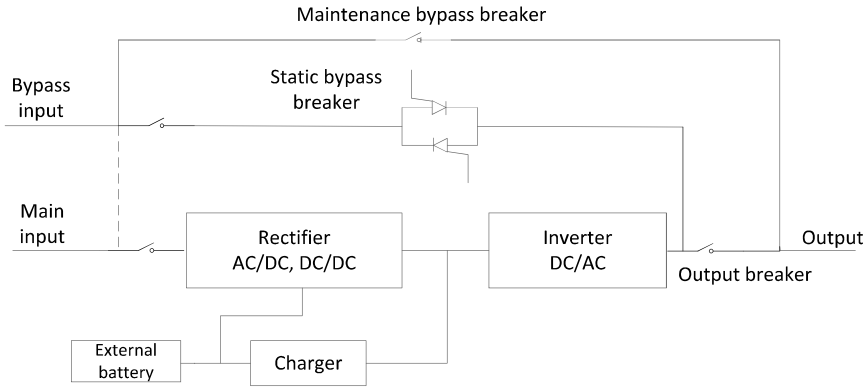


Figure 2-2UPS system diagram

2.4. Operation Mode

UPS system adopts online double-conversion design, according to different working conditions, can work in different working modes, including normal mode, battery mode, bypass mode, maintenance bypass mode, ECO mode, auto-restart mode and frequency converter mode.

2.4.1. Normal Mode

In normal mode, UPS change AC input into DC voltage (AC/DC) through the rectifier, DC voltage boost to bus (BUS) voltage. When the system is connected to the external battery, part of the AC input is charging the battery through the charger (DC/DC), the other part is changed to AC output (DC/AC) through the inverter to provide high-quality AC power for the load. The normal mode working principle is shown in Figure 2-3.

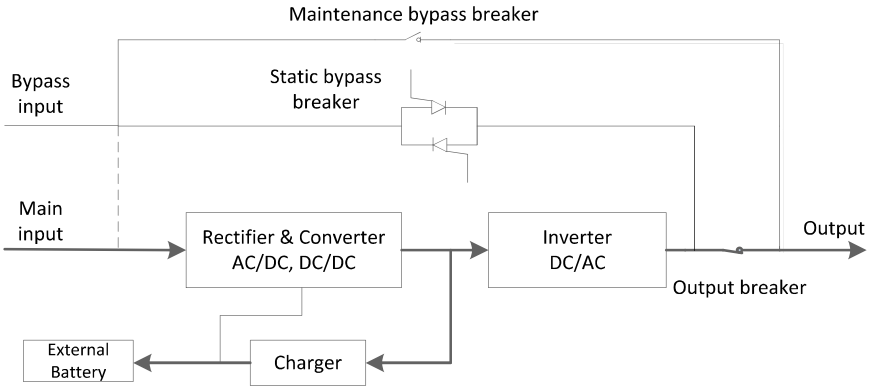


Figure 2-3 UPS conceptual diagram in normal mode

Note

The dark lines indicate the route involved in this mode of operation, and the arrows indicate the direction of energy flow, the same below.

2.4.2. Battery Mode

The operating mode in which the battery outputs AC power through the inverter to power the load is called battery mode. When the mains power fails, the UPS automatically switches to battery mode and the load power supply is not interrupted. Afterwards, when the mains power is restored, the UPS output returns to the normal working mode without interruption. The working principle of the battery mode is shown in Figure 2-4:

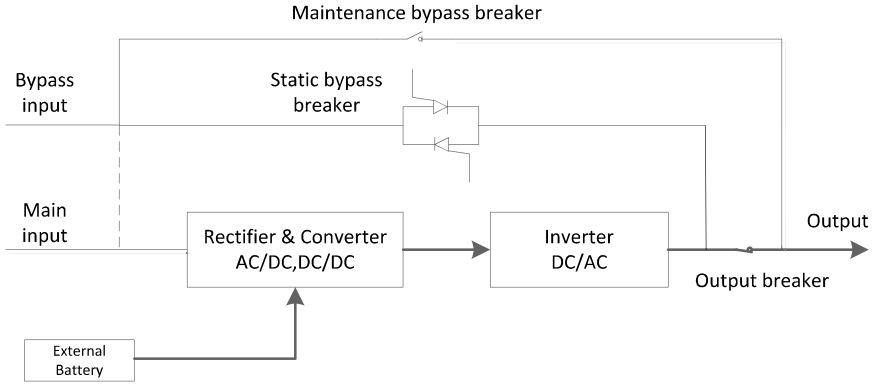


Figure 2-4 UPS conceptual diagram in Battery mode

Note

Use the battery cold start function to start the UPS directly from battery (The battery has been charged) mode when there is no mains power. Therefore, the battery power can be used independently to expand the application scenarios of the system. For details, see Chapter 5.1.2.

2.4.3. Bypass Mode

After the system is powered on, if the inverter is not started or manually turned off, the load will be supplied by bypass. In normal mode, if the UPS monitoring unit detects that the power module over temperature, overload, or other failures may cause the inverter to shut down, the UPS automatically switches to bypass mode and the mains supply power directly to the load through bypass static switch. In bypass mode, load power supply quality is not protected by the UPS and may be affected by power failure, abnormal voltage waveform or frequency. As Figure 2-5 shows:

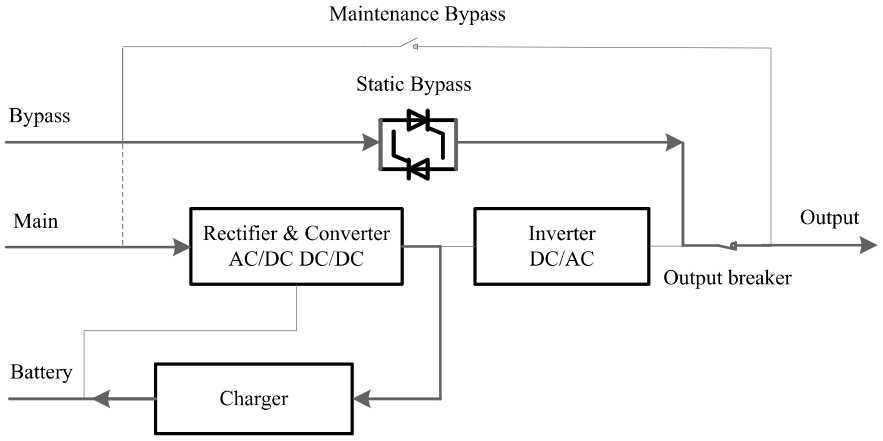


Figure 2-5 UPS conceptual diagram in Bypass mode

2.4.4. Maintenance Bypass Mode

When the UPS system and batteries are repaired, you should transfer to bypass first. Then manually close the maintenance bypass breaker, and then open the input, output breaker, open the bypass breaker, and turn off the external battery circuit breaker in the end. The load is directly supplied by the mains through the maintenance bypass, so as to realize the maintenance of the system without power failure to the load. As Figure 2-6 shows:

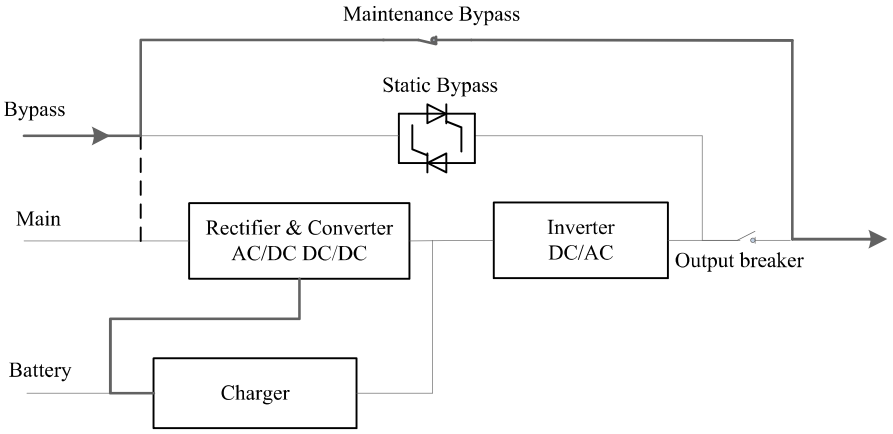


Figure 2-6 UPS conceptual diagram in Maintenance Mode


Danger

After the UPS switches to maintenance bypass operation, the power unit and bypass unit do not work, the LCD has no display, and the input terminals, output terminals and N line are live.

2.4.5. ECO Mode

ECO mode is an UPS energy-saving mode which can be set through the LCD or background software. In ECO mode, when the bypass input voltage is within the ECO range, the load is powered by utility through bypass static switch, the rectifier and inverter are standby. When the bypass input voltage is beyond the ECO range, the UPS will transfer from bypass to normal mode. In ECO mode, the system can achieve higher efficiency. The working principle of ECO mode is shown in Figure 2-7.

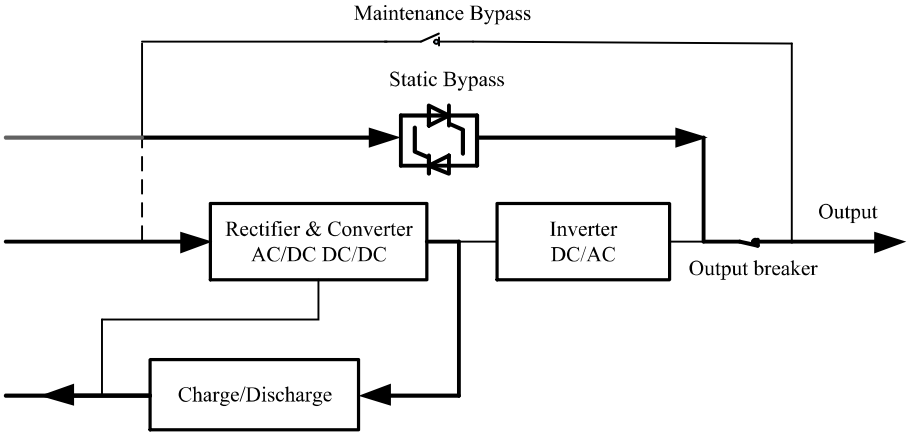


Figure 2-7 UPS conceptual diagram in ECO Mode

2.4.6. Auto-restart Mode

The UPS supports Auto-restart function, after a long time of AC mains failure, the inverter shuts down when the battery reaches the End of Discharge Voltage (EOD). The UPS will restart after the mains recover. This function can be set by trained and qualified professionals.

2.4.7. Frequency Converter Mode

By setting the UPS to Frequency Converter mode, the UPS could provide a stable output frequency (50 or 60Hz). Input frequency range is 40Hz~70Hz. In this mode, bypass is not available; the battery is optional based on whether it is required to operate in battery mode.

2.5. UPS Structure

2.5.1. UPS Configuration

The UPS configuration is provided in Table 2-1.

Table 2-1 UPS Configuration

Item	Components	Quantity (pcs)	Remark
800-1000kVA Zero-Switch cabinet	Switch distribution	1	Maintenance bypass switch
	Monitoring	1	Standard configuration
	Bypass unit	2	Standard configuration
800-1000kVA Fully equipped cabinets	Switch distribution	4	Main input switch, bypass switch maintenance bypass switch, output switch
	Monitoring	1	Standard configuration
	Bypass unit	2	Standard configuration
1200kVA Zero-Switch cabinet	Switch distribution	0	Standard configuration
	Monitoring	1	Standard configuration
	Bypass unit	2	Standard configuration
1200kVA Single-Switch cabinet	Switch distribution	1	Maintenance bypass switch
	Monitoring	1	Standard configuration
	Bypass unit	2	Standard configuration
1200kVA Fully equipped cabinets	Switch distribution	4	Main input switch, bypass switch maintenance bypass switch, output switch

	Monitoring	1	Standard configuration
	Bypass unit	2	Standard configuration
100kVA Power module	Power module	1~12	/

2.5.2. UPS Appearance (800-1000kVA Single-Switch Cabinet)

The standard UPS structure (front view) is shown in Figure 2-8.

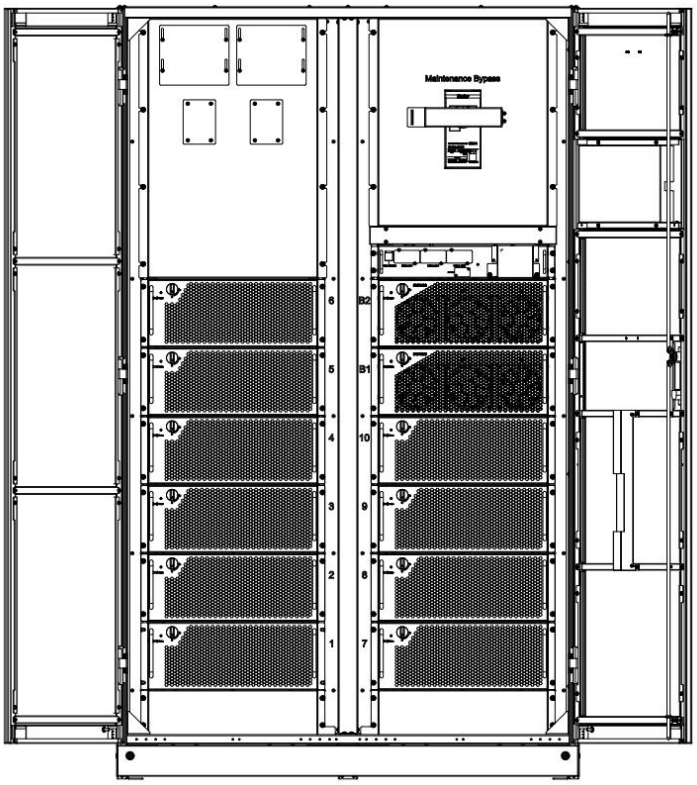


Figure 2-8 UPS cabinet front view

The UPS structure (back view) is shown in Figure 2-9.

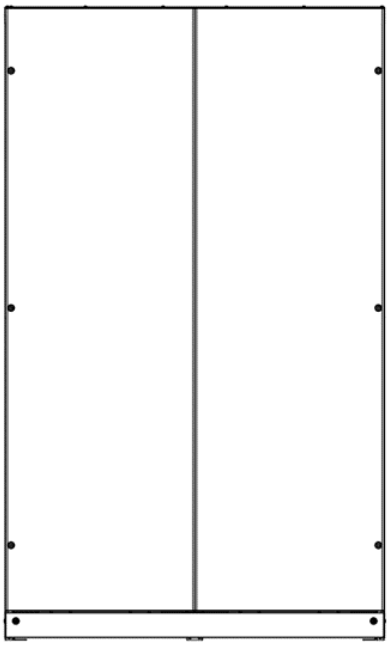


Figure 2-9 UPS Cabinet back view

2.5.3. UPS Appearance (800-1000kVA Fully Equipped Cabinet)

The fully equipped UPS structure (front view) is shown in Figure 2-10.

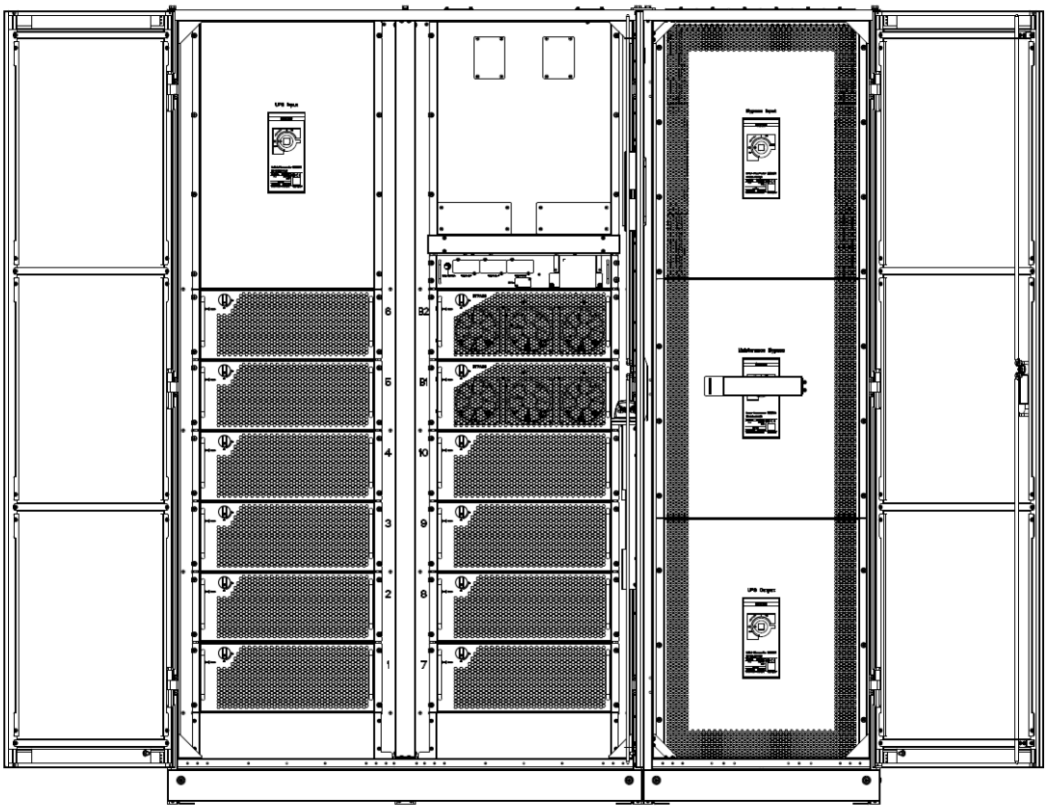


Figure 2-10 UPS cabinet front view

The UPS structure (back view) is shown in Figure 2-11.

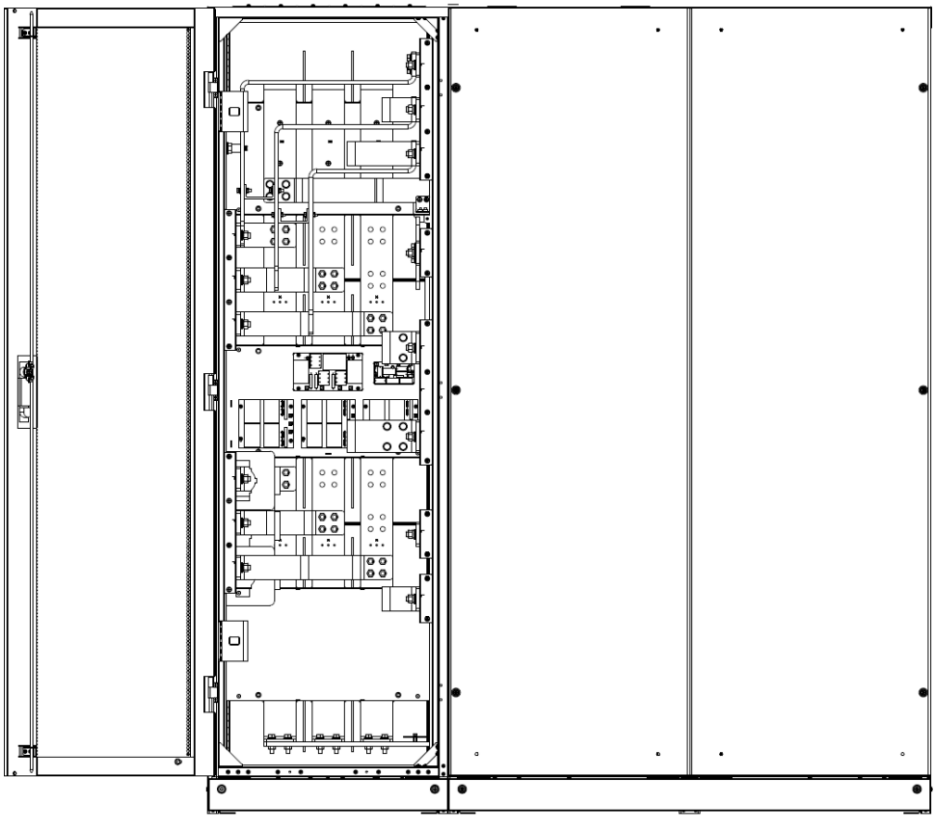


Figure 2-11 UPS Cabinet back view

2.5.4.UPS System Appearance (1200 kVA Zero-Switch Cabinet)

The front view of the standard configuration system is shown in Figure 2-12 below.

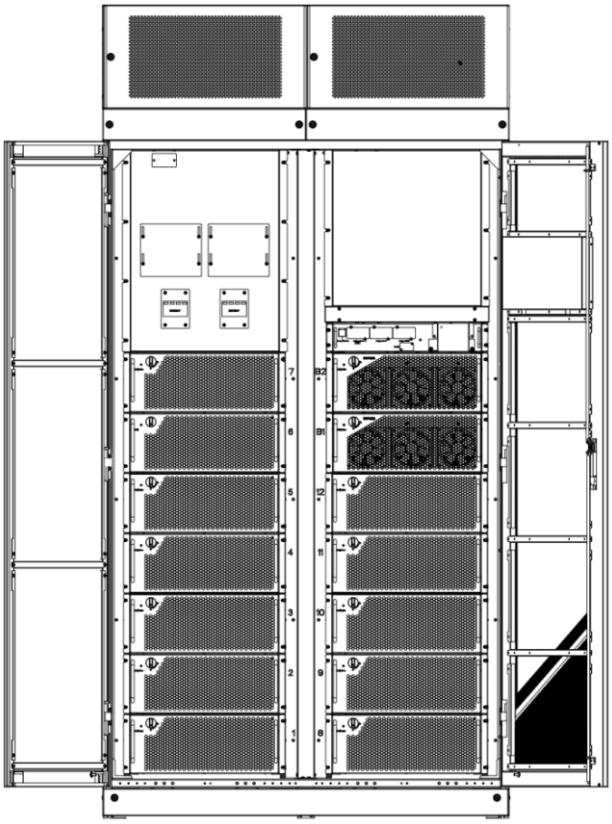


Figure 2-12 Front View of the System

The rear view of the system is shown in Figure 2-13 below.

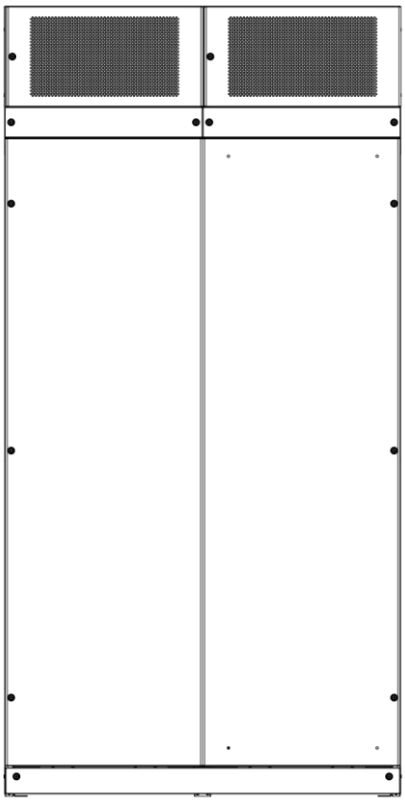


Figure 2-13 Rear View of the System

2.5.5.UPS System Appearance (1200 kVA Single-Switch Cabinet)

The front view of the standard configuration system is shown in Figure 2-14 below.

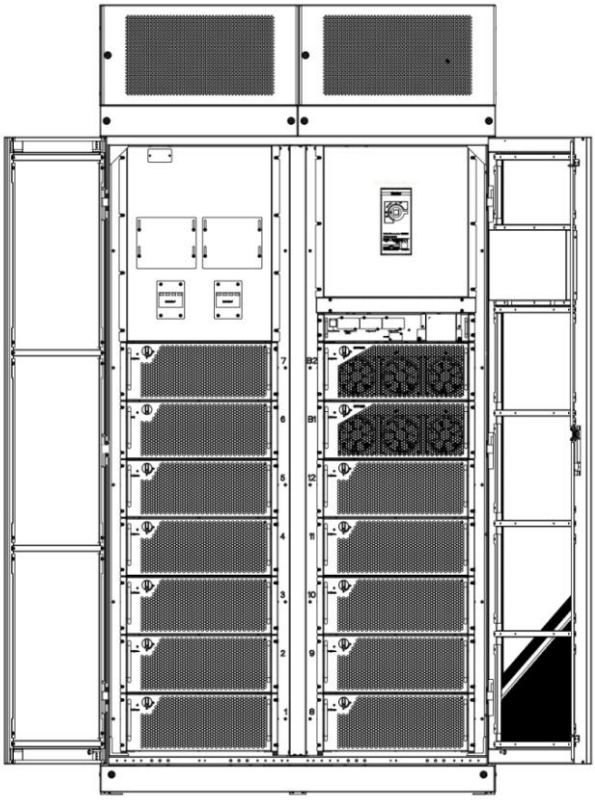


Figure 2-14 Front View of the System

The rear view of the system is shown in Figure 2-15 below.

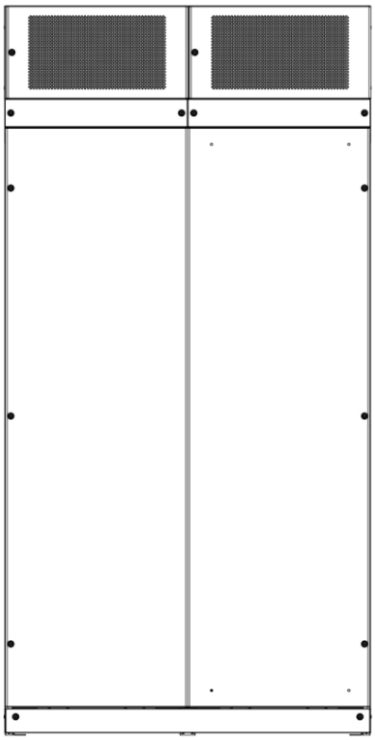


Figure 2-15 Rear View of the System

2.5.6.UPS System Appearance (1200 kVA Four-Switch Cabinet)

The front view of the fully equipped system is shown in Figure 2-16 below.

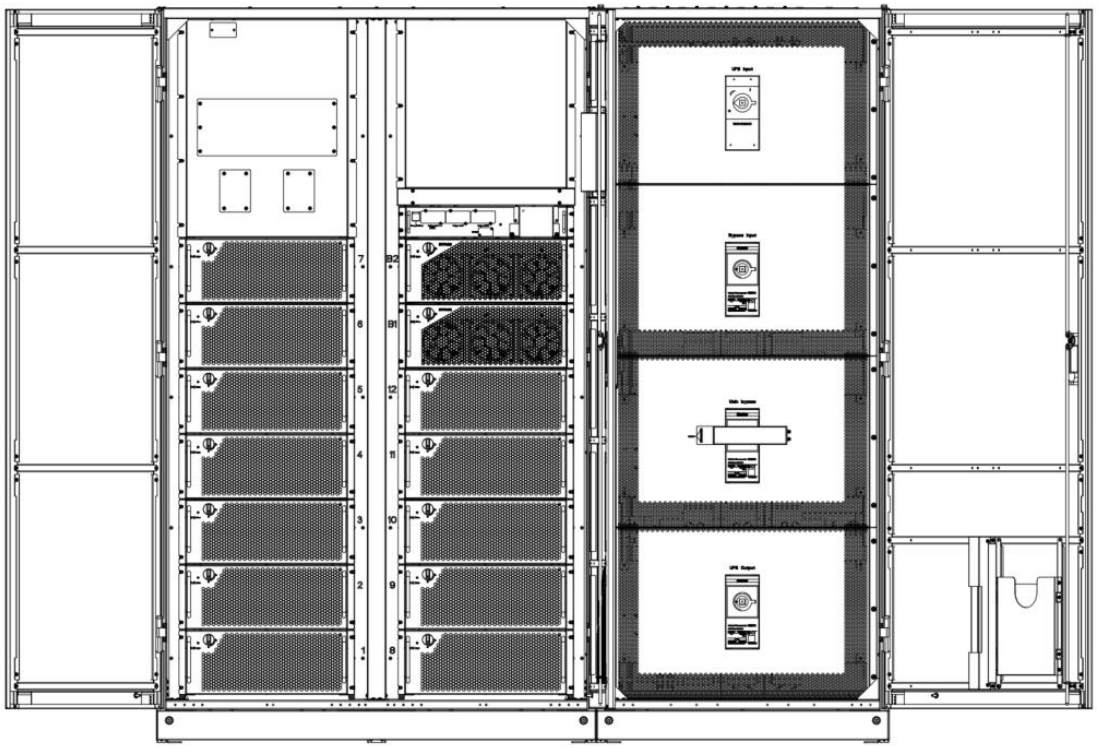


Figure 2-16 Front View of the System

The rear view of the system is shown in Figure 2-17 below.

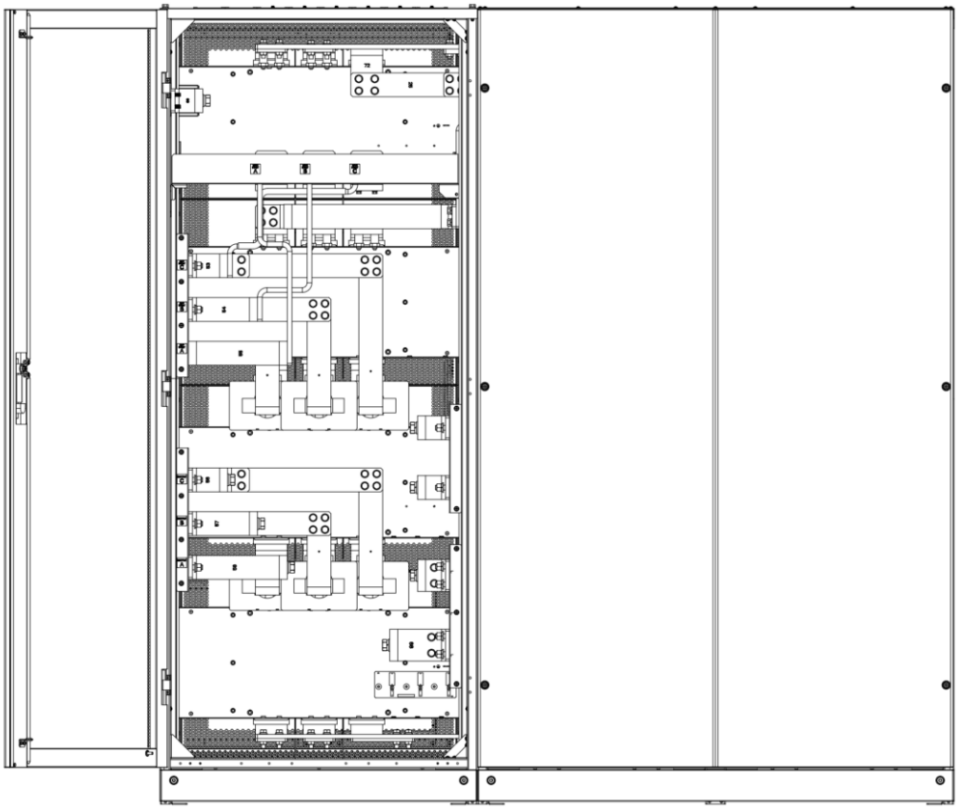


Figure 2-17 Rear View of the System

3. Installation

3.1. Location

3.1.1. Installation Environment

- The UPS is designed for indoor installation. Fans are used inside the UPS for forced air cooling. Enough space should be reserved around the cabinet to ensure ventilation and heat dissipation.
- Keep the UPS far away from water, heat and inflammable and explosive, corrosive material. Avoid installing the UPS in the environment with direct sunlight, dust, volatile gases, corrosive material and high salinity.
- It is strictly prohibited to install the UPS in a working environment with metal conductive dust.
- The optimal temperature for battery operation is 20±2℃. Working in an environment with a temperature higher than 30℃ will reduce the battery life. Working in an environment with a temperature lower than 20℃ will shorten the battery backup time.
- The battery will produce a small amount of hydrogen and oxygen at the end of charging, so the fresh air ventilation volume of the battery installation environment must meet the requirements of EN50272-2001.
- UPS uses an external battery, and a battery protection device (such as a DC circuit breaker) must be installed. The battery protection device should be installed as close to the battery as possible, and the connection to the battery should use the shortest wiring distance.

3.1.2. Site Selection

- Ensure the ground can bear the weight of the UPS cabinet, batteries and battery rack.
- No vibration and less than 5 degree inclination horizontally.
- If the UPS is no hurry to be installed. The UPS must be stored indoors to avoid excessive humidity or high temperature. Batteries need to be stored in a dry, low-temperature, well-ventilated place. The most suitable storage temperature is 20℃~25℃. The battery storage time generally does not exceed 3 months. If it exceeds this time, it must be recharged.

3.1.3. Weight and Dimension

Make sure that the ground or installation platform can bear the weight of the UPS cabinet, battery and battery rack. The weight of the battery and battery rack is calculated based on actual usage. The weight of the UPS is shown in Table 3-1.

Table 3-1 Weight of the UPS

Model	Weight
800kVA Standard cabinet(Single-Switch)	590kg
800kVA Fully equipped cabinet	890kg
1000 kVA Standard cabinet(Single-Switch)	620kg
1000 kVA Fully equipped cabinet	940kg
1200 kVA Standard cabinet(Zero-Switch)	657kg
1200 kVA Standard cabinet(Single-Switch)	760kg
1200 kVA Fully equipped cabinet	1150kg
Bypass Module	47 kg
Monitoring Module	6.5kg

100kVA Power Module	53.5 kg

3.2. Installation Guidance (800-1000 kVA Single-Switch Cabinet)

3.2.1. Dimension of the Standard Cabinet（800-1000 kVA Standard Cabinet）

Ensure that the power distribution room has sufficient space for the UPS system. The dimensions of the UPS cabinet are shown in Figure 3-1.

Attention

At least 0.8 meters should be reserved in front of the cabinet to facilitate opening the front door and replacing the power module. At least 0.8 meters should be reserved behind the cabinet for air flow and heat dissipation. The reserved space of the cabinet is shown in Figure 3-2.

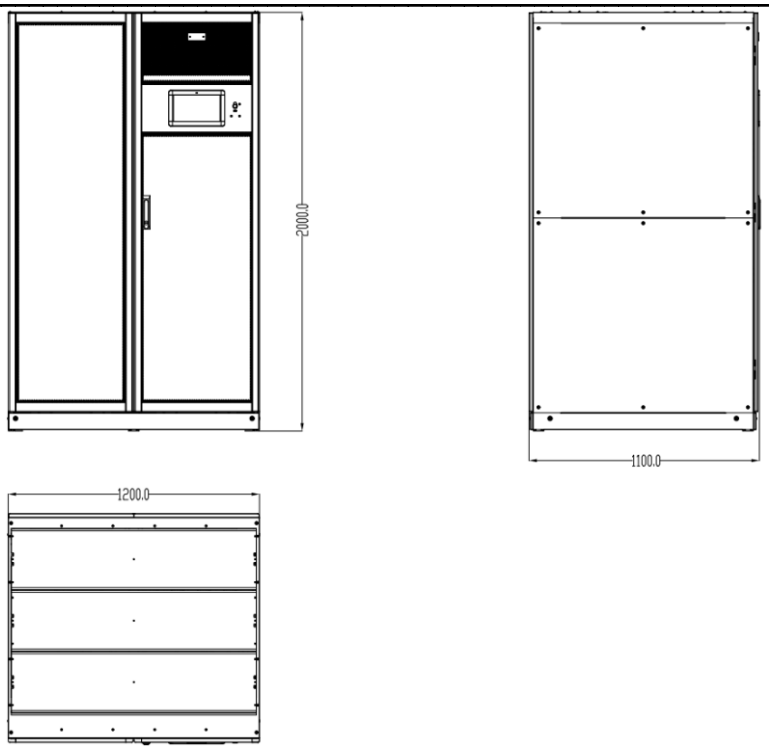


Figure 3-1 Dimensions of Cabinet (unit: mm)

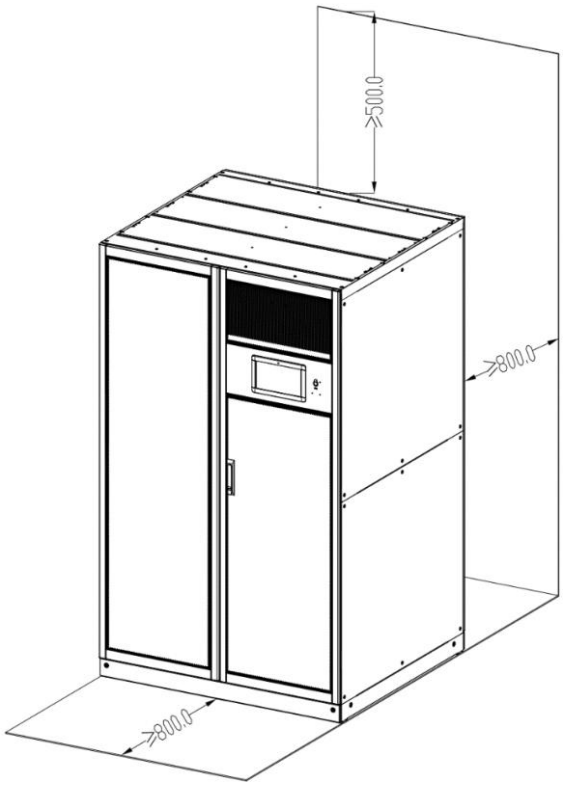


Figure 3-2 Reserved Cabinet Space (unit: mm)

3.2.2. Unloading and Unpacking (800-1000 kVA Standard Cabinet)

The specific steps for moving and unpacking the cabinet are as follows:

Step 1: Confirm that the UPS packaging is not damaged (if there is any transportation damage, please notify the carrier immediately);

Step 2: Use a forklift to transport the equipment to the designated location, see Figure 3-3;

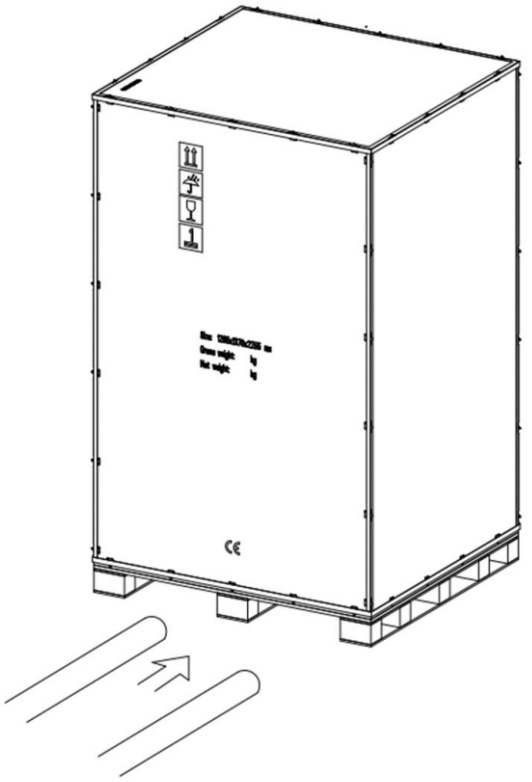


Figure 3-3 Transport the equipment to the designated location

Step 3: Pry open the buckle and open the wooden box, as shown in Figure 3-4;

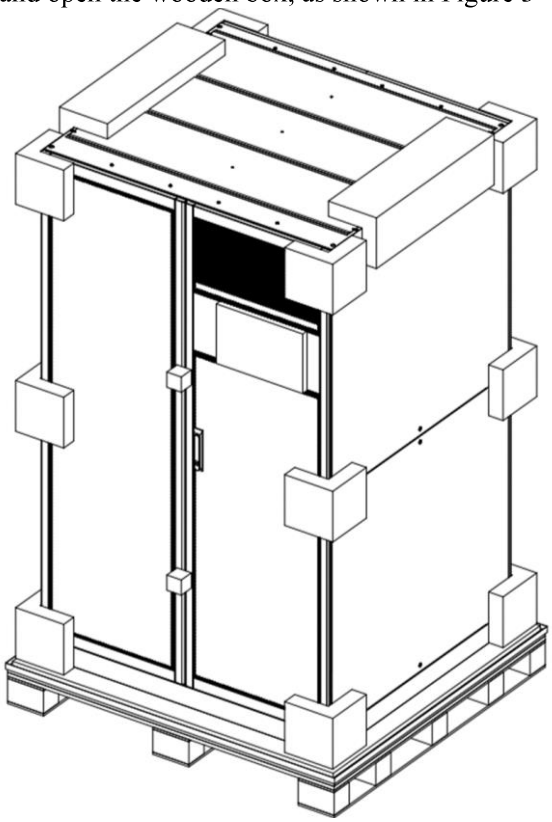


Figure 3-4 Disassemble the box

Step 4: After opening the wooden box, remove the cushioning material, as Figure 3-5;

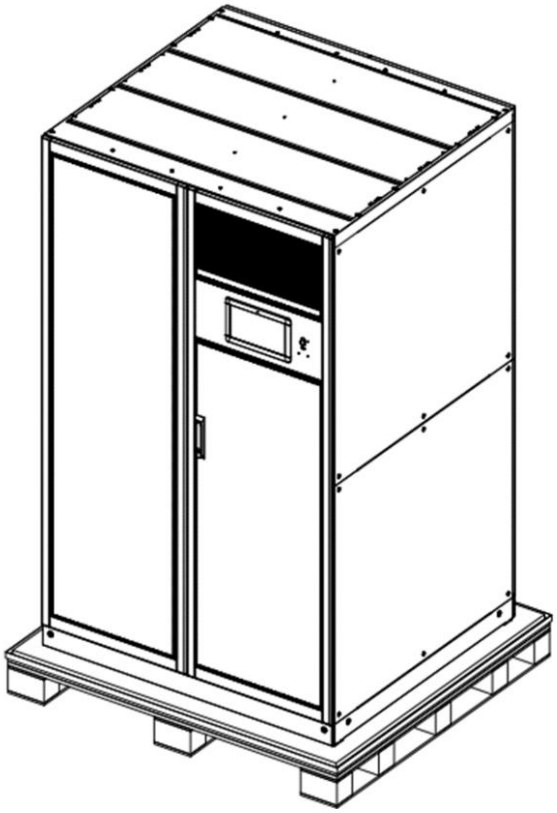


Figure 3-5 Remove the protective foam

Step 5 Check device integrity:

1. Visually inspect the appearance of the UPS and check whether there is any transportation damage to the UPS. If there is any damage, please notify the carrier immediately;
2. Check whether the models of the random accessories are complete and correct according to the shipping packing list. If you find that the accessories are missing or the model does not match, you should make on-site records in time and contact our local office;
Step 6 After confirming that the equipment is intact, remove the screws fixing the cabinet and wooden support;
Step 7 Place the cabinet into the installation position.
Step 8 If you choose to use a cable guard, unpack the cable guard and install the cable guard after completing the wiring.

Attention
After the packaging is disassembled, please dispose of waste items according to green environmental protection requirements.

3.2.3. Positioning (800-1000 kVA Standard Cabinet)

The weight of the UPS cabinet is supported by the corresponding four six supports at the bottom. The foot support method is generally used to support the cabinet for a long time after the cabinet is fixed in position. The schematic diagram of the footing is shown in Figure 3-6 below.

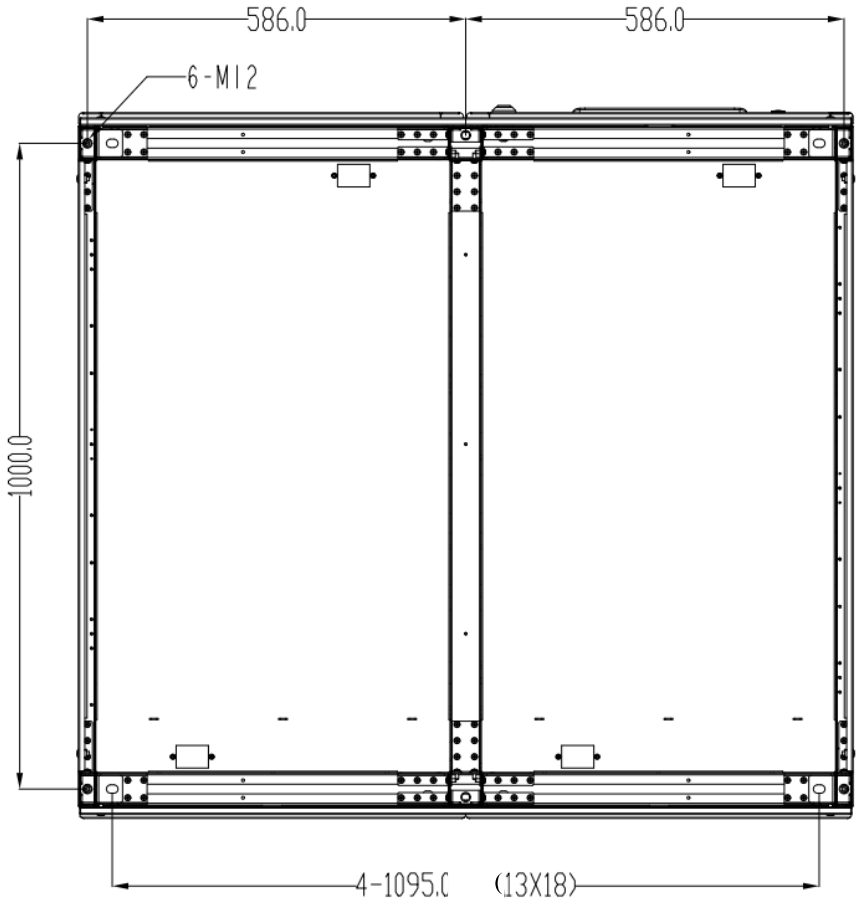


Figure 3-6 Supporting structure (Bottom view)

The specific installation process of the cabinet is as follows:
Step 1: Make sure the cabinet support feet are intact and the installation floor is flat;

Step 2: Use a forklift to move to the installation position. At this time, the cabinet is supported by the feet;
Step 3: Check whether the six feet are firm and consistent to ensure that the cabinet is stable;
Step 4: Fixed installation completed.

Attention
Auxiliary equipment is needed when the mounting floor is not solid enough to support the cabinet, which helps distribute the weight over a larger area. For example, cover the floor with iron plate or increase the supporting area of the anchor bolts.

3.2.4. Cable Entry (800-1000 kVA Standard Cabinet)

The standard cabinet has top cable entry. The system cable entry method is shown in Figure 3-7 below.

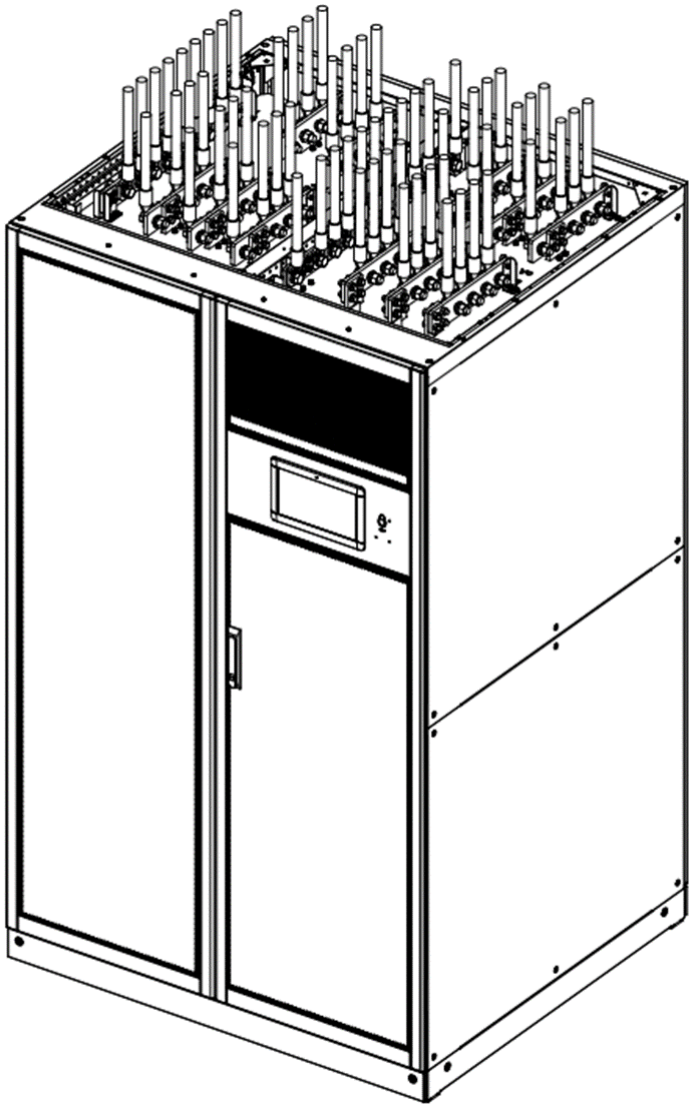


Figure 3-7 Cable entry method

3.2.5. Connecting Power Cables (800-1000 kVA Standard Cabinet)

The specific connection process is carried out as follows:

Step 1: Confirm that all input power distribution switches are completely disconnected, and all power switches inside the cabinet are disconnected. Put warning signs on these switches to prevent others from operating them;

Step 2: Remove the protective cover on the top of the cabinet. The input and output terminals, battery terminals and grounding terminals are visible. The wiring terminal layout is shown in Figure 3-8:

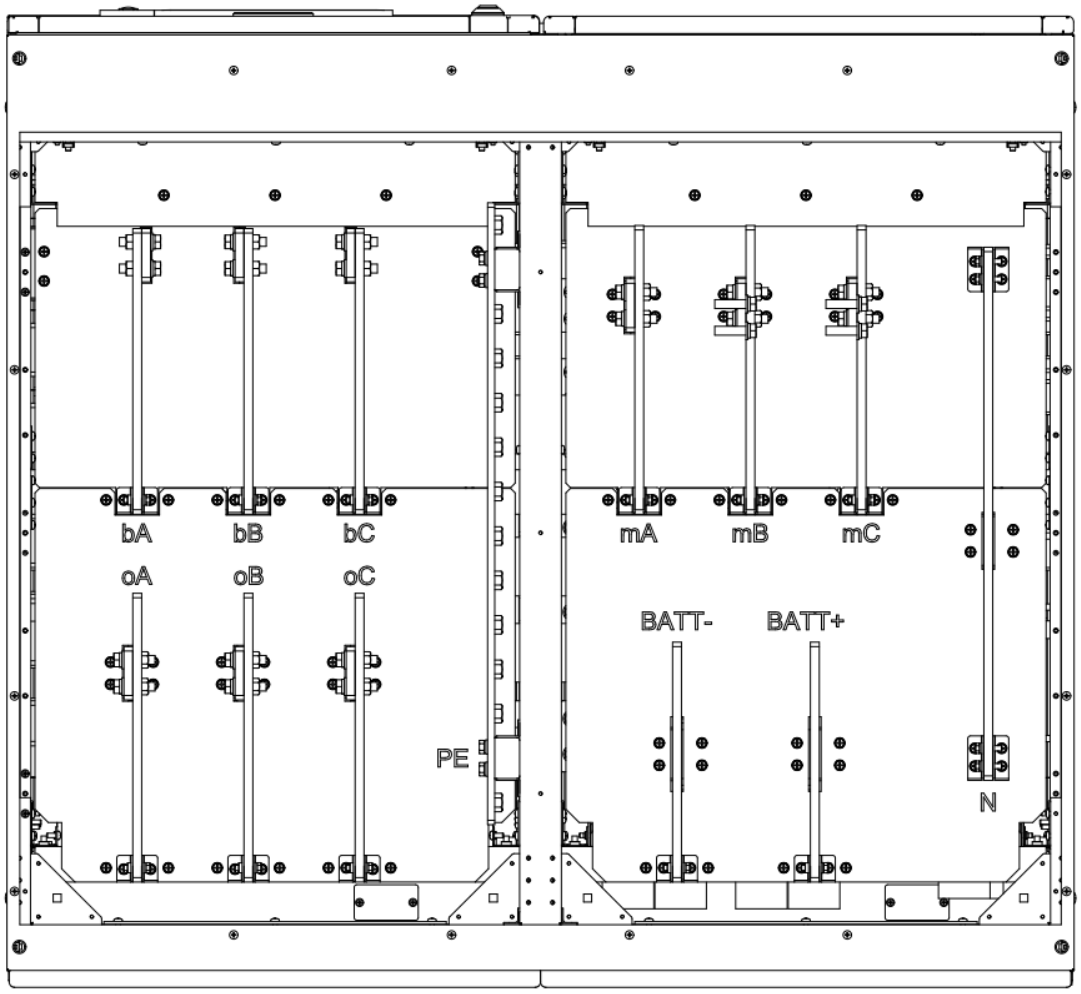


Figure 3-8 terminal block layout diagram

Step 3: Connect the input ground wire to the input ground terminal. Note that the ground wire connection must comply with local and national regulations;

Step 4: Connect the AC input cable to the UPS input terminal (mA, mB, mC)according to Figure 3-8; connect the output load cable to the UPS output terminal (oA, oB, oC);

Step 5: Connect the battery cable to the battery terminal of the UPS (BATT±);

Step 6: After checking that the wiring is correct, replace the protective cover and complete the wiring.

Warning

- When connecting power cables, it is necessary to follow the torque given in Table 3-3 to ensure the tightness of the wiring terminals and avoid safety hazards.
- Before wiring the UPS, ensure that you know the position and status of the switch connecting the UPS input to the mains power distribution. Ensure that the switch is disconnected and attaches warning labels to prevent others from operating the switch.

3.2.6. Cable Guard (800-1000 kVA Standard Cabinet)

The cable guard is an optional accessory and is packaged in a carton and shipped separately. The cable guard can be installed on site after the wiring is completed. The cabinet with the cable guard assembly is shown in Figure 3-9.

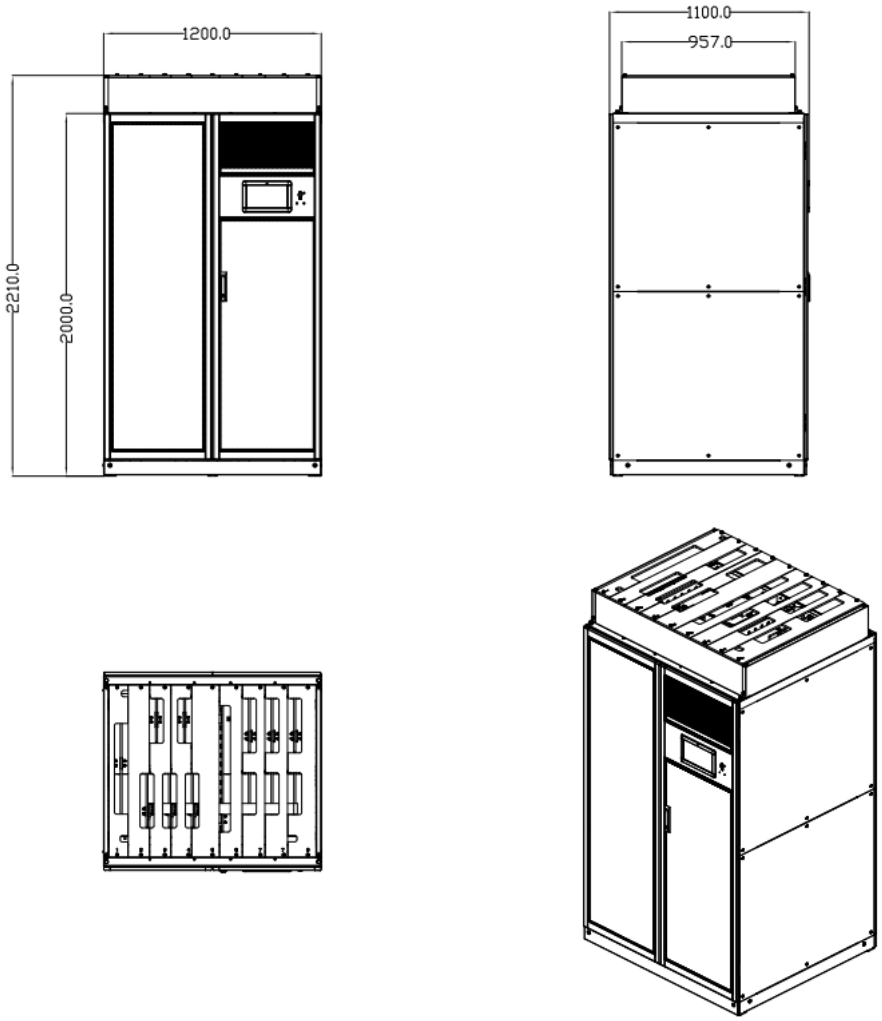


Figure 3-9 Standard cabinet with cable guard

3.2.7. Common Input Kit (800-1000 kVA Standard Cabinet)

The main and bypass source kit consists of three copper bars, which connect the A, B and C phases of the main circuit and bypass respectively. The standard cabinet provides two options:

1. The main and side sources are detachable. The main and side source copper bars can be freely disassembled according to actual needs, as shown in Figure 3-10.
2. The main and side sources are not removable. To use this solution, you need to install the main and side sources kit at the factory or do not install the main and side source kits. The main and side sources kits cannot be removed or installed during later use, as shown in Figure 3-11 shown.

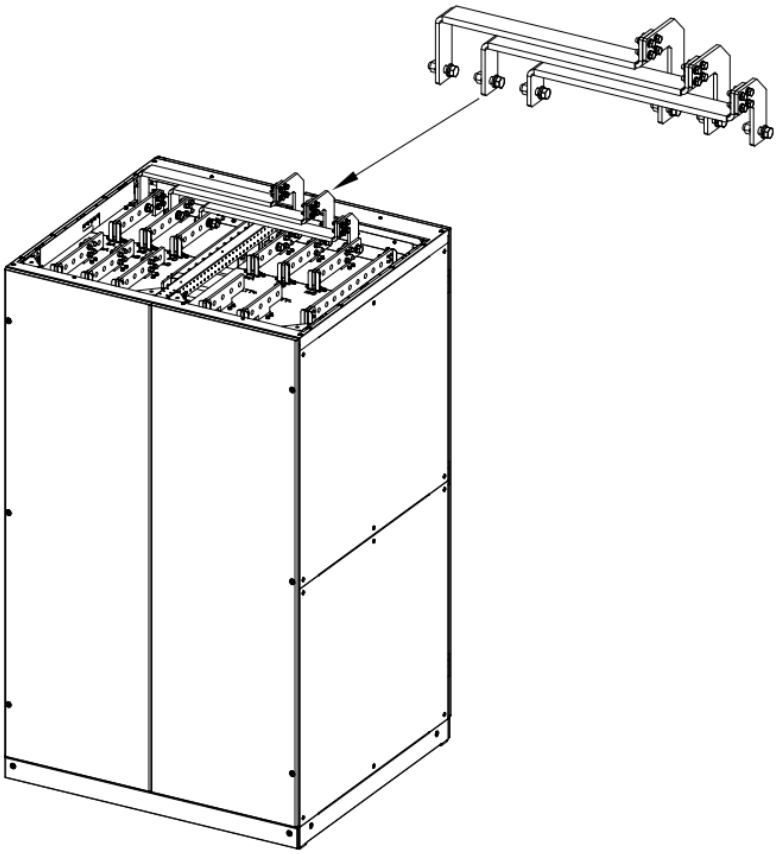


Figure 3-10 Detachable common input kit

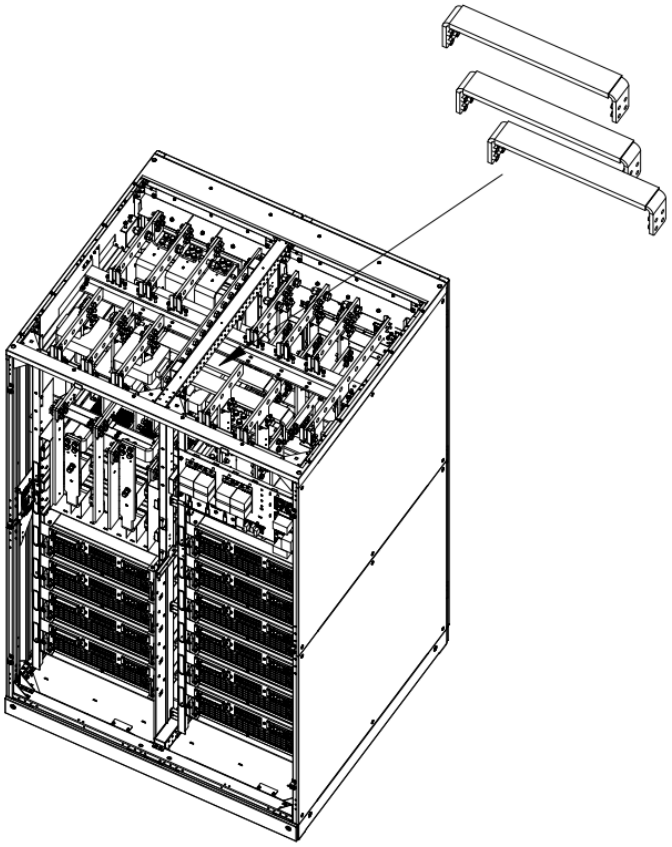


Figure 3-11 Non-detachable common input kit

3.3. Installation Guidance (800-1000 kVA Fully Equipped Cabinet)

3.3.1. Dimension of the Fully equipped Cabinet

Ensure that the power distribution room has sufficient space for the UPS system. The dimensions of the UPS cabinet are shown in Figure 3-12.

Attention

At least 0.8 meters should be reserved in front of the cabinet to facilitate opening the front door and replacing the power module. At least 0.8 meters should be reserved behind the cabinet for air flow and heat dissipation. The reserved space of the cabinet is shown in Figure 3-13.

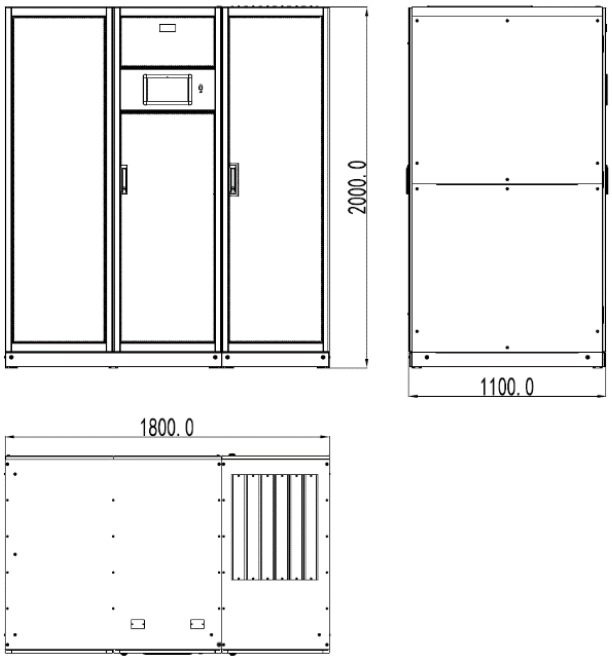


Figure 3-12 Dimensions of Cabinet (unit: mm)

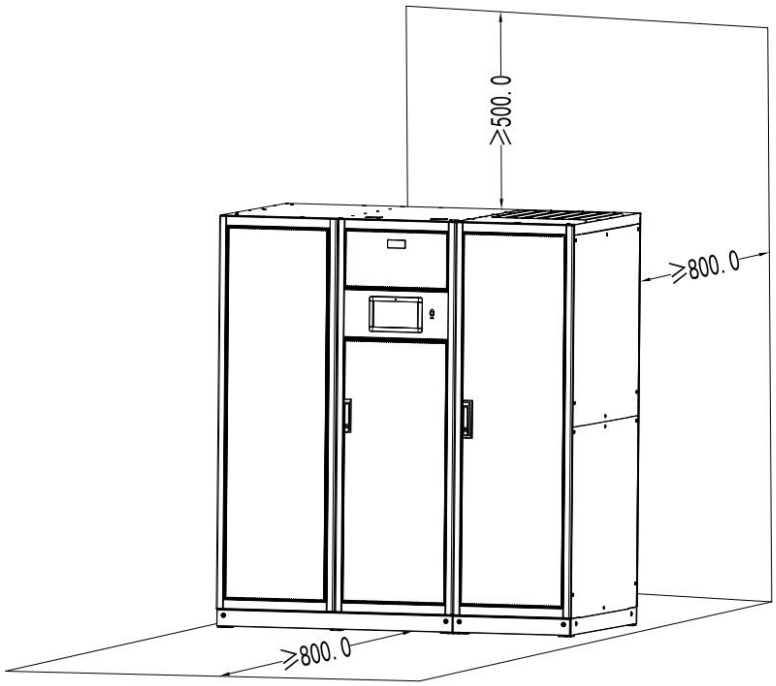


Figure 3-13 Reserved Cabinet Space (unit: mm)

3.3.2. Unloading and Unpacking (800-1000 kVA Fully Equipped Cabinet)

The specific steps for moving and unpacking the cabinet are as follows:

Step 1: Confirm that the UPS packaging is not damaged (if there is any transportation damage, please notify the carrier immediately);

Step 2: Use a forklift to transport the equipment to the designated location, see Figure 3-14;

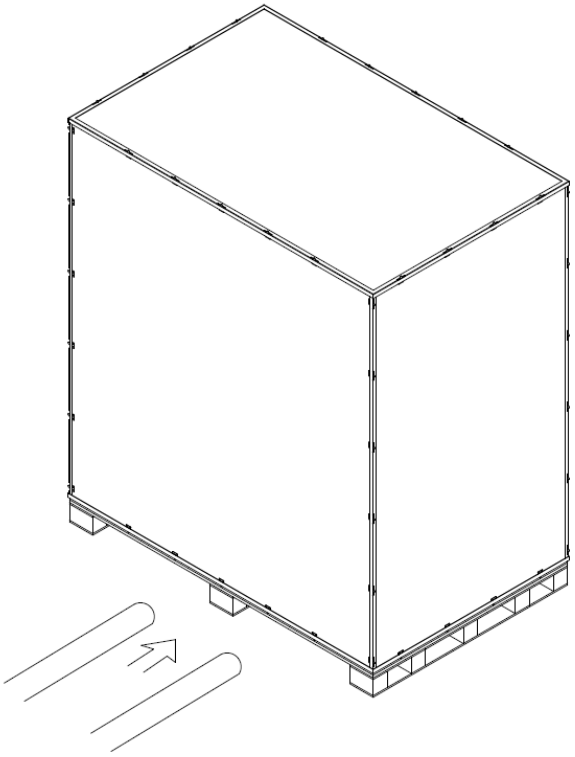


Figure 3-14 Transport the equipment to the designated location

Step 3: Pry open the buckle and open the wooden box, as shown in Figure 3-15;

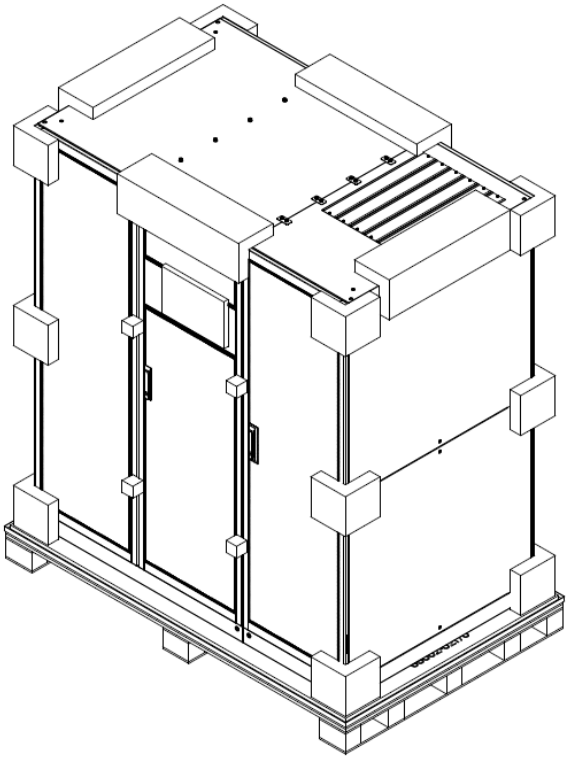


Figure 3-15 Disassemble the box

Step 4: Remove the protective foam around the cabinet as Figure 3-16;

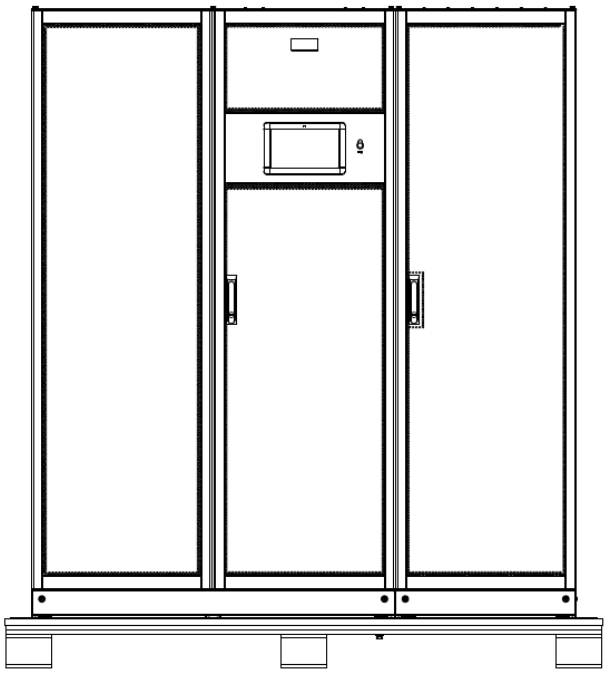


Figure 3-16 Remove the protective foam

Step 5 Check device integrity:

1. Visually inspect the appearance of the UPS and check whether there is any transportation damage to the UPS. If there is any damage, please notify the carrier immediately;
2. Check whether the models of the random accessories are complete and correct according to the shipping packing list. If you find that the accessories are missing or the model does not match, you should make on-site records in time and contact our local office;

Step 6 After confirming that the equipment is intact, remove the screws fixing the cabinet and wooden support;

Step 7 Place the cabinet into the installation position.

Special circumstances: If the fully equipped cabinet encounters space restrictions during the move to the installation site, such as insufficient elevator space, our professionals can dismantle the cabinet, dismantle the 1.8-meter-wide cabinet into two cabinets of 1.2 meters and 0.6 meters, and move them to the designated location, then combined the cabinets, as shown in Figure 3-17.

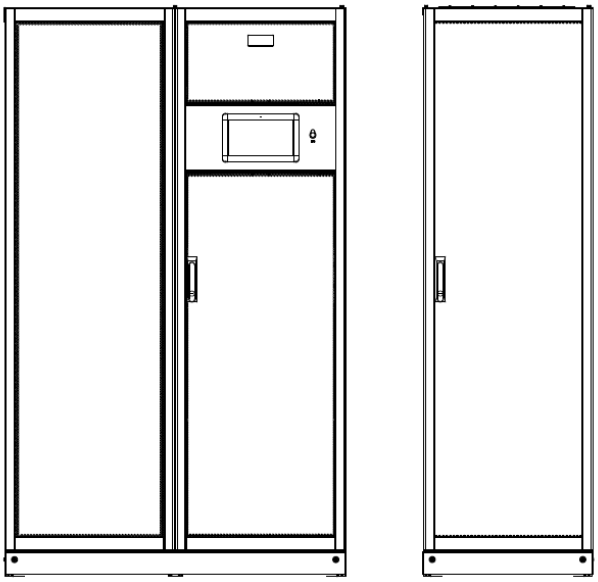


Figure 3-16 Dismantle and combine the cabinet

Atention

Disassemble carefully and do not scratch the body.

After the packaging is disassembled, please dispose of waste items according to green environmental protection requirements.

3.3.3. Fix the cabinet(800-1000 kVA Fully Equipped Cabinet)

The weight of the UPS cabinet is supported by the corresponding eight foot supports at the bottom. The foot support method is generally used to support the cabinet for a long time after the cabinet is fixed in position. The schematic diagram of the footing is shown in Figure 3-18 below.

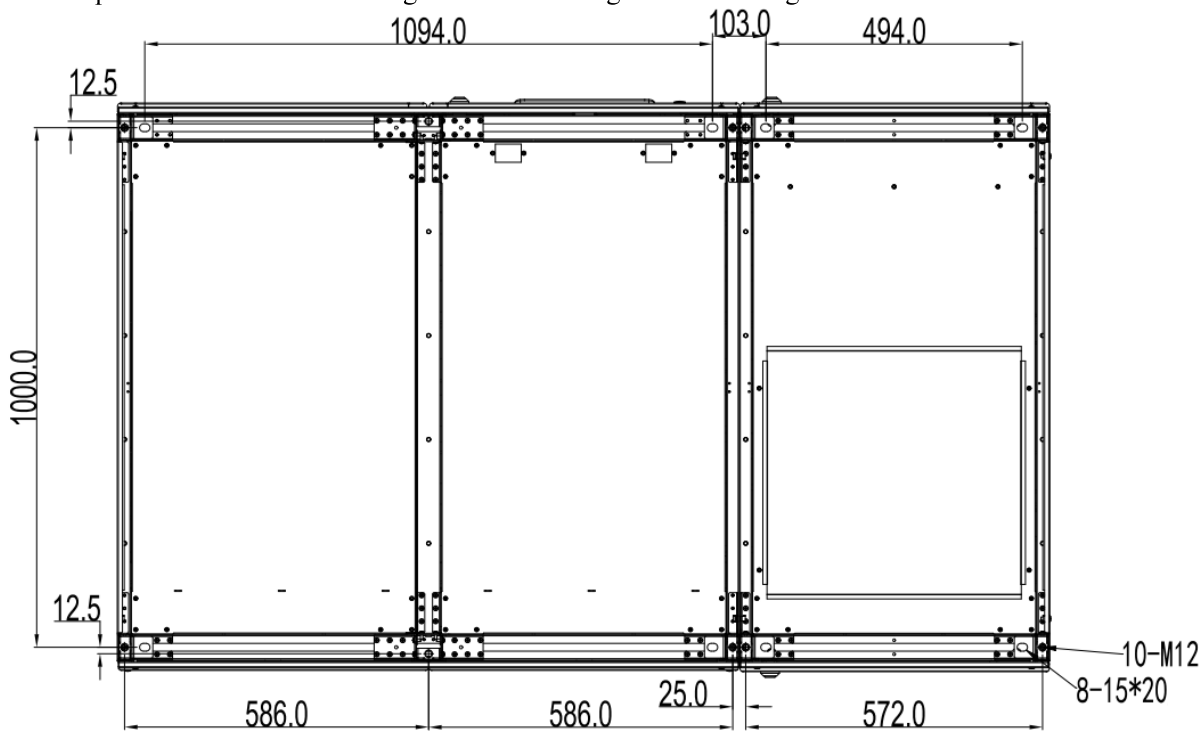


Figure 3-18 Supporting structure (Bottom view)

The specific installation process of the cabinet is as follows:

Step 1: Make sure the cabinet support feet are intact and the installation floor is flat;

Step 2: Use a forklift to move to the installation position. At this time, the cabinet is supported by the feet;

Step 3: Check whether the eight feet are firm and consistent to ensure that the cabinet is stable;

Step 4: Fixed installation completed.

Attention

Auxiliary equipment is needed when the mounting floor is not solid enough to support the cabinet, which helps distribute the weight over a larger area. For example, cover the floor with iron plate or increase the supporting area of the anchor bolts.

3.3.4. Fix the cabinet with anti-seismic components(800-1000 kVA Fully Equipped Cabinet)

The anti-seismic component is an optional accessory and is shipped after installation by the

factory. The installation method of using the anti-seismic component to fix the cabinet takes a 1000kVA cabinet as an example.
The cabinet with anti-seismic components is shown in Figure 3-19.

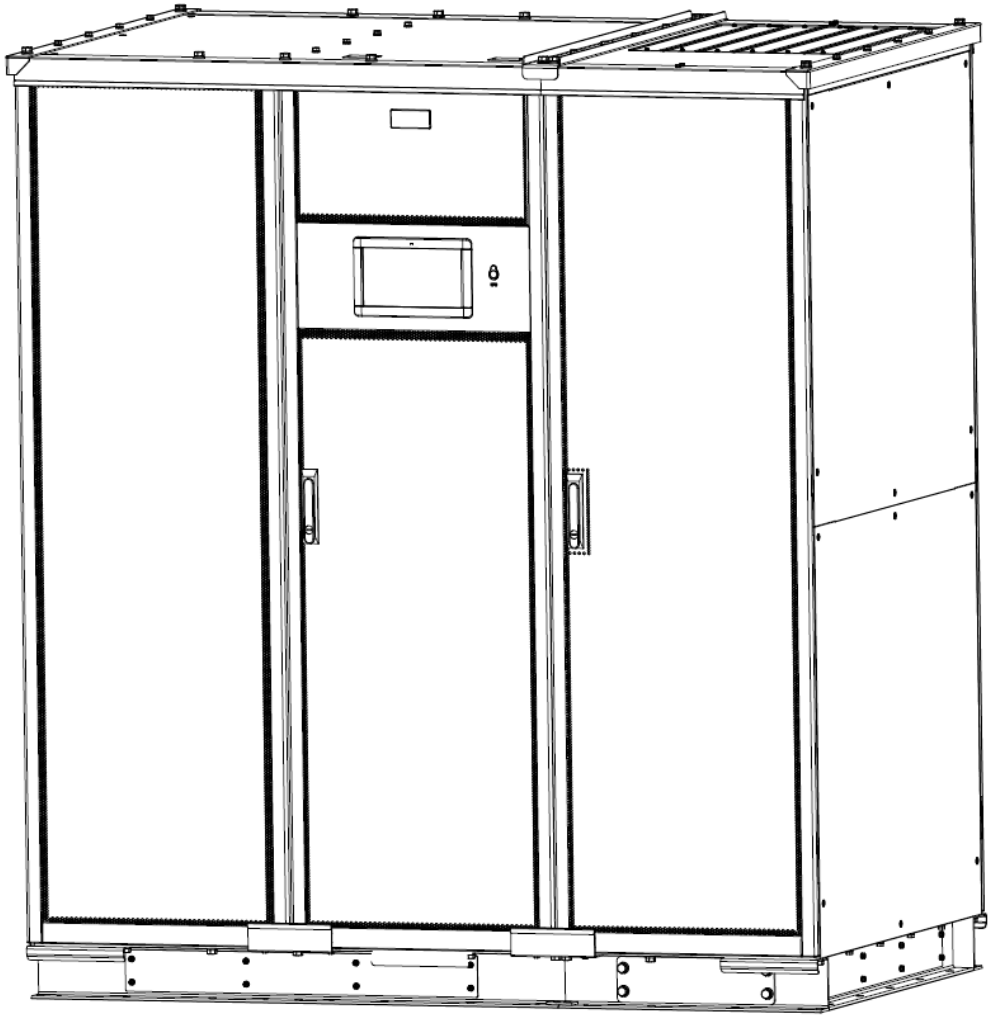


Figure 3-19 Cabinet with anti-seismic components

Fix on the Ground

Step 1 Make sure the installation ground is flat.
Step 2 Determine the installation position of the cabinet, and draw the installation hole positions on the installation surface according to the seismic component and equipment dimensional drawing. The seismic component and equipment dimensional drawing is shown in Figure 3-20.

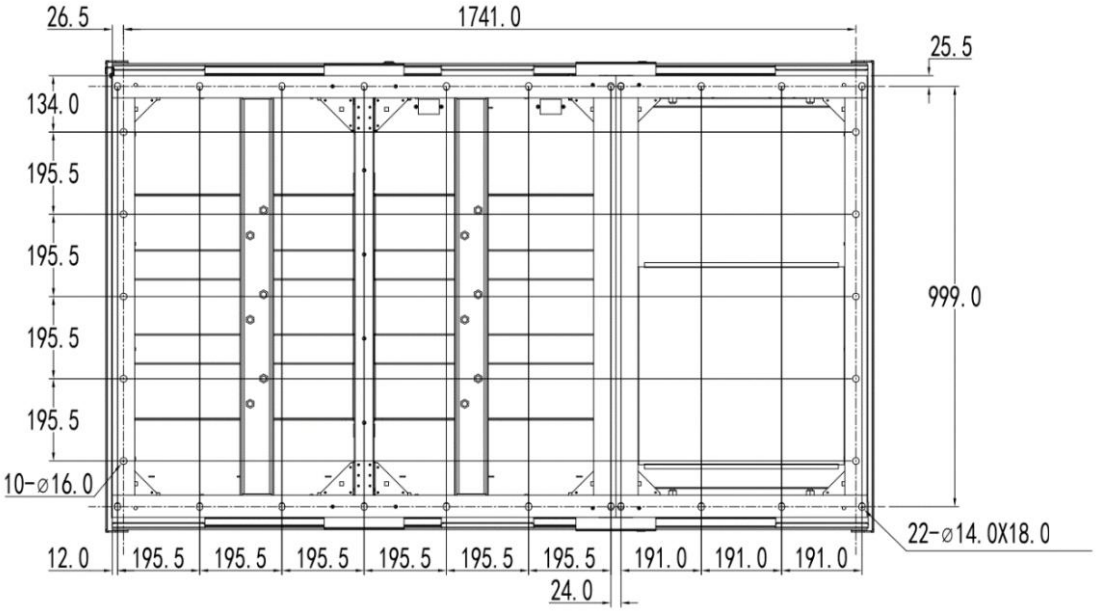


Figure 3-20 Dimension of anti-seismic components

Step 3 Use an impact drill to drill the mounting holes for the expansion bolts on the left and right sides of the cabinet, and then tap the expansion tubes of 32 M12 expansion bolts into the mounting holes.
Step 4 Push the cabinet onto the installation floor, and secure the cabinet to the installation floor through the screws of M12 expansion bolts.

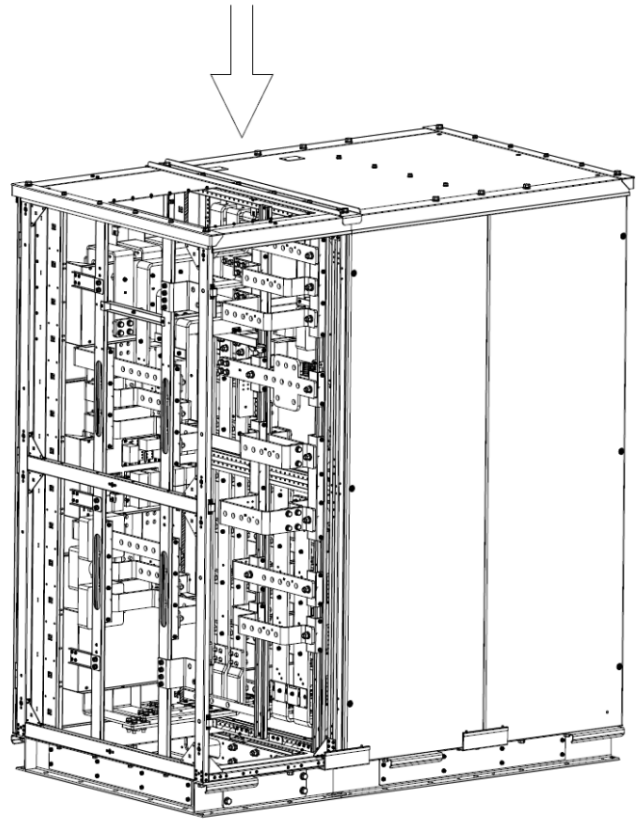
Attention
The expansion tube of the expansion bolt needs to be hammered in until it is flush with the installation surface, and the expansion tube must not be higher than the installation surface.

Channel steel installation

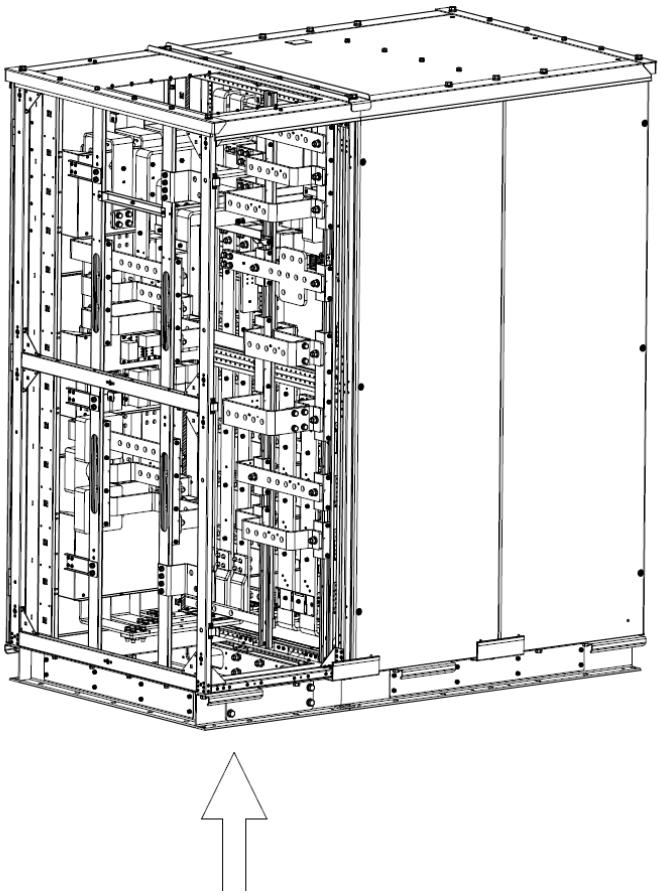
Step 1. Install the channel steel according to the seismic components and equipment size diagram. It is recommended that the channel steel width be more than 50mm. The surface of the channel steel should be flush with the ground and cannot be tilted. Determine the bolt mounting hole positions on the channel steel.
Step 2 Use an impact drill to drill holes in the channel steel installation holes. The hole diameter is M14.
Step 3 Use a ceiling crane to transport the cabinet to the installation location.
Step 4 Use 32 M12×45 hexagonal bolts to fix the cabinet to the mounting holes of the channel steel, and tighten the bolts with nuts.

3.3.5. Cable Entry (800-1000 kVA Fully Equipped Cabinet)

Fully equipped cabinets can support both top and bottom cable entry. The system cable entry method is shown in Figure 3-21 below.



(a) Top entry



(b) Bottom entry

Figure 3-21 Cable entry method

3.3.6. Connecting Power Cables (800-1000 kVA Fully Equipped Cabinet)

The specific connection process is carried out as follows:

Step 1: Confirm that all input power distribution switches are completely disconnected, and all power switches inside the cabinet are disconnected. Put warning signs on these switches to prevent others from operating them;

Step 2: Open the back door of the cabinet and remove the protective cover. The input and output terminals, battery terminals and grounding terminals are visible. The wiring terminal layout is shown in Figure 3-22:

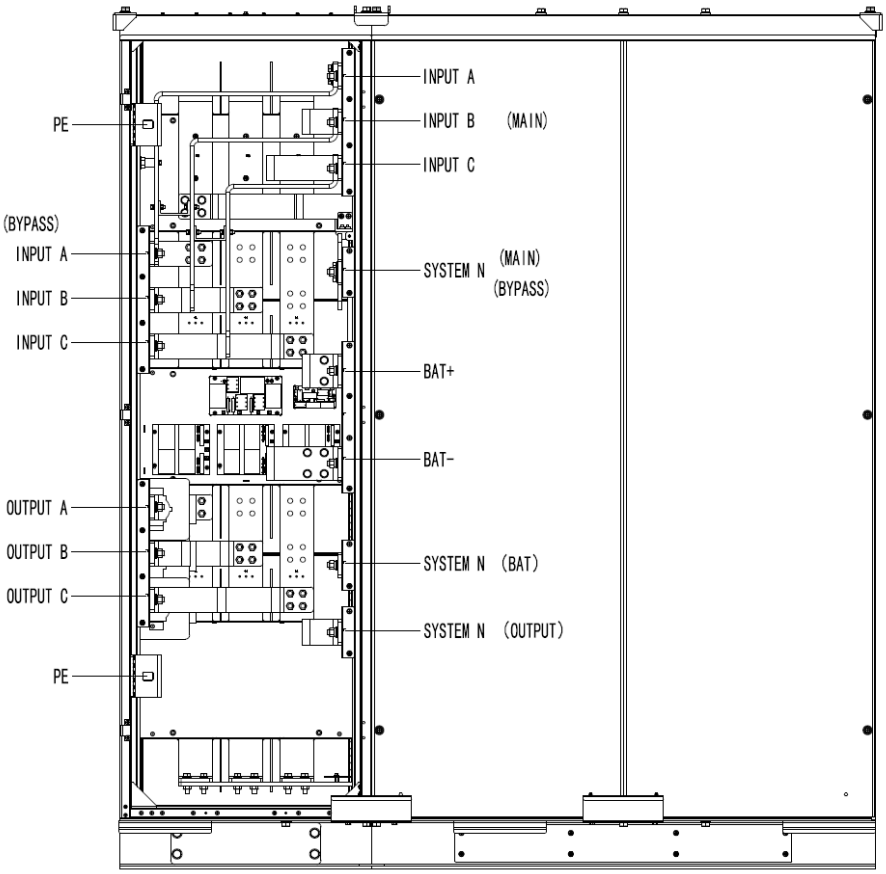


Figure 3-22 Terminal block layout diagram

Step 3: Connect the input ground wire to the input ground terminal. Note that the ground wire connection must comply with local and national regulations;

Step 4: Connect the AC input cable to the UPS input terminal (Main Input) according to Figure 3-22; connect the output load cable to the UPS output terminal (Output);

Step 5: Connect the battery cable to the battery terminal of the UPS (Battery);

Step 6: After checking that the wiring is correct, replace the protective cover and complete the wiring.

Warning

- When connecting power cables, it is necessary to follow the torque given in Table 3-3 to ensure the tightness of the wiring terminals and avoid safety hazards.
- Before wiring the UPS, ensure that you know the position and status of the switch connecting the UPS input to the mains power distribution. Ensure that the switch is disconnected and attaches warning labels to prevent others from operating the switch.

3.3.7. Common Input Kit (800-1000 kVA Fully Equipped Cabinet)

The main and bypass source kit consists of three copper bars, which connect the A, B and C phases of the main circuit and bypass respectively, can be freely disassembled to achieve common input function, shown in Figure 3-23.

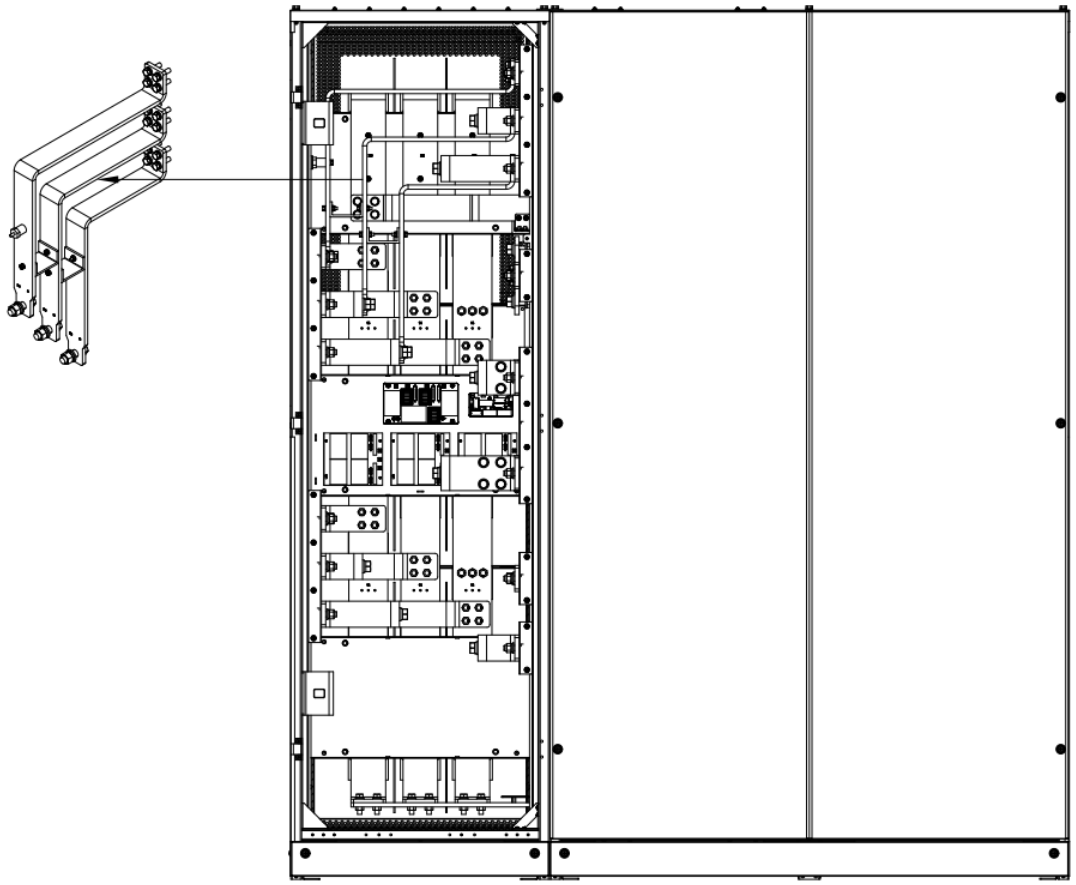


Figure 3-23 Common input kit of fully equipped cabinet

3.4.Installation Guide for Standard Cabinet (1200kVA Zero-Switch Cabinet)

3.4.1.Dimension of Standard Cabinet(1200kVA Zero-Switch Cabinet)

Ensure there is sufficient space in the power distribution room to place the UPS system. The dimensions of the UPS cabinet are shown in Figure 3-24 below.

Attention

Reserve at least 0.8 meters in front of the cabinet to facilitate opening the front door and replacing power modules, and reserve at least 0.8 meters at the rear of the cabinet for air circulation and heat dissipation. The schematic diagram of the reserved space for the cabinet is shown in Figure 3-25.

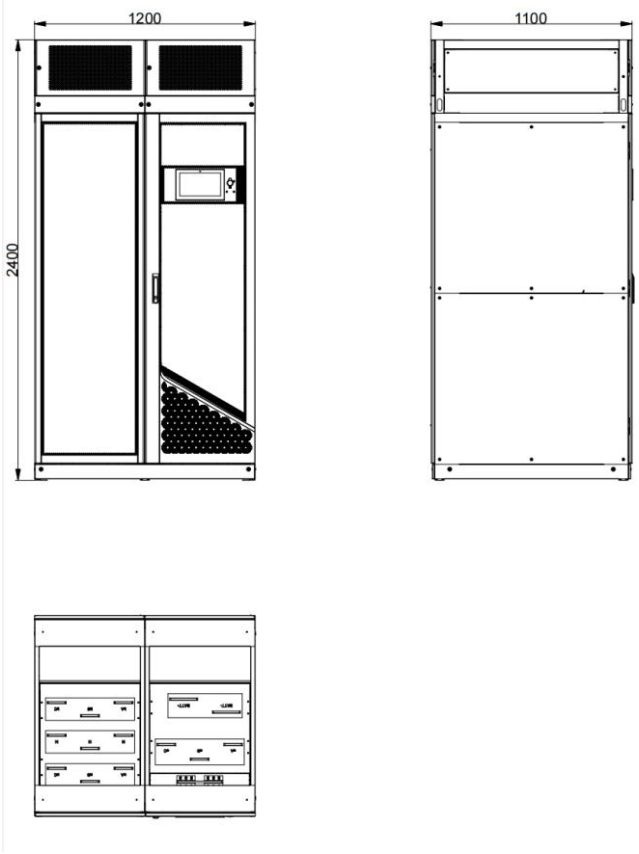


Figure 3-24 Cabinet Dimension Diagram (Unit: mm)

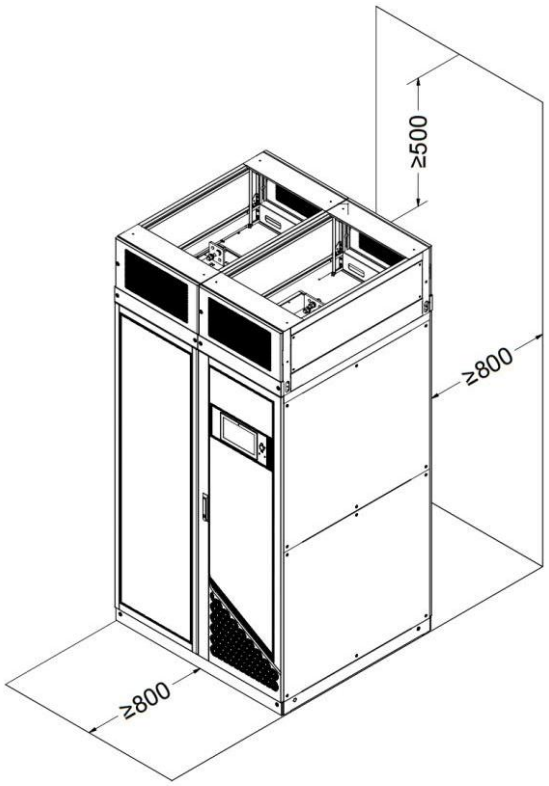


Figure 3-25 Schematic Diagram of Cabinet Reserved Space (Unit: mm)

3.4.2.Unloading and Unpacking of Standard Cabine(1200kVA Zero-Switch Cabinet)

The specific steps for unloading and unpacking the standard cabinet are as follows:
Step 1: Confirm that the UPS packaging is undamaged (if there is transportation damage, immediately notify the carrier);
Step 2: Use a forklift to transport the equipment to the designated location, see Figure 3-26;

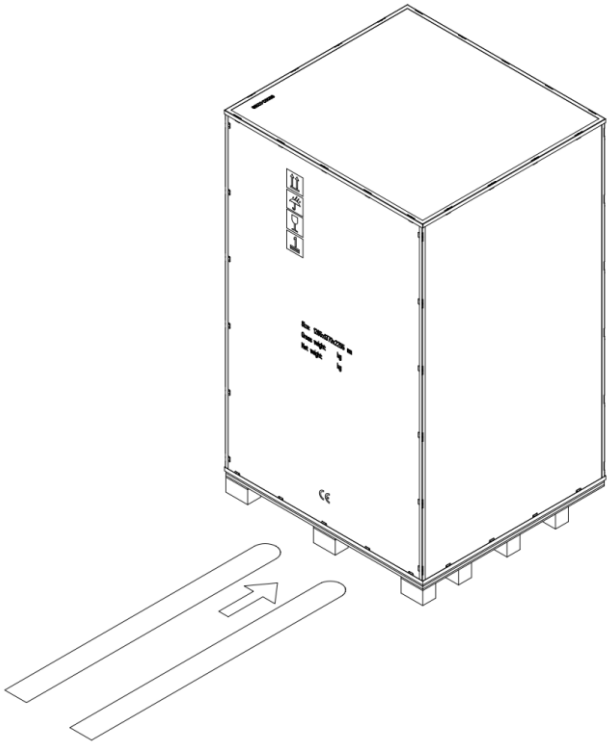


Figure 3-26 Transport the equipment to the designated location

Step 3: Pry open the buckles to open the wooden box, as shown in Figure 3-27;

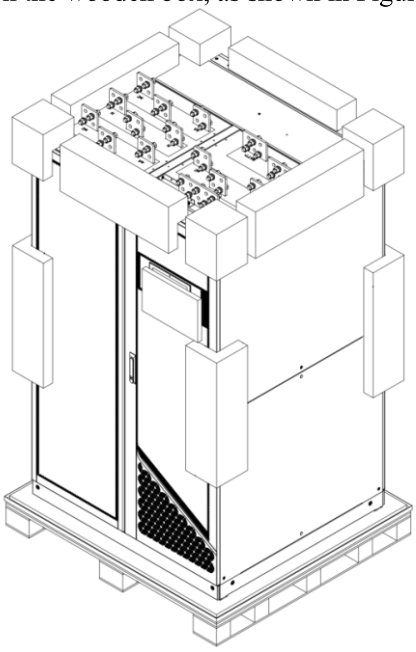


Figure 3-27 Open the wooden box

Step 4: After opening the wooden box, remove the cushioning material, as shown in Figure 3-28 below;

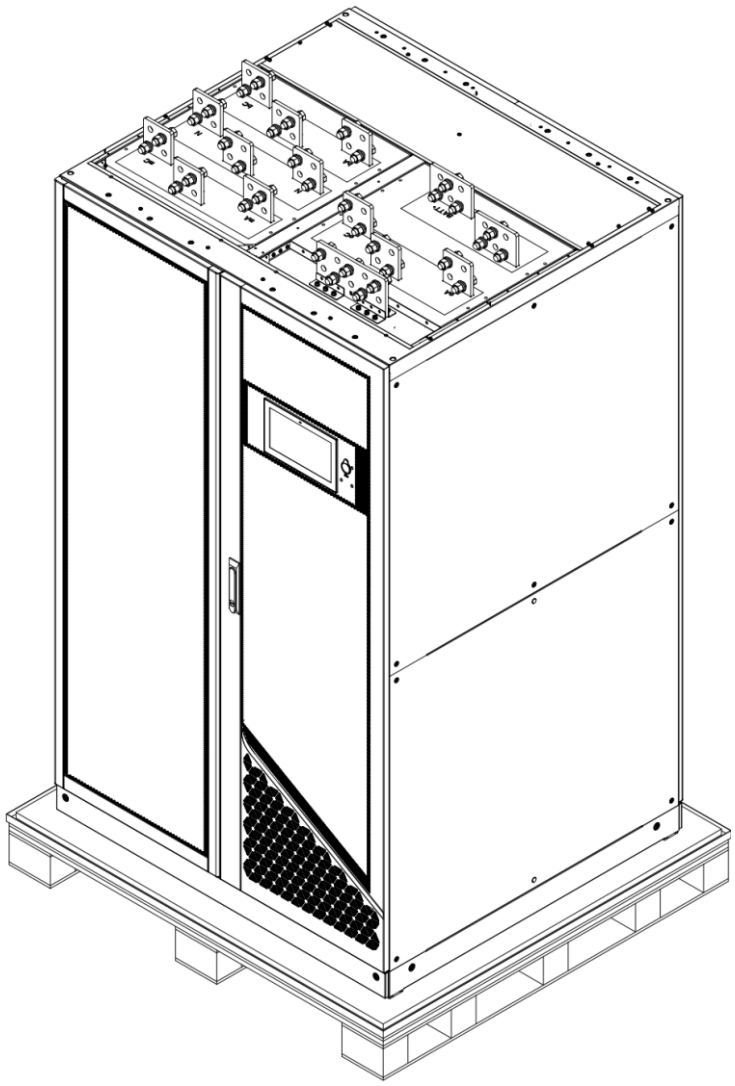


Figure 3-28 Remove the cushioning foam

Step 5: Check the integrity of the equipment:

1.Visually inspect the appearance of the UPS to check for transportation damage. If there is damage, immediately notify the carrier;

2.Compare with the shipping packing list to check whether the models of random accessories are complete and correct. If accessories are missing or models do not match, make on-site records in a timely manner and contact the local office of our company;

Step 6: After confirming the equipment is intact, remove the screws fixing the cabinet and the wooden pallet;

Step 7: Place the cabinet in the installation position.

Step 8: If a cable guard is used, unpack the cable guard and install it after completing the wiring.

Attention

Disassemble carefully to avoid scratching the cabinet body.

After unpacking, dispose of waste materials in accordance with green environmental protection requirements.

3.4.3.Fixing the Cabinet(1200kVA Zero-Switch Cabinet)

The weight of the UPS cabinet is supported by eight corresponding foot supports at the bottom. The foot support method is generally used to support the cabinet for a long time after the cabinet is fixed in position. The schematic diagram of the foot supports is shown in Figure 3-29 below.

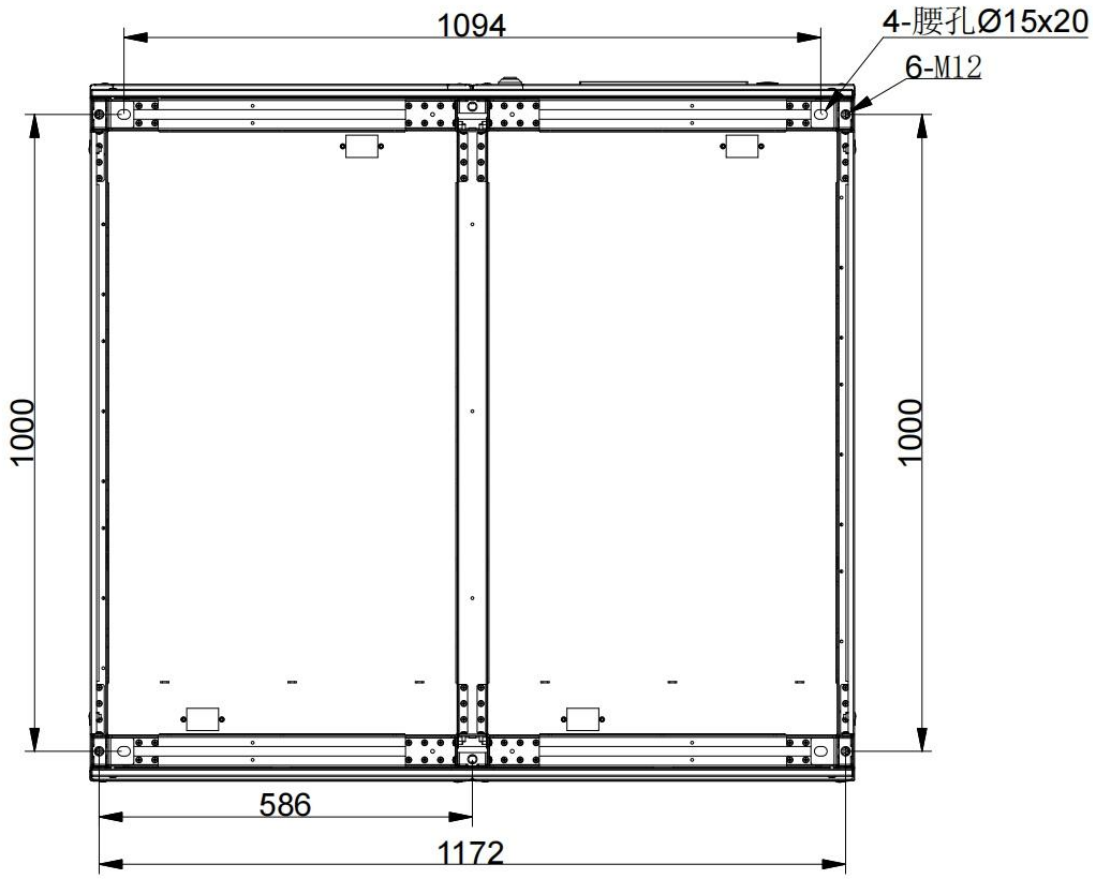


Figure 3-29 Schematic Diagram of Foot Supports (Bottom View)

The specific installation process of the cabinet is as follows:
Step 1: Ensure the cabinet support feet are intact and the installation floor is level;Step 2: Use a forklift to move to the installation position, with the cabinet supported by the foot supports at this time;Step 3: Check whether the eight foot supports are firm and consistent to ensure the cabinet is stable;Step 4: Complete the fixed installation.

Attention
If the floor bearing capacity is insufficient, auxiliary equipment should be added to distribute the cabinet's weight to a larger supporting surface. For example, lay a large-area iron plate or increase the area of the support feet.

3.4.4.Cable Entry Method of Standard Cabinet(1200kVA Zero-Switch Cabinet)

The standard cabinet adopts the top cable entry method. The system cable entry method is shown in Figure 3-30 below.

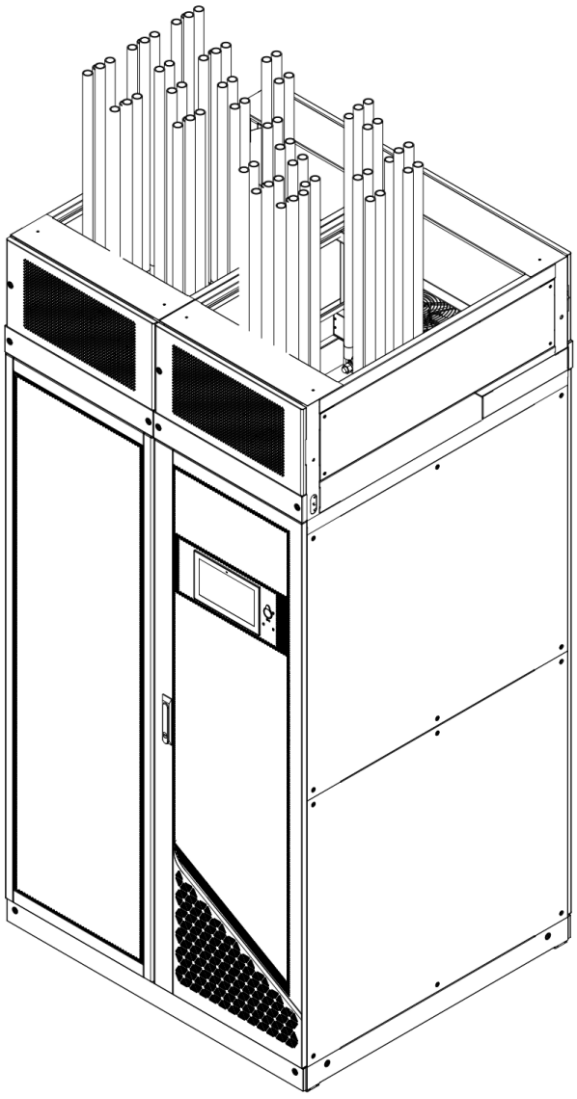


Figure 3-30 Schematic Diagram of Cable Entry Method

3.4.5.Connecting Power Cables of Standard Cabinet(1200kVA Zero-Switch Cabinet)

The specific cable connection process is carried out as follows:

Step 1: Confirm that all input power distribution switches are completely disconnected and all power switches inside the cabinet are disconnected. Attach warning signs to these switches to prevent others from operating them;

Step 2: Remove the protective cover on the top of the cabinet. The input and output terminals, battery terminals, and grounding terminals are visible. The layout of the terminals is shown in Figure 3-31 (Terminal Layout Diagram);

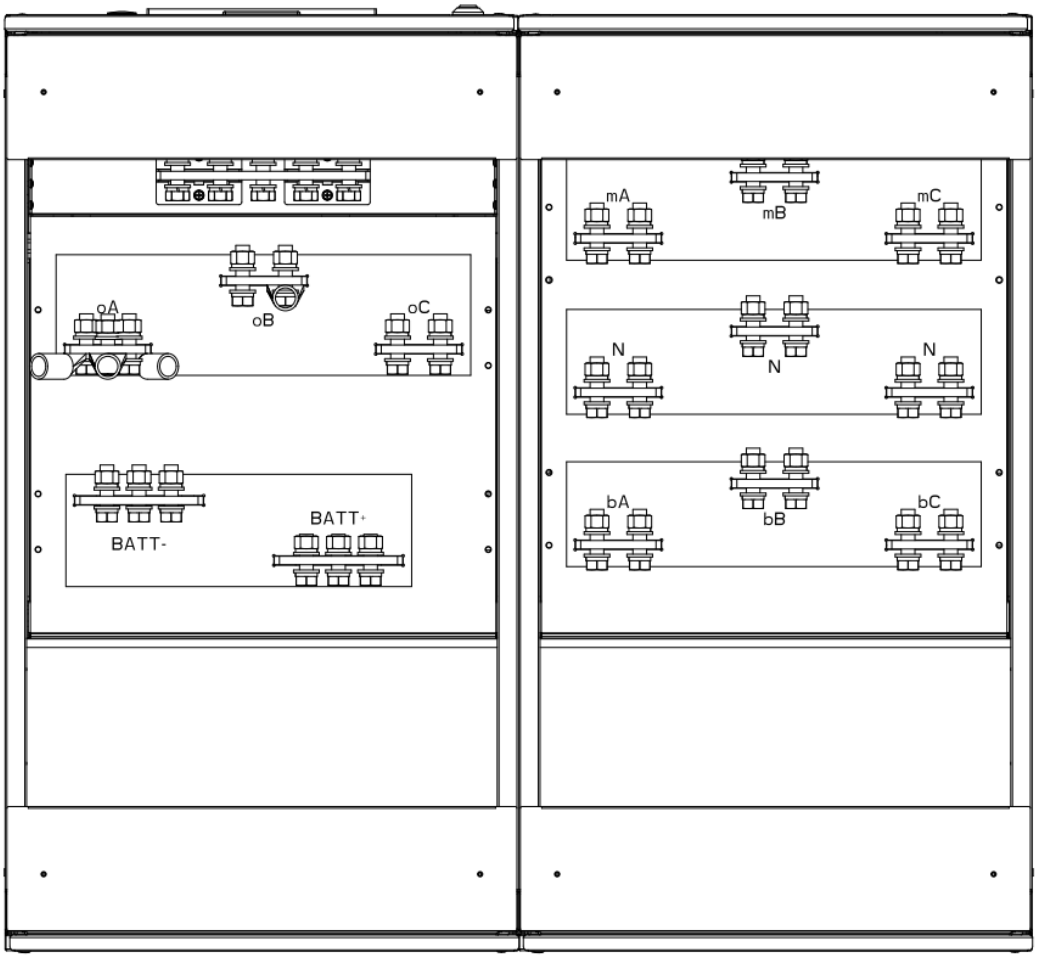


Figure 3-31 Terminal Layout Diagram

Step 3: Connect the input ground wire to the input grounding terminal. Note that the ground wire connection must comply with local and national regulations;

Step 4: According to the terminal layout in Figure 3-31, connect the AC input cable to the UPS input terminals (mA, mB, mC); connect the output load cable to the UPS output terminals (oA, oB, oC);

Step 5: Connect the battery cable to the UPS battery terminals (BAT±);

Step 6: After checking that the wiring is correct, complete the connection.

Warning

- When connecting power cables, follow the torque specified in Table 3-3 to ensure the tightness of the terminal connections and avoid potential safety hazards.
- Before wiring the UPS, ensure you know the location and status of the switch connecting the UPS input to the mains power distribution. Ensure the switch is in the disconnected state and attach a warning sign to prevent others from operating the switch.

3.4.6.Common Input Kit for Standard Cabinet(1200kVA Zero-Switch Cabinet)

The common input kit consists of three copper bars, which connect the A, B, and C phases of the main circuit and bypass respectively. It is a non-detachable common input kit, and the common

input kit cannot be removed or installed during later use, as shown in Figure 3-32.

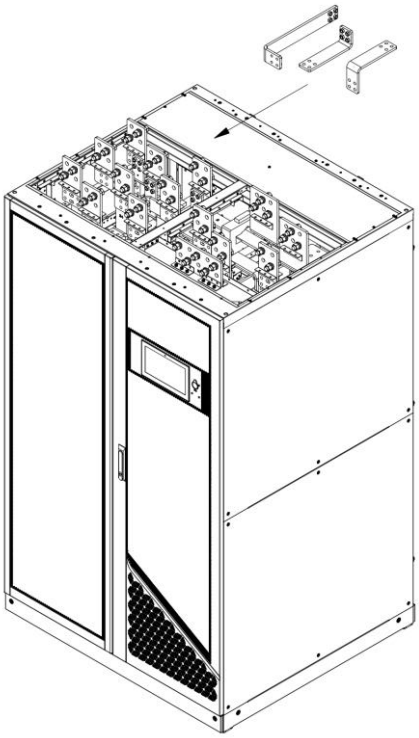


Figure 3-32 Non-Detachable Common Input Kit

3.4.7.Top Fan Accessory for Standard Cabinet(1200kVA Zero-Switch Cabinet)

The top fan accessory of the standard cabinet is composed of four AC fans. When used with the rear air outlet of the cabinet, the cabinet can operate at full power without derating. The fan accessory can be freely disassembled according to actual needs, as shown in Figure 3-33.

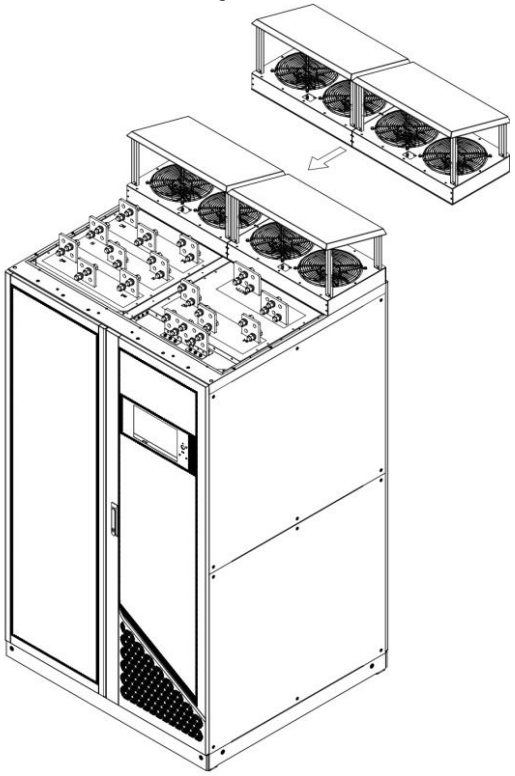


Figure 3-33 Top Fan Accessory of the Cabinet

3.4.8.Bypass Input Fuse Accessory for Standard Cabinet(1200kVA Zero-Switch Cabinet)

The Standard Cabinet provides three fuses for bypass input as optional accessories. Aluminum blocks can be replaced with input fuses, and accessories can be selected based on actual needs. The 1200kVA Fully-Equipped Model is also compatible with the following optional accessories, as shown in Figure 3-34.

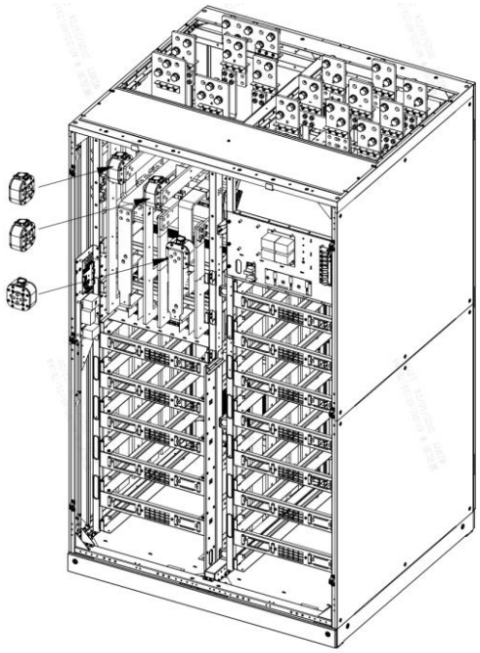


Figure 3-34 Bypass Input Fuse Optional Accessories

3.4.9.Bypass Fuse Fan Accessory for Standard Cabinet(1200kVA Zero-Switch Cabinet)

The standard cabinet can be equipped with a bypass fuse fan accessory, which consists of one AC fan. When used with the rear air outlet of the cabinet, the cabinet can operate at full power without derating. The accessory can be selected according to actual needs, as shown in Figure 3-35.

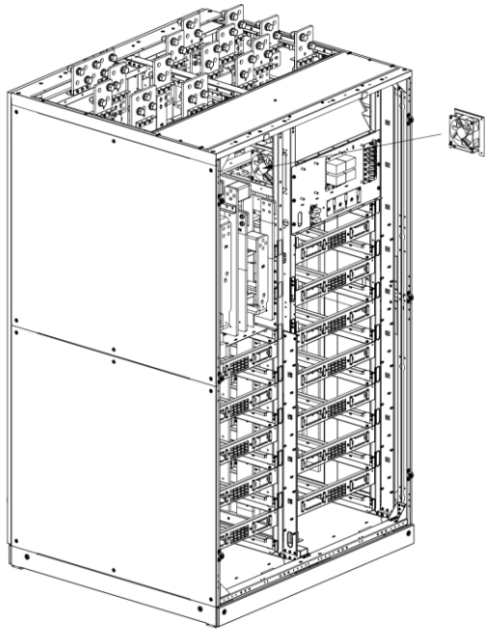


Figure 3-35 Bypass Fuse Fan Optional Accessorie

3.5.Installation Guide for Standard Cabinet (1200kVA Single-Switch Cabinet)

3.5.1.Dimension of Standard Cabinet(1200kVA Single-Switch Cabinet)

Ensure there is sufficient space in the power distribution room to place the UPS system. The dimensions of the UPS cabinet are shown in Figure 3-36 below.

Attention

Reserve at least 0.8 meters in front of the cabinet to facilitate opening the front door and replacing power modules, and reserve at least 0.8 meters at the rear of the cabinet for air circulation and heat dissipation. The schematic diagram of the reserved space for the cabinet is shown in Figure 3-37.

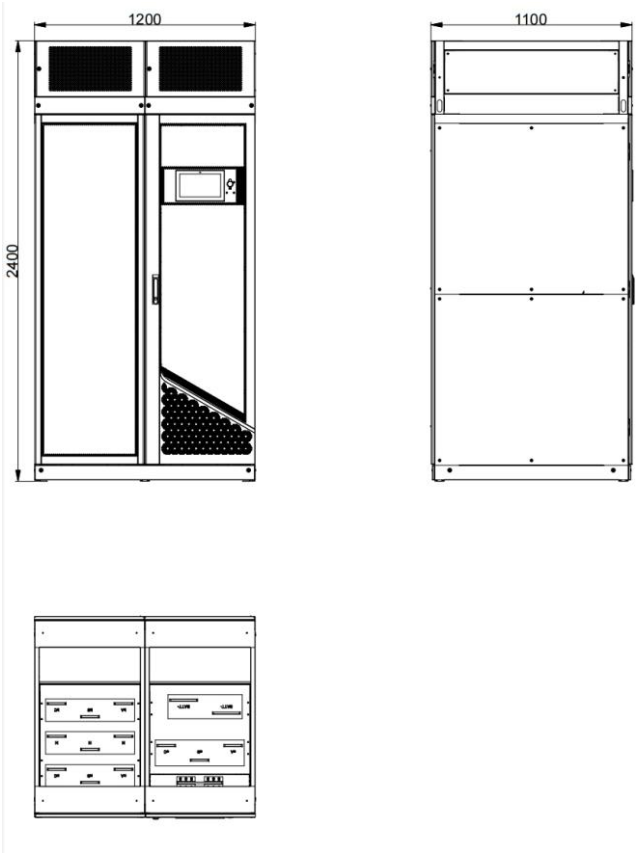


Figure 3-36 Cabinet Dimension Diagram (Unit: mm)

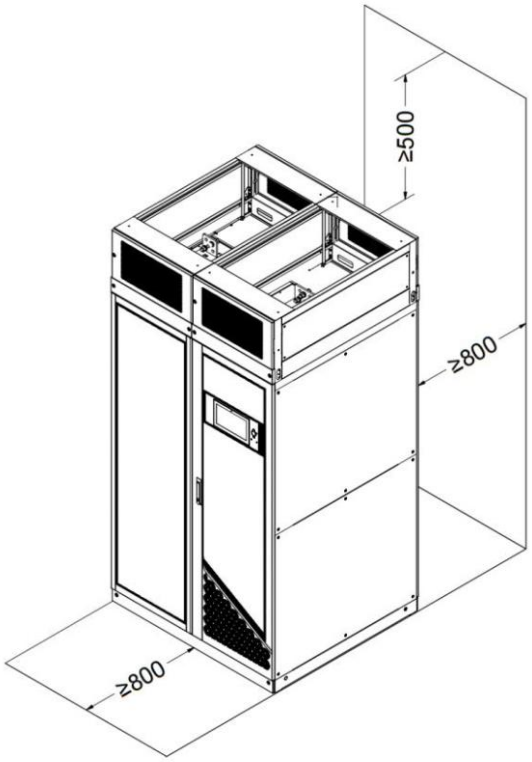


Figure 3-37 Schematic Diagram of Cabinet Reserved Space (Unit: mm)

3.5.2.Unloading and Unpacking of Standard Cabinet(1200kVA Single-Switch Cabinet)

The specific steps for unloading and unpacking the standard cabinet are as follows:
Step 1: Confirm that the UPS packaging is undamaged (if there is transportation damage, immediately notify the carrier);
Step 2: Use a forklift to transport the equipment to the designated location, see Figure 3-38;

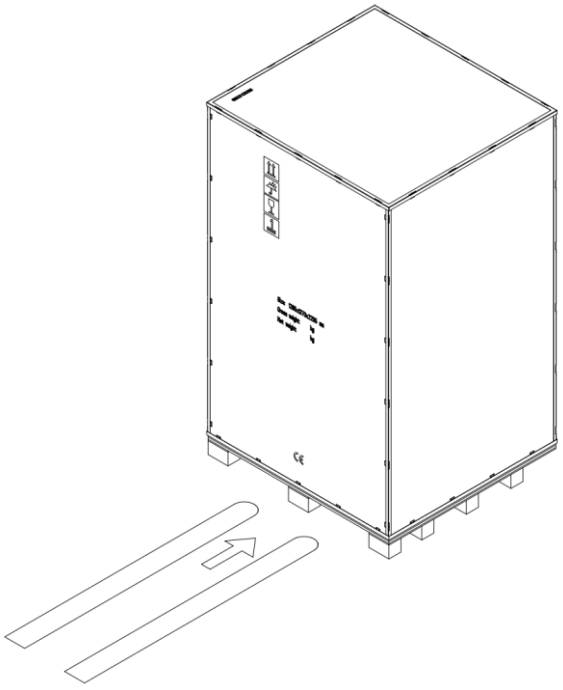


Figure 3-38 Transport the equipment to the designated location

Step 3: Pry open the buckles to open the wooden box, as shown in Figure 3-39;

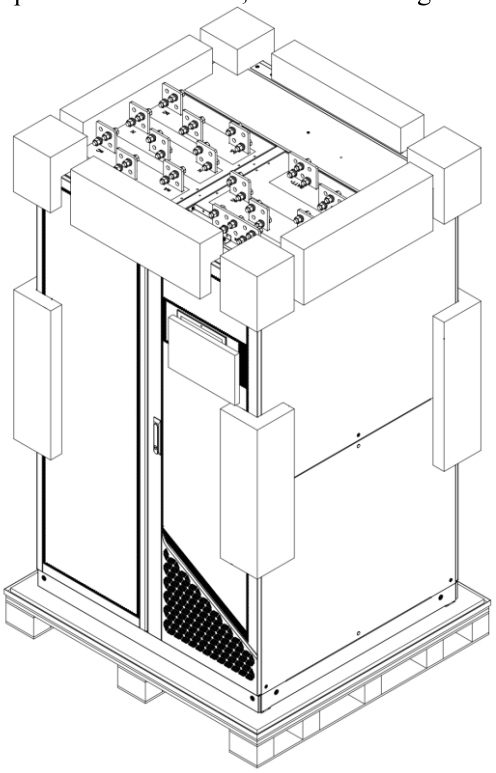


Figure 3-39 Open the wooden box

Step 4: After opening the wooden box, remove the cushioning material, as shown in Figure 3-40 below;

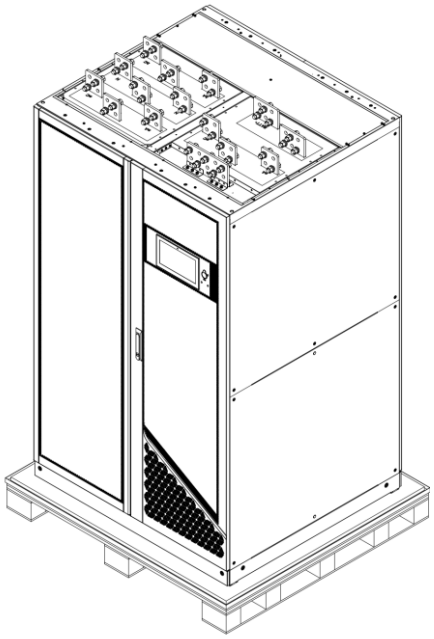


Figure 3-40 Remove the cushioning foam

Step 5: Check the integrity of the equipment:

1. Visually inspect the appearance of the UPS to check for transportation damage. If there is damage, immediately notify the carrier;
2. Compare with the shipping packing list to check whether the models of random accessories are complete and correct. If accessories are missing or models do not match, make on-site records in a timely manner and contact the local office of our company;

Step 6: After confirming the equipment is intact, remove the screws fixing the cabinet and the

wooden pallet;
Step 7: Place the cabinet in the installation position.
Step 8: If a cable guard is used, unpack the cable guard and install it after completing the wiring.

Attention
Disassemble carefully to avoid scratching the cabinet body.After unpacking, dispose of waste materials in accordance with green environmental protection requirements.

3.5.3.Fixing the Cabinet(1200kVA Single-Switch Cabinet)

The weight of the UPS cabinet is supported by eight corresponding foot supports at the bottom. The foot support method is generally used to support the cabinet for a long time after the cabinet is fixed in position. The schematic diagram of the foot supports is shown in Figure 3-41 below.

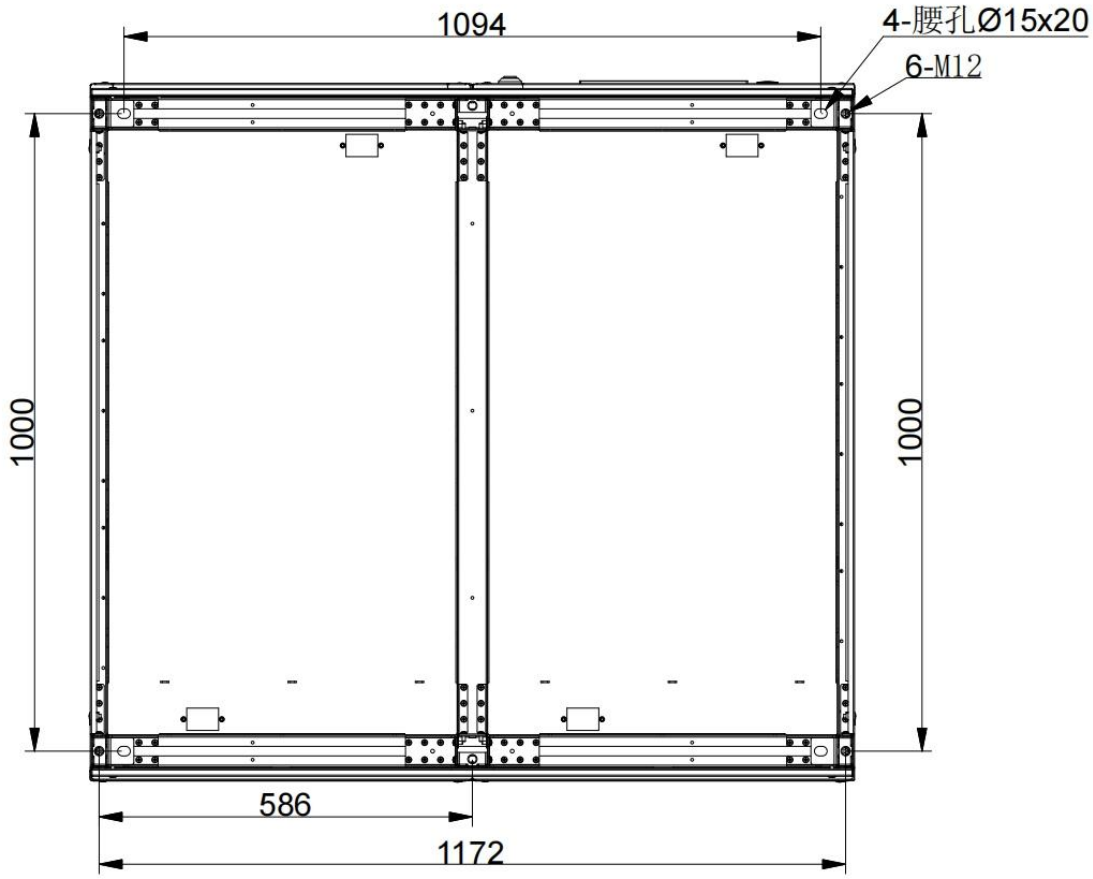


Figure 3-41 Schematic Diagram of Foot Supports (Bottom View)

The specific installation process of the cabinet is as follows:
Step 1: Ensure the cabinet support feet are intact and the installation floor is level;
Step 2: Use a forklift to move to the installation position, with the cabinet supported by the foot supports at this time;
Step 3: Check whether the eight foot supports are firm and consistent to ensure the cabinet is stable;
Step 4: Complete the fixed installation.

Attention

If the floor bearing capacity is insufficient, auxiliary equipment should be added to distribute the cabinet's weight to a larger supporting surface. For example, lay a large-area iron plate or increase the area of the support feet.

3.5.4.Cable Entry Method of Standard Cabinet(1200kVA Single-Switch Cabinet)

The standard cabinet adopts the top cable entry method. The system cable entry method is shown in Figure 3-42 below.

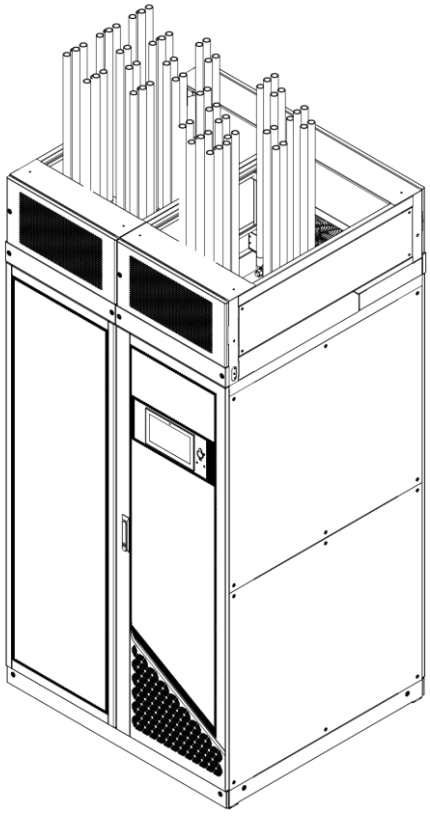


Figure 3-42 Schematic Diagram of Cable Entry Method

3.5.5.Connecting Power Cables of Standard Cabinet(1200kVA Single-Switch Cabinet)

The specific cable connection process is carried out as follows:

Step 1: Confirm that all input power distribution switches are completely disconnected and all power switches inside the cabinet are disconnected. Attach warning signs to these switches to prevent others from operating them;

Step 2: Remove the protective cover on the top of the cabinet. The input and output terminals, battery terminals, and grounding terminals are visible. The layout of the terminals is shown in Figure 3-43 (Terminal Layout Diagram);

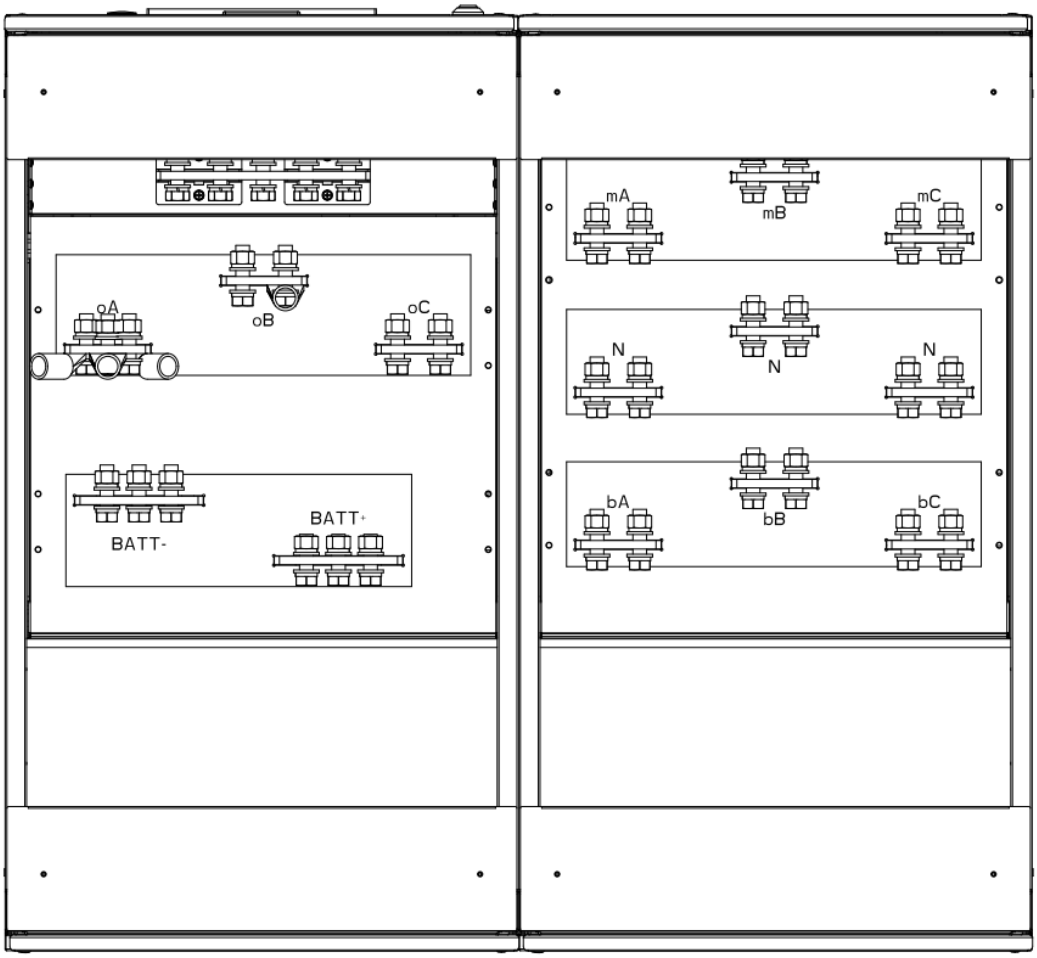


Figure 3-43 Terminal Layout Diagram

Step 3: Connect the input ground wire to the input grounding terminal. Note that the ground wire connection must comply with local and national regulations;Step 4: According to the terminal layout in Figure 3-43, connect the AC input cable to the UPS input terminals (mA, mB, mC); connect the output load cable to the UPS output terminals (oA, oB, oC);Step 5: Connect the battery cable to the UPS battery terminals (BAT±);Step 6: After checking that the wiring is correct, complete the connection.

Warning

- When connecting power cables, follow the torque specified in Table 3-3 to ensure the tightness of the terminal connections and avoid potential safety hazards.
- Before wiring the UPS, ensure you know the location and status of the switch connecting the UPS input to the mains power distribution. Ensure the switch is in the disconnected state and attach a warning sign to prevent others from operating the switch.

3.5.6.Common Input Kit for Standard Cabinet(1200kVA Single-Switch Cabinet)

The common input kit consists of three copper bars, which connect the A, B, and C phases of the main circuit and bypass respectively. It is a non-detachable common input kit, and the common input kit cannot be removed or installed during later use, as shown in Figure 3-45.

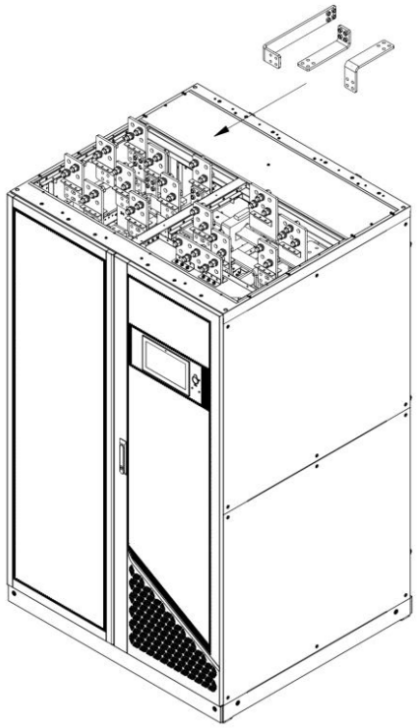


Figure 3-45 Non-Detachable Common Input Kit

3.5.7.Top Fan Accessory for Standard Cabinet(1200kVA Single-Switch Cabinet)

The top fan accessory of the standard cabinet is composed of four AC fans. When used with the rear air outlet of the cabinet, the cabinet can operate at full power without derating. The fan accessory can be freely disassembled according to actual needs, as shown in Figure 3-46.

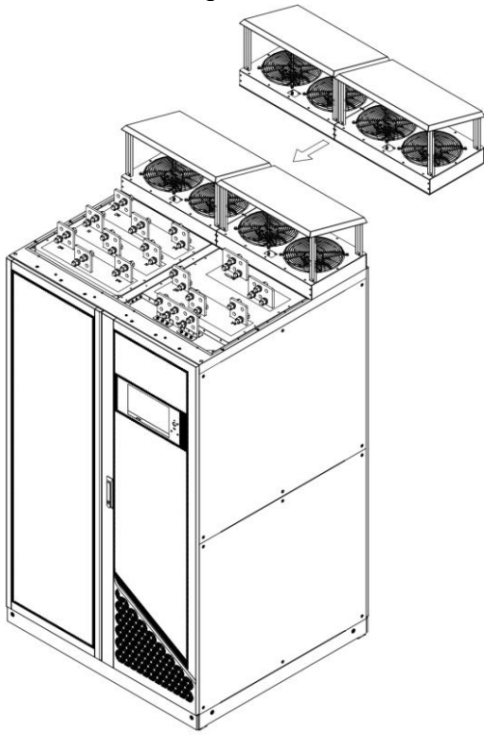


Figure 3-46 Top Fan Accessory of the Cabinet

3.5.8.Bypass Input Fuse Accessory for Standard Cabinet(1200kVA Single-Switch Cabinet)

The Standard Cabinet provides three fuses for bypass input as optional accessories. Aluminum blocks can be replaced with input fuses, and accessories can be selected based on actual needs. The 1200kVA Fully-Equipped Model is also compatible with the following optional accessories, as shown in Figure 3-47.

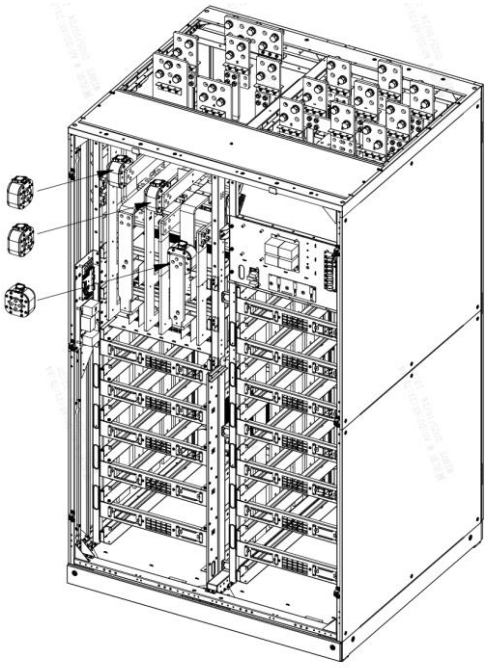


Figure 3-47 Bypass Input Fuse Optional Accessories

3.5.9.Bypass Fuse Fan Accessory for Standard Cabinet(1200kVA Single-Switch Cabinet)

The standard cabinet can be equipped with a bypass fuse fan accessory, which consists of one AC fan. When used with the rear air outlet of the cabinet, the cabinet can operate at full power without derating. The accessory can be selected according to actual needs, as shown in Figure 3-48.

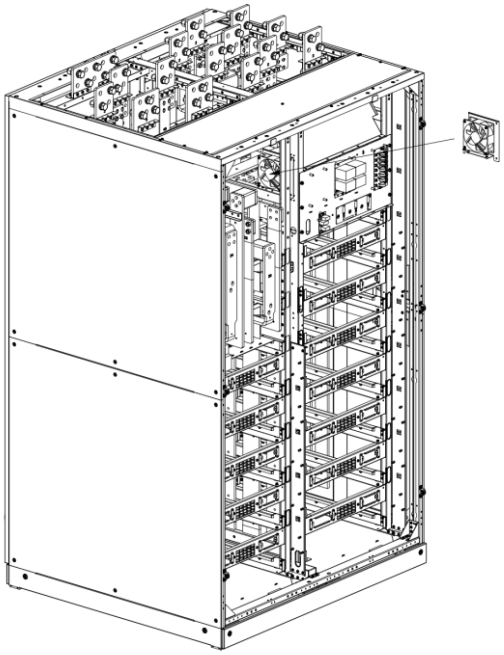


Figure 3-48 Bypass Fuse Fan Accessory Kit

3.6.Installation Guide for Fully Equipped Cabinet (1200kVA Four-Switch Cabinet)

3.6.1.Dimension of Fully Equipped Cabinet(1200kVA Four-Switch Cabinet)

Ensure there is sufficient space in the power distribution room to place the UPS system. The dimensions of the UPS cabinet are shown in Figure 3-49 below.

Attention

Reserve at least 0.8 meters in front of the cabinet to facilitate opening the front door and replacing power modules, and reserve at least 0.8 meters at the rear of the cabinet for air circulation and heat dissipation. The schematic diagram of the reserved space for the cabinet is shown in Figure 3-50.

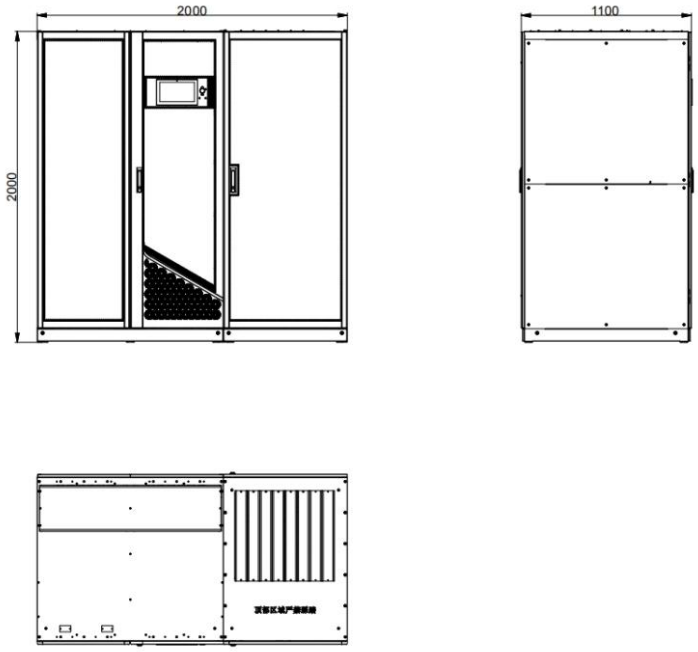


Figure 3-49 Cabinet Dimension Diagram (Unit: mm)

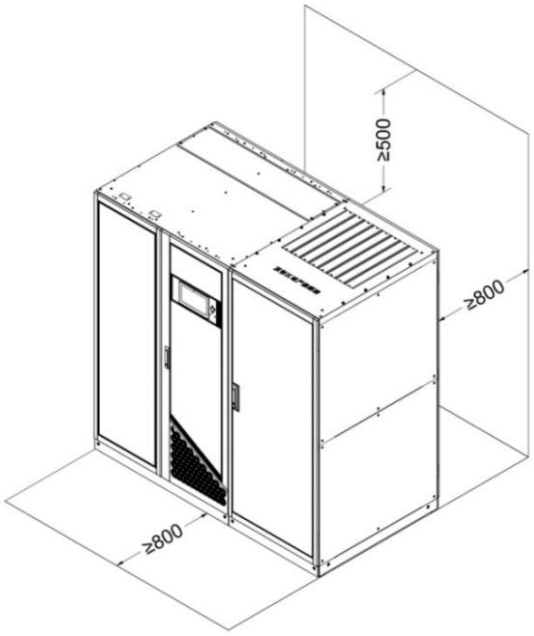


Figure 3-50 Schematic Diagram of Cabinet Reserved Space (Unit: mm)

3.6.2.Unloading and Unpacking of Fully Equipped Cabinet (1200kVA Four-Switch Cabinet)

The specific steps for unloading and unpacking the cabinet are as follows:

Step 1: Confirm that the UPS packaging is undamaged (if there is transportation damage, immediately notify the carrier);

Step 2: Use a forklift to transport the equipment to the designated location, see Figure 3-51;

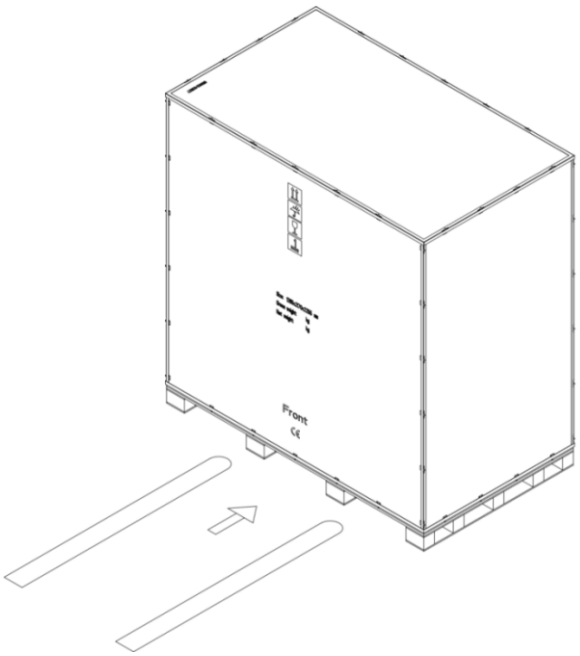


Figure 3-51 Transport the equipment to the designated location

Step 3: Pry open the buckles to open the wooden box, as shown in Figure 3-49;

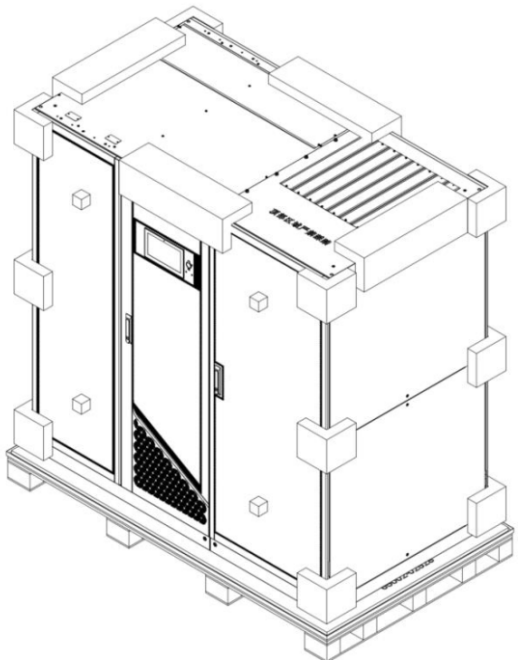


Figure 3-49 Open the wooden box

Step 4: After opening the wooden box, remove the cushioning material, as shown in Figure 3-50 below;

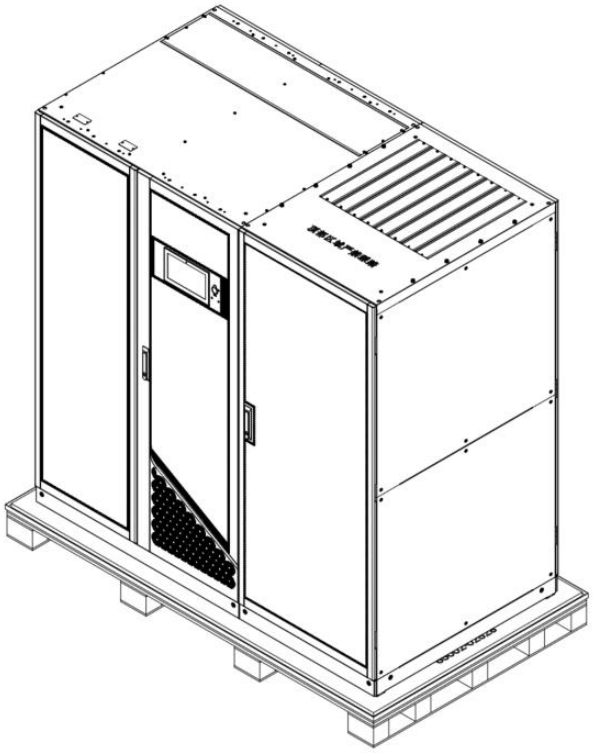


Figure 3-50 Remove the cushioning foam

Step 5: Check the integrity of the equipment:

Visually inspect the appearance of the UPS to check for transportation damage. If there is damage, immediately notify the carrier;

2. Compare with the shipping packing list to check whether the models of random accessories are complete and correct. If accessories are missing or models do not match, make on-site records in a timely manner and contact the local office of our company;

Step 6: After confirming the equipment is intact, remove the screws fixing the cabinet and the wooden pallet;

Step 7: Place the cabinet in the installation position.

Special case: If the fully equipped cabinet encounters space constraints during transportation to the installation site (e.g., insufficient elevator space), our professional personnel can disassemble the cabinet—split the 2.0-meter-wide cabinet into two cabinets (1.2 meters and 0.8 meters)—move them to the designated location, and then combine the cabinets, as shown in Figure 3-51.

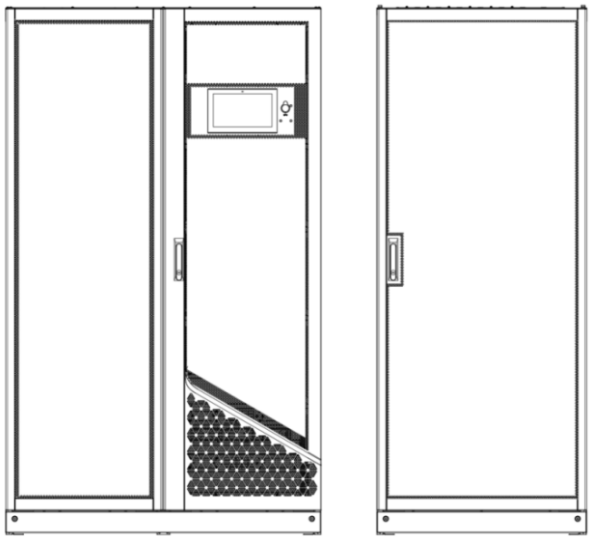


Figure 3-51 Cabinet Disassembly and Combination

Attention

Disassemble carefully to avoid scratching the cabinet body.After unpacking, dispose of waste materials in accordance with green environmental protection requirements.

3.6.3.Fixing the Cabinet(1200kVA Four-Switch Cabinet)

The weight of the UPS cabinet is supported by eight corresponding foot supports at the bottom. The foot support method is generally used to support the cabinet for a long time after the cabinet is fixed in position. The schematic diagram of the foot supports is shown in Figure 3-52 below.

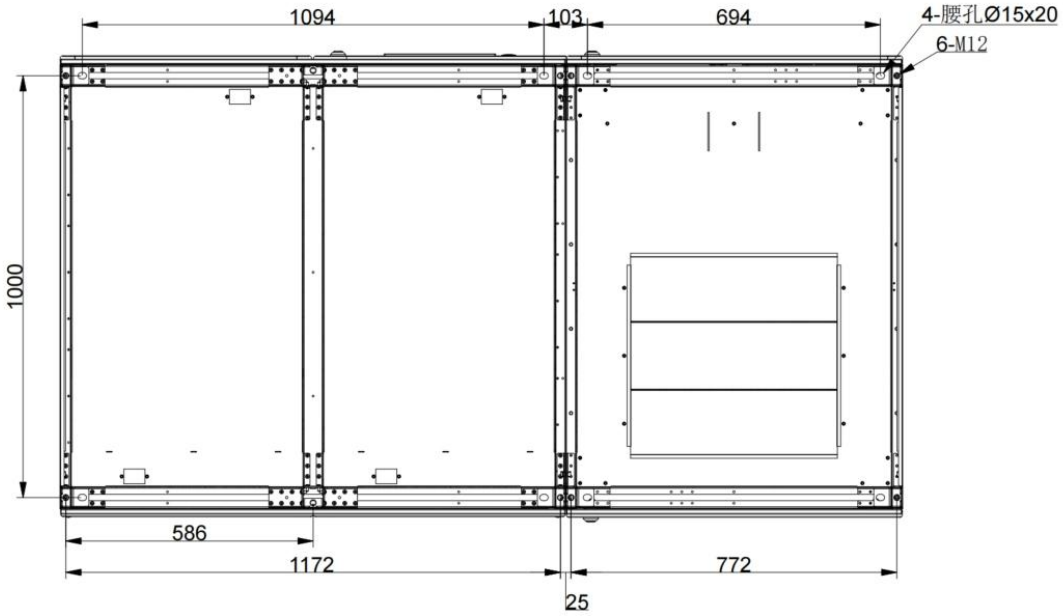


Figure 3-52 Schematic Diagram of Foot Supports (Bottom View)

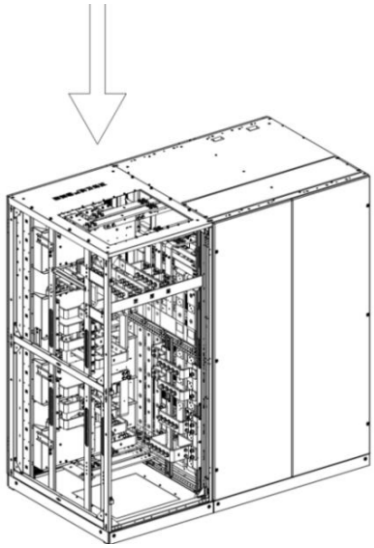
The specific installation process of the cabinet is as follows:
Step 1: Ensure the cabinet support feet are intact and the installation floor is level;
Step 2: Use a forklift to move to the installation position, with the cabinet supported by the foot supports at this time;
Step 3: Check whether the eight foot supports are firm and consistent to ensure the cabinet is stable;
Step 4: Complete the fixed installation.

Attention

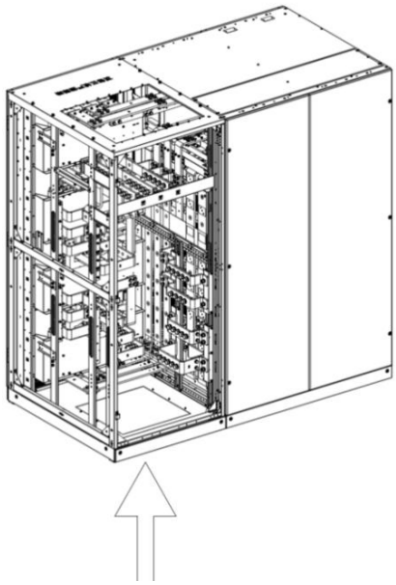
If the floor bearing capacity is insufficient, auxiliary equipment should be added to distribute the cabinet's weight to a larger supporting surface. For example, lay a large-area iron plate or increase the area of the support feet.

3.6.4.Cable Entry Method of Fully Equipped Cabinet(1200kVA Four-Switch Cabinet)

The fully equipped cabinet supports both top and bottom cable entry. The system cable entry method is shown in Figure 3-53 below.



(a)Schematic Diagram of Cabinet Top Cable Entry Method



(b) Schematic Diagram of Cabinet Bottom Cable Entry Method

Figure 3-53 Schematic Diagram of Cable Entry Method

3.6.5.Connecting Power Cables of Fully Equipped Cabinet (1200kVA Four-Switch Cabinet)

The specific cable connection process is carried out as follows:

Step 1: Confirm that all input power distribution switches are completely disconnected and all power switches inside the cabinet are disconnected. Attach warning signs to these switches to prevent others from operating them;

Step 2: Open the rear door of the cabinet and remove the protective cover. The input and output terminals, battery terminals, and grounding terminals are visible. The layout of the terminals is shown in Figure 3-54;

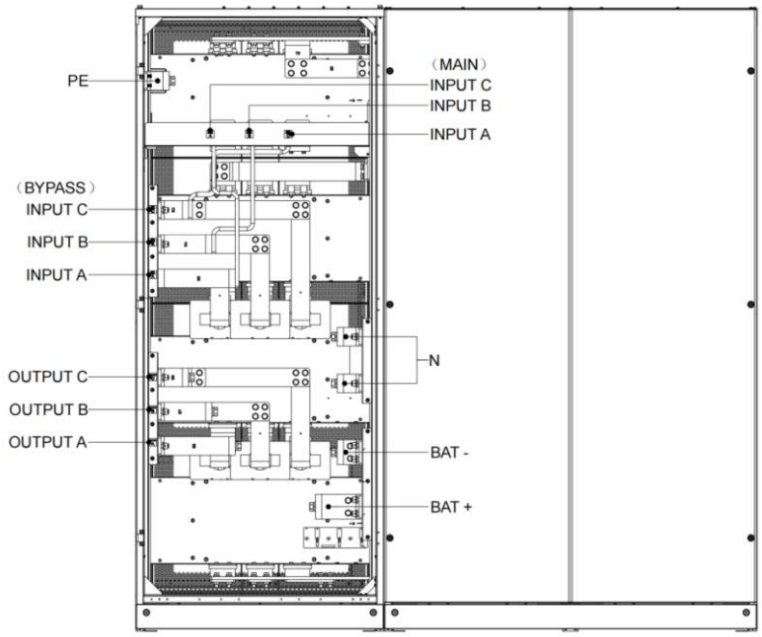


Figure 3-54 Terminal Layout Diagram

Step 3: Connect the input ground wire to the input grounding terminal. Note that the ground wire connection must comply with local and national regulations;

Step 4: According to Figure 3-54, connect the AC input cable to the UPS input terminals (Main Input); connect the output load cable to the UPS output terminals (Output);

Step 5: Connect the battery cable to the UPS battery terminals (Battery);

Step 6: After checking that the wiring is correct, reinstall the protective cover and complete the connection.

Warning

- When connecting power cables, follow the torque specified in Table 3-3 to ensure the tightness of the terminal connections and avoid potential safety hazards.
- Before wiring the UPS, ensure you know the location and status of the switch connecting the UPS input to the mains power distribution. Ensure the switch is in the disconnected state and attach a warning sign to prevent others from operating the switch.

3.6.6.Common Input Kit for Fully Equipped Cabinet(1200kVA Four-Switch Cabinet)

The common input kit consists of three copper bars, which connect the A, B, and C phases of the main circuit and bypass respectively. It can be freely disassembled to realize the common input function, as shown in Figure 3-55.

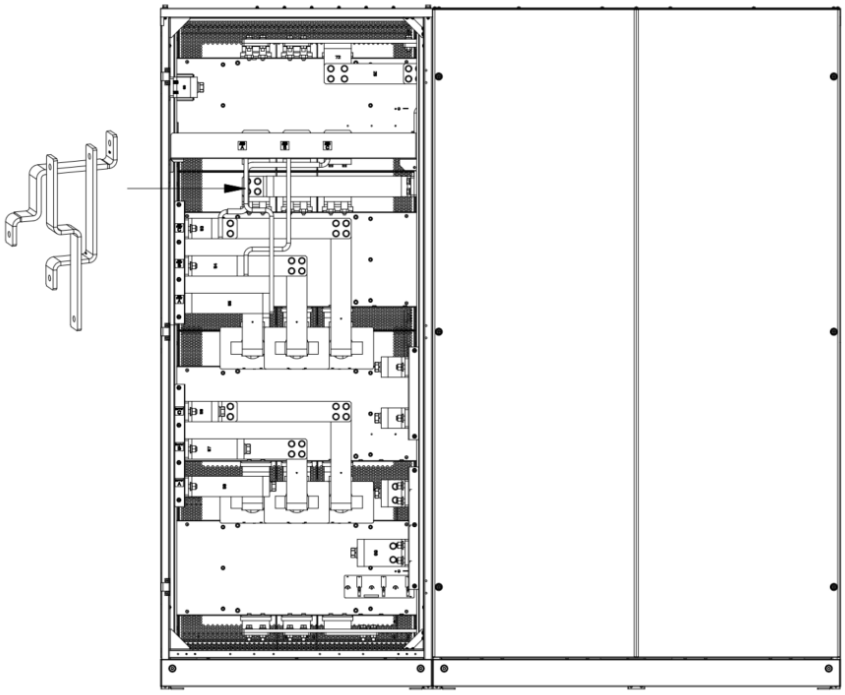
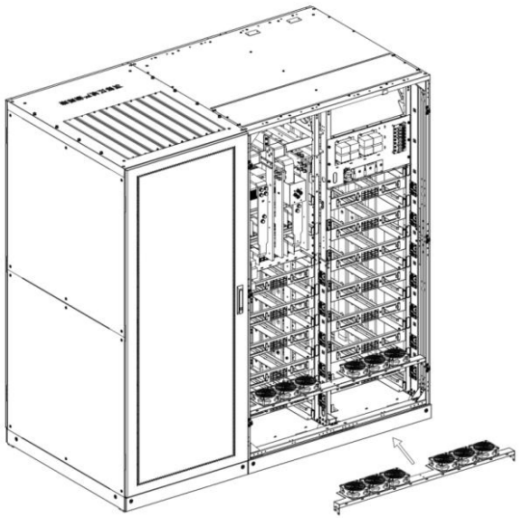


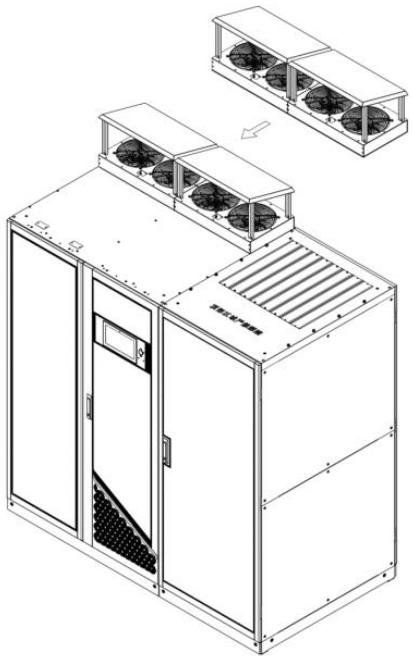
Figure 3-55 Common Input Copper Bars of Fully Equipped Cabinet

3.6.7. Top Air Outlet Heat Dissipation Accessory for Fully Equipped Cabinet(1200kVA Four-Switch Cabinet)

The fully equipped cabinet adopts top air outlet. Its top air outlet duct is composed of 4 top AC fan accessories and 6 bottom DC fans to address the increased heat dissipation requirements. Due to the top air outlet design, the fully equipped cabinet needs to be derated by 0.9 for operation. Fan heat dissipation kits can be selected according to actual needs.Both the 1200kVA Zero-Switch Cabinet and the 1200kVA Single-Switch Cabinet are equally compatible with the following optional accessories to form the top air outlet channel, as shown in Figure 3-56.



（a）Bottom Fan Accessory Kit of Fully Equipped Cabinet



（b）Top Fan Accessory Kit of Fully Equipped Cabinet

Figure 3-56 Top Fan Heat Dissipation Accessory of Fully Equipped Cabinet

3.6.8.Bypass Input Fuse Heat Dissipation Accessory for Fully Equipped Cabinet(1200kVA Four-Switch Cabinet)

The fully equipped cabinet can be equipped with a bypass fuse fan accessory, which consists of one AC fan. When used with the rear air outlet of the cabinet, the cabinet can operate at full power without derating. The accessory can be selected according to actual needs, as shown in Figure 3-57.

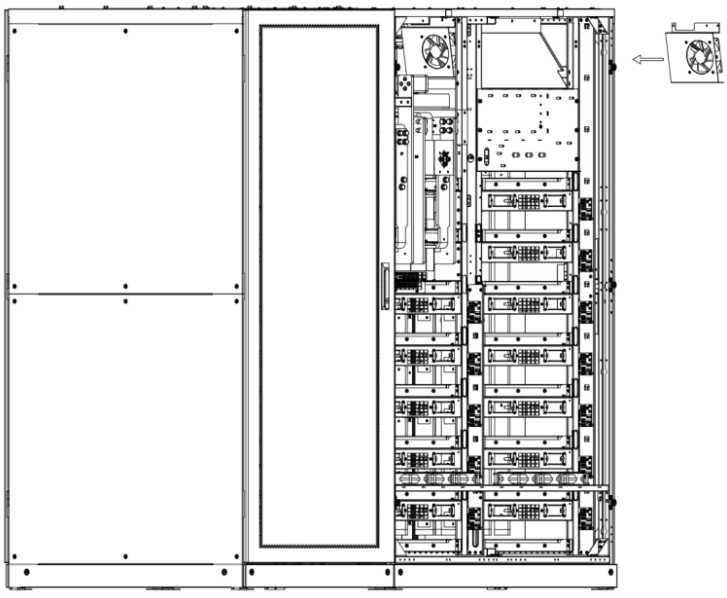


Figure 3-57 Bypass Input Fuse Heat Dissipation Accessory of Fully Equipped Cabinet

3.7.Battery Pack Installation

Three terminals (positive, neutral, negative) are drawn from the battery unit and connected to UPS system. The neutral line is drawn from the middle of the batteries in series, as shown in Figure 3-58.

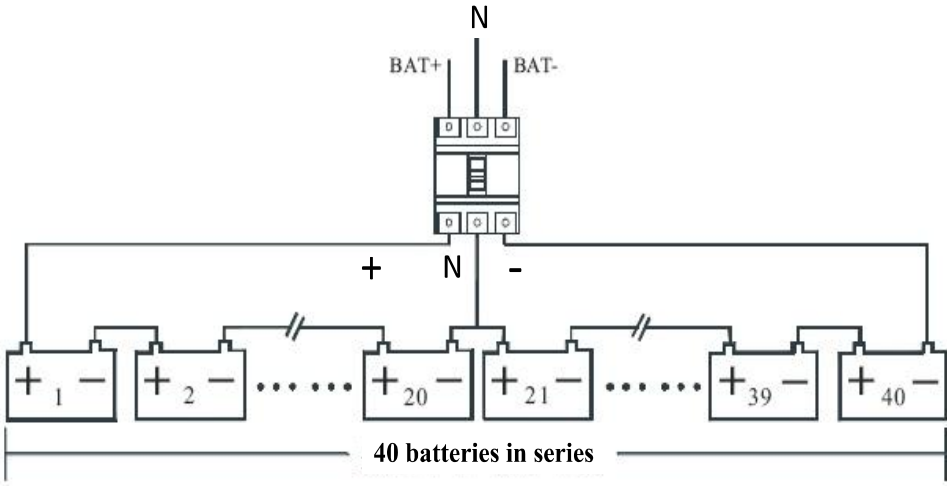


Figure 3-58 Battery string wiring diagram

Warning

The battery terminal has hazardous voltage. Please observe safety precautions when installing. When installing, make sure the polarity between the battery and the external switch of the battery pack and the external switch and the UPS system are correct, and make sure not to reverse the connection.

3.8.Power Cables

3.8.1.Specifications of Cables

The selection of UPS system power cables should meet the requirements of Table 3B in IEC60950-1, and select appropriate cables based on actual engineering applications. The maximum operating current of the UPS is shown in Tables 3-2.

Table 3-2 Recommended sizes for power cables

Content		800kVA cabinet	1000kVA cabinet	1200kVA cabinet
Main Input	Main Input Current (A)	1393	1742	2090
Main Output	Main Output Current (A)	1212	1515	1818
Bypass Input	Bypass Input Current (A)	1212	1515	1818
Battery Input	Battery Input Current (A)	1666	2083	2500

Note

The recommended cable section for power cables in Table 3-2 is only for the situations described below:

- Ambient temperature: 30℃
- AC loss is less than 3%, DC loss is less than 1%, the length of the AC power cables should be no longer than 30 meters and the length of the DC power cables should be no longer than 40 meters. When the length exceeds, the cable specification should be increased.
- When external conditions change, for 90℃ copper conductor flexible cables, it is necessary to refer to IEC60364-5-52 and relevant local regulations for verification. The current values

in the table are for data when the rated line voltage is 380V. For 400V rated voltage, the current value needs to be multiplied by 0.95; for 415V rated voltage, the current value needs to be multiplied by 0.92.

- When the main load is a nonlinear load, the N line cross-section needs to be increased to 1.5 times to 1.7 times.

3.8.2.Specification of Cable Terminal

Specifications for power cables connection terminals are listed as Table 3-3.

Table 3-3 Requirements for power module terminal

Model	Port	Connection	Bolt	Torque
RM800/100D RM800/100D-F RM1000/100D RM1000/100D-F RM1200/100D RM1200/100D-S RM1200/100D-F	Main Input	Cable crimp OT terminal	M16	96Nm
	Bypass Input	Cable crimp OT terminal	M16	96Nm
	Battery Input	Cable crimp OT terminal	M16	96Nm
	Output	Cable crimp OT terminal	M16	96Nm
	PE	Cable crimp OT terminal	M16	96Nm

3.8.3.Selection of External Circuit Breaker

The UPS system needs to be configured with external distribution circuit breakers, including main input circuit breaker, bypass input circuit breaker (configured for dual input), output circuit breaker, maintenance bypass circuit breaker, and battery output circuit breaker, the circuit breakers (CB) for the system are recommended in Table 3-4.

Table 3-4 Recommended specification of CB

Installed Position	Recommended CB		
	800kVA cabinet	1000kVAcabinet	1200kVAcabinet
Main Input front-end	1600A/3P	2000A/3P	2500A/3P
Bypass Input front-end	1600A/3P	2000A/3P	2500A/3P
Output back-end	1600A/3P	2000A/3P	2500A/3P
Maintenance Bypass	1600A/3P	2000A/3P	2500A/3P
Battery Output back-end	2000A/3P	2500A/3P	3200A/3P

 Attention

It is not recommended to configure a circuit breaker with leakage protection function.

3.9. Control and Communication Cables

The front panel of the bypass module provides dry contact interface (EPO, NTC, IP, OP), and communication interface (CAN, RS485, Intelligent slot and USB Port), as shown in Figure 3-25.

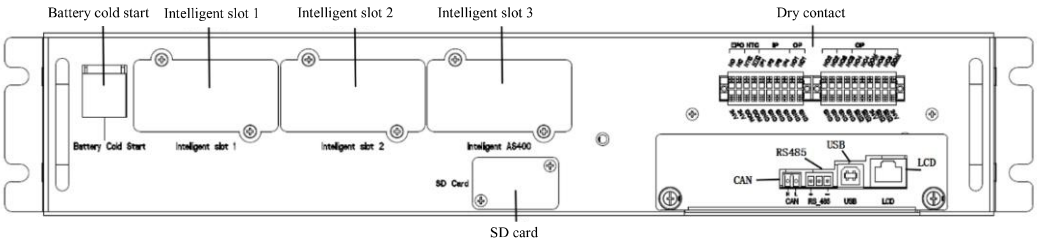


Figure 3-59 Communication interface

3.9.1. Dry Contact Interface

Dry contact interface includes EPO, NTC, IP, OP, as shown in Figure 3-26, the interface function can be set by software, the function of the dry contact are shown in Table 3-5:

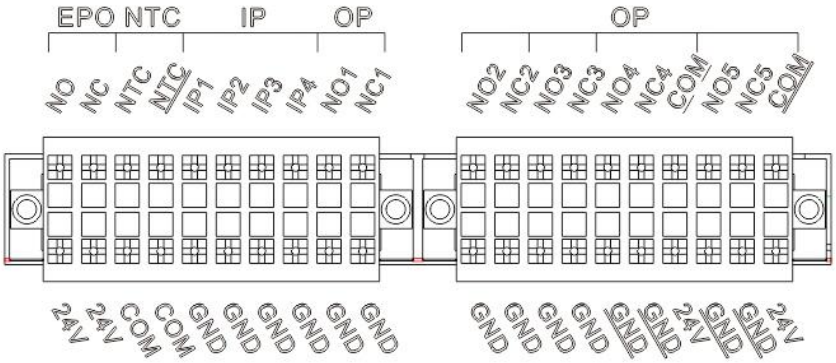


Figure 3-60 Dry Contact Interface

Table 3-5 Dry contact interface definition

Port	Name	Function
NTC-NTC	TEMP_BAT	Detection of battery temperature
NTC-NTC	TEMP_ENV	Detection of environmental temperature
NTC-COM	TEMP_COM	Detection of Common terminal temperature
EPO-NC	REMOTE_EPO_NC	Trigger EPO when disconnect with EPO-24V
EPO-24V	+24V_DRY	+24V power supply
EPO-NO	REMOTE_EPO_NO	Trigger EPO when shorted with EPO-24V
IP-IP1	GEN_CONNECTED	Internal Input dry contact , function is settable Default: interface for generator
IP-IP2	BCB Status	Internal Input dry contact, function is settable Default: BCB Status (Alert no battery when BCB Status is invalid)
IP-IP3	BCB Online	Internal Input dry contact, function is settable Default: BCB Online (Alert no battery when BCB Status is invalid)
IP-IP4	Silence	Internal Input dry contact, function is settable Default: Mute the alarm
IP-GND	GND_DRY	Ground for +24V
OP-NO1	BCB Drive_NO	Internal Output dry contact, (Normally open) function is settable Default: Battery CB trip signal(Valid under EOD or EPO)
OP-NC1	BCB Drive_NC	Internal Output dry contact, (Normally close)

		function is settable Default: Battery CB trip signal (Valid under EOD or EPO)
OP-NO2	BAT_LOW_ALARM_NO	Internal Output dry contact, (Normally open) function is settable Default: Battery low alarming
OP-NC2	BAT_LOW_ALARM_NC	Internal Output dry contact (Normally closed), function is settable Default: Low battery alarming
OP-NO3	GENERAL_ALARM_NO	Internal Output dry contact, (Normally open) function is settable Default: General alarming
OP-NC3	GENERAL_ALARM_NC	Internal Output dry contact, (Normally closed) function is settable Default: General alarming
OP-NO4	UTILITY_FAIL_NO	Internal Output dry contact, (Normally open) function is settable Default: Utility abnormal alarming
OP-NC4	UTILITY_FAIL_NC	Internal Output dry contact, (Normally open) function is settable Default: Utility abnormal alarming
OP-NO5	Overload_NO	Internal Output dry contact, (Normally closed) function is settable Default: Utility abnormal alarming
OP-NC5	Overload_NC	Internal Output dry contact, (Normally open) function is settable Default: overload alarming
OP-GND	GND	Internal Output dry contact, (Normally close) function is settable Default: overload alarming
OP-24V	OP4_24V	+24V
OP-GND	GND	OP-5 Internal Output dry contact GND
OP-GND	GND	OP-4 Dry contact GND
OP-VCC	VCC	OP-5, optional connected to external power supply or internal 24V
OP-COM	COM	OP-5 COM port, optional connect to external VCC and internal power supply 24V
OP-COM	COM	OP-4 COM port, optional connect to external VCC and internal power supply 24V

Note

The function of each port can be set by the monitor software.

The default functions of each port are described as follows:

Battery and Environment Temperature Detection Port

The input dry contact NTC can detect the temperature of batteries and environment respectively, which can be used in environment monitoring and battery temperature compensation. Interfaces diagram for NTC are shown in Figure 3-61, the description of interface is in Table 3-6.

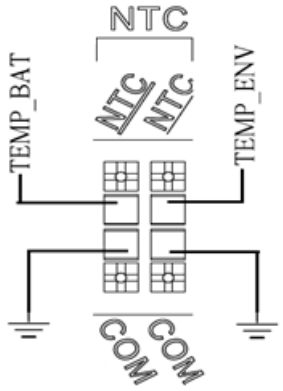


Figure 3-61 Temperature detection port

Table 3-6 Description of input dry contact J2 and J3

Port	Name	Function
NTC-NTC	TEMP_BAT	Battery temperature detection
NTC-NTC	TEMP_ENV	Environment temperature detection
NTC-COM	ENV_TEMP	Temperature detection common port

Note

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

Remote EPO Input Dry Contact Port

During normal operation, EPO_NC needs to be short-circuited to +24V. When EPO needs to be triggered, EPO_NC needs to be disconnected from +24V. The interface diagram is shown in Figure 3-62, and the interface description is shown in Table 3-7.

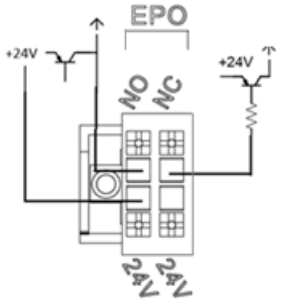


Figure 3-62 Diagram of remote EPO input port

Table 3-7 Description of remote EPO input port

Port	Name	Function
EPO-NC	REMOTE_EPO_NC	Trigger EPO when disconnect with +24V
EPO-24V	+24V_DRY	+24V
EPO-NO	REMOTE_EPO_NO	Trigger EPO when short-circuited with +24V

During normal operation of the UPS system, the EPO-NC and the EPO-24V need to be shorted, and the pins EPO-NO and EPO-24V need to be disconnected. If the EPO-NC and the pin EPO-24V are disconnected or the pin EPO short-circuiting NO and EPO-24V will trigger an emergency shutdown.

Generator Input Dry Contact Port

The default function of IP-IP1 is the interface for generator connecting. If IP1 is connected with IP1-GND, it indicates that the generator has been connected with the system. The interface diagram is shown in Figure 3-63, and interface description is shown in Table 3-8.

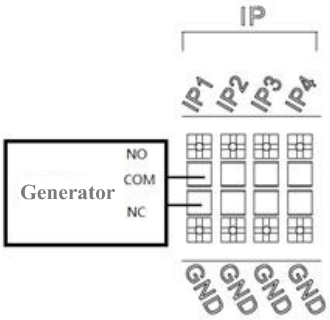


Figure 3-63 Interface of the generator connection status

Table 3-8 Description of dry contact port

Port	Name	Function
IP-IP1	GEN_CONNECTED	Connection status of generator
IP-GND	GND_DRY	Ground for +24V power

Note

For the connection diagram of IP-IP2, IP-IP3 and IP-IP4 input dry contacts, refer to IP-IP1.

Battery Voltage Warning Output Dry Contact Port

OP-1 is the output dry contact interface, which defaults to the battery CB trip signal (valid under EOD or EPO). When the battery CB trip signal occurs, an auxiliary dry contact signal isolated by a relay will be provided. The interface schematic diagram is shown in Figure 3-64, and the interface description is shown in Table 3-9.

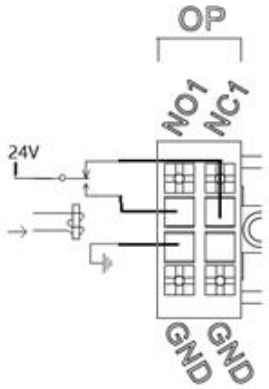


Figure 3-64 Battery voltage warning dry contact port diagram

Table 3-9 Description of battery voltage warning dry contact port

Port	Name	Function
OP-NC1	BCB Drive_NC	Battery voltage warning relay (normally closed) will be open during warning
OP-NO1	BCB Drive_NO	Battery voltage warning relay (normally open) will be closed during warning
OP-GND	GND	Internal output dry contact GND

Note

For the connection diagram of OP-2, OP-3 output dry contacts, refer to OP1.

Utility Fail Warning Output Dry Contact Interface

OP-4 defaults to the utility fail alarm output dry contact interface. When the utility fail, the system will send out alarm message and provide an auxiliary dry contact signal isolated by a relay. The interface schematic diagram is shown in Figure 3-65, and the interface description is shown in Table 3-10.

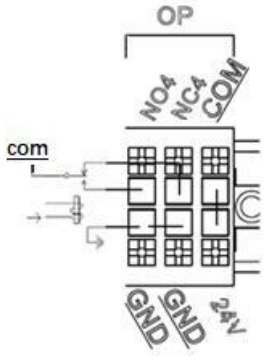


Figure 3-65Utility failure warning dry contact interface diagram

Table 3-10 Utility failure warning dry contact interface description

Port	Name	Function
OP-NC4	UTILITY_FAIL_NC	Mains failure warning relay(normally closed) will be open during warning
OP-NO4	UTILITY_FAIL_NO	Mains failure warning relay (normally open) will be closed during warning
OP-GND	EXT_GND	Output common port, can be shorted with OP-COM
OP-COM	GND	The common terminal of OP-NC4 and OP-NO4 can be connected to an internal 24V power supply (OP-24V), or an external 24V power supply, or an external common terminal (OP-GND)

Overload Alarm Output Dry Contact Port

OP-5 defaults to the overload alarm output dry contact interface. When an overload occurs, the system will send out alarm message and provide an auxiliary dry contact signal isolated by a relay. The schematic diagram of the interface is shown in Figure 3-65, and the interface description is shown in Table 3-11.

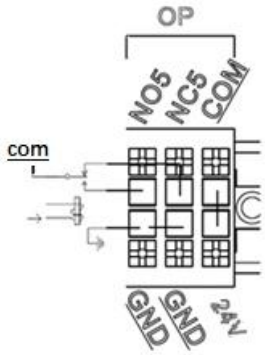


Figure 3-65 Diagram of overload alarm output dry contact

Table 3-11 Description of overload alarm output dry contact interface

Port	Name	Function
OP-NC5	Overload_NC	Overload Alarm relay (normally closed) will be open during warning
OP-NO5	Overload_NO	Overload Alarm relay (normally open) will be close during warning
OP-GND	EXT_GND	External common terminal, can be short circuited with OP-COM
OP-COM	GND	The common terminal of OP-NC5 and NO5, can be connected with internal 24V (OP-24V) or external 24V, or external common terminal (OP-GND).

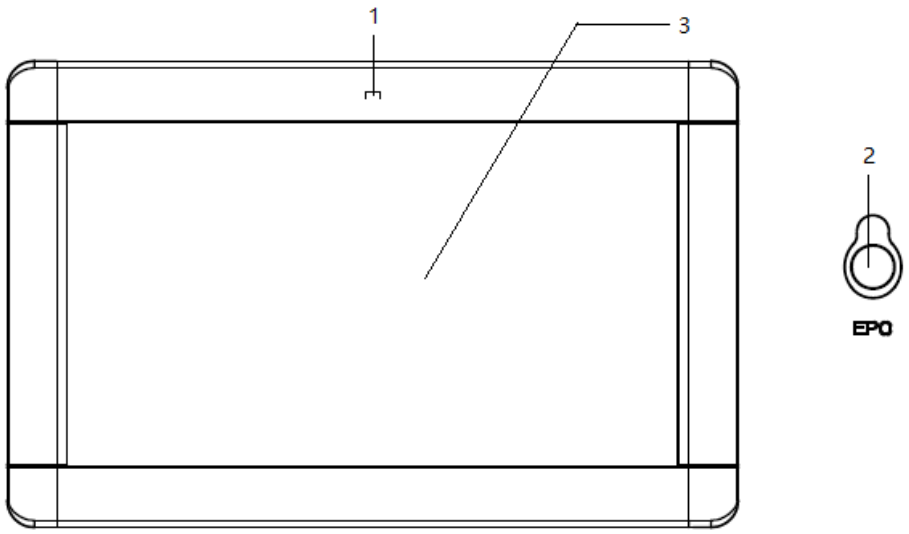
3.9.2. Communication Interface

CAN, RS485 and USB port: Provide serial data which can be used for commissioning and maintenance by authorized engineers or can be used for networking or integrated monitoring system in the service room.
SNMP card: used for on-site installation of communication intelligent cards (optional).
Smart AS400 card: dry contact expansion interface (optional).
Expanded RS485 card: used to communicate with BMS (option).

4. Control and Display Panel

4.1. Cabinet Display Panel

The panel is located on the front door. According to the function, it can be divided into two parts: control button and LCD display area; the structure is shown as Figure 4-1.



1: Screen power indicator 2: Emergency power off (EPO) switch 3: LCD touch screen

Figure 4-1 Control and display panel

4.1.1. Audible Alarm Indication

There are two different types of audible alarm during UPS operation, as shown in Table 4-1.

Table 4-1 Description of audible alarm

Alarm	Description
Intermittently alarm	When system has general warning alarm (for example: AC fault)
Continuous alarm	When system has serious faults (for example: EOD or hardware failure)

4.1.2. Control and Operation Button

Table 4-2 Description of control and operation key

Function Key	Description
EPO	Long press, cut off the load power, shut down the rectifier, inverter, static bypass and battery

4.1.3. LCD Touch Screen

After the UPS is started, the monitoring system starts self-test, and a welcome interface will appear on the LCD control panel. After 3 seconds, enter home page. The home page is shown in

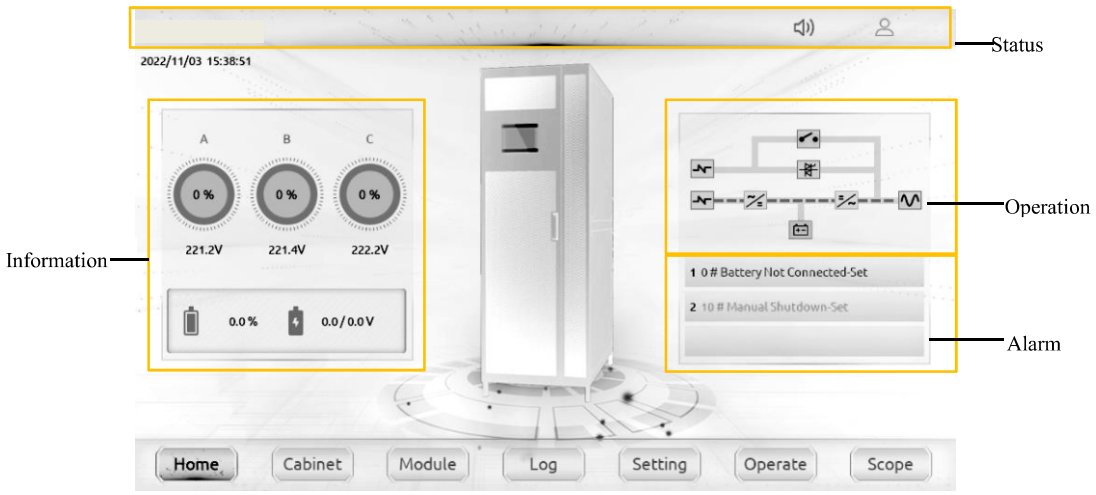


Figure 4-2 Home page

The homepage mainly includes status information, information display, operation status, alarm display, and main menu.

- **Status bar**

It include UPS models; parallel operation mode and number of parallel operation power modules; time display; user account login.

- **Information display**

Users can easily view the main information of the cabinet in the information display area.

The load percentage is displayed graphically on the dial, and the load voltage, battery positive and negative voltage and capacity are displayed numerically.

The load rate of the system is indicated by a bar graph. The load rate is displayed as a percentage value in the instrument graph. The green area indicates that the load rate is less than 60%, the yellow area indicates that the load is between 60% and 100%, and the red area indicates that the load rate is between 60% and 100%. Red means the load exceeds 100%.

- **Running status**

The visualized image displays the status of each part of the UPS system, green indicates that the power module is running normally, white indicates that it is not started, red indicates that the function of the part is missing (such as battery red, indicating that the battery is not connected to the system), green energy flow indicates that the module has energy output.

- **Warning Information**

Display the warning information of the cabinet.

- **Main menu**

The main menu displays UPS status information, fault alarm information, and related settings. It mainly includes six menus: Cabinet, Power module, Setting, Log, Operate and Scope. The structure of the main menu tree is shown in Figure 4-3.

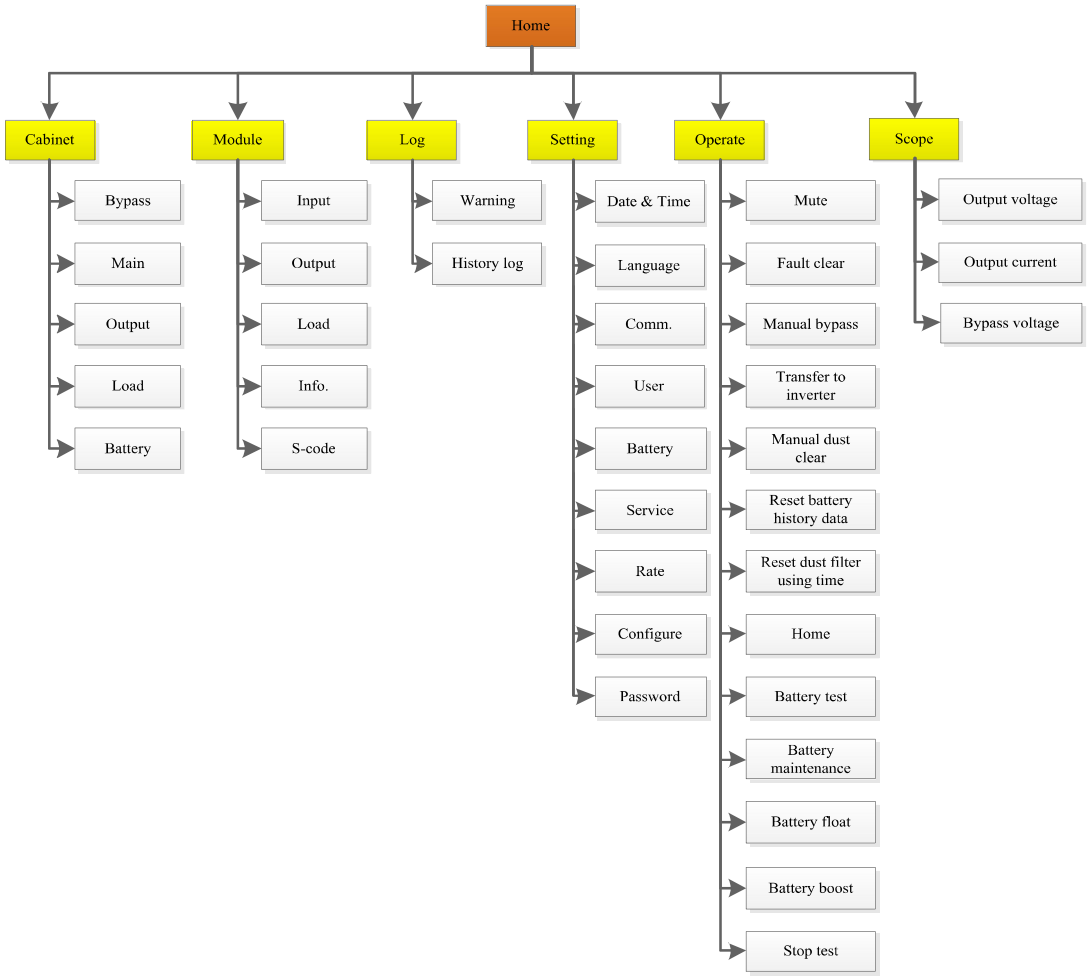


Figure 4-3 Structure of menu tree

4.2. Main Menu

The main menu mainly includes six menus: Cabinet, Power module, Setting, Log, Operate and Scope.

4.2.1. Cabinet Submenu

After entering the home page, touch the icon 

(At the bottom left of the screen) and the system enters the page of the Cabinet, as shown in Figure 4-4:

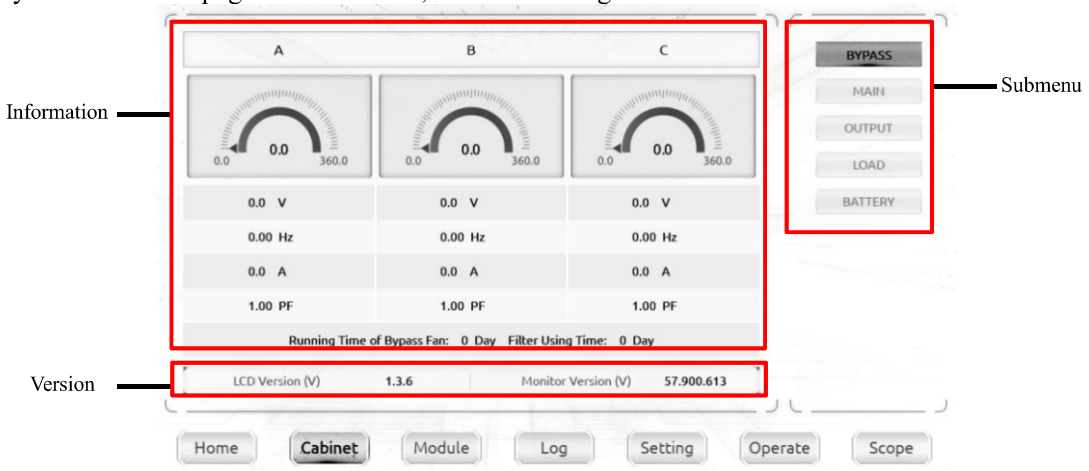


Figure 4-4 Cabinet Submenu

The cabinet menu interface mainly consists of information display, version information and cabinet submenus. The functions of each part are as follows.

- **Title**

Indicate that the bypass of the cabinet is selected.

- **Version Information**

Indicates the LCD software version number and monitoring module software version number.

- **Information Display**

Visually display the voltage of each phase through a dynamic dial.

The digital display is mainly used to show the voltage (unit: V), current (unit: A), frequency (unit: Hz), and power factor (PF) of the bypass three phases.

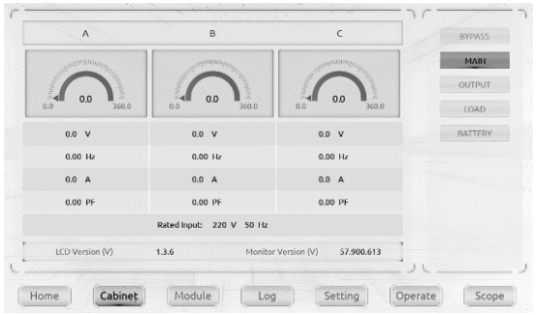
The running time displays the total running time of the bypass fan and the usage time of the dust filter.

- **Submenu**

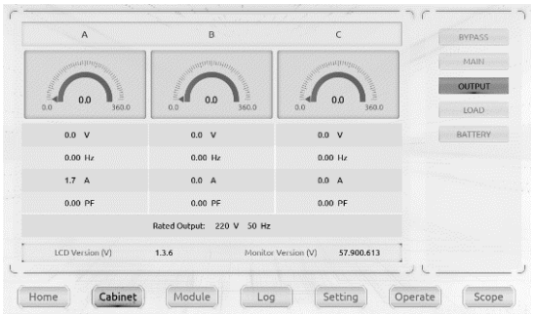
It mainly includes submenus such as bypass, mains, output, load, battery, etc.

Click the corresponding submenu icon to enter the corresponding interface, as shown in Figure 4-5.

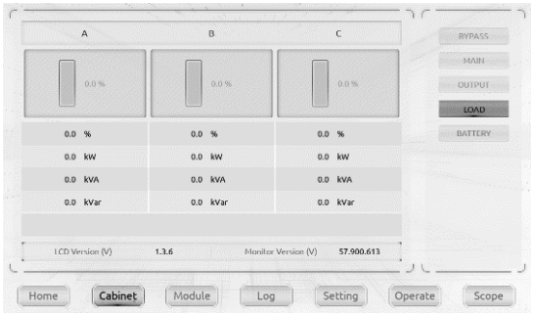
(a) Bypass



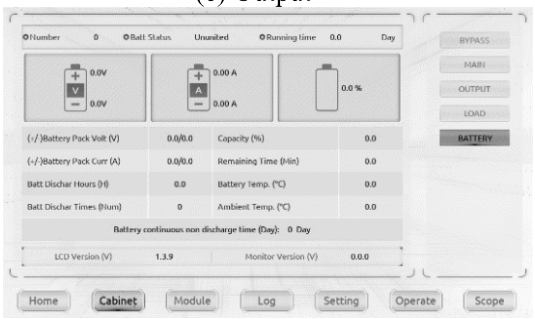
(b) Main



(c) Output



(d) Load



(e) Battery

(f) Information

Figure 4-5 Submenu interface of cabinet

The submenu of cabinet is described in details below in Table 4-3.

Table 4-3 Description of each submenu of cabinet

Submenu	Items	Description
Bypass Input	V	Phase voltage
	Hz	Frequency
	A	Phase current
	PF	Power factor
Main	V	Phase voltage
	Hz	Bypass frequency
	A	Phase current
	PF	Power factor
Output	V	Phase voltage
	A	Phase current
	Hz	Output frequency
	PF	Output power factor
Load	%	Load percentage
	kW	Pout: active power
	kVA	Sout: apparent power
	kVar	Qout: reactive power
Battery	Number	Number of batteries
	Batt States	Connection states of battery
	Runtime (Day)	Battery running time(Day)
	(+/-) Battery Pack Volt (V)	Battery Voltage (Positive & Negative)
	(+/-) Battery Pack Curr (A)	Battery Current (Positive & Negative)
	Batt Dischar Hours (H)	Total time of battery discharging(H)
	Batt Dischar Times (Num)	Number of battery discharges (Num)
	Capacity (%)	Percentage relative to new battery capacity
	Remaining Time (Min.)	Remaining battery backup time
	Battery Temp. (℃)	Battery temperature℃
	Ambient Temp.	Ambient temperature
	Battery continuous non discharge time (Day)	Battery continuous non-discharge time (Day)
Imformation	Byp SCR1 Temp. (℃)	The A/B phase SCR temperature of bypass module 1
	Byp SCR2 Temp. (℃)	The B/C phase SCR temperature of bypass module 1
	Byp SCR3 Temp. (℃)	The A/B phase SCR temperature of bypass module 2
	Byp SCR4 Temp. (℃)	The B/C phase SCR temperature of bypass module 2
	NTC1 Temp. (℃)	The rear environment temperature 1 of TF5 monitor
	NTC2 Temp. (℃)	The rear environment temperature 2 of TF5 monitor
	Byp Module 1 Knob Status	The knob status of bypass module 1—open/close
	Byp Module 2 Knob Status	The knob status of bypass module 2—open/close
	MTR Air Inlet Temp. (℃)	The monitoring inlet temperature

4.2.2. Power Module

Touch the icon Module (At the bottom left of the screen), and the system enters the page of the Power unit, as is shown in Figure 4-6.

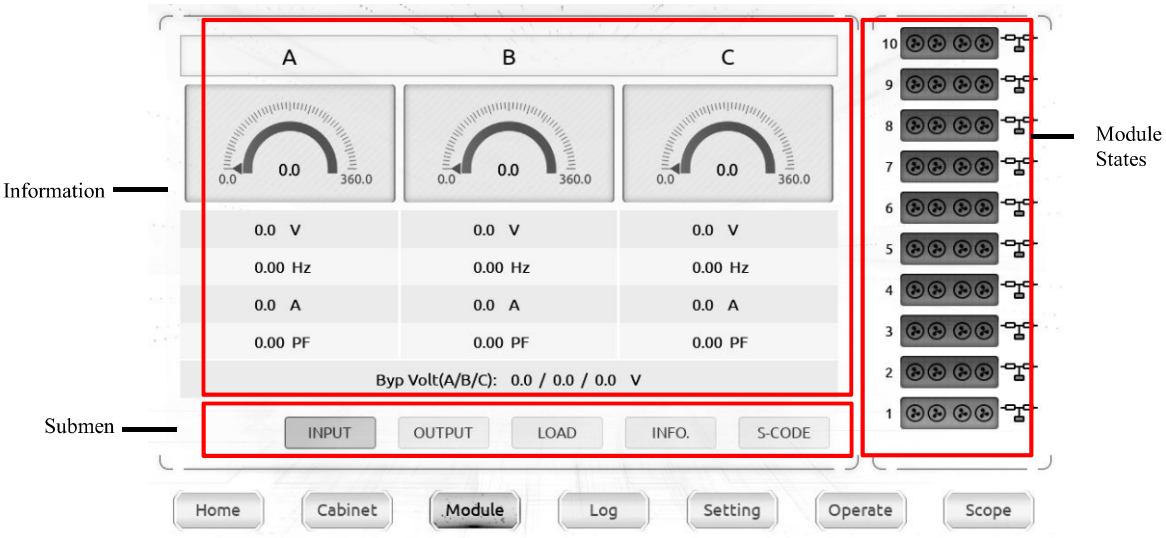


Figure 4-6 Power module

The main interface of the module menu mainly includes information display, power module status display and power module submenus.

- **Information display**

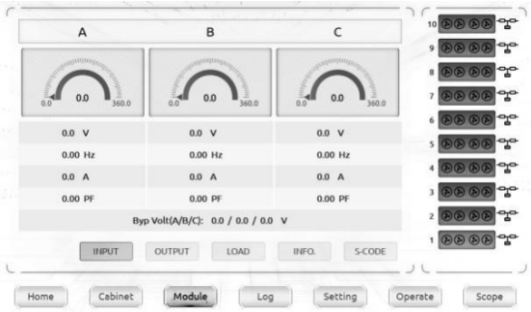
Display the corresponding information of the selected power module, mainly including voltage, frequency, current, and power factor.

- **Power module information**

(1) Power module number, numbered from bottom to top is 1-10;
(2) Whether the power module is inserted and selected;
After the module is inserted and the communication connection is normal, the module icon will be displayed on the corresponding ID number;
After the module is selected, the module icon colour will turn dark.
(3) The operating status of the power module is as follows:
(a) The green box indicates that the power module is working normally.
(b) The black box indicates that the corresponding part of the power module is invalid.
(c) The red part means that the part is not connected or the part is faulty.;

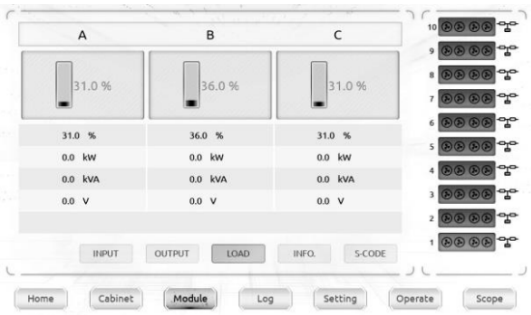
- **Submenu**

The submenu includes Input, Output, Load, INFO and S-CODE. Each interface of the submenu is shown in Figure 4-7:



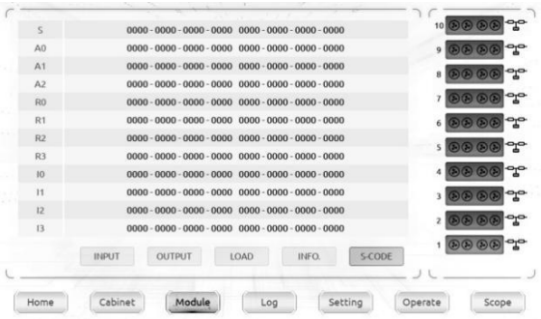
(a) Input

(b) Output



(c) Load

(d) Information



(e) S-CODE

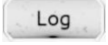
Figure 4-7 Submenu interface of power module

The detailed display content of the submenu under the power module is shown in Table 4-4.

Table 4-4 Description of each submenu of Power module

Submenu	Items	Description
Input	V	Phase voltage
	Hz	Input frequency
	A	Phase current
	PF	Power factor
Output	V	Phase voltage
	Hz	Output frequency
	A	Phase current
	PF	Power factor
Load	%	Output load percentage
	KW	Output active power
	KVA	Output reactive power
	V	Phase voltage
Information	(+/-) BATTERY (V)	Battery voltage (Positive & Negative)
	(+/-) BATTERY (A)	Battery current (Positive & Negative)
	(+/-) BUS (V)	Bus voltage (Positive & Negative)
	(+/-) Charger (V)	Charger voltage(Positive & Negative)
	Fan Time (Day)	Total fan's running time of the selected power module
	Capacitance Time (Day)	Total capacitance's running time of the selected power module
	Air Inlet Temp. (℃)	Inlet temperature of the selected power module
	Air Outlet Temp. (℃)	Outlet temperature of the selected power module
	REC VER (V)	The module rectifier software version
	INV VER (V)	The module inverter software version
S-code	S-CODE	For the maintenance personnel

4.2.3. Log

Directly click the button 

at the bottom of the LCD screen to enter the main recording

menu. The main interface of the recording menu mainly includes current alarm information display and historical record display. The interface is shown in Figure 4-8 below.

(a) Current alarm (b) Historical event

Figure 4-8 Submenu interface of log

Table 4-5 is a complete list of all UPS system events and alarm information displayed in the history records.

Table 4-5 System events and alarm list

Events	Description
Load On UPS-Set	Inverter feeds load
Load On Bypass-Set	Bypass feeds load
No Load-Set	No load
Battery Boost-Set	Charger is working in boost charging mode
Battery Float-Set	Charger is working in float charging mode
Battery Discharge-Set	Battery is discharging
Battery Connected-Set	Battery is connected already
Battery Not Connected-Set	Battery is not yet connected.
Maintenance CB Closed-Set	Manual maintenance breaker is closed
Maintenance CB Open-Set	Manual maintenance breaker is opened
EPO-Set	Emergency Power Off
EPO-Clear	None Emergency Power Off
Module On Less-Set	Inverter output power capacity is less than the load capacity
Module On Less-Clear	Inverter output power capacity is more than the load capacity
Generator Input-Set	External generator is connected
Generator Input-Clear	Disconnect the external generator after it is connected
Utility Abnormal-Set	Utility (Grid) is abnormal.
Utility Abnormal-Clear	Utility recover normal
Bypass Sequence Error-Set	Bypass voltage Sequence is reverse
Byp Sequence Error-Clear	Bypass voltage Sequence recover normally
Bypass Volt Abnormal-Set	Bypass voltage is abnormal
Byp Volt Abnormal-Clear	Bypass voltage is abnormal recover normally
Bypass Module Fail-Set	Bypass module fails.
Bypass Module Fail-Clear	Bypass module recover normally
Bypass Overload-Set	Bypass is overload
Bypass Overload-Clear	Bypass recover normally
Bypass Overload Tout-Set	The bypass overload continues and the overload times out
Byp Overload Tout-Clear	The bypass overload stop times-out counting
Byp Freq. Over Track-Set	Bypass frequency is out of tracking range
Byp Freq. Over Track-Clear	Bypass frequency recovery tracking range
Exceed Tx Times Lmt-Set	Number of transfer between bypass and inverter exceeds five in the last hour
Exceed Tx Times Lmt-Clear	Clear transfer times
Output Short Circuit-Set	Output shorted Circuit

Events	Description
Output Short Circuit-Clear	Output shorted Circuit disappear
Battery EOD-Set	The battery voltage reaches the battery EOD
Battery EOD-Clear	The battery voltage is restored above the battery EOD
Battery Test-Set	System transfer to battery mode for self-test
Battery Test OK-Set	Battery self-test normally
Battery Test Fail-Set	Battery self-test abnormally
Battery Maintenance-Set	System transfer to battery maintenance mode for self-test
Batt Maintenance OK-Set	Battery maintenance normally
Batt Maintenance Fail-Set	Battery maintenance abnormally
Stop Test-Set	Stop battery maintenance or test
Fault Clear-Set	Clear the reported failure
Log Clear-Set	Delete all history records
N# Module Inserted-Set	The N# Power Module is inserted in system
N# Module Exit-Set	The N# Power Module is pulled out from system
N# Rectifier Fail-Set	The N# Power Module Rectifier Fail
N# Rectifier Fail-Clear	The N# Power module rectifier fault resolved
N# Inverter Fail-Set	The N# Power Module Inverter Fail
N# Inverter Fail-Clear	The N# Power Module Inverter Fail resolved
N# Rectifier Over Temp.-Set	The N# Power Module Rectifier Over Temperature
N# Rectifier Over Temp.-Clear	The N# Power Module Rectifier Over Temperature resolved
N# Fan Fail-Set	The N# module fan not connected properly or blocked
N# Fan Fail-Clear	The N# Fans recover normally
N# Output Overload-Set	The N# Power Module Output Over Load
N# Output Overload-Clear	The N# Power Module Output Recover
N# Output Inverter Overload Tout-Set	The N# Power Module Inverter Over Load Timeout
N# Output Inverter Overload Tout-Clear	The N# Power Module Inverter Over Load Timeout clear
N# Inverter Over Temp.-Set	The N# Power Module Inverter Over Temperature
N# Inverter Over Temp.-Clear	The N#Power Module Inverter Over Temperature resolved
On UPS Inhibited-Set	Inhibit system transfer from bypass to inverter
On UPS Inhibited-Clear	Stop inhibit system transfer from bypass to inverter
Manual Transfer Byp-Set	Transfer to bypass manually
Esc Manual Bypass-Set	Transfer from bypass to inverter manually
Battery Volt Low-Set	Battery Voltage is Low
Battery Volt Low-Clear	Battery Voltage recover normal
Battery Wiring Error-Set	Battery wiring reversed
Battery Wiring Error-Clear	Battery cables are connected correctly
N# Inverter Protect-Set	The N#Power Module Inverter Protect
N# Inverter Protect-Clear	The N# Power Module Inverter Protect resolved
Input Neutral Lost-Set	The mains neutral wire is lost or not detected
Bypass Fan Fail-Set	At least one of bypass module Fans Fails
Bypass Fan Fail-Clear	Bypass module Fans Fails resolved
N# Manual Shutdown-Set	The N# Power Module is manually shutdown
Manual Boost Charge-Set	Manually force the Charger work in boost charge mode
Manual Float Charge-Set	Manually force the charger work in float charge mode
UPS Locked-Set	Forbidden to shut down UPS power module
Parallel Cable Error-Set	Parallel cables error
Parallel Cable Error-Clear	Parallel cables error resolved
This Timer-Set	This time the accumulated time is up
N# Batt or Charger Fail-Set-Set	The N#Power module battery or charger malfunction
N# Batt or Charger Fail-Clear	The N#Power module battery or charger malfunction resolved

Events	Description
N+X Redundant Lost-Set	Cabinet lost N+X Redundant
N+X Redundant Lost-Clear	Cabinet recover N+X Redundant
EOD System Inhibited-Set	EOD System Inhibited set
EOD System Inhibited-Clear	EOD System Inhibited clear
Signal Cable Fail-Set	Signal wire connection malfunction
Signal Cable Fail-Clear	Signal wire connection malfunction resolved
Batt Ambient Over Temp.-Set	Battery ambient temperature is over the limit of UPS
Batt Ambient Over Temp.-Set	Battery ambient temperature recover normal
Batt Ambient Over Temp.-Clear	Rectifier CAN bus communication is abnormal
REC CAN Fail-Set	Rectifier CAN bus communication recover normal
REC CAN Fail-Clear	Monitoring unit inverter signal CAN abnormal
INV IO CAN Fail-Set	Monitoring unit inverter signal returns to normal
INV DATA CAN Fail-Set	Monitoring unit inverter data CAN abnormal
INV DATA CAN Fail-Clear	Monitoring unit inverter data CAN returns to normal
N# Power Share Fail-Set	The difference of the N# power modules' output current in system is over limitation
N# Power Share Fail-Clear	The difference of the N# power modules' output current in system recover normal
N# Sync Pulse Fail-Set	The N# Synchronization signal between modules is abnormal
N# Sync Pulse Fail-Clear	The N# Synchronization signal between modules recover normal
N# Input Volt Detect Fail-Set	Input voltage of N# power module is abnormal
N# Input Volt Detect Fail-Clear	Input voltage of N# power module recover normal
N# Battery Volt Detect Fail-Set	The N# Power module detect that battery voltage is abnormal
N# Batt Volt Detect Fail-Clear	The N#Power module detect that battery voltage recover normal
N# Output Volt Test Exception-Set	The N#Power module output voltage is abnormal
N# Output Volt Test Exception-Clear	The N#Power module output voltage recover normal
N# Bypass Volt Detect Fail-Set	The N#Power module detect that bypass voltage is abnormal
N# Bypass Volt Detect Fail-Clear	The N#Power module detect that bypass voltage recover normal
N# INV Bridge Fail-Set	The N# Power module inverter is failure
N# INV Bridge Fail-Clear	The N#Power module inverter failure resolved
N# Outlet Temp. Error-Set	Outlet temperature of N# power module is over the limitation
N# Outlet Temp. Error-Clear	Outlet temperature of N# power module recover normal
N# Input Curr Unbalance-Set	The three-phase input current of the N# power module is different
N# Input Curr Unbalance-Clear	The three-phase input current of the N# power module recover normal
N# DC Bus Over Volt-Set	The N# Power module Voltage of DC bus capacitors is over limitation
N# DC Bus Over Volt-Clear	The N#Power module Voltage of DC bus capacitors recover normal
N# REC Soft Start Fail-Set	The N#Power module rectifier can't start
N# REC Soft Start Fail-Clear	The N#Power module rectifier recover normal
N# Relay Connect Fail-Set	The N# Power module inverter relay can't close
N# Relay Connect Fail-Clear	The N#Power module inverter relay is closed
N# Relay Short Circuit-Set	The N#Power module Inverter relays are shorted
N# Relay Short Circuit-Clear	The N#Power module Inverter relays recover normally
N# PWM Sync Fail-Set	The N#Power module rectifier and inverter PWM synchronizing signal is abnormal

Events	Description
N# PWM Sync Fail-Clear	The N#Power module rectifier and inverter PWM synchronizing signal recover normal
N# Intelligent Sleep-Set	The N#Power module works in intelligent sleep mode
N# Intelligent Sleep-Clear	The N#Power module exits intelligent sleep mode
N# Manual Transfer to INV-Set	The N#Manually transfer UPS to inverter
N# Input Over Curr Tout-Set	The N# Power module Input over current timeout
N# Input Over Curr Tout-Clear	The N# Power module Input over current timeout disappear
N# No Inlet Temp. Sensor-Set	The N#Power module Inlet temperature sensor is not connected correctly or open
N# No Inlet Temp. Sensor-Clear	The N#Power module Inlet temperature sensor recover normal
N# No Outlet Temp. Sensor-Set	The N#Power module outlet temperature sensor is not connected correctly or open
N# No Outlet Temp. Sensor-Clear	The N#Power module outlet temperature sensor recover normal
N# Inlet Over Temp.-Set	The N#Power module Inlet air is over temperature
N# Inlet Over Temp.-Clear	The N#Power module Inlet air temperature recover normal
N# Capacitor Time Reset-Set	The N#Power module reset timing of DC bus capacitors
N# Fan Time Reset-Set	The N#Power module reset timing of fans
Battery History Reset-Set	Reset battery history data
Battery Over Temp.-Set	Battery is over temperature
Battery Over Temp.-Clear	Battery temperature recover normal
Bypass Fan Expired-Set	working life of bypass fans is expired or need to be cleaned
Bypass Fan Expired-Clear	Working life of bypass fans isn’t expired
N# Capacitor Expired-Set	The N#Power module Working life of capacitors is expired
N# Capacitor Expired-Clear	The N#Power module Working life of capacitors isn’t expired
N# Fan Expired-Set	The N#Power module working life of bypass fans is expired or need to be cleaned
N# Fan Expired-Clear	The N#Power module Working life of power modules’ fans isn’t expired
N# INV IGBT Driver Block-Set	The N#Power module Inverter IGBTs are shutdown
N# INV IGBT Driver Block-Clear	N# power module inverter drive signal blockage is released
Dust Filter Expired-Set	It’s time for dust filter maintenance
Dust Filter Expired-Clear	The dust filter maintenance time has not yet arrived
Battery Expired-Set	Battery maintenance cycle has arrived
Battery Expired-Clear	The battery maintenance cycle has not yet arrived
BMS RS485 Error-Set	BMS communication failure
BMS RS485 Error-Clear	BMS communication fault resolved
CAN Error-Set	Monitoring unit CAN communication failure
CAN Error-Clear	Monitoring unit CAN communication returns to normal
Cell Undervoltage-Set	Single battery voltage is low
Cell Undervoltage-Clear	Single battery voltage returns to normal
Cell Overvoltage-Set	Single battery voltage is high
Cell Overvoltage-Clear	Single battery voltage returns to normal
Cell Volt Difference Fail-Set	The voltage difference between single cells is too large
Cell Volt Difference Fail-Clear	Single battery voltage returns to normal
Batt Low Temperature-Set	Battery ambient temperature is too low
Batt Low Temperature-Clear	Battery ambient temperature returns to normal
Battery Over Temp.-Set	Battery ambient temperature is too high
Battery Over Temp.-Clear	Battery ambient temperature returns to normal
BMS Charge Inhibited-Set	The BMS system prohibits charging the battery
BMS Charge Inhibited-Clear	BMS system restores battery charging function

Events	Description
BMS Disharge Inhibited-Set	BMS system prohibits battery discharge
BMS Disharge Inhibited-Clear	BMS system restores battery discharge
Wave Trigger-Set	Fault waveform latch
Bypass CAN Fail-Set	Monitoring unit bypass CAN signal abnormality
Bypass CAN Fail-Clear	The monitoring unit bypasses the CAN signal and returns to normal
Bypass Power Fuse Fail-Set	Bypass power fuse is disconnected
Bypass Power Fuse Fail-Clear	Bypass power supply fuse is normal
N# Firmware Error-Set	N# power module software version error
N# Firmware Error-Clear	N# power module software version is updated
System Setting Error-Set	System setting data error
Bypass Over Temp.-Set	Bypass over-temperature
Bypass Over Temp.-Clear	Bypass temperature returns to normal
N# Module ID Duplicate-Set	N# power module ID is reused with the rest
N# Module ID Duplicate-Clear	N# power module ID is changed back to normal
Electrolyte Leakage-Set	Battery leaking
Electrolyte Leakage-Clear	Battery leakage alarm cleared
Power Units Num. Error-Set	Abnormal number of power units occurs
Power Units Num. Error-Clear	Abnormal number of power units is resolved
Output Volt Exception-Set Output Volt Abnormal-Set	Abnormal output voltage
Output Volt Exception-Clear Output Volt Abnormal-Clear	Output voltage is normal
TransformerOverTemp.-Set	Transformer temperature is too high
TransformerOverTemp.-Clear	Transformer temperature is normal
SystemOverload-Set	System load is too large
SystemOverload-Clear	The system is under normal load
SystemOverloadTimeout-Set	System overload time expires
SystemOverloadTimeout-Clear	Clear system load time out
Battery Low ProhibitedDischarge-Set	Battery capacity is insufficient, discharging is prohibited
Battery Low ProhibitedDischarge-Clear	Battery capacity sufficient, cancel the discharge prohibition
Battery Fuse Failure-Set	Battery fuse disconnected
Battery Fuse Failure-Clear	Battery fuse is normal
LCD Communication Fail-Set	LCD communication failure
LCD Communication Fail-Clear	LCD communication recovery
Interface Board Communication Fail-Set	Interface board connection error
Interface Board Communication Fail-Clear	Interface board connection is normal
Input Breaker Open_Set	Input circuit breaker is open
Input Breaker Close_Set	Input circuit breaker closed
Output Breaker Open_Set	Output circuit breaker is open
Output Breaker Close_Set	Output circuit breaker is closed
Bypass Breaker Open_Set	Bypass circuit breaker is open
Bypass Breaker Close_Set	Bypass circuit breaker closed
AuxiliaryPowerFailure-Set	Auxiliary power failure
AuxiliaryPowerFailure-Clear	Auxiliary power supply is normal
DryContactPowerFailure-Set	Dry contact power failure
DryContactPowerFailure-Clear	Dry contact power supply is normal
N# Bus Low Voltage-Set	The bus voltage of module N is low
N# Bus Low Voltage-Disappear	N# Module bus voltage is normal
N# Discharge Unbalance-Set	N# module has uneven discharge current
N# Discharge Unbalance-Clear	Discharge current sharing of N# module
UPS Type Error	Wrong UPS model selection
Output CT Fail-Set	Output CT sampling abnormality
Output CT Fail-Clear	Output CT sampling is normal
N# INV Volt Detect Abnormal-Set	Abnormal inverter voltage of N# module

Events	Description
N# INV Volt Detect Abnormal-Clear	The inverter voltage of N# module is normal
N# SCI Power transfer failure-Set	The difference between the SCI transmission power and the output power of N# module is too large
N# SCI Power transfer failure-Clear	The SCI transmission power and output power of N# module are normal
N# Battery Relay Connect Fail-Set	The battery relay of N# module cannot be closed.
N# Battery Relay Connect Fail-Clear	N# module battery relay closed
SD card lack of remaining capacity-Set	Insufficient remaining capacity of SD card
SD card lack of remaining capacity-Clear	SD card has sufficient remaining capacity
Bypass module knob disconnect-Set	Bypass module knob is disconnected
Bypass module knob disconnect-Clear	Bypass module knob closed
Bypass temp. difference exceed -Set	The temperature difference between No. 1 bypass module and No. 2 bypass module is too large
Bypass temp. difference exceed -Clear	The temperature difference between bypass module No. 1 and bypass module No. 2 is normal.
Output CT Fail-Set	Output CT sampling abnormality
Output CT Fail-Clear	Output CT sampling is normal

Note

- Different colors of the words represent different level of events: Green, a normal event occur; Grey, the event occurs then clears; Yellow, warning occurs; Red, faults happen.
- Generally, "Set" refers to the occurrence of an event or corresponding operation. "Disappear" refer to the event is removed or the fault is cleared.

4.2.4. Setting

Click the button Setting directly below the LCD screen to enter the setting menu. As shown in Figure 4-9 below.

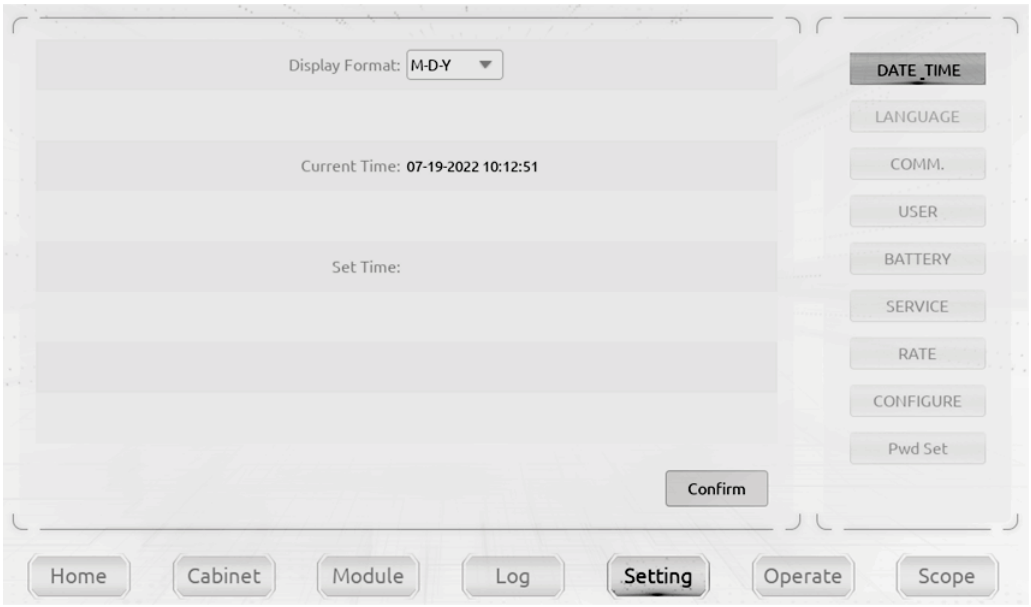


Figure 4-9 Setting menu

The submenus are described in details below in Table 4-6:

Table 4-6 Description of each submenu of Setting

Submenu	Items	Meaning
DATE & TIME	Date format setting	Three formats: year/month/day, month/day/year, day/month/year
	Time setting	Set according to selected date format
LANGUAGE	Current language	Language in use
	Language selection	Simplified Chinese and English, etc. (selectable)
COMM.	Device address	Setting the communication address
	USB, RS485, SNMP protocol selection	SNT Protocol, Modbus Protocol
	Baud rate	Setting the baud rate of SNT, Modbus protocol
	Modbus mode	Setting mode for Modbus: ASCII and RTU selectable
	Modbus parity	Setting the parity for Modbus
USER	Output voltage adjustment	Setting the Output Voltage
	Bypass voltage upper limit	Up limited working Voltage for Bypass, settable: +10%, +15%, +20%, +25%
	Bypass voltage lower limit	Down limited working Voltage for Bypass, settable: -10%, -15%, -20%, -30%, -40%
	Bypass frequency limit	Permitted working Frequency for Bypass Settable: +-1Hz, +-3Hz, +-5Hz
	Title set	Modify the software three-phase display title, such as A-B-C, R-S-T, U-V-W, L1-L2-L3
	LCD backlight settings	Set the screen on duration
	LOGO time	Set the length of time the LOGO appears on the screen
BATTERY	Battery type	Display battery type, such as Lead-acid or lithium battery
	Battery number	Setting the number of the battery
	Battery capacity	Setting of the AH of the battery
	Float charge voltage/cell	Setting the floating Voltage for battery cell
	Boost charge voltage/cell	Setting the boost Voltage for battery cell
	EOD cell, @0.6C Current	EOD voltage for cell battery, @0.6C current
	EOD cell @0.15C current	EOD voltage for cell battery, @0.15C current
	Charge curr percent limit	Charge current (percentage of the rated current)
	Batt temp compensate	Coefficient for battery temperature compensation
	Boost charge time limit	Setting boost charging time
	Auto boost period	Setting the auto boost period
	Auto maintenance discharge period	Setting the period for auto maintenance discharge
SERVICE	System mode	System mode setting, such as single, parallel, single ECO, parallel ECO, LBS, parallel LBS. Self-aging can't be set
	Parallel number	Set the number of UPS in parallel system
	Cabinet ID	Set the ID of UPS in parallel system
	Slew rate	Slew rate of track
	Dust filter maint Period	Set the dust filter maintenance period
	Synchronization window	Set the frequency rate limitation

Submenu	Items	Meaning
	Redundant module Number	Set the redundant module number
	Delay from Battery to utility	Set the delay time from battery transfer to main
	System auto start mode after EOD	Setting System startup mode after EOD
RATE	Cabinet capacity	Set the UPS total capacity
	Power module capacity	Set the single power module capacity
	Rated input voltage	Set the rated input voltage
	Rated Input Frequency	Set the rated input frequency
	Rated output voltage	Set the rated output voltage
	Rated output frequency	Set the rated output frequency
CONFIGURE	System configuration	Configuring system parameters
Pwt Set	Change the password of the login account	Modify the password of the current user and those with lower authority than the current user. The password recovery function sets the passwords of all login accounts to their initial values.

Note

- The time settings, language settings, and communication settings in the submenu under Settings can be set by the user themselves; user settings require a first-level password and need to be set by professional personnel; battery settings and service settings require a second-level password for after-sales service; The rated settings and system settings are factory settings and require a third-level password.
- The C of the battery setting is the ampere hour of the battery, if it is a 100AH battery, then C=100A.

Warning

Make sure the battery cell number and capacity settings are consistent with the actual battery pack, otherwise the battery may be damaged.

4.2.5. Operate

Directly click the button Operate on the lower right side of the LCD screen to enter the system operation menu interface, as shown in Figure 4-10 below.

(a) Function Button Page (b) Test Command Page

Figure 4-10 Operate menu

The "Operate" menu includes Function button page and Test command page. The contents are described in details below.

Function Button

- **Clear/Restore Buzzing**

Touch the icon  or  to mute or restore buzzing of the system.

- **Fault Clear**

Touch the icon  to execute the fault clear.

- **Transfer to and ESC Bypass**

Touch the icon  or  to transfer to bypass mode or cancel.

- **Manual Transfer to Inverter**

Touch the icon  to transfer to inverter mode.

- **Manual Dust Clear**

Touch the icon  , the UPS start to dust clear.

- **Reset Battery History Data**

Touch the icon  , reset the battery history data, includes the times of discharge, days for running and hours of discharging.

- **Reset Dust filter Using Time**

Touch the icon  , reset the time of dust filter using.

Test Command

- **Battery Test**

Click the icon  to switch the system to battery discharge mode to discharge to check whether the battery status is normal. The main path and bypass must be in normal condition, and the battery capacity should be kept above 25%.

- **Battery Maintenance**

By touching the icon  partially discharge the battery, charge and discharge the battery for maintenance. The bypass must be in normal condition and should maintain more than 25% of the battery capacity. After the system reaches EOD, the discharge ends and the system switches back to normal mode.

- **Battery Boost**

By touching the icon  the system starts boost charging.

- **Battery Float**

By touching the icon  the system starts float charging.

- **Stop Test**

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

4.2.6. Scope

Touch the icon 

(At the bottom right of the screen), and the system enters the page of the scope. It mainly provides waveform diagrams of output voltage, output current, bypass voltage, which is convenient for users to observe intuitively. As shown in Figure 4-11. Click the display item on the left, and the corresponding waveform will be displayed in the corresponding display area on the right. Yellow, green, and red represent the corresponding ABC phase, and the numbers below represent their specific values in sequence.

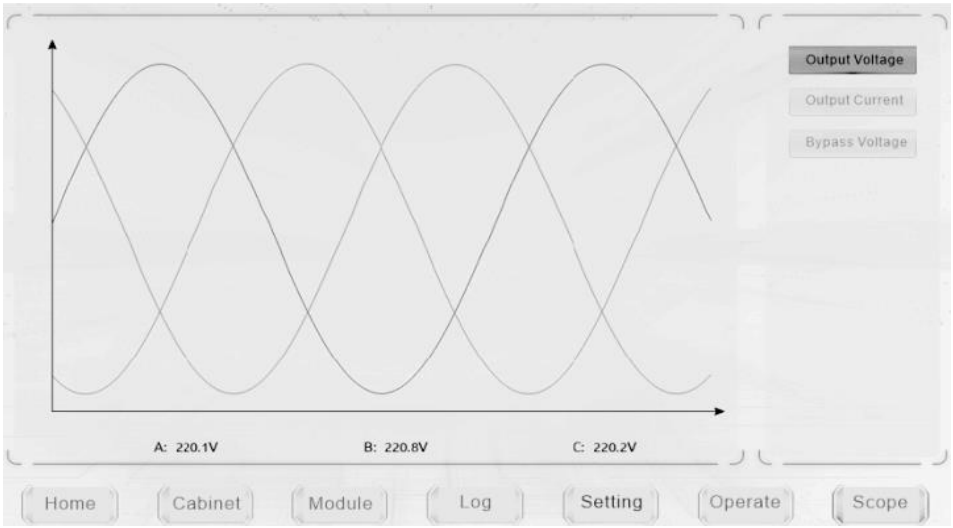


Figure 4-11 Scope Menu

5. Operation

5.1 UPS Start-up

5.1.1 Start-up in Normal Mode

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

1. Ensure all the breaker is open;
2. Close the output breaker (Q4), then close the input (Q1) and bypass breaker (Q2), the system starts to initialize;
3. After the monitoring is started, the LCD screen in front of the cabinet is lit up, and then enter the home page interface, as shown in Figure 4-2;
4. Observe the status of the water animation on the LCD homepage interface. At this moment, the system rectifier is started, and the rectifier indicator is green. The status of each water animation indication is shown in Table 5-1;

Table 5-1 Rectifier indicator status

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

5. After about 30s, the rectifier indicator goes steady green, presenting the finishing of rectifier power-on and bypass static switch closes then the inverter is starting up. The LED indicators are listed below in Table 5-2;

Table 5-2 Inverter indicator status

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

6. The UPS transfers from bypass to inverter after the inverter goes normal bypass indicator off, inverter indicator and load indicator on. The LED indicators are listed below in Table 5-3;

Table 5-3 Inverter supply power indicator status

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

7. Cloth the external battery switch, the battery indicator turns off, then the UPS charges the battery, the UPS enters the normal mode and completes start up. The status of the water animation indication is shown in Table 5-4;

Table 5-4 Indicator status under normal mode

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

Note

- When you power on for the first time, you can set the language, time and date, and system parameters through the setting submenu. When you power on again, the system defaults to the last settings; if these parameters have been set, the system defaults to the existing settings.
- Users can browse all events during the start up process of the starting up by checking the menu Log.
- During the power-on process, you can check the operating status of each power module through the buttons on the front of the power module.

5.1.2 Start-up from Battery

Start from battery mode is battery cold start. The specific steps are as follows:

1. Check to confirm that the battery is connected, and close the external battery switch;
2. Press the red battery start button for 5 seconds, as shown in Figure 5-1. At this time, the system is powered by the battery;

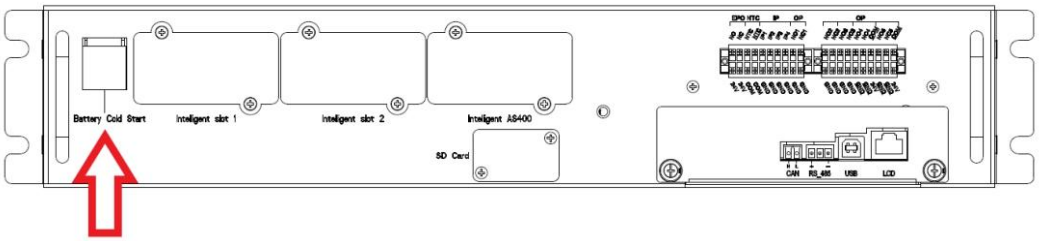


Figure 5-1 The position of the battery cold start button on cabinet

3. The system starts according to the steps 3 in normal mode. The system starts the rectifier and then the inverter to complete the inverter output. The whole process takes about 60 seconds and the system runs in battery mode;
4. Close the UPS output breaker or external output breaker to feed the load to complete the start up in battery mode.

5.2. Switching Between Operating Modes

5.2.1. Switching to Battery Mode from Normal Mode

Disconnect the input switch to cut off the mains, and the UPS enters battery mode. If you need to switch the UPS back to normal mode, closing the input switch and resupplying mains power. After 10 seconds, the rectifier automatically restarts and power to the inverter.

5.2.2. Switching to Bypass Mode from Normal Mode

Touch the icon Operate to entry submenu page, then touch the icon  , then the system will transfer to bypass mode manually.

 Warning

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

Manually turning off power module, make sure the remaining power module don't overload.

5.2.3. Switching to Normal Mode from Bypass Mode

Select the function command menu under the LCD control panel, enter the command submenu, click Operate, and the system will manually switch to the normal mode.

5.2.4. Switching to Maintenance Bypass Mode from Normal Mode

When UPS is operating in normal mode, this operation step can be used to switch the load from inverter output to maintenance bypass mode. It can achieve the maintenance of the cabinet.

1. Touch the  on LCD, transfer the UPS into Bypass mode following section 5.2.2;
   The inverter indicator LED goes out, the buzzer alarm. The bypass supplies power to load, the

inverter shutdown;

2. Disconnect the external battery breaker and close the maintenance bypass breaker;
3. At this time, you can pull out the bypass module, and the load is powered through maintenance bypass.

 Warning

Before performing the switching operation, please check the LCD display first to ensure that the bypass is normal and the inverter is synchronized with the bypass. If this condition is not met, the load power supply may be temporarily interrupted.

 Danger

If you need to maintain the power module, wait about 10 minutes for the internal DC bus capacitor voltage to automatically discharge to a safe voltage range before opening the power module.

5.2.5. Switching to Normal Mode from Maintenance Bypass Mode

When UPS is running in maintenance bypass mode, this operation step can be used to switch the system to normal main circuit mode.

1. Disconnect the maintenance bypass switch and wait for about 30 seconds. The static bypass switch is turned on, the status of the bypass flow animation indicator turns green, and the load is powered by the bypass;
2. Open the maintenance bypass breaker and the load is powered through static bypass;
3. Close the input breaker, battery breaker, and the rectifier starts, after 30S, the rectifier finish to start; the rectifier indicator LED goes green, and then inverter start. After 60S, the system transfers to Normal mode.

5.3. Battery Test

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

1. Manual Discharging test. Enter the menu Operate, as is shown in Figure 5-2 and touch the icon "Battery maintenance"  , the system transfers into the Battery mode for discharging, then the battery will have 20% of capacity, users can stop the discharging by touching the "Stop Test" icon  .

(a) Function button page (b) Test command page

Figure 5-2 Battery Maintenance

2. Auto discharging. After the automatic discharge setting of the battery, the battery will automatically discharge to close to the battery low voltage and then recover. It is necessary to set automatic discharge period and enable battery maintenance. The steps are as follows:

(1) Enter the system configuration secondary menu under the Settings submenu, select "Automatic Battery Maintenance", and confirm;

(2) Enter the secondary menu of battery settings under the settings submenu, as shown in Figure 5-3 for automatic battery discharge period settings. Set the discharge period in the "Automatic Discharge Period" and confirm (the battery self-test period is 30-120 days, and if not set by default, the battery self-test is disabled).

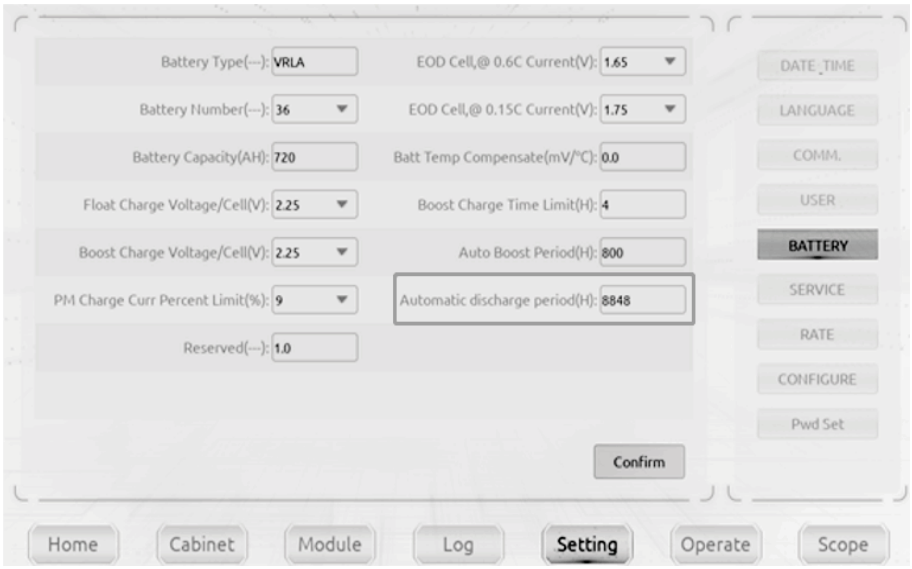


Figure 5-3 Setting period for battery auto discharge

Warning

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

5.4. EPO

The EPO button is designed to switch off the UPS in emergency conditions (such as fire, flood, etc.). The system will shut down the rectifier and inverter, and quickly cut off the power supply to the load (including inverter and bypass output), and the battery will stop charging or discharging.

As shown in Figure 5-4, the emergency stop button is opened. Open the button cover of the emergency stop button and press and hold it for about 1 second, and the system will realize an emergency stop.

If there is still mains input, the UPS control circuit is still powered, but the output is turned off. If you need to completely cut off the mains power supply of the UPS, you can only disconnect the external mains switch and external battery switch.

Warning

When the emergency switch is triggered, the load will have no power input, so please operate with caution.

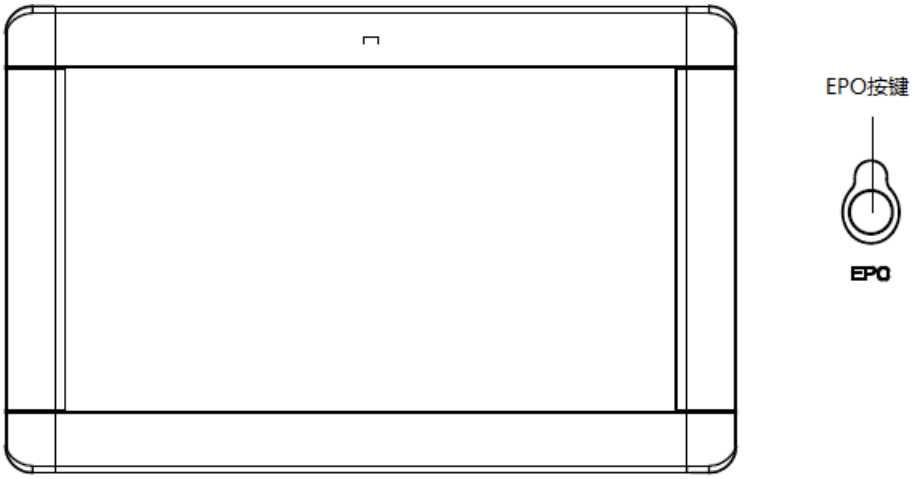


Figure 5-4 EPO Button

5.5. UPS Reset Steps After Emergency Power Off (EPO) or Abnormal Shutdown

After the UPS shuts down due to the activation of the Emergency Power Off (EPO) function or causes such as inverter over-temperature, overload, battery over-voltage, and DC bus over-voltage, take measures to clear the fault according to the alarm information prompted on the display screen. Then use the following UPS reset steps to restore the UPS to its normal operating state.

After the user confirms that the fault has been cleared, perform the following steps:
1. Click the Fault Clear button on the operation page of the display screen (refer to Chapter 4.2.5) to make the system exit the emergency shutdown state or abnormal shutdown state;
2. After the rectifier is fully started, the system starts normally.

Note
2 minutes after the over-temperature signal disappears, the rectifier starts automatically when the over-temperature fault is cleared.

3. If the mains input of the UPS has been disconnected after pressing the EPO button and the UPS shuts down completely, the UPS will start up, enter bypass mode for operation, and restore output when the mains input is restored.

Warning **Danger**
If the maintenance bypass switch is in the closed state and the UPS has mains input, the UPS will have output.

5.6. Parallel System

The UPS system maximum parallel cabinets is shown in Table 5-5.

Table 5-5 The number of parallel cabinet

Item	RM800/100D	RM1000/100D	RM1200/100D
Maximum parallel cabinet	4	4	4
Maximum parallel Power	3.2MW	3.2MW	3.2MW

The UPS system can support maximum four cabinets in parallel. UPS cabinets are connected as is shown in Figure 5-5.

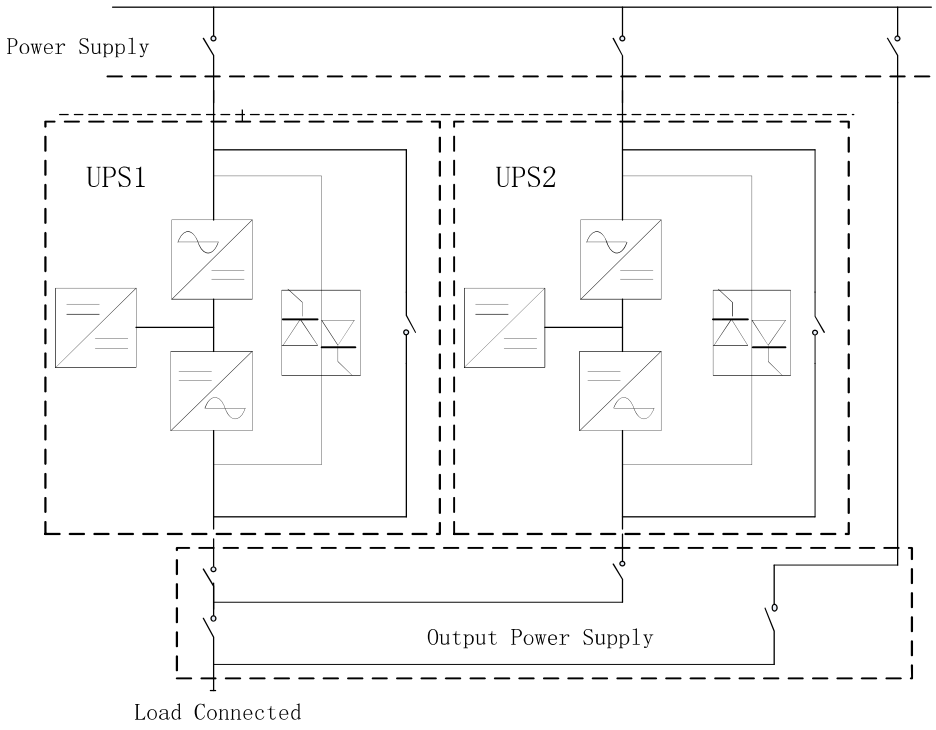


Figure 5-5 Parallel diagram

The parallel terminals of the standard cabinet can be connected directly from the top or from the parallel holes at the bottom of the cabinet. The location of the parallel holes can be seen by opening the rear cover, as shown in Figures 5-6.

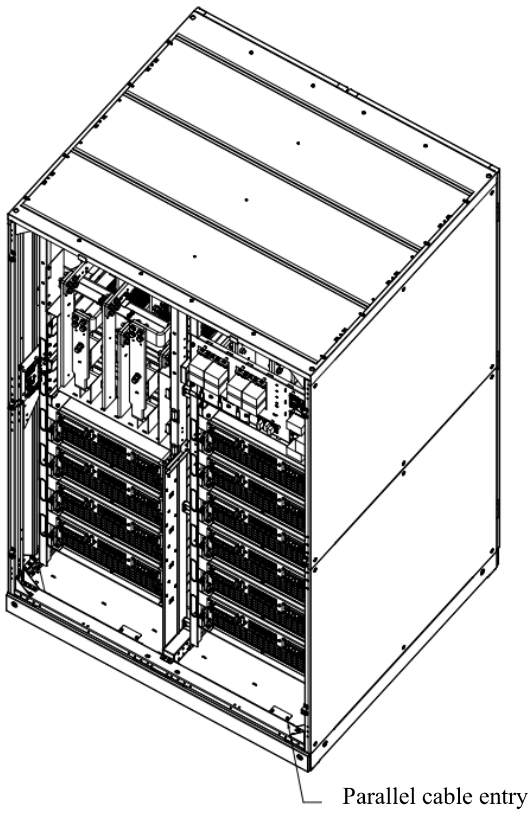


Figure 5-6 Location of the parallel entry interface

The parallel terminals of fully-equipped cabinets are located inside the cabinet and can be seen by opening the front panel. Their location is shown in Figure 5-7.

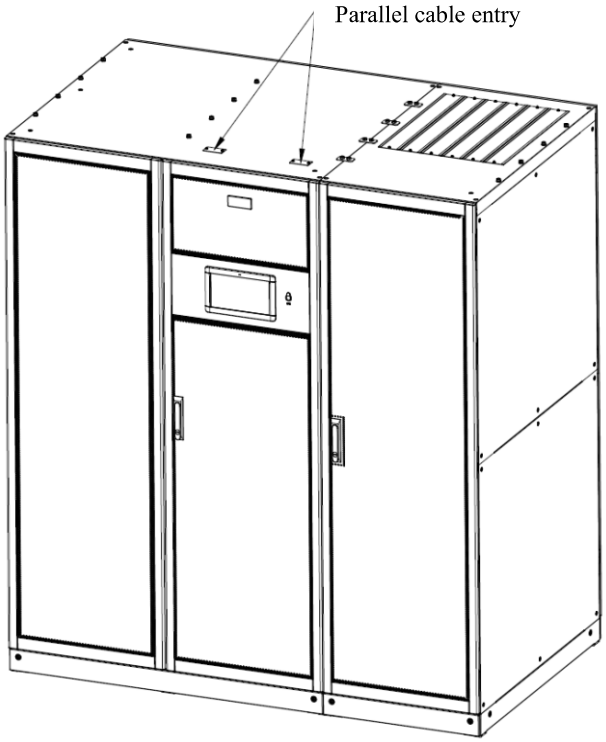


Figure 5-7 Parallel Terminal positions for fully equipped cabinets

When paralleling, the control lines need to be connected in a ring, and the connection method is shown in Figure 5-8.

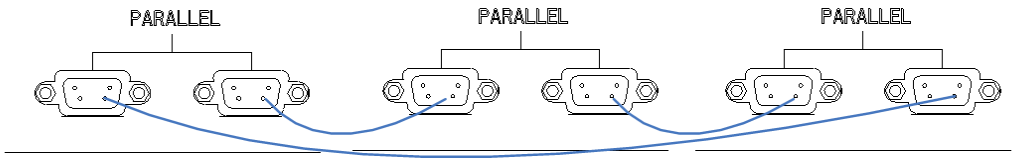


Figure 5-7 Parallel connection diagram

Note

- The parallel signal cable should not be longer than 20 meters.
- For more details of parallel operation, please refer to the "Instruction for Parallel Operation".

5.7.UPS Shutdown Steps

5.7.1.Complete UPS Shutdown Without Load Power Interruption

This operation step is applicable to completely shutting down the UPS while continuing to maintain load power supply. Please refer to the operation steps in Section 5.2.4 for switching from Normal Mode to Maintenance Bypass Mode.

5.7.2.Complete UPS Shutdown

This step shall be followed when completely shutting down the UPS and cutting off load power. All power switches, isolation switches, and circuit breakers are disconnected, and the UPS no longer supplies power to the load.

Warning

The following steps will cut off the load power supply, resulting in a complete load power outage.

---

1. Press the Emergency Power Off (EPO) button on the operation control panel to stop the operation of the rectifier, inverter, bypass switch, and battery;
2. Disconnect the external battery switch;
3. Disconnect the main input switch, bypass input switch, and output switch. At this point, all internal power supplies are turned off and the display screen goes out.

Warning **Danger**

- If maintenance is required, attach a warning label at the AC input power distribution point (usually away from the UPS) indicating that the UPS is under maintenance.
- Wait for approximately 10 minutes to allow the internal DC bus capacitor voltage to discharge; at this time, the UPS is completely powered off.

Warning **Danger**

After the UPS is completely powered off, there may still be dangerous voltage at the battery terminals, which must be confirmed by measurement with a multimeter.

5.8.Dual Bus System (LBS)

The LBS signal interface is shown in Figure 5-8, and the connection method between the LBS interfaces of UPS1 and UPS2 and the LBS Box is shown in Figure 5-9.

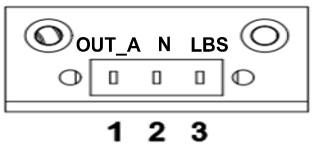


Figure 5-8 LBS Interface Location of the UPS System

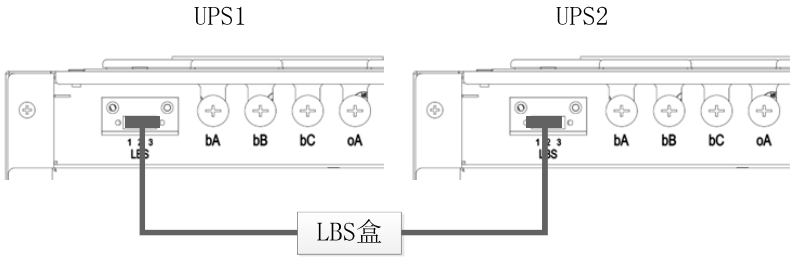


Figure 5-9 LBS Cable Connection Schematic Diagram of the UPS System

For detailed procedures of LBS, please refer to the LBS Operation Guide Manual.

Warning **Danger**

- he operation of the LBS system requires the use of background monitoring software to perform individual settings for each standalone unit in the system, and this setup must be completed by professional technical personnel.
- The LBS interface voltage is consistent with the UPS output voltage, and the specification of the cable used for LBS connection must meet the 600V and above rating.

6. Maintenance

6.1 Chapter Content

This chapter introduces the maintenance of UPS, including the operation and guidance for power module, monitoring module, bypass module, and battery pack maintenance.

6.2. System maintenance instruction

6.2.1. Precautions

Only maintaining engineers can maintain the power module, monitoring bypass module.

1. The power module should be disassembled from top to bottom to prevent the cabinet from tip ping over due to a high center of gravity.
2. Before maintaining the power module and monitoring unit, to ensure safety, be sure to use a multimeter to measure that the voltage on the DC bus capacitor is lower than 36Vdc, and use a multimeter to measure the voltage between the part to be operated and the earth to ensure that it is lower than the dangerous voltage value, that is DC is lower than 36Vdc, AC is lower than 30Vac.
3. The monitoring unit and bypass unit can be disassembled only when the UPS is in maintenance bypass mode or after the UPS is completely powered off.
4. Maintenance can be performed after the power module is pulled out for 10 minutes, and it can be reinserted into the cabinet after 10 minutes.

6.2.2. Instruction for Maintaining Power Module

Confirm the UPS is operating in Normal Mode and the bypass is working normally before repair the power module.

1. Shut down the power module. Turn the knob to the unlocked state and the power module exits the system;
2. First confirm whether the remaining power modules will be overloaded when one power module exits operation. If there is a risk of overload, please manually transfer the UPS system to bypass mode (refer to Chapter 5.2.2) before proceeding with the next operation;
3. After 10 minutes, remove the fixing screws on the both sides of the front panel of the power module, and pull the power module out of the cabinet;
4. After completing the maintenance of the power module, push the power module into the cabinet (the interval between pushing each power module is more than 10 seconds), turn the knob to the locked state, and tighten the screws on both sides. The power module will automatically start and join the system.
5. If the UPS system is manually transferred to bypass mode in step 2, 2 minutes after the power module is started, return the UPS system to normal mode for power supply. Refer to Chapter 5.2.3.

6.2.3. Instruction for Maintaining the Monitoring & Bypass Module

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

1. Select the manual bypass switch command on the LCD touch screen, and the UPS will switch to bypass power supply.
2. Close the maintenance bypass breaker;
3. One by one to disconnect the battery breaker, main input breaker, bypass input breaker and output breaker, UPS is powered by maintenance bypass;
4. Remove the screws on the both side of the front panel and pull out connection cable of the front panel of LCD to maintain the monitoring module;
5. Turn the knob to the unlocked state, remove the screws on the both side of the bypass front panel, pull bypass module out for maintenance.
6. After completing the maintenance of the power module, push the bypass and monitoring module into the cabinet, turn the knob to the locked state, and tighten the screws on both sides.
7. One by one to close the output breaker, bypass input breaker, main input breaker and battery

breaker UPS;
8. After 2 minutes, the bypass indicator LED goes green, and the load is powered through static bypass;
9. Disconnect the maintenance bypass breaker, the inverter will start up automatically, then inverter power on, after 60s the UPS will transfer to normal mode.

 Danger

For models that do not use an external power distribution switch, in maintenance bypass mode, the terminal blocks and connected copper bars or cables, and the maintenance bypass switch copper bars or cables will be live. Please do not touch them to avoid danger.

6.3.Battery Maintenance

Generally, maintenance-free batteries do not require manual maintenance work when in use. If they are operated according to certain requirements, the service life of the battery can be extended. The factors that affect the battery life include the following: installation, temperature, charge and discharge current, charging voltage, discharge depth and long-term charging, etc.

1. Installation. Batteries should be installed as clean as possible, in a cool, airy, dry place, avoiding exposure to direct sunlight or other radiant heat sources. When installing the battery, pay attention to the accuracy and quantity of the battery. The batteries with different specifications and batch numbers should not be mixed.
2. Temperature. Keep the temperature of the battery at about 25℃.
3. Charge and discharge current. The optimum charging current of lead-acid battery is about 0.1C, and the charging current must not be greater than 0.3C. Charging current is too large or too small, will affect the battery life. Discharge current is generally required at 0.05~3C.
4. Charging voltage. Because the UPS battery belongs to the standby mode, the battery will be discharged only when the power supply is abnormal. To prolong the life of battery charger, UPS generally uses the constant voltage/current limiting control, after the battery is turned into floating state, each section of the floating voltage set to about 13. 5V. if the charge voltage is too high, the battery will be overcharged; otherwise the battery will not be charged enough.
5. Discharge depth. The deeper the discharge depth is, the less cycle times to be, so the depth discharge should be avoided. UPS in the case of light load discharge or no-load discharge will cause deep discharge of the battery.
6. Regular maintenance. The battery should be checked regularly, such as observing its appearance and measure whether the voltage of each battery is average, etc. If the battery is not discharged for a long time, the activity will become worse, so the UPS also needs periodic discharge test to keep the battery active.
7. Check the battery regularly for leakage, deformation and so on.

7. Product Specification

7.1 Chapter Content

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

7.2. Applicable Standards

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

Table 7-1 European and International Standards

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

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

7.3. Environment Characteristics

Table 7-2 Environmental Characteristics

Item	Unit	Requirements
Acoustic noise level at 1 meter	dB	75dB @ 100% load, 70dB @ 45% load
Altitude	m	≤1000, derate by 1% every 100m within the range of 1000m~2000m
Relative humidity	%RH	0~95, non-condensing
Operating temperature	℃	0~40; When the temperature is above 20℃, the battery life will be halved for every 10℃ increase.
UPS storage temperature	℃	-40~70
Recommended battery storage temperature	℃	20~25℃ (20℃ is optimal)

7.4. Mechanical Characteristic

The main physical parameters of the cabinet are shown in Table 7-3.

Table 7-3 Mechanical Characteristics for Cabinet

Model	Weight (excludes power modules)	Dimension (W×D×H)	Color
800kVA Standard cabinet	590kg	1200*1100*2000	Black
800kVA Fully equipped cabinet	890kg	1800*1100*2000	Black
1000 kVA Standard cabinet	620kg	1200*1100*2000	Black

1000 kVA Fully equipped cabinet	940kg	1800*1100*2000	Black
1200 kVA Standard cabinet(Zero-Switch)	657kg	1200*1100*2100 (Excludes a wire protection kit) 1200*1100*2400 (Incorporates a wire protection kit)	Black
1200 kVA Standard cabinet(Single-Switch)	760kg	1200*1100*2100 (Excludes a wire protection kit) 1200*1100*2400 (Incorporates a wire protection kit)	Black
1200 kVA Fully equipped cabinet	1150kg	2000*1100*2000	Black

The main physical parameters of the power module are shown in Table 7-4.

Table 7-4 Mechanical Characteristics for power module

	Unit	100kVA power module
Dimension (W×D×H)	mm	440*795*174
Weight	kg	53.5

7.5. Electrical Characteristic

7.5.1. Input Rectifier Electrical Characteristics

The main electrical features of the rectifier are shown in Table 7-5.

Table 7-5 Rectifier AC input (Mains)

Item	Unit	Parameter
Grid system	\	3 Phases + Neutral + Ground
Rated AC input voltage	Vac	380/400/415 (three-phase and sharing neutral with the bypass input)
Rated frequency	Vac	50/60Hz
Input voltage range	Vac	323~478Vac (Line-Line), full load 323V~138Vac (Line-Line), load decrease linearly from 100% to 30%@30-40℃
Input frequency range	Hz	40~70
Input power factor	kW/kVA, full load	>0.99
THDi	THDi%	<3% (full Linear Load)

7.5.2. DC Link Electrical Characteristics

Table 7-6 Battery parameters

	Items	Parameters
Electrical Characteristics of Intermediate DC Link	Battery bus voltage	Rated: 360~600Vdc
	Quantity of lead-acid cells	30~50 cells (Each cell is 12V, derating is required for 30 cells, no derating for 32~50 cells)
	Float voltage	2.25V/cell (Adjustable range: 2.10~2.35V/cell)Constant current and constant voltage charging mode
	Equalization Voltage	2.25V/cell (Adjustable range: 2.10~2.35V/cell)Constant current and constant voltage charging mode
	Float Temperature Compensation	0.0mV/℃ (Adjustable range: 0.0~5.0mV/℃)
	Equalization Temperature Compensation	0.0mV/℃ (Adjustable range: 0.0~5.0mV/℃)

	Ripple voltage	≤1%
	Ripple current	≤5%
	EOD Voltage	1.65V/cell (selectable from: 1.60V/cell~1.85V/cell) @0.6C discharge current 1.75V/cell (selectable from: 1.65V/cell~1.9V/cell) @0.15C discharge current (EOD voltage changes linearly within the set range according to discharge current)
	Charging Current Limit of Power Module	10% (Adjustable range: 1~15% rated output power; 15% rated output power corresponds to a maximum charging current of 27.5A for a single module)
	Note:This UPS supports lithium batteries. For the application of lithium batteries, please contact the technical support engineer.	

Note

The factory default setting is 40 cells. Please check the battery voltage marked on the machine nameplate. If it is set to 30~50 cells for on-site use, please set it successfully before connecting the battery. Otherwise, the battery pack may be damaged. Set the battery for specific operation steps of number of sections; please contact the manufacturer's customer service phone number.

7.5.3. Inverter Output Electrical Characteristics

Table 7-7 Inverter Output (To critical load)

Items	Unit	Parameters
Rated capacity	kVA	100-1200
Rated AC voltage	Vac	380/400/415 (three-phase four-wire, sharing neutral with the bypass)
Rated frequency	Hz	50/60
Frequency precision	Hz	50/60Hz ±0.01%
Voltage precision	%	±1.0 (0-100% linear load)
Inverter overload	%	110%, 1hour 125%, 10min 150%, 1min >150%, 200ms
Synchronized range	Hz	Settable, ±0.5Hz ~ ±5Hz, default ±3Hz
Synchronized slew rate	Hz	Settable, 0.5Hz/s ~ 3Hz/s, default 0.5Hz/s
Output power factor		1
Transient response		<5% (20% - 80% - 20% step load)
Transient recovery		< 20ms (0% - 100% - 0% step load)
Output voltage (THDu)		<1%, 0-100%, linear load <5%, non-linear load

7.5.4. Bypass Input Electrical Characteristics

Table 7-8 Bypass Mains Input

Item	Unit	Parameters
Rated AC voltage	Vac	380/400/415 (three-phase four-wire and sharing neutral with the bypass, provide a neutral reference for the output)
Rated current	A	151~1510 (see Table)
Overload	%	110%, Long term operation 110%~125%, 10min 125%~150%, 1min >150%, 200ms
Rated current of neutral cable	A	1.7×In
Rated frequency	Hz	50/60
Switch time (between bypass	ms	Synchronous transfer: 0ms

and inverter)		
Bypass voltage range	%	Settable: Up limited: +10, +15, +20, default is +15 Down limited: -10, -15, 30, -40, default is -20
Bypass frequency range	Hz	Settable, ±1, ±3, ±5

7.6. Efficiency

Table 7-9 Efficiency

Rated Power (kVA)	Unit	Parameters
Overall Efficiency		
Normal mode (dual conversion)	%	>96
ECO mode	%	>99
Battery discharging efficiency (DC/AC) (at nominal voltage 480Vdc and full-rated linear load)		
Battery mode	%	>95

7.7. Display and Interface

The system display and interface are shown in Table 7-10:

Table 7-10 System display and interface

Display	LED + LCD + Touch Screen
Interface	Standard: CAN, RS485, USB, Dry Contact Option: RS485 Expand Card, SNMP Card, Intelligent AS400 Card

V1.1