

USER'S MANUAL

UNINTERRUPTIBLE POWER SUPPLY (UPS)

Modules 10-200kVA

ADAPT

SALICRU

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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 your 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. PRESENTATION.

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.

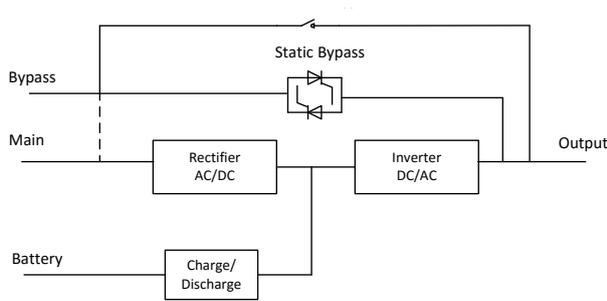


Fig. 1. UPS Configuration

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.

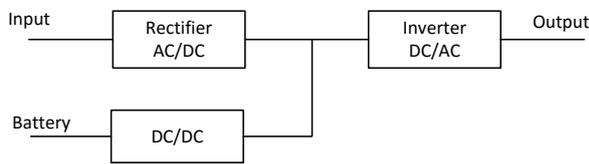


Fig. 2. Power module structure

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.

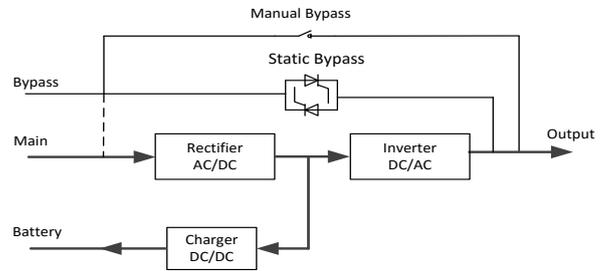


Fig. 3. Normal mode operation diagram

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.

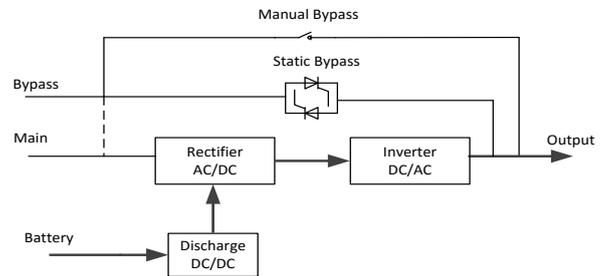


Fig. 4. Battery mode operation diagram



Note:

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

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.

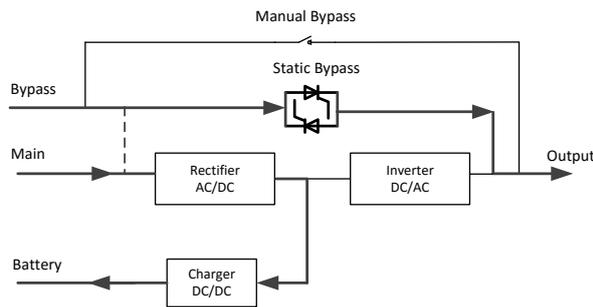


Fig. 5. Bypass mode operation diagram

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).

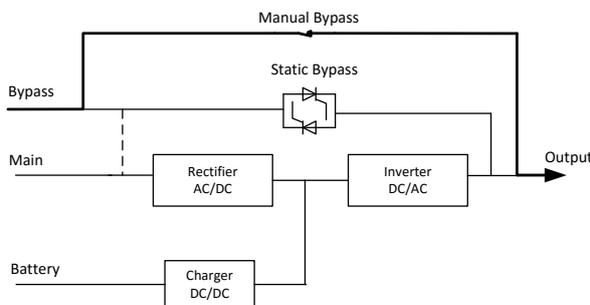


Fig. 6. Maintenance mode operation diagram



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.

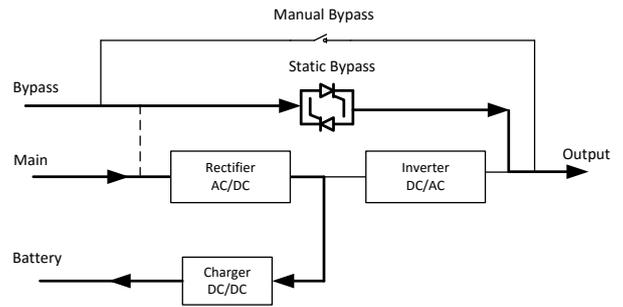


Fig. 7. ECO Mode operation diagram



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.

4.4. UPS STRUCTURE

4.4.1. 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.

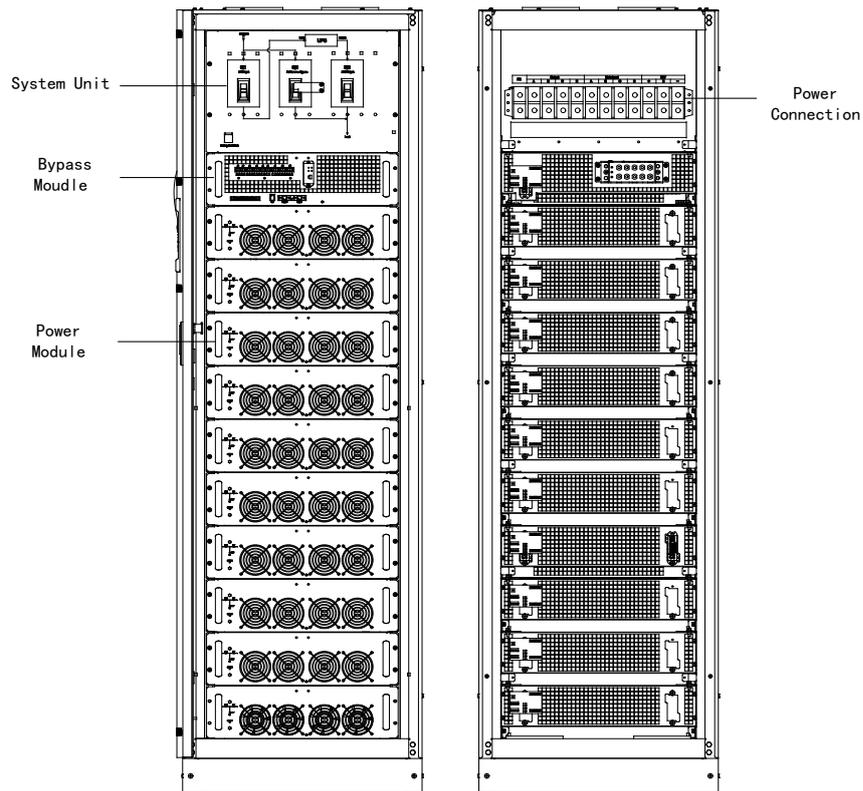


Fig. 8. 10 module cabinet UPS Structure

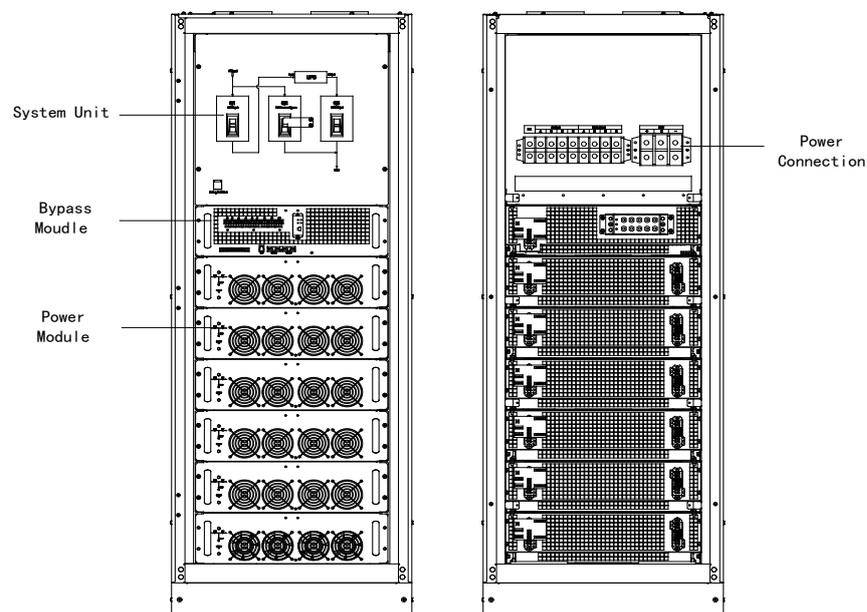


Fig. 9. 6 module cabinet UPS Structure

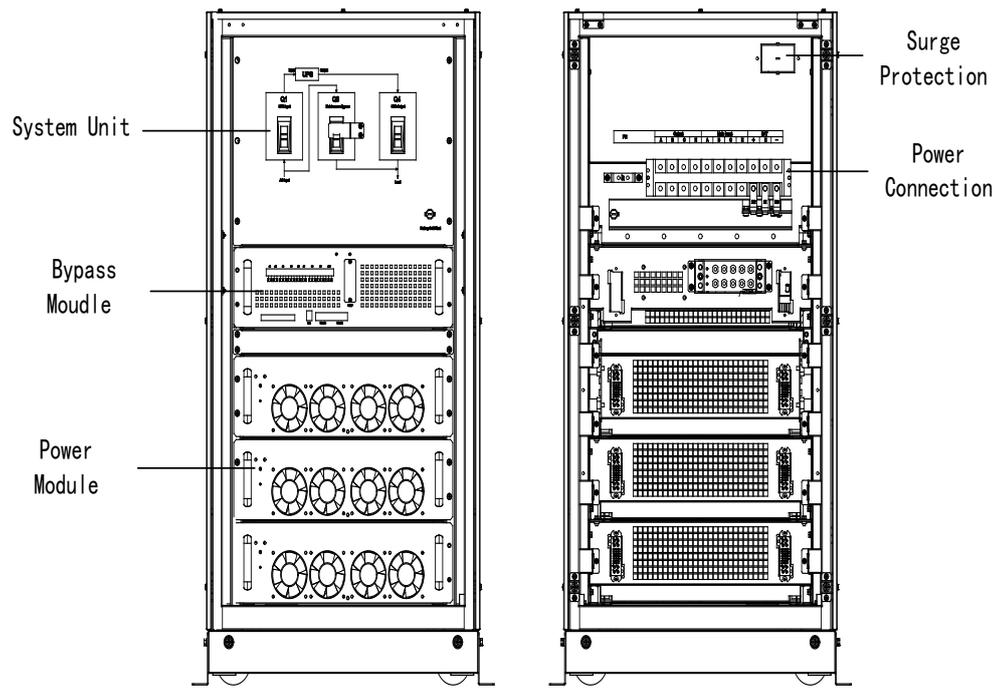


Fig. 10. 3 module cabinet UPS Structure

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 20°C-25°C. Operating above 25°C will reduce the battery life, and operation below 20°C 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 °C to 25°C.

5.1.3. Size and Weight

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



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.

Module	Units	10	15	20
Dimensions WxDxH	mm	590 x 440 x 134		
Weight	Kg	21	22.5	22.5

Table 2. Module mechanical characteristics.

Module	Units	30/10,45/15,60/20	60/10,90/15,120/20	100/10,150/15, 200/20
Dimensions WxDxH	mm	900x600x1100	900x600x1600	900x600x2000
Weight	Kg	120	151	182

Table 3. System mechanical characteristics.

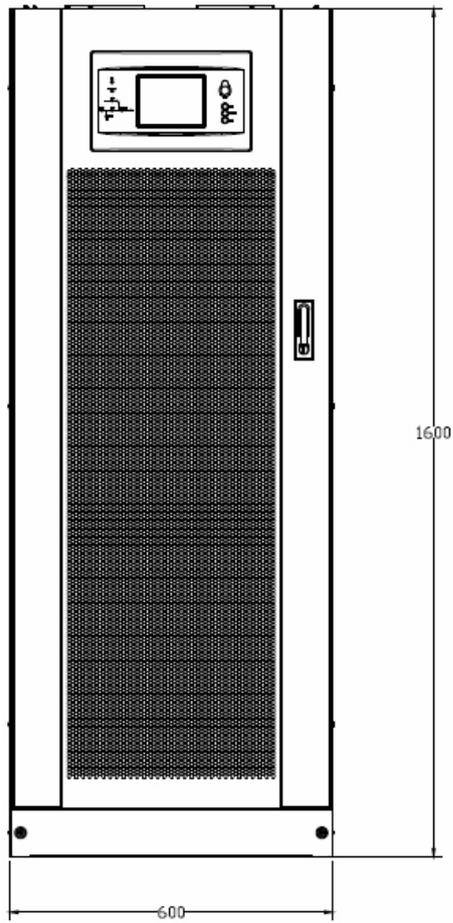


Fig. 11. Dimensions 120KVA.

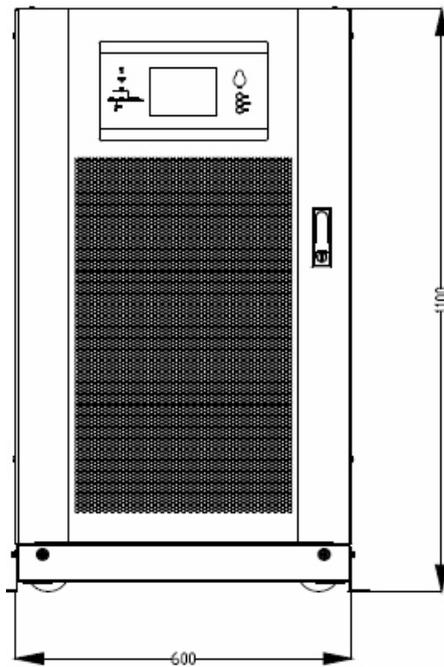


Fig. 12. Dimensions 60KVA.

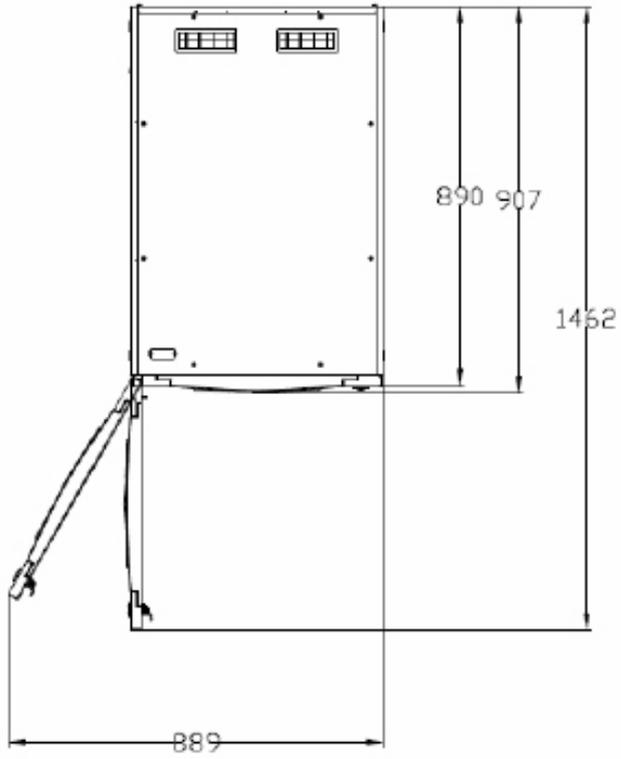
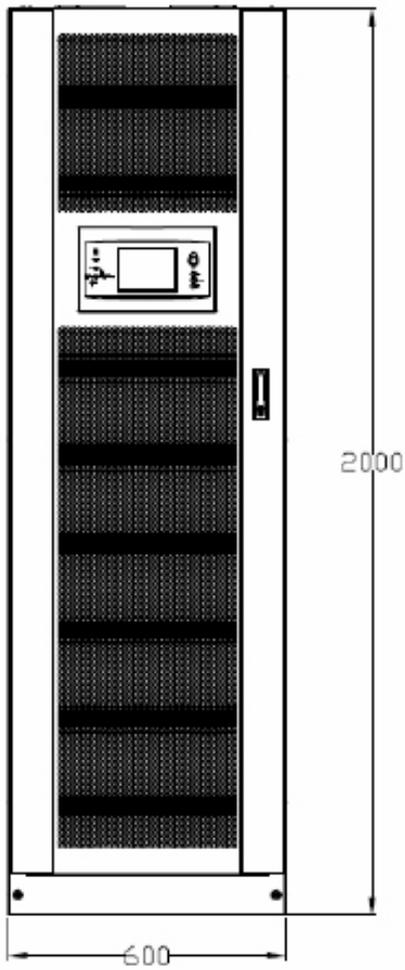


Fig. 13. Dimensions 200KVA.

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. 14.

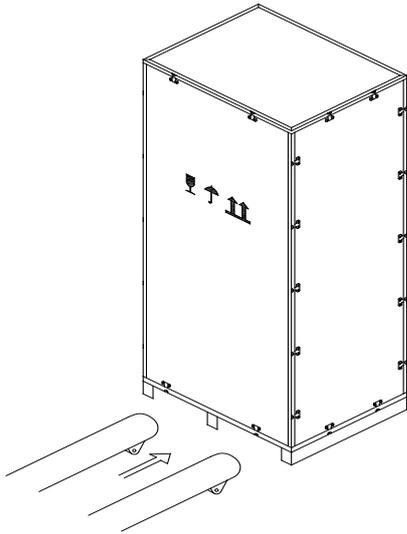


Fig. 14. Transport to the designated site

3. Open the top plate of the steel-edged wooden case with slotted awl and pier, followed by side boards (see Fig. 15).

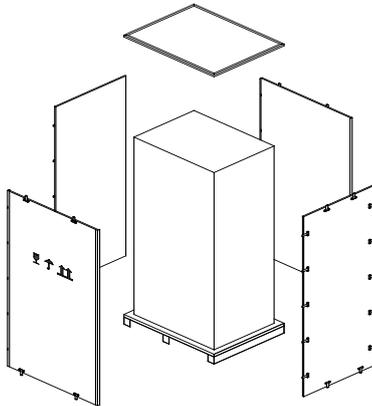


Fig. 15. Disassemble the case

4. Remove the protective foam around the cabinet

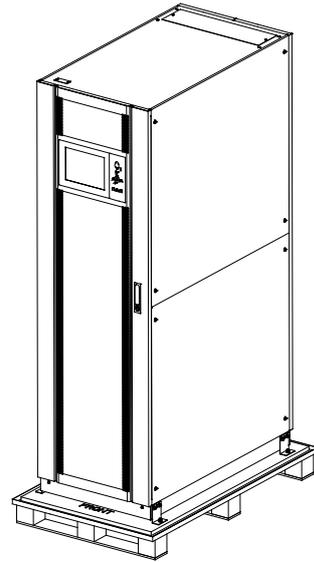


Fig. 16. Remove the protective foam

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. 17.

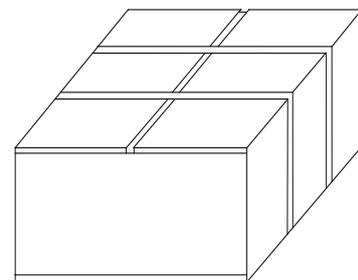
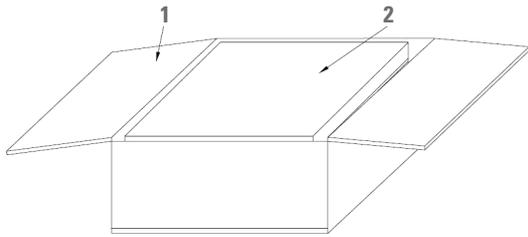


Fig. 17. Place on platform smoothly

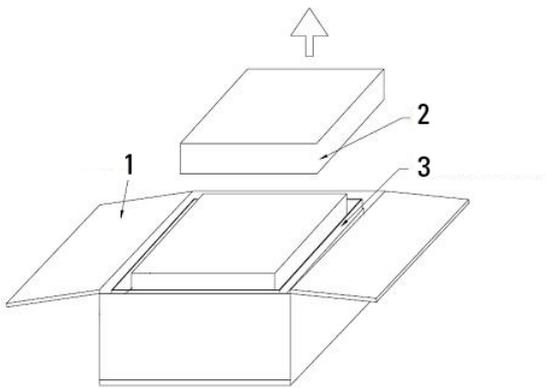
3. Cut the plastic packing belt and scotch tape to open the carton. (See Fig. 18).



- 1- Carton
- 2- Foam packing

Fig. 18. Open the carton

- 4. Remove the foam cover (See Fig. 19).



- 1- Carton
- 2- Foam packing
- 3- Power module

Fig. 19. Remove the foam cover.

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



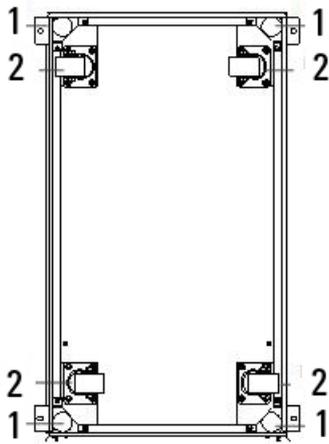
Attention:

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. 20.



- 1- Anchor bolts
- 2- Wheels

Fig. 20. 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.



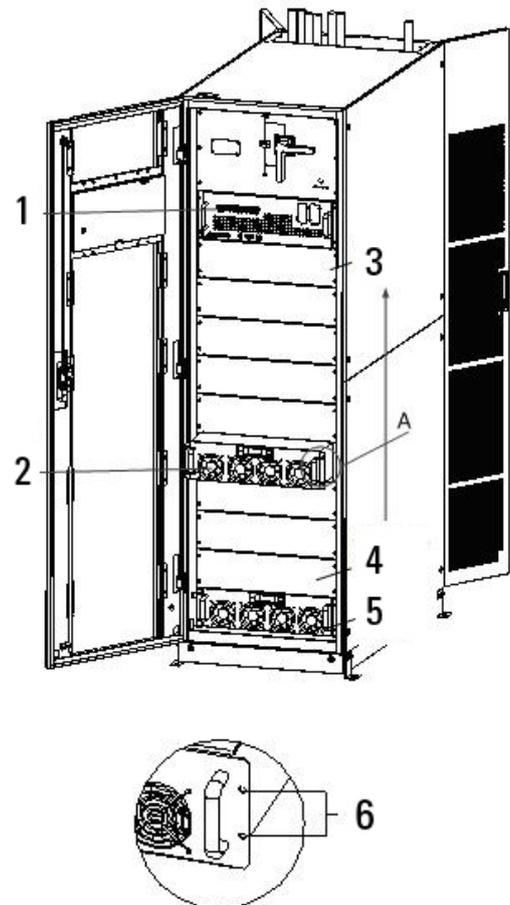
Attention:

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. 21. 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. 21 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. 21. 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. 22, "N" means the total quantity of battery blocks connected in serial, being able to select it among the figures above stated.

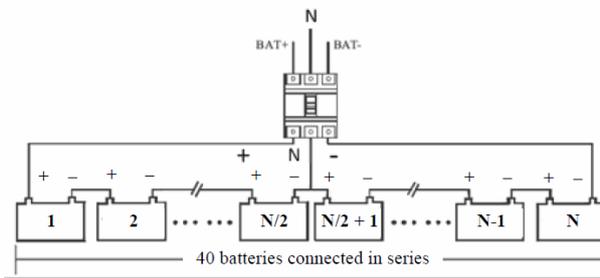


Fig. 22. Battery string wiring diagram



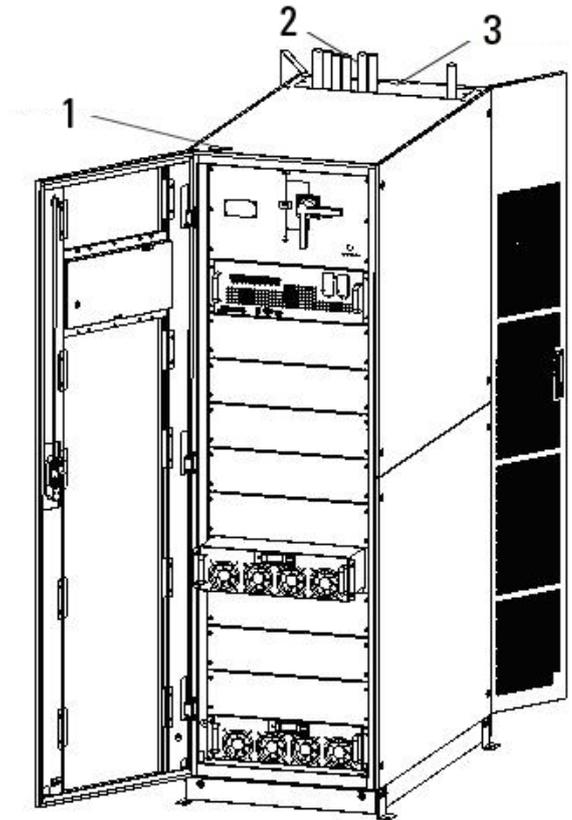
Danger:

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.23.



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

Fig. 23. 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».



Attention:

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

6.5.2. 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.

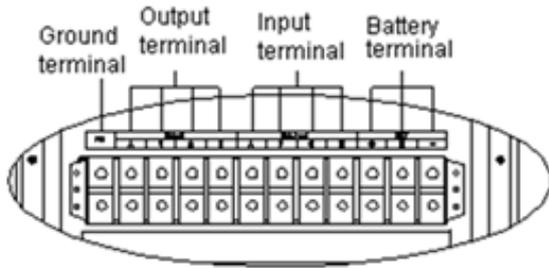


Fig. 24. Power Connection of Module System UPS: 200KVA UPS power connection

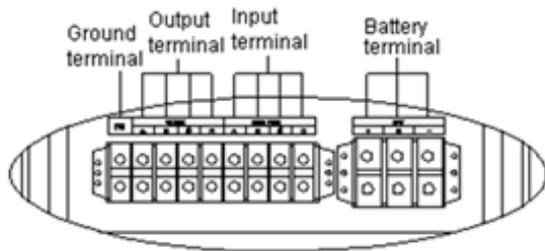


Fig. 25. Power Connection of Module System UPS: 120KVA UPS power connection

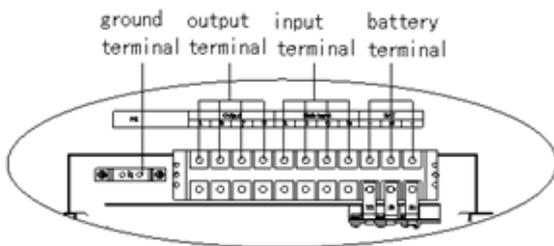


Fig. 26. Power Connection of Module System UPS: 60KVA UPS power connection

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

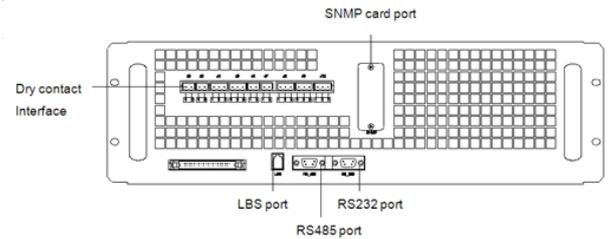


Fig. 27. Bypass Module (Include Interface of Dry Contact Board GJ and Monitoring Board FK)

6.6.1. The UPS dry contact board GJ provides input dry contacts and output dry contacts

- **Dry Contact Interface of Battery and Environmental Temperature Detection**

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

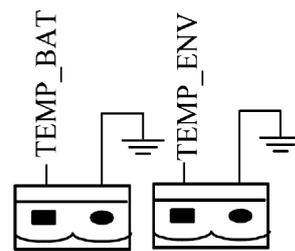


Fig. 28. Diagram of J2 and J3 Dry Contact of Temperature Detection

Position	Name	Purpose
J2.1	TEMP_BAT	Battery temperature detection
J2.2	/	Battery temperature detection
J3.1	TEMP_ENV	Environment temperature detection
J3.2	/	Environment temperature detection

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

Table 4. Description of Input Dry Contact

- **Remote EPO Input Port**

The UPS has an Emergency Power OFF (EPO) function. This function can be activated by pressing a button on the control panel of the UPS or through a remote contact provided by the user. The EPO pushbutton is protected by a hinged plastic cover.

J4 is the input port for remote EPO. It requires shorting NC and +24v during normal operation, and the EPO is triggered when opening NC and +24v, or shorting NO and +24v.

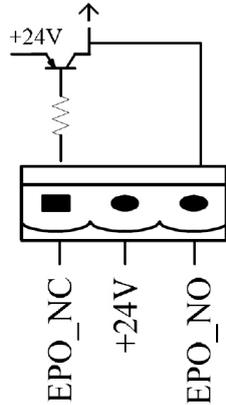


Fig. 29. Description of Input Dry Contact for Remote EPO

Position	Name	Purpose
J4.1	EPO_NC	EPO is activated when disconnecting from J4.2
J4.2	+24V	+24V, connect the common terminal of NC and NO
J4.3	EPO_NO	EPO is activated when shorting with J4.2

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. 30, and interface description is shown in Table 6.

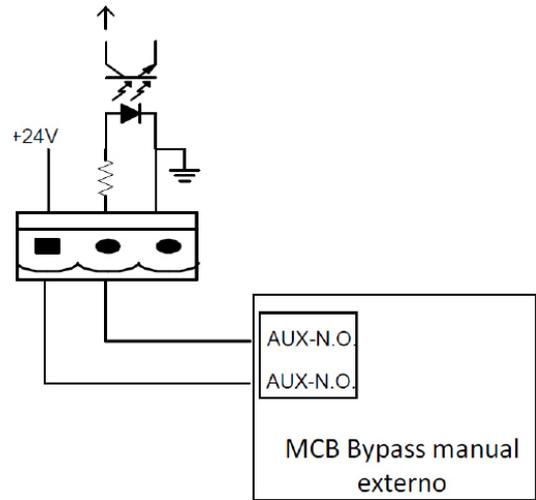


Fig. 30. Diagram of aux. contact external manual bypass MCB

Position	Name	Purpose
J5.1	+24V	Internal +24V power supply
J5.2	GEN	Connection status of generator
J5.3	GND	Power ground

Table 6. Description of Status Interface and Connection of Generator

- **BCB Input Port**

The default function of J6 and J7 are the ports of BCB. The port diagram is shown in Fig. 31, and description is shown in Table 7.

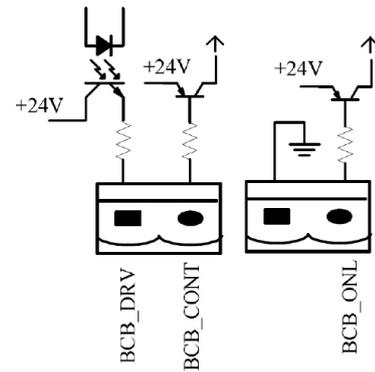


Fig. 31. BCB Interface

Position	Name	Description
J6.1	BCB_DRV	BCB actuating signal, provide the actuating signal of +24V, 20mA
J6.2	BCB_CONT	BCB contact status, connect with the normally open signal of BCB
J7.1	GND	Common connection
J7.2	BCB_ONL	BCB on-line-input (normally open), BCB is on-line when the signal is connecting with common connection

Table 7. Description of BCB Interface

• **Bypass Output Dry Contact Interface .**

The default function of J8 is the bypass output dry contact interface. The interface diagram is shown in Fig. 32, and description is shown in Table 8.

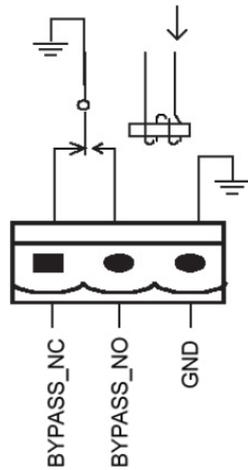


Fig. 32. Battery Low Warning Dry Contact

Position	Name	description
J8.1	BAT_LOW_NC	Battery warning relay (normally closed) will be open during warning
J8.2	BAT_LOW_NO	Battery warning relay (normally open) will be closed during warning
J8.3	GND	Common connection

Table 8. Battery warning 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. The interface diagram is shown in Fig. 33, and description is shown in Table 9.

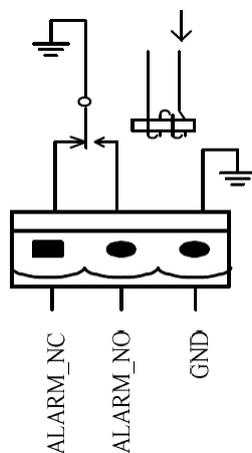


Fig. 33. Integrated warning dry contact

Position	Name	Purpose
J9.1	ALARM_NC	Integrated warning relay (normally closed) will be open during warning
J9.2	ALARM_NO	Integrated warning relay (normally open) will be closed during warning
J9.3	GND	Common connection

Table 9. Description of BCB Interface

• **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. 34, and description is shown in Table 10.

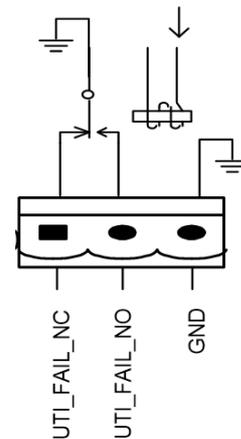


Fig. 34. Utility failure warning dry contact interface diagram

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.

7. INSTALLATION OF UPS RACK SYSTEM AND PARALLEL SYSTEM

7.1. OVERVIEW

The single or parallel system should be installed according to the installation procedures of the UPS rack module system and the requirements in this Chapter.

For single UPS rack module installation the EPO button on the front panel of the UPS rack controls the emergency stop of UPS modules and bypass static switch and also supports remote emergency power off function that can be used to shut down the UPS rack module remotely.

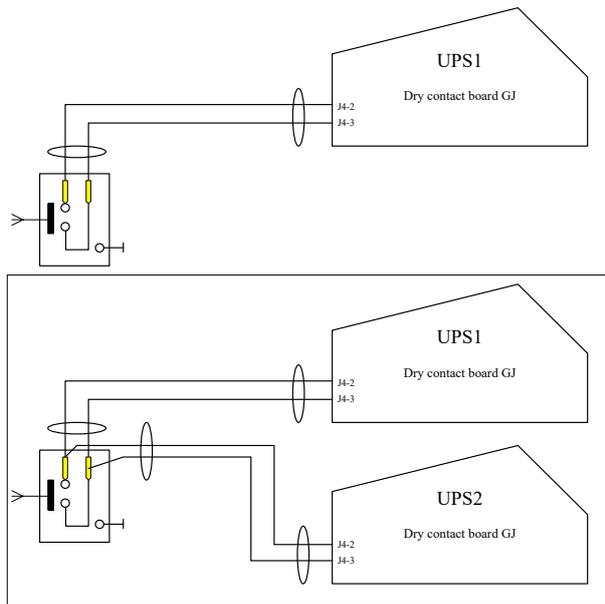


Fig. 35. Circuit diagram of EPO

7.2. UPS RACK MODULES IN PARALLEL SYSTEM

The basic installation procedures of parallel system are the same with those of the UPS rack module system. In this section, only the installation procedures related to the parallel system are introduced.

7.2.1. Installation of Cabinet

To make the maintenance and system test easier, an external maintenance bypass is recommended in the installation.

7.2.2. External Protective Devices

Refer to Chapter 4 Installation

7.2.3. Parallel Signal Board

Installation of parallel signal board

The parallel signal board BJ is installed at the rear of the static switch power module. Refer to fig.36 and 37.

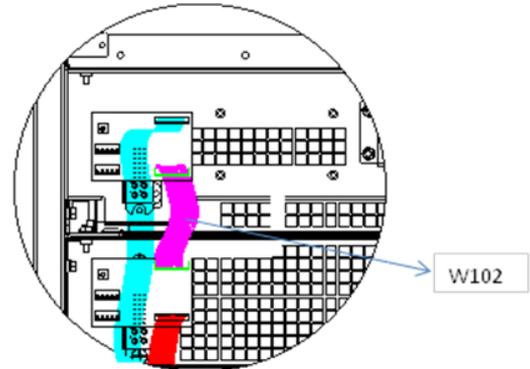


Fig. 36. Installation of Parallel Signal Board BJ (a)

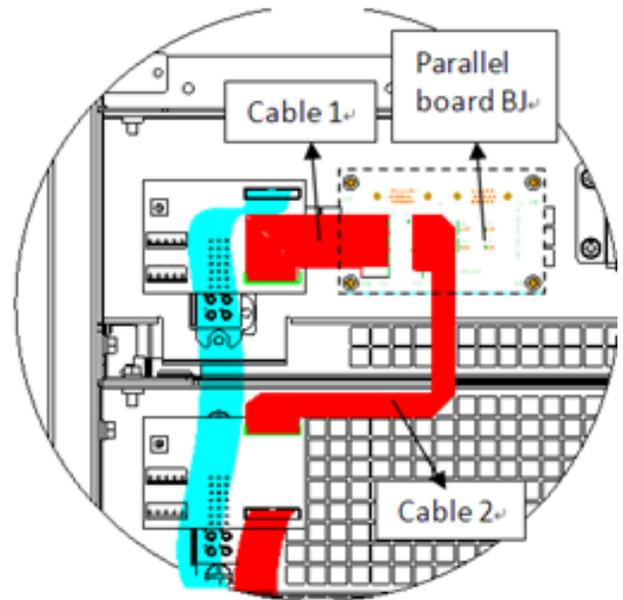


Fig. 37. Installation of Parallel Signal Board BJ (b)

- Remove cable W102 as fig. 36
- Install parallel signal board BJ as fig.37
- Connect cable 1 and cable 2 as fig.37

7.2.4. Control Cables

Parallel control cable

The parallel control cables are designed to be shielded and double insulated, and are connected between the UPS rack modules to form a loop as shown below. The parallel signal board BJ is installed at the rear of the static switch power module. This close loop connection ensures the reliability of the parallel system control. Refer to fig. 38.

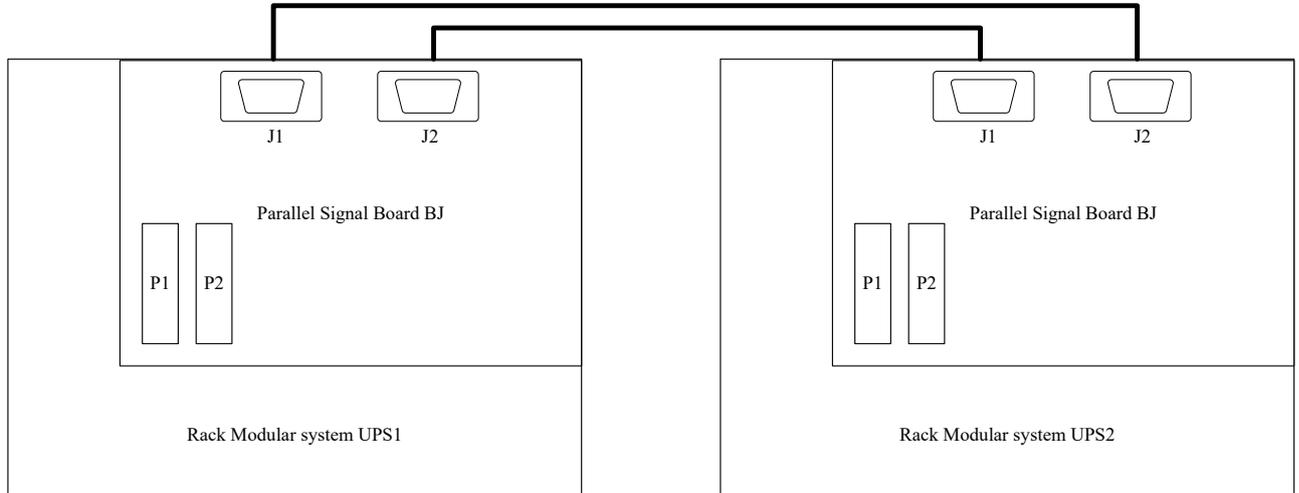


Fig. 38. Connection of Parallel Control Cables of "1+N" System

- External BCB interface:

Position	Name	Description
J6.1	BCB_DRV	BCB actuating signal, provide the actuating signal of +24V, 20mA
J6.2	BCB_CONT	BCB contact status, connect with the normally open signal of BCB
J7.1	GND	Common connection
J7.2	BCB_ONL	BCB on-line—input (normally open), BCB is on-line when the signal is connecting with common connection

Table 11. Description of BCB Interface

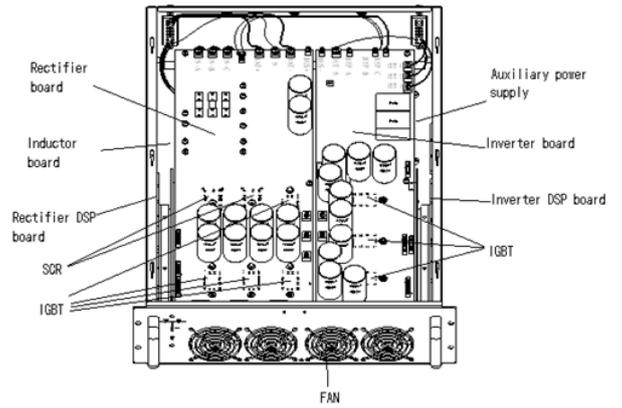


Fig. 44. Power Module

- Connections terminals

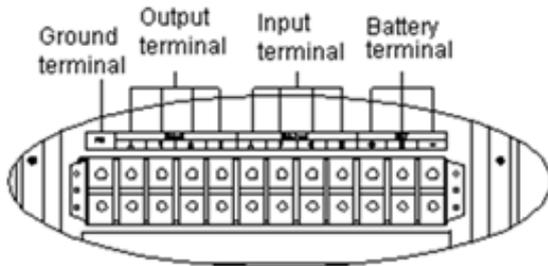


Fig. 41. Power Connection of Module System UPS: 200KVA UPS power connection

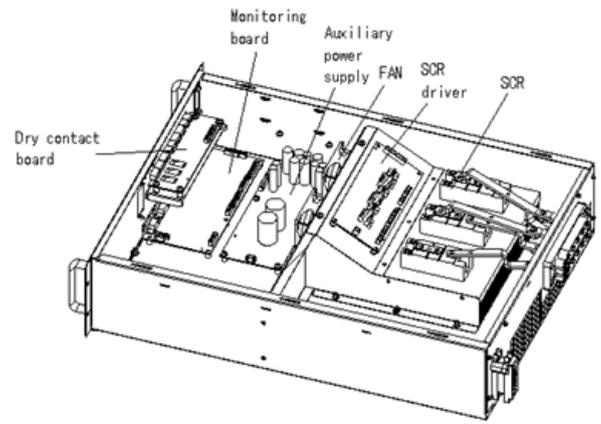


Fig. 45. Static Bypass Module

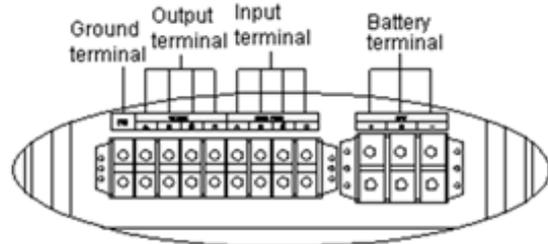


Fig. 42. Power Connection of Module System UPS: 120KVA UPS power connection

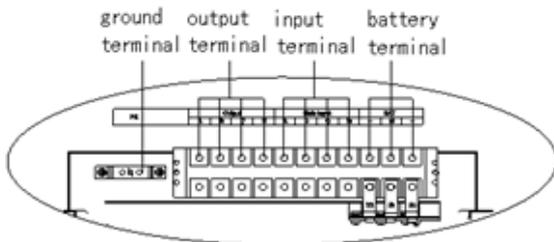


Fig. 43. Power Connection of Module System UPS: 60KVA UPS power connection

9. OPERATOR CONTROL AND DISPLAY PANEL

This chapter introduces the functions and operation instructions of the UPS 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 list.

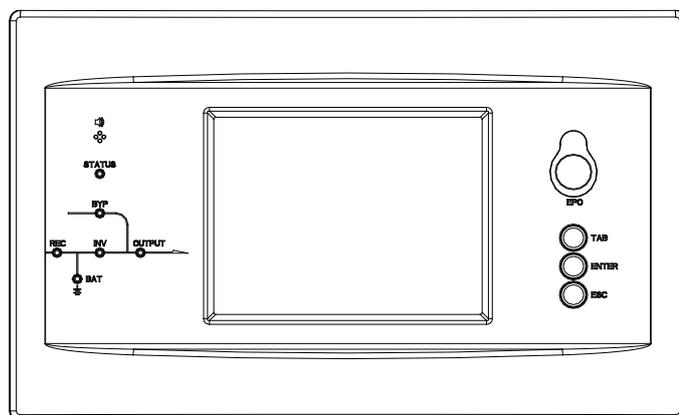


Fig. 46. UPS operator control and display panel

Indicator	Function
REC	Rectifier indicator
BAT	Battery indicator
BYP	Bypass indicator
INV	Inverter indicator
OUTPUT	Load indicator
STATUS	Status indicator

Table 12. Description of UPS Display Panel indicators

Button	Function
EPO	EPO (emergency power off)
TAB	Select
ENTER	Confirm
ESC	Exit

Table 13. Description of UPS Display Panel buttons

9.1. MIMIC CURRENT PATH

The LEDs shown on the mimic current path represent the various UPS power paths and show the current UPS operating status. The status description of indicators is shown in table. 14.

Indicator	State	Description
Rectifier indicator	Steady green	Rectifier of all modules is normal
	Flashing green	At least one of module rectifier is starting
	Steady red	At least one Rectifier of module fault
	Flashing red	Main input of at least one module is abnormal
	Off	Rectifier is not working
Battery indicator	Steady green	Battery is charging
	Flashing green	Battery is discharging
	Steady red	Battery is abnormal (battery failure, no battery or battery reverse) or battery converter is abnormal (failure, over current or over temperature) , EOD
	Flashing red	Battery voltage is low
	Off	Battery and battery converter is normal, battery is not charging
Bypass indicator	Steady green	UPS is working in bypass mode
	Steady red	Bypass is failure
	Flashing red	Bypass voltage is abnormal
	Off	Bypass is normal and is not working

Indicator	State	Description
Inverter indicator	Steady green	Inverter is feeding the load
	Flashing green	Inverter is starting, or UPS is working in ECO mode
	Steady red	At least one module's inverter is failure, and inverter is not feeding the load
	Flashing red	Inverter is feeding load, and at least one module's inverter is failure
	Off	Inverter is not working in all modules
Load indicator	Steady green	UPS output is on and is normal
	Steady red	UPS output is overload and time is over, or output is shorten, or output has no power supply
	Flashing red	UPS is overload
	Off	No output voltage
Status indicator	Steady green	Normal operation
	Steady red	Fault

Tabla 14. Status Description of Indicator

There are two different types of audible alarm during UPS operation as shown in table.15.

Alarm	Purpose
Two short, one long	when system has general alarm (for example: main input abnormal), this audible alarm can be heard
Continuous alarm	When system has serious faults (for example: fuse or hardware fault), this audible alarm can be heard

Table 15. Description of Audible Alarm

9.2. FUNCTIONAL KEYS

There are 4 functional buttons on operator control and display panel, which are used together with LCD. The functions description is shown in table. 16.

Funct. key	Functions
EPO	To shutdown the rectifier, inverter, static bypass and battery
TAB	Select
ENTER	Confirm
ESC	Exit

Table 16. Functions of Functional Keys

9.3. BATTERY PACK INDICATOR

The LED on the front panel of battery pack indicates battery pack status. If battery fuse in battery pack is broken, LED changes to be red. Customer must contact with our local distributor to maintain it.

9.4. LCD DISPLAY TYPE

Following the self-check of UPS LCD display, the main LCD display is shown as fig. 47, which can be divided into three display windows: system information, data command and current record.

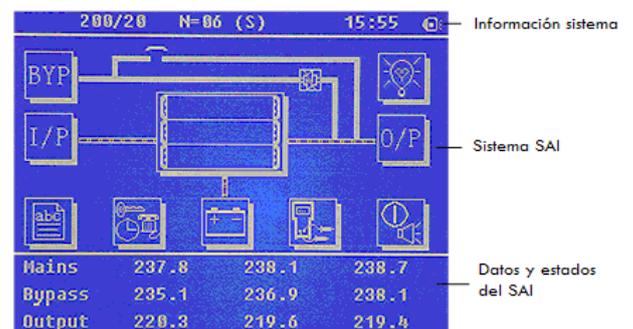


Fig. 47. Main LCD Display

The description of LCD icon is shown in table.17:

Icon	Description
	Bypass parameter(voltage, current, PF, frequency)
	Main input parameter(voltage, current, PF, frequency)
	History log, system information
	Function setting (display calibration, password setting, time setting, date format, communication protocol and language setting), system setting (used only for manufacturer)
	Battery data, battery parameter setting (used for service engineer)
	Test (battery self-test, battery maintenance)
	Functional keys used by service staff (fault clear, history log clear, mute on or off, manual transfer to bypass or escape from bypass), user setting (system mode, machine number, system ID, output voltage adjustment, frequency slew rate, frequency range)
	Output parameter(voltage, current, PF, frequency)
	Load(Apparent load, active load, reactive load, load percent)
	Mute off, mute on
	Page up/down

Table 17. Description of LCD Icons

The LCD menu tree is shown as below. Please refer to table. 17: Item Description of UPS Menu

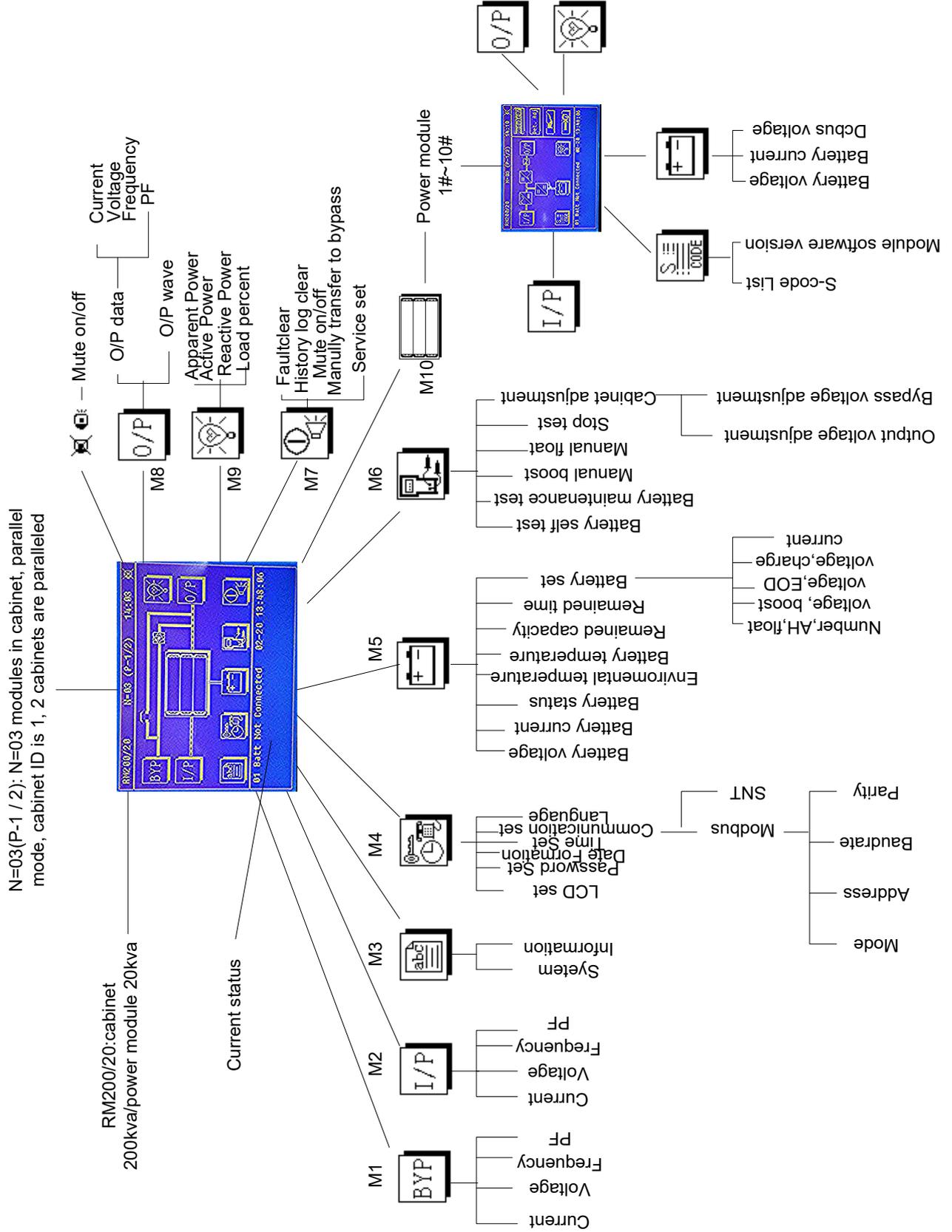


Fig. 48. Menu Tree Structure

9.5. LANGUAGE SELECTION

The LCD menus and data display are available in 4 languages: Simple Chinese, English, Korean, Traditional Chinese.

Perform the following procedure to select a language needed:

1. In main menu, press  to enter in function setting menu in the LCD screen.
2. Select language setting menu.
3. Select the language and make sure. At this time, all the words in the LCD will be displayed in the selected language.

9.8. DETAILED DESCRIPTION OF MENU ITEMS

The LCD main display shown in fig. 48 is described in details below.

UPS information window

UPS information window: display the current time and UPS name. The information of the window is not necessary for the user to operate. The information of this window is given in table.18.

Display contents	Meaning
RM200/20	UPS model. 200-200KVA cabinet, 20-20KVA
N=03(P-1/2)	N=03-3 power modules in system. P-parallel mode, 2 units in parallel system, current unit is 1#. S-single mode. E-ECO mode.
12:00	Current Time (format: 24 hours, hour : minute)
(Status) Normal, alarm, fault	Normal: UPS in normal condition Alarm: UPS has general alarm, such as AC input fault Fault: UPS fuse or hardware fault

Table 18. Description of Items in UPS System Information Window

UPS menu and data window

UPS menu window displays the menu name of data window, while the data window displays the related contents of selected menu in menu window. Select UPS menu and data window to browse related parameters of UPS and set related functions. The details are given in table.19

9.6. CHANGING THE CURRENT DATE AND TIME

To change system date and time:

1. In main menu, press  to enter in function setting menu in the LCD screen.
2. Select time setting
3. Enter new date and time, then enter to confirm it.

9.7. CONTROL PASSWORD 1

The system is password protected to limit the operator's operating and control authorities. You can only operate and test the UPS and battery after entering correct password 1. The default password 1 is 12345678.

Menu name	Menu item	Meaning
Main input	V phase(V)	Voltage
	I phase(A)	Current
	Freq.(Hz)	Frequency
	PF	Power factor
Bypass input	V phase(V)	Voltage
	Freq. (Hz)	Frequency
	I phase(A)	Current
	PF	Power factor
Output	V phase(V)	Voltage
	I phase(A)	Current
	Freq. (Hz)	Frequency
	PF	Power factor
This UPS module's load	Sout (kVA)	Apparent Power
	Pout (kW)	Active Power
	Qout (kVAR)	Reactive Power
	Load (%)	Load percent
Battery data	Environmental Temp	Environmental Temp
	Battery voltage(V)	Positive and negative battery voltage
	Battery current A)	Positive and negative battery current
	Battery Temp()	Battery Temperature
	Remaining Time (Min.)	Remained battery backup time
	Battery capacity (%)	Remained battery capacity
	battery boost charging	Battery is working in boost charging mode
	battery float charging	Battery is working in float charging mode
Battery disconnected	Battery is not connected	
Current alarm		Display all current alarm. The alarms are displayed on LCD
History log		Display all history logs.
Function Settings	Display calibration	Adjust the accuracy of LCD display
	Date format set	MONTH-DATE-YEAR and YEAR-MONTH-DATE formats can be selected
	Date & Time	Date/Time set
	Language set	User can set the language
	Communication set	/
	Control password 1 set	User can modify control password 1
Command	Battery maintenance test	This test will lead to the battery being partly discharged to activate battery until battery voltage is low. Bypass must be in normal condition, the battery capacity should be above 25%.
	Battery self-check test	UPS transfer to battery discharge mode to test if the battery is normal. Bypass must be in normal condition, the battery capacity should be above 25%.
	Stop testing	Manually Stop the test including maintenance test, capacity test
UPS system information	Monitoring software version	Monitoring software version
	Rectified software version	Rectifier software version
	Inverted software version	Inverter software version
	Serial No.	The serial NO set when delivery from the factory
	Rated information	System rated information
	Module model	Module model

Table 19. Item Description of UPS Menu

9.9. UPS EVENT LOG

The follow table. 20 gives the complete list of all the UPS events displayed by history record window and current record window.

NO.	UPS events	Description
1	FaultClr	Manually clear fault
2	Log Clr	Manually clear History log
3	Load On UPS	Inverter feeds load
4	Load On Byp	Bypass feeds load
5	No Load	There is no output power for load.
6	Batt Boost	Charger is working in boost charging mode
7	Batt Float	Charger is working in float charging mode
8	Batt Discharge	Battery is discharging
9	Batt Connected	Battery is connected already
10	Batt Not Connected	Battery is not connected.
11	Maint CB Closed	Manual maintenance breaker is closed
12	Maint CB Open	Manual maintenance breaker is opened
13	EPO	Emergency Power Off
14	Inv On Less	Available power module capacity is less then the load capacity. Please reduce the load capacity or add extra power module to make sure that the UPS capacity is big enough.
15	Generator Input	Generator is connected and a signal is sent to the UPS.
16	Utility Abnormal	Utility (Grid) is abnormal. Mains voltage or frequency exceeds the upper or lower limit and results in rectifier shutdown. Check the input phase voltage of rectifier.
17	Byp Sequence Err	Bypass voltage Sequence is reverse. Check if input power cables are connected correctly.
18	Byp Volt Abnormal	<p>This alarm is triggered by an inverter software routine when the amplitude or frequency of bypass voltage exceeds the limit. The alarm will automatically reset if the bypass voltage becomes normal.</p> <p>First check if relevant alarm exists, such as "bypass circuit breaker open", "Byp Sequence Err" and "Ip Neutral Lost". If there is any relevant alarm, first clear this alarm.</p> <p>1. Then check and confirm if the bypass voltage and frequency displayed on the LCD are within the setting range. Note that the rated voltage and frequency are respectively specified by "Output Voltage" and "Output Frequency".</p> <p>2. If the displayed voltage is abnormal, measure the actual bypass voltage and frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions</p>
19	Byp Module Fail	Bypass Module Fails. This fault is locked until power off. Or bypass fans fail.
20	Byp Ov Load	Bypass current is over the limitation. If bypass current is under 135% of the rated current. The UPS alarms but has no action.
21	Byp Ov Load Tout	The bypass overload status continues and the overload times out.

NO.	UPS events	Description
22	Byp Freq Ov Track	<p>This alarm is triggered by an inverter software routine when the frequency of bypass voltage exceeds the limit. The alarm will automatically reset if the bypass voltage becomes normal.</p> <p>First check if relevant alarm exists, such as "bypass circuit breaker open", "Byp Sequence Err" and "lp Neutral Lost". If there is any relevant alarm, first clear this alarm.</p> <ol style="list-style-type: none"> 1. Then check and confirm if the bypass frequency displayed on the LCD are within the setting range. Note that the rated frequency are respectively specified by "Output Frequency". 2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user's suggestions
23	Exceed Tx Times Lmt	The load is on bypass because the output overload transfer and re-transfer is fixed to the set times during the current hour. The system can recover automatically and will transfer back to the inverter with 1 hour
24	Output Shorted	<p>Output shorted Circuit.</p> <p>Fist check and confirm if loads have something wrong.</p> <p>Then check and confirm if there is something wrong with terminals, sockets or some other power distribution unit.</p> <p>If the fault is solved, press "Fault Clr" to restart UPS.</p>
25	Batt EOD	Inverter turned off due to low battery voltage. Check the mains power failure status and recover the mains power in time
26	Batt Test OK	Battery Test OK
27	Batt Maint OK	Battery maintenance succeed
28	N# Comm Node Join	The N# Power Module is inserted in system.
29	N# Comm Node Exit	The N# Power Module is pulled out from system.
30	N# REC Fail	The N# Power Module Rectifier Fail, The rectifier has fault and results in rectifier shutdown and battery discharging.
31	N# INV Fail	The N# Power Module Inverter Fail. The inverter output voltage is abnormal and the load transfers to bypass.
32	N# REC OV Temp.	<p>The N# Power Module Rectifier Over Temperature. The temperature of the rectifier IGBTs is too high to keep rectifier running. This alarm is triggered by the signal from the temperature monitoring device mounted in the rectifier IGBTs. The UPS recovers automatically after the over temperature signal disappears.</p> <p>If over temperature exists, check:</p> <ol style="list-style-type: none"> 1. Whether the ambient temperature is too high. 2. Whether the ventilation channel is blocked. 3. Whether fan fault happens. 4. Whether the input voltage is too low.
33	N# Fan Fail	At least one fan fails in the N# power module.
34	N# Output Ov Load	<p>The N# Power Module Output Over Load. This alarm appears when the load rises above 100% of nominal rating. The alarm automatically resets once the overload condition is removed.</p> <ol style="list-style-type: none"> 1. Check which phase has overload through the load (%) displayed in LCD so as to confirm if this alarm is true. 2. If this alarm is true, measure the actual output current to confirm if the displayed value is correct. <p>Disconnect non-critical load. In parallel system, this alarm will be triggered if the load is severely imbalanced.</p>

NO.	UPS events	Description
35	N# INV Ov Load Tout	<p>N# Power Module Inverter Over Load Timeout. The UPS overload status continues and the overload times out.</p> <p>Note: The highest loaded phase will indicate overload timing-out first. When the timer is active, then the alarm "unit over load" should also be active as the load is above nominal. When the time has expired, the inverter Switch is opened and the load transferred to bypass. If the load decreases to lower than 95%, after 2 minutes, the system will transfer back to inverter mode. Check the load (%) displayed in LCD so as to confirm if this alarm is true. If LCD displays that overload happens, then check the actual load and confirm if the UPS has over load before alarm happens.</p>
36	N# INV Ov Temp.	<p>The N# Power Module Inverter Over Temperature.</p> <p>The temperature of the inverter heat sink is too high to keep inverter running. This alarm is triggered by the signal from the temperature monitoring device mounted in the inverter IGBTs. The UPS recovers automatically after the over temperature signal disappears.</p> <p>If over temperature exists, check: Whether the ambient temperature is too high. Whether the ventilation channel is blocked. Whether fan fault happens. Whether inverter overload time is out.</p>
37	On Ups Inhibited	<p>Inhibit system transfer from bypass to UPS (inverter). Check: Whether the power module's capacity is big enough for load. Whether the rectifier is ready. Whether the bypass voltage is normal.</p>
38	Manual Transfer Byp	Transfer to bypass manually
39	Esc Manual Byp	Escape from "transfer to bypass manually" command. If UPS has been transferred to bypass manually, this command enable UPS to transfer to inverter.
40	Batt Volt Low	Battery Voltage is Low. Before the end of discharging, battery voltage is low warning should occur. After this pre-warning, battery should have the capacity for 3 minutes discharging with full load.
41	Batt Reverse	Battery cables are connected not correctly.
42	N# INV Protect	<p>The N# Power Module Inverter Protect. Check: Whether inverter voltage is abnormal Whether inverter voltage is much different from other modules, if yes, please adjust inverter voltage of the power module separately.</p>
43	lp Neutral Lost	The mains neutral wire is lost or not detected. For 3 phases UPS, it's recommended that user use a 3-poles breaker or switch between input power and UPS.
44	Byp Fan Fail	At least one of bypass module Fans Fails
45	N# Manual Shutdown	The N# Power Module is manually shutdown. The power module shuts down rectifier and inverter, and there's on inverter output.
46	ManBoost	Manually force the Charger work in boost charge mode.
47	Manfloat	Manually force the charger work in float charge mode.
48	Arrears Shutdown	Reserved.
49	Lost N+X Redundant	Lost N+X Redundant. There is no X redundant powers module in system.
50	EOD Sys Inhibited	System is inhibited to supply after the battery is EOD (end of discharging)

Table 20. UPS Event List

10. OPERATIONS

The components that can only be accessed by opening the protective cover with tools cannot be operated by user. Only qualified service personnel are authorized to remove such covers.

10.1. INTRODUCTION

The Modular UPS rack system provides the critical load (such as communication and data processing equipment) with high quality uninterruptible AC power. The power from the UPS is free from voltage and frequency variations and disturbances (interruption and spike) experienced at the Mains AC input supply.

This is achieved through high frequency double conversion power pulse width modulation (PWM) associated with fully digital signal processing control (DSP), which features high reliability and convenience for use.

As shown in fig. 49, the AC input mains source is supplied at UPS input and converted into a DC source. This DC source feeds the Inverter that converts the DC source into a clean and input independent AC source. The battery powers the load through the inverter in case of an AC input mains power failure. The utility source can also power the load through the static bypass.

When the UPS needs maintenance or repair, the load can be transferred to maintenance bypass without interruption and the power module and bypass module can be removed for maintenance.

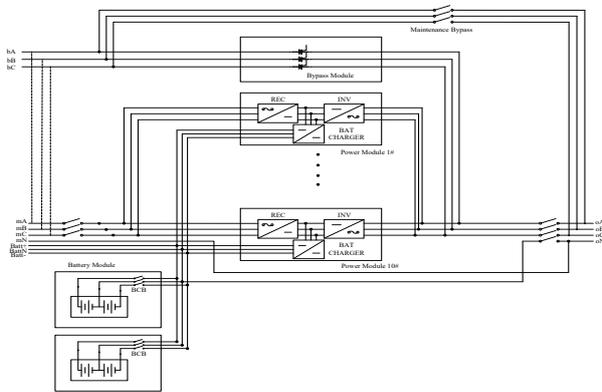


Fig. 49. Single Unit Block Diagram

10.2. UPS STARTUP

Do not start the UPS until the installation is completed, the system has been commissioned by authorized personnel and the external power isolators are closed.

10.2.1. Start-Up Procedure

This procedure must be followed when turning on the UPS from a fully powered down condition.

The operating procedures are as follows:

1. Open the external power switch. Open the internal power switch. Open the UPS door, connect the power supply cables and ensure the correct phase rotation.
2. Close the output circuit breaker (Q3). Close the mains input circuit breaker (Q1) and connect the mains power.
3. The LCD starts up at this time.
4. The Rectifier indicator flashes during the startup of rectifier. The rectifier enters normal operation state, and after about 20s, the rectifier indicator goes steady green. After initialization, the bypass static switch closes.

LED	Status
Rectifier indicator	Green
Battery indicator	Red
Bypass indicator	Green
Inverter Indicator	Off
Load indicator	Green
Status indicator	Green

Table 21. Inverter start up

5. The inverter starts up automatically. The inverter indicator flashes during the startup of inverter. After about 1minute, the inverter is ready, the UPS transfers from bypass to inverter, the bypass indicator turns off, and the inverter and load indicators turn on.

LED	Status
Rectifier indicator	Green
Battery indicator	Red
Bypass indicator	Off
Inverter Indicator	Green
Load indicator	Green
Status indicator	Green

Table 22. Normal mode

6. Close external battery switch, battery indicator turns off, a few minutes later, the battery will be charged by UPS.

LED	Status
Rectifier indicator	Green
Battery indicator	Green
Bypass indicator	Off
Inverter Indicator	Green
Load indicator	Green
Status indicator	Green

Table 23. Battery charged

10.2.2. Battery Start

1. Verify that the battery is properly connected.

2. Press the cold start-up button (see as fig. 50) under the rectifier input circuit breaker for 1 seconds
3. At this point, the LCD displays the start screen, press cold start-up button again. And the battery indicator flashes green. It stops flashing and becomes solid green about 10 seconds after the rectifiers enter normal operation.
4. The inverter starts up automatically, the green inverter indicator flashes. The UPS works in battery mode after 60 seconds.

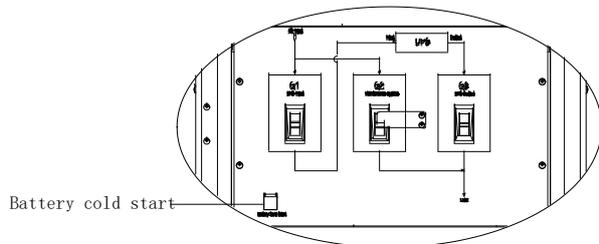


Fig. 50. Location of Battery Cold Start Button

10.3. PROCEDURE FOR SWITCHING THE UPS BETWEEN MAINTENANCE BYPASS AND NORMAL MODE

10.3.1. Switch from normal mode to bypass mode

Press “Tran byp” menu in menu  to switch to bypass mode.



Note:

In bypass mode, the load is directly fed by the mains power instead of the pure AC power from the inverter.

10.3.2. Switch from bypass mode to normal mode

Press “Esc byp” menu in bypass mode. After the inverter enters normal operation, the UPS transfers to normal mode.

10.3.3. Switch from Normal Mode to Maintenance Bypass Mode

This procedure can transfer the load from the UPS inverter output to the maintenance bypass supply, but the precondition is that the UPS is in normal mode before the transfer.



Warning:

Before making this operation, read messages on 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.

1. Press the “Tran Byp” menu in  on the right side of the LCD. The UPS Mimic indicator Inverter will green flash and also the Status Indicator will turn red and will be accompanied by an audible alarm. The load transfers to static bypass, and the inverter standby.



Note:

Pressing the Alarm Silence button  cancels the audible alarm but leaves the warning message displayed until the alarm condition is rectified.

2. Open the UPS front door, close the maintenance bypass breaker (Q2) from OFF to ON position. The load power supply is provided by the manual maintenance bypass.
3. Press EPO to make sure the charge current is 0. Open the mains input breaker (Q1) and output breaker (Q3), open the external battery breaker and internal battery breaker (if built-in battery modular UPS)



Warning:

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

When the maintenance bypass switch is on position of ON, some part of the UPS circuit still has hazardous voltage. Therefore, only qualified person can maintain the UPS.



Note:

When the UPS is in maintenance bypass mode, the load is not protected against abnormal mains supply.

10.3.4. Switch from Maintenance Mode to Normal Mode

1. Close output breaker (Q3). Close mains input breaker (Q1). The LCD starts up at this time. The Rectifier indicator flashes during the startup of rectifier. The rectifier enters normal operation state, and after about 20s, the rectifier indicator goes steady green. After initialization, the bypass static switch closes.
2. Open the manual maintenance breaker (Q2).



Warning:

Before opening the maintenance breaker (Q2), make sure that static bypass switch is working according power flow displayed on LCD.

3. After about 60s, UPS transfers to inverter. Close external battery breaker and internal battery breaker (for battery built-in cabinet).

10.4. EPO PROCEDURE

The EPO button 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), and the battery stops charging or discharging.

If the input utility is present, the UPS control circuit will remain

11. MAINTENANCE

11.1. 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, i.e. DC voltage is lower than 60Vdc, and AC maximum voltage is lower than 42.4Vac.
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.

11.2. 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 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 and the power module will automatically join the system.

11.3. 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.

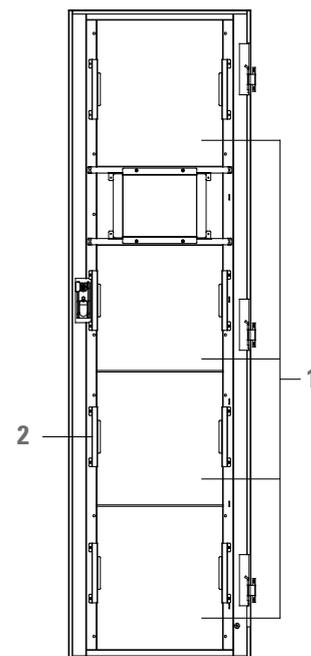
1. Transfer the system to bypass mode through the LCD control panel.
2. Close maintenance bypass switch, the UPS power will be supplied by maintenance bypass.
3. Pull out the bypass module and the load is powered through maintenance bypass.

4. Remove the mounting screw on the two front sides of the bypass module and the front signal cable connects to the bypass module.
5. Pull out the bypass module and the LCD touch screen goes off.
6. Wait 10 mins before opening the cover for repairing.
7. After the repairing is done, push the bypass module into the cabinet and the LED touch screen goes on.
8. 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.
9. Turn off the maintenance bypass switch and the load is powered through bypass. The rectifier starts followed by the inverter.
10. After 60S, the system transfers to Normal mode.

11.4. REPLACING DUST FILTER (OPTIONAL)

As shown in Fig. 51, 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. 51. Dust filter on the back side of front door

12. PRODUCT SPECIFICATION

This chapter provides UPS product specification.

12.1. APPLICABLE STANDARDS

The UPS has been designed to conform to the following European and international 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-EC62040-2/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

12.2. ENVIRONMENTAL CHARACTERISTICS

Items	Unit	Requirements
Acoustic noise level at 1 meter	dB	58.0
Altitude of Operation	m	≤1000m above sea level, derate power by 1% per 100m between 1000m and 2000m
Relative Humidity	%RH	0 to 95%, non condensing
Operating Temperature	°C	0 to 40 deg , Battery life is halved for every 10°C increase above 20°C
UPS Storage Temperature	°C	-20~70
Battery Storage Temperature	°C	0~25 (20°C for optimum battery storage)

Table 25. Environmental Properties

12.3. ENVIRONMENTAL PROPERTIES

Cabinet Specification	Unit	30/10,45/15, 60/20	60/10, 90/15, 120/20	100/10, 150/15, 200/20	60/20 battery built-in
Mechanical Dimension, W×D×H	mm	600×900×1100	600×900×1600	600×900×2000	600×1000×2000
Weight	kg	120	151	182	---

Module type	Unit	10	15	20
Mechanical Dimension, W×D×H	mm	440×590×134		
Weight	kg	21	22.5	22.5

Table 26. Mechanical Properties

12.4. ELECTRICAL CHARACTERISTICS (INPUT RECTIFIER)

Items	Unit	Parameter
Rated AC Input Voltage	Vac	380/400/415(three-phase and sharing neutral with the bypass input)
Input voltage range	Vac	-40%~+25%
Frequency1	Hz	50/60(range: 40Hz~70Hz)
Power factor	kW/kVA, full load	0.99
THD	THDI%	3

Table 27. Rectifier AC Input (mains)

12.5. ELECTRICAL CHARACTERISTICS (INTERMEDIATE DC LINK)

Items	Unit	Parameters
Battery bus voltage	Vdc	Nominal: $\pm 240V$, one-side range: 198V~288V
Quantity of lead-acid cells	Nominal	480V=40*6cell(12V)
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/°C /cl	-3.0(selectable from : 0~-5.0, 25°C or 30°C, or inhibit)
Ripple voltage	%V float	≤ 1
Ripple current	%C10	≤ 5
Boost charge voltage	V/cell (VRLA)	2.4V/cell(selectable from : 2.30V/cell~2.45V/cell) Constant current and constant voltage charge mode
End of 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 Charging Power	kW	10%* UPS capacity (selectable from : 0~20%* UPS capacity)

Table 28. Battery Information

12.6. ELECTRICAL CHARACTERISTICS (INVERTER OUTPUT)

Rated capacity (kVA)	Unit	40~120
Rated AC voltage ¹	Vac	380/400/415(three-phase four-wire and sharing neutral with the bypass)
Frequency ²	Hz	50/60
overload	%	110% load, 1 hour 125% load, 10min 150% load, 1min > 150% load, 200ms
Fault current	%	300% short current limitation for 200ms
Non linear load Capability ³	%	100%
Neutral current capability	%	170%
Steady state voltage stability	%	± 1 (balanced load) ± 1.5 (100% unbalance load)
Transient voltage response ⁴	%	± 5
THD	%	< 1.5(linear load) , < 5(non linear load ³)
Synchronization Window	-	Rated frequency $\pm 2Hz$ (selectable: $\pm 1 \sim \pm 5Hz$)
Max change rate of synch frequency	Hz/s	1: selectable: 0.1~5
Inverter voltage range	%V(ac)	± 5

Note:

1. Factory setting is 380V. Commissioning engineers can set to 400V or 415V.
2. Factory setting is 50Hz. Commissioning engineers can set to 60Hz.
3. EN50091-3(1.4.58) crest ratio is 3: 1.
4. IEC62040-3/EN50091-3 including 0%~100%~0% load transient, the recovery time is half circle to within 5% of stable output voltage.

Table 29. Inverter Output (to Critical Load)

12.7. ELECTRICAL CHARACTERISTICS (BYPASS INPUT)

Rated capacity(kVA)		30	45	60	90	100	120	150	200
Rated AC Voltage (Vac)		380/400/415 three-phase four-wire, sharing neutral with the rectifier input and providing neutral reference for the output							
Rated current	380V	46	68	91	136	151	182	227	302
	400V	43	65	87	130	144	174	216	288
	415V	42	63	83	124	138	166	207	276
Overload	%	125% load, long term							
		130% load, 1 hour							
		150% load, 6min							
		1000% load, 100ms							
Superior protection bypass line		Thermal-magnetic breaker, the capacity is 125% of rated current output. IEC60947-2 curve C							
Current rating of neutral cable (A)		1.7×In							
Frequency (Hz)		50/60							
Switch time (between bypass and inverter) (ms)		Synchronized switch: ≤1ms							
Bypass voltage tolerance (% Vac)		Upper limit: +10, +15 or +20, default: +20							
		Lower limit: -10, -20, -30 or -40, default: -20							
		(acceptable stable bypass voltage delay: 10s)							
Bypass frequency tolerance (%)		±2.5, ±5, ±10 or ±20, default: ±10							
Synchronization-Window (Hz)		Rated frequency±2Hz (selectable from ±0.5Hz~±5Hz)							

Note:

1. Factory setting is 400V. Commissioning engineers can set to 380V or 415V.
2. Commissioning engineers can set to 50Hz or 60Hz. For example, UPS is set to frequency inverter mode, and then bypass status will be neglected.

Table 30. Bypass Input

12.8. EFFICIENCY

Efficiency		
Normal mode(dual conversion)	%	95
ECO mode	%	98
Battery discharging efficiency (DC/AC) (battery at nominal voltage 480Vdc and full-rated linear load)		
Battery mode	%	95

Table 31. Efficiency, Air Exchange

12.9. DISPLAY AND INTERFACE

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

Table 32. Efficiency, Air Exchange

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