USER MANUAL | EN

NOVA

Online Double Conversion UPS

3:3

10 – 40 kVA

Threephase/Threephase

Accedi al link ed utilizza la password per scaricare il manuale in Italiano	
Access the link and use the password to download the manual in English	
Accédez au lien et utilisez le mot de passe pour télécharger le manuel en Français	
Rufen Sie den Link auf und verwenden Sie das Passwort, um das Handbuch auf Deutsch herunterzuladen	

https://gtec-power.eu/nova-user-manual/

PASSWORD: GTCNV104024

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Preface

Usage

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

Users

Authorized Person

Note

Our company is providing a full range of technical support and service. Customers can contact our local office or customer service center for help.
The manual will update irregularly, due to the product upgrading or other reasons.
Unless otherwise agreed, the manual is only used as guide for users and any statements or information contained in this manual make no warranty expressed or implied.

Safety Precautions

This manual contains information concerning the installation and operation of UPS. Please carefully read this manual prior to installation.

The UPS cannot be put into operation until it is commissioned by engineers approved by the manufacturer (or its agent). Not doing so could result in personnel safety risk, equipment malfunction and invalidation of warranty.

Safety Message Definition

Danger: Serious human injury or even death may be caused, if this requirement is ignored.

Warning: Human injury or equipment damage may be caused, if this is requirement is ignored.

Attention: Equipment damage, loss of data or poor performance may be caused, if this requirement is ignored.

Commissioning Engineer: The engineer who installs or operates the equipment should be well trained in electricity and safety, and familiar with the operation, debug, and maintenance of the equipment.

Warning Label

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

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

Safety Instruction

	• Performed only by commissioning engineers. • This UPS is designd for commercial and industrial applications only, and is not intended for any use in life-support devices or system.
	• Read all the warning labels carefully before operation, and follow the instructions.
	• When the system is running , do not touch the surface with this label, to avoid any hurt of scald.
	• ESD sensitive components inside the UPS, anti-ESD measure should be taken before handling.

Move & Installation

 Danger	• Keep the equipment away from heat source or air outlets. • In case of fire, use dry powder or gas extinguisher only, any liquid extinguisher can result in electric shock.
 Warning	• Don't start the system if any damage or abnormal parts founded. • Contacting the UPS with wet material or hands may be subject to electric shock.
 Attention	• Use proper facilities to handle and install the UPS. Shielding shoes, protective clithes and other protective facilities are necessary to aviod injury. • During positioning, keep the UPS way from shock or vibration. • Install the UPS in proper environment, more detail in section 2.3.

Debug & Operate

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

Maintenance & Replacement

 Danger	• All the equipment maintenance and servicing procedures involving internal access need special tools and should be carried out only by trained personnel. The components that can be accessed by opening the protective cover with tools cannot be maintenance by user. • This UPS full complies with "IEC /EN62040-1 General and safety requirements for use in operator access area UPS". Dangerous voltages are present within the battery area. • However, the risk of contact with these high voltages is minimized for non-service personnel. Since the component with dangerous voltage can only be touched by opening the protective cover with a tool, the possibility of touching high voltage component is minimized. No risk exists to any personnel when operating the equipment in the normal manner, following the recommended operating procedures in this manual.

Battery Safety

	• All the battery maintenance and servicing procedures involving internal access need special tools or keys and should be carried out only by trained personnel. • When connected together, the battery terminal voltage will exceed 400Vdc and is potentially lethal. • Battery manufacturers supply details of the necessary precautions to be observed when working on, or in the vicinity of a large bank of battery cells. These precautions should be followed implicitly at all times. Particular attention should be paid to the recommendations concerning local environmental conditions and the provision of protective clothing, first aid and fire-fighting facilities. • Ambient temperature is a major factor in determining the battery life. The nominal operating temperature of battery is 20℃. Operating above this temperature will reduce the battery life. Periodically change the battery according to the battery user manuals to ensure the back-up time of UPS. • Replace the batteries only with the same type and the same number, or it may cause explosion or poor performance. • When connecting the battery, follow the precautions for high-voltage operation before accepting and using the battery, check the appearance of the batteries. If the package is damaged, or the battery terminal is corroded or rusted or the shell is broken, deformed or has leakage, replace it with new product. Otherwise, battery capacity reduction, electric leakage or fire may be caused. • Before operating the battery, remove the finger ring, watch, necklace, bracelet and any other metal jewelry. • Wear rubber gloves. • Eye protection should be worn to prevent injury from accidental electrical arcs. • Only use tools (e.g. wrench) with insulated handles. • The batteries are very heavy. Please handle and lift the battery with proper method to prevent any human injury or damage to the battery terminal. • Don’t decompose, modify or damage the battery. Otherwise, battery short circuit, leakage or even human injury may be caused. • The battery contains sulfuric acid. In normal operation, all the sulfuric acid is closed inside in the battery. However, when the battery case is broken, the acid will leak from the battery. Therefore, be sure to wear a pair of protective glasses, rubber gloves and skirt when operating the battery. Otherwise, you may become blind if acid enters your eyes and your skin may be damaged by the acid.

	• At the end of battery life, the battery may have internal short circuit, drain of electrolytic and erosion of positive/negative plates. If this condition continues, the battery may have temperature out of control, swell or leak. Be sure to replace the battery before these phenomena happen. • If a battery leaks electrolyte, or is otherwise physically damaged, it must be replaced, stored in a container resistant to sulfuric acid and disposed of in accordance with local regulations. • If electrolyte comes into contact with the skin, the affected area should be washed immediately with water.

Disposal

 Warning	• Dispose of used battery according to the local instructions.

1. UPS Structure and Introduction

1.1 UPS structure

1.1.1 UPS Configuration

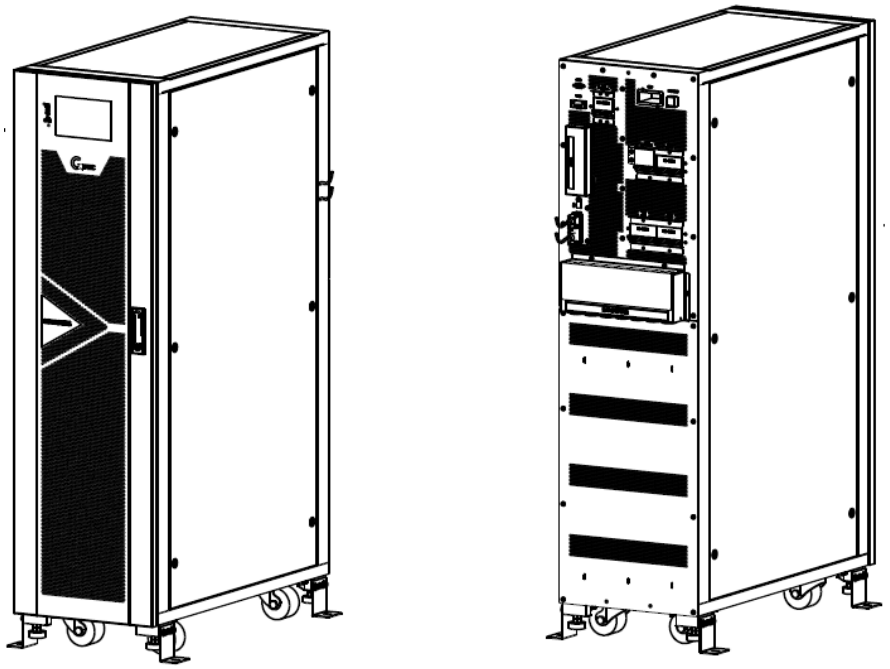
The UPS configurations are provided in Table 1-1.

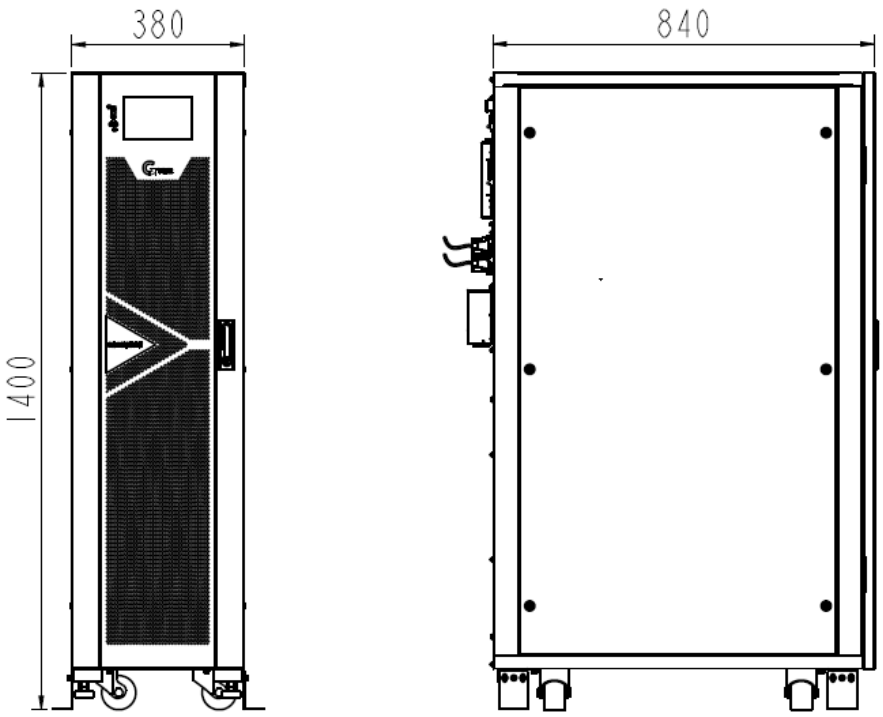
Table 1-1 UPS Configuration

Item	Components	Quantity	Remark
10-40kVA	Circuit Breakers	5	Standard
	Dual Input	---	Standard
	Parallel Card,	1	Optional
	Dry Contact Card	1	Standard
	Cold start	---	Optional
	Dust filter	1	Optional
	SNMP	1	Optional

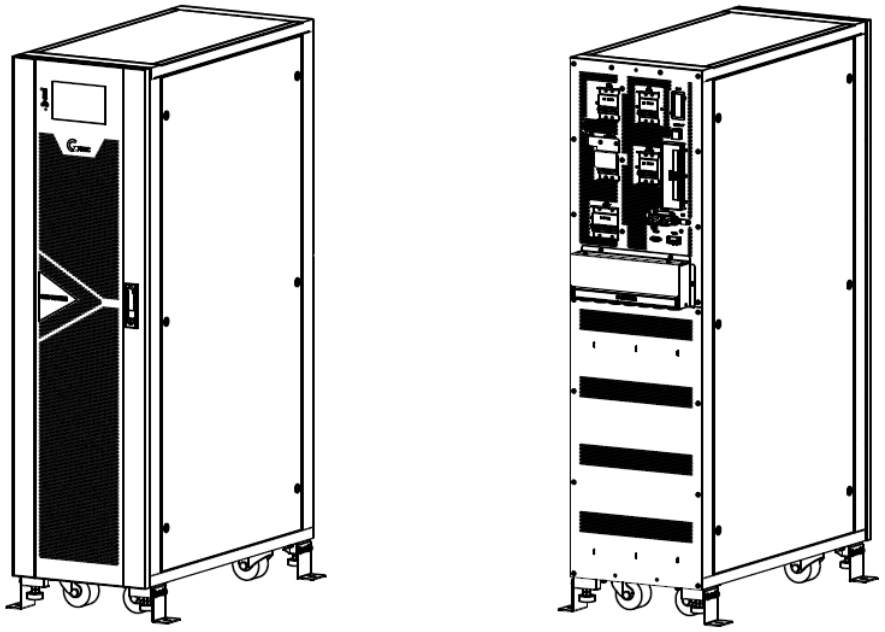
1.1.2 UPS Outlook

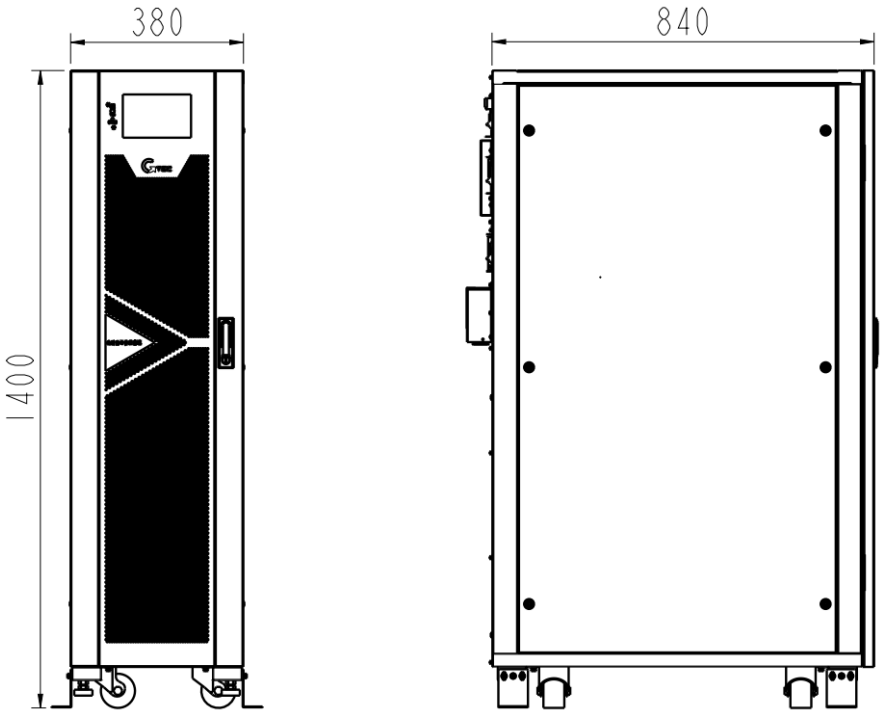
The UPS outlooks are shown as figure 1-1.



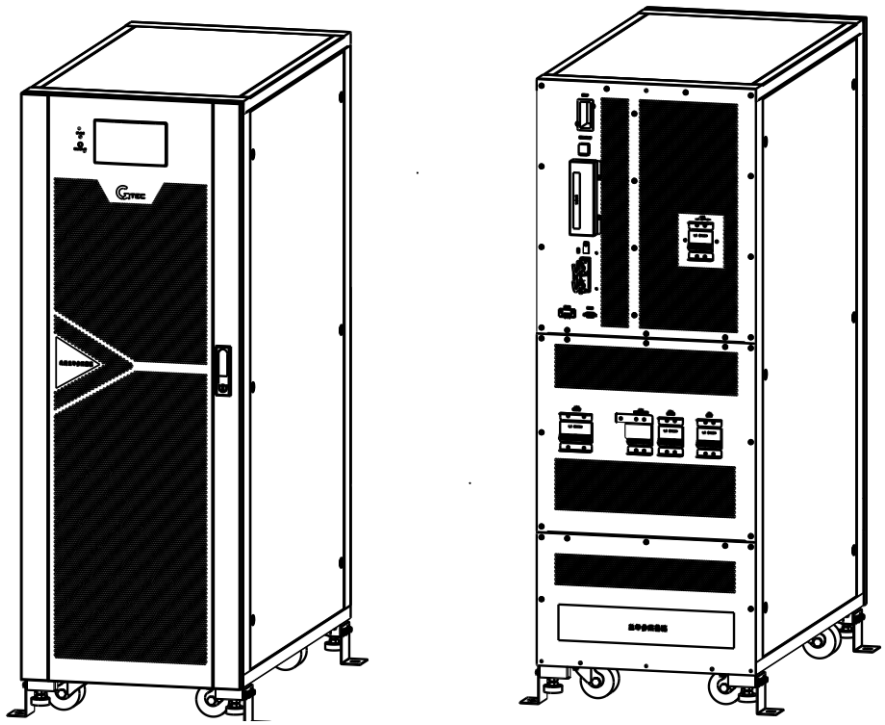


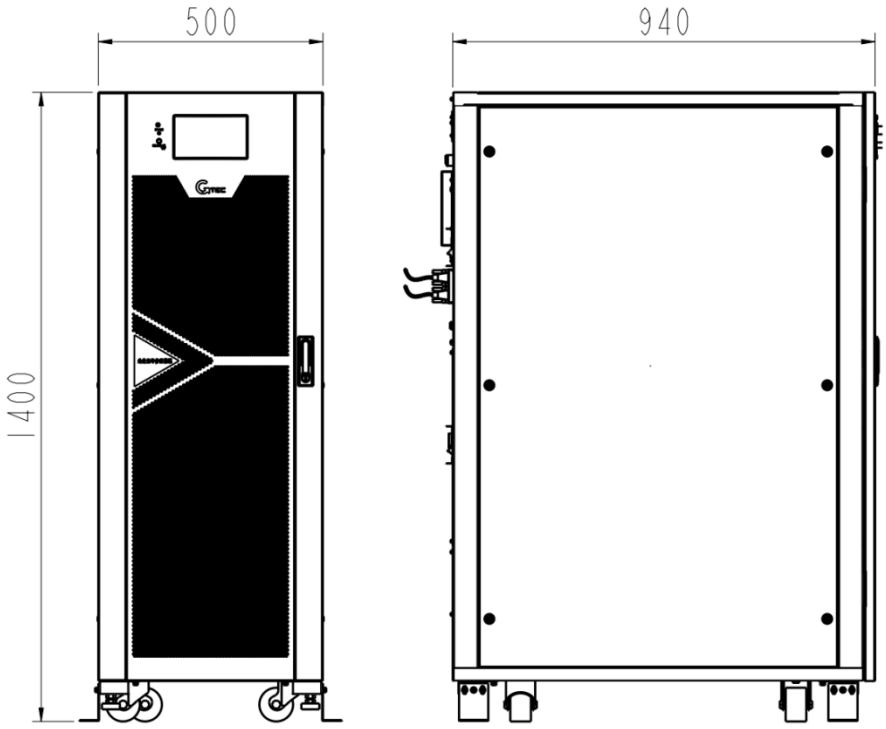
(a) The outlook of 10kVA/15kVA (unit: mm)





(b) The outlook of 20kVA (unit: mm)



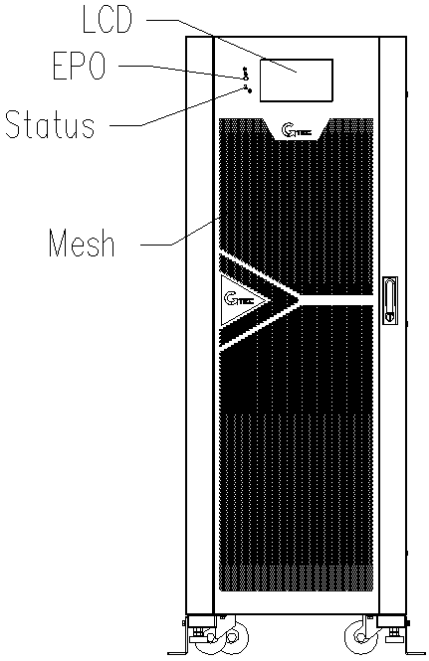


(c) The outlook of 30kVA/40kVA (unit: mm)

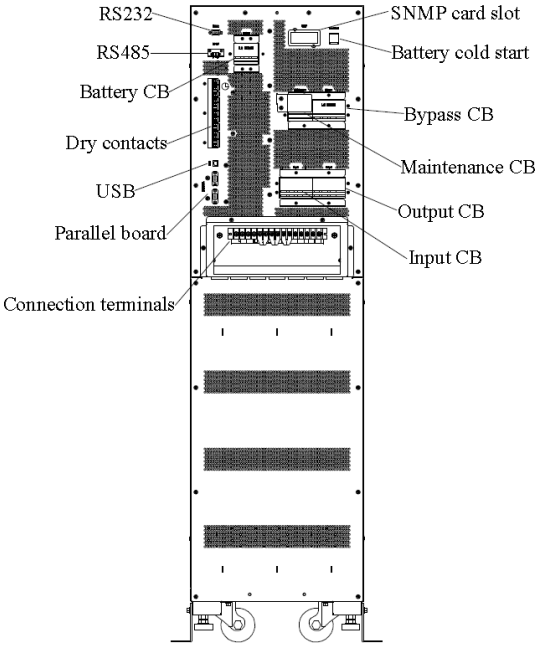
Figure 1-1 UPS Outlook

1.1.3 Details of UPS front and rear views

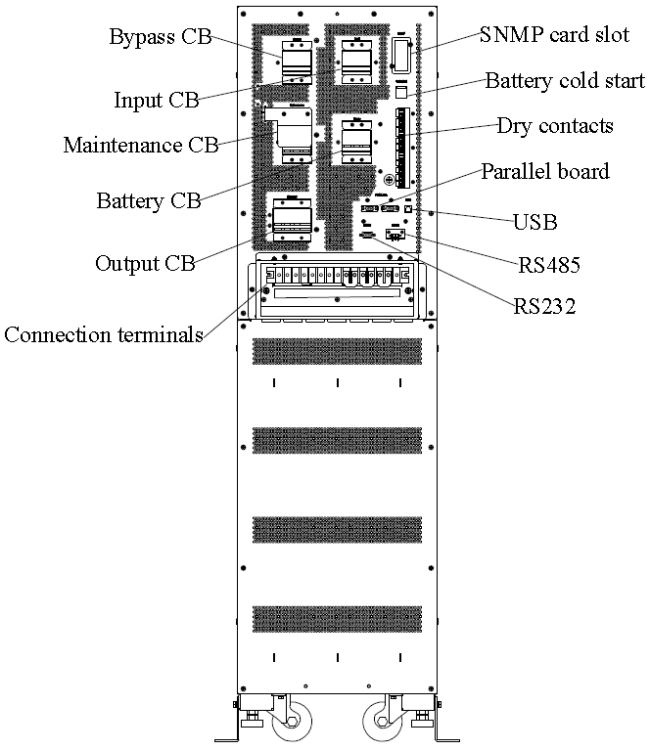
The UPS front and rear views are shown as Figure 1-2.



(a) The details of front view for 10-40kVA

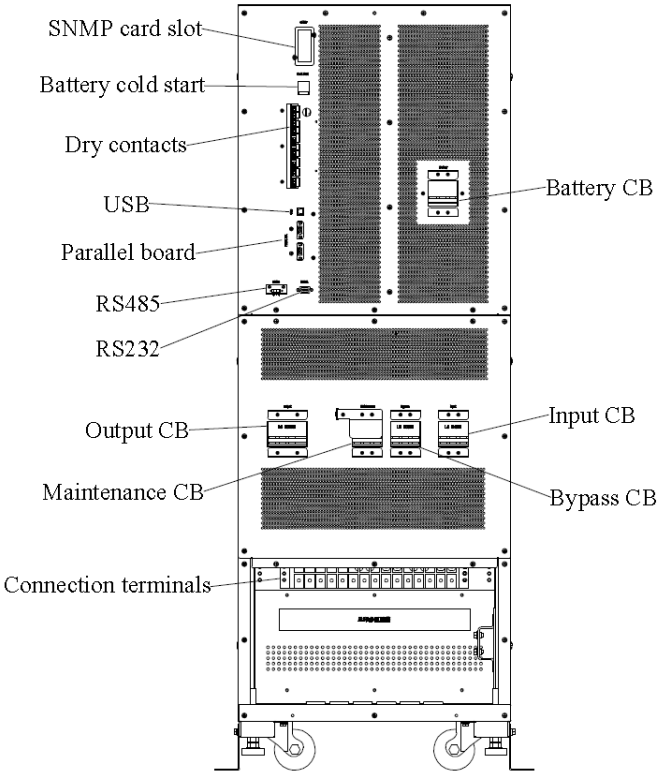


(b) The details of rear view for 10kVA and 15kVA



(c) The details of rear view for 20kVA

Note: USB port is available in the parallel card



(d) The details of rear view for 30kVA and 40kVA

Figure 1-2 Details of UPS front and rear views

1.2 Product Introduction

1.2.1 UPS System Description

The UPS is composed by the following part: rectifier, charger, inverter, static bypass switch and Maintenance bypass breaker. One or several battery strings should be installed inside, to provide backup energy once the utility fails. The UPS structures are shown in Figure 1-3.

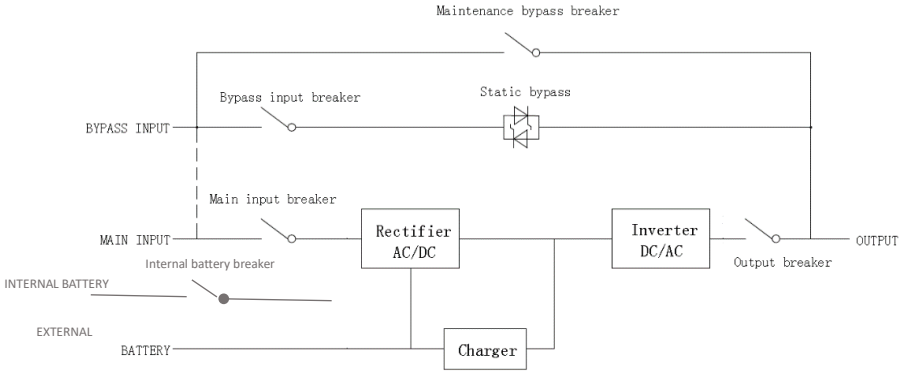


Figure 1-3 UPS Block Diagram

1.2.2 Operation Mode

The 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
- Frequency Converter mode

1.2.2.1 Normal Mode

The inverter continuously supplies AC power to the critical AC load. The rectifier derives power from the AC mains input source and supplies DC power to the inverter, meanwhile the charger derives the DC power from the rectifier and charger its associated backup batteries.

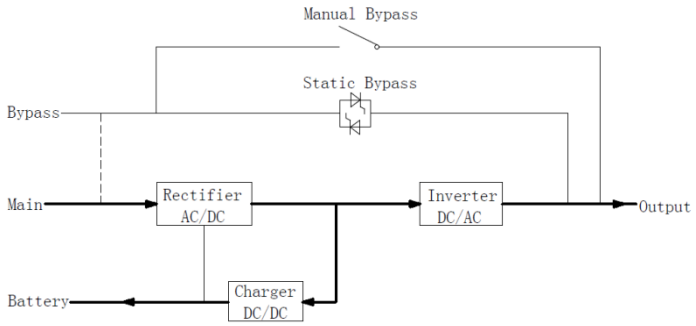


Figure 1-4 Normal mode operation diagram

1.2.2.2 Battery Mode

Upon failure of the AC mains input power, the inverter will obtain power from the batteries, and supply AC power to the critical AC load. There is no interruption to the critical load. After restoration of the AC mains input power, UPS will transfer automatically to normal mode without users' intervention.

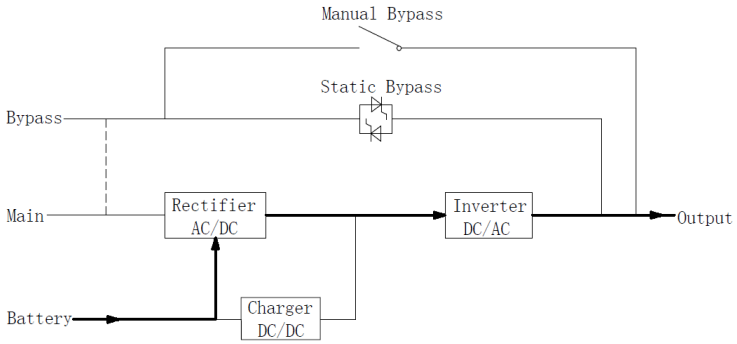


Figure 1-5 Battery Mode operation diagram

Note: With the function of "Battery Cold Start", the UPS could start without utility.

1.2.2.3 Bypass Mode

If the inverter overload capacity is exceeded under normal mode, or if the inverter becomes unavailable for any reason, the static switch will perform a transfer of the load from the inverter to the bypass source, without interruption to critical AC load. If the inverter is asynchronous with the bypass source, an interruption would exist in the transfer from the inverter to the bypass. This is to avoid large cross current due to the paralleling of unsynchronized AC sources. This interruption is programmable, but the typically setting is less than 3/4 of an electrical cycle, e.g. less than 15ms on 50Hz system or less than 12,5ms on 60Hz system. The action of transfer/re-transfer can be done by the command through the monitor screen.

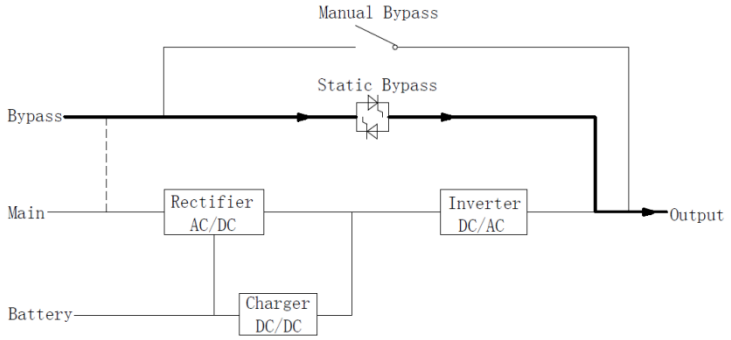


Figure 1-6 Bypass mode operation diagram

1.2.2.4 Maintenance Mode (Manual Bypass)

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

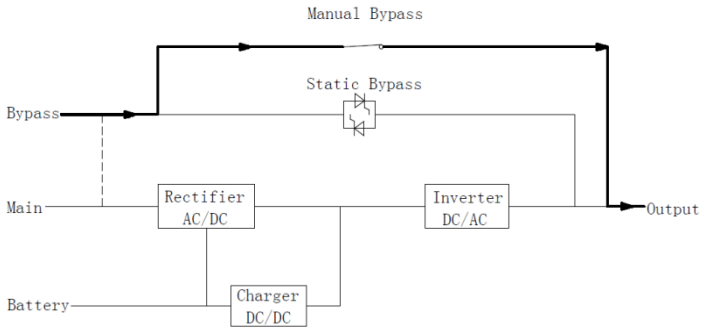


Figure 1-7 Maintenance mode operation diagram

Danger

During Maintenance mode, dangerous voltages are present on the terminal of input, output, neutral, battery and in breakers terminals, even with all switch and the LCD turned off.

1.2.2.5 ECO Mode

To improve system efficiency, UPS system works in Bypass Mode at normal time, and the inverter is standby, when the utility from the bypass fails, the UPS will transfer to Battery Mode and the inverter powers the load.

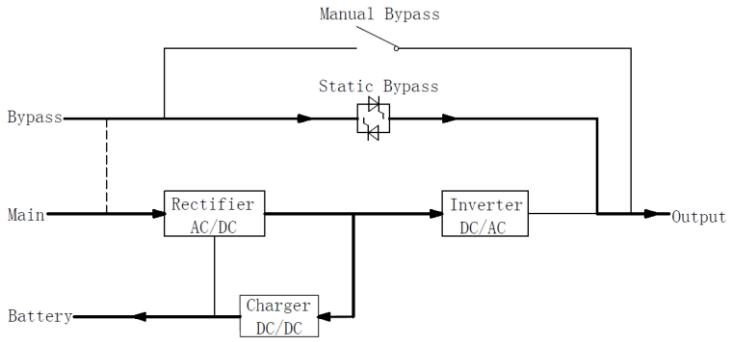


Figure 1-8 ECO Mode operation diagram

Note

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

1.2.2.6 Frequency Converter Mode

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

2. Installation

2.1 Location

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

2.1.1 Installation Environment

The UPS is intended for indoor installation and uses forced convection cooling by internal fans. Please make sure there is enough space for the UPS ventilation and cooling.

Keep the UPS far away from water, heat and inflammable and explosive corrosive material. Avoid installing the UPS in the environment with direct sunlight, dust, volatile gases, corrosive material and high salinity.

Avoid installing the UPS in the environment with conductive dirt.

The best operating environment temperature for batteries is 20-25℃. Operating above 25℃ will reduce the battery life, and operation below 20℃ will reduce the battery capacity.

The battery will generate a little amount of hydrogen and oxygen during charging; ensure the fresh air volume of the battery installation environment must meet EN50272-2001 and EN-IEC62485-2 requirements.

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

2.1.2 Site Selection

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

No vibration and less than 5 degree inclination horizontally.

The equipment should be stored in a room so as to protect it against excessive humidity and heat sources.

The battery needs to be stored in dry and cool place with good ventilation. The most suitable storage temperature is 5℃ to 25℃.

2.1.3 Size and Weight

Ensure there is enough space for the placement of the UPS. The room reserved for the UPS cabinet is shown in Figure 2-1.

Attention

Ensure there is at least 0,8m on front of the cabinet for an easier access to the UPS and at least 0,5m behind for cooling ventilation. Refer to Figure2-1.

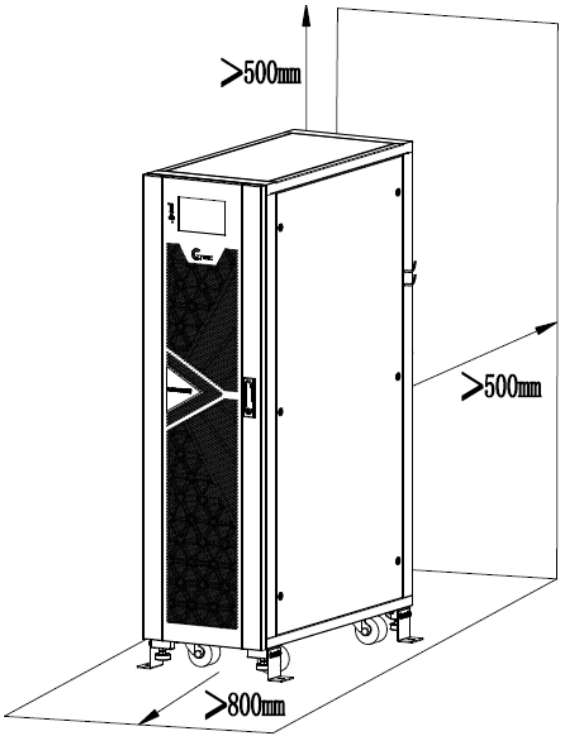


Figure 2-1 Space reserved for the cabinet (Unit: mm)

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

Table 1.1 Weight for the cabinet

Configuration	Dimension(W*D*H) mm	Weight Without Batteries	Max Weight With Batteries
10kVA	380*840*1400	100 kg	424 kg (3 strings)
15kVA	380*840*1400	100 kg	424 kg (3 strings)
20kVA	380*840*1400	100 kg	424 kg (3 strings)
30kVA	500*940*1400	140 kg	572 kg (4 strings)
40kVA	500*940*1400	140 kg	572 kg (4 strings)

2.2 Unloading and Unpacking

2.2.1 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 Figure2-2.

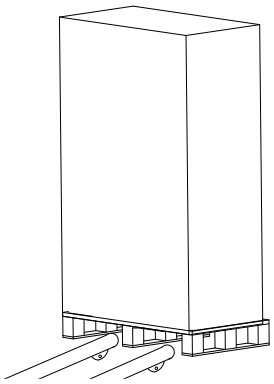


Figure 2-2 Transport to the designated site

3. Unpack the package as shown in Figure 2-3.

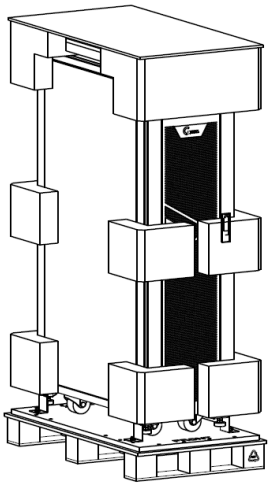


Figure 2-3 Disassemble the case

4. Remove the protective foam around the cabinet as shown in Figure 2-4.

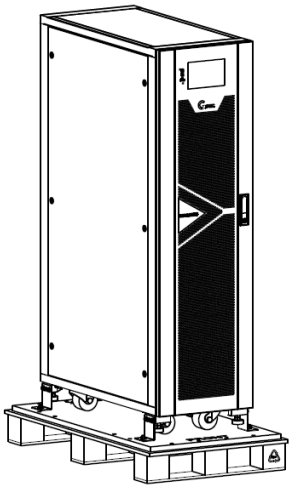


Figure 2-4 remove the protective foam

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 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.

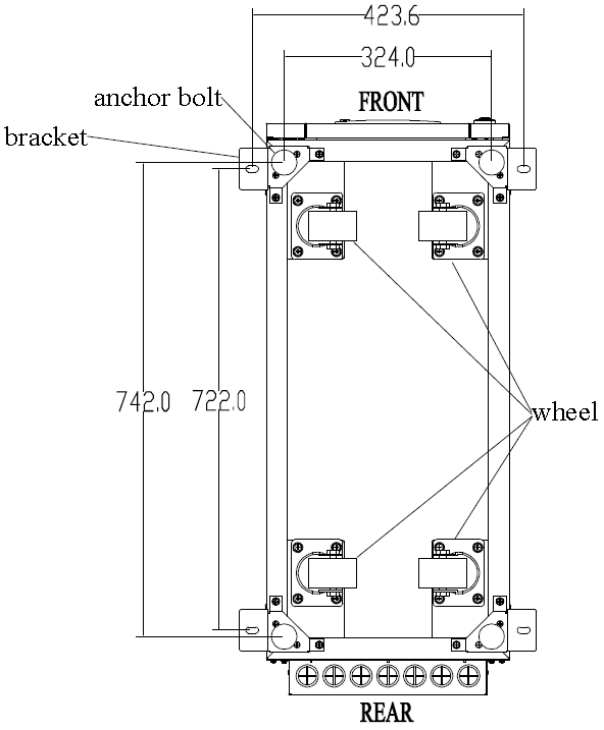
Attention

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

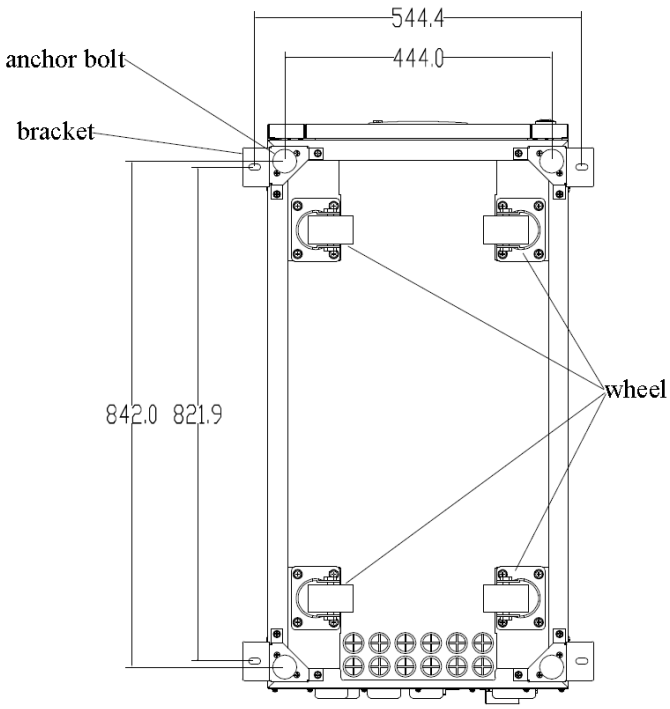
2.3 Positioning

2.3.1 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 Figure 2-5.



(a) 10-20kVA (Bottom, unit: mm)



(b) 30kVA and 40kVA (Bottom, unit: mm)

Figure 2-4 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 counter clockwise 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.

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.

2.4 Battery

The UPS can contain internal batteries, but it also have the external battery connection terminals for more choice.

Three terminals (positive, neutral, negative) are drawn from the battery group and connected to UPS system. The neutral line is draw from the middle of the batteries in series (See Figure 2-5)

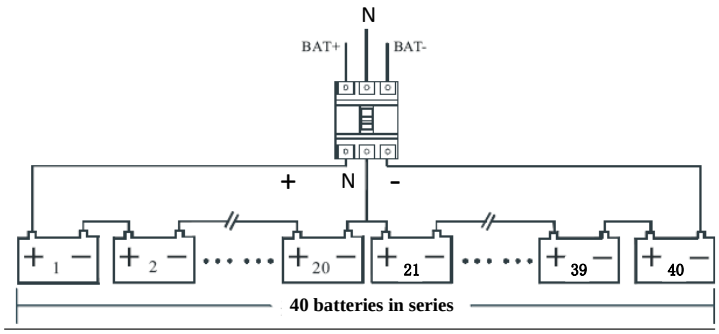


Figure 2-5 Battery connection diagram

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.

2.5 Cable Entry

Cables entry is on the bottom of the rear.

Cable entry is shown in Figure 2-6.

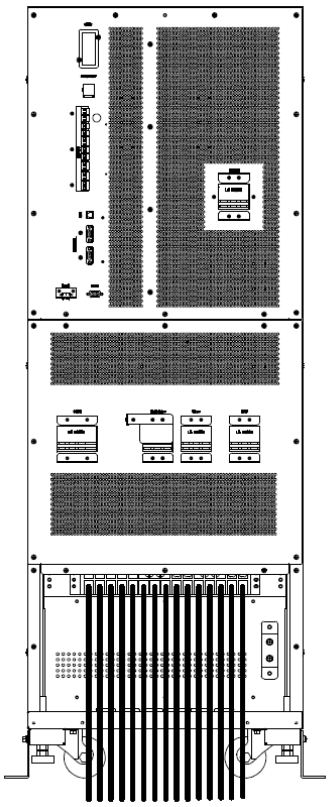


Figure 2-6 Cables entry

2.6 Power Cables

2.6.1 Specifications

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

Table 2-2 Recommended sizes for power cables

Contents			10kVA	15kVA	20kVA	30kVA	40kVA
Main Input	Main Input Current (A)		18	28	35	55	70
	Cable Section （mm²）	Phases and N	6	6	10	10	16
Output	Output Current (A)		15	23	30	45	60
	Cable Section （mm²）	Phases And N	6	6	10	10	16
Bypass Input （Optional）	Bypass Input Current (A)		15	23	30	45	60
	Cable Section （mm²）	Phases And N	6	6	10	10	16
Battery Input	Battery Input current (A)		20	30	40	60	80
	Cable Section （mm²）	+ / - / N	6	10	16	16	25
PE	Cable Section （mm²）	PE	6	10	10	10	16

Note

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

- Ambient temperature: < 30℃.
- AC loss is less than 3%, DC loss is less than 1%, the length of the AC power cables should be no longer than 50 meters and the length of the DC power cables should be no longer than 30 meters.
- Currents listed in the table are based on the 380V system (line to line voltage). For 400V system, the current is 0,95 times and for the 415V system the current is 0,92 times.
- The size of neutral lines should be 1,5-1,7 times the value listed above when the predominant load is non-linear.

2.6.2 Specifications for Power Cables Terminal

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

Table 2-3 Requirements for power terminal

Port	Connection	Bolt	Terminal space	Torque
Mains input	Cables crimped OT terminal	10 + 15kVA = M5 20 + 30kVA = M6 40kVA = M8	10 + 15kVA = 10,4mm 20 + 30kVA = 13mm 40kVA = 23mm	4,9Nm
Bypass Input				
Battery Input				
Output				
PE				

2.6.3 Circuit Breaker

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

Table 2-4 Recommended CB

Installed position	10kVA	15kVA	20kVA	30kVA	40kVA
Input CB	32A/3P	40A/3P	63A/3P	80A/3P	100A/3P
Bypass CB				63A/3P	
Output CB					
Maintenance CB					
Battery CB	32A/3P	40A, 250Vdc	63A, 250Vdc	100A, 250Vdc	125A, 250Vdc

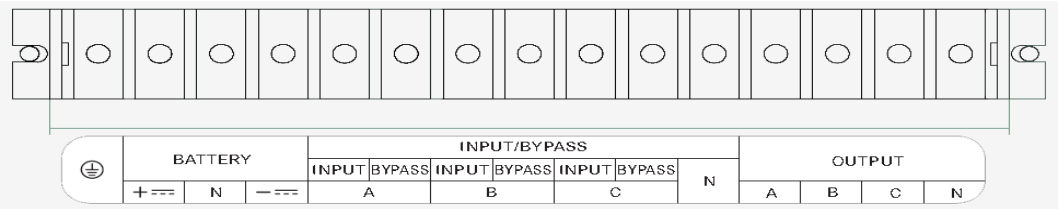
Attention

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

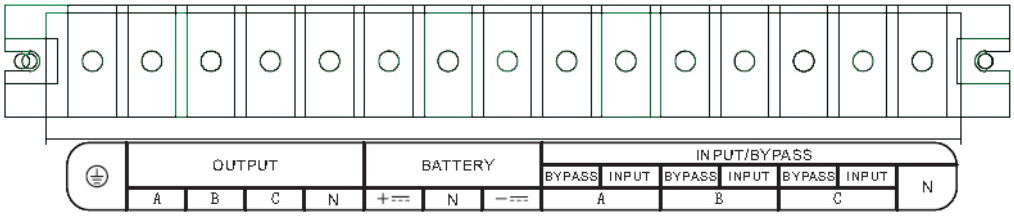
2.6.4 Connecting Power Cables

The steps of connecting power cables are as follows:

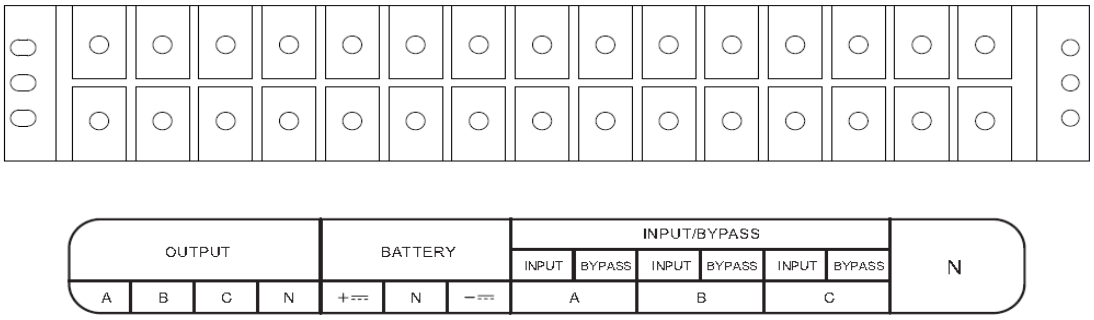
1. Verify that all the external input distribution switches of the UPS are completely open and the UPS internal maintenance bypass switch and internal battery switch are open, Attach necessary warning signs to these switches to prevent unauthorized operation.
2. The connection terminals are in the rear of UPS, remove the metal protective cover, the terminals are shown in Figure 2-7



(a) Connection terminals for 10kVA and 15kVA (screw M5)



(b) Connection terminals for 20kVA (screw M6)



(c) Connection terminals for 30kVA (screw M6) and 40kVA (Screw M8)

Figure 2-7 Cable connection terminals (phases name A-B-C is equivalent to L1- L2-L3 or R-S-T)

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 cables to the output terminal.
5. Connect external battery cables to the battery terminal.
6. Check to ensure 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.

Attention

After connection restore the protective plastic safety shield before energize the UPS, the electrical measures to do the activation safety.

Warning

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

2.7 Control and Communication Cables

UPS is configured with RS232, RS485 interfaces and Drycontact card.
USB and SNMP card are optional, as is shown in Figure 2-8.

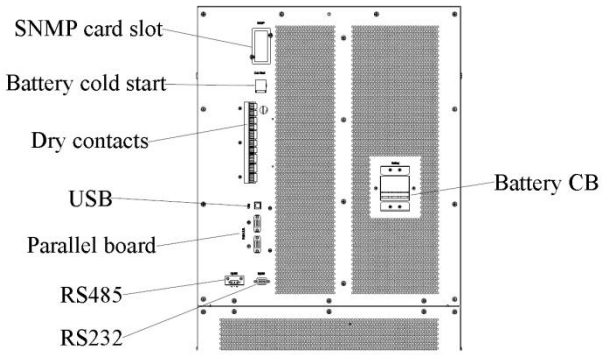


Figure 2-8 Dry contact & communication interface

2.7.1 Dry Contact Interface

The UPS has ports with dry contacts from J2 to J10 and they are divided into measurement contacts (J2 and J3), Input contacts (J4, J5, J6-2 and J7) and Output contacts (J6-1, J8, J9 and J10). The dry Input contacts allow you to execute some commands while the dry Output contacts provide some signals. All the Input and Output contacts can be programmed for different functions.
The default functions of these ports are shown in Table 2-5.

Table 2-5 Default Functions of the ports

Port	Name	Function
J2-1	TEMP_BAT	Measure battery temperature
J2-2	TEMP_COM	Measure battery temperature
J3-1	ENV_TEMP	Measure Environmental temperature
J3-2	TEMP_COM	Measure Environmental temperature
J4-1	REMOTE_EPO_NC	EPO Contact Normally Closed (closed between J4-1 and J4-2)
J4-2	+24V_DRY	Internal Power Supply +24V
J4-3	+24V_DRY	Internal Power Supply +24V
J4-4	REMOTE_EPO_NO	EPO Contact Normally Open (open between J4-1 and J4-2)
J5-1	+24V_DRY	Internal Power Supply +24V
J5-2	GEN_CONNECTED	Genset Input Contact Normally Open.
J5-3	GND_DRY	**Do not Use.** Is internal Common for +24V
J6-1	BCB Drive	Drive “+24V / 20 mA” output to power the external coil of an MCB (or MCCB).
J6-2	BCB_Status	Input that identifies the “tripped” state on MCB (or MCCB).
J7-1	GND_DRY	Ground for +24V
J7-2	BCB_Online	Input that identifies the “open/closed” state on MCB (or MCCB).
J8-1	BAT_LOW_ALARM_NC	Output dry contact (Normally closed), for Battery Low.
J8-2	BAT_LOW_ALARM_NO	Output dry contact (Normally open), for Battery Low.
J8-3	BAT_LOW_ALARM_COMM	Common terminal for J8-1 and J8-2
J9-1	GENERAL_ALARM_NC	Output dry contact (Normally closed), for Generic Alarm.
J9-2	GENERAL_ALARM_NO	Output dry contact (Normally open), for Generic Alarm.
J9-3	GENERAL_ALARM_COMM	Common terminal for J9-1 and J9-2
J10-1	UTILITY_FAIL_NC	Output dry contact (Normally closed), for UPS Fault
J10-2	UTILITY_FAIL_NO	Output dry contact (Normally open), for UPS Fault.
J10-3	UTILITY_FAIL_COMM	Common terminal for J10-1 and J10-2

Note: The input dry contact ports J5-2, J6-2, and J7 can be programmed through our MTR software, the programmable events are shown in Table 2-6.

Table 2-6 Input Programmable Events

NO.	Event	Description
1	Generator Input	The input power is supplied by the generator
2	Main CB Close	Main input breaker is closed
3	Mute	Mute
4	BCB Status	BCB status, closed or open
5	Transfer Inverter	UPS would transfer to the inverter mode
6	BCB Online	Enable the BCB status checking
7	Transfer Bypass	UPS would transfer to the bypass mode
8	Fault Clear	Recheck the fault or alarm information
9	Battery Over Charge	Batteries are over charged
10	Battery Over Discharge	Batteries are over discharging
11	Stop Boost Charge	Stop boost charging

Note: The output dry contact ports J6-1, J8, J9 and J10 can be programmed through our MTR software, the programmable events are shown in Table 2-7.

Table 2-7 Output Programmable Events

NO.	Event	Description
1	BCB Trip	BCB tripping
2	Byp Backfeed Trip	Bypass Backfeed protective breaker tripping
3	Overload	Output is overload
4	General Alarm	General alarms
5	Output Lost	No output voltage
6	Battery Mode	UPS works in battery mode
7	Utility Fail	The power-grid fails
8	On Inverter	UPS works in inverter mode
9	Battery Charge	Batteries are being charged
10	Normal Mode	UPS works in normal mode
11	Batt Volt Low	Batteries voltage is low
12	On Bypass	UPS works in bypass mode
13	Batt Discharge	Batteries are discharging
14	Rectifier Ready	The rectifier is starting
15	Battery Boost Charge	Batteries are boosting charged

Note: There below take the default definitions for example to introduce the methods of application.

MEASURE

Interface of Battery and Environmental Temperature Detection

The input J2 and J3 can detect the temperature of batteries and environment respectively.
The battery temperature is use to do voltage compensation of the battery recharge. It is possible to set how much voltage do you need to compensate every °C (default value is -3mV/C)
The environment temperature is using monitoring local environmental temperature.

Interfaces diagram for J2 and J3 are shown in Figure 2-22, the description of the interface is in Table 2-8.

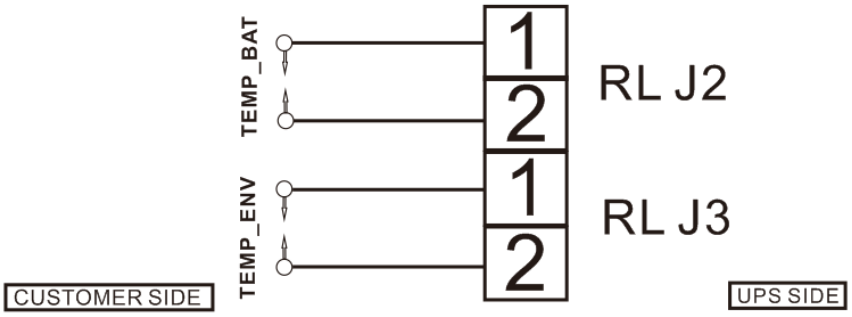


Figure 2-22 J2 and J3 for temperature detecting

Table 2-8

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

Note

A specified temperature sensor is required for temperature detection, and it's optional, please confirm with the manufacturer or the local agency before the order.

Input Dry-Contact

Remote EPO Input Port

J4 is the input port for remote EPO.
There are two possibilities: connecting at the Normally Close contact (J4 1-2) or Normal Open contact (J4 3-4). During normal operations these contact still remain in this position.
When the EPO has been activated the contact (J4 1-2) change in the Open position and the EPO contact (J4 3-4) change in Close position.

The port diagram is shown in Figure 2-23, and the port description is shown in Table 2-9.

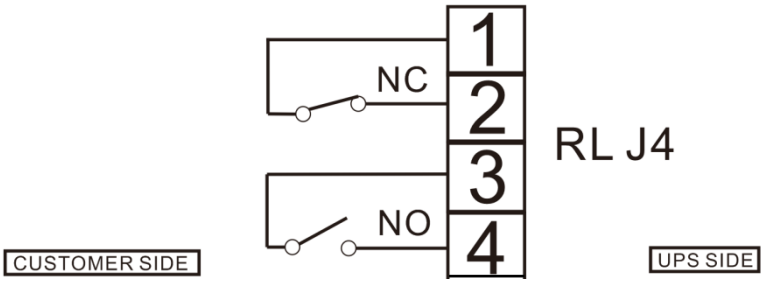


Figure 2-23 Diagram of input port for remote EPO

Table 2-9

Port	Name	Function
J4-1	REMOTE_EPO_NC	Trigger EPO when connect pass in Open Position.
J4-2	+24V_DRY	+24V
J4-3	+24V_DRY	+24V
J4-4	REMOTE_EPO_NO	Trigger EPO when connect pass in Close Position.

Note

J4-1 and J4-2 must be connected in normal operations.
J4-2 and J4-3 has got a +24V from internal power supply.

Genset Input Dry Contact

J5 is the input port for the Generator.
The contact J5 1-2 is normally open when the Generator is not running. When the Generator starts, it closes the contact J5 1-2 and the UPS recognizes that the Generator is active and powers the UPS.

The port diagram is shown in Figure 2-24, the port description is shown in Table 2-10.

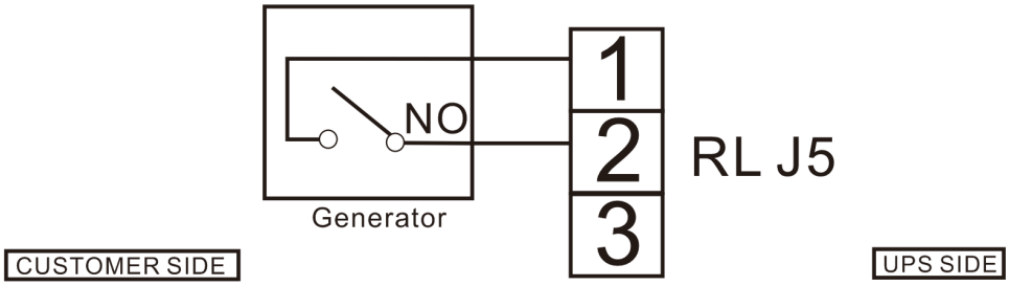


Figure 2-24 Diagram of input port for generator input

Table 2-10

Port	Name	Function
J5-1	+24V_DRY	Internal +24V Power Supply
J5-2	GEN_CONNECTED	Connection status of generator
J5-3	GND_DRY	**Do not Use.** In ground of the internal +24V

Battery Circuit Breaker (BCB) Input Port

The default functions of J6 and J7 are the BCB trip ports and the BCB open/closed status.

BCB Trip: The BCB trip coil connection (ports J6-1 and J7-1) provides a 24V and 20 mA signal to trip the external battery protection switch via a shunt trip coil. This command is activated when the EPO command is activated and/or EOD (end of discharge) occurs.

BCB "Tripped" status contact: Connect the BCB "Tripped" auxiliary contact (normally open contact) between terminals J6-2 and J7-1. The contact becomes Normally Closed when the BCB trips.

N.B. To use this function it is mandatory to short-circuit J7-1 with J7-2.

BCB "Position" status contact: Connect the BCB "Position" auxiliary contact (normally open contact) between terminals J7-1 and J7-2. The contact becomes Normally Closed when the BCB status changes position.

The port diagram is shown in Figure 2-25, and the description is shown in Table 2-11.

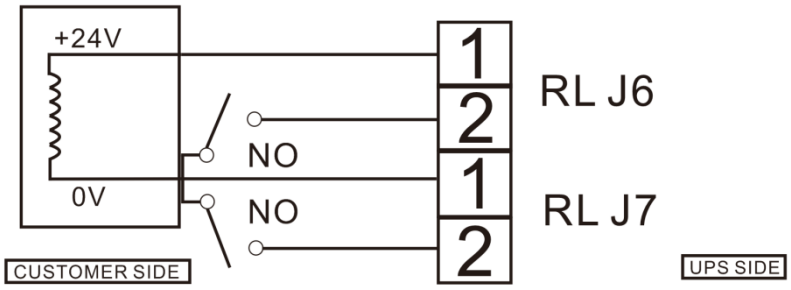


Figure 2-25 BCB Port

Table 2-11

Port	Name	Function
J6-1	BCB_DRIV	BCB contact drive, provides "+24V voltage 20ms" drive signal
J6-2	BCB_Status	BCB tripped contact status, connect with the signal of BCB (normally open)
J7-1	GND_DRY	Power ground for +24V
J7-2	BCB_ON	"BCB Status" detection function is activated when connected to J7-1 (normally close).

Note

Note: is possible use also MCB (or MCCB) in Input (example: Backfeed protection)

Output Dry-Contact

Battery Warning Dry Contact

It is a changeover contact with position between J8 1-3 Normally closed and J8 2-3 Normally open. Its purpose is to warn when the battery voltage, during the discharge phase, is at a level lower than a set value.
When the alarm is activated, contact J8 1-3 becomes NO and contact J8 2-3 becomes NC.

The port diagram is shown in Figure 2-26, and the description is shown in Table 2-12.

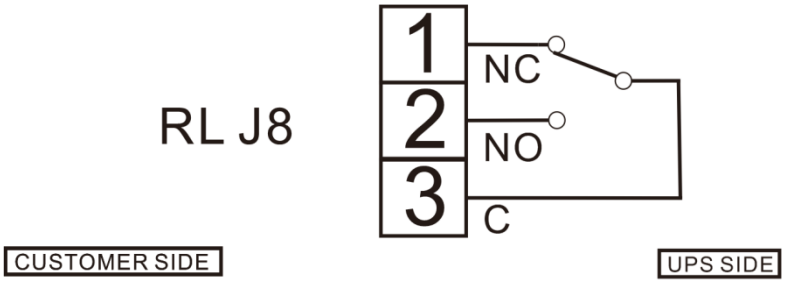


Figure 2-26 Battery warning output dry contact interface diagram

Table 2-12

Port	Name	Function
J8-1	BAT_LOW_ALARM_NC	Battery warning relay NC (normally closed) will be open during warning
J8-2	BAT_LOW_ALARM_NO	Battery warning relay NO (normally open) will be closed during warning
J8-3	BAT_LOW_ALARM_COMM	Common terminal

General Alarm Output Dry Contact Interface

It is a changeover contact with position between J9 1-3 Normally closed and J9 2-3 Normally open.
Its purpose is to provide a dry-contact in the presence of a Generic Alarm.
When the alarm is activated, contact J9 1-3 becomes NO and contact J9 2-3 becomes NC.

The port diagram is shown in Figure 2-27, and the description is shown in Table 2-13.

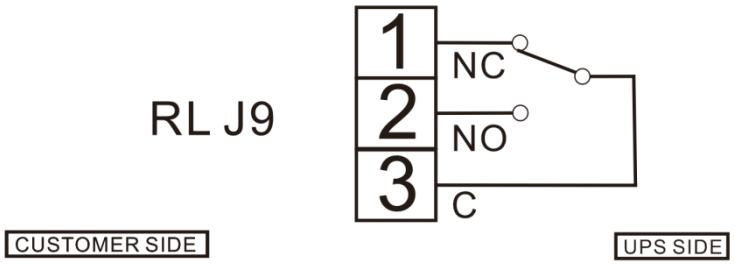


Figure 2-27 General alarm dry contact interface diagram

Table 2-13

Port	Name	Function
J9-1	GENERAL_ALARM_NC	Integrated warning relay NC (normally closed) will be open during warning
J9-2	GENERAL_ALARM_NO	Integrated warning relay NO (normally open) will be closed during warning
J9-3	GENERAL_ALARM_COMM	Common terminal

Utility Fail Warning Output Dry Contact Interface

It is a changeover contact with position between J10 1-3 Normally closed and J10 2-3 Normally open. Its purpose is to provide a dry-contact in the presence of a fault on the UPS.
When the alarm is activated, contact J10 1-3 becomes NO and contact J10 2-3 becomes NC.

The interface diagram is shown in Figure 2-28, and the description is shown in Table 2-13.

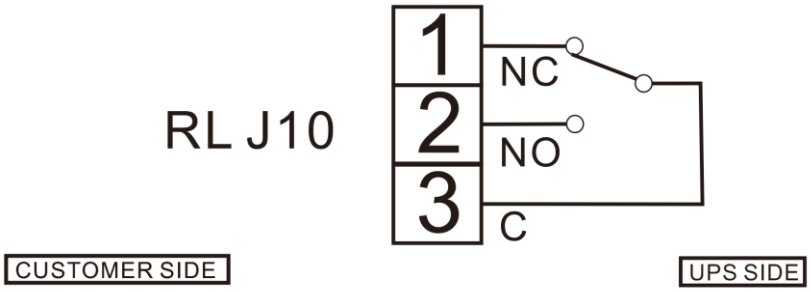


Figure 2-28 Utility failure warning dry contact interface diagram

Table 2-13

Port	Name	Function
J10-1	UTILITY_FAIL_NC	Mains failure warning relay NC (normally closed) will be open during warning
J10-2	UTILITY_FAIL_NO	Mains failure warning relay NO (normally open) will be closed during warning
J10-3	UTILITY_FAIL_COMM	Common terminal

2.7.2 Communication Interface

RS232, RS485 and USB ports can 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 is used on site for communication (Optional).

3. Control and LCD display Panel

3.1 Introduction

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

3.2 LCD Screen

After the monitoring system starts, the system enters the home page, following the welcome window. The home page is shown in Figure 3-1.

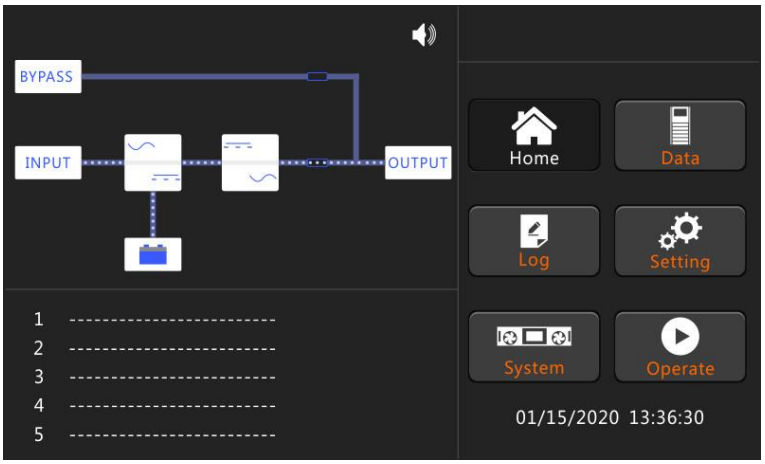


Fig.3-1 Home page

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

- **Status bar**
  Status bar contains the model of the product, capacity, operational mode and the time of the system.
- **Warning Information**
  Display the warning information of the cabinet.
- **Main Menu**
  Main menu includes Cabinet, Data, Setting, Log, Operate and System. Users can operate and control the UPS, and browse all measured parameters through main menu.

3.3 Main menu

3.3.1 Data

Touch “Data” icon and the system enters the page of the Data, as it is shown in Figure 3-2.

Figure 3-2 Submenu Interface of Data Page

3.3.2 Log

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

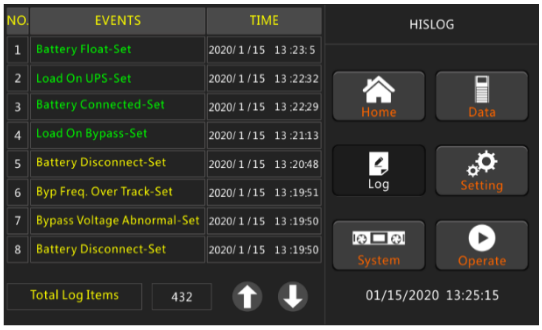


Figure 3-3 Log Page

The following Table 3-1 shows possible events of UPS History Log.

No.	LCD Display	Explanation
1	Load On UPS-Set	Load On UPS

2	Load On Bypass-Set	Load On Bypass
3	No Load-Set	No Load (Output Power Lost)
4	Battery Boost-Set	Charger is Boosting Battery Voltage
5	Battery Float-Set	Charger is Floating Battery Voltage
6	Battery Discharge-Set	Battery is Discharging
7	Battery Connected-Set	Battery is Connected
8	Battery Not Connected-Set	Battery is 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	Inverter capacity set is less than the load capacity
13	Module On Less-Clear	Alarm disappears
14	Generator Input-Set	Generator as the Ac Input Source
15	Generator Input-Clear	Alarm disappears
16	Utility Abnormal-Set	Utility (Grid) Abnormal
17	Utility Abnormal-Clear	Alarm disappears
18	Bypass Sequence Error-Set	Bypass voltage Sequence is reverse
19	Bypass Sequence Error-Clear	Alarm disappears
20	Bypass Volt Abnormal-Set	Bypass Voltage Abnormal
21	Bypass Volt Abnormal-Clear	Alarm disappears
22	Bypass Module Fail-Set	Bypass Fail
23	Bypass Module Fail-Clear	Alarm disappears
24	Bypass Overload-Set	Bypass Over load
25	Bypass Overload-Clear	Alarm disappears
26	Bypass Overload Tout-Set	Bypass Over Load Timeout
27	Byp Overload Tout-Clear	Alarm disappears
28	Byp Freq Over Track-Set	Bypass Frequency out of tolerance
29	Byp Freq Over Track-Clear	Alarm 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	Alarm disappears
32	Output Short Circuit-Set	Output shorted Circuit
33	Output Short Circuit-Clear	Alarm disappears
34	Battery EOD-Set	Battery End Of Discharge
35	Battery EOD-Clear	Alarm disappears
36	Battery Test-Set	Battery Test Starts
37	Battery Test OK-Set	Battery Test OK
38	Battery Test Fail-Set	Battery Test fails
39	Battery Maintenance-Set	Battery Maintenance test starts
40	Batt Maintenance OK-Set	Battery maintenance test OK
41	Batt Maintenance Fail-Set	Battery maintenance test fails
44	Rectifier Fail-Set	Rectifier Failed
45	Rectifier Fail-Clear	Alarm disappears

46	Inverter Fail-Set	Inverter Failed
47	Inverter Fail-Clear	Alarm disappears
48	Rectifier Over Temp.-Set	Rectifier Over Temperature
49	Rectifier Over Temp.-Clear	Alarm disappears
50	Fan Fail-Set	Fan Fail
51	Fan Fail-Clear	Alarm disappears
52	Output Overload-Set	Output Over Load
53	Output Overload-Clear	Alarm disappears
54	Inverter Overload Tout-Set	Inverter Over Load Timeout
55	INV Overload Tout-Clear	Alarm disappears
56	Inverter Over Temp.-Set	Inverter Over Temperature
57	Inverter Over Temp.-Clear	Alarm disappears
58	On UPS Inhibited-Set	Inhibit system transfer from bypass to inverter
59	On UPS Inhibited-Clear	Alarm 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	Alarm disappears
65	Battery Reverse-Set	Battery pole (positive and negative are reverse)
66	Battery Reverse-Clear	Alarm disappears
67	Inverter Protect-Set	Inverter Protect (Inverter Voltage Abnormal or Power Back feed to DC Bus)
68	Inverter Protect-Clear	Alarm disappears
69	Input Neutral Lost-Set	Input Grid Neutral Lost
70	Bypass Fan Fail-Set	Bypass Fan Fail
71	Bypass Fan Fail-Clear	Alarm disappears
72	Manual Shutdown-Set	Manually Shutdown
73	Manual Boost Charge-Set	Manually Battery Boost Charge
74	Manual Float Charge-Set	Manually Battery Float Charge
75	UPS Locked-Set	UPS Locked
76	Parallel Cable Error-Set	Parallel cable in error
77	Parallel Cable Error-Clear	Alarm disappears
78	Lost N+X Redundant	Lost N+X Redundant
79	N+X Redundant Lost-Clear	Alarm 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	Alarm disappears
83	Input Volt Detect Fail-Set	Input Voltage is abnormal
84	Input Volt Detect Fail-Clear	Alarm disappears
85	Battery Volt Detect Fail-Set	Battery Voltage is abnormal

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

3.3.3 Setting

Touch the “Setting” icon, the system enters the page of Setting, as it is shown in Figure 3-4.

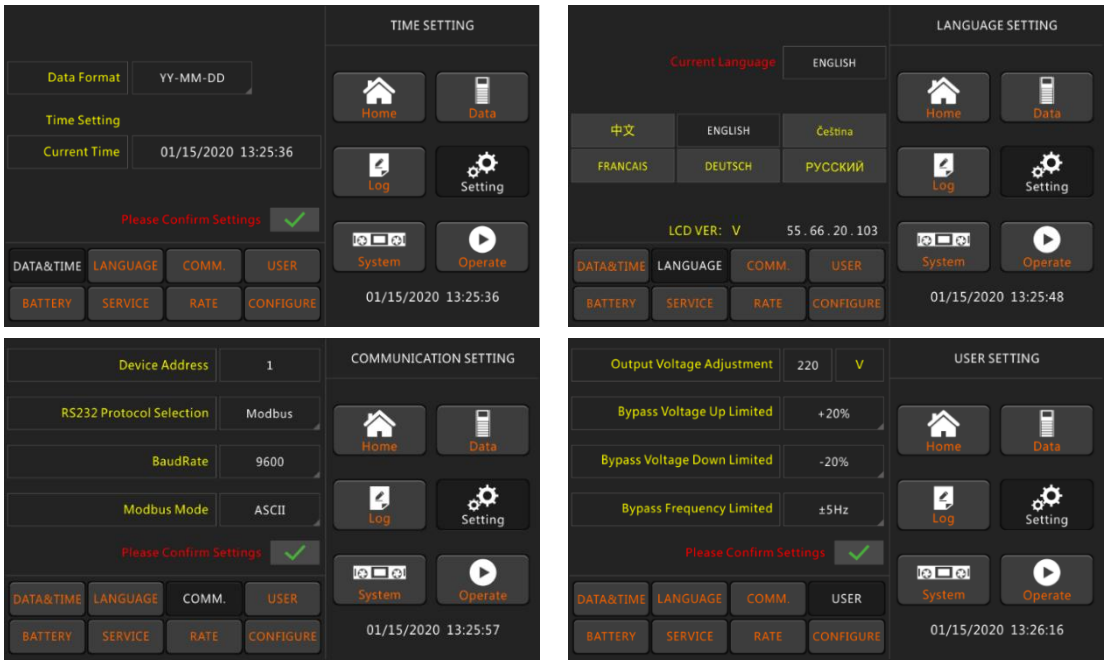


Figure 3-4 Submenu Interface of Setting Page

The submenus are listed on the bottom side of the Setting page. Users can enter each of the setting interfaces by touching the relevant icon. The submenus are described in details below in Table 3-2.

Table 3-2 Description of each submenu of Setting

Submenu Name	Contents	Meaning
Date & Time	Date format setting	Three formats: (a) year/month/day; (b) month/date/year; (c) date/month/year
	Time setting	Setting time
Language	Current language	Language in use
	Language selection	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 only）
	Baud rate	Setting the baud rate
	Modbus Mode	Modbus setting mode: ASCII or RTU
USER	Output voltage Adjustment	Setting the Output Voltage
	Bypass Voltage Up Limited	Up limit working Voltage for Bypass，settable: +10%，+15%，+20%，+25%
	Bypass Voltage Down Limited	Down limited working Voltage for Bypass，settable: -10%，-15%，-20%，-30%，-40%
	Bypass Frequency Limited	Permitted working Frequency for Bypass Settable：+/-1Hz，+/-3Hz，+/-5Hz

BATTERY	Battery Number	Setting the number of 12V battery
	Battery Capacity	Setting battery capacity in Ah
	Float Charge Voltage/Cell	Setting the floating charging Voltage
	Boost Charge Voltage/Cell	Setting the boost charging Voltage
	Charge Current Percent Limit	Charge current (% of the rated power)
SERVICE	System Mode	Setting the system mode: Single, parallel, Single ECO, parallel ECO, LBS, parallel LBS
	Parallel number	Parallel system UPS number
	Parallel ID	UPS ID in parallel system
	Slew rate	Bypass frequency slew rate
	Synchronization window	Bypass frequency Synchronization window
	System auto start mode after EOD	UPS start mode after battery EOD (end of discharging)
RATE	Configure the rated Parameter	Factory use only
CONFIGURE	Display mode	Support Tower and Rack LCD display (on Nova UPS tower only)
	Back light time	LCD back light time
	Contrast	LCD contrast

3.3.4 System

System Information Window displays software version, Bus voltage, charger voltage, and so on, these menus “Status & Alarm”, “REC Code”, and “INV Code” are helpful to maintain the UPS, as is shown in the following Figure 3-5.

Figure 3-5 Submenu Interface of System Page

3.3.5 Operate

Touch the “Operate” icon, the system enters the page of “Operate”, as it is shown in Figure 3-6.

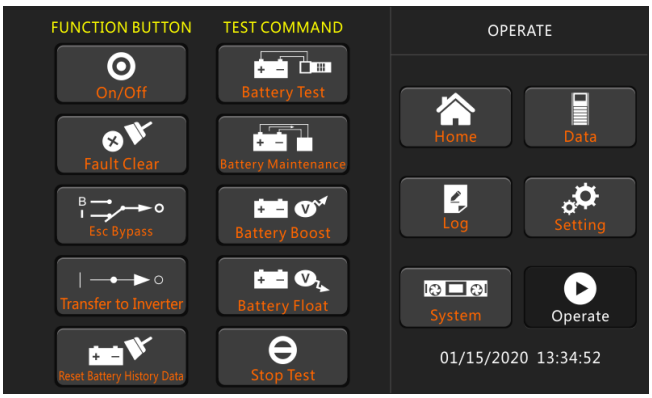


Figure 3-6 Operate Page

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

FUNCTION BUTTON

- **On/Off** Manual turn ON/OFF UPS
- **Fault Clear** Clear the faults.
- **Transfer to Bypass / Esc Bypass** Transfer to bypass mode and back to normal
- **Transfer to Inverter** Transfer the automatic bypass mode to Inverter Mode.
- **Reset Battery History Data** Reset the battery history data by touching the icon, the history data includes the times of discharge, days for running and hours of discharging.

TEST COMMAND

- **Battery Test** The system transfer to the Battery mode to test the condition of the battery. which requires the normality of the bypass and the battery capacity is no less than 25%.
- **Battery Maintenance** The system transfers to the Battery mode. This function is used for maintaining the battery, which requires the normality of the bypass and minimum battery capacity of 25%.
- **Battery Boost** The system starts boost charging.
- **Battery Float** The system starts float charging.
- **Stop Test** The system stops battery test or battery maintenance.

4. Operations

4.1 UPS start-up

4.1.1 Startup in normal mode

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

1. Ensure all the circuit breakers are open.
2. Close the output circuit breaker (CB) and then close both input and bypass breakers CB and the system starts initializing.
3. The LCD in front of the UPS is lit up. The system enters the home page, as shown in Fig.4-1.
4. The LCD home interface shows that the system rectifier is working, the indicator flashes, as shown in Figure 4.1.

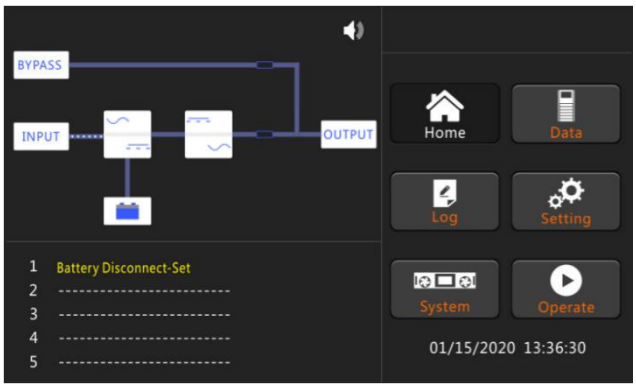


Fig.4-1 LCD of rectifier starting

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

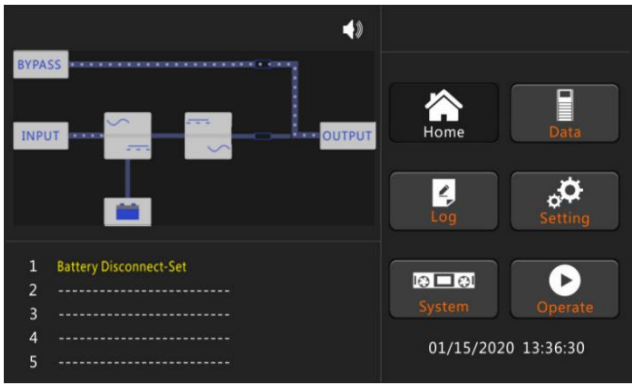


Fig.4-2 LCD of bypass starting

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

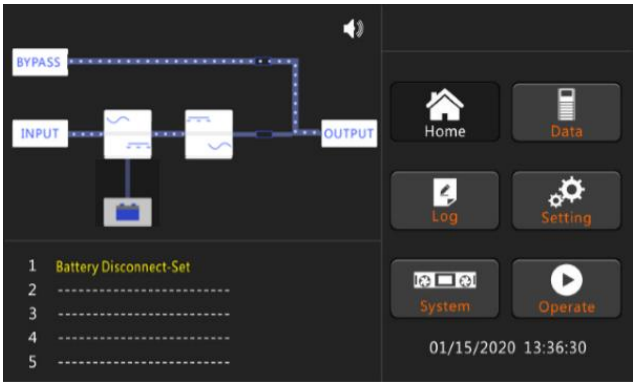


Fig.4-3 LCD of inverter starting

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

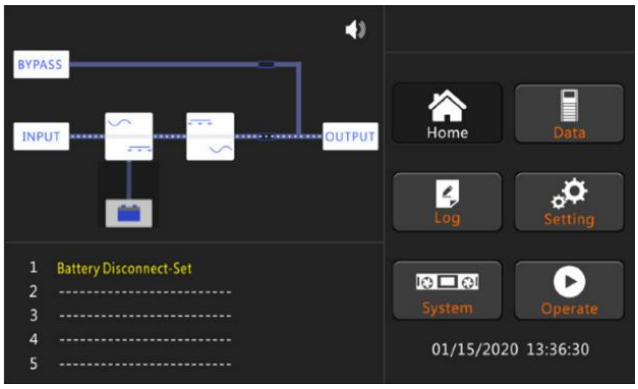


Fig.4-4 LCD of inverter mode

8. Close the external battery switch, the battery indicator flashes, and then the UPS charges the battery. The UPS works in normal mode, as shown in Figure 4-5

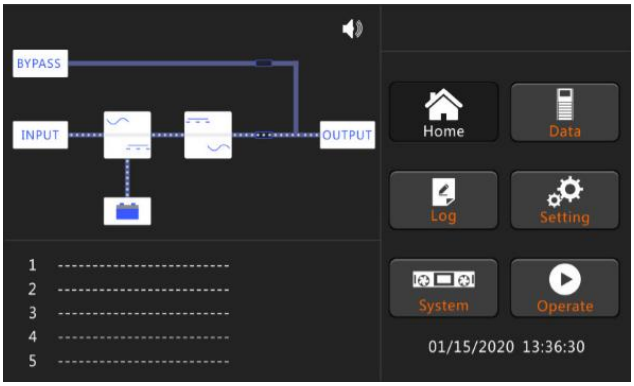


Fig.4-5 LCD of normal mode

Note Users can browse alarms during the process of the starting up by checking the menu Log.

4.1.2 Start from Battery

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

1. Confirm the battery is correctly connected; close the battery circuit breakers.
2. Press the red button for the battery cold start, see Fig.4-6.

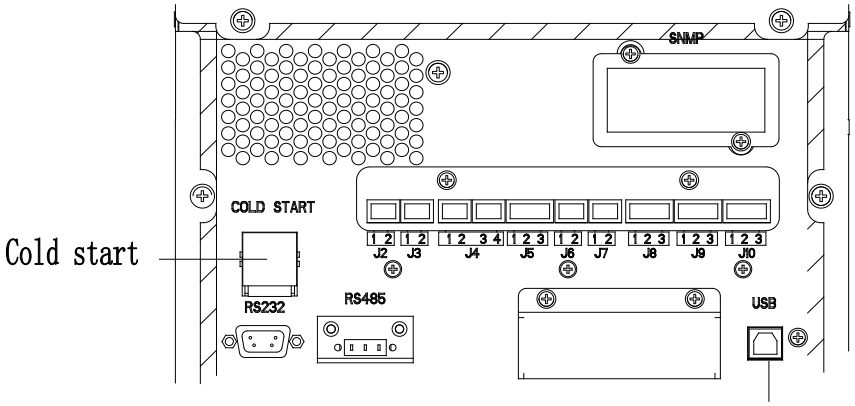


Fig.4-6 position of the battery cold start button

3. After that, the system is starting up following steps 3 in section 4.1.1 and the system transfers to battery mode in 30S.
4. Close the output isolation switch and external output isolation switch to supply the load, and the system is working on battery mode.

4.2 Procedure for Switching between Operation Modes

4.2.1 Switching the UPS from Normal Mode into Battery Mode

The UPS transfers to Battery mode immediately after input circuit breaker disconnects from the utility. Warning if battery is not OK there is risk to loose/stop the load, to test the battery use battery test command

4.2.2 Switching the UPS from Normal Mode into Bypass Mode

Follow the path by selecting the icon of “Operate” and then select “Transfer to bypass” to transfer the system to Bypass Mode.

Warning

Ensure the bypass is normal before transferring to bypass mode. Or there is risk to loose/stop the load.

4.2.3 Switching the UPS from Bypass Mode into Normal Mode

Case 1) UPS has been transfer to bypass manually:

Select “ESC Bypass” it is the same Icon used to transfer to bypass but once used it change name between “Transfer to bypass” to/from “ESC Bypass”.

Note: the command “Transfer to inverter” it doesn’t operate in this case, if you used it, ups stay on bypass but the icon “esc bypass” change back in “Transfer to bypass” so you have to press again “Transfer to bypass” and them press “ESC Bypass” (same icon).

Case 2) UPS went to bypass automatically:

Follow the path by selecting the icon of “Operate” and then “Transfer to inverter”, the system transfer to Normal Mode

Normally, the system will transfer to the Normal mode automatically. This function is used when the frequency of the bypass is out of range or inverter is not synchronize to bypass

4.2.4 Switching the UPS from Normal Mode into Maintenance Bypass Mode

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

Transfer the UPS into Bypass mode following section 4.2.2.

Remove the cover of maintenance bypass breaker.

Turn ON the maintenance bypass breaker. And the load is powered through maintenance bypass and static bypass.

One by one turn off the battery breaker, input breaker, bypass input breaker and output breaker.

The load is powered through maintenance bypass.

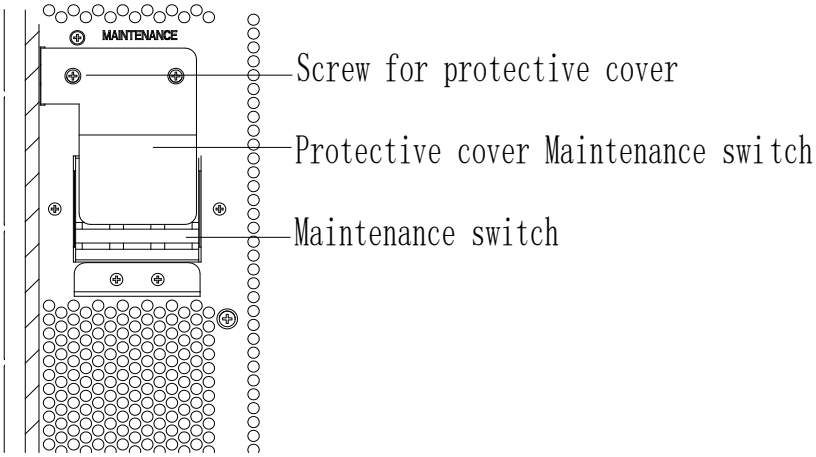


Fig.4-7 the cover of maintenance bypass breaker

Warning

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

Warning

Before making this operation, confirm the 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

Even with the LCD turned off, the terminals of input and output may be still energized.
Wait for 10 minutes to let the DC bus capacitor fully discharge before removing the cover.

4.2.5 Switching the UPS from Maintenance Bypass Mode into Normal Mode

These following procedures can transfer the load from the Maintenance Bypass mode to inverter output.
After finish of maintenance. One by one turn on the output breaker, bypass input breaker, input breaker and battery breaker.
After 30S, the bypass indicator trace flashes and the load is powered through maintenance bypass breaker and static bypass.
Turn OFF the maintenance bypass breaker， close the maintenance bypass breaker cover, now the load is powered through static bypass.
On LCD follow the path by selecting the icon of “Operate” and then select “Fault Clear” 

to reset the manual bypass alarm.
The rectifier starts followed by the inverter.
After about 60Sec, the system transfers to Normal mode.

Warning

The system will stay on bypass mode until the cover of maintenance bypass breaker is fixed and Fault clear command has been given.

4.3 Battery Maintenance

If the battery is not discharged for a long time, it is necessary to test the condition of the battery. Enter the menu “Operate”, as is shown in Fig.5-8 and select the icon “Battery maintenance”， the system transfers into the Battery mode for discharging. The system will discharge the batteries until the alarm of “Battery low voltage” is given Users can stop the test by the “Stop Test” icon. With the icon of “Battery test”, batteries will be discharged for about 30 seconds, and then re-transfer to normal mode.

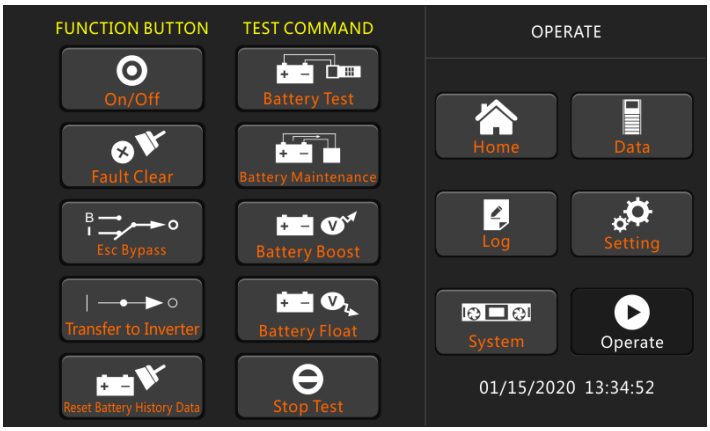


Fig.4-8 Battery maintenance

4.4 EPO

The EPO button located in the operator control and display panel (with cover to avoid disoperation, see Fig.4-9) 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.

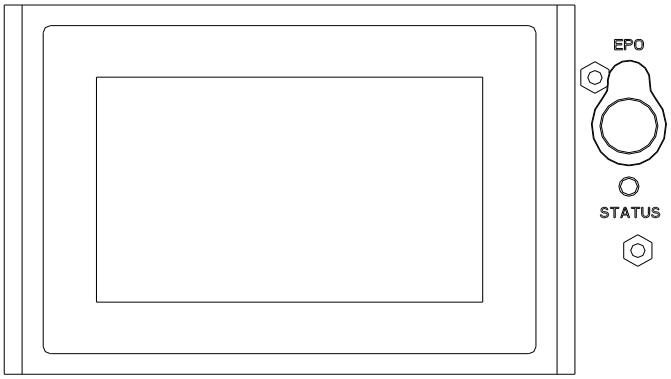


Fig .4-9 EPO Button

5. Maintenance

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

5.1 Precautions

Only maintaining engineers can maintain the UPS.

1) Wait 10 minutes before opening the cover of the power area or the bypass after pulling out from the cabinet
2) Use a multi-meter to measure the voltage between operating parts and the earth to ensure the voltage is lower than hazardous voltage, i.e. DC voltage is lower than 60Vdc, and AC maximum voltage is lower than 42 Vac.

5.2 Instruction for maintaining UPS

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

5.3. Instruction for Maintaining Battery String

For the Lead-Acid maintenance free battery, when maintaining the battery according to requirements, battery life can be prolonged. The battery life is mainly determined by the following factors:

1) Installation. The battery should be placed in dry and cool place with good ventilation. Avoid direct sunlight and keep away from heat source. When installing, ensure the correct connection to the batteries with same specification.
2) Temperature. The most suitable storage temperature is 5 ℃ to 25℃, Operating 15-25℃.
3) Charging/discharging current. The best charging current for the lead-acid battery is 0,1C. The maximum charging current for the battery can be 0,2C (some brand it can be higher). The discharging current should be 0,05C-3C.
4) Charging voltage. In most of the time, the battery is in standby state. When the utility is normal, first the system will charge the battery in boost mode, when battery is almost charged it transfers to the state of float charge.
5) Discharge depth. Avoiding frequent deep discharge, which will greatly reduce the life time of the battery. When the UPS runs in battery mode with light load or no load for a long time, it will cause the battery to deep discharge.
6) Check periodically. Observe if is present any abnormality of the battery, measure if the voltage of each battery is in balance with others. Discharge the battery periodically.

Warning

Frequent inspection is very important!
Check and confirm the battery connection is tightened regularly, and make sure there is no abnormal heat generated from the battery.

Warning

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

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

6. Product Specifications

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

6.1 Applicable Standards

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

Table 6-1

Item	Normative reference
General safety requirements for UPS used in operator access areas	IEC62040-1-1 EN62040-1
Electromagnetic compatibility (EMC) requirements for UPS	IEC62040-2 IEC-EN62040-2 (2018)
Method of specifying the performance and test requirements of	IEC62040-3

Note

The above mentioned product standards incorporate relevant compliance clauses with generic IEC and EN standards for safety (IEC/EN/AS60950 and IEC/EN 62477-1), electromagnetic emission and immunity (IEC/EN61000 series) and construction (IEC/EN60146 series and 60950 and 62477-1).

6.2 Environmental Characteristics

Table 6-2

Item	Unit	Parameter
Acoustic noise level at 1 meter	dB	58dB @ 100% load, 55dB @ 45% load
Altitude of Operation	m	≤1000, load de-rated 1% per 100m from 1000m to 2000m
Relative Humidity	%	0-95, non-condensing
Operating Temperature	℃	10 and 15 KVA: 0-40°C 20-30-40 KVA at PF=1: 0-30°C 20-30-40 KVA at PF=0,9: 0-40°C warning for battery is recommended 15-25°C, due battery life is halved for every 10°C increase above 20°C
UPS Storage Temperature	℃	-40 ~ +70, warning battery life is halved for every 10°C increase above 20°C

6.3 Mechanical Characteristics

Table 6-3

Model	Unit	10kVA	15kVA	20kVA	30kVA	40kVA
Dimension W×D×H	mm	380*840*1400	380*840*1400	380*840*1400	500*940*1400	500*940*1400
Weight without batteries	kg	100	100	100	140	140
Max Weigh with batteries	kg	424 3 battery strings	424 3 battery strings	424 3 battery strings	572 4 battery strings	572 4 battery strings
Color	---	BLACK, RAL 7021				
Protection Level IEC60529	---	IP20				

6.4 Electrical Characteristics

6.4.1 Electrical Characteristics Input Rectifier

Table 6-4

Item	Unit	Parameter
Grid System	---	3Phases + Neutral + PE, (sharing neutral with the bypass input)
Rated AC Input Voltage	Vac	380/400/415 std=400V
Input Voltage Range	Vac	304~478Vac (Line-Line), full load; 228V~304Vac (Line-Line), load decreases linearly from 100% to 60% according to the input voltage
Rated Frequency	Hz	50/60
Input Frequency range	Hz	40~70
Input Power factor	---	>0,99
Input Current THDi	%	<4% (full Linear Load) 10-15kVA <3% (full Linear Load) 20-40kVA

6.4.2 Electrical Characteristics Battery

Table 6-5

Items	Unit	Parameters
Battery bus voltage	Vdc	Rated：±240V (total 480)
Quantity of lead-acid cells	Nominal range	240 cells 2V, = 40 batteries 12V (settable 32-44 for external battery only)
Float charge voltage	V/cell （VRLA）	2,25V/cell (selectable from 2,2V/cell～2,35V/cell) Constant current and constant voltage charge mode
Boost charge voltage	V/cell（VRLA）	2,35V/cell (selectable from: 2,30V/cell~2,45V/cell) Constant current and constant voltage charge mode
Temperature compensation (option)	mV/°C/cell	3,0 (selectable:0~5)
Final discharging voltage	V/cell（VRLA）	1,65V/cell (selectable from: 1,60V/cell~1,75V/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	selectable from : 0 to 20% * UPS capacity
Max battery charging current (40 battery)	A	NOVA-10K = 3,7 A settable (max setting = 20%) NOVA-15K = 5,5 A settable (max setting = 20%) NOVA-20K = 6,7 A settable (max setting = 20%) NOVA-30K = 10 A settable (max setting = 20%) NOVA-40K = 13,3 A settable (max setting = 20%)
Batt. charging current factory setting	A	Std is between 0,7 and 1,5A

Note: the parameter “PM Charge Current Percent limit%” is settable in LCD or MTR SW, using this formula: “PM Charge Current Percent limit%” = (Irch / Imax) x 20

Where

PM Charge Current Percent limit%” is the value to enter in the setting (LCD or SW)

Irch is the charging current in A you want to set

Imax is the maximum battery charger current, see value on table above

Eg : UPS power=20kVA with Battery capacity= 18A/h

We would like charge these batteries with 2A so on formula Irch= 2A

Calculation: PM Charge Current Percent limit%” = (Irch / Imax) x 20 = 2 / 6,7 x 20 = 6%

Note

When the battery in use is different than the default 40 (range 32-44), ensure the actual number and the set number is the same, otherwise batteries may be damaged.

6.4.3 Electrical Characteristics Inverter Output

Table 6-6

Item	Unit	Parameter
Rated capacity	kVA	10 / 15 / 20 / 30 / 40
Power Factor	---	1 (see note 1)
Rated AC voltage	Vac	220/230/240 (Line-N), std=230
Voltage precision	%	±1,5% (0-100% linear load)
Rated Frequency	Hz	50/60
Frequency Regulation	Hz	50/60±0,1% (battery mode)
Synchronized Range	Hz	default ±3Hz, Settable ±0.5Hz～±5Hz
Synchronized Slew Rate	Hz/s	default 2Hz/s, settable, 0,5～3
Output Voltage THDv	%	10-40kVA <1% (linear load) 10-15K <5,5%, (non-linear load), 20+30+40kVA <6% (non-linear load)
Overload	%	<110% 60min; 110%~125%,10min; 125%~150%,1min
(note 1) 20-30-40KVA model has Dynamic PF, it is PF=1 up to 30°C, over 30°C is 0,9		

6.4.4 Electrical Characteristics Bypass Mains Input

Table 6-7

Item	Unit	Value
Rated AC voltage	Vac	380/400/415 three-phase four-wire (sharing neutral with the rectifier main Input)
Overload	%	125% Long term operation; 125%~130% for 10min; 130%~150% for 1min; 150%~400% for 1s; >400%, less than 200ms
Current rating of neutral cable	A	1,7×In
Rated frequency	Hz	50/60
Switch time (between bypass and inverter)	ms	Synchronized transfer: 0ms
Bypass voltage range	%	Settable, default -20%~+15% Upper limit: +10%, +15%, +20%, +25% Lower limit: -10%, -15%, -20%, -30%, -40%
Bypass frequency range	%Hz	Settable, ±1Hz, ±3Hz, ±5Hz
Synchronized Range	Hz	Settable ±0,5Hz~±5Hz, default ±3Hz

6.5 Efficiency

Table 6-8

Rated power(kVA)	Unit	10kVA/15kVA	20kVA/30kVA	40kVA
Normal mode (dual conversion)	%	95	95	96
Battery mode (battery at nominal voltage 480Vdc and full-rated linear load)				
Battery mode	%	94,5	95	96

6.6 Display and Interface

Table 6-9

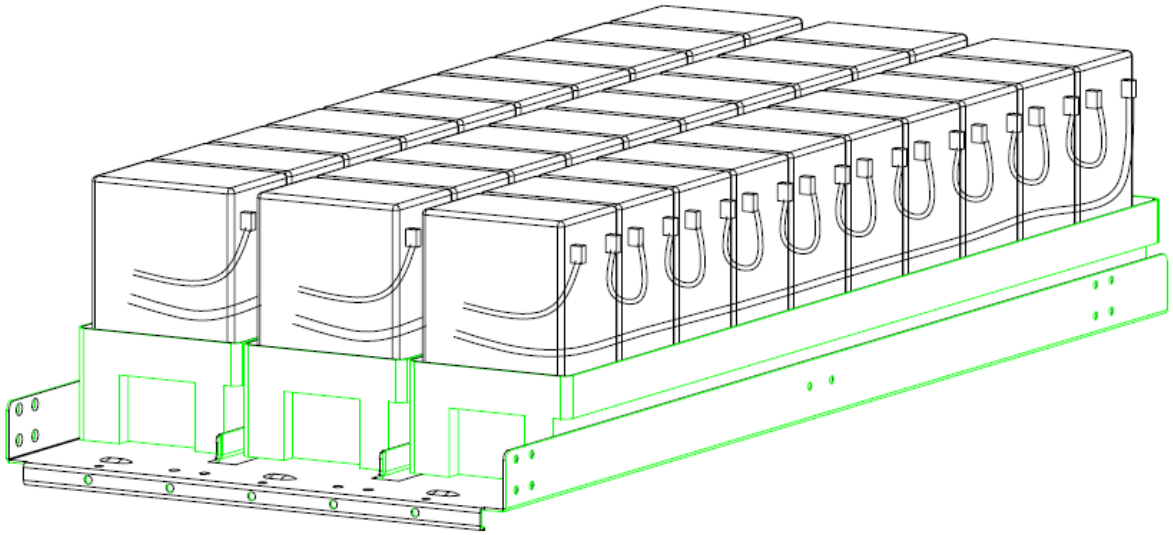
Display	Touch screen
Interface	Standard: RS232, RS485 Option: SNMP

Annex A Installation of internal batteries

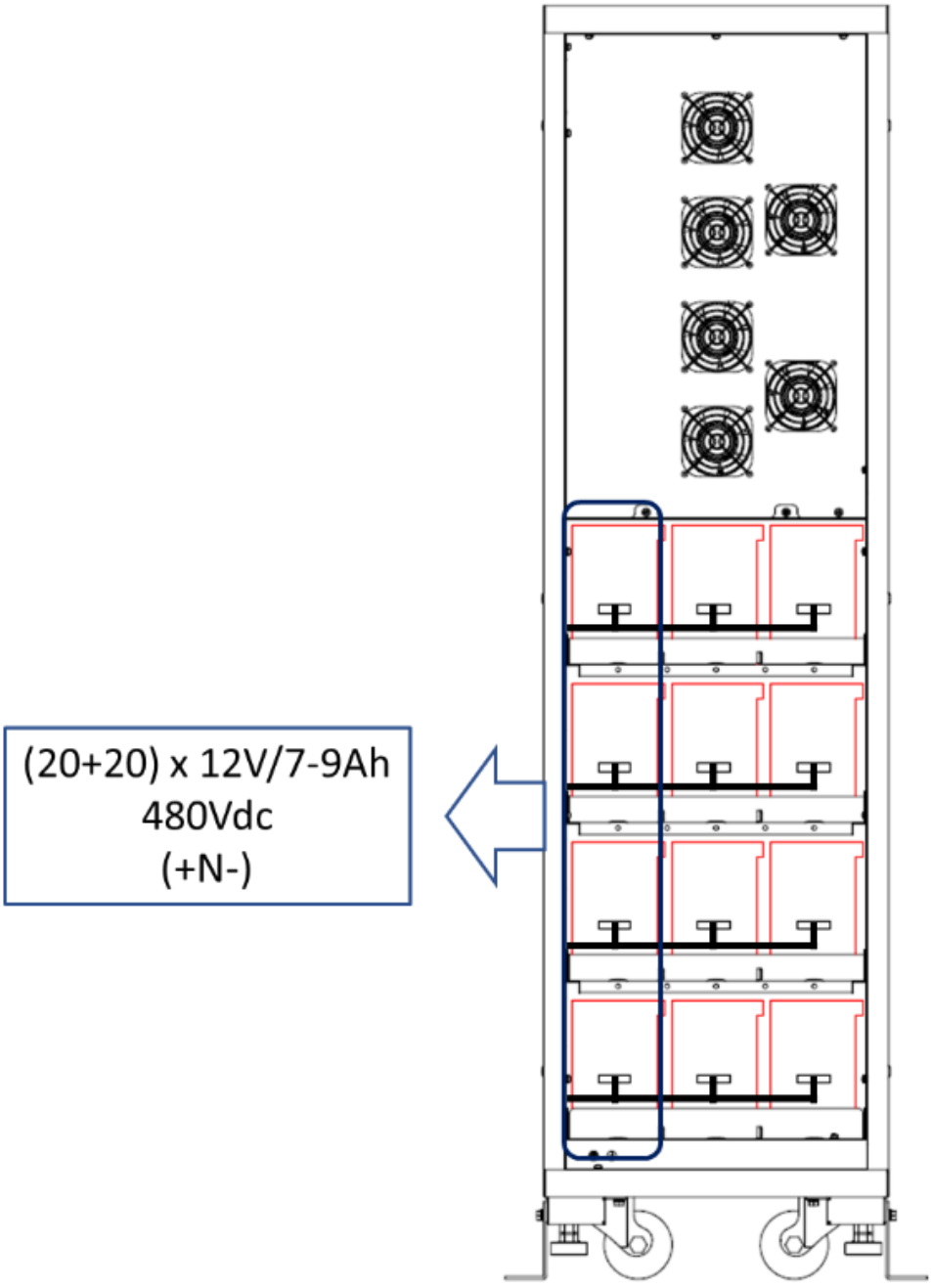
For UPS 10kVA & 20kVA, up to 120pcs (3 * 40) 12Vdc 7-9Ah batteries can be installed.
For UPS 30kVA & 40kVA, up to 160pcs (4 * 40) 12Vdc 7-9Ah batteries can be installed.

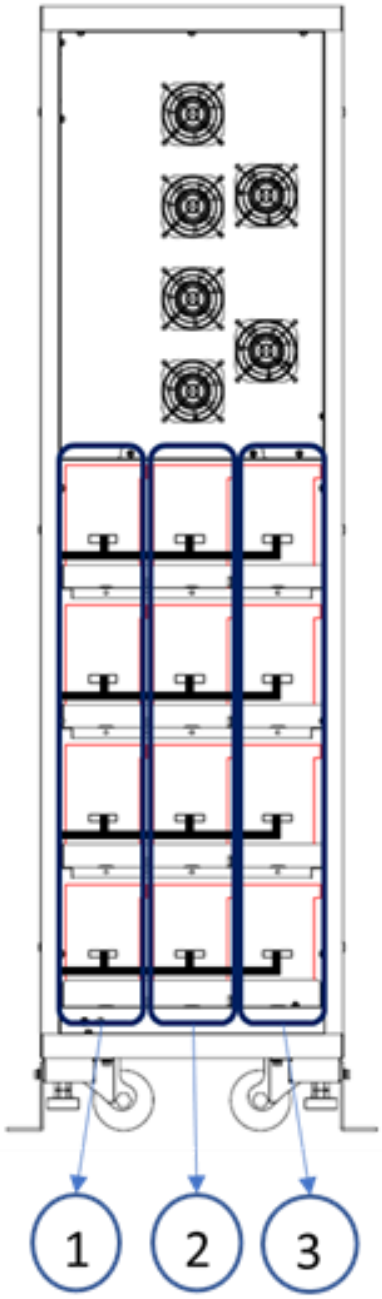
Per each string there are 40 batteries, divided in 4 groups/tray of 10batteries each connected in series with middle connection, the tray is front access.
The interconnection among groups is via cable with Anderson connector, refer to the below diagrams.

The batteries are installed in trays, each tray has 10 batteries 7Ah or 9Ah, see drawing



For UPS 10kVA & 20kVA it is possible to install up to 3 strings of 40pcs 7 or 9Ah batteries.
For UPS 10kVA & 20kVA the minimum is one (1) strings





1 String Nr.1 with 40 batteries 7/9Ah

2 String Nr.2 with 40 batteries 7/9Ah

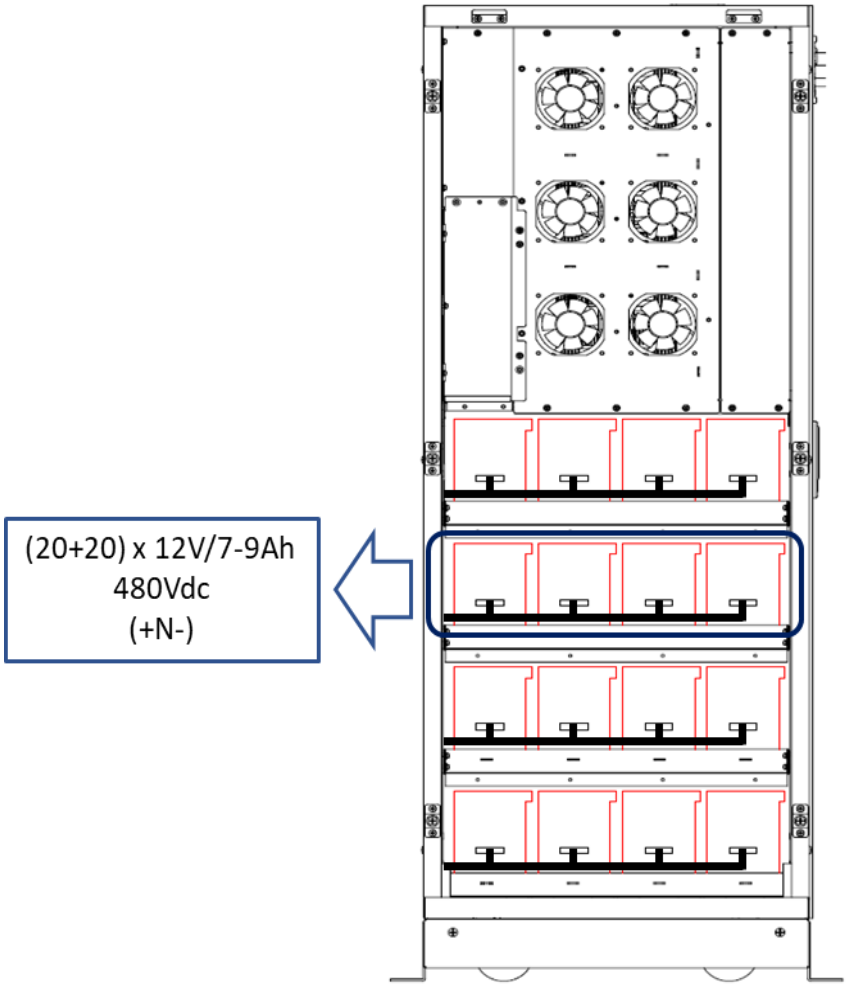
3 String Nr.3 with 40 batteries 7/9Ah

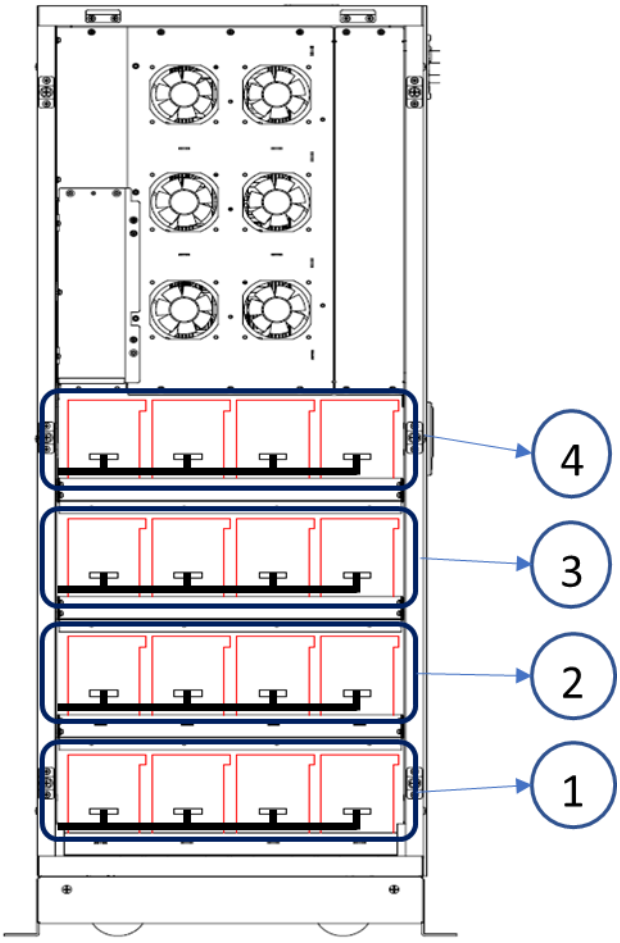
Attention: If it is present one string only installs it in position 2

The interconnections are made with electrical cables and Anderson type connectors.
Use only original battery Kit

Measure and confirm correct battery voltage before connecting to UPS

For UPS 30kVA & 40kVA it is possible to install up to 4 strings of 40pcs 7 or 9Ah batteries in series.
For UPS 30kVA & 40kVA the minimum is two (2) strings





4 String Nr.4 with 40 batteries 7/9Ah

3 String Nr.3 with 40 batteries 7/9Ah

2 String Nr.2 with 40 batteries 7/9Ah

1 String Nr.1 with 40 batteries 7/9Ah

Attention: installs the first battery string in position 1, and so on

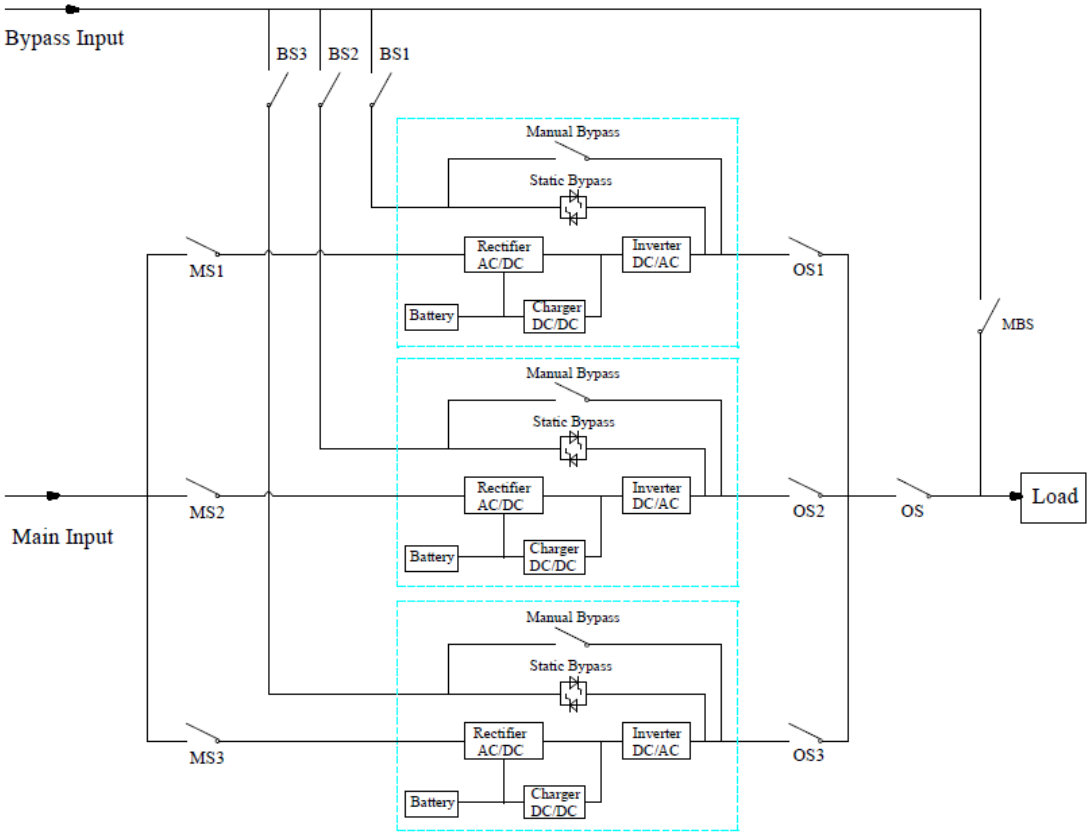
The interconnections are made with electrical cables and Anderson type connectors.
Use only original battery Kit.

Measure and confirm correct battery voltage before connecting to UPS

Annex B Instructions of the parallel system for UPS

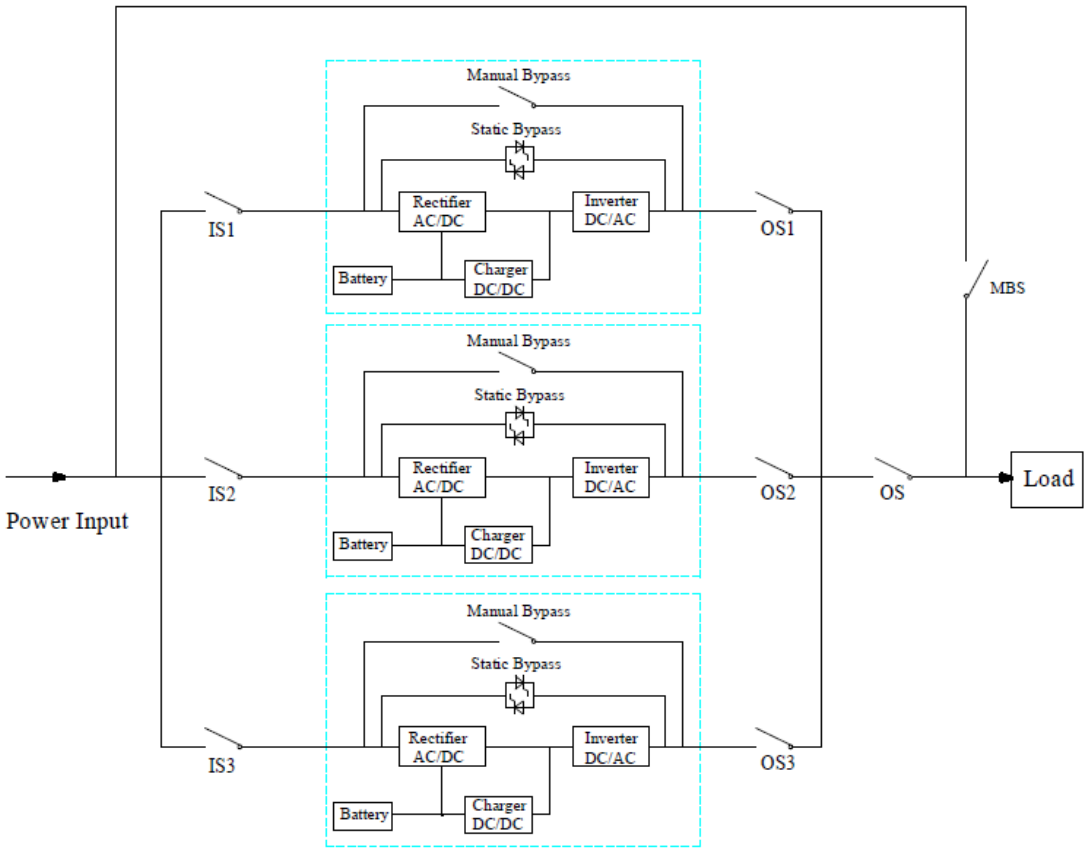
The UPS can be paralleled; normally there are 2 UPSs or 3 UPSs in parallel. If more than 3 UPSs in parallel, please ask to the factory in advance.

1. Power cable connection in case of 3 UPSs in parallel.



The cable connection drawing for 3 UPSs in parallel (dual input)

Note: MS1, MS2 and MS3 are the main input switches for each UPS, BS1, BS2 and BS3 are the bypass input switches, OS1, OS2 and OS3 are the output switches, OS is the output main switch of the power system, MBS is the maintenance bypass switch.



The cable connection drawing for 3UPSs in parallel (common input)

Note: IS1, IS2 and IS3 are the input switches for each UPS, OS1, OS2 and OS3 are the output switches, OS is the output main switch of the power system, MBS is the maintenance bypass switch.

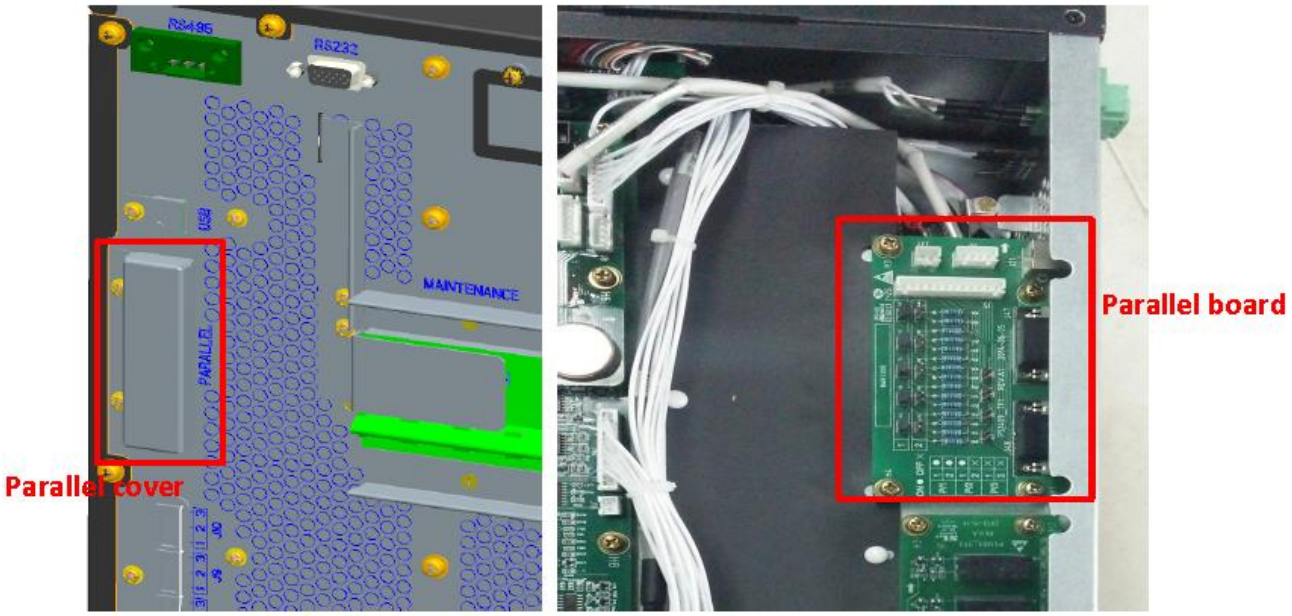
2. Parallel setting for UPS

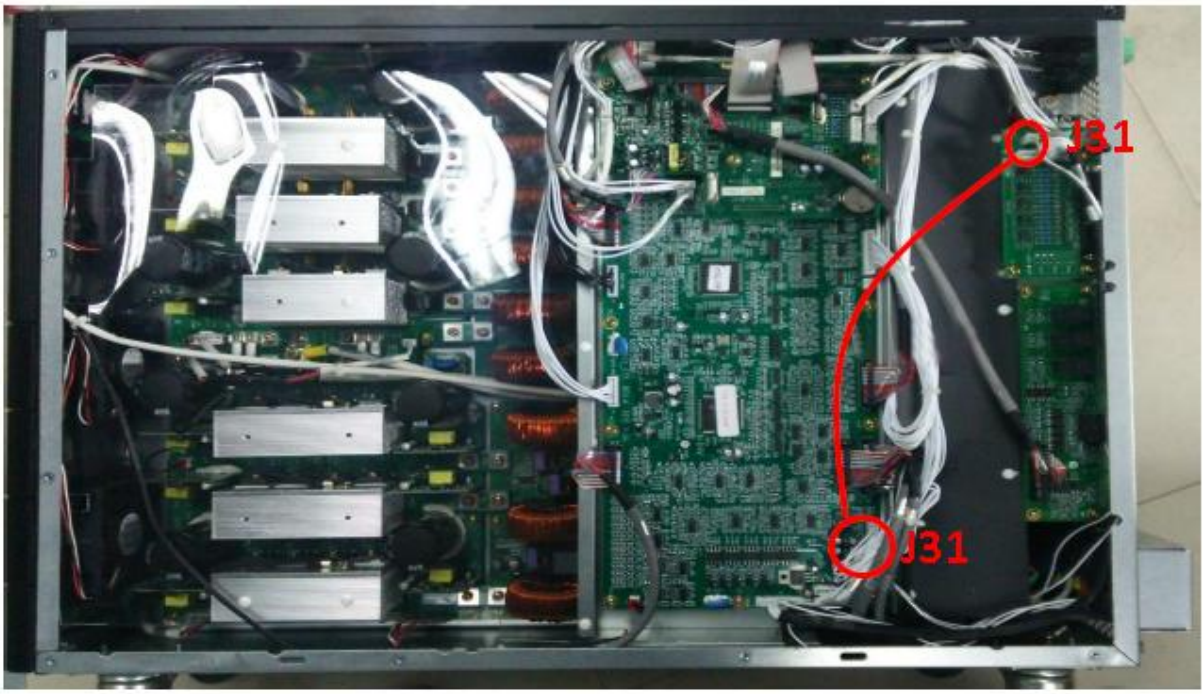
Generally users should inform the factory before the order, and the factory will set the parallel parameters before the delivery. If you need to change from a single system to a parallel system on site, do as the operations below.

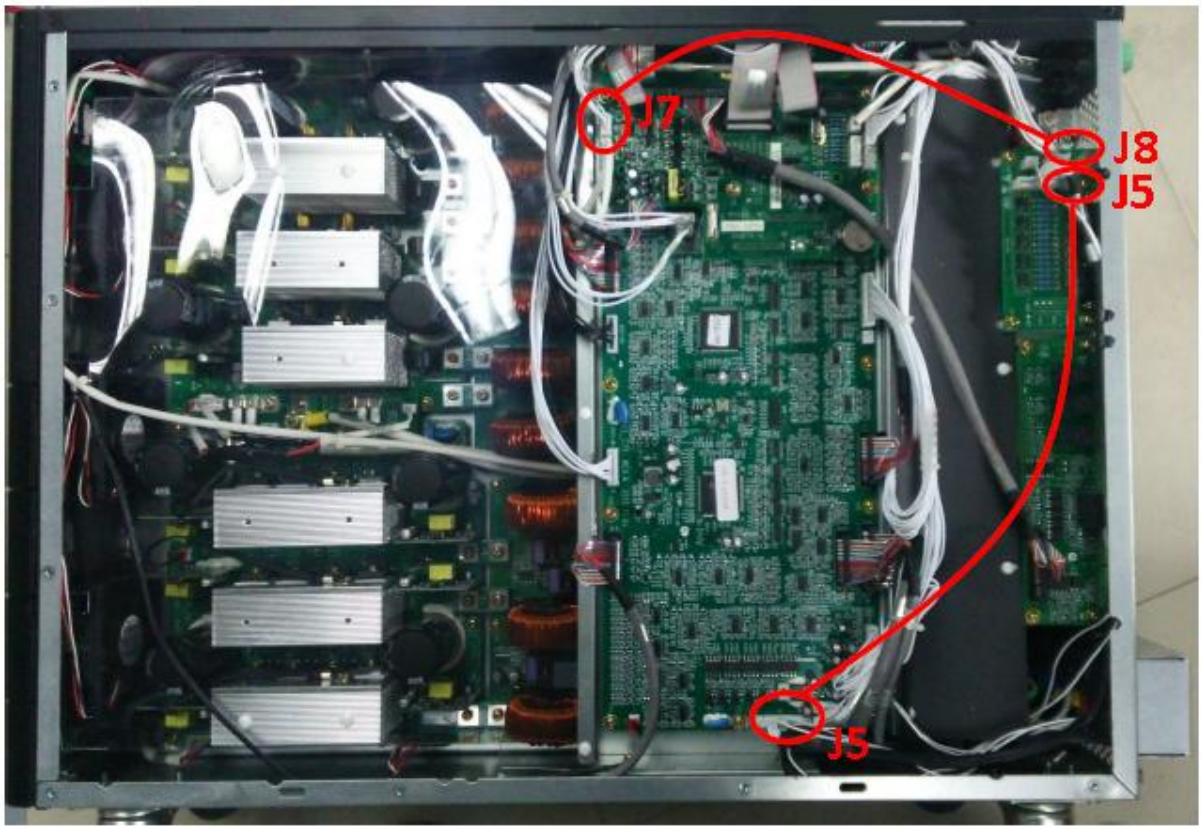
1) Install the parallel board as below

- Remove the parallel interface cover plate and the cover panel on both sides of UPS;
- Fix the parallel board with screws;
- Connect J31 on the parallel board to J31 on the control board with the 2pins cable;
- Connect J5 on the parallel board to J5 on the control board with the 12pis cable;
- Connect J8 on the parallel board to J7 on the Monitors interface board with the 4pins cable.
- Reinstall the cover panel of UPS.

Note: refer to the below pictures.



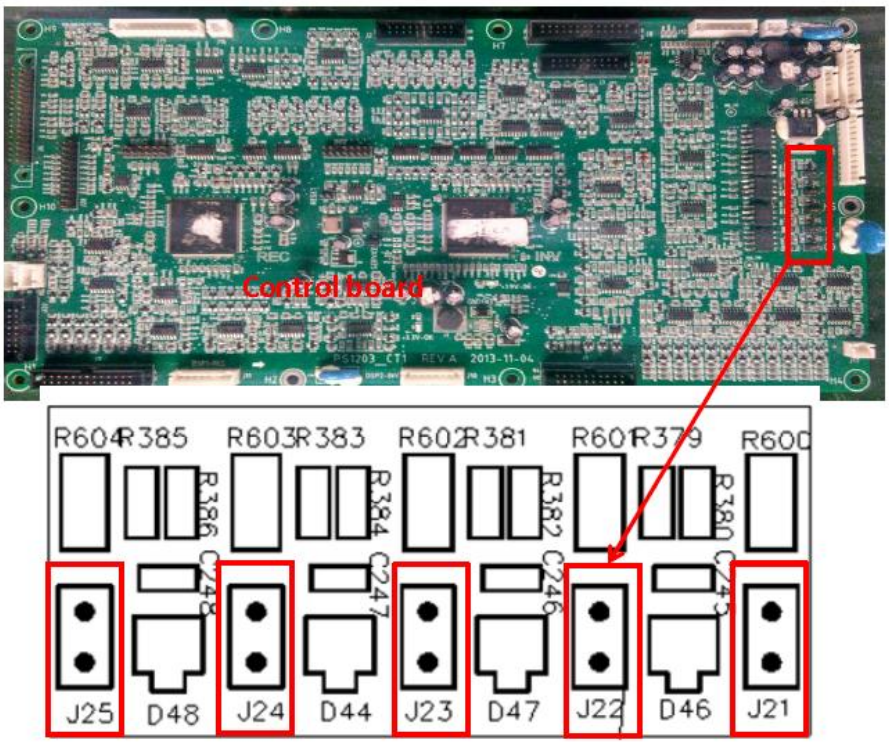




Parallel board installation and cables

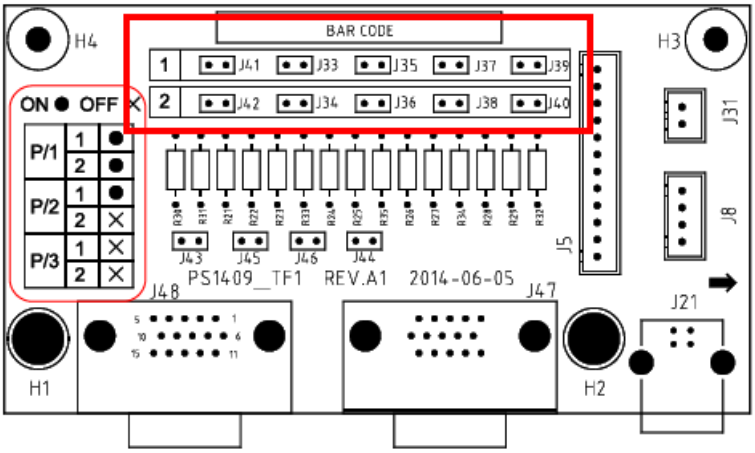
The pictures are for 10, 15, 40K model. On 20kVA and 30kVA size, the PCB's position is different, while the PCB connector inside the PCB's is in the same position.

Set the parallel board as below



The above is control board, please find the pin ports J21, J22, J23, J24 and J25.

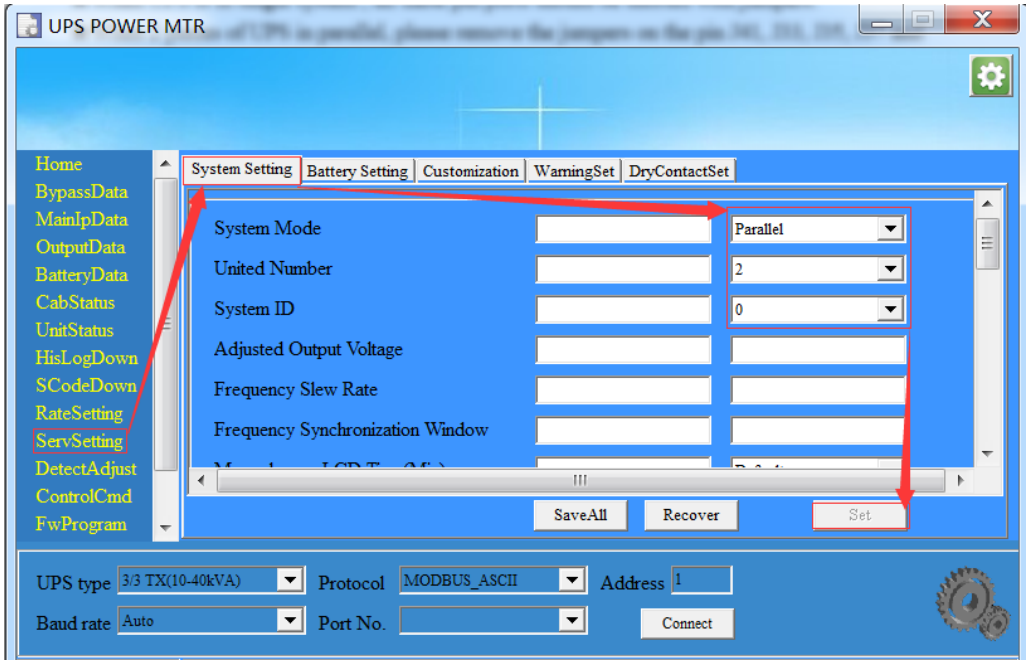
- When UPS is in single system, J21-J25 should be shorted with jumpers.
- When UPS is in parallel system, please remove the jumpers from J21 to J25.



The above is the parallel board, please find the pin ports, J41, J33, J35, J37, J39, J42, J34, J36, J38, J40.

- When UPS is in single system , all these pin ports should be shorted with jumpers.
- When 2 pieces of UPS in parallel, please remove the jumpers on the pin J41, J33, J35, J37 and J39, and keep J42, J34, J36, J38 and J40 shorted with jumpers.
- When 3 pieces of UPS in parallel, please remove all the jumpers above.

2) Set the UPS parallel parameters through MTR software



Above is our MTR software, connect MTR SW to UPS, find the setting page, set as below.

- 2 UPS in parallel

  The first UPS should be set as below.

  System Mode: Parallel

  United Number: 2

  System ID: 0

  The second UPS should be set as below.

  System Mode: Parallel

  United Number: 2

  System ID: 1

- 3 UPS in parallel

  The first UPS should be set as below.

  System Mode: Parallel

  United Number: 3

  System ID: 0

  The second UPS should be set as below.

  System Mode: Parallel

  United Number: 3

  System ID: 1

  The third UPS should be set as below.

  System Mode: Parallel

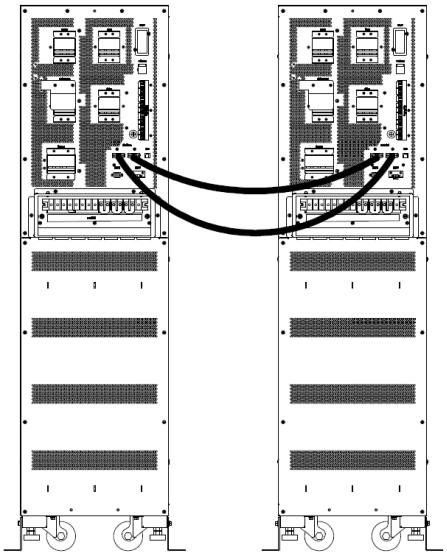
  United Number: 3

  System ID: 2

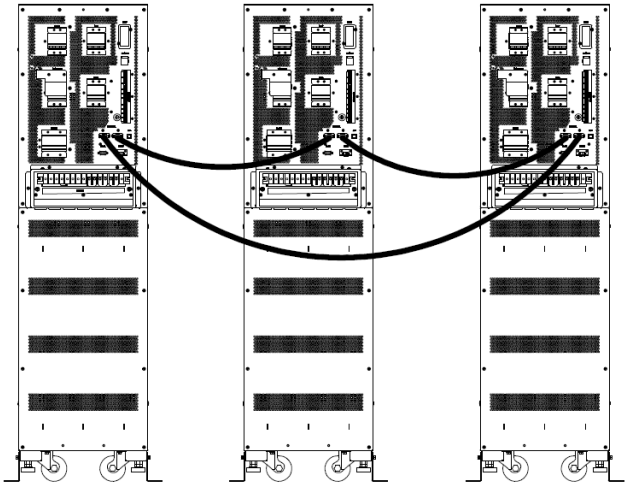
Note: Keep the other parameters same for UPS in the parallel system.

3) Connect the parallel signal cables

The parallel signal cable



The signal cable connection for 2 UPSs in parallel

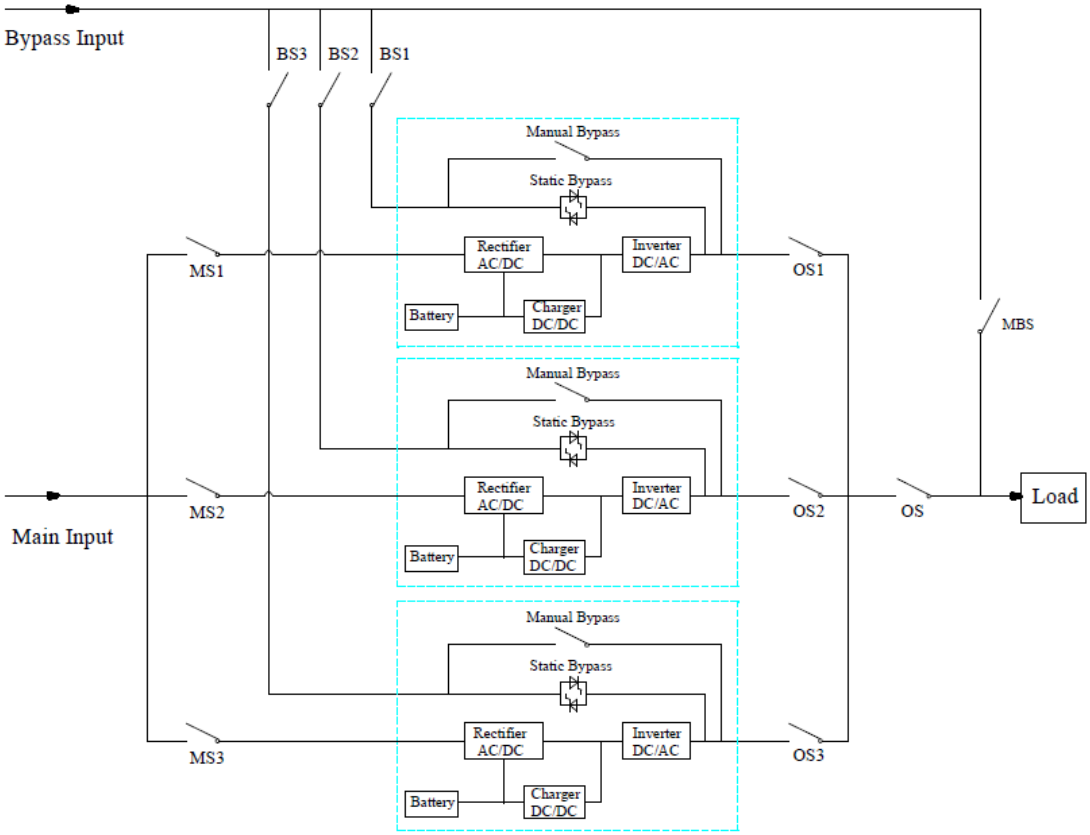


The signal cable connection for 3 UPSs in parallel

4) Testing for the parallel system

After all above done, please operate as below to test the parallel system.

Below is a parallel system of 3 UPSs with dual input as example.



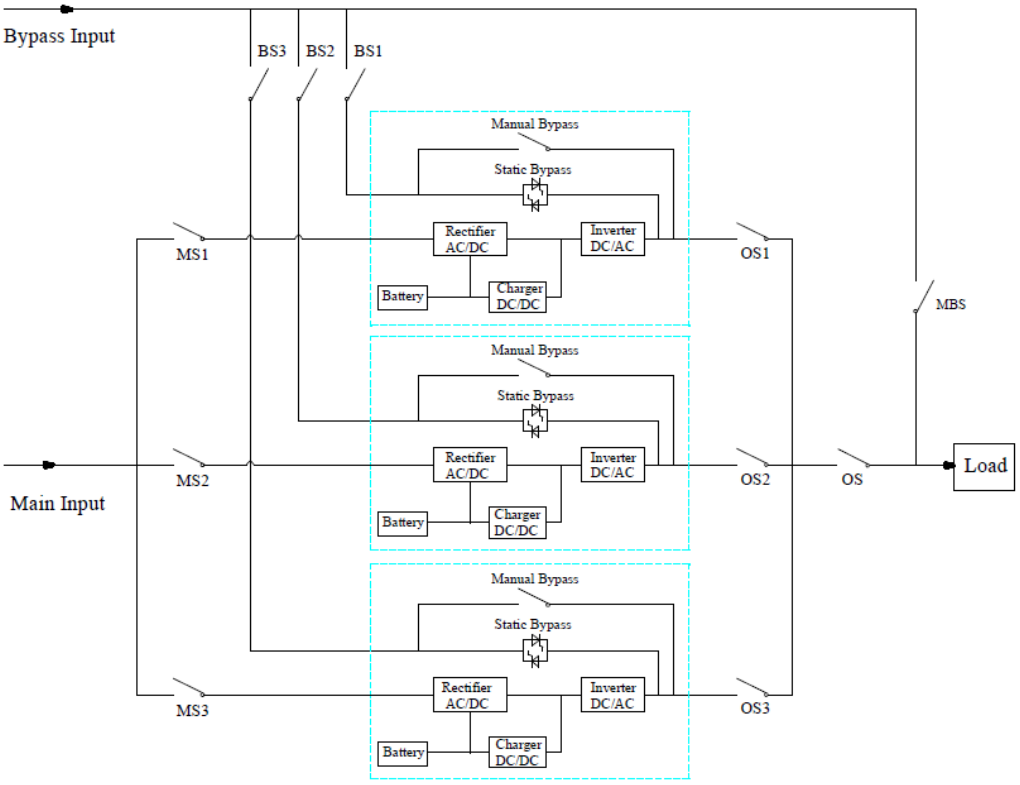
Note: Before the operation, please keep all the switches off.

1) First close OS1, and then close BS1 and MS1, the first UPS will start automatically, for the details of start, please refer to the user manual. About 2 minutes later, the first UPS will complete the start and final close the battery switch. At the moment, there should be no any alarm on the display screen, users can check the information on the screen, and they should be same to that from its nameplate. If the start fails, please contact the commissioned engineer or the supplier.
2) Turn off the battery switch, and then turn off BS1 and MS1, and finally turn off OS1, the first UPS would be shut down completely.
3) Operate on second UPS and on third UPS as the first UPS mentioned above.
4) After above operations and confirming there is no abnormity, please first close OS1, OS2 and OS3 one by one, and second close BS1, BS2 and BS3, and third close MS1, MS2 and MS3, after about 2 minutes, the 3 UPSs should start successfully at the same time, and finally close the battery switches for each UPS, at the moment there should be no any alarm on the display screen.
5) Operate the function “Transfer to Bypass” on the first UPS as below, the 3 UPSs should transfer to bypass mode at the same time, and then operate the function “Esc Bypass”, the 3 UPSs should retransfer to inverter mode. If there is no problem
6) Close the main output switch OS, the start is completed, users can start their equipments, one by one.

4. The operations for the parallel system

1) Shut down the UPS.

If users want to shut down one UPS or all UPSs, please operate as below.



First turn off the battery switch, and then turn off BS1 and MS1 one by one, and finally turn off OS1, the first UPS will be off.

If users want to shut down the second and the third UPS, please operate as above, but must note whether the remaining capacity of the system can meet the load capacity.

2) Transfer the parallel system from the normal mode to the maintenance bypass mode.

please operate as below.

a) Operate “Transfer to Bypass” on the display screen, all UPSs will transfer to the bypass mode at the same time.

b) Remove the metal plate on the manual bypass switch of all UPS.

c) Turn ON the maintenance switch MBS of all UPS.

d) Turn off all the battery switches one by one.

e) Turn OFF MS1, MS2 and MS3 (input mains rectifier).

f) Turn OFF BS1, BS2 and BS3(input mains bypass).

g) Turn OFF OS1, OS2, OS3 and OS (output switch). All UPSs will be OFF; the load is powered by the maintenance bypass.

3) Retransfer the parallel system from the maintenance bypass mode to the normal mode.

please operate as below.

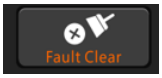
a) Turn ON OS, OS1, OS2 and OS3 (output switch) one by one.

b) Turn ON BS1, BS2 and BS3 (input mains bypass) one by one, about 20 seconds later, check on LCD and confirm the static bypass of each UPS is ON.

c) Turn OFF the maintenance bypass switch MSB and install the metal plate in all UPSs (now the load is powered through static bypass)

d) Turn ON MS1, MS2 and MS3 (input mains rectifier).

e) Turn ON all the battery switches one by one.

g) On LCD follow the path by selecting the icon “Operate” and then select “Fault Clear” 

to reset the manual bypass alarm.

The rectifier starts followed by the inverter.

After about 60-90Sec, the system transfers to Normal mode.

Warning

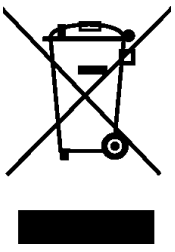
The system will stay on bypass mode until the cover of maintenance bypass breaker is fixed and Fault clear command has been given.

Recycling information in accordance with the WEEE

The product is marked with the wheelie bin symbol. It indicates that at the end of life the product should enter the recycling system.

You should dispose of it separately at an appropriate collection point and not place it in the normal waste stream.

The figure below shows the wheelie bin symbol indicating separate collection for electrical and electronic equipment (EEE).



The Horizontal bar underneath the crossed-out wheelie bin indicates that the equipment has been manufactured after the Directive came into force in 2005.

The main parts of the drive can be recycled to preserve natural resources and energy. Product parts and materials should be dismantled and separated.

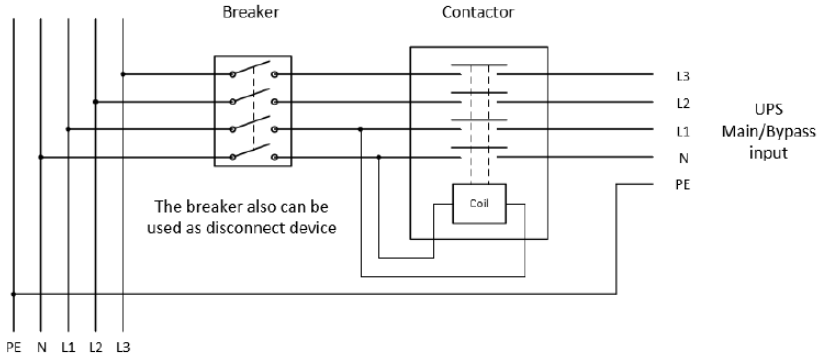
Contact your local distributor for further information on environmental aspects. End of life treatment must follow international and national regulations.

Annex C Instructions for voltage Backfeed

Its purpose is to prevent a return of energy to the electrical system if the UPS has an internal fault during operation in battery mode.

This protection can be achieved either by means of a contactor external to the UPS, or by means of a current launch coil controlled by a contact on the UPS clean contact board. This coil must open the UPS input protection circuit breaker.

Below is an example of a system using an external contactor:



Three phase input system

Note: In the case of separate networks, apply the schematic to both the Input network and the Auxiliary network (By-Pass).

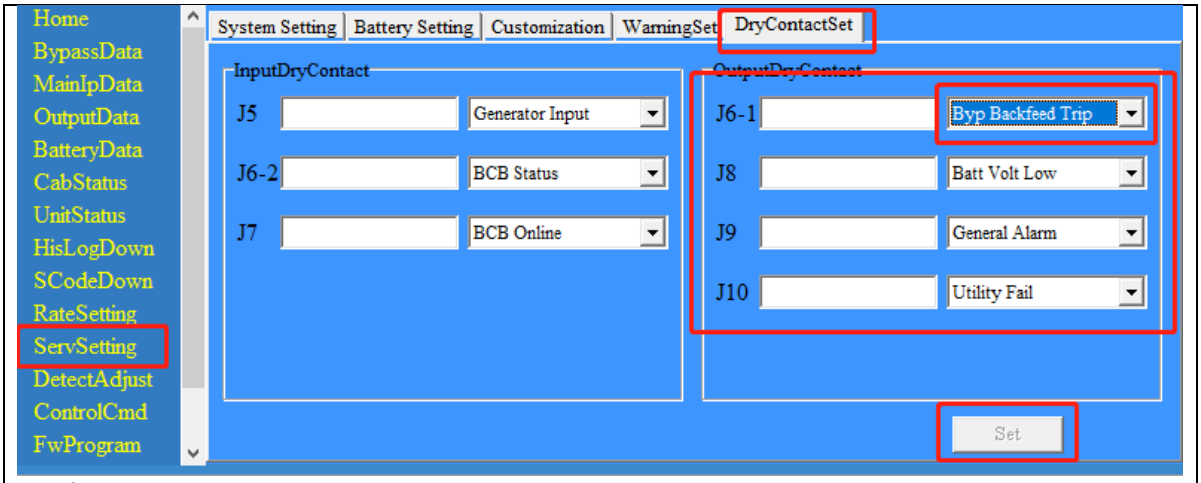
Whenever the Input and/or By-Pass network is absent, the contactor will open, blocking any return of voltage to the Input circuit breaker.

The size of the contactor to be used must take into account the maximum currents flowing through the Input section and the By-Pass, summarized below:

Index	10kVA	15kVA	20kVA	30kVA	40kVA
Current on Input Mains (A)	18	28	35	55	70
Current on By-Pass Mains (A)	15	23	30	45	60

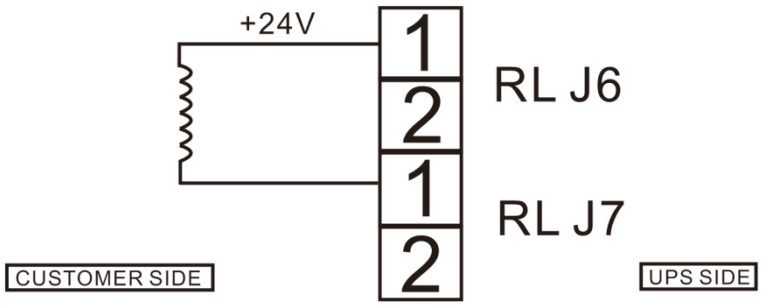
Below is an example using a contact on the clean contact board and a current launch coil.

In this case is necessary, by Expert software MTR, setting the output dry-contact J6-1 as “BYP Backfeed Trip” (see below):



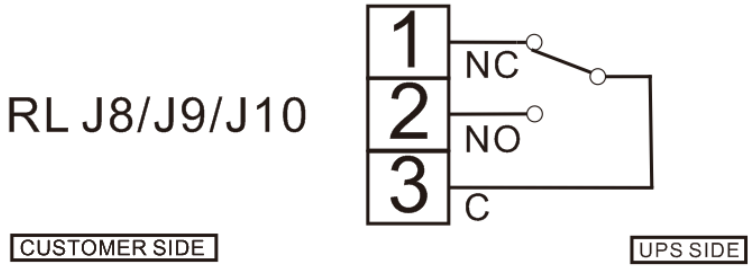
The function must be programmed via SW as indicated above

J6	By-Pass Backfeed Trip	When the Backfeed fault is detected by the UPS, a "24VDC/20ms" drive signal will be sent out between J6-1 and J7-1. This signal it’s send to the current launch coil of the MCB (or MCCB) input protection, which it going to disconnect the Backfeed circuit.



The other dry Output contacts (J8, J9 and J10) can be used as a remote signal to know when the Backfeed circuit has intervened.

RL J8/J9/10	Backfeed Contacts	When the bypass Backfeed fault doesn't occurs, the contact 1-3 is Normally Close and the contact 2-3 is Normally Open.
		When a Backfeed error occurs, contact 1-3 opens while contact 2-3 becomes closed.



WARNING LABEL

UPS is designed for permanent connection by fixed wiring to the AC supply.
A warning label (see below) shall be place by the Installer (must be a skilled person), on all primary power isolators installed remote from the UPS area and on external access points, if any, between such isolators and the UPS.