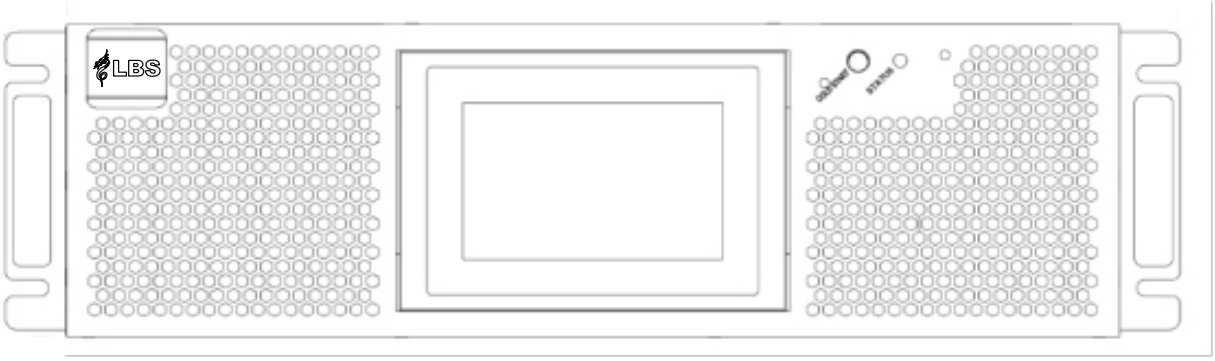
UPS USER MANUAL

DRAGON POWER PLUS 15
15 KVA - 60 KVA



Uninterruptible Power Supply

Preface

Usage

The manual contains information on installation, use, operation and maintenance of UPS. Please carefully read this manual prior to installation.

Users

Authorized Person

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 the guide for users and any statements or information contained in this manual make no warranty expressed or implied.
- **The product shouldn't be used for any life sustaining system.**

Safety Precautions

This manual contains information concerning the installation and operation of UPS. Please carefully read this manual prior to installation.
The UPS cannot be put into operation until it is commissioned by engineers approved by the manufacturer (or its agent). Not doing so could result in personnel safety risk, equipment malfunction and invalidation of warranty.

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: Equipment damage, loss of data or poor performance may be caused, if this requirement is ignored.
Commissioning Engineer: The engineer who installs or operates the equipment should be well trained in electricity and safety, and familiar with the operation, debug, and maintenance of the equipment.

Warning Label

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

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

Safety Instruction

 Danger	✧ Performed only by commissioning engineers. ✧ This UPS is designd for commercial and industrial applications only, and is not intended for any use in life-support devices or system.
 Warning	✧ Read all the warning labels carafully before operation, and follow the instructions.

	✧ When the system is running , do not touch the surface with this label, to avoid any hurt of scald.
	✧ 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	✧ 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 clithes and other protective facilities are necessary to aviod injury. ✧ During positioning, keep the UPS way from shock or vibration. ✧ Install the UPS in proper environment, more detail in section 2.3.

Debug & Operate

 Danger	✧ Make sure the grounding cable is well connected before connecting the power cables, the grounding cable and neutral cable must be in accordance with the local and national codes practice. ✧ Before moving or re-connecting the cables, make sure to cut off all the input power sources, and wait for at least 10 minutes for internal discharge. Use a multi-meter to measure the voltage on terminals and ensure the voltage is lower than 36V before operation.
 Attention	✧ The earth leakage current of load will be carried by RCCB OR RCD. ✧ Initial check and inspection should be performed after long time storing of UPS.

Maintenance & Replacement

 Danger	✧ All the equipment maintenance and servicing procedures involving internal access need special tools and should be carried out only by trained personnel. The components that can be accessed by opening the protective cover with tools cannot be maintenance by user.

	✧ This UPS full complies with “IEC62040-1-1-General and safety requirements for use in operator access area UPS”. Dangerous voltages are present within the battery box. However, the risk of contact with these high voltages is minimized for non-service personnel. Since the component with dangerous voltage can only be touched by opening the protective cover with a tool, the possibility of touching high voltage component is minimized. No risk exists to any personnel when operating the equipment in the normal manner, following the recommended operating procedures in this manual.

Battery Safety

 Danger	✧ All the battery maintenance and servicing procedures involving internal access need special tools or keys and should be carried out only by trained personnel. ✧ When connected together, the battery terminal voltage will exceed 200Vdc and is potentially lethal. ✧ Battery manufacturers supply details of the necessary precautions to be observed when working on, or in the vicinity of a large bank of battery cells. These precautions should be followed implicitly at all times. Particular attention should be paid to the recommendations concerning local environmental conditions and the provision of protective clothing, first aid and fire-fighting facilities. ✧ Ambient temperature is a major factor in determining the battery capacity and life. The nominal operating temperature of battery is 20℃. Operating above this temperature will reduce the battery life. Periodically change the battery according to the battery user manuals to ensure the back-up time of UPS. ✧ Replace the batteries only with the same type and the same number, or it may cause explosion or poor performance. ✧ When connecting the battery, follow the precautions for high-voltage operation before accepting and using the battery, check the appearance of the batteries. If the package is damaged, or the battery terminal is dirty, corroded or rusted or the shell is broken, deformed or has leakage, replace it with new product. Otherwise, battery capacity reduction, electric leakage or fire may be caused. ✧ Before operating the battery, remove the finger ring, watch, necklace, bracelet and any other metal jewelry. ✧ Wear rubber gloves. ✧ Eye protection should be worn to prevent injury from

	accidental electrical arcs. ✧ Only use tools (e.g. wrench) with insulated handles. ✧ The batteries are very heavy. Please handle and lift the battery with proper method to prevent any human injury or damage to the battery terminal. ✧ Don't decompose, modify or damage the battery. Otherwise, battery short circuit, leakage or even human injury may be caused. ✧ The battery contains sulfuric acid. In normal operation, all the sulfuric acid is attached to the separation board and plate in the battery. However, when the battery case is broken, the acid will leak from the battery. Therefore, be sure to wear a pair of protective glasses, rubber gloves and skirt when operating the battery. Otherwise, you may become blind if acid enters your eyes and your skin may be damaged by the acid. ✧ At the end of battery life, the battery may have internal short circuit, drain of electrolytic and erosion of positive/negative plates. If this condition continues, the battery may have temperature out of control, swell or leak. Be sure to replace the battery before these phenomena happen. ✧ If a battery leaks electrolyte, or is otherwise physically damaged, it must be replaced, stored in a container resistant to sulfuric acid and disposed of in accordance with local regulations. ✧ If electrolyte comes into contact with the skin, the affected area should be washed immediately with water.

Disposal

 **Warning**	✧ Dispose of used battery according to the local instructions.

1 UPS Structure and Introduction

1.1 UPS Structure

1.1.1 UPS Configuration

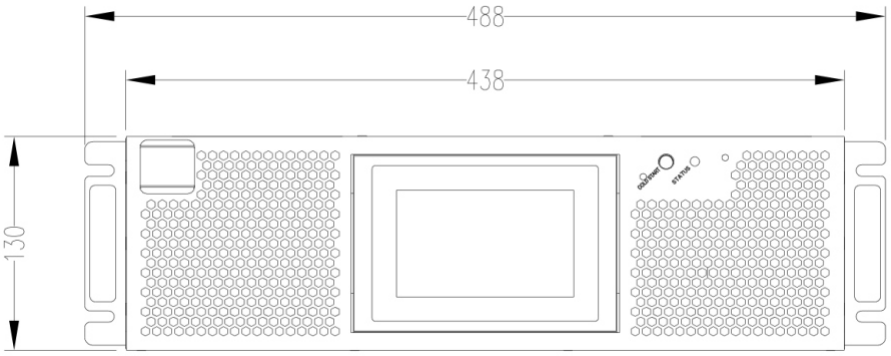
The UPS configurations are provided in Table 1-1.

Table 1-1 UPS Configuration

Item	Components	Quantity	Remark
10-15kVA	Circuit Breakers	4	Optional
	Dual Input	1	Standard
	Parallel Card	1	Optional
	Dry Contact Card	1	Optional
	Cold start	1	Standard

1.1.2 UPS Outlook

The UPS outlooks are shown as figure 1-1.



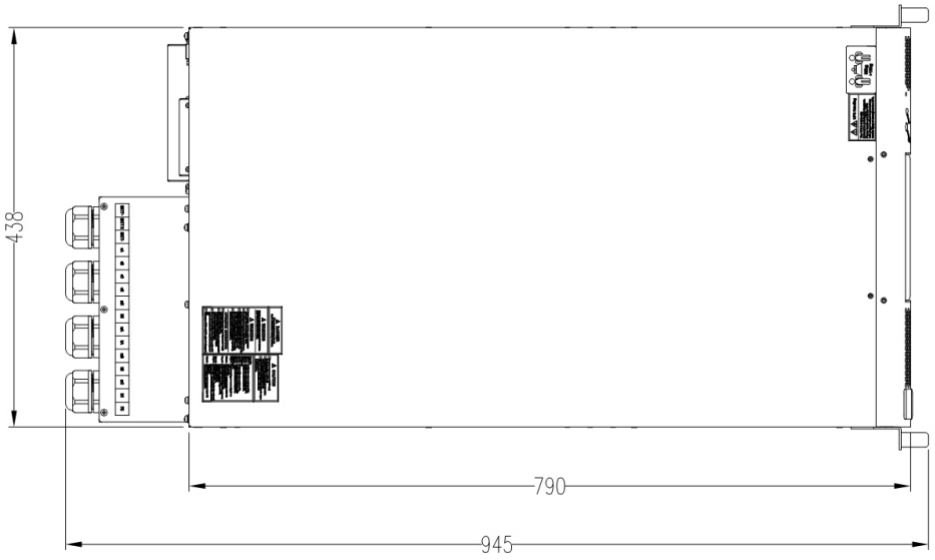
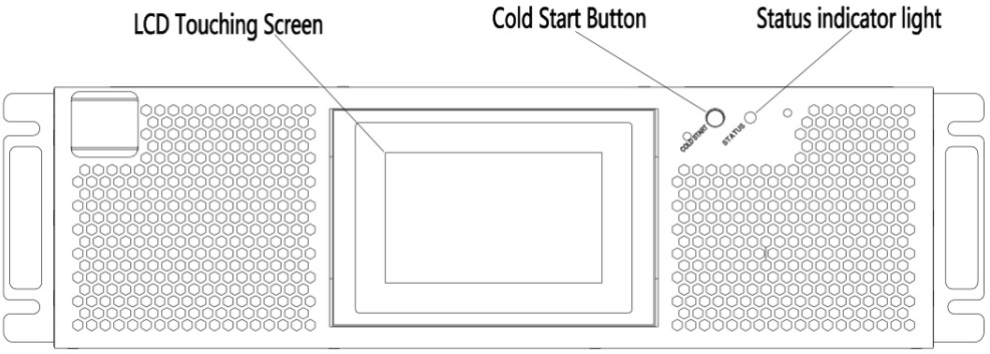


Figure 1-1 UPS Outlook (Unit: mm)

1.1.3 Details of UPS front and rear views

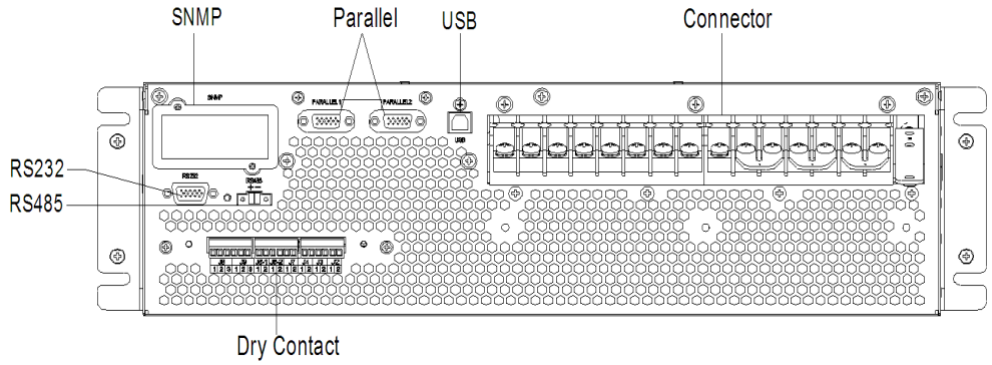
The UPS front views are shown as Figure 1-1.



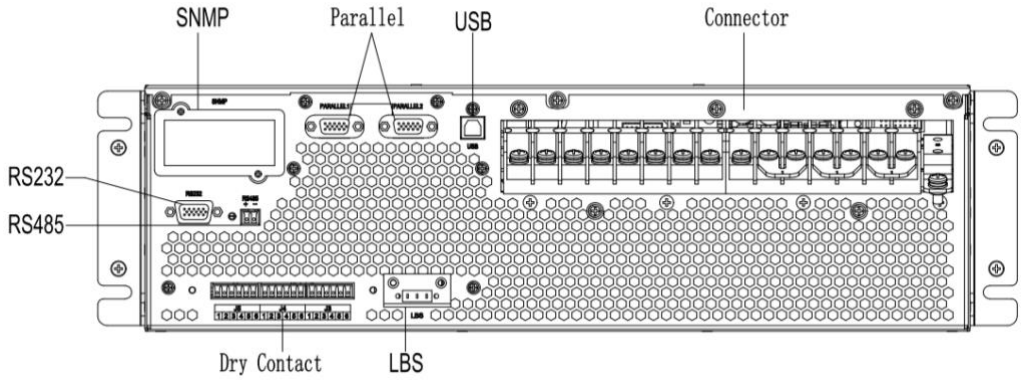
Rear panel:

As shown in Figure 1-2, the UPS rear panel offers the following components:

SNMP (Optional)	Parallel（Optional）	RS485
RS232	USB（Optional）	Connector
Dry Contact	LBS（Optional, only available for 20k and 25k）	



Rear View for 10k



Rear View for 15k

Figure 1-2 Details of the views

1.2 Product Introduction

1.2.1 UPS System Description

The Rack UPS is configured by the following part: Rectifier, Charger, Inverter, Static bypass switch. One or several battery strings should be installed to provide backup energy once the utility fails. The UPS structures are shown in Figure 1-3.

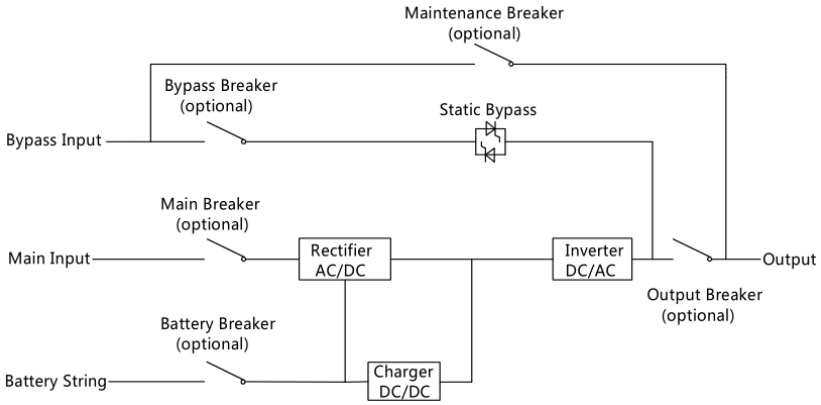


Figure 1-3 UPS Block Diagram

1.2.2 Operation Mode

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

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

1.2.2.1 Normal Mode

The inverter of UPS continuously supply the critical AC load. The rectifier/charger derives power from the AC main input source and supplies DC power to the inverter while simultaneously FLOAT or BOOST charging its associated backup battery. The Normal mode structure is shown in Fig.1-4.

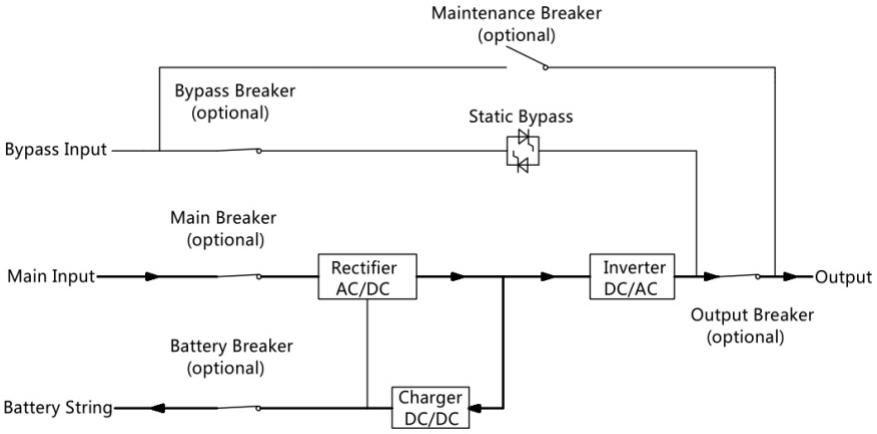


Figure 1-4 Normal mode operation diagram

1.2.2.2 Battery Mode

Upon failure of the AC main input power, the inverter of UPS, which obtains power from the battery, supply the critical AC load. There is no interruption in power to the critical load upon failure. After restoration of the AC mains input power, the" Normal mode" operation will continue automatically without the necessity of user intervention. The Battery mode structure is shown in Fig.1-5.

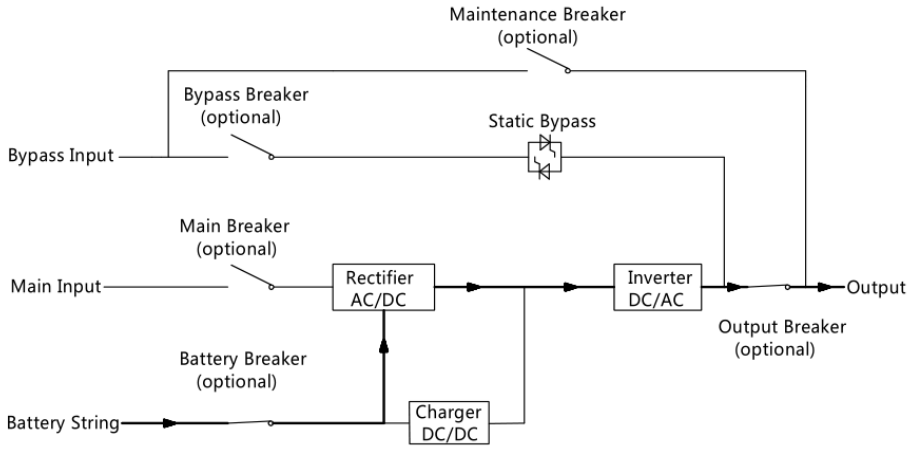


Figure 1-5 Battery Mode operation diagram

Note: With the function of "Battery Cold Start", the UPS could start without utility. See more detail in section5.1.2.

1.2.2.3 Bypass Mode

If the overload capacity of the inverter is exceeded under Normal mode, or if the inverter becomes unavailable for any reason, the static transfer switch will perform a transfer of the load from the inverter to the bypass source, with no interruption in power to the critical AC load. Should the inverter be asynchronous with the bypass, the static switch will perform a transfer of the load from the inverter to the bypass with power interruption to the load. This is to avoid large cross currents due to the paralleling of unsynchronized AC sources. This interruption is programmable but typically set to be less than 3/4 of an electrical cycle, e.g., less than 15ms (50Hz) or less than 12.5ms (60Hz). The action of transfer/re-transfer can also be done by the command through monitor. The Bypass mode structure is shown in Fig.1-6.

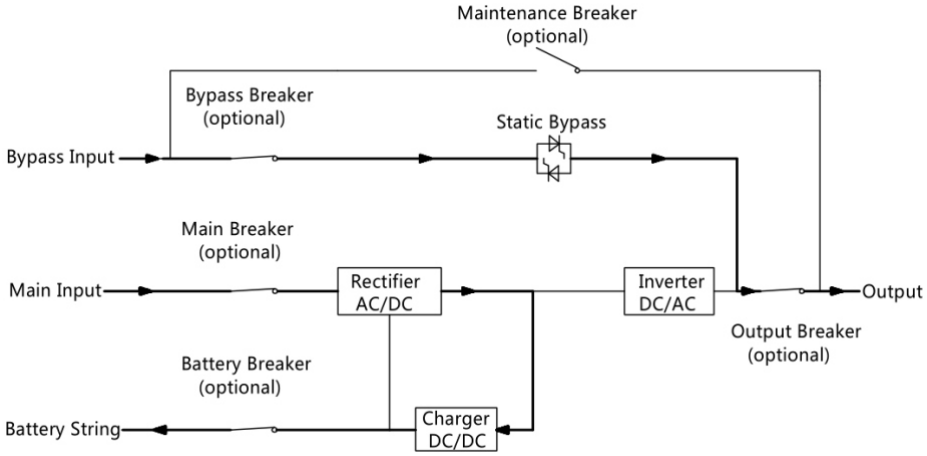


Figure 1-6 Bypass mode operation diagram

1.2.2.4 Maintenance Mode (Manual Bypass)

A manual bypass switch is available to ensure continuity of supply to the critical load when the UPS becomes unavailable e.g. during a maintenance procedure. The Maintenance mode structure is shown in Fig.1-7.

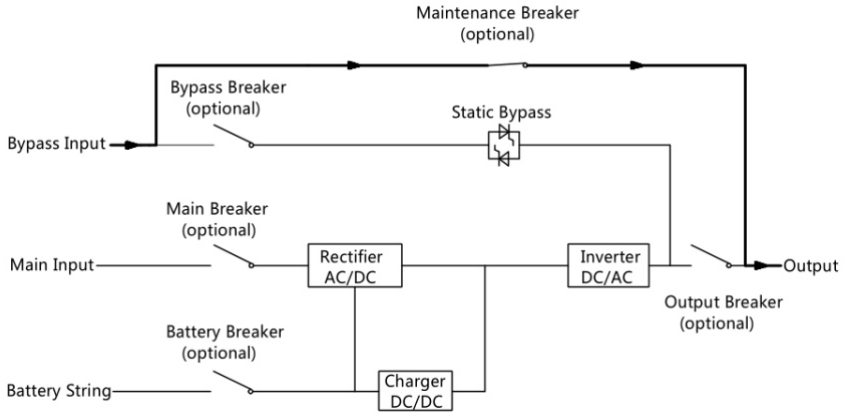


Figure 1-7 Maintenance mode operation diagram

Danger

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

1.2.2.5 ECO Mode

To improve system efficiency, UPS system works in Bypass Mode at normal time, and the inverter is standby, when the utility from the bypass fails, the UPS will transfer to Battery Mode and the inverter powers the load. The ECO mode structure is shown in Fig.2-8.

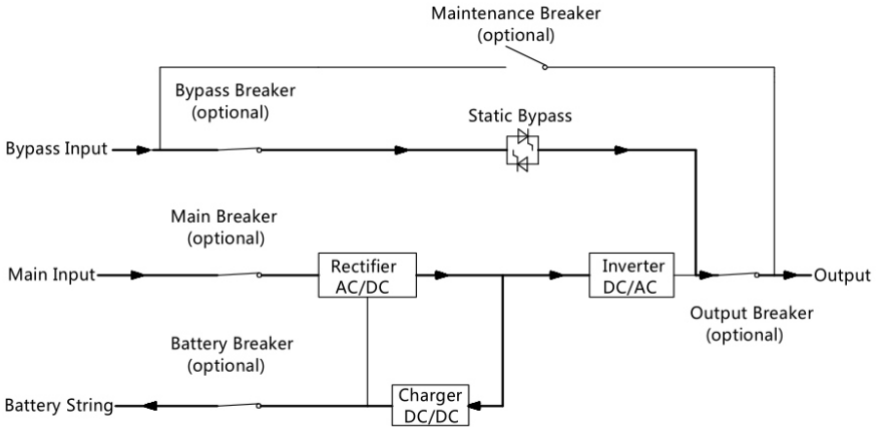


Figure 1-8 ECO Mode operation diagram

Note

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

1.2.2.6 Auto-restart Mode

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

1.2.2.7 Frequency Converter Mode

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

2 Installation

This chapter introduces UPS installation, including unpacking and inspection, main Cabinet Installation, cables connection.

2.1 Location

As each site has itself requirements, the installation instructions in this section are as a guide for the general procedures and practices that should be observed by the installing engineer.

2.1.1 Installation Environment

The UPS is intended for indoor installation and uses forced convection cooling by internal fans. Please make sure there is enough space for the UPS ventilation and cooling.
Keep the UPS far away from water, heat and inflammable and explosive corrosive material. Avoid installing the UPS in the environment with direct sunlight, dust, volatile gases, corrosive material and high salinity.
Avoid installing the UPS in the environment with conductive dirt.
The operating environment temperature for batteries is 20℃-25℃. Operating above 25℃ will reduce the battery life, and operation below 20℃ will reduce the battery capacity.
The battery will generate a little amount of hydrogen and oxygen at the end of charging; ensure the fresh air volume of the battery installation environment must meet EN50272-2001 requirements.
When external batteries are used, the battery circuit breakers (or fuses) must be mounted as close as possible to the batteries, and the connecting cables should be as short as possible.

2.1.2 Site Selection

Ensure the ground or installation platform can bear the weight of the UPS cabinet, batteries and battery racks.
No vibration and less than 5 degree inclination horizontally.
The equipment should be stored in a room so as to protect it against excessive humidity and heat sources.
The battery needs to be stored in dry and cool place with good ventilation. The most suitable storage temperature is 20℃ to 25℃.

2.1.3 Size and Weight

The dimension and weigh for the UPS cabinet is shown in Table 2-1

Table 2.1 Weight for the cabinet

Configuration	Dimension(W*D*H)mm	Weight
10kVA	488*945*130	25kg
15kVA	488*945*130	30kg

2.2 Unpacking and Inspection

1) Unpack the packaging and check the package contents. The shipping package contains:
- 1 UPS
- 1 user manual

2) Inspect the appearance of the UPS to see if there is any damage during transportation. Do not turn on the unit and notify the carrier and dealer immediately if there is any damage or lacking of some parts.
3) If you need tower type installation, you need to find the support block and the middle seat in advance. You need a support seat and 2 middle seats

2.3 Notes for Installation

(1) The UPS must be installed in a location with good ventilation, far away from water, inflammable gas and corrosive agents.
(2) Ensure the air vents on the front and rear of the UPS are not blocked. Allow at least 0.5m of space on each side.
(3) Condensation to water drops may occur if the UPS is unpacked in a very low temperature environment. In this case it is necessary to wait until the UPS is fully dried inside out before proceeding installation and use. Otherwise there are hazards of electric shock.

 NOTICE：UPS operation in sustained temperature outside the range of 15-25□C(59□-77□F) reduces battery life.

2.4 Main Cabinet Installation

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

2.4.1 Tower Installation

Various installation configurations are available: single UPS, single UPS with single or multiple battery cabinets. Their installation methods are all the same.
Please prepare support bases and spacers before installation

(1) Take out the support bases and spacers and then assemble the spacer and the support bases, shown as Fig.2-1.

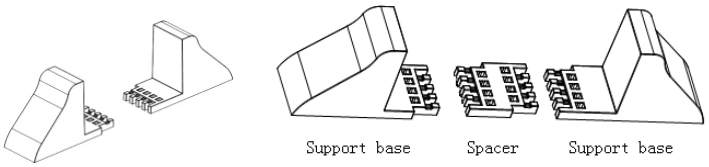


Fig.2-1 Support bases and spacers assembly

(2) Place the UPS on the support bases, shown as Fig.2-2.

Fig.2-2 Tower installation

(3) Remove the LOGO in the upper right corner, turn it 90 degrees counterclockwise, and then insert it.

2.4.2 Rack Installation

Battery cabinets must be installed firstly because battery cabinets are too heavy. And two or more installation personnel are required to install them at the same time. Please install them from bottom to top.

(1)Install the guide rail

(2)Put the UPS and battery cabinet on the guide rail, fix the units to the service rack, shown as Fig.2-3.

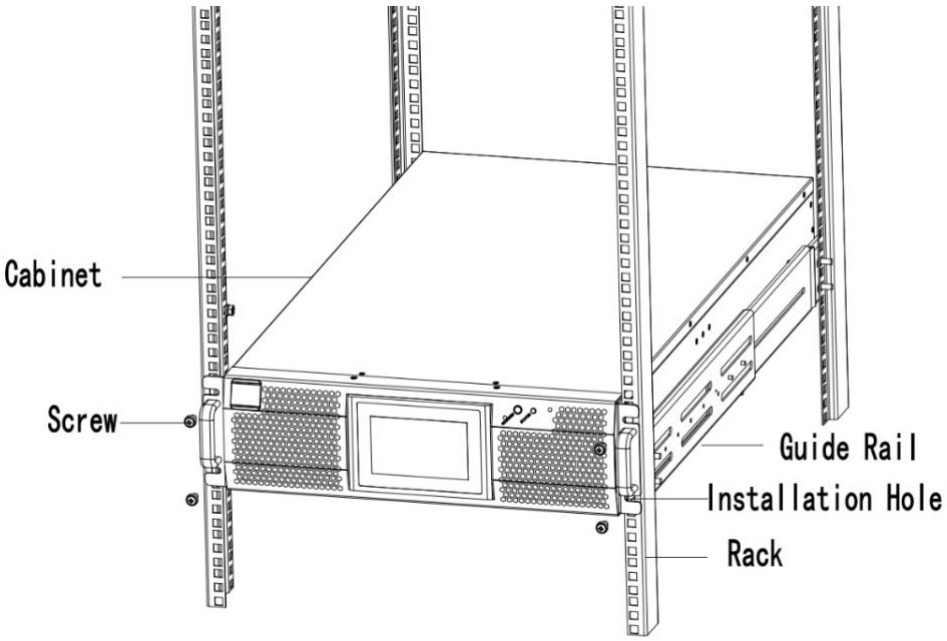


Fig.2-3 Rack Mounted Installation

2.5 Battery

Three terminals (positive, neutral, negative) are drawn from the battery group and connected to UPS system. The neutral line is draw from the middle of the batteries in series (See Figure 2-4)

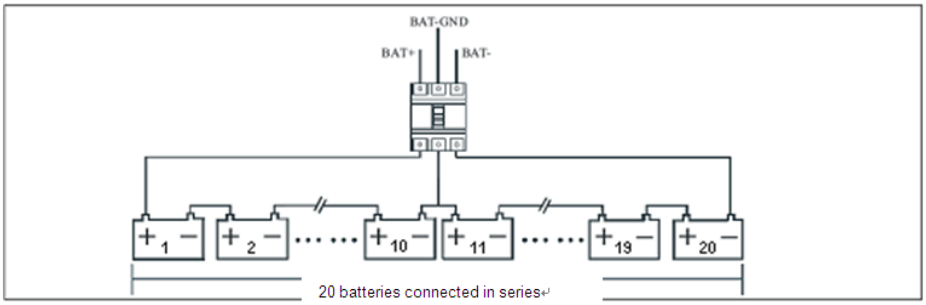


Figure 2-4 Battery connection diagram

Danger

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

Ensure the positive, negative, neutral electrode is correctly connected from the battery unit terminals to the breaker and from the breaker to the UPS system.

2.6 Power Cables

2.6.1 Specifications

The UPS power cables are recommended in Table 2-2.

Table 2-2 Recommended cables for power cables

Contents	Main Input				Bypass Input				Output				Battery			PE
15KVA (3/3)	A	B	C	N	A	B	C	N	A	B	C	N	BAT+	N	BAT-	PE
Current (A)	50	50	50	50	42	42	42	42	42	42	42	42	76	76	76	42
Size (mm²)	10	10	10	10	10	10	10	10	10	10	10	10	16	16	16	10
10KVA (3/3)	A	B	C	N	A	B	C	N	A	B	C	N	BAT+	N	BAT-	PE
Current (A)	34	34	34	34	28	28	28	28	28	28	28	28	51	51	51	28
Size (mm²)	10	10	10	10	6	6	6	6	6	6	6	6	10	10	10	6

Note

The recommended cable section for power cables are only for the situations described below:

- Ambienttemperature：30℃.
- AC loss less than 3%，DC loss less than1%，The length of the AC power cables are no longer than 50 m and the length of the DC power cables are no longer than 30 m.
- Currents listed in the table are based on the 208V system (Line-to-line voltage).
- The size of neutral lines should be 1.5~1.7 times the value listed above when the predominant loads non-linear.

2.6.2 Specifications for Power Cables Terminal

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

Table 2-3 Requirements for power terminal

Port	Connection	Bolt	Bolt	Torque
Mains input	Cables crimped OT terminal	M6	7mm	4.9Nm
Bypass Input	Cables crimped OT terminal	M6	7mm	4.9Nm
Battery Input	Cables crimped OT terminal	M6	7mm	4.9Nm
Output	Cables crimped OT terminal	M6	7mm	4.9Nm

PE	Cables crimped OT terminal	M6	7mm	4.9Nm

2.6.3 Circuit Breaker

The external circuit breakers (CB) for the system are recommended in Table 2-4.

Table 2-4 Recommended CB

Model	Input	Bypass	Output	Battery
15KVA (3/3)	63A/3P	63A/3P	63A/4P	DC 100A/3P
10KVA (3/3)	63A/3P	63A/3P	63A/4P	DC 80A/3P

Attention

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

2.6.4 Connecting Power Cables

(1) Verify that all the switches of the UPS are completely open and the UPS internal maintenance bypass switch is open. Attach necessary warning signs to these switches to prevent unauthorized operation.

(2) Open the back door of the cabinet, remove the plastic cover. The input and output terminal, battery terminal and protective earth terminal are shown in Fig.2-5

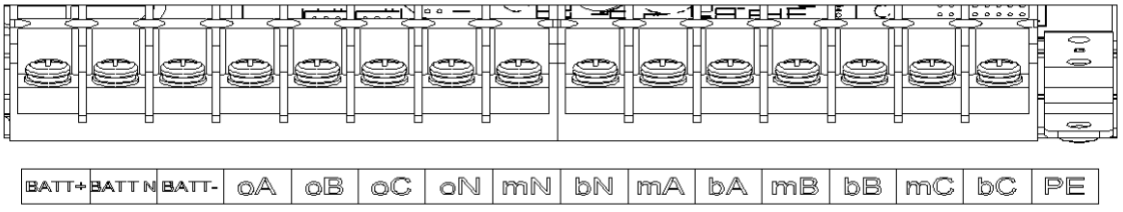


Fig.2-5 Connection terminals

(3) Connect the protective earth wire to protective earth terminal (PE).

(4) Connect the AC input supply cables to the main input terminal and AC output supply cables to the output terminal.

(5) Connect the battery cables to the battery terminal.

(6) Check to ensure there is no mistake and re-install all the protective covers.

Note: mA, mB, mC standard for Main input phase A, B and C; bA, bB, bC standard for Bypass Input phase A, B and C.

Attention

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

Warning

- Tighten the connections terminals to enough torque moment, refer to Table 2-3, and please ensure correct phase rotation.
- Before connection，ensure the input switch and the power supply are off，attach warnings label to warn not to operate by others
- The grounding cable and neutral cable must be connected in accordance with local and national codes.
- When the cable holes does not goes through by cables, it should be filled by the protective ring.

2.7 Control and Communication Cables

The rear panel of the cabinet provides dry contact interface(J2-J9) and communication interface (RS232, RS485, SNMP, Parallel card interface and USB port)，as it is shown in Fig.2-6.

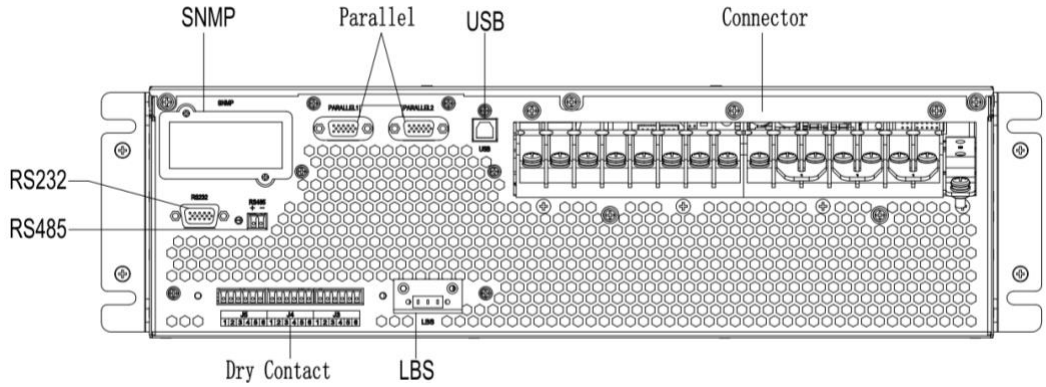


Fig.2-6 Dry contact &communication interface

2.7.1 Dry Contact Interface

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

Table 2.5 Functions of ports

Port	Name	Function
J2-1	TEMP_BAT	Detection of battery temperature
J2-2	TEMP_COM	Common terminal for temperature detection
J3-1	ENV_TEMP	Detection of environmental temperature

J3-2	TEMP_COM	Common terminal for temperature detection
J4-1	REMOTE_EPO_NC	Trigger EPO when disconnect with J4-2
J4-2	+24V_DRY	+24V
J6-1-1	BCB Drive	Output dry contact, function is settable. Default: Battery trip signal
J6-1-2	GND_DRY	Ground for +24V
J6-2-1	BCB_Status	Input dry contact, function is settable. Default: BCB Status and BCB Online, (Alert no battery when BCB Status is invalid).
J6-2-2	GND_DRY	Ground for +24V
J7-1	BCB_Online	Input dry contact, function is settable. Default: BCB Status and BCB Online (Alert no battery when BCB Status is invalid)
J7-2	GND_DRY	Ground for +24V
J8-1	BAT_LOW_ALARM_NC	Output dry contact (Normally closed), function is settable. Default: Low battery alarming
J8-2	BAT_LOW_ALARM_NO	Output dry contact (Normally open), function is settable. Default: Low battery alarming
J8-3	BAT_LOW_ALARM_GND	Common terminal for J8-1 and J8-2
J9-1	GENERAL_ALARM_NC	Output dry contact, (Normally closed) function is settable. Default: Fault alarming
J9-2	GENERAL_ALARM_NO	Output dry contact, (Normally open) function is settable. Default: Fault alarming
J9-3	GENERAL_ALARM_GND	Common terminal for J9-1 and J9-2

Note

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

The default function of each port is described as follows.

Battery Warning Output Dry Contact Interface

The input dry contact J2 and J3 can detect the temperature of batteries and environment respectively, which can be used in environment monitoring and battery temperature compensation.

Interfaces diagram for J2 and J3 are shown in Figure2-11, the description of interface is in Table 2-6.

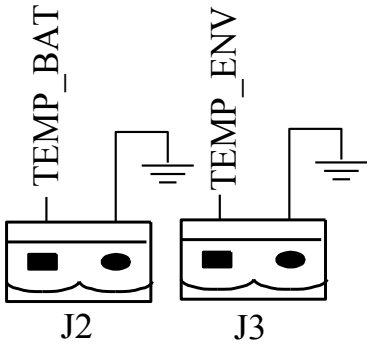


Figure 2-11 J2 and J3 for temperature detecting

Table 2-6 Description of J2 and J3

Port	Name	Function
J2-1	TEMP_BAT	Detection of battery temperature
J2-2	TEMP_COM	common terminal
J3-1	ENV_TEMP	Detection of environmental temperature
J3-2	TEMP_COM	common terminal

Note

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

Remote EPO Input Port

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

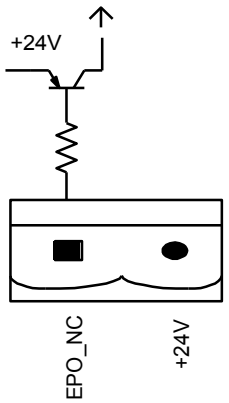


Figure 2-12 Diagram of input port for remote EPO

Table 2-7 Description of input port for remote EPO

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

BCB Input Port

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

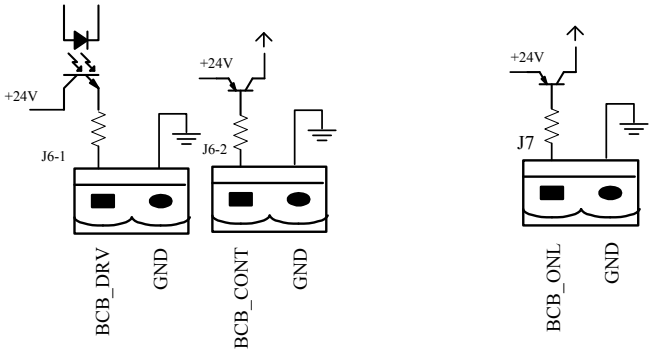


Figure 2-14 BCB Port

Table 2-9 Description of BCB port

Port	Name	Function
J6-1-1	BCB_DRIV	BCB contact drive, provides +24V voltage，20mA drive signal
J6-1-2	GND_DRY	Power ground for +24V
J6-2-1	BCB_Status	BCB contact status, connect with the normally open signal of BCB
J6-2-2	GND_DRY	Power ground for +24V
J7-1	BCB_Online	BCB on-line input (normally open), BCB is on-line when the signal is connecting with J7-2
J7-2	GND_DRY	Power ground for +24V

Battery Warning Output Dry Contact Interface

The default function of J8 is the output dry contact interface, which presents the battery warnings of low or excessive voltage, when the battery voltage is lower than set value, an auxiliary dry contact signal will be activated via the isolation of a relay. The interface diagram is shown in Figure2-15, and description is shown in Table 2-10.

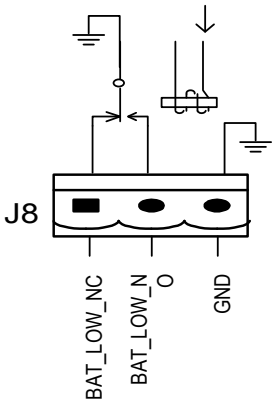


Figure 2-15 Battery warning dry contact interface diagram

Table 2-10 Battery warning dry contact interface description

Port	Name	Function
J8-1	BAT_LOW_ALARM_NC	Battery warning relay (normally closed) will be open during warning
J8-2	BAT_LOW_ALARM_NO	Battery warning relay (normally open) will be closed during warning
J8-3	BAT_LOW_ALARM_GND	Common terminal

General Alarm Output Dry Contact Interface

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

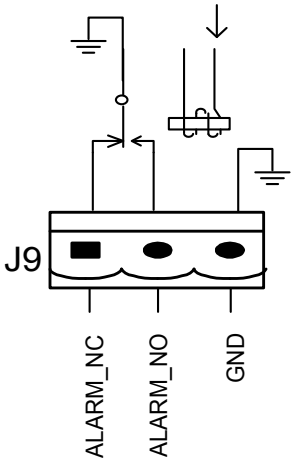


Figure 2-16 Integrated warning dry contact interface diagram

Table 2-11 General alarm dry contact interface description

Port	Name	Function
J9-1	GENERAL_ALARM_NC	Integrated warning relay (normally closed) will be open during warning
J9-2	GENERAL_ALARM_NO	Integrated warning relay (normally open) will be closed during warning
J9-3	GENERAL_ALARM_GND	Common terminal

2.7.2 Communication Interface

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

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

Parallel card interface：Cabinet parallel (Optional).

2.8 Power Distribution Mode

Stand-alone UPS has two power distribution modes: Either use matching COP power distribution options or users install the external breakers.

According to the needs of the user, distribution cable connection is divided into four types:

3-phase in and 3-phase out, common input;

3-phase in and 3-phase out, dual input;

3-phase in and 1 phase out, common input;

3-phase in and 1 phase out, dual input.

2.8.1 3-phase in and 3-phase out, common input

Use No.1 copper bar to connect mA and bA, mB and bB, mC and bC with No.1 copper bar as shown in Figure 2-12.

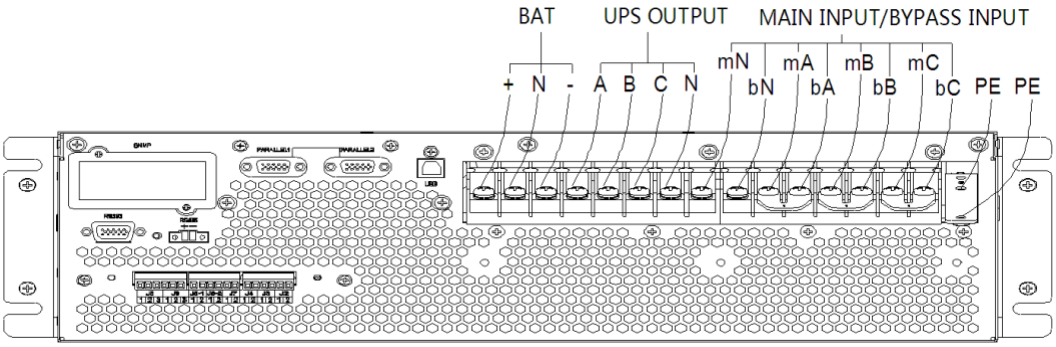


Fig. 2-12 3 phases in 3 phases out, common input

2.8.2 3-phase in and 3-phase out, dual input

Remove No.1 copper bar, and then connect the cables as shown in Figure 2-13

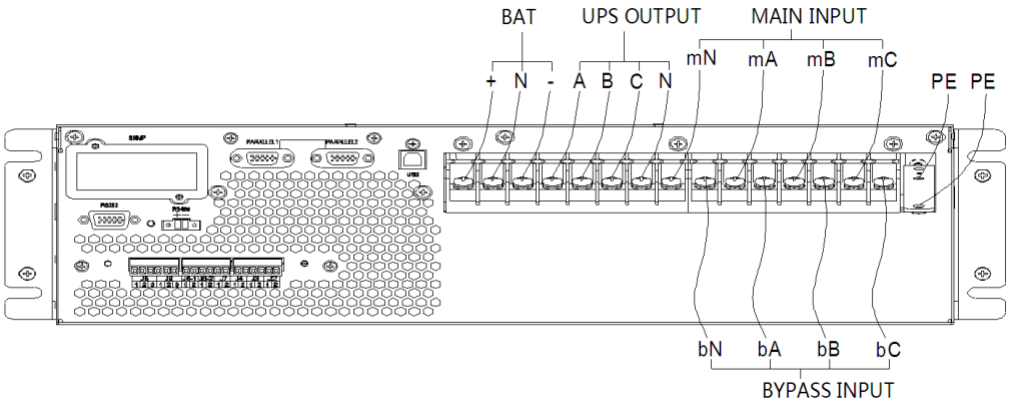


Fig. 2-13 3-phase in and 3-phase out, dual input

2.8.3 3-phase in and 1 phase out, common input

1. The default setting is 3-phase in and 3-phase out, if need to change the system into 3-phase in and 1 phase out, please operate as follows.

a．Remove all copper bars，connect input cable only(no bypass/output/battery).Asshown in Figure 2-14.

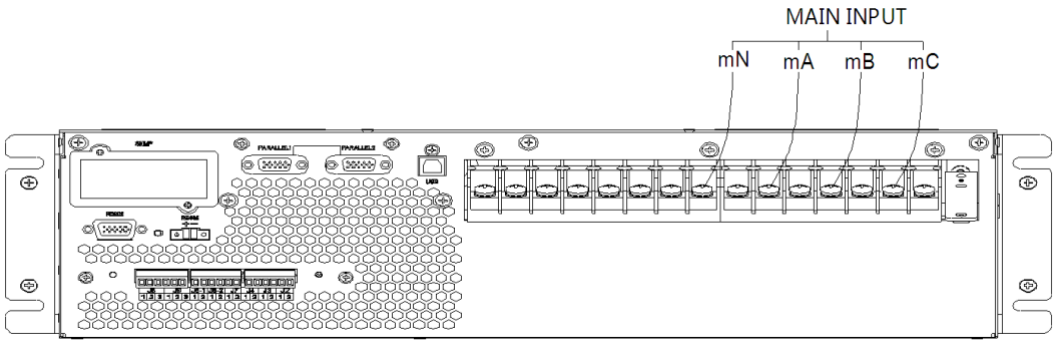


Fig. 2-14 Main line input connection diagram

b．Unplug the shorted dry contact terminal J4 (EPO).

c．Close the external input breaker, the LCD screen of the ups will be lighted; connect the MTR software, and set the related parameters as below.

- Change "UsedKva" to "10" or "6" from "15" or "10";
- Tick the box in front of the option "Out 3/1(1).

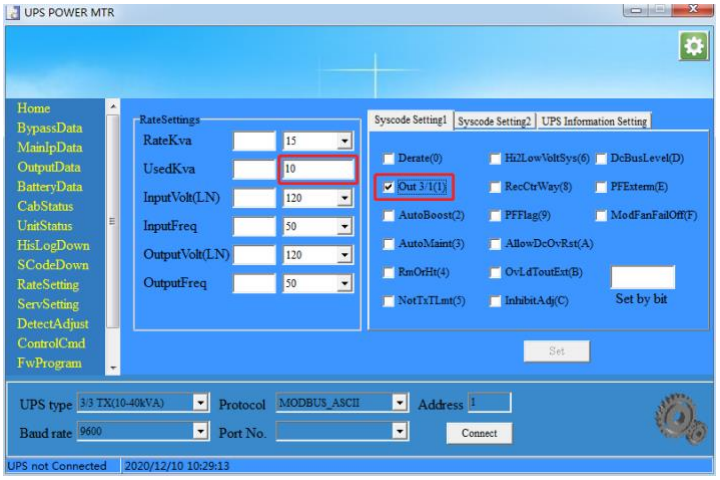


Fig. 2-15 Setting interface of MTR software

Note: when configured as 3/1 from 3/3, 15kVA should be de-rated to 10kVA; 10kVA should be de-rated to 6kVA.

2. Short-circuit mA, bA, bB and bC with No.6 copper bar; short-circuit oN，bN and mN with No.7 copper bar; short-circuit oA, oB, oC with No.4 copper bar .As shown in figure 2-16.

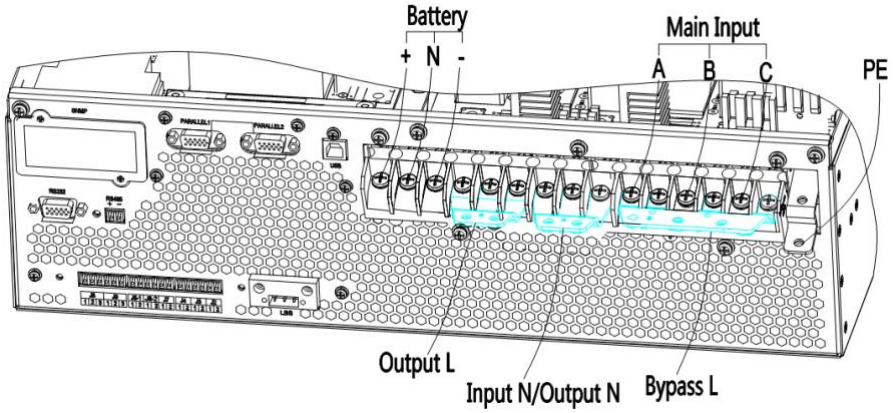


Fig. 2-16 3-phase in and 1 phase out, common input

3. Fix the insulating film (accessory) to the No.6 copper bar as shown in figure 2-17, and fixed in the corresponding position with the plastic rivet, as shown in figure 2-18.

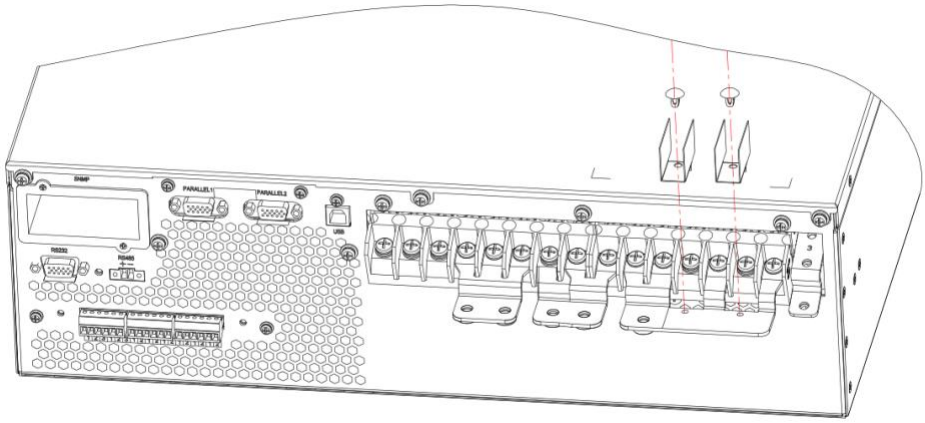


Fig. 2-17 Fix insulation film

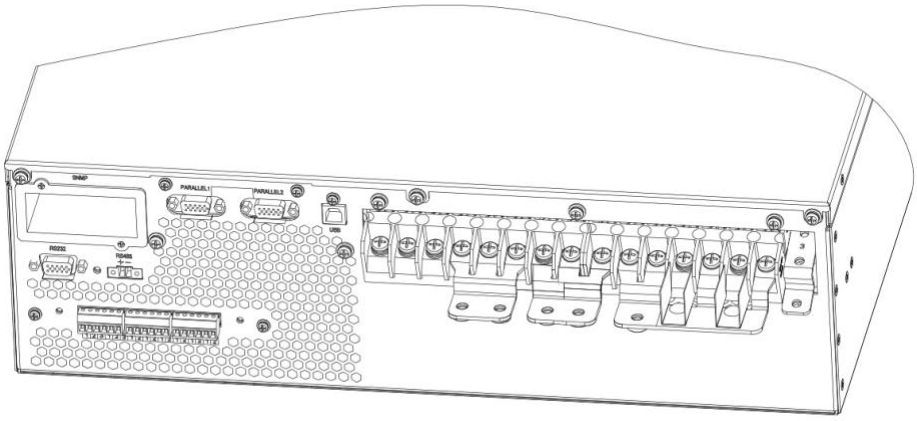


Fig. 2-18 Graphic of insulation film fixed

4. Connect input phase A to No.6 copper bar, then connect input phase B and phase C to mB and mC.

5. Connect output cable to No.4 copper bar.

6. Connect bypass input N, output N, Main input N to No.7 copper bar.

2.8.4 3-phase in and 1 phase out, dual input

1. According to section 2.8.3, first step is to change system into 3 in 1 out system

2. As shown in Figure 2-19, short-circuit bA, bB and bC with No.5 copper bar; short-circuit oN, bN and mN with No.7 copper bar; short-circuit oA, oB and oC with No.4 copper bar.

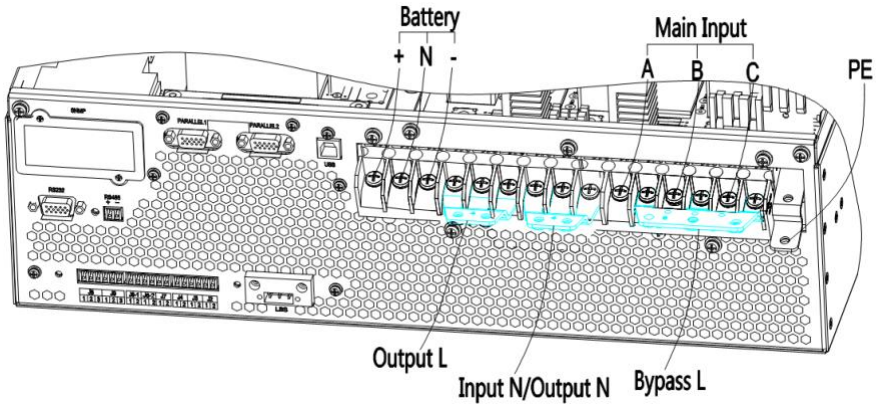


Fig. 2-19 3-phase in and 1 phase out, dual input

3. Fix the insulating film (accessory) to the No.5 copper bar as shown in Figure 2-20, and fixed in the corresponding position with the plastic rivet, as shown in figure 2-21.

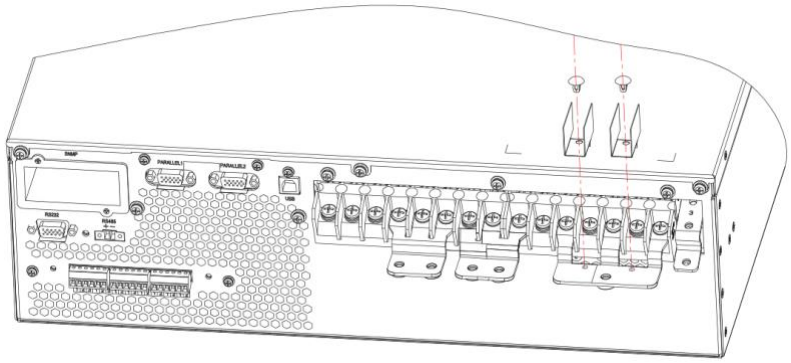


Fig. 2-20 Fix insulation film

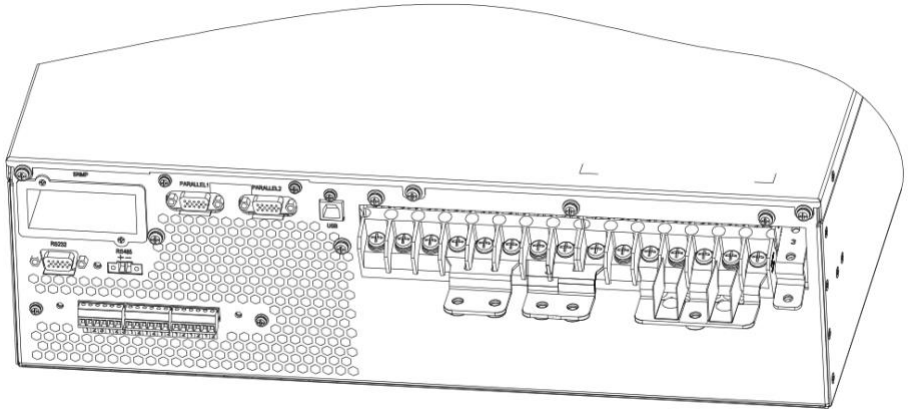


Fig. 2-21 Graphic of insulation film fixed

4. Connect bypass input to No.5 copper bar, and then connect input A, B and C cables to UPS's mA, mB and mC.

5. Connect output cable to No.4 copper bar.

6. Connect bypass input N, output N, Main input N to No.7 copper bar.

3. LCD Panel

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

3.1 Control and Operation Panel

The operation control panel of UPS is located on the front panel of the case. By operating the LCD, the UPS can be operated, controlled, and checked for all its parameters, operating status, and alarm information. As shown in Figure 3-1

The front panel of the UPS can be divided into three parts: status indicator, LCD display, and cold-start operation key. The front panel components of the UPS are described in table 3-1.

Figure 3-1 Front panel of UPS

Table 3-1 Description of front panel parts

Item	Name	Description
①	LCD	Can operate, control, and query all its parameters, running status, and alert information to the UPS。
②	STATUS	Status indicator light
③	COLD START	Battery cold start button
④	Logo	Company trademark

3.2 Audible and Visual Alarm

If no alarm or fault, the status indicator light always be green, when any alarm or fault occurs, the light should turn red.

There are two different types of audible alarm during UPS operation, as shown in Table 3-1.

Table 3-2 Description of audible alarm

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

3.3 LCD Screen

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

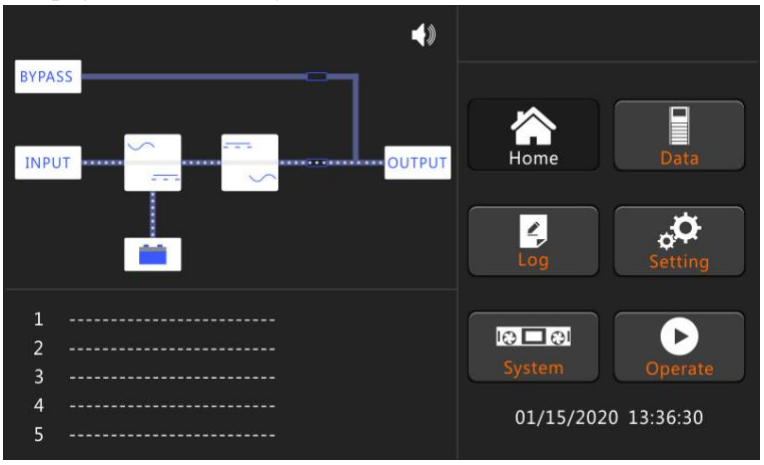


Fig.3-2 Home page

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

- **Statusbar**

Status bar contains the model of the product, capacity, operational mode and the time of the system.

- **Warning Information**

Display the warning information of the cabinet.

- **Main Menu**

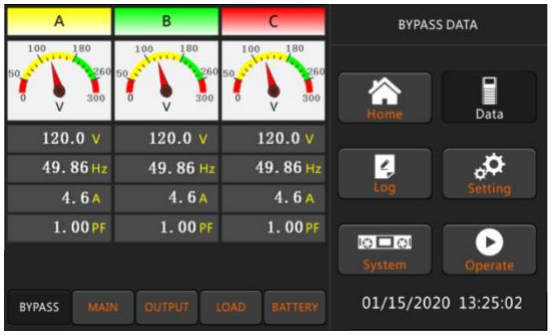
Main menu includes Cabinet, Data, Setting, Log, Operate and System. Users can operate and control the UPS, and browse all measured parameters through main menu.

3.4 Main menu

Main menu includes Cabinet, Data, Setting, Log, Operate and System, and it is described in details below.

3.4.1 Data

Touch “Data” icon and the system enters the page of the Data, as it is shown in Figure 3-3.



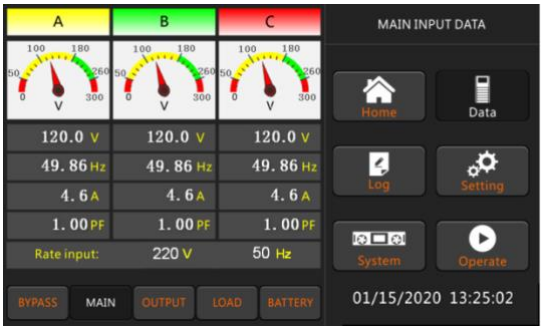


Figure 3-3 Submenu Interface of Data Page

3.4.2 Log

Touch the "Log" icon, and the system enters the interface of the Log, as it is shown in Figure 3-4.The log is listed in reverse chronological order (i.e. the first on the screen with #1 is the most new), which displays the events, warnings and faults information and the data and time they occur and disappear.

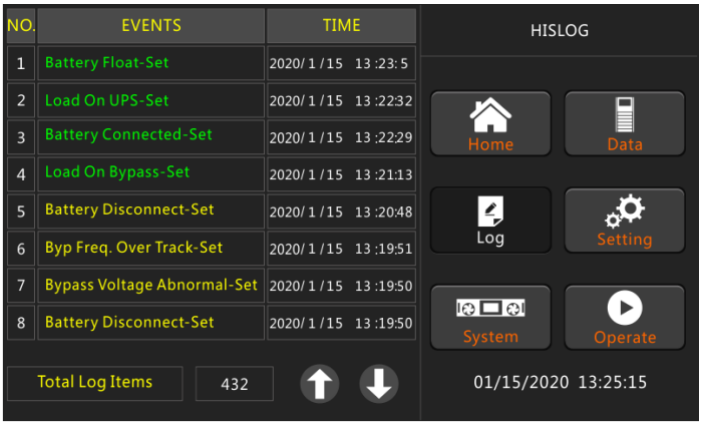


Figure 3-4 Log Page

The following Table 3-3 shows events of UPS History Log.

No.	LCD Display	Explanation
1	Load On UPS-Set	Load On UPS
2	Load On Bypass-Set	Load On Bypass
3	No Load-Set	No Load (Output Power Lost)
4	Battery Boost-Set	Charger is Boosting Battery Voltage
5	Battery Float-Set	Charger is Floating Battery Voltage
6	Battery Discharge-Set	Battery is Discharging
7	Battery Connected-Set	Battery cables Connected

8	Battery Not Connected-Set	Battery cables Disconnected.
9	Maintenance CB Closed-Set	Maintenance CB is Closed
10	Maintenance CB Open-Set	Maintenance CB is Open
11	EPO-Set	Emergency Power Off
12	Module On Less-Set	Valid Inverter capacity is less than the load capacity
13	Module On Less-Clear	Incident above disappears
14	Generator Input-Set	Generator as the Ac Input Source
15	Generator Input-Clear	Incident above disappears
16	Utility Abnormal-Set	Utility (Grid) Abnormal
17	Utility Abnormal-Clear	Incident above disappears
18	Bypass Sequence Error-Set	Bypass voltage Sequence is reverse
19	Bypass Sequence Error-Clear	Incident above disappears
20	Bypass Volt Abnormal-Set	Bypass Voltage Abnormal
21	Bypass Volt Abnormal-Clear	Incident above disappears
22	Bypass Module Fail-Set	Bypass Module Fail
23	Bypass Module Fail-Clear	Incident above disappears
24	Bypass Overload-Set	Bypass Over load
25	Bypass Overload-Clear	Incident above disappears
26	Bypass Overload Tout-Set	Bypass Over Load Timeout
27	Byp Overload Tout-Clear	Incident above disappears
28	Byp Freq Over Track-Set	Bypass Frequency Over Track Range
29	Byp Freq Over Track-Clear	Incident above disappears
30	Exceed Tx Times Lmt-Set	Transfer times (from inverter to bypass) in 1 hour exceed the limit.
31	Exceed Tx Times Lmt-Clear	Incident above disappears
32	Output Short Circuit-Set	Output shorted Circuit
33	Output Short Circuit-Clear	Incident above disappears
34	Battery EOD-Set	Battery End Of Discharge
35	Battery EOD-Clear	Incident above disappears
36	Battery Test-Set	Battery Test Starts
37	Battery Test OK-Set	Battery Test OK
38	Battery Test Fail-Set	Battery Test fails
39	Battery Maintenance-Set	Battery Maintenance Starts
40	Batt Maintenance OK-Set	Battery maintenance succeeds
41	Batt Maintenance Fail-Set	Battery maintenance fails
44	Rectifier Fail-Set	Rectifier Fails
45	Rectifier Fail-Clear	Incident above disappears
46	Inverter Fail-Set	Inverter Fail
47	Inverter Fail-Clear	Incident above disappears
48	Rectifier Over Temp.-Set	Rectifier Over Temperature

49	Rectifier Over Temp.-Clear	Incident above disappears
50	Fan Fail-Set	Fan Fail
51	Fan Fail-Clear	Incident above disappears
52	Output Overload-Set	Output Over Load
53	Output Overload-Clear	Incident above disappears
54	Inverter Overload Tout-Set	Inverter Over Load Timeout
55	INV Overload Tout-Clear	Incident above disappears
56	Inverter Over Temp.-Set	Inverter Over Temperature
57	Inverter Over Temp.-Clear	Incident above disappears
58	On UPS Inhibited-Set	Inhibit system transfer from bypass to UPS (inverter)
59	On UPS Inhibited-Clear	Incident above disappears
60	Manual Transfer Byp-Set	Transfer to bypass manually
61	Manual Transfer Byp-Set	Cancel to bypass manually
62	Esc Manual Bypass-Set	Escape transfer to bypass manually command
63	Battery Volt Low-Set	Battery Voltage Low
64	Battery Volt Low-Clear	Incident above disappears
65	Battery Reverse-Set	Battery pole (positive and negative are reverse)
66	Battery Reverse-Clear	Incident above disappears
67	Inverter Protect-Set	Inverter Protect (Inverter Voltage Abnormal or Power Back feed to DC Bus)
68	Inverter Protect-Clear	Incident above disappears
69	Input Neutral Lost-Set	Input Grid Neutral Lost
70	Bypass Fan Fail-Set	Bypass Module Fan Fail
71	Bypass Fan Fail-Clear	Incident above disappears
72	Manual Shutdown-Set	Manually Shutdown
73	Manual Boost Charge-Set	Manually Battery Boost Charge
74	Manual Float Charge-Set	Manually Battery Float Charge
75	UPS Locked-Set	Inhibit to shut down the UPS
76	Parallel Cable Error-Set	Parallel cable in error
77	Parallel Cable Error-Clear	Incident above disappears
78	Lost N+X Redundant	Lost N+X Redundant
79	N+X Redundant Lost-Clear	Incident above disappears
80	EOD Sys Inhibited	System is inhibited to supply after the battery is EOD (end of discharging)
81	Power Share Fail-Set	Power share is not in balance
82	Power Share Fail-Clear	Incident above disappears
83	Input Volt Detect Fail-Set	Input Voltage is abnormal
84	Input Volt Detect Fail-Clear	Incident above disappears
85	Battery Volt Detect Fail-Set	Battery Voltage is abnormal
86	Batt Volt Detect Fail-Clear	Incident above disappears
87	Output Volt Fail-Set	Output Voltage is abnormal

88	Output Volt Fail-Clear	Incident above disappears
89	Outlet Temp. Error-Set	Outlet Temperature is abnormal
90	Outlet Temp. Error-Clear	Incident above disappears
91	Input Curr Unbalance-Set	Input current is not balance
92	Input Curr Unbalance-Clear	Incident above disappears
93	DC Bus Over Volt-Set	DC bus over Voltage
94	DC Bus Over Volt-Clear	Incident above disappears
95	REC Soft Start Fail-Set	Rectifier soft start fails
96	REC Soft Start Fail-Clear	Incident above disappears
97	Relay Connect Fail-Set	Relay in open circuit
98	Relay Connect Fail-Clear	Incident above disappears
99	Relay Short Circuit-Set	Relay shorted
100	Relay Short Circuit-Clear	Incident above disappears
101	No Inlet Temp. Sensor-Set	The inlet temperature sensor is not connected or abnormal
102	No Inlet Temp Sensor-Clear	Incident above disappears
103	No Outlet Temp. Sensor-Set	The Outlet temperature sensor is not connected or abnormal
104	No Outlet TmpSensor-Clear	Incident above disappears
105	Inlet Over Temp.-Set	Inlet over temperature
106	Inlet Over Temp.-Clear	Incident above disappears

3.4.3 Setting

Touch the “Setting” icon, and the system enters the page of Setting, as it is shown in Figure 3-5.

Figure 3-5 Submenu Interface of Setting Page

The submenus are listed on the bottom side of the Setting page. Users can enter each of the setting interfaces by touching the relevant icon. The submenus are described in details below in Table 3-4.

Table 3-4 Description of each submenu of Setting

Submenu Name	Contents	Meaning
Date & Time	Date format setting	Three formats: (a) year/month/day; (b) month/date/year; (c) date/month/year
	Time setting	Setting time
Language	Current language	Language in use
	Language selection	Simplified Chinese and English selectable（The setting taking action immediately after touching the language icon）
COMM.	Device Address	Setting the communication address
	RS232 Protocol Selection	SNT Protocol, Modbus Protocol, YD/T Protocol and Dwin（For factory use）
	Baud rate	Setting the baud rate of SNT, Modbus and YD/T
	Modbus Mode	Setting mode for Modbus: ASCII and RTU selectable
USER	Output voltage Adjustment	Setting the Output Voltage
	Bypass Voltage Up Limited	Up limited working Voltage for Bypass，settable:+10%，+15%，+20%，+25%
	Bypass Voltage Down Limited	Down limited working Voltage for Bypass，settable:-10%，-15%，-20%，-30%，-40%
	Bypass Frequency Limited	Permitted working Frequency for Bypass Settable：+-1Hz，+-3Hz，+-5Hz
BATTERY	Battery Number	Setting the number of the battery（12V）
	Battery Capacity	Setting of the AH of the battery
	Float Charge Voltage/Cell	Setting the floating Voltage for battery cell（2V）

	Boost Charge Voltage/Cell	Setting the boost Voltage for battery cell（2V）
	Charge Current Percent Limit	Charge current (percentage of the rated current)
SERVICE	System Mode	Setting the system mode: Single , parallel, Single ECO, parallel ECO, LBS, parallel LBS
	Parallel number	Parallel system UPS numbers
	Parallel ID	UPS ID in parallel system
	Slew rate	Bypass frequency slew rate
	Synchronization window	Bypass frequency slew window
	System auto start mode after EOD	UPS start mode after battery end of discharging
RATE	Configure the rated Parameter	For the factory use
CONFIGURE	Display mode	Support Tower and Rack LCD display
	Back light time	LCD back light time
	Contrast	LCD contrast

3.4.4 System

System Information Window displays software version, Bus voltage, charger voltage, and so on, these menus “Status & Alarm”, “REC Code”, and “INV Code” are helpful to maintain the UPS, as is shown in the following Figure 3-6.

Figure 3-6 Submenu Interface of System Page

3.4.5 Operate

Touch the “Operate” icon, and the system enters the page of “Operate”, as it is shown in Figure 3-7.

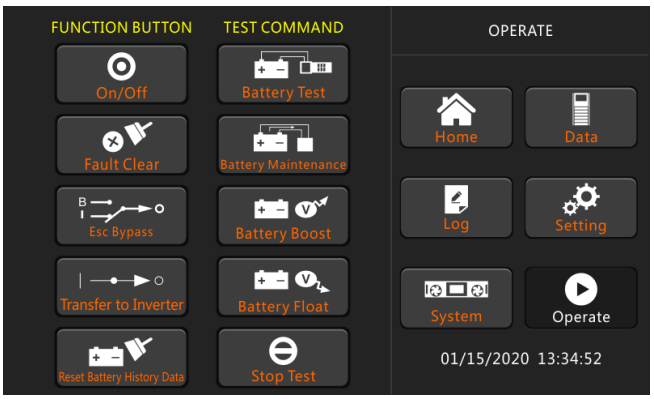


Figure 3-7 Operate Page

The "Operate" menu includes FUNCTION BUTTON and TEST COMMAND. The contents are described in details below.

FUNTION BUTTON

- **On/Off**

Manual turn ON/OFF UPS

- **Fault Clear**

Clear the faults by touching the icon.

- **Transfer to Bypass**

Transfer to bypass mode by touching the icon

- **Transfer to Inverter**

Transfer the bypass mode to Inverter Mode by touching the icon.

- **Reset Battery History Data**

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

TEST COMMAND

- **Battery Test**

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

- **Battery Maintenance**

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

- **Battery Boost**

By touching the icon, the system starts boost charging.

- **Battery Float**

By touching the icon, the system starts float charging.

- **Stop Test**

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

4 Operations

4.1 UPS start-up

4.1.1 Startup in normal mode

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

1) Ensure all the circuit breakers are open. If the ups is used with our POD option (POD includes 4 breakers), one by one to turn on the output breaker, input breaker, bypass input breaker, and then the system starts initializing; if not, please one by one to turn on Input breaker, Bypass input breaker, and then the system starts initializing.
2) The LCD in front of the cabinet is lit up. The system enters the home page, as shown in Figure 3-2.

3) Notice the energy flowing diagram and alarms on the home page, as is shown in Figure 4-1.

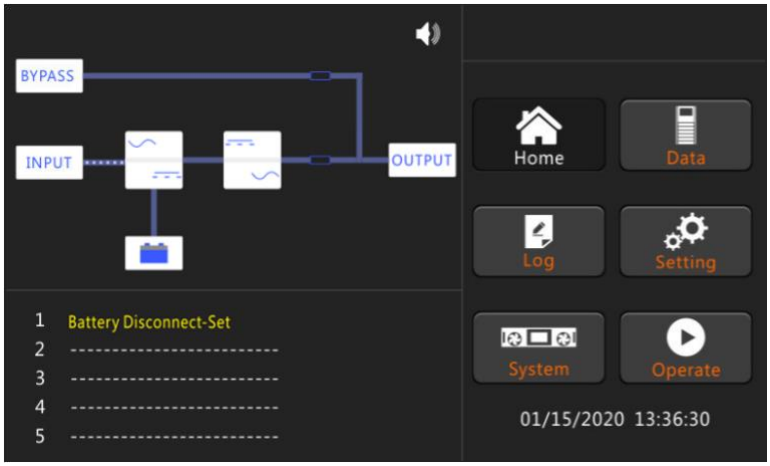


Figure 4-1 Rectifier starting

4) After about 30S, the rectifier start is completed, the bypass static switch is on, and the bypass indicator flashes. As shown in Figure 4-2.

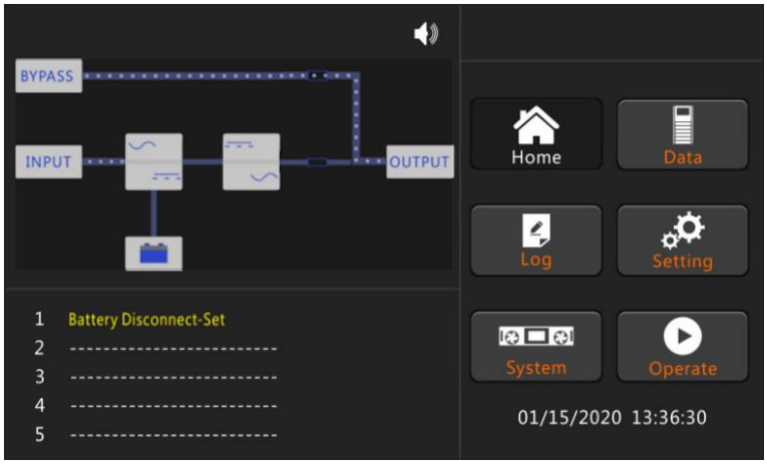


Figure 4-2 Bypass starting

5) After the bypass static switch is on, the inverter starts and the inverter indicator bar flashes as shown in Figure 4-3.

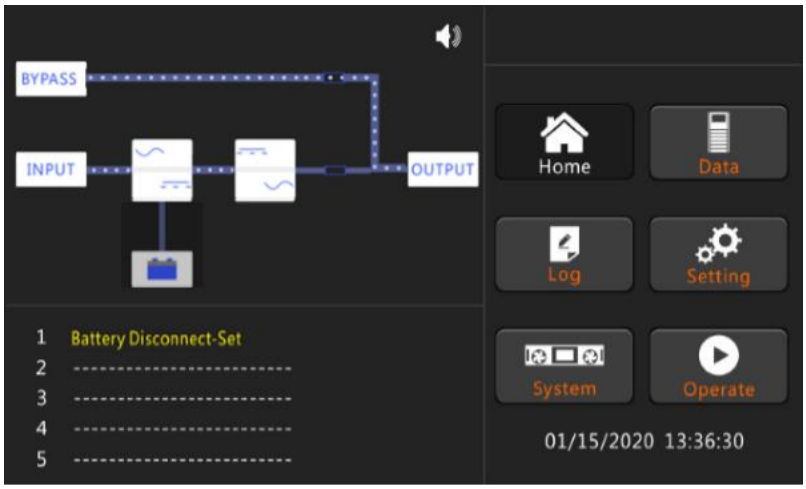


Figure 4-3 Inverter starting

6) After about 30S, when the inverter is running normally, the UPS switches from the bypass to the inverter, the bypass indicator bar is off, and the load indicator bar flashes. As shown in Figure 4-4.

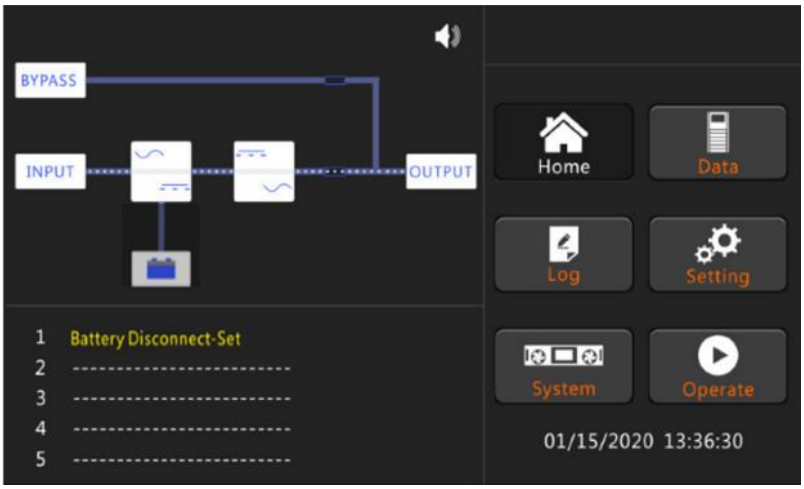


Figure 4-4 Normal mode

7) The startup has finished, users can close the external or internal battery breaker, the main output breaker, and then close the branch breakers one by one. Figure 4-5 shows the completeness of starting.

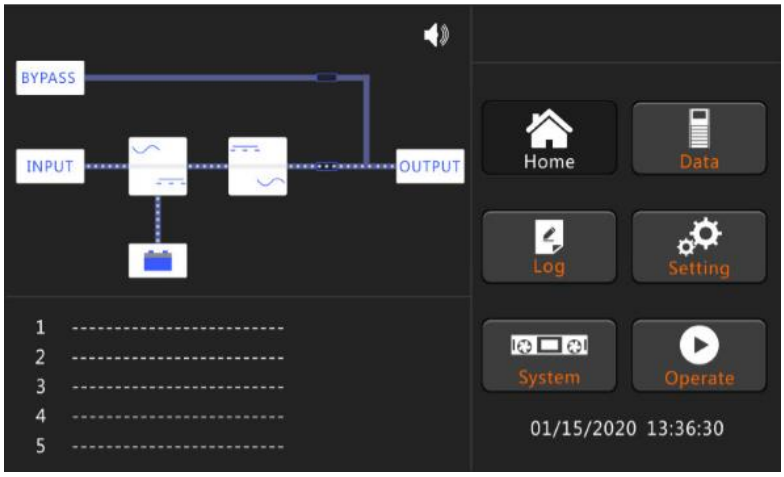


Figure 4-5 Starting completed

Note

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

4.1.2 Start from battery

The start from battery refers to the battery cold start. The steps of the start-up are as follow:
1) Confirm the batteries are correctly connected, and then close the external battery circuit breakers.
2) Press and hold the red button of battery cold start until the energy flowing is lighted and flashing, it indicates the system is been powering by the batteries. The position of the battery cold start button is shown in Figure 4-6, the energy flowing diagram is shown in Figure 4-7.

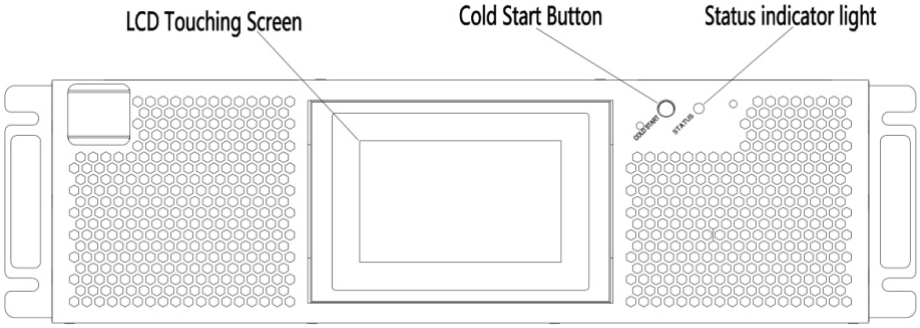


Figure 4-6 Position of the battery cold start button

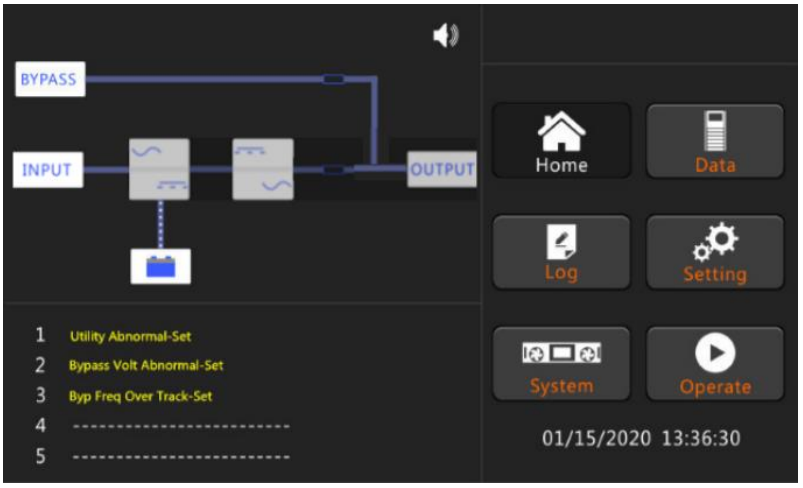


Figure 4-7 Energy flowing diagram of discharge

3) After about 60 seconds, the rectifier completes the start, and the inverter begins to start, and after 30 seconds, the inverter complete the start, and supply the power to the output. The energy flowing diagram is shown in Figure 4-8.

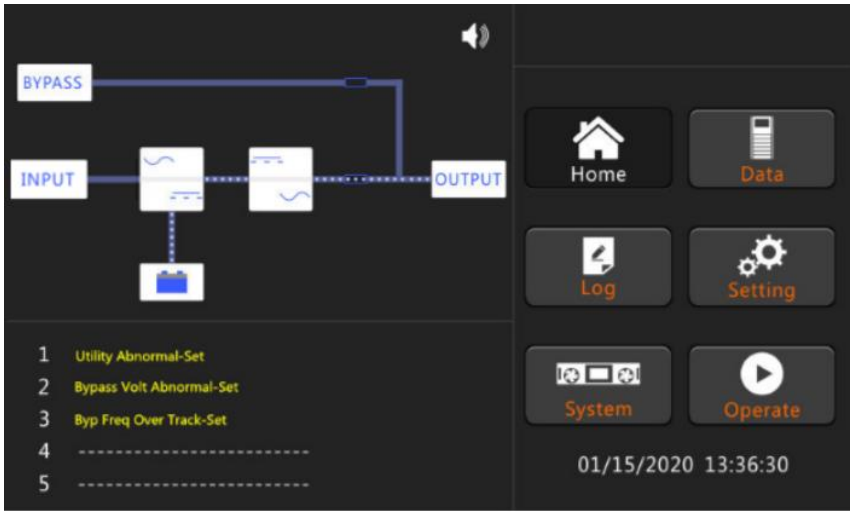


Figure 4-8 Energy flowing diagram of the start completed from batteries

4) Close the external output power supply isolators to supply the loads, and the system is working in battery mode.

4.2 UPS Shut down

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

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

4.3 Procedure for Switching between Operation Modes

4.3.1 Switching the UPS from normal mode into battery mode

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

4.3.2 Switching the UPS from normal mode into bypass mode

Touching the icon 

and then input the password "1203" to transfer the system to Bypass Mode.

Warning

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

4.3.3 Switching the UPS into normal mode from bypass mode

Touch the icon 

, UPS will return to Normal Mode from bypass mode.

Note

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

4.3.4 Switching the UPS into maintenance bypass mode from normal mode

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

1. Transfer the UPS into Bypass mode as per the chapter 4.3.2.
2. Turn on the maintenance bypass breaker (external or from POD). And the load is powered through maintenance bypass and static bypass.
3. One by one to turn off the external battery breaker, input breaker, bypass input breaker and output breaker (external or from POD).
4. The load is powered through maintenance bypass.

Waring

Once the cover on the maintenance bypass breaker is removed, the system will transfer to bypass mode automatically.

Waring

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

Danger

Even with the LCD turned off, the terminals of input and output may be still energized.

Wait for 10 minutes to let the DC bus capacitor fully discharge before removing the cover.

4.3.5 Switching the UPS into normal mode from maintenance bypass mode

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

1. After finish of maintenance. One by one to turn on the output breaker, the bypass input breaker, the input breaker (external or from POD) and the external battery breaker.
2. After 30S, the bypass indicator LED goes green and the load is powered through maintenance bypass breaker and static bypass.
3. Turn off the maintenance bypass breaker and fix the protection cover, and then the load is powered through static bypass. The rectifier starts followed by the inverter.
4. Operate “Fault Clear” as per chapter 3.4.5.
5. After 60 seconds, the system transfers to normal mode.

Waring

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

4.4 Battery Maintenance

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

Touch the icon 

, and input the password “1203”, the system transfers into Battery Mode for discharge. If no human intervention, the system will continue to discharge until the alarm of “Battery low voltage” is given. Users can stop the discharge by touching the icon 

.

Touch the icon 

, the system will discharge for about 30 seconds, and then re-transfer to normal mode.

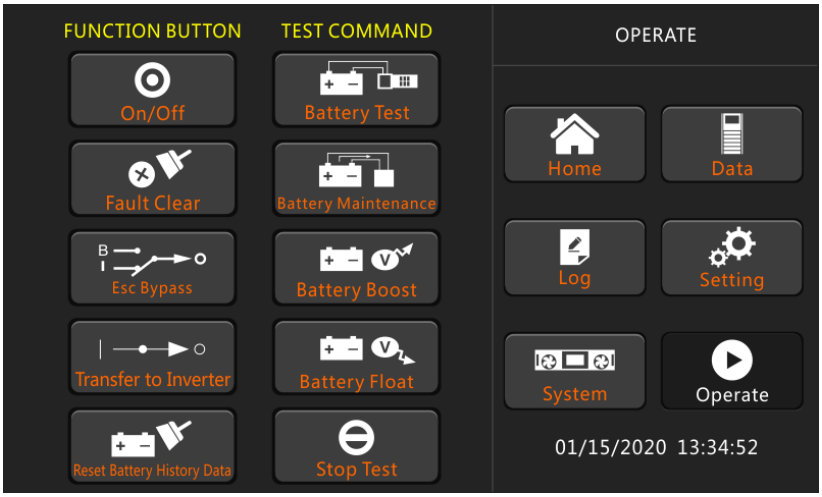


Figure 4-9 Battery maintenance

Warning

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

4.5 Installation of parallel operation system

Normally 4 cabinets can be paralleled; and the parallel function is optional, if users need the function, please confirm the configuration with the supplier in advance. For the details of the parallel system, please refer to the annex “Instructions of the parallel system for UPS”.

5 Maintenance

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

5.1 Precautions

Only maintaining engineers can maintain the power module and monitoring bypass module.
1) The power module should be disassembled from top to bottom, so as to prevent any inclination from high gravity center of the cabinet.
2) To ensure the safety before maintaining power module and bypass module, use a multi-meter to measure the voltage between operating parts and the earth to ensure the voltage is lower than hazardous voltage, i.e. DC voltage is lower than 60Vdc, and AC maximum voltage is lower than 42.4 Vac.
3) Bypass module is not recommended to hot swap; only when UPS is in Manual Bypass Mode or UPS is completely powered off, the bypass module can be disassembled.
4) Wait 10 minutes before opening the cover of the power module or the bypass after pulling out from the cabinet.

5.2 Instruction for maintaining UPS

For the maintenance of the UPS, please refer to Chapter 4.3.4 to transfer to maintenance bypass mode. After maintenance, re-transfer to normal mode according to Chapter 4.3.5.

5.3. Instruction for Maintaining Battery String

For the Lead-Acid maintenance free battery, when maintaining the battery according to requirements, battery life can be prolonged. The battery life is mainly determined by the following factors:
1) Installation. The battery should be placed in dry and cool place with good ventilation. Avoid direct sunlight and keep away from heat source. When installing, ensure the correct connection to the batteries with same specification.
2) Temperature. The most suitable storage temperature is 20℃ to 25℃.
3) Charging/discharging current. The best charging current for the lead-acid battery is 0.1C. The maximum charging current for the battery can be 0.2C. The discharging current should be 0.05C-3C.
4) Charging voltage. In most of the time, the battery is in standby state. When the utility is normal, the system will charge the battery in boost mode (constant voltage with maximum limited) to full and then transfers to the state of float charge.
5) Discharge depth. Avoiding deep discharge, which will greatly reduce the life time of the battery.

When the UPS runs in battery mode with light load or no load for a long time, it will cause the battery to deep discharge.

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

 **Warning**

Daily inspection is very important!

Check and confirm the battery connection is tightened regularly, and make sure there is no abnormal heat generated from the battery.

 **Warning**

If one battery has leakage or is damaged, it must be replaced, stored in a container resistant to sulfuric acid and disposed of in accordance with local regulations.

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

Therefore, its storage, transportation, use and disposal must comply with the national or local regulations and laws about the disposal of hazardous waste and waste batteries or other standards. According to the national laws, the waste lead-acid battery should be recycled and reused, and it is prohibited to dispose of the batteries in other ways except recycling. Throwing away the waste lead-acid batteries at will or other improper disposal methods will cause severe environment pollution, and the person who does this will bear the corresponding legal responsibilities.

6 Product Specifications

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

6.1 Applicable Standards

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

Table 6-1 Compliance with European and International Standards

Item	Normative reference
General safety requirements for UPS used in operator access areas	IEC62040-1-1
Electromagnetic compatibility (EMC) requirements for UPS	IEC62040-2
Method of specifying the performance and test requirements of UPS	IEC62040-3

Note

The above mentioned product standards incorporate relevant compliance clauses with generic IEC and EN standards for safety (IEC/EN/AS60950), electromagnetic emission and immunity (IEC/EN61000 series) and construction (IEC/EN60146 series and 60950).

6.2 Environmental Characteristics

Table 6-2 Environmental Characteristics

Item	Unit	Parameter
Acoustic noise level at 1 meter	dB	65dB @ 100% load, 62dB @ 45% load
Altitude of Operation	m	≤1000,load de-rated 1% per 100m from 1000m to 2000m
Relative Humidity	%	0-95, non-condensing
Operating Temperature	℃	0-40(for UPS only),Battery life is halved for every 10°C increase above 20°C
UPS Storage Temperature	℃	-40-70

6.3 Mechanical Characteristics

Table 6-3 Mechanical Characteristics for Cabinet

Item	Unit	Parameter	
Rated capacity	kVA	10	15
Dimension (W×D×H)	mm	488*945*130	
Weight	kg	25	30
Color	N/A	BLACK,RAL 7021	
Protection Level IEC（60529）	N/A	IP20	

6.4 Electrical Characteristics

6.4.1 Electrical Characteristics (Input Rectifier)

Table 6-4 Rectifier AC input Mains

Item	Unit	Parameter	
Rated capacity	kVA	10	15
Grid System	\	3 Phases + Neutral + Ground	
Rated AC Input Voltage	Vac	208/220(three-phaseand sharing neutral with the bypass input)	
Rated Frequency	Vac	50/60Hz	
Input voltage range	Vac	166-261Vac(Line-Line),full load 125V~166Vac(Line-Line),load decrease linearly according to the min phase voltage	
Input Frequency range	Hz	40~70	
Input Power factor	PF	>0.99	
THDI	THDI%	<4% (full Linear Load)	<3% (full Linear Load)

6.4.2 Electrical Characteristics (Intermediate DC Link)

Table 6-5 Battery

Items	Unit	Parameters
Battery bus voltage	Vdc	Rated：±120V

Quantity of lead-acid cells	Nominal	20=[1 battery(12V)] ,120=[1battery(2V)]
Float charge voltage	V/cell （VRLA）	2.25V/cell(selectable from 2.2V/cell ~ 2.35V/cell) Constant current and constant voltage charge mode
Temperature compensation	mV/℃/cl	3.0(selectable:0~5.0)
Ripple voltage	%	≤1
Ripple current	%	≤5
Equalized charge voltage	VRLA	2.4V/cell(selectable from : 2.30V/cell~2.45V/cell) Constant current and constant voltage charge mode
Final discharging voltage	V/cell （VRLA）	1.65V/cell(selectable from: 1.60V/cell~1.750V/cell) @0.6C discharge current 1.75V/cell (selectable from: 1.65V/cell~1.8V/cell) @0.15C discharge current (EOD voltage changes linearly within the set range according to discharge current)
Battery Charge	V/cell	2.4V/cell(selectable from : 2.3V/cell~2.45V/cell) Constant current and constant voltage charge mode
Battery Charging Power Max Current	kW	10%* UPS capacity (selectable from : 1~20%* UPS capacity)

Note

The default battery number is 20.

6.4.3 Electrical Characteristics (Inverter Output)

Table 6-6 Inverter Output (To critical load)

Items	Unit	Parameters
Rated AC voltage	Vac	120/208 (Line-Line)
Rated Frequency	Hz	50/60
Frequency Regulation	Hz	50/60Hz±0.1%
Voltage precision	%	±1.5(0~100% linear load)
Overload	\	110%, 60min; 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	PF	0.9
Transient Response	%	<5% for step load (20% - 80% -20%)
Transient recovery	ms	< 30ms for step load (20% - 100% -20%)
Output Voltage THDu	%	<1% from 0% to 100% linear load <6% full non-linear load according to IEC/EN62040-3

6.4.4 Electrical Characteristics (Bypass Mains Input)

Table 6-7 Bypass Mains Input

Item	Unit	Value
Rated AC voltage	Vac	120/208 (three-phase four-wire and sharing neutral with the bypass)
Overload	%	125% Long term operation; 125%~130% for 10min; 130%~150% for 1min; 150%~400% for 1s; >400% ,less than 200ms
Current rating of neutral cable	A	1.7×In
Rated frequency	Hz	50/60
Switch time (between bypass and inverter)	ms	Synchronized transfer: 0ms
Bypass voltage range	%	Settable, default -20%~+15% Upper limit: +10%, +15%, +20%, +25% Lower limit: -10%, -15%, -20%, -30%, -40%
Bypass frequency range	Hz	Settable, ±1Hz, ±3Hz, ±5Hz
Synchronized Range	Hz	Settable ±0.5Hz~±5Hz,default ±3Hz

6.5 Efficiency

Table 6-8 Efficiency

Items	Unit	Parameters	
Normal mode(dual conversion)	%	>95	>95.5
ECO mode	%	>98	
Battery mode	%	>94.5	>95.5

6.6 Display and Interface

Table 6-10 Display and Interface

Display	LCD

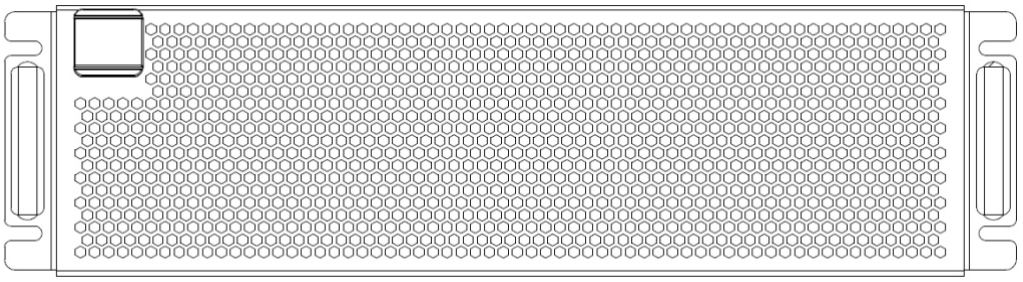
Interface	Standard:RS232, RS485, Dry Contact Option: SNMP, Parallel, USB

Annex. A Instructions of the POD

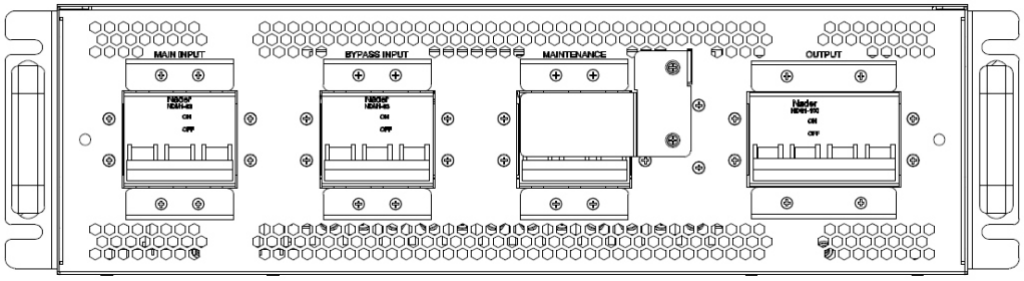
This series of UPS has no breaker in its own cabinet, POD unit is designed to be used together with this kind of UPS, and users could select it as per requirements. The POD units have 2 kinds, one is for single UPS, and the other is for 2 UPS in parallel.

1. POD for single system

The outlook of POD for single system is shown as Figure 1.

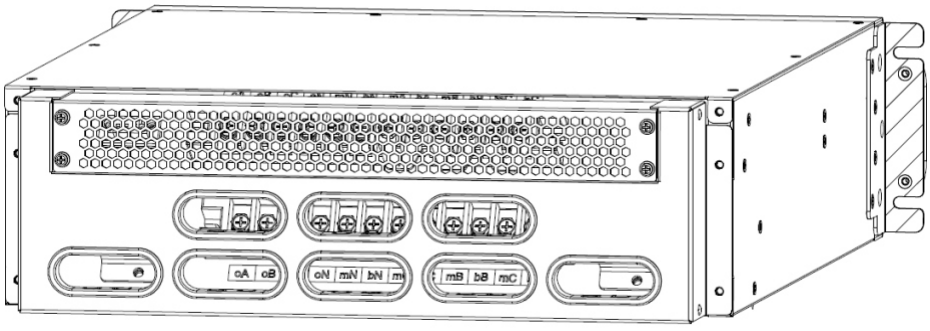


(A) Front view with the cover

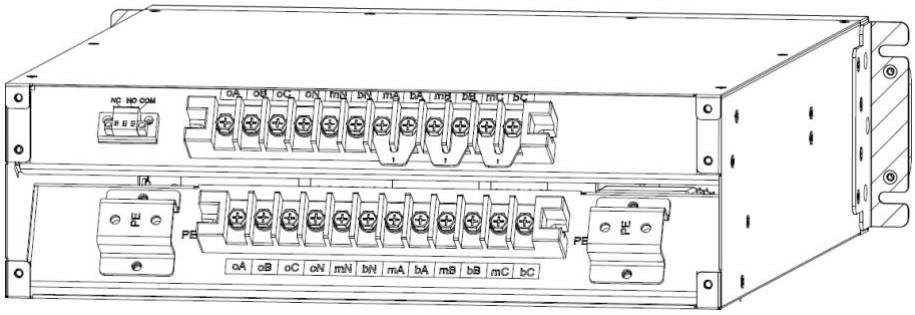


(B) Front view without the cover

The cover is attracted by magnet on the both side. Remove the cover, 4 breakers occur, they are MAIN INPUT breaker, BYPASS INPUT breaker, Maintenance breaker and OUTPUT breaker from left to right.



(C) Rear view with the protective cover



(D) the rear view without the protective cover

Remove the protective cover, the connection terminal occurs.

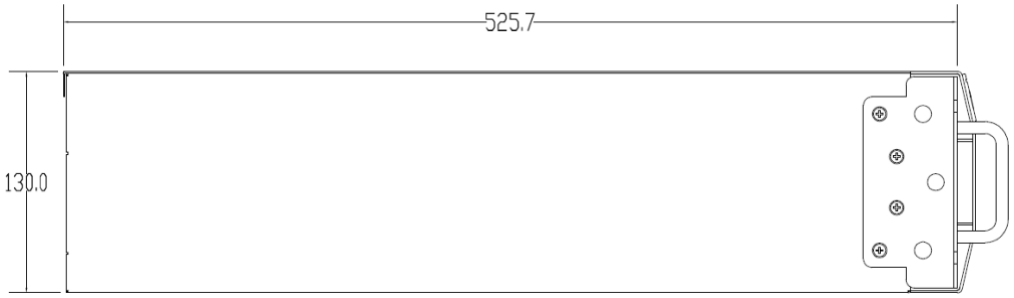
MAIN INPUT: mA, mB, mC, mN;

BYPASS INPUT: bA, bB, bC, bN;

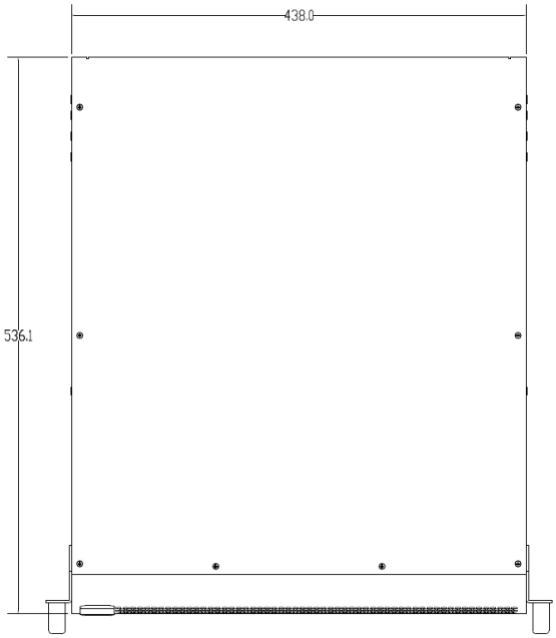
OUTPUT: oA, oB, oC, oN;

Ground: PE;

Note: For the factory default configuration, mA and bA, mB and bB, mC and bC are short-connected by the copper sheet B1.



(E) Side view (unit: mm)



(F) Top view (unit: mm)

Figure 1 POD for single system outlook

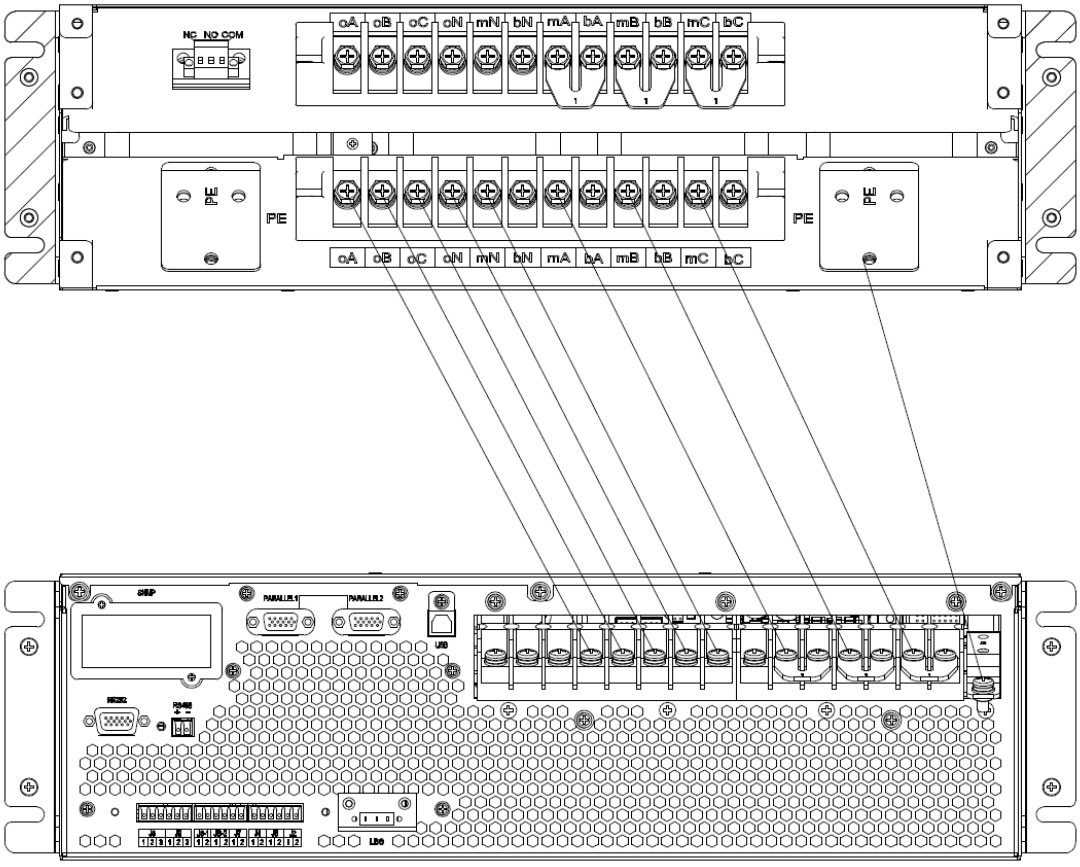
2. Cable connection of POD for single system

UPS has 4 kinds of configurations, so there are 4 kinds of cable connections.

NOTE: Before connecting the cables, please first confirm the configuration of the UPS, generally the UPS is configured as the type of 3-phase input and 3-phase output (3/3) as default. If changing to 3-phase input and one phase output (3/1), please first set the UPS as the type of 3-phase input and one phase output as per the UPS user manual.

(1) 3-phase input and 3-phase output with common input

(a) Please refer to the diagram below, connect oA, oB, oC, oN, mN, mA, mB, mC, PE on the bottom connection terminal row of POD to the corresponding positions on the UPS.
(b) The top connection terminal row is for connecting the input and output cables of the whole system.
(c) Battery cabeles should be dircetly connected to the corresponding positions on the UPS.



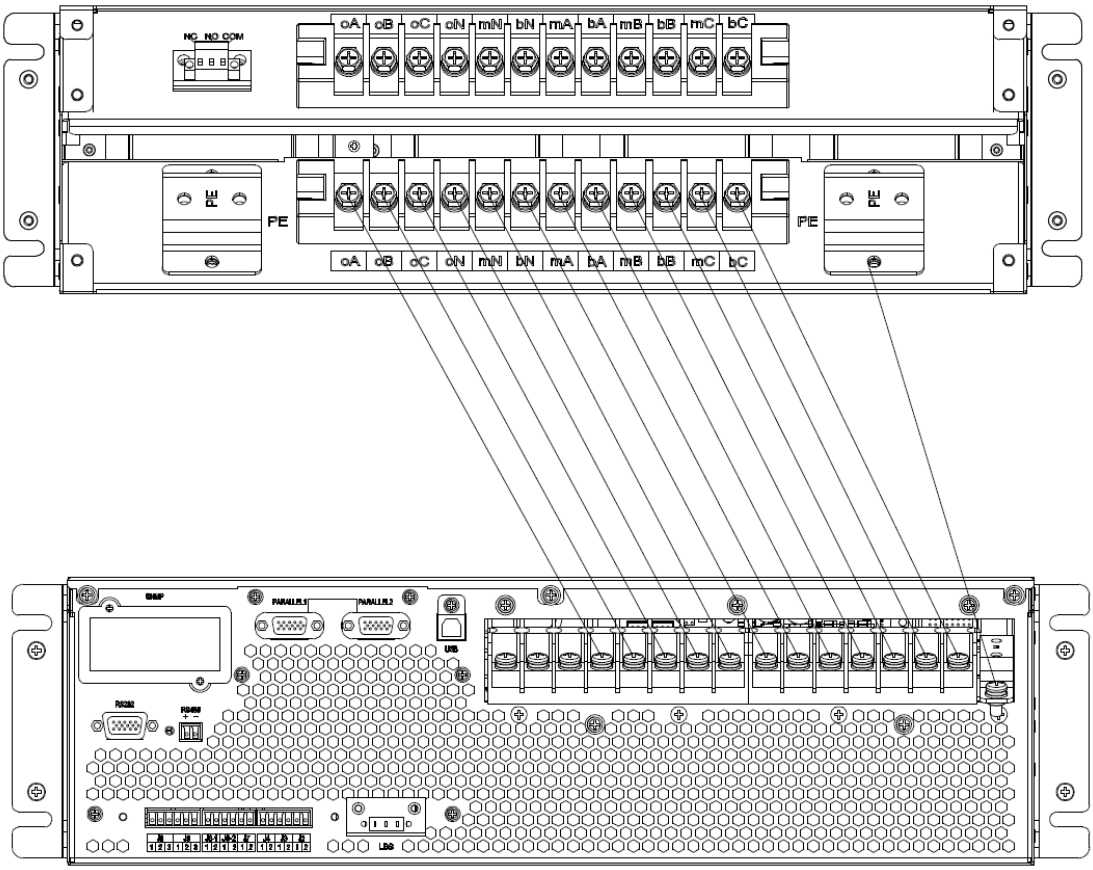
(2) 3-phase input and 3-phase output with dual input

(a) Remove these copper sheets (named B1) between mA and bA, mB and bB, mC and bC of COP and UPS.
(b) Please refer to the diagram below, connect oA, oB, oC, oN, mN, bN, mA, bA, mB, bB, mC, bC

PE on the bottom connection terminal row of POD to the corresponding positions on the UPS.

(c) The top connection terminal row is for connecting the input and output cables of the whole system.

(d) Battery cabeles should be dircetly connected to the corresponding positions on the UPS.



(3) 3-phase input and 1 phase output with common input

NOTE: The UPS and COP are both configured as the type of 3-phase input and 3-phase output as default. If configuring the system as the type of 3-phase input and 3-phase output, there needs some copper sheets for connection, these copper sheets are optional, they are named "3/1 kit for UPS" and "3/1 kit for single POD".

"3/1 kit for UPS" contains 4 blocks of copper sheets, they are named "UPS-4", "UPS-5", "UPS-6", "UPS-7".

"3/1 kit for single POD" contains 4 blocks of copper sheets, they are named "POD-3", "POD-4", "POD-5", "POD-6".

(a) Remove these original copper sheets (named B1) between mA and bA, mB and bB, mC and bC of COP and UPS.

(b) Short oA and oB on the top connection terminal row of POD with the copper sheet "POD-3".

(c) Short oC, oN, mN, and bN on the top connection terminal row of POD with the copper sheet "POD-4".

(d) Short mA, bA, bB and bC on the top connection terminal row of POD with the copper sheet "POD-6".

(e) Short oA, oB and oC on the UPS connection terminal row with the copper sheet "UPS-4".

(f) Short oN, mN, and bN on the UPS connection terminal row with the copper sheet “UPS-7”.

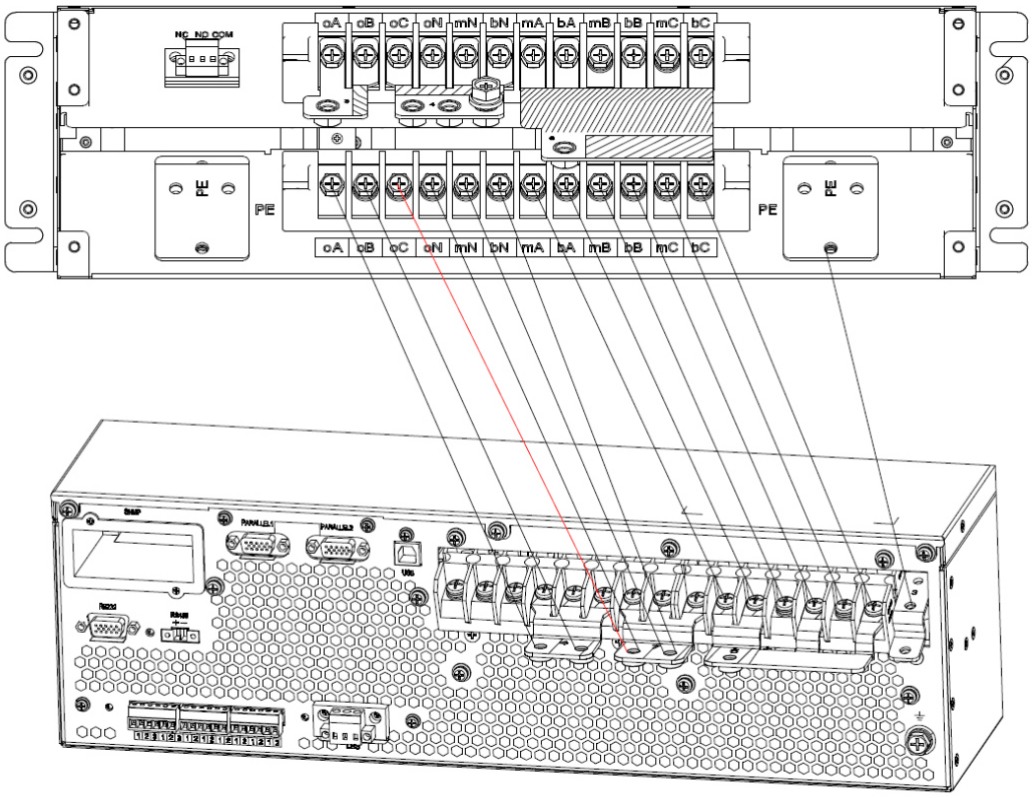
(g) Short mA, bA, bB and bC on the UPS connection terminal row with the copper sheet “UPS-6”.

(h) Connect oA and oB on the bottom connection terminal row of POD to the copper sheet “UPS-4” with cables.

(i) Connect **oC**, oN, mN, and bN on the bottom connection terminal row of POD to the copper sheet “UPS-7” with cables.

(j) Connect mA, bA, bB and bC on the bottom connection terminal row of POD to the copper sheet “UPS-6” with cables.

(k) Connect mB, mC and PE on the bottom connection terminal row of POD to the corresponding positions on the UPS.



(4) 3-phase input and 1 phase output with dual input

NOTE: The UPS and COP are both configured as the type of 3-phase input and 3-phase output as default. If configuring the system as the type of 3-phase input and 3-phase output, there needs some copper sheets for connection, these copper sheets are optional, they are named “3/1 kit for UPS” and “3/1 kit for single POD”.

“3/1 kit for UPS” contains 4 blocks of copper sheets, they are named “UPS-4”, “UPS-5”, “UPS-6”, “UPS-7”.

“3/1 kit for single POD” contains 4 blocks of copper sheets, they are named “POD-3”, “POD-4”, “POD-5”, “POD-6”.

(a) Remove these original copper sheets (named B1) between mA and bA, mB and bB, mC and bC of COP and UPS.

(b) Short oA and oB on the top connection terminal row of POD with the copper sheet “POD-3”.

(c) Short oC, oN, mN, and bN on the top connection terminal row of POD with the copper sheet "POD-4".

(d) Short mA, bA, bB and bC on the top connection terminal row of POD with the copper sheet "POD-5".

(e) Short oA, oB and oC on the UPS connection terminal row with the copper sheet "UPS-4".

(f) Short oN, mN, and bN on the UPS connection terminal row with the copper sheet "UPS-7".

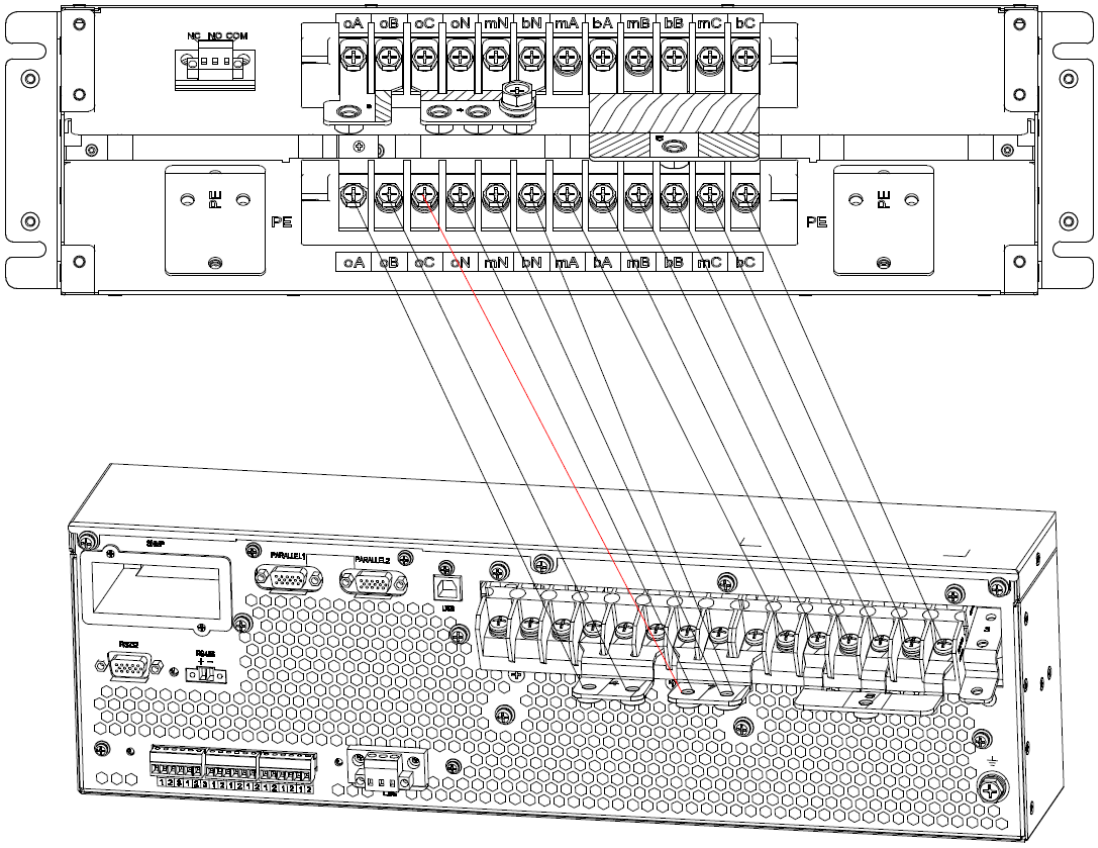
(g) Short bA, bB and bC on the UPS connection terminal row with the copper sheet "UPS-5".

(h) Connect oA and oB on the bottom connection terminal row of POD to the copper sheet "UPS-4" with cables.

(i) Connect **oC**, oN, mN, and bN on the bottom connection terminal row of POD to the copper sheet "UPS-7" with cables.

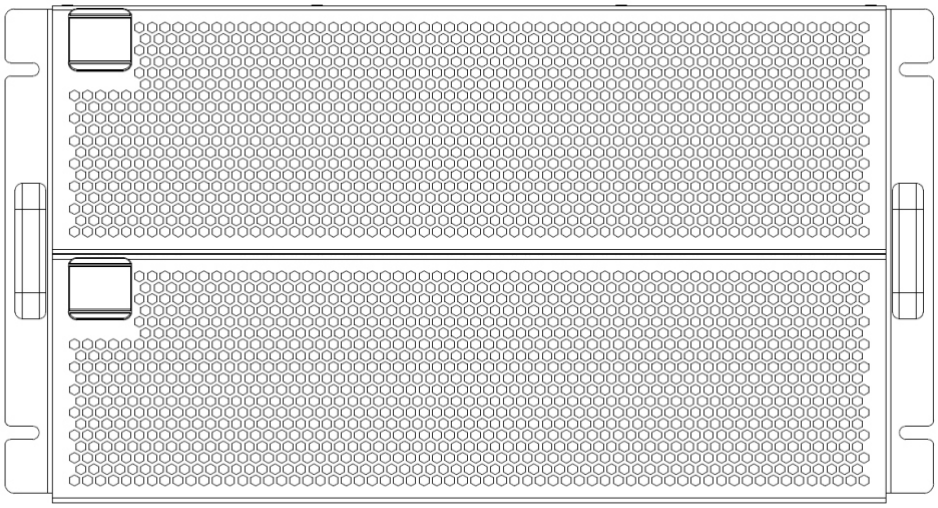
(j) Connect bA, bB and bC on the bottom connection terminal row of POD to the copper sheet "UPS-5" with cables.

(k) Connect mA, mB, mC and PE on the bottom connection terminal row of POD to the corresponding positions on the UPS.

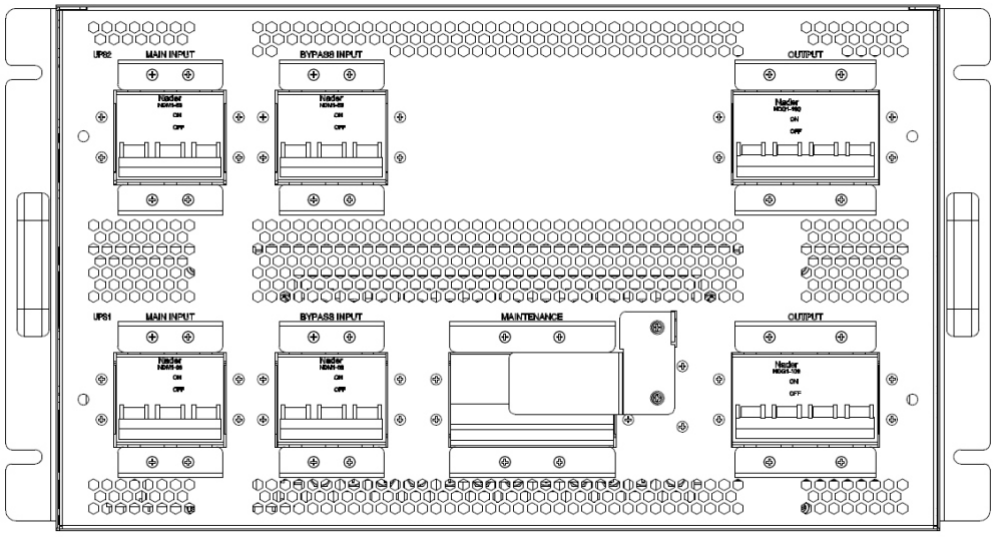


3. POD for parallel system

The outlook of POD for parallel system is shown as Figure 2.



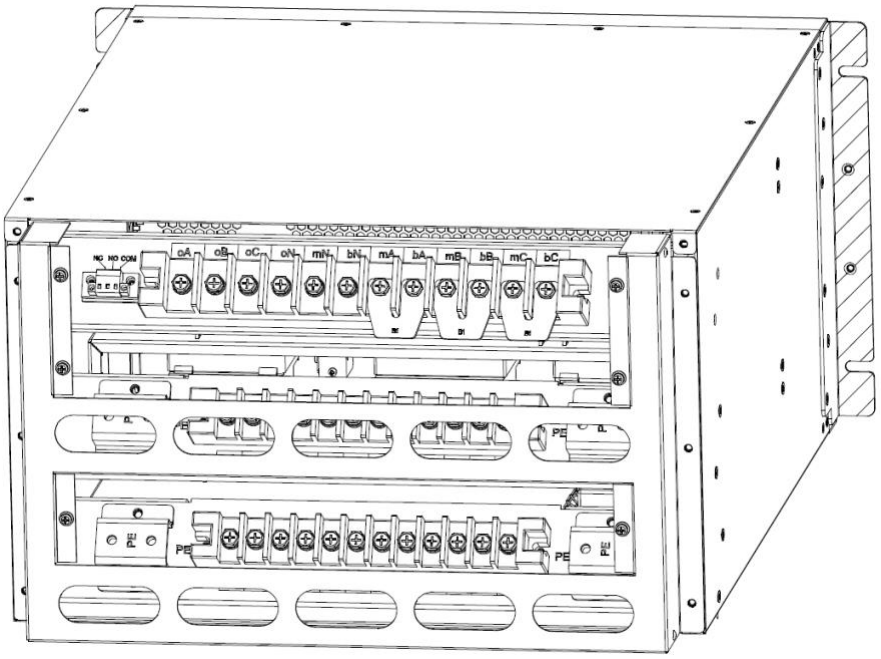
(A) Front view with the cover



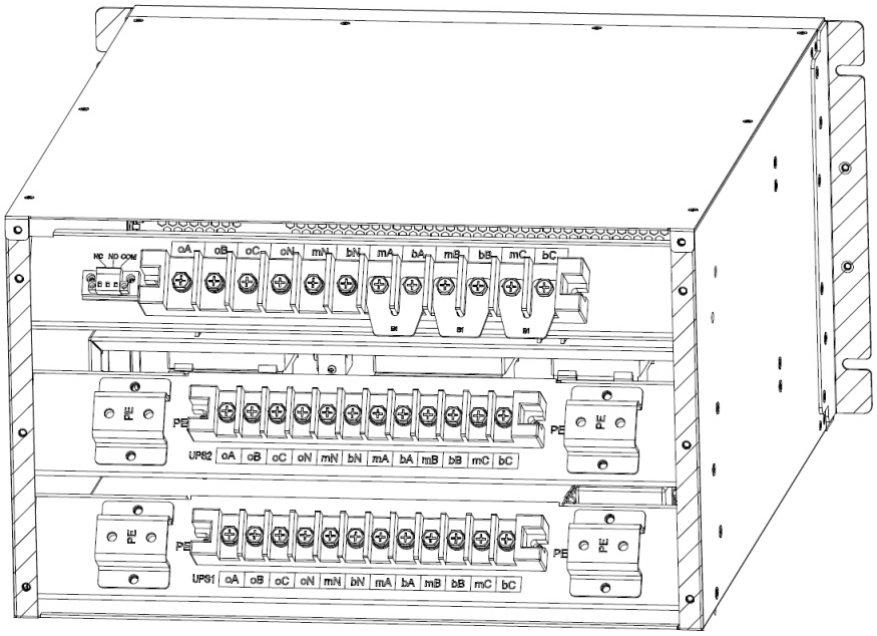
(B) The front view without the cover

The cover is attracted by magnet on the both side. Remove the cover, 7 breakers occur, they are MAIN INPUT breaker, BYPASS INPUT breaker, and OUTPUT breaker on the top row from left to right.

They are MAIN INPUT breaker, BYPASS INPUT breaker, Maintenance breaker and OUTPUT breaker on the bottom row from left to right.

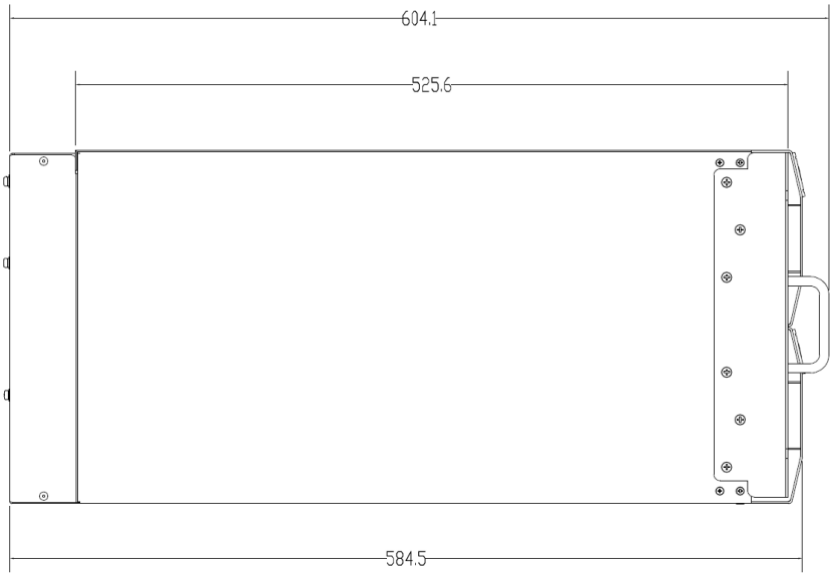


(C) Rear view with the cover

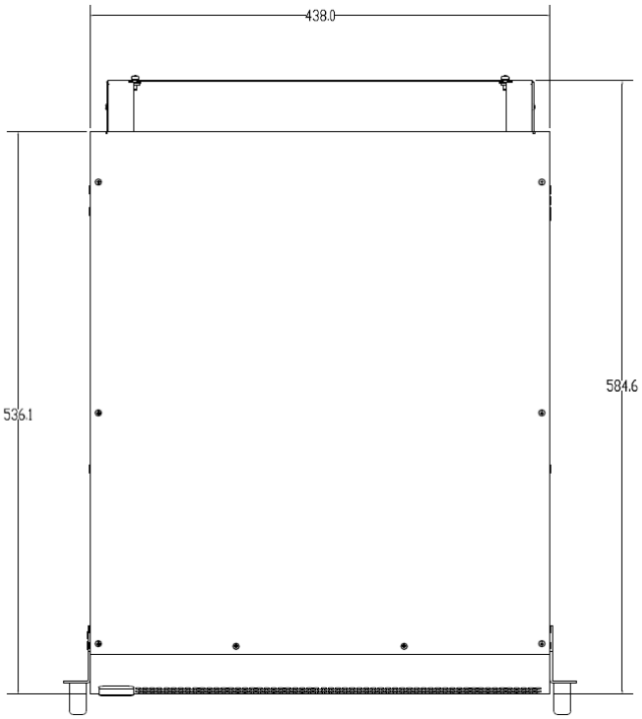


(D) Rear view without the cover

Remove the protective cover, the connection terminal occurs.
MAIN INPUT: mA, mB, mC, mN;
BYPASS INPUT: bA, bB, bC, bN;
OUTPUT: oA, oB, oC, oN;
Ground: PE;
Note: For the factory default configuration, mA and bA, mB and bB, mC and bC are short-connected by the copper sheet B1.



(E) Side view (unit: mm)



(F) Top view (unit: mm)

Figure 2 POD for parallel system outlook

4. Cable connection of POD for parallel system

UPS has 4 kinds of configurations, so there are 4 kinds of cable connections.

NOTE: Before connecting the cables, please first confirm the configuration of the UPS, generally the UPS is configured as the type of 3-phase input and 3-phase output (3/3) as default. If changing to 3-phase input and one phase output (3/1), please first set the UPS as the type of 3-phase input and one phase output as per the UPS user manual

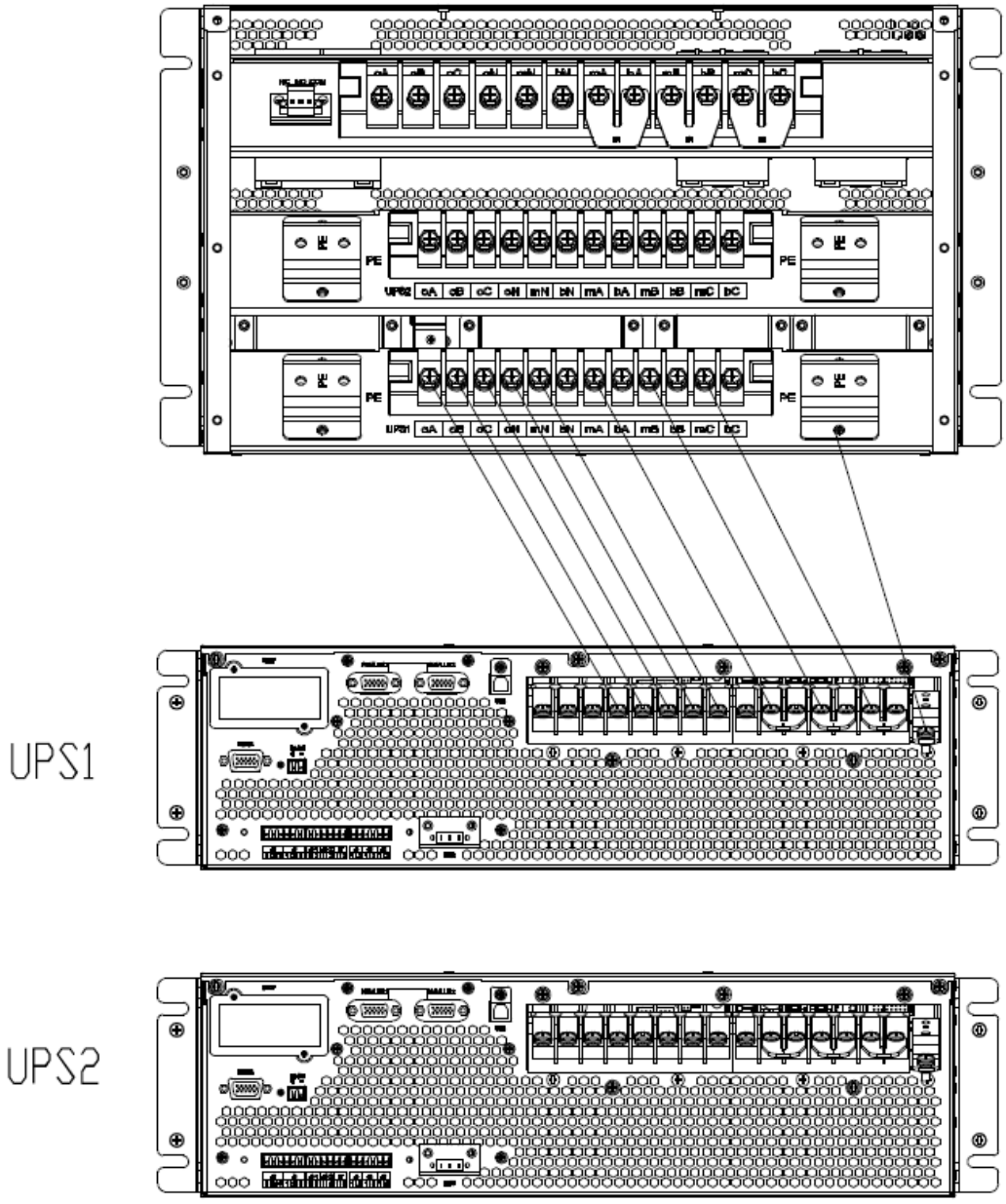
(1) 3-phase input and 3-phase output with common input

There are 3 blocks of connection terminal rows in POD for parallel system, the first is for connecting the input and the output of the whole system, the second is for connecting UPS2, and the third is for connecting UPS1.

(a) Please refer to the diagram below, connect oA, oB, oC, oN, mN, mA, mB, mC, PE on the third connection terminal row of POD to the corresponding positions on the UPS1.

(b) Connect oA, oB, oC, oN, mN, mA, mB, mC, PE on the second connection terminal row of POD to the corresponding positions on the UPS2.

(c) Battery cabeles should be dircetly connected to the corresponding positions on each UPS.

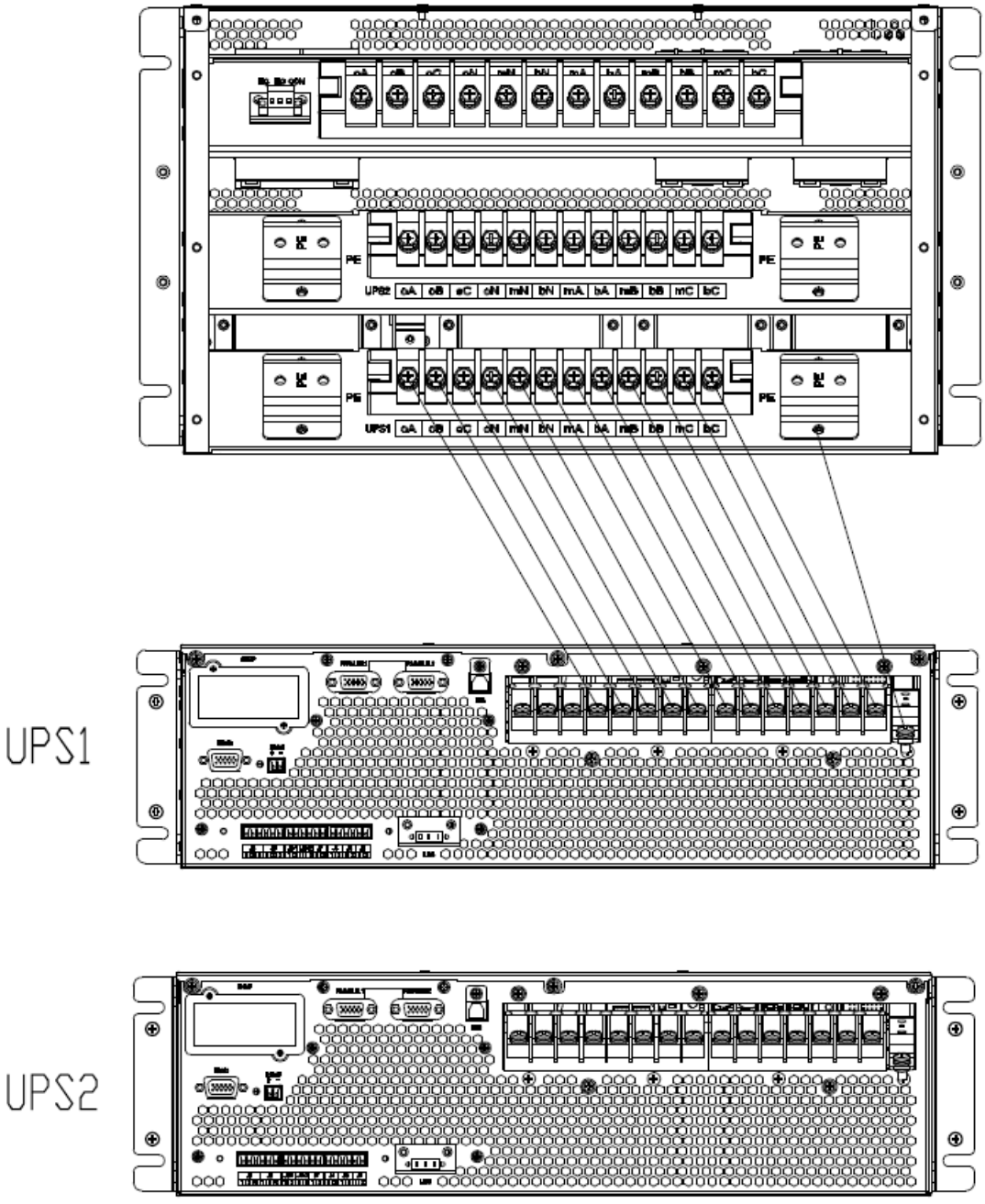


(2) 3-phase input and 3-phase output with dual input

(a) Remove these copper sheets (named B1) between mA and bA, mB and bB, mC and bC of COP and UPS.

(b) Connect oA, oB, oC, oN, mN, bN, mA, bA, mB, bB, mC, bC PE on the third connection terminal row of POD to the corresponding positions on the UPS1.

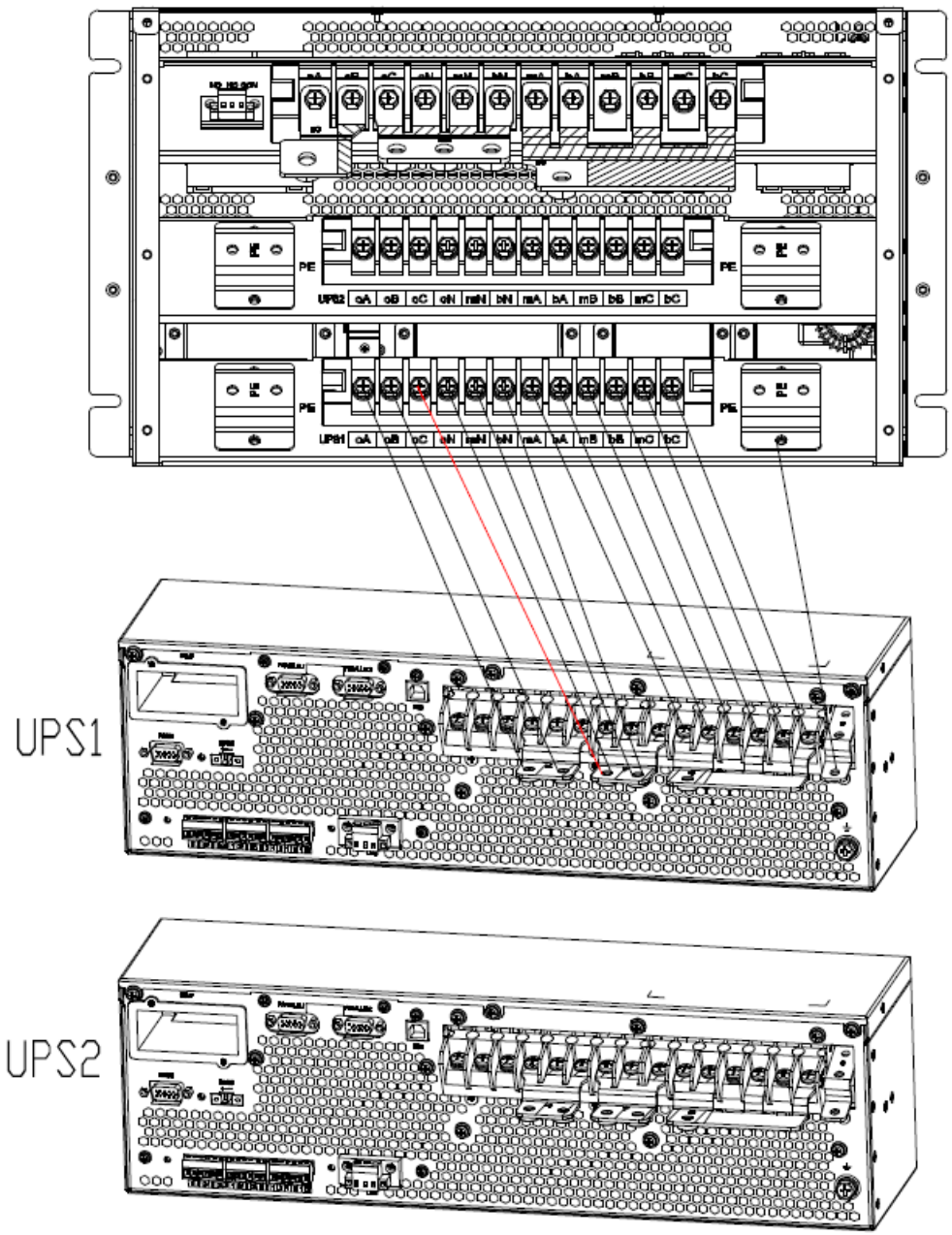
(c) Connect oA, oB, oC, oN, mN, bN, mA, bA, mB, bB, mC, bC PE on the second connection terminal row of POD to the corresponding positions on the UPS2.



(a) 3-phase input and 1 phase output with common input

NOTE: The UPS and COP are both configured as the type of 3-phase input and 3-phase output as default. If configuring the system as the type of 3-phase input and 3-phase output, there needs some copper sheets for connection, these copper sheets are optional, they are named "3/1 kit for UPS" and "3/1 kit for single POD".
"3/1 kit for UPS" contains 4 blocks of copper sheets, they are named "UPS-4", "UPS-5", "UPS-6", "UPS-7".
"3/1 kit for parallel POD" contains 4 blocks of copper sheets, they are named "POD-B3", "POD-B4", "POD-B5", "POD-B6".

(a) Remove these original copper sheets (named B1) between mA and bA, mB and bB, mC and bC of COP and UPS.
(b) Short oA and oB on the top connection terminal row of POD with the copper sheet "POD-B3".
(c) Short oC, oN, mN, and bN on the top connection terminal row of POD with the copper sheet "POD-B4".
(d) Short mA, bA, bB and bC on the top connection terminal row of POD with the copper sheet "POD-B6".
(e) Short oA, oB and oC on the UPS connection terminal row with the copper sheet "UPS-4".
(f) Short oN, mN, and bN on the UPS connection terminal row with the copper sheet "UPS-7".
(g) Short mA, bA, bB and bC on the UPS connection terminal row with the copper sheet "UPS-6".
(h) Connect oA and oB on the bottom connection terminal row of POD to the copper sheet "UPS-4" with cables.
(i) Connect **oC**, oN, mN, and bN on the bottom connection terminal row of POD to the copper sheet "UPS-7" with cables.
(j) Connect mA, bA, bB and bC on the bottom connection terminal row of POD to the copper sheet "UPS-6" with cables.
(k) Connect mB, mC and PE on the bottom connection terminal row of POD to the corresponding positions on the UPS1.
(l) As per the above stpes, connect UPS2 to POD.



(b) 3-phase input and 1 phase output with dual input

NOTE: The UPS and COP are both configured as the type of 3-phase input and 3-phase output as default. If configuring the system as the type of 3-phase input and 3-phase output, there needs some copper sheets for connection, these copper sheets are optional, they are named "3/1 kit for UPS" and "3/1 kit for single POD".

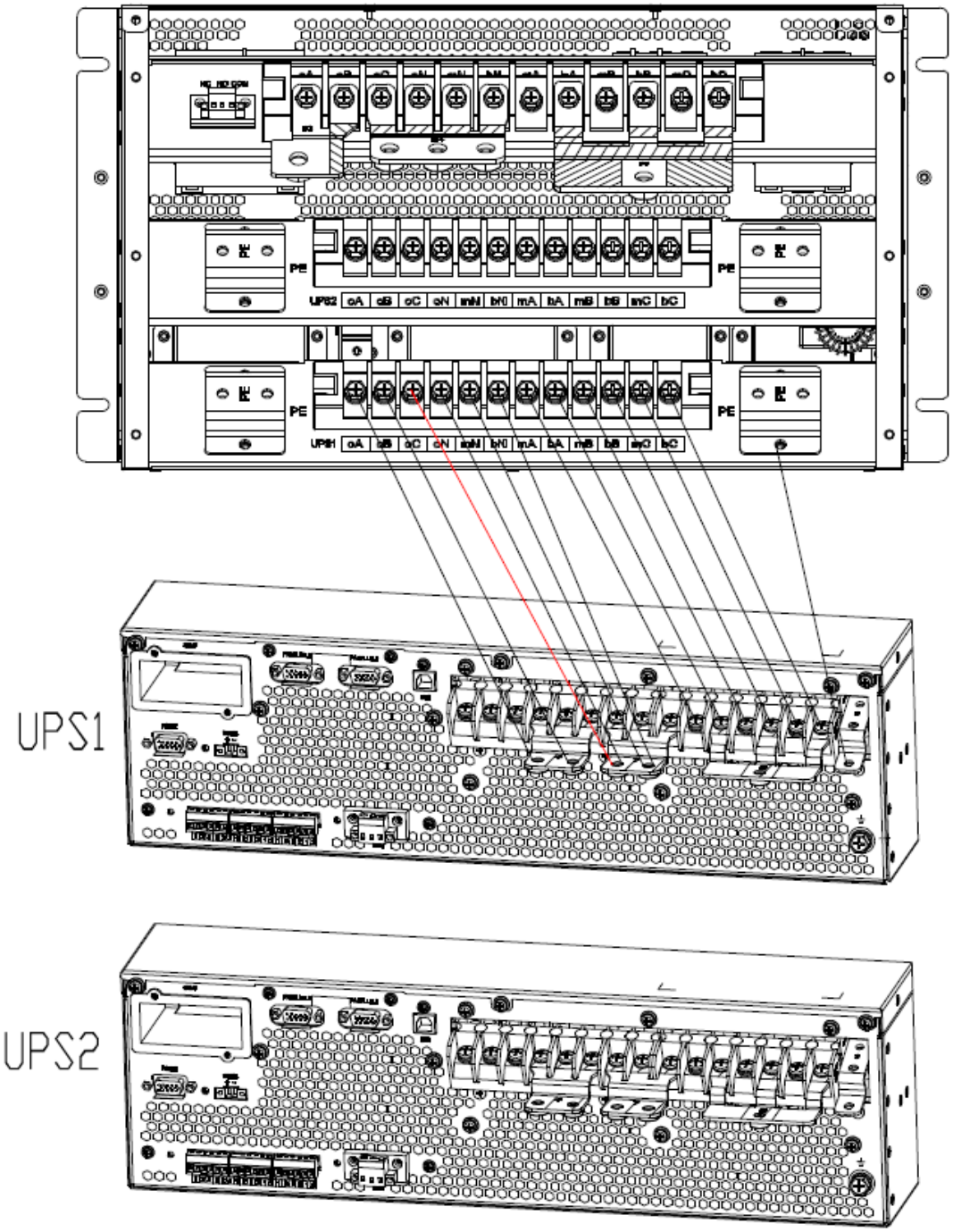
"3/1 kit for UPS" contains 4 blocks of copper sheets, they are named "UPS-4", "UPS-5", "UPS-6", "UPS-7".

"3/1 kit for parallel POD" contains 4 blocks of copper sheets, they are named "POD-B3", "POD-B4", "POD-B5", "POD-B6".

(a) Remove these original copper sheets (named B1) between mA and bA, mB and bB, mC and bC of COP and UPS.

(b) Short oA and oB on the top connection terminal row of POD with the copper sheet "POD-3".

(c) Short oC, oN, mN, and bN on the top connection terminal row of POD with the copper sheet "POD-4".
(d) Short mA, bA, bB and bC on the top connection terminal row of POD with the copper sheet "POD-5".
(e) Short oA, oB and oC on the UPS connection terminal row with the copper sheet "UPS-4".
(f) Short oN, mN, and bN on the UPS connection terminal row with the copper sheet "UPS-7".
(g) Short bA, bB and bC on the UPS connection terminal row with the copper sheet "UPS-5".
(h) Connect oA and oB on the bottom connection terminal row of POD to the copper sheet "UPS-4" with cables.
(i) Connect **oC**, oN, mN, and bN on the bottom connection terminal row of POD to the copper sheet "UPS-7" with cables.
(j) Connect bA, bB and bC on the bottom connection terminal row of POD to the copper sheet "UPS-5" with cables.
(k) Connect mA, mB, mC and PE on the bottom connection terminal row of POD to the corresponding positions on the UPS1.
(l) As per the above steps, connect UPS2 to POD.


PE
PE
UPS2
oA
oB
oC
oN
mN
bN
mA
bA
mB
bB
mC
bC
PE
PE
UPS1
oA
oB
oC
oN
mN
bN
mA
bA
mB
bB
mC
bC
UPS1
UPS2

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