USER'S MANUAL

UNINTERRUPTIBLE POWER SUPPLY (UPS)

Modules 25-300 kVA III/III

ADAPT

salicru

General index

1. INTRODUCTION.

1.1. ACKNOWLEDGEMENT LETTER.

2. INFORMATION FOR SAFETY.

2.1. USING THIS MANUAL.

2.1.1. Conventions and used symbols.

3. QUALITY AND STANDARD GUARANTEE.

3.1. DECLARATION OF THE MANAGEMENT.

3.2. STANDARD.

3.2.1. First and second environment.

3.2.1.1. First environment.

3.2.1.2. Second environment.

3.3. ENVIRONMENT.

4. OPRESENTATION.

4.1. SYSTEM CONFIGURATION

4.2. POWER MODULE

4.3. OPERATION MODE

4.3.1. Normal Mode

4.3.2. Battery Mode

4.3.3. Bypass Mode

4.3.4. Maintenance Mode (Manual Bypass)

4.3.5. ECO Mode

4.3.6. Auto-restart Mode

4.3.7. Frequency Converter Mode

4.3.8. UPS Configuration

4.3.9. UPS Outlook

5. INSTALLATION INSTRUCTION

5.1. LOCATION

5.1.1. Installation Environment

5.1.2. Site Selection

5.1.3. Size and Weight

5.2. UNLOADING AND UNPACKING

5.2.1. Moving and Unpacking of the Cabinet

5.2.2. Unpacking Power Module

6. POSITIONING

6.1. POSITIONING CABINET

6.2. INSTALLING POWER MODULE

6.3. BATTERY

6.4. CABLE ENTRY

6.5. POWER CABLES

6.5.1. Specifications

6.5.2. Power switch

6.5.3. Connecting Power Cables

6.6. CONTROL AND COMMUNICATION CABLES

6.6.1. Communication Interface

7. LCD PANEL

7.1. INTRODUCTION

7.2. OPERATIONS OF LCD PANEL

7.3. LCD PANEL FOR POWER MODULE

7.3.1. LED Indicator

7.3.2. Control and Operation Keys

7.3.3. LCD Display

7.4. LCD PANEL FOR CBINET

7.4.1. LED Indicator

7.4.2. Control and Operation Keys

7.4.3. LCD touch Screen

7.5. MAIN MENU

7.5.1. Cabinet

7.5.2. Module

7.5.3. Setting

7.5.4. Log

7.5.5. Operate

7.5.6. Scope

8. OPERATIONS

8.1. UPS START-UP

8.1.1. Start from Normal Mode

8.1.2. Start from Battery Mode

8.2. PROCEDURE FOR SWITCHING BETWEEN OPERATION MODES

8.2.1. Switching the UPS into Battery Mode from Normal Mode

8.2.2. Switching the UPS into Bypass Mode from Normal Mode

8.2.3. Switching the UPS into Normal Mode from Bypass Mode

8.2.4. Switching the UPS into Maintenance Bypass Mode from Normal Mode

8.2.5. Switching the UPS into Normal Mode from Maintenance Bypass Mode

8.3. BATTERY MAINTENANCE

8.4. EPO

8.5. INSTALLATION OF PARALLEL OPERATION SYSTEM

9. MAINTENANCE

9.1. PRECAUTIONS

9.2. INSTRUCTION FOR MAINTAINING POWER MODULE

9.3. INSTRUCTION FOR MAINTAINING BYPASS MODULE

9.4. REPLACING DUST FILTER (OPTIONAL)

10. . PRODUCT SPECIFICATION

10.1. APPLICABLE STANDARDS

10.2. ENVIRONMENTAL CHARACTERISTICS

10.3. MECHANICAL CHARACTERISTIC

10.4. ELECTRICAL CHARACTERISTICS

10.4.1. Electrical Characteristics (Input Rectifier)

10.4.2. Electrical Characteristics (Intermediate DC Link)

10.4.3. Electrical Characteristics (Inverter Output)

10.4.4. Electrical Characteristics (Bypass Mains Input)

10.5. EFFICIENCY

10.6. DISPLAY AND INTERFACE

1. INTRODUCTION.

1.1. ACKNOWLEDGEMENT LETTER.

We would like to thank you in advance for the trust you have placed in us by purchasing this product. Read this instruction manual carefully in order to be familiarized with its contents, because, as much as you know and understand the equipment the highest will be your satisfaction and safety levels and their features will be optimized too.

We remain at you entire disposal for any further information or any query you should wish to make.

Yours sincerely.

SALICRU

- The equipment here described **can cause important physical damages due to wrong handling**. This is why, the installation, maintenance and/or fixing of itself must be done by our staff or qualified **personnel exclusively**.
- Although we have made every effort to guarantee a complete and accurate information in this user's manual, we are not responsible for any errors or omissions that may exist.
  The images included in this document are mere illustrations and they could not represent the part of the equipment exactly, therefore they are not contractual. Nevertheless, differences that could exist will be alleviated or solved with the correct labelling of the equipment.
- According to our policy of constant evolution, **we reserve the right to modify the specifications, operating or described actions in this document without forewarning**.
- **Any reproduction, copy or third party concession, modification or partial or in whole translations** of this manual or document, in any format or media, **is prohibited without the previous written authorization of our firm**, being reserved the full and exclusive ownership right over it.

2. INFORMATION FOR SAFETY.

2.1. USING THIS MANUAL.

The generic information of the equipment is supplied in digital format in a CD-ROM, and it includes among other documents the own user's manual of the system and the EK266*08 document concerning to **«Safety instructions»**. Before doing any action over the equipment regarding installation or commissioning, change of location, setting or handling, read them carefully.

This user's manual is intended to provide information regarding the safety and to give explanations about the procedures for the installation and operating of the equipment. Read them carefully and follow the stated steps in the established order.

Compliance as regards to "Safety instructions" is mandatory, being the user the legal responsible regarding to its observance and application.

The equipments are delivered duly labelled for the correct identification of any their parts, which combined with the instructions described in this user's manual, allows the end-user to make any operating of both installation and commissioning, in an easy and ordered way without doubt. When an equipment differs from the one shown in figures of section 4, additional annexes will be edited if they were deemed appropriate or necessary. Generally, they will be delivered in hardcopy.

Finally, once the equipment is installed and operative, for future requests or doubts that could arise, it is recommended to keep the CD-ROM documentation in a safe place with easy access.

The following terms are used in the document indistinctly to be referred to:

- «**ADAPT, unit or UPS».- Uninterruptible Power Supply.**

  Depending on the context of the sentence, it can be referred either to the own equipment or to the equipment with batteries, although all is assembled in one cabinet or metallic enclosure.
- «**T.S.S.**».- Technical Service and Support.
- «**client, fitter, operator or end-user**».- are used indistinctly and by extension, to be referred to the fitter and/or operator which will make the corresponding actions, being responsible the same person about the actions to take on behalf of himself.
- In case of installations with IT neutral regime, the switches, circuit breakers must break the NEUTRAL a part from the three lines.

2.1.1. Conventions and used symbols.

Some symbols can be used and shown in the equipment and/or in the description of this user's manual.

For more information, see section 1.1.1 of EK266*08 document as regards to **«Safety instructions»**.

3. QUALITY AND STANDARD GUARANTEE.

3.1. DECLARATION OF THE MANAGEMENT.

Our target is the client's satisfaction, therefore this Management has decided to establish a Quality and Environmental policy, by means of installation a Quality and Environmental Management System that becomes us capable to comply the requirements demanded by the standard ISO 9001 and ISO 14001 and by our Clients and concerned parts too.

Likewise, the enterprise Management is committed with the development and improvement of the Quality and Environmental Management System, by means of:

- The communication to all the company about the importance of satisfaction both in the client's requirements and in the legal and regulations.
- The Quality and Environmental Policy diffusion and the fixation of the Quality and Environment targets.
- To carry out revisions by the Management.
- To provide the needed resources.

3.2. STANDARD.

The **SLC ADAPT** product is designed, manufactured and commercialized in accordance with the standard **EN ISO 9001** of Quality Management Systems and certified by SGS body. The CE marking shows the conformity to the EEC Directive by means of the application of the following standards:

- **2014/35/EU**. - Low Voltage Directive (LVD).
- **2014/30/EU**. - Electromagnetic Compatibility (EMC).
- **2011/65/EU**. - Restriction of Hazardous Substances in electrical and electronic equipment (RoHS).

In accordance with the specifications of the harmonized standards. Standards as reference:

- **IEC/EN 62103.** - Electronic equipments for use in power installations.
- **IEC/EN 61000-6-4.** - Electromagnetic compatibility. Generic norm of emission. Industrial environment.
- **IEC/EN 61000-6-2.** - Electromagnetic compatibility. Generic norm of immunity. Industrial environment.

In case of any modification or intervention over the equipment by the end-user, the manufacturer is not responsible.

WARNING!:
SLC ADAPT. This is a category C3 UPS product. This is a product for commercial and industrial application in the second environment - installation restrictions or additional measures may be needed to prevent disturbances.

Pay attention to those systems used in vital signs maintenance, medical applications, commercial transport, nuclear power stations, as well as other applications or loads where a failure in the product can cause serious personal injuries or material damages.

Declaration of conformity CE of the product is at the client disposal under previous request to our headquarters offices.

3.2.1. First and second environment.

The following examples of environment cover the majority of UPS installations.

3.2.1.1. First environment.

Environment that includes residential, commercial and light industrial premises directly connected without intermediate transformers to a public low-voltage mains supply.

3.2.1.2. Second environment.

Second environment: Environment that includes all commercial, light industry and industrial establishments other than those directly connected to a low-voltage mains that supplies buildings used for residential purposes.

3.3. ENVIRONMENT.

This product has been designed to respect the Environment and manufactured in accordance with the **ISO 14001 norm**.

Equipment recycling at the end of its useful life:
Our company commits to use the services of authorised societies and according to the regulations, in order to treat the whole recovered product at the end of its useful life (contact your distributor).

Packaging:
To recycle the packaging, follow the legal regulations in force, in accordance with the particular norm of the country where the equipment is installed.

Batteries:
The batteries mean a serious danger for health and environment. The disposal of them must be done in accordance with the regulations in force.

4. OPRESENTATION.

4.1. SYSTEM CONFIGURATION

The Modular UPS is configured by the following part: Power modules, Bypass & Monitoring module, and cabinet with manual Bypass switch. One or several battery strings should be installed to provide backup energy once the utility fails. The UPS structure is shown in Fig. 1.

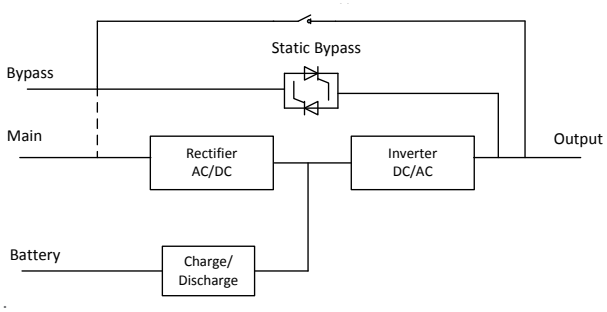


Fig. 1. UPS Configuration

4.2. POWER MODULE

The power module structure is shown as Fig. 2. The power module contains a rectifier, an inverter, and a DC/DC converter for charge and discharge of the external batteries.

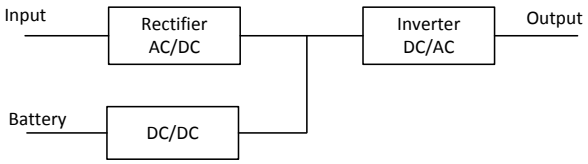


Fig. 2. Power module structure

4.3. OPERATION MODE

The Modular 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

4.3.1. Normal Mode

The inverter of power modules continuously supply the critical AC load. The rectifier/charger derives power from the AC mains input source and supplies DC power to the inverter while simultaneously FLOAT or BOOST charging its associated backup battery.

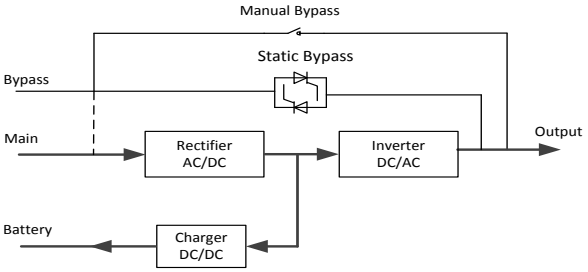


Fig. 3. Normal mode operation diagram

4.3.2. Battery Mode

Upon failure of the AC mains input power, the inverter of power modules, which obtain 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.

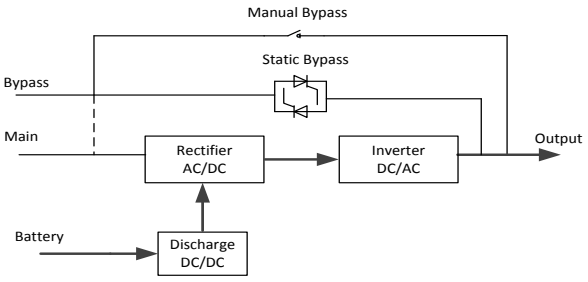


Fig. 4. Battery mode operation diagram

Note:

With the function of Battery cold start, the UPS may start without utility. See more detail in section 8.1.2.

4.3.3. Bypass Mode

If the inverter overload capacity 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.

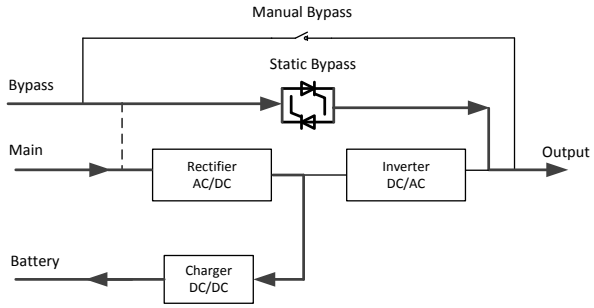


Fig. 5. Bypass mode operation diagram

4.3.4. Maintenance Mode (Manual Bypass)

A manual bypass switch is available to ensure continuity of supply to the critical load when the UPS becomes unavailable e.g. during a maintenance procedure. (See Fig. 6).

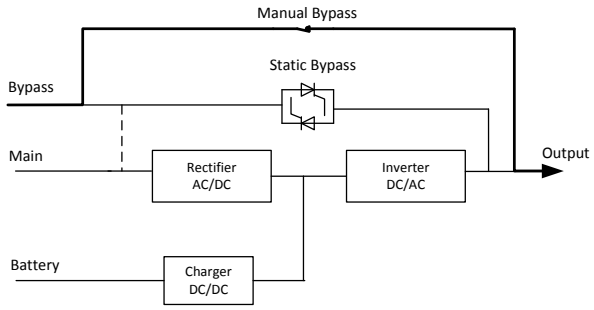


Fig. 6. Maintenance mode operation diagram

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.

4.3.5. ECO Mode

To improve system efficiency, UPS rack system works in Bypass mode at normal time, and inverter is standby. When the utility fails, the UPS transfers to Battery Mode and the inverter powers the loads.

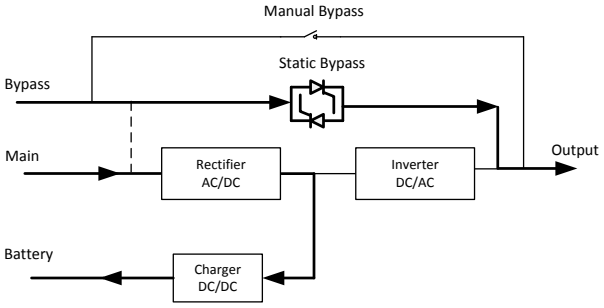


Fig. 7. ECO Mode operation diagram

Note:

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

4.3.6. Auto-restart Mode

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

4.3.7. Frequency Converter Mode

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

4.3.8. UPS Configuration

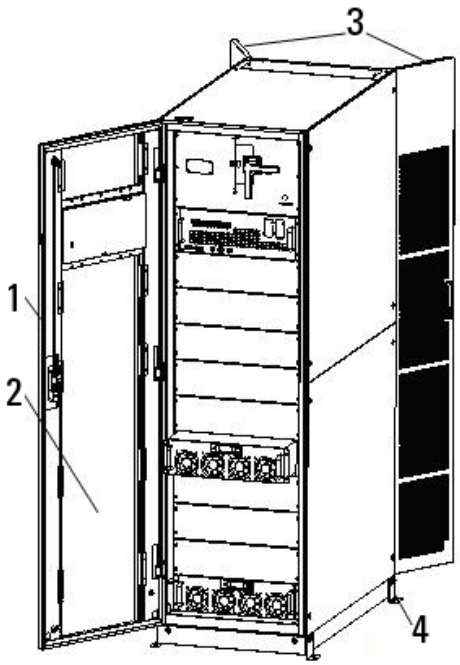
The UPS configuration is provided in Table 1

Item	Components	Quantity/ pcs	Remark
Cabinet	Manual Bypass	1	Requisite, factory installed
	System display	1	Requisite, factory installed
	Bypass & Monitoring module	1	Requisite, factory installed
	Dust filter	1	Optional.
Power module	Power module	1-10	Requisite, installed on site.

Table 1. UPS Configuration.

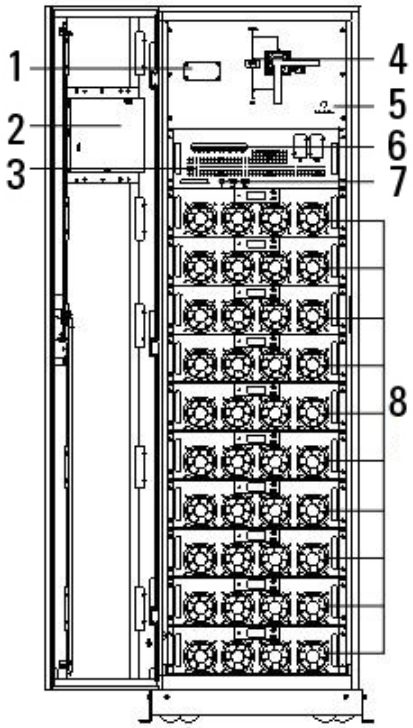
4.3.9. UPS Outlook

The UPS outlook is shown as Fig. 8 to Fig. 10.



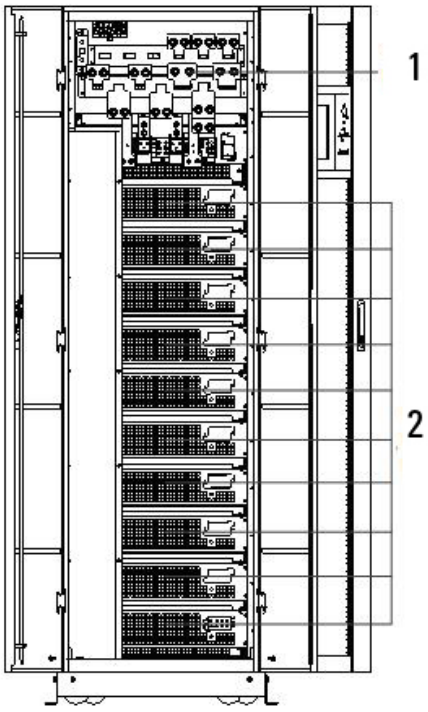
1- Front Door
2- Dust Filter
3- Back Door
4- Foot Print

Fig. 8. System outlook of UPS.



1- SPD (Optional)
2- LCD
3- Bypass & Monitoring Module
4- Manual Bypass
5- Battery Cold star
6- Dry Contact
7- Communication interface
8- Power module

Fig. 9. System outlook-Front view.



1- System Connectors
2- Power module connector

Fig. 10. System outlook-Rears View.

5. INSTALLATION INSTRUCTION

5.1. LOCATION

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

5.1.1. 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 battery is 20ºC-25ºC. Operating above 25ºC will reduce the battery life, and operation below 20ºC 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.

If external batteries are to be used, the battery circuit breakers (or fuses) must be mounted as close as possible to the batteries, and the connecting cables should be as short as possible.

5.1.2. Site Selection

Ensure the ground or installation platform can bear the weight of the UPS cabinet ,batteries and battery rack.

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 ºC to 25ºC.

5.1.3. Size and Weight

The size of three views for the UPS cabinet is shown in Fig. 11.

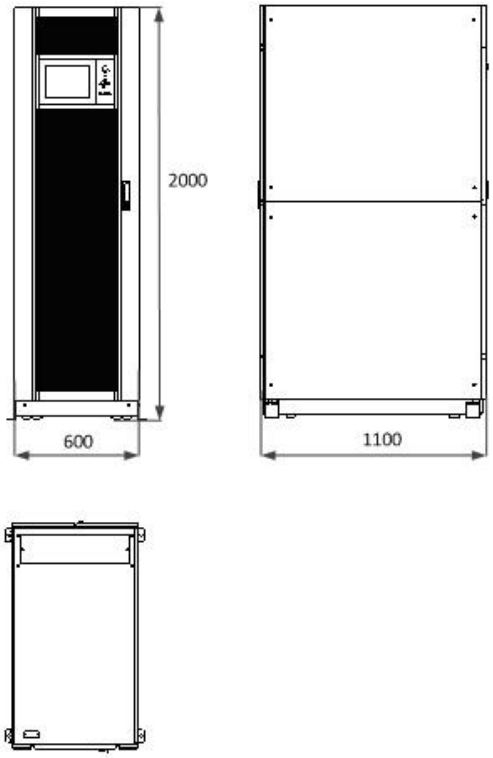


Fig. 11. Size of the UPS cabinet (Unit : mm)

Attention:

Ensure there is at least 0.8m before the front of the cabinet so as to easily maintain the power module with the front door fully open and at least 0.5m behind for ventilation and cooling. The room reserved for the cabinet is shown in Fig. 12.

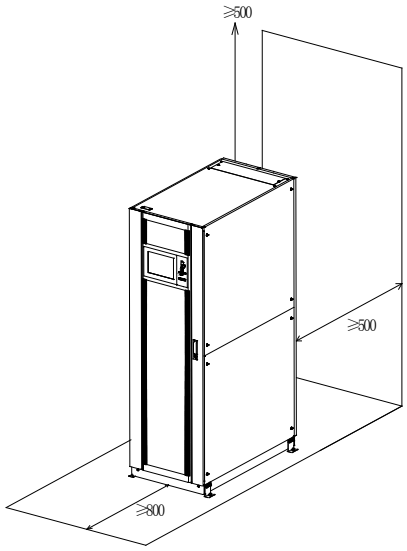


Fig. 12. Room reserved for the cabinet (Unit: mm)

The weight for the UPS cabinet is shown in Table 2.

Configuration	Weight
UPS Cabinet	220Kg
UPS 300KVA	560Kg
UPS 150KVA	390kg

Table 2. Weight for the UPS.

5.2. UNLOADING AND UNPACKING

5.2.1. Moving and Unpacking of the Cabinet

The steps to move and unpack the cabinet are as follows:

1. Check if any damages to the packing. (If any, contact to the carrier)
2. Transport the equipment to the designated site by forklift, as shown in Fig. 13.

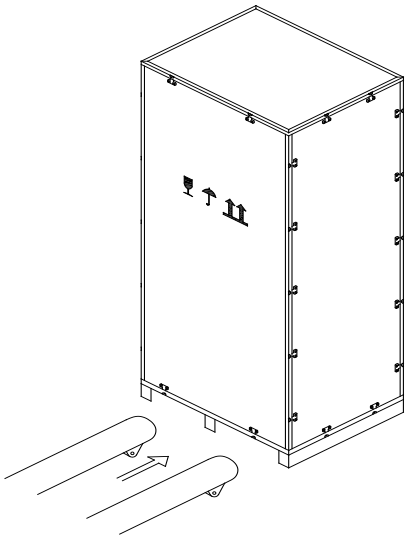


Fig. 13. Transport to the designated site

3. Open the top plate of the steel-edged wooden case with slotted awl and pier, followed by side boards (see Fig. 14).

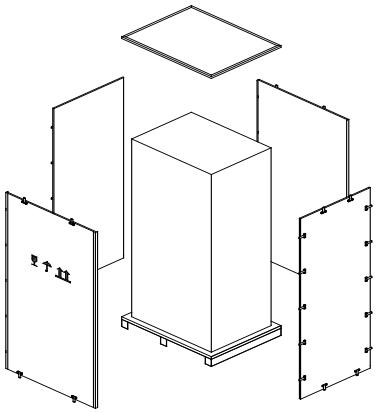


Fig. 14. Disassemble the case

4. Remove the protective foam around the cabinet

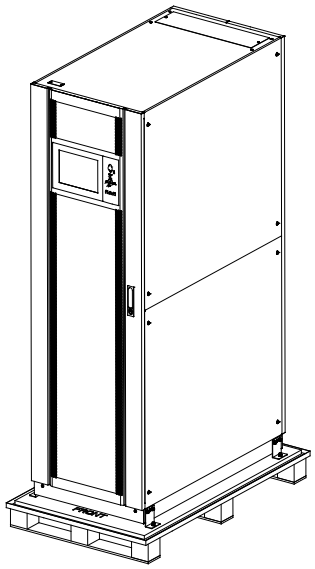


Fig. 15. Remove the protective foam

5. Check the UPS.
   a. Visually examine if there are any damages to UPS during transportation. If any, contact to the carrier.
   b. Check the UPS with the list of the goods. If any items are not included in the list, contact to our company or the local office.
6. Dismantle the bolt that connects the cabinet and wooden pallet after disassembly.
7. Move the cabinet to the installation position.

Attention:

Be careful while removing to avoid scratching the equipment.

5.2.2. Unpacking Power Module

1. The steps to move and unpack the power module are as follows:
2. The packing case must be placed on the platform smoothly, as is shown in Fig. 16.

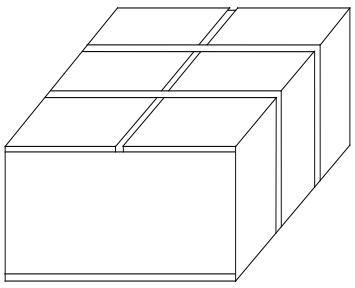
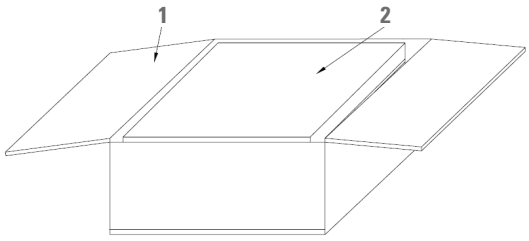


Fig. 16. Place on platform smoothly

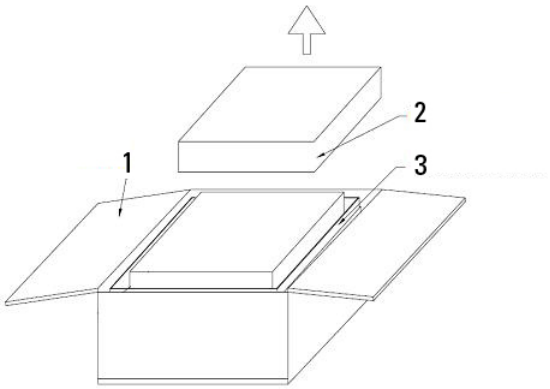
3. Cut the plastic packing belt and scotch tape to open the carton. (See Fig. 17).



1- Carton
2- Foam packing

Fig. 17. Open the carton

4. Remove the foam cover (See Fig. 18).



1- Carton
2- Foam packing
3- Power module

Fig. 18. Remove the foam cover.

5. Take out the UPS with plastic package and dismantle the packaging materials.

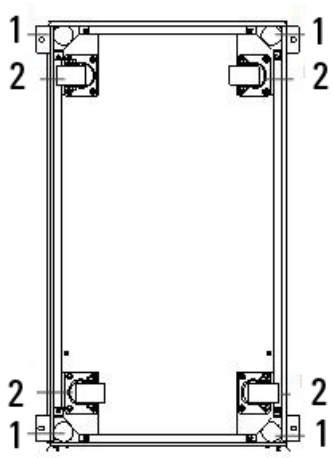
Attention:

The waste materials of unpacking should be disposed to meet the demand for environmental protection.

6. POSITIONING

6.1. POSITIONING CABINET

The UPS cabinet has two way of supporting itself: One is to support itself temporarily by the four wheels at the bottom, making it convenient to adjust the position of the cabinet; The other is by anchor bolts to support the cabinet permanently after adjusting the position of the cabinet. The supporting structure is shown in Fig. 19.



1- Anchor bolts
2- Wheels

Fig. 19. Supporting structure (Bottom view).

The steps to position the cabinet are as follows:

1. Ensure the supporting structure is in good condition and the mounting floor is smooth and strong.
2. Retract the anchor bolts by turning them counterclockwise using wrench, the cabinet is then supported by the four wheels.
3. Adjust the cabinet to the right position by the supporting wheels.
4. Put down the anchor bolts by turning them clockwise using wrench, the cabinet is then supported by the four anchor bolts.
5. Ensure the four anchor bolts are in the same height and the cabinet is fixed and immovable.
6. Positioning done.

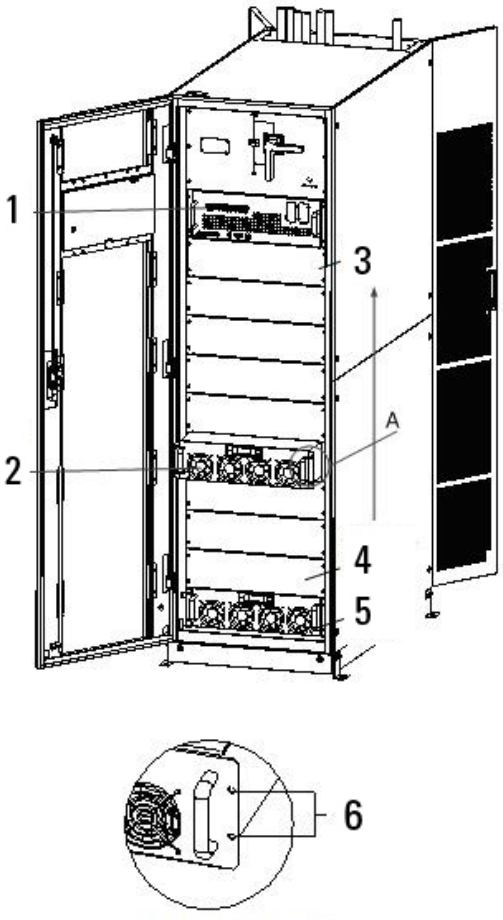
Attention:

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 instance, cover the floor with iron plate or increase the supporting area of the anchor bolts.

6.2. INSTALLING POWER MODULE

The installation position of power module is shown in Fig. 20. Please install the power modules following the principle of from bottom to top to prevent inclination of the cabinet due to high center of gravity. The steps of installing power module are as follows:

1. Ensure the cabinet is fixed and no damage to the body and inserting port of the power module.
2. Hold the handler and the body of the power module by two persons at each side.
3. Insert the module in the installation position, and push it into the cabinet smoothly.
4. Fix the module to the cabinet though the mounting holes on two sides of the front plate of the module (See Fig. 20 right).
5. Installing Power Module done.



1-Bypass module
2- Power module
3-10# Power module
4- 2# Power module
5- 1# Power module
6- Mounting holes

Fig. 20. Installing power module

Note:

The installing method of bypass module is the same as the power module.

6.3. BATTERY

The battery set can be based between 36 and 44 blocks connected in serial, but it will always be an even number due to the internal structure of the equipment, which needs a mid tap or central point (neutral) of them. At the same time, the back up time together with the required power to feed the loads establishes the needed capacity of the battery in Ah.

In Fig. 21, "N" means the total quantity of battery blocks connected in serial, being able to select it among the figures above stated.

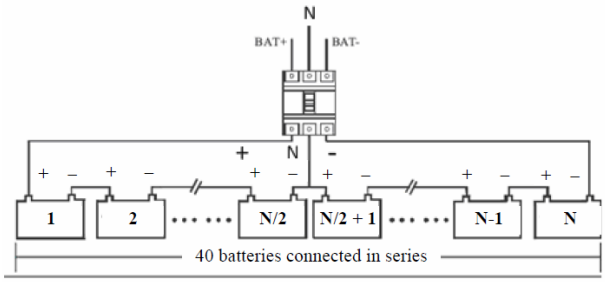


Fig. 21. Battery string wiring diagram

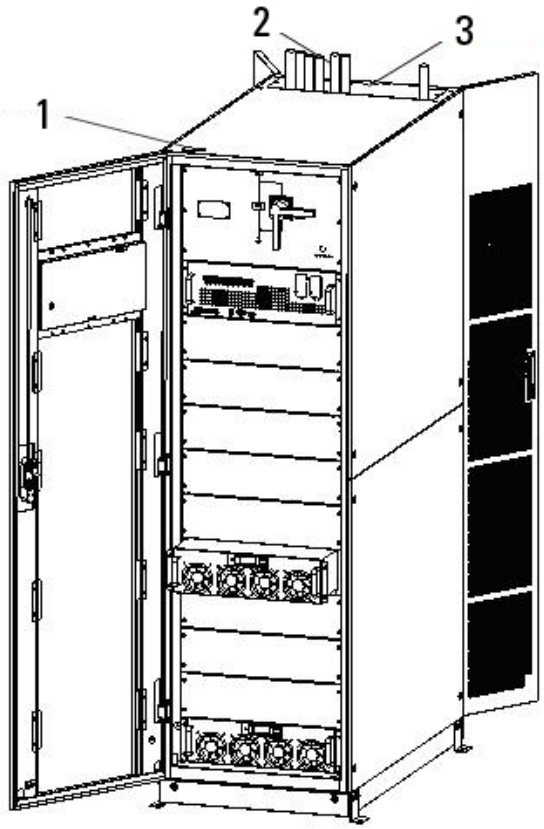
Danger:

The battery terminal voltage is of more than 400Vdc, 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.

6.4. CABLE ENTRY

Cables can enter the UPS cabinet from the top. Cable entry is made possible through a blanking plate fitted at the top of the equipment. The cable entry is shown in Fig.22.



1- Signal Cables
2- Power Cables
3- Blanking plate

Fig. 22. Cable entry

6.5. POWER CABLES

6.5.1. Specifications

The «Recommended installation» information for each input and output setting is available with the supplied documentation, manual and/or CD. In that information is shown the circuit diagram, as well as the protection size and minimum cross section of the wires that are connected to the equipment, taking into account the nominal operating voltage. All figures are calculated for a **maximum total cable length of 30 m** between the distribution panel board, equipment and loads.

- For longer lengths correct the cross sections accordingly, in order to avoid dropping voltages, by respecting the Regulations or norms corresponding to the country.
- In the own documentation and for each setting, it is available the information for «N» units in parallel, as well as the features of the own «Backfeed protection».

6.5.2. Power switch

From the initials CB in English (Circuit Breakers), the recommendations are the following:

POSITION	150KVA	300KVA
Input switch	300A/3P	600A/3P
Bypass input switch	250A/3P	500A/3P
Output switch	250A/3P	500A/3P
Batteries switch	400A,250Vdc	800A,250Vdc

Tabla 3. Recommendations

Attention:

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

6.5.3. Connecting Power Cables

The steps of connecting power cables are as follows:

1. Verify that all the external input distribution switches of the UPS are completely open and the UPS internal maintenance bypass switch is opened. 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. 23.

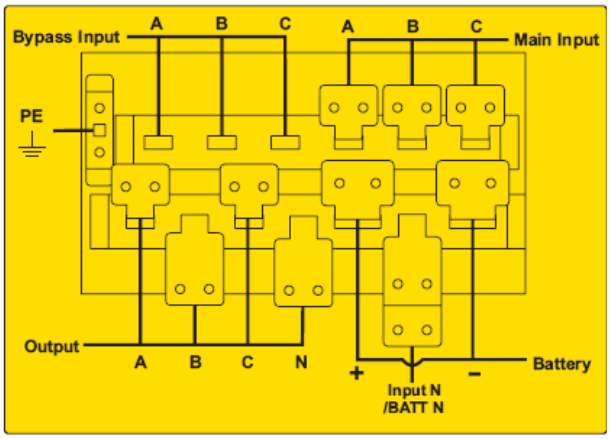


Fig. 23. Connections terminals.

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 make sure there is no mistake and re-install all the protective covers.

Attention :

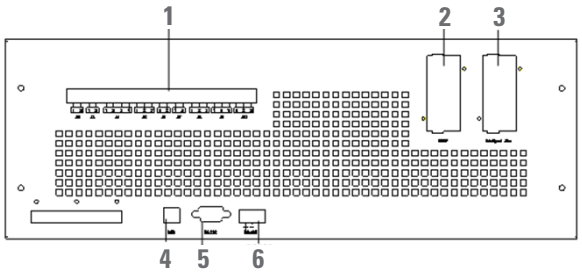
The operations described in this section must be performed by authorized electricians or qualified technical personnel. If you have any difficulties, contact the manufacturer or agency.

Warning :

- Tighten the connections terminals to enough torque moment, and please ensure correct phase rotation.
- The grounding cable and neutral cable must be connected in accordance with local and national codes.

6.6. CONTROL AND COMMUNICATION CABLES

The front panel of the bypass module provides dry contact interface (J2-J11) and communication interface (RS232, RS485, SNMP ,Intelligent card interface and USB port), as it is shown in Fig. 24.



1- Dry Contact Interface
2- SNMP card
3- Intelligent Slot
4- USB Port
5- RS-232
6- RS-485

Fig. 24. Dry contact &communication interface .

- **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 Fig. 25, the description of interface is in Table 4.

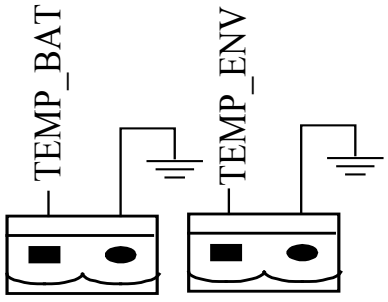


Fig. 25. J2 and J3 for temperature detecting

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

Table 4. Description of J2 and J3.

- **Remote EPO Input Port**

J4 is the input port for remote EPO. It requires shorting NC and +24V and 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 Fig. 26, and port description is shown in Table 5.

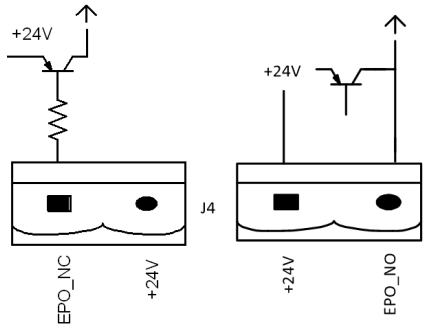


Fig. 26. Diagram of input port for remote EPO

Port	Name	Function
J4-1	REMOTE_EPO_NC	Trigger EPO when disconnect with J4-2
J4-2	+24V_DRY	+24V
J4-3	+24V_DRY	+24V
J4-4	REMOTE_EPO_NO	Trigger EPO when connect with J4-3

Table 5. Description of input port for remote EPO.

- **Aux. contact external manual bypass Input Dry Contact**

The default function of J5 is the interface for external manual bypass J5 Connect pin 2 of J5 with +24V power supply; it indicates that the external manual bypass MCB has been connected and the load are supplied the mains. The interface diagram is shown in Fig. 27, and interface description is shown in Table 6.

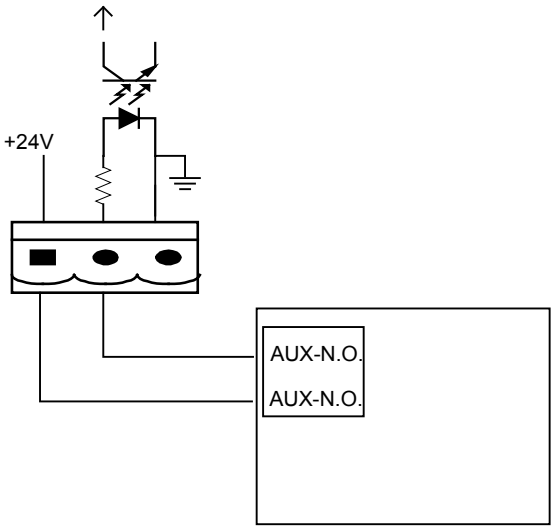


Fig. 27. Diagram of aux. contact external manual bypass MCB

Port	Name	Function
J5-1	+24V_DRY	+24V
J5-2	EXTERNAL_MAINT_ BYPASS	Aux. contact –NO- external manual bypass MCB
J5-3	GND_DRY	Power ground for +24V

Table 6. Description of status interface and connection of aux. contact external manual bypass MCB.

- **BCB Input Port**

The default function of J6 and J7 are the ports of BCB. The port diagram is shown in Fig. 28, and description is shown in Table 7.

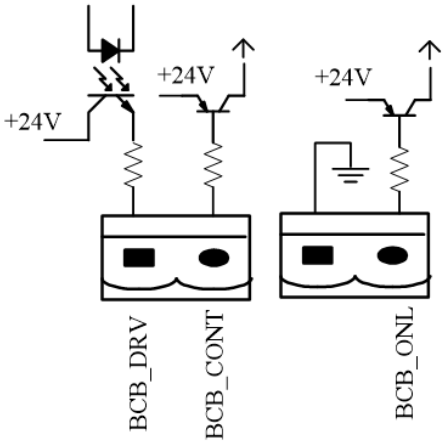


Fig. 28. BCB Port.

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

Table 7. Description of BCB port.

- **Bypass Output Dry Contact Interface .**

The default function of J8 is the bypass output dry contact interface. The interface diagram is shown in Fig. 29, and description is shown in Table 8.

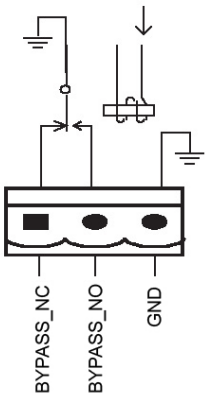


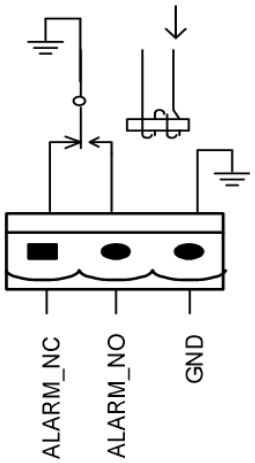
Fig. 29. Bypass dry contact interface diagram

Port	Name	Function
J8-1	BYPASS_ALARM_NC	Bypass relay (normally closed). It will open during the bypass condition equipment.
J8-2	BYPASS _ALARM_NO	Bypass relay (normally open). It will closed during the bypass condition equipment.
J8-3	BYPASS _ALARM_GND	Common terminal

Table 8. Bypass dry contact interface description.

- **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.



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

Table 9. General alarm dry contact interface description.

- **Utility Fail Warning Output Dry Contact Interface**

The default function of J10 is the output dry contact interface for utility failure warning, when the utility fails, the system will send a utility failure warning information, and provide an auxiliary dry contact signal via the isolation of a relay. The interface diagram is shown in Fig. 30, and description is shown in Table 10.

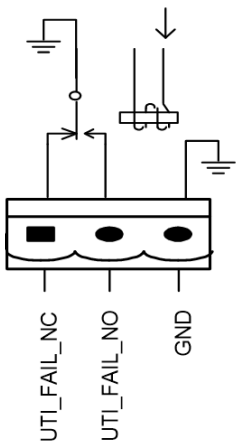


Fig. 30. Utility failure warning dry contact interface diagram

Port	Name	Function
J10-1	UTILITY_FAIL_NC	Mains failure warning relay(normally closed) will be open during warning
J10-2	UTILITY_FAIL_NO	Mains failure warning relay (normally open) will be closed during warning
J10-3	UTILITY_FAIL_GND	Common terminal

Table 10. Utility failure warning dry contact interface description.

6.6.1. 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).

Intelligent card interface: Extension dry contact interface (Optional).

7. LCD PANEL

7.1. INTRODUCTION

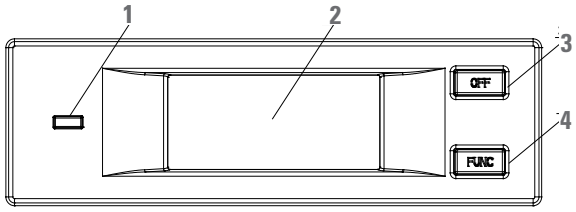
This chapter introduces the functions and operator instructions of the operator control and display panel in detail, and provides LCD display information, including LCD display types, detailed menu information, prompt window information and UPS alarm information.

7.2. OPERATIONS OF LCD PANEL

This section presents the operations of LCD panels for the power module and cabinet.

7.3. LCD PANEL FOR POWER MODULE

The structure of LCD panels for power module is shown in Fig.31.



1- Status indicator
2- LCD Display
3- OFF Key
4- Function Key

Fig. 31. Control and display panel for power module

The operator control panel is divided into three functional areas: Status indicator, control and operation keys and LCD display.

7.3.1. LED Indicator

The LED indicator has green and red colors to indicate the statuses and faults by combinations of different colors and the time it lasts. The combinations are listed in Table 11.

No.	LED combinations	Description
1	Green short-time flashing 1 (Green for 1S, Off for 2S)	Rectifier soft starting
2	Green short-time flashing 1 (Green for 1S, Off for 2S)	Inverter soft starting
3	Green medium-time flashing (Green for 1S, Off for 5S)	Power module inverter standby
4	Green long-time flashing (Green for 2S, Off for 10S)	Power module in deep sleep (shutdown)
5	Steady green	UPS is working normally
6	Red and Green Alternating (Red for 1S,Green for 5S)	The load powered by inverter with warnings (No battery, battery discharging, overload etc.)
7	Steady red	Power module shutdown by fault
8	Red medium-time flashing (Red for 1S, Off for 5S)	Shutdown manually or by monitoring software
9	Red short-time flashing (Red for 1S, Off for 1S)	Situation except above

Table 11. Statues and faults of different combinations.

7.3.2. Control and Operation Keys

The control and operation keys include FUNC keys and OFF key that have different functions:

a. The FUNC key is used for turning the display pages;

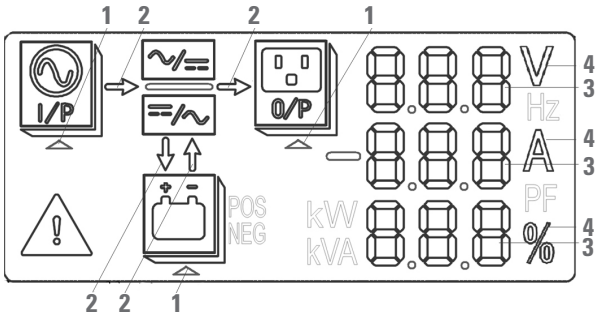
b. The OFF key is mainly for turning off the power module:1)Enable.LCD panel -> Menu Operate 

-> Enable Module "OFF" Key 
;2)Press the "OFF" key for 3 seconds, the power module quits from the system.;

c. Pressing the FUNC keys resets the LCD display.

7.3.3. LCD Display

LCD is for displaying the information for the module and its structure is shown in Fig.32.



1- Select triangle
2- Enregy bar
3- Digit Display Area
4- Unit

Fig. 32. LCD display

Users can browse the information of each power module by pressing the FUNC key to turn the pages.

- Select triangle of  :highlighted:

  Input information is presented in the Digit Displays Area: 3-phase voltage and 3-phase current.

- Select triangle of  :highlighted:

  Output information is presented in the Digit Displays Area: 3-phase voltage, 3-phase current and the 3-phase load percentage.

- Select triangle of  highlighted:

  Battery information is presented in the Digit Displays Area: Battery positive voltage, battery positive charge/discharge voltage and bus positive voltage; battery negative voltage, battery negative charge/discharge current and bus negative voltage.

- Select triangle of  highlighted:

  Battery information is presented in the Digit Displays Area: battery negative voltage, battery negative charge/discharge current and bus negative voltage.

-  highlighted:

  Fault and warning codes are shown in Digit Displays Area in recycle (shown with short dash when less than 3).The meanings of the codes are listed in Table 12.

-  :flashing:

  Indicating a fault occurs.

- Energy bar of  :

  a. Flashing: Rectifier soft start;

  b. Highlighted: The rectifier is working normally;

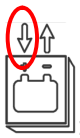
  c. Off: Other situation.

- Energy bar of  :

  a. Flashing: Inverter starting;

  b. Highlighted: Load on inverter;

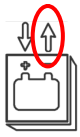
  c. Off: Other situation.

- Energy bar of  :

  a. Flashing: low battery voltage;

  b. Highlighted: Charging normally;

  c. Off: battery not connected.

- Energy bar of  :

  a. Lightened: Discharging mode;

  b. Off: battery not connected or charging.

Unit: Voltage (V), Current (A), Percentage (%).

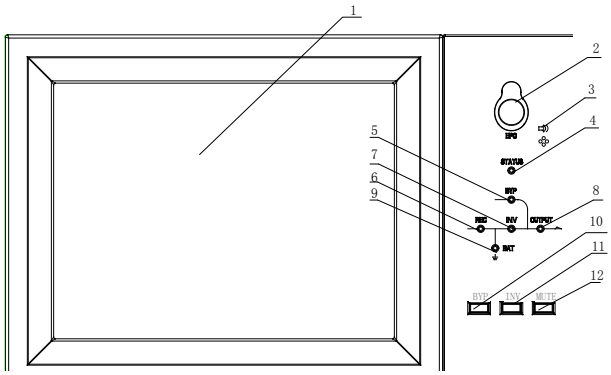
When one power module is turning page, the other modules are turning delayed by 2 seconds.

Codes	Description
16	Main abnormal
18	Bypass phase sequence fault
20	Bypass voltage abnormal
28	Bypass Over-track frequency
30	Over-transferring-time
32	Output shorted
34	EOD of battery
38	Battery test fail
41	Battery maintenance fail
47	Rectifier fail
49	Inverter fail
51	Rectifier over temperature
53	Fan fail
55	Output overload
57	Output overload time out
59	Inverter over temperature
61	UPS inverter Inhibited
65	Low battery
67	Battery phase reversed
69	Inverter protected
71	Neutral disconnected
74	Module shut down manual
81	Battery or charger fail
83	Lost N+X redundancy
85	EOD system inhibited
93	Inverter data CAN fail
95	Data CAN fail
97	Power share fail
109	Inverter bridge open
111	Temperature difference over limit
113	Input current unbalanced
115	DC bus over voltage
117	Rectifier soft start fail
119	Relay open
121	Relay shorted
127	Transfer to inverter manually

Tabla 12. codes for faults and warnings

7.4. LCD PANEL FOR CBINET

The structure of operator control and display panel for cabinet is shown in Fig. 33.



1-LCD touch screen
2: EPO switch
3: Audible Alarm (Buzzer)
4: Status indicator
5: Bypass indicator
6: Rectifier indicator
7: Inverter indicator
8: Load indicator
9: Battery indicator
10: Bypass transfer
11: Inverter transfer
12: Mute

Fig. 33. Control and display panel for cabinet

The LCD panel for cabinet is divided into three functional areas: LED indicator: control and operation keys and LCD touch screen.

7.4.1. LED Indicator

There are 6 LEDs on the panel to indicate the operating status and fault. The description of indicators is shown in Table 13.

Indicator	State	Description
Rectifier indicator	Steady green	Rectifier normal for all modules
	Flashing green	Rectifier normal for at least one module, mains normal
	Steady red	Rectifier fault
	Flashing red	Mains abnormal for at least one module
	Off	Rectifier not operating
Battery indicator	Steady green	Load supplied by inverter
	Flashing green	Inverter on, start, synchronization or standby (ECO mode) for at least one module
	Steady red	System output not supplied by inverter, inverter fault for at least one module.
	Flashing red	System output supplied by inverter, inverter fault for at least one module.
	Off	Battery and battery converter normal, battery not charging

Indicator	State	Description
Bypass indicator	Steady green	Load supplied by bypass
	Steady red	Bypass abnormal or out of normal range, or static bypass switch fault
	Flashing red	Bypass voltage abnormal
	Off	Bypass normal
Inverter indicator	Steady green	Load supplied by inverter
	Flashing green	Inverter on, start, synchronization or standby (ECO mode) for at least one module
	Steady red	System output not supplied by inverter, inverter fault for at least one module.
	Flashing red	System output supplied by inverter, inverter fault for at least one module.
	Off	Inverter not operating for all modules
Load indicator	Steady green	UPS output ON and normal
	Steady red	UPS overload time is out, or output short, or output no power supply
	Flashing red	Overload output of UPS
	Off	No output of UPS
Status indicator	Steady green	Normal operation
	Steady red	Failure

Tabla 13. Status description of indicator

There are two different types of audible alarm during UPS operation, as shown in Table 14.

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)

Table 14. Description of audible alarm

7.4.2. Control and Operation Keys

The central touch screen has keys with different functionalities. See Table 15 for the description of each one.

Function Key	Description
EPO	Long press, cut off the load power (shut down the rectifier, inverter, static bypass and battery)
BYP	Long press, transfer to the bypass(Push the button up in the back of the door to enable ,see Fig.5.2)
INV	Long press, transfer to the inverter
MUTE	Long press to switch between turning off and on the buzzing

Table 15. Functions of Control and operation keys

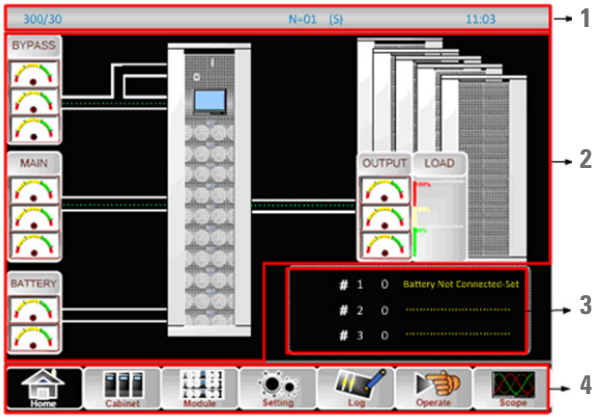
Attention:

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

7.4.3. LCD touch Screen

Users can easily browse the information, operate the UPS, and reset the parameters through the LCD touch screen, which is friendly for users.

After the monitoring system starts self-test, the system enters the home page, following the welcome window. The home page is shown in Fig. 34.



1-Status bar
2: Warning Information
3: Information Display
4: Main Menu

Fig. 34. Home page

- **Status bar**

The Status bar contains the model of the product, capacity, operational mode , and the number of the power module and the time of the system.

- **Warning Information**

Display the warning information of the cabinet.

- **Information Display**

Users can check the information of the cabinet in this area.
The bypass voltage, main input voltage, battery voltage, and output voltages are presented in the form of gauge.

The loads are displayed in the form of bar chart in percentage. The green area stands for a load of less than 60%, yellow area for a load of 60%-100% and red area for a load of more than 100%.
The energy flow mimics the flow of the power.

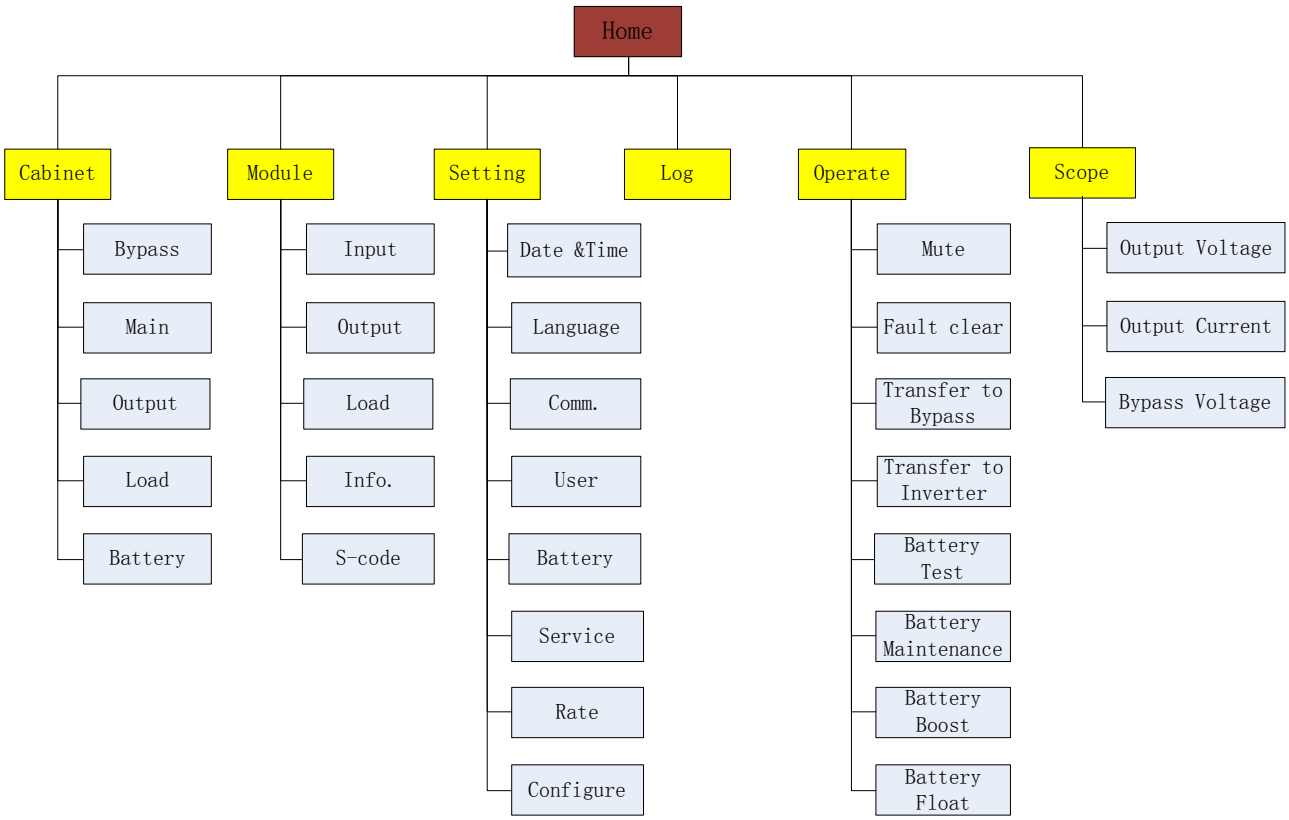


Fig. 35. Structure of menu tree

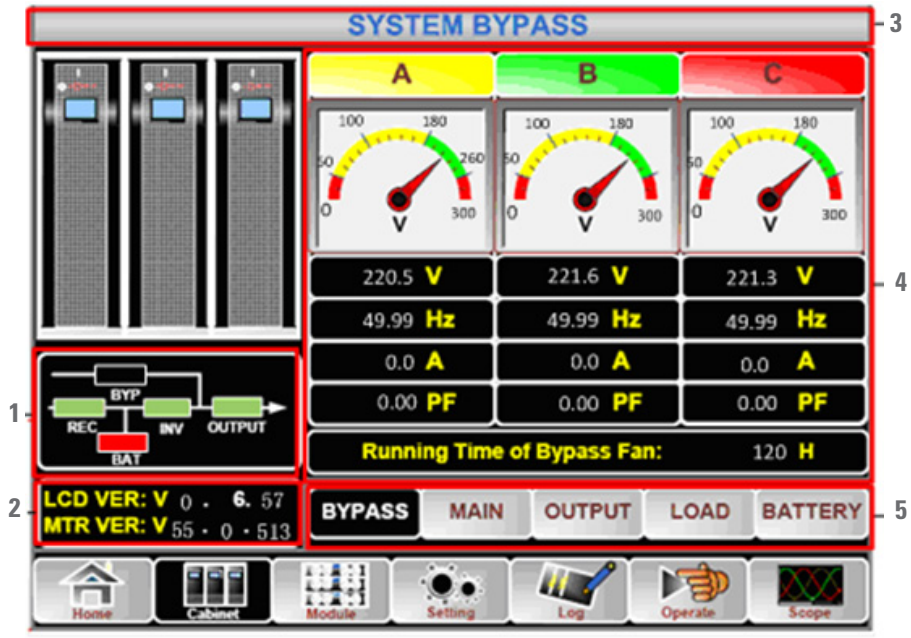
7.5. MAIN MENU

The main menu includes Cabinet, Module, Setting, Log, Operate and Scope and it is described in details below.

7.5.1. Cabinet

Touch the icon 

, (At the bottom left of the screen), and the system enters the page of the Cabinet, as it is shown in Fig. 36.



1- Running status, 2- Version information, 3- Title, 4- Information display, 5- Submenu

Fig. 36. Cabinet

The Cabinet comprises sectors of title, information display, version running status information display and submenu. The sectors are described as follows.

- **Title**

  Display the information of the selected submenu.

- **Running status**

  The squares shown on the mini current path represent the various UPS power paths and show the current UPS operating status. (The green square indicating the module working normally, the white indicating the absent of the module and red indicating the absence of the module or in fault).

- **Version Information**

  The version information for LCD of the power module and monitor.

- **Submenu**

  It includes the submenu of Bypass, Main, Output, load and battery.

- **Information display**

  Display information of each submenu.

The interface of each submenu is shown from Fig. 37 to Fig. 40.

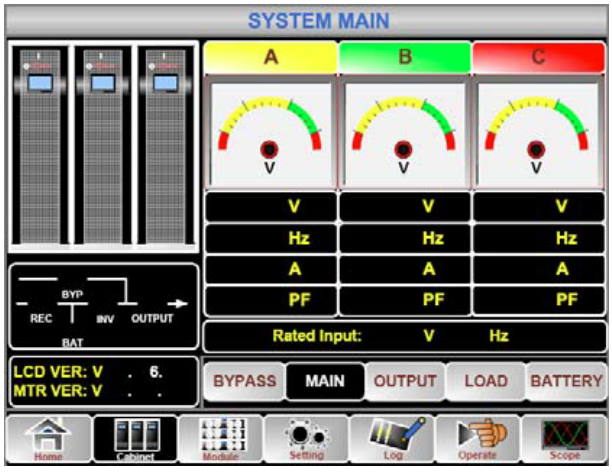


Fig. 37. Submenu interface of Cabinet: Interface of Main

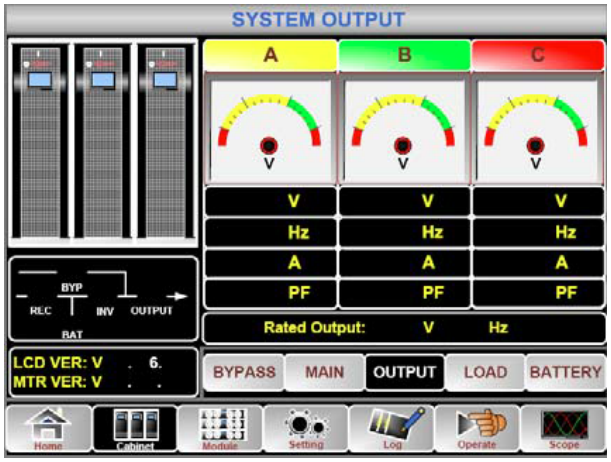


Fig. 38. Submenu interface of Cabinet: Interface of Output

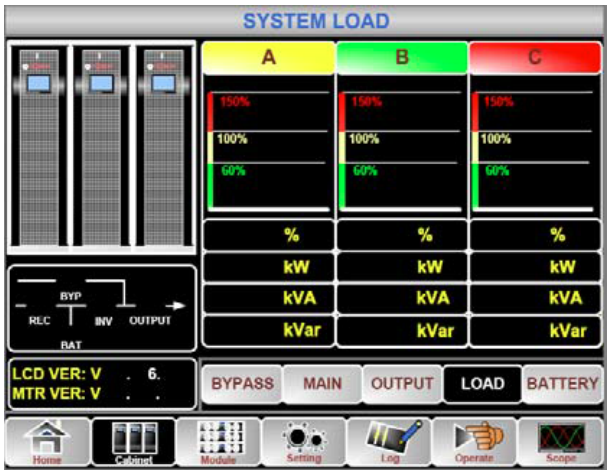


Fig. 39. Submenu interface of Cabinet: Interface of Load

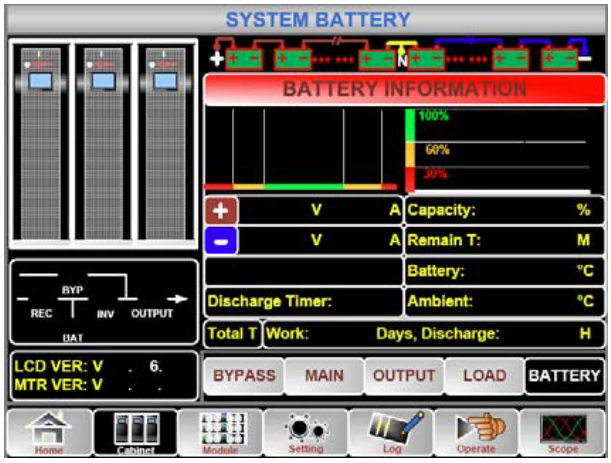


Fig. 40. Submenu interface of Cabinet: Interface of Battery

The submenu of Cabinet is described in details below in Table 16.

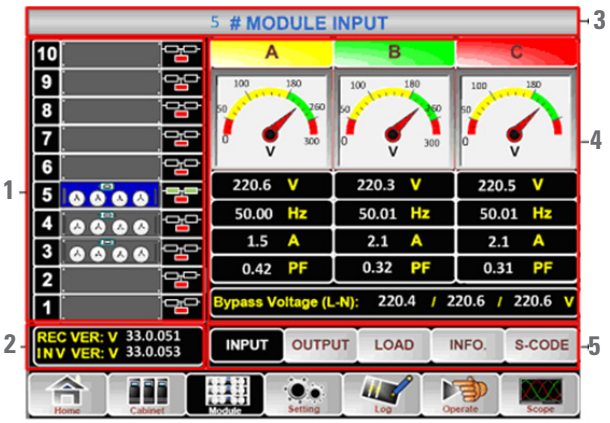
Submenu Name	Contents	Meaning
Main	V	Phase voltage
	A	Phase current
	Hz	Input frequency
	PF	Power factor
Bypass	V	Phase voltage
	A	Phase voltage
	Hz	Bypass frequency
	PF	Phase current
Output	V	Phase voltage
	A	Phase current
	Hz	Output frequency
	PF	Power factor
Load	kVA.	Sout: Apparent Power
	kW	Pout: Active Power
	kVAr	Qout: Reactive power
	%	Load (The percentage of the UPS load)
Battery	V	Battery positive/negative Voltage
	A	Battery positive/negative Current
	Capacity (%)	The percentage compared with new battery capacity
	Remain T (Min)	Remaining battery backup time
	Battery	Battery Temp
	Ambient	Environmental Temp
	Total Work T	Total work time
	Total Discharge T	Total discharging time

Table 16. Description of each submenu of Cabinet

7.5.2. Module

Touch the icon 

, (At the bottom left of the screen), and the system enters the page of the Module, as is shown in Fig. 41.



1- Power module information
2- Version information
3- Title
4- Information display
5- Submenu

Fig. 41. Module

The Cabinet comprises sectors of title, information display, power module information, version information and submenu. The sectors are described as follows.

- **Title**

Present the title of submenu of the selected power module.

- **Information display**

Display information of each submenu.

- **Power module information**

The users can choose the power module to browse the information in the "Information display" sector.
Colors of the square on the mimic current path represent the various power module paths and show the current operating status.

- The green square indicating the module working normally,
- The black indicating module in invalid
- The red indicating the absence of the module or in fault

Take the 5#module for example. It indicates that UPS is in Normal mode and the rectifier and inverter are working normally .The battery is not connected.

- **Version Information**

The version information for rectifier and inverter of the selected module.

- **Submenu**

The submenu includes Input, Output, Load, INFO. and S-CODE. Users can enter the interface of each submenu by directly touching the icon .Each interface of the submenu is shown in Fig. 42.

(a) Output

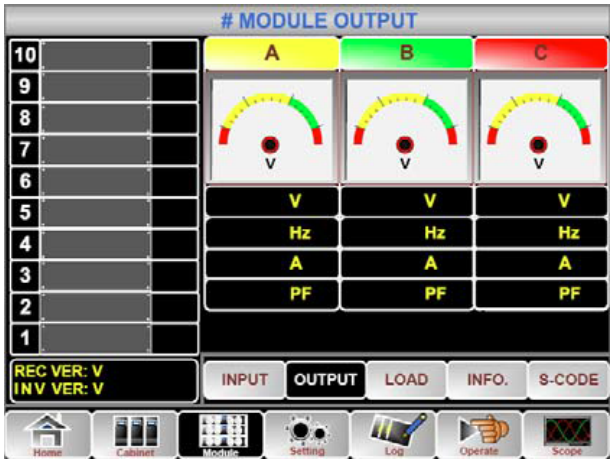


Fig. 42. Module menu: Interface of Output

(b) Load

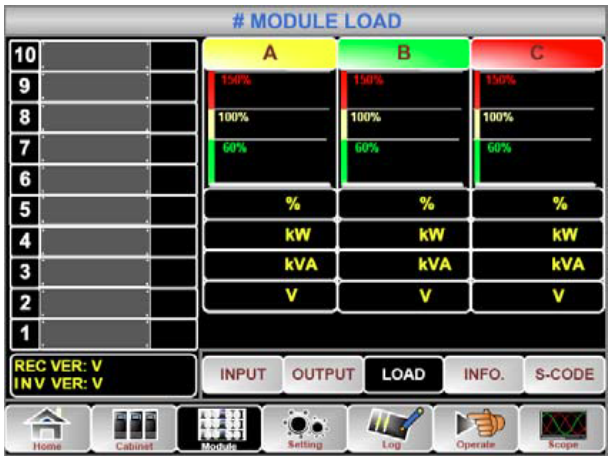


Fig. 43. Module menu: Interface of Load

(c) Module information

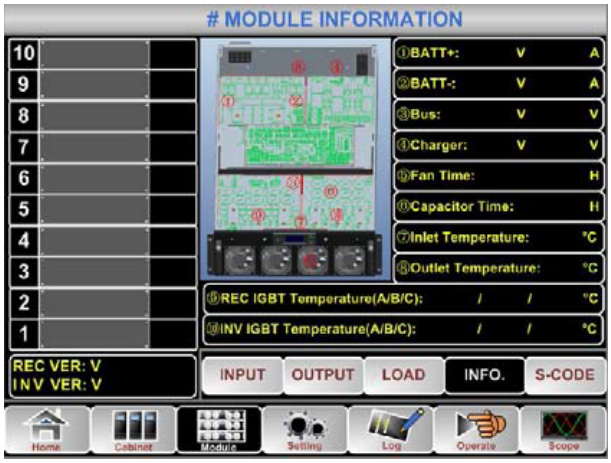


Fig. 44. Module menu: Interface of Information

(d) S-Code

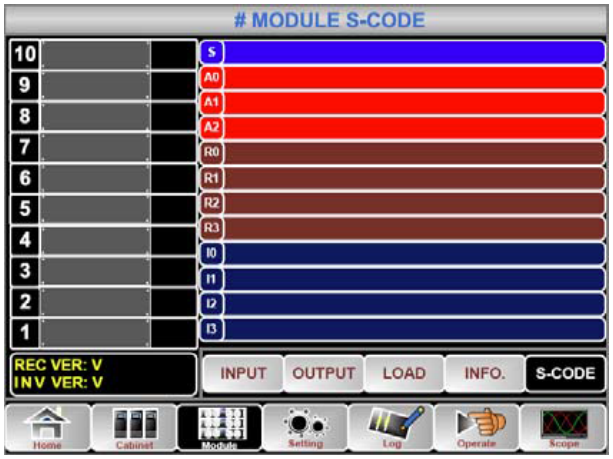


Fig. 45. Module menu: Interface of S-Code

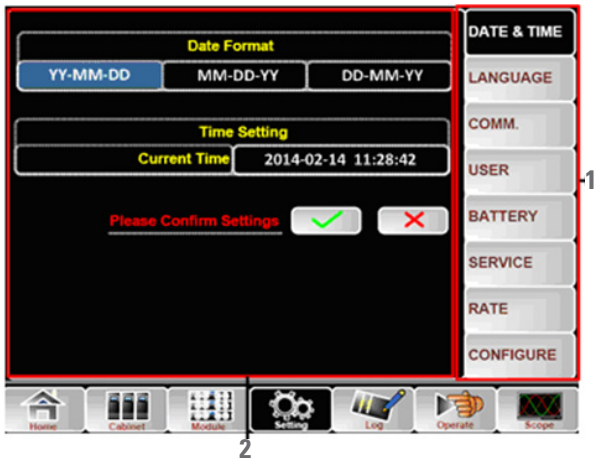
The submenus of Module are described below in details in Table 17.

Submenu Name	Contents	Meaning
Input	V	Input phase voltage of selected module
	A	Input phase current of selected module
	Hz	Input frequency of selected module
	PF	Input power factor of selected module
Output	V	Output phase voltage of selected module
	A	Output phase current of selected module
	Hz	Output frequency of selected module
	PF	Output power factor of selected module
Load	V	Load voltage of selected module
	%	Load (The percentage of the power module selected)
	kW	Pout: Active Power of each
	kVA	Sout: Apparent Power
Information	BATT+(V)	Battery Voltage (positive)
	BATT-(V)	Battery Voltage (negative)
	BUS(V)	Bus Voltage(Positive & Negative)
	Charger(V)	Charger Voltage(Positive & Negative)
	Fan Time	Total Running time of the selected power module
	Inlet Temperature(°C)	Inlet Temperature of the selected power module
	Outlet Temperature(°C)	Outlet Temperature of the selected power module
S-code	Fault Code	For the maintenance personne

Table 17. Description of each submenu of Module

7.5.3. Setting

Touch the icon  , (At the bottom of the screen), and the system enters the page of the Setting, as it is shown in Fig. 46.



1- Submenus
2- Setting interface

Fig. 46. Setting menu

Note:

- Users have various permissions to the configuration of the Setting :(a) for the Date &Time, LANGUAGE and COMM, user can set on their own. (b)For the USER, a one-level password is needed and the setting must be done by commissioning engineer (c) For the Battery and SERVICE, a Two-level password is needed and it is set by the after-service personal. (d)For the RATE and CONFIGURE, a Three-level password is needed and it is set only by the factory.
- The "C" stands for Ampere number. For instance, if the battery is 100AH, then C=100A..

Warning:

Ensure the number of the battery set is completely in accord with the practice, otherwise, it will cause serious damage to the batteries or the equipment.

The options for each of the submenus are detailed below:

Submenu Name	Contents	Meaning
Submenu Name	Date format setting	Three format: (a) year/month/day,(b) moth/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)
	Baudrate	Setting the baudrate of SNT, ModBus and YD/T
	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 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 BypassSettable, +-1Hz, +-3Hz, +-5Hz
	Dust Filter Maintenance Period	Setting Dust Filter Maintenance Period
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)
	EOD(End of charge) Voltage/Cell,@0.6C Current	EOD voltage for cell battery,@0.6C
	EOD(End of charge) Voltage/ Cell,@0.15C Current	EOD voltage for cell battery,@0.15C
	Charge Current Percent Limit	Charge current (percentage of the rated current)
	Battery Temperature 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	Setting the system mode: Single ,parallel, Single ECO, parallel ECO,LBS, parallel LBS
RATE	Configure the rated Parameter	For the factory use
CONFIGURE	Configure the system	For the factory use

Table 18. Description of each submenu of Setting

7.5.4. Log

Touch the icon 

, (At the bottom of the screen), and the system enters the interface of the Log, as it is shown in Fig.47. The log is listed in reverse chronological order, which displays the events ,warnings and faults information and the time they occur and disappear.

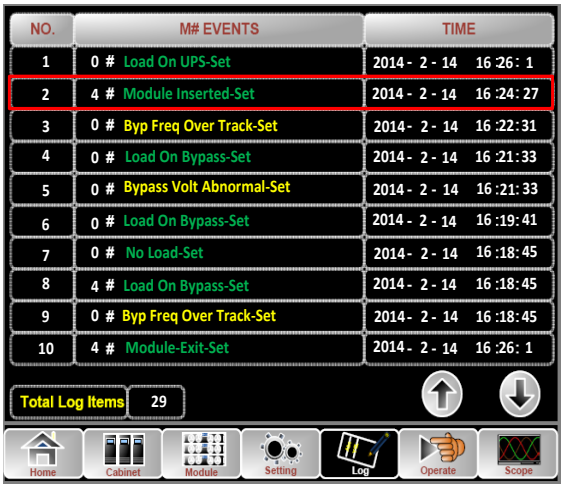


Fig. 47. Log menu

Every incident recorded in the table includes the sequence number, the content of the incident and the time when it occurs, as is marked in the red box.

- Sequence number

The serial number for the incident.

- Content of the incident

Display the information of events, warnings and faults. (0# means the event happens to the cabinet, n# means the information is sent by the nth power module.)

- Time for the Event

The time the incident occurs.

- Total Log Items

Display the total number of incidents. The system can record 895 incidents. If the number exceeds 895, the system will delete the earliest incidents.

Turn the list page up/down to check the information of the incidents.

The Table 19 below displays all the incidents and gives a brief explanation.

Sq.	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 then 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

Sq.	LCD Display	Explanation
39	Battery Maintenance-Set	Battery Maintenance Starts
40	Batt Maintenance OK-Set	Battery maintenance succeeds
41	Batt Maintenance Fail-Set	Battery maintenance fails
42	Module Inserted-Set	N# Power Module joins the system
43	Module Exit-Set	N# Power Module quits the system.
44	Rectifier Fail-Set	N# Power Module Rectifier Fails
45	Rectifier Fail-Clear	Incident above disappears
46	Inverter Fail-Set	N# Power Module Inverter Fail
47	Inverter Fail-Clear	Incident above disappears
48	Rectifier Over Temp.-Set	N# Power Module Rectifier Over Temperature
49	Rectifier Over Temp.-Clear	Incident above disappears
50	Fan Fail-Set	N# Power Module Fan Fail
51	Fan Fail-Clear	Incident above disappears
52	Output Overload-Set	N# Power Module Output Over Load
53	Output Overload-Clear	Incident above disappears
54	Inverter Overload Tout-Set	N# Power Module Inverter Over Load Timeout
55	INV Overload Tout-Clear	Incident above disappears
56	Inverter Over Temp.-Set	N# Power Module 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	N# Power Module 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	N# Power Module 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

Table 19. List for incidents

Note:

Different colors of the words represent different level of incidents: (a)Green, an event occurs: (b)Grey, the event occurs then clears: (c)Yellow, warning occurs: (d) Red, faults happen.

7.5.5. Operate

Touch the icon 

, (At the bottom of the screen), and the system enters the page of the Operate, as it is shown in Fig.48.

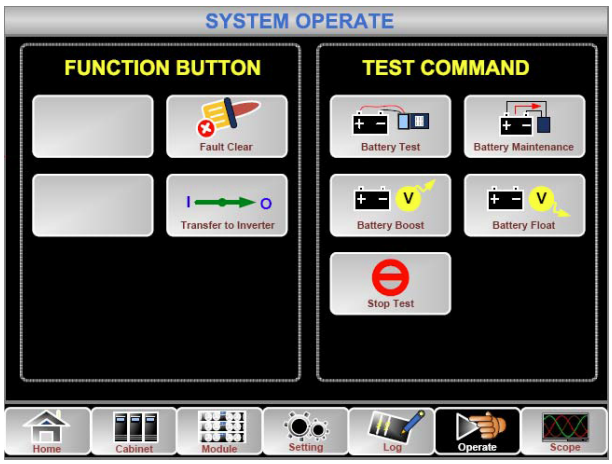


Fig. 48. Operate menu

The Operate menu includes function button and test command. The contents are described in details below.

FUNTION BUTTON

- **Clear/Restore Buzzing**

  Clear or Restore buzzing of the system by touching the icon 

or 

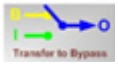
.

- **Fault Clear**

  Clear the faults by touching the icon 

.

- **Transfer to \ESC Bypass**

  Transfer to or ESC bypass mode by touching the icon 

or 

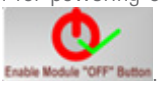
.

- **Transfer to Inverter**

  Transfer the bypass mode to Inverter Mode by touching the icon 

.

- **Enable Module "OFF" Button**

  Enable the switch for powering off the Power Module 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.

- **Reset Dust filter Using Time**

  Reset the time of dust filter using by touching the icon 

, it includes the days of using and maintenance period.

TEST COMMAND

- **Battery Test**

  By touching the icon 

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

- **Battery Maintenance**

  By touching the icon 

, the system 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.

7.5.6. Scope

Touch the icon 

, (At the bottom right of the screen), and the system enters the page of the Operate, as it is shown in Fig.49.

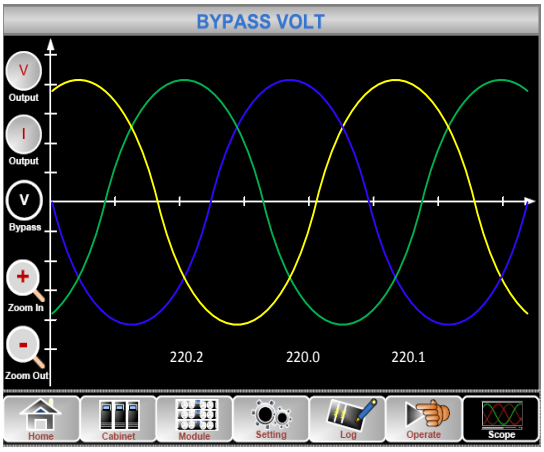


Fig. 49. Scope Menu

Users can view the waves for output voltage, output current and bypass voltage by touching the corresponding icon in the left side of the interface.The waves can be zoomed in and zoom out.

-  Touch the icon to display the 3 phase output voltage.
-  Touch the icon to display the 3 phase output current.
-  Touch the icon to display the 3 phase bypass voltage.
-  Touch the icon to zoom in the wave.
-  Touch the icon to zoom out wave.

8. OPERATIONS

8.1. UPS START-UP

8.1.1. Start from Normal Mode

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

1. Ensure all the external circuit breakers are open.
2. Close the input external circuit breakers and the system starts initializing. If the system has dual inputs close both of the breakers.
3. The LCD in front of the cabinet is lit up. The system enters the home page, as shown in Fig. 36.
4. Notice the energy bar in the home page, and pay attention to the LED indicators. The rectifier flashes indicating the rectifier is starting up. The LED indicators are listed below in Table 20.

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

Table 20. Rectifier starting up

5. After 30S, the rectifier indicator goes steady green, presenting the finishing of rectification and bypass static switch closes then the inverter is starting up. The LED indicators are listed below in Table. 21.

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

Table 21. Inverter starting up

6. The UPS transfers from the bypass to inverter after the inverter goes normal. The LED indicators are listed below in Table 22.

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

Table 22. Supplying the load

7. The UPS is in Normal Mode. Close the battery circuit breakers and the UPS starts charging the battery. The LED indicators are listed below in Table 23.

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

Table 23. Normal mode

8. Close the output circuit breaker for the load and it finishes the starting up for the UPS.

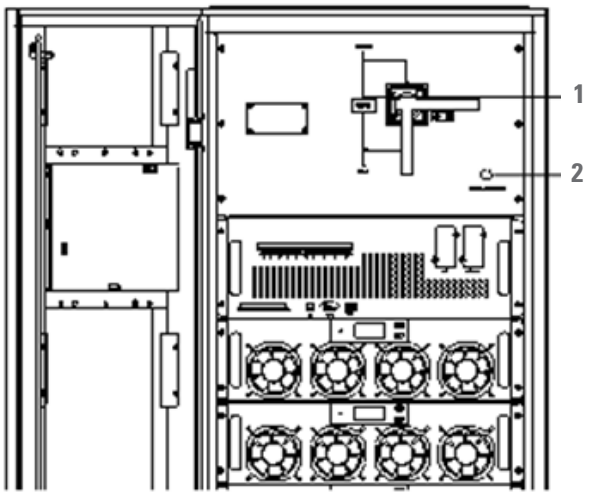
Note:

- When the system starts, the stored setting will be loaded.
- Users can browse all incidents during the process of the starting up by checking the menu Log.
- Information of each power module can be viewed by the keys in the front of it.

8.1.2. Start from Battery Mode

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

1. Confirm the battery is correctly connected; close the external battery circuit breakers.
2. Press the red button for the battery cold start (See Fig. 50). The system is than powered by the battery.



1- Manual Bypass
2- Battery Cold Start

Fig. 50. The position of the battery cold start button.

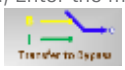
3. After that, the system is starting up following steps 3 in section 8.1.1 and the system transfers to battery mode in 30S.
4. Close the external output power supply isolation to supply the load, and the system is working on battery model.

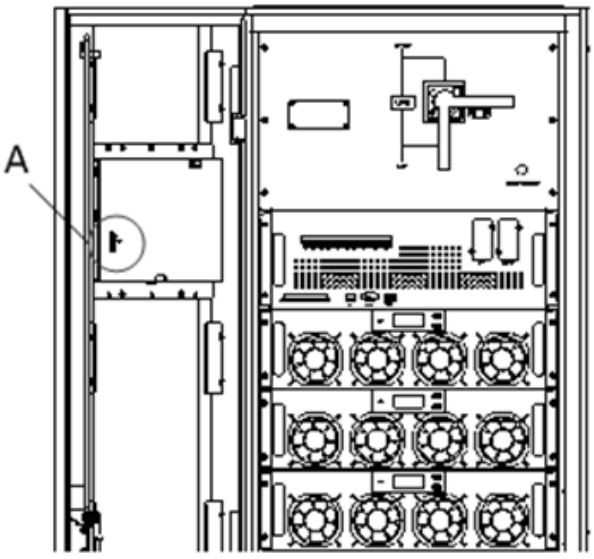
8.2. PROCEDURE FOR SWITCHING BETWEEN OPERATION MODES

8.2.1. Switching the UPS into Battery Mode from Normal Mode

The UPS transfers to Battery model immediately after input circuit breaker disconnects from the Utility.

8.2.2. Switching the UPS into Bypass Mode from Normal Mode

Two ways to transfer the UPS into Bypass mode from Normal mode; (a) Enter the menu Operate, touch the icon "transfer to bypass"  and the system transfers to bypass mode ;(b) Press and hold the BYP key on the operator control panel for longer than two seconds and the system transfers to bypass mode. This needs to enable the switch behind the front door. See Fig. 51.



Zoom in A area:

Fig. 51. Enable the switch

Warning:

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

8.2.3. Switching the UPS into Normal Mode from Bypass Mode

Two ways to transfer the UPS into Normal mode from Bypass Mode: (a) Enter the menu Operate, touch the icon transfer to inverter  and the system transfers to bypass mode (b) Press and hold the INV key on the operator control panel for longer than two seconds and the system transfers to Normal mode.

Note:

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

8.2.4. Switching the UPS into Maintenance Bypass Mode from Normal Mode

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

1. Transfer the UPS into Bypass mode following section 8.2.2.
2. Open the battery breaker and close the maintenance bypass. And the load is powered through maintenance bypass and static bypass.
3. Pull out the bypass module and the load is powered through maintenance bypass.

Warning:

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

Danger:

If you need to maintain the power module, wait for 10 minutes to let the DC bus capacitor fully discharge before removing the cover.

8.2.5. Switching the UPS into Normal Mode from Maintenance Bypass Mode

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

1. The bypass turns on 30S after the LED touch screen goes on, the bypass indicator goes green and the load is powered through maintenance bypass and static bypass.
2. Turn off the maintenance bypass switch and the load is powered through bypass. The rectifier starts followed by the inverter.
3. After 60S, the system transfers to Normal mode.

8.3. BATTERY MAINTENANCE

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. Discharging by manual. Enter the menu Operate, as is shown in Fig.52 and touch the icon "Battery maintenance"

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

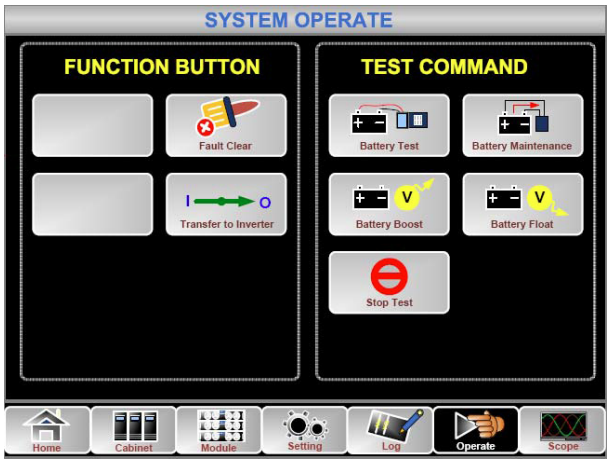


Fig. 52. Battery maintenance

2. Auto discharging. The system can maintenance the battery automatically when the setting is done. The setting procedures are as follows.

   (a) Enable battery auto discharge. Enter the "CONFIGURE" page of the menu Setting, tick the "Battery Auto Discharge" and confirm (This needs to be done by factory).

   (b) Setting period for battery auto discharge. Enter the "BATTERY "page of the Setting (See Fig.54), Set the period time in the item "Auto Maintenance Discharge Period" and confirm.

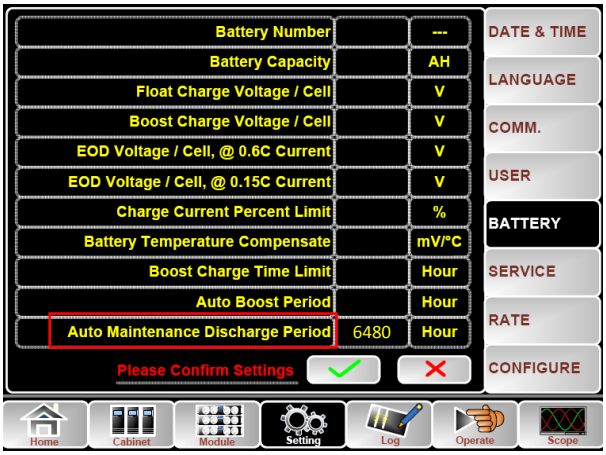


Fig. 53. Setting period for battery auto discharge

Warning:

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

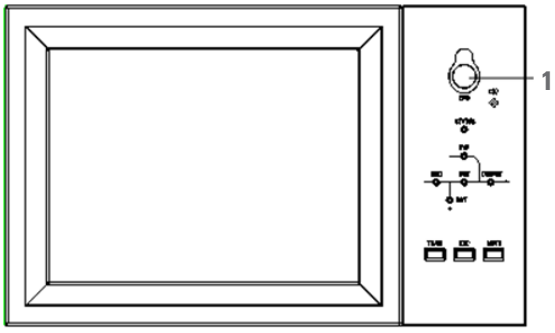
8.4. EPO

The EPO button located in the operator control and display panel (with cover to avoid disoperation, see Fig.55) is designed to switch off the UPS in emergency conditions (e.g., fire, flood, etc.).To achieve this, just press the EPO button, and the system will turn off the rectifier, inverter and stop powering the load immediately (including the inverter and bypass output), and the battery stops charging or discharging.

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

Warning:

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



1- EPO BUTTON

Fig. 54. EPO

8.5. INSTALLATION OF PARALLEL OPERATION SYSTEM

The system can have three UPS cabinets in parallel, which can extend to a capacity of total 900KVA.

Two UPS cabinets are connected as is shown in Fig. 55.

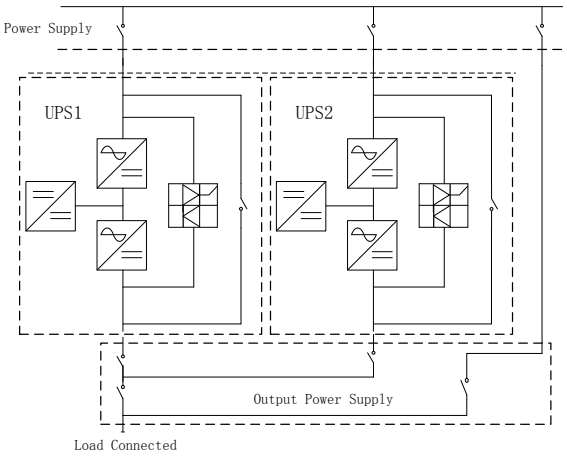
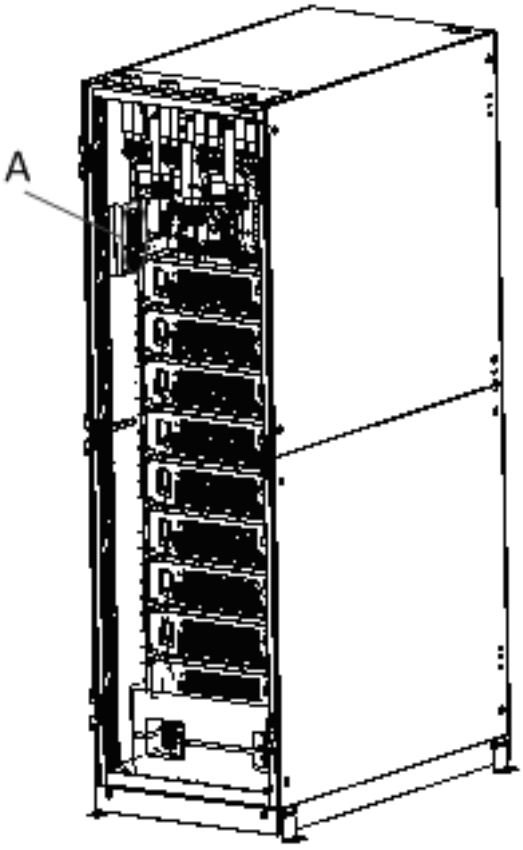
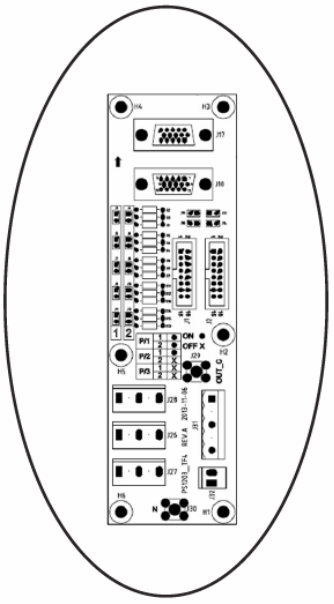


Fig. 55. Parallel diagram

The parallel board is located at the back of the UPS cabinet, whose name is PS1203-TF4 as is shown in Fig. 56.



Zoom A AREA



Parallel board

PS1203-TF4

Fig. 56. Location of the Parallel board

The control cables for the parallel operation must be connected with all single devices to form a closed loop, as is shown in Fig. 57.

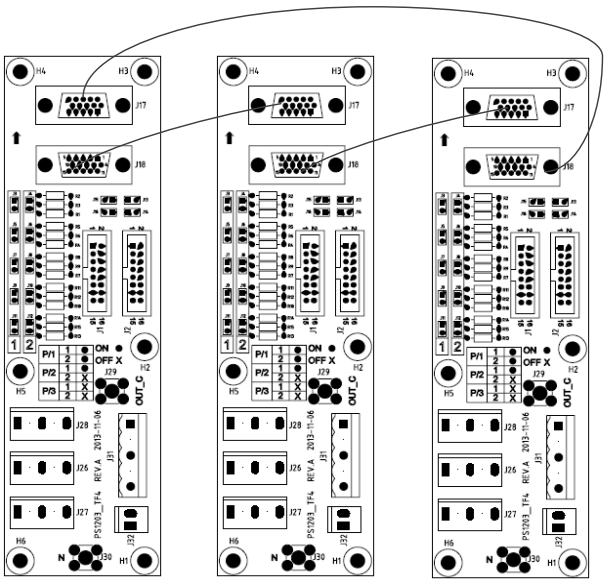


Fig. 57. Parallel connection

For more details of parallel operation, please refer to the "Instruction for Parallel Operation of Modular UPS".

9. MAINTENANCE

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

9.1. 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 centre of the cabinet.
2. To ensure the safety before maintaining power module and bypass module, use a multimeter to measure the voltage between operating parts and the earth to ensure the voltage is lower than hazardous voltage.
3. Bypass module is not recommended to hot swap; only when UPS is in Maintenance 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.

9.2. INSTRUCTION FOR MAINTAINING POWER MODULE

Confirm the UPS is operating in Normal Mode and the bypass is working normally before pulling out the power module needed to be repaired.

1. Ensure the remaining power module will not be overloaded.
2. Power off the module.1)Enable.LCD panel -> Menu Operate 

-> Enable Module "OFF" Key 

; 2) Press the "OFF" key for 3 seconds, the power module quits from the system.
3. Remove the mounting screw on the two front sides of the power module (See Fig.20) and pull out the module by two persons.
4. Wait 10 mins before opening the cover for repairing.
5. After the repairing is done, push the power module into the cabinet following the steps in section 6.2 and the power module will automatically join the system.

9.3. INSTRUCTION FOR MAINTAINING BYPASS MODULE

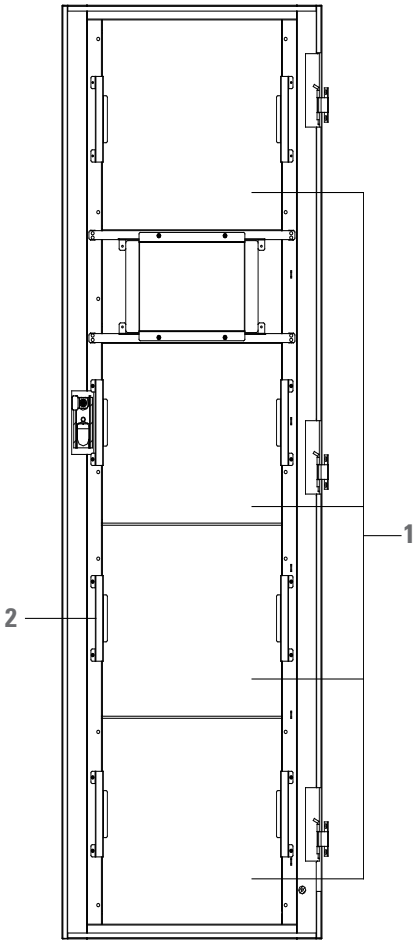
Confirm the UPS is operating in Normal mode and the bypass is working normally before pulling out the bypassing module needed to be repaired. Follow the steps below to maintain the bypass module.

1. Transfer the system to bypass mode through the LCD control panel (see section 7.6.5).
2. Close maintenance bypass switch, the UPS power will be supplied by maintenance bypass.
3. Remove the mounting screw on the two front sides of the bypass module (See Fig. 20) and the front signal cable connects to the bypass module.
4. Pull out the bypass module and the LCD touch screen goes off.
5. Wait 10 mins before opening the cover for repairing.
6. After the repairing is done, push the bypass module into the cabinet following the steps in section 6.2 and the LED touch screen goes on.
7. The bypass turns on 30S after the LED touch screen goes on and the bypass indicator goes green and the load is powered through maintenance bypass and static bypass.
8. Turn off the maintenance bypass switch and the load is powered through bypass. The rectifier starts followed by the inverter.
9. After 60S, the system transfers to Normal mode.

9.4. REPLACING DUST FILTER (OPTIONAL)

As shown in Fig. 58, there are 3~4 dust filters on the back of UPS' front door, each filter is held in place by a bracket on either side of each filter. The procedure of replacing each filter is as follows:

1. Open the front door and locate the filters on the back side of the front door.
2. Remove one bracket.
3. Remove the dust filter to be replaced and insert the clean one.
4. Reinstall the bracket.



1- Dust filter
2- Bracket

Fig. 58. Dust filter on the back side of front door

10. . PRODUCT SPECIFICATION

10.1. APPLICABLE STANDARDS

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

Table 24. Compliance with European and International Standards

10.2. ENVIRONMENTAL CHARACTERISTICS

Item	Unit	Requirements
Acoustic noise level	dB	65dB @ 100% carga, 62dB @ 45% carga
at 1 meter	dB	65dB @ 100% load, 62dB @ 45% load
Altitude of Operation	m	≤1000,load derated 1% per 100m from 1000m and 2000m
Relative Humidity	%	0-95,non condensing
Operating Temperature	Celsius	0-40,Battery life is halved for every 10°C increase above 20°C
UPS Storage Temperature	Celsius	-40-70

Table 25. Environmental Characteristics

10.3. MECHANICAL CHARACTERISTIC

Item	Unit	150/30	300/30
Mechanical Dimension W×D×H	mm	600*1100*2000	
Weight	kg	220	
Color	N/A	Black	
Protection Level (IEC60529)	N/A	IP20	

Table 26. Mechanical Characteristics for Cabinet

Item	Unit	Parameter
Mechanical Dimension, W×D×H	mm	460×790×134
Weight	kg	34

Table 27. Mechanical Characteristics for Power Module

10.4. ELECTRICAL CHARACTERISTICS

10.4.1. Electrical Characteristics (Input Rectifier)

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	304~478Vac (Line-Line),full load 228V~304Vac (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%	<3% (full Linear Load)

Table 28. Rectifier AC input Mains

10.4.2. Electrical Characteristics (Intermediate DC Link)

ÍTEM	UNIDADES	PARÁMETROS
Battery bus voltage	Vdc	±192V (to 32 batteries).. ±264V (to 44 batteries)
Quantity of lead-acid cells		32.. 44 (for the batteries of the 12V), 192.. 264 (for the batteries of the 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/Celsius/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 : 0~20% * UPS capacity)

Table 29. Battery

10.4.3. Electrical Characteristics (Inverter Output)

Item	Unit	Value
Rated capacity	kVA	30~300
Rated AC voltage	Vac	380/400/415 (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		< 30ms for step load (0% - 100% -0%)
Output Voltage THDu		<1% from 0% to 100% linear load <6% full non-linear load according to IEC/EN62040-3

Table 30. Inverter Output (To critical load)

10.4.4. Electrical Characteristics (Bypass Mains Input)

ÍTEM	Unit	Value
Rated AC voltage	Vac	380/400/415 (three-phase four-wire and sharing neutral with the bypass)
Rated AC Current	A	455
Overload	%	110% Long term operation 110%~125% for 5min 125%~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% Up limited: +10%, +15%, +20%, +25% Down limited: -10%, -15%, -20%, -30%, -40%
Bypass frequency range	%Hz	Settable, ±1Hz, ±3Hz, ±5Hz
Synchronized Range	Hz	Settable ±0.5Hz~±5Hz, default ±3Hz

Table 31. Bypass Mains Input

10.5. EFFICIENCY

Item	Unit	Value
Normal mode(dual conversion)	%	>95
ECO Mode	%	99
Battery discharging efficiency (battery at nominal voltage 480Vdc and full-rated linear load)		
battery mode	%	>95

Table 32. Efficiency

10.6. DISPLAY AND INTERFACE

Item	Value
Display	LED + LCD +Color touch screen
Interface	Standard:RS232, RS485, USB, Dry Contact Option: SNMP,AS/400

Table 33. Display and Interface

Avda. de la Serra 100
08460 Palautordera
BARCELONA
Tel. +34 93 848 24 00
Fax +34 93 848 22 05
services@salicru.com
SALICRU.COM

The Technical Service & Support (T.S.S.) network, Commercial network and warranty information are available in website:
www.salicru.com

Product Range
Uninterruptible Power Supplies (UPS)
Lighting Flow Dimmer-Stabilisers
DC Power Systems
Static Inverters
Photovoltaic Inverters
Voltage stabilisers

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