M90S Online Split-Phase UPS

6kVA, 12kVA, 18kVA, 24kVA Models

User & Installation Manual

Table of Contents

1 Safety

1.1 Important Safety Instructions

This UPS contains LETHAL VOLTAGES. All repairs and service must be performed by AUTHORIZED SERVICE PERSON-NEL ONLY. There are NO USER SERVICEABLE PARTS inside the UPS.

WARNING:
- The UPS designed for commercial and industrial purpose, it is forbidden to apply for any life sustainment and support.
- The UPS system contains its own energy source. The output terminals may carry live voltage even when UPS is disconnected from an AC source.
- To reduce the risk of fire or electrical shock, UPS installation has to be in a controlled room where temperature and humidity are monitored. Ambient temperature must not exceed 104°F. The system is only for indoor use.
- Ensure all power is disconnected before installation or service.
- Service and maintenance should be performed by qualified personnel only.

Before working on this circuit
- Isolate Uninterruptible Power System (UPS).
- Then check for Hazardous Voltage between all terminals including the protective earth.

 Risk of Voltage Backfeed

The isolation device must be able to carry the UPS input current.

1.2 EMC

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

1.3 Installation Information

WARNING:
- Installation must be performed by qualified personnel only.
- The cabinets must be installed on a level floor suitable for computer or electronic equipment.
- The UPS cabinet is heavy. If unloading instructions are not closely followed, cabinet may cause serious injury.
- Do not tilt the cabinets more than 10 degree.
- Before applying electrical power to the UPS, make sure the Ground conductor is properly installed.
- Installation and Wiring must be performed in accordance with the local electrical laws and regulations.
- The disconnection device should be chosen based on the input current.

1.4 Maintenance

- Only qualified service personnel should perform the battery installation.
- The following PRECAUTIONS should be observed:
    1. Remove watches, rings, or other metal objects. Use tools with insulated handles.

2. Wear rubber gloves and boots.
3. Do not lay tools or metal parts on top of batteries or battery cabinets.
4. Disconnect the charging source prior to connecting or disconnecting terminal.
5. Check to see if the battery is inadvertently grounded. If it is, remove the source of grounding. Contacting with any part of the ground might result in electrical shock. The likelihood of such shock can be prevented if such grounds are removed during installation and maintenance.

- UPS is designed to supply power even when disconnected from the utility power. After disconnect the utility and DC power, authorized service personnel should attempt internal access to the UPS.
- Do not disconnect the batteries while the UPS is in Battery mode.
- Disconnect the charging source prior to connecting or disconnecting terminals.
- Batteries can result in a risk of electrical shock or burn from high short circuit current.
- When replacing batteries, use the same number of sealed, lead-acid batteries.
- Do not open or mutilate the battery. Released electrolyte is harmful to the skin and eyes, and may be toxic.

1.5 Recycling the Used Battery

- Do not dispose of the battery in a fire. Battery may explode. Proper disposal of battery is required. Refer to your local codes for disposal requirements.
- Do not open or mutilate the battery. Released electrolyte is harmful to the skin and eyes. It may be toxic.
- Do not discard the UPS or the UPS batteries in the trash. This product contains sealed, lead-acid batteries and must be disposed properly. For more information, contact your local recycling/reuse or hazardous waste center.
- Do not discard waste electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.

2 Installation

2.1 Initial Inspection

1. Visually examine if there is any damage inside and outside of packages in the process of the transportation. If any damage, report it to the carrier immediately.
2. Verify the product label and confirm the consistency of the equipment.
3. If the equipment needs to be returned, carefully repack the equipment by using the original packing material that came with.

## 2.2 Installation Environment

1. The UPS is designed for indoor use only and should be located in a clean environment with adequate ventilation to keep the environmental parameters within the required specification.
2. Make sure that transportation routes (e.g. corridor, door gate, elevator, etc.) and installation area can accommodate and bear the weight of the UPS, the external battery cabinet and handling equipment.
3. The UPS uses forced convection cooling by internal fans. Cooling air enters the module through ventilation grills located at the front of the cabinet and exhausted through grills located in the rear part of the cabinet. Please do not block the ventilation holes.
4. Ensure that the installation area is spacious for maintenance and ventilation.
5. Keep the temperature of installation area around 30°C and humidity within 90%. The highest operating altitude without derating is 5200 ft above sea level.
6. If necessary, install a system of room extractor fans to avoid formation of room temperature. Air filters are necessary if the UPS is operated in a dusty environment.
7. It is recommended that you parallel the external battery cabinets to the UPS. The following instructions of

clearances are suggested:
- Keep a clearance of 40" from the top of the UPS for maintenance, wiring and ventilation.
- Keep a clearance of 40" from the back of the UPS and the external battery cabinets for ventilation.
- Keep a clearance of 60" from the front of the UPS and the external battery cabinets for maintenance and ventilation.

8. For safety concerns, we suggest that you shall:
- Equip with CO_2 or dry powder fire extinguishers near the installation area.
- Install the UPS in an area where the walls, floors and ceilings were constructed by fireproof materials.

9. Do not allow unauthorized personnel to enter the installation area. Assign specific personnel to keep the UPS key.

2.3 Unpacking

1. Use a forklift to move the product to installed area. Please make sure the bearing capacity of forklift is sufficient.
2. Please follow the order in the figures below to remove carton and foams.
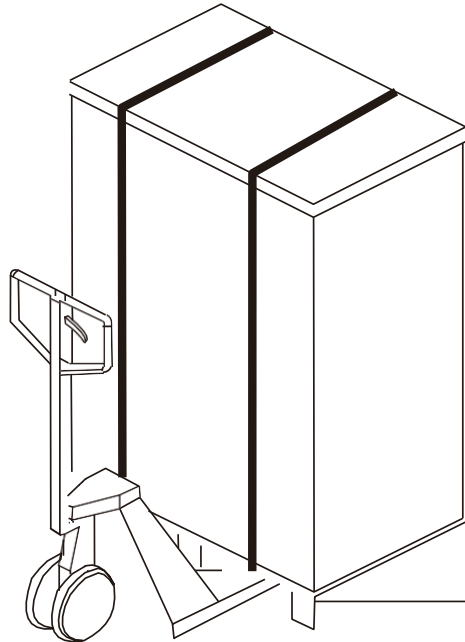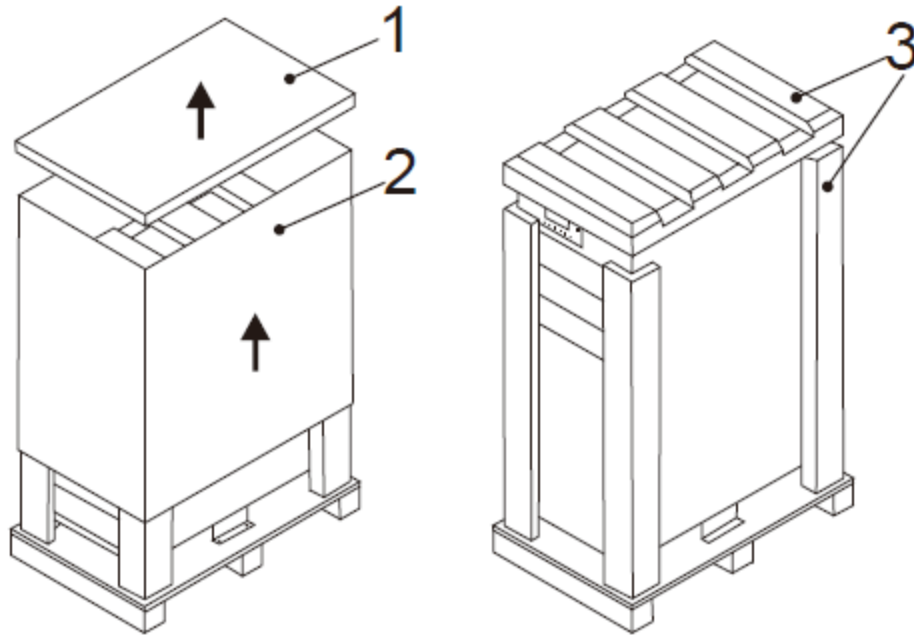
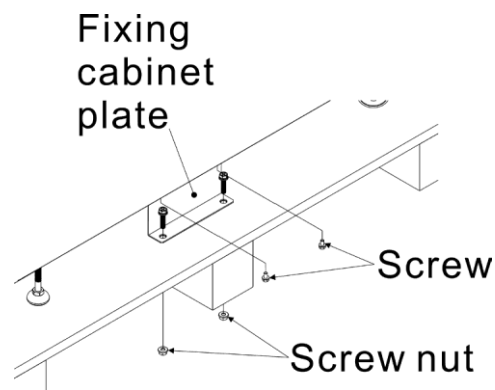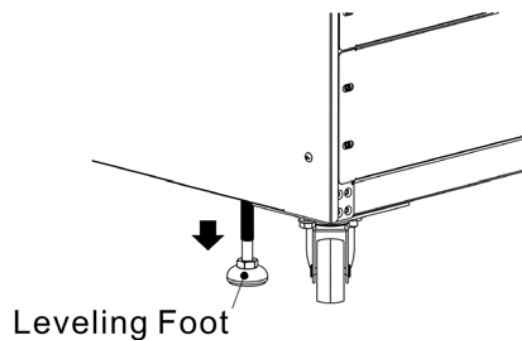3. Remove 2 fixing cabinet plates and loosen leveling feet by rotating them counterclockwise. Then, move the cabinet from the pallet.

4. To fix the cabinet in position, simply rotate leveling feet clockwise.

2.4 Moving the Cabinet

⚠ **Warning**
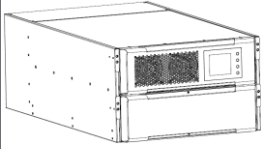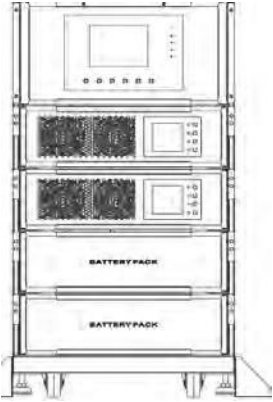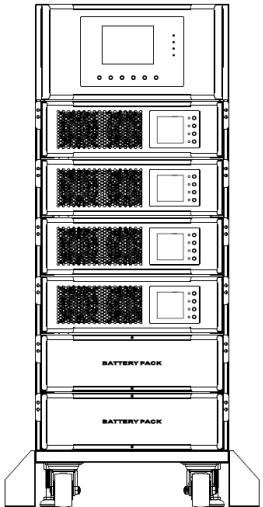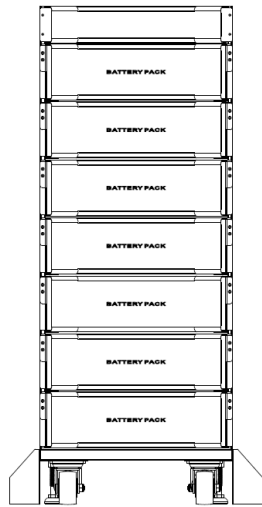
The UPS is screwed to the pallet with 2 mounting brackets. When removing it, pay attention to the movement of the casters to avoid accidents. The cabinet can be pushed forward or backward only. Pushing it sideward is not allowed. When pushing the cabinet, pay attention to the gravity center so as not to turn over the UPS.

1. If you need to move the UPS over a long distance, please use appropriate equipment like a forklift. Do not use the UPS casters to move over a long distance.
2. After the UPS has been removed from the pallet to the floor, we suggest that at least three people move the UPS to the installation area. One person holds a lateral side of the UPS with hands, another holds the other lateral side of the UPS with hands, and the other person pushes the UPS either from the front side or from the back side to the installation area to avoid tipping the UPS.
3. The casters are designed to move on level ground. Do not move the UPS on an uneven surface. This might cause damage to the casters. Toppling the UPS could also damage the unit.
4. Ensure that the weight of UPS is within the designated bearing capacity of any handling equipment.
5. At the bottom of the UPS, the four casters help you to move the UPS to a designated area. Before you move the UPS, please turn the four leveling feet counterclockwise to raise them off the ground. This protects the leveling feet from damage when moving the UPS.

Leveling Foot   Caster
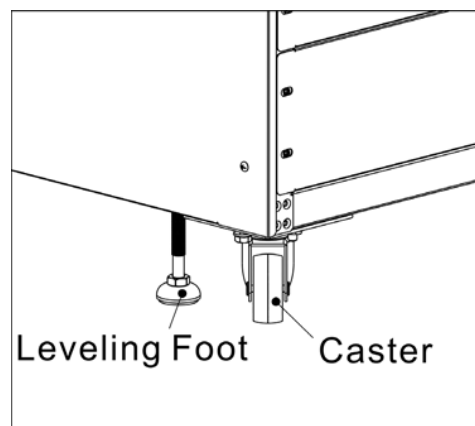
2.5 Model Configuration

There are three UPS configurations and one external battery cabinet configuration:

	UPS with Internal Batteries			External Batteries
	2 Slot UPS Chassis	4 Slot UPS Chassis	6 Slot UPS Chassis	Battery Chassis
Photo				
UPS Module #	Max of 1 (Slot 1 ONLY)	Max of 2 (Slots 1 and 2 ONLY)	Max of 4 (Slots 1-4 ONLY)	0
Battery Module #	Max of 1	Max of 3	Max of 5	Max of 7
Cabinet Height	10.5" (6U)	33.25"	45.5"	45.5"

2.6 Exterior

In the front of the UPS, there are control interface LCD Panel (4 and 6 slot chassis). Power Module slots and Battery Module slots. A wiring terminal blocks, circuit breakers, communication slots (4 and 6 slot chassis), communication ports are located at the back of cabinet. The side panels are locked by screws. The casters at the bottom of the UPS cabinet can be used to move the UPS for short distances. There are four leveling feet to fix and stabilize the UPS cabinet on the ground.

NOTE: The two slot chassis is intended to mount in a rack and doesn't have casters or leveling feet.

2 Slot M90S
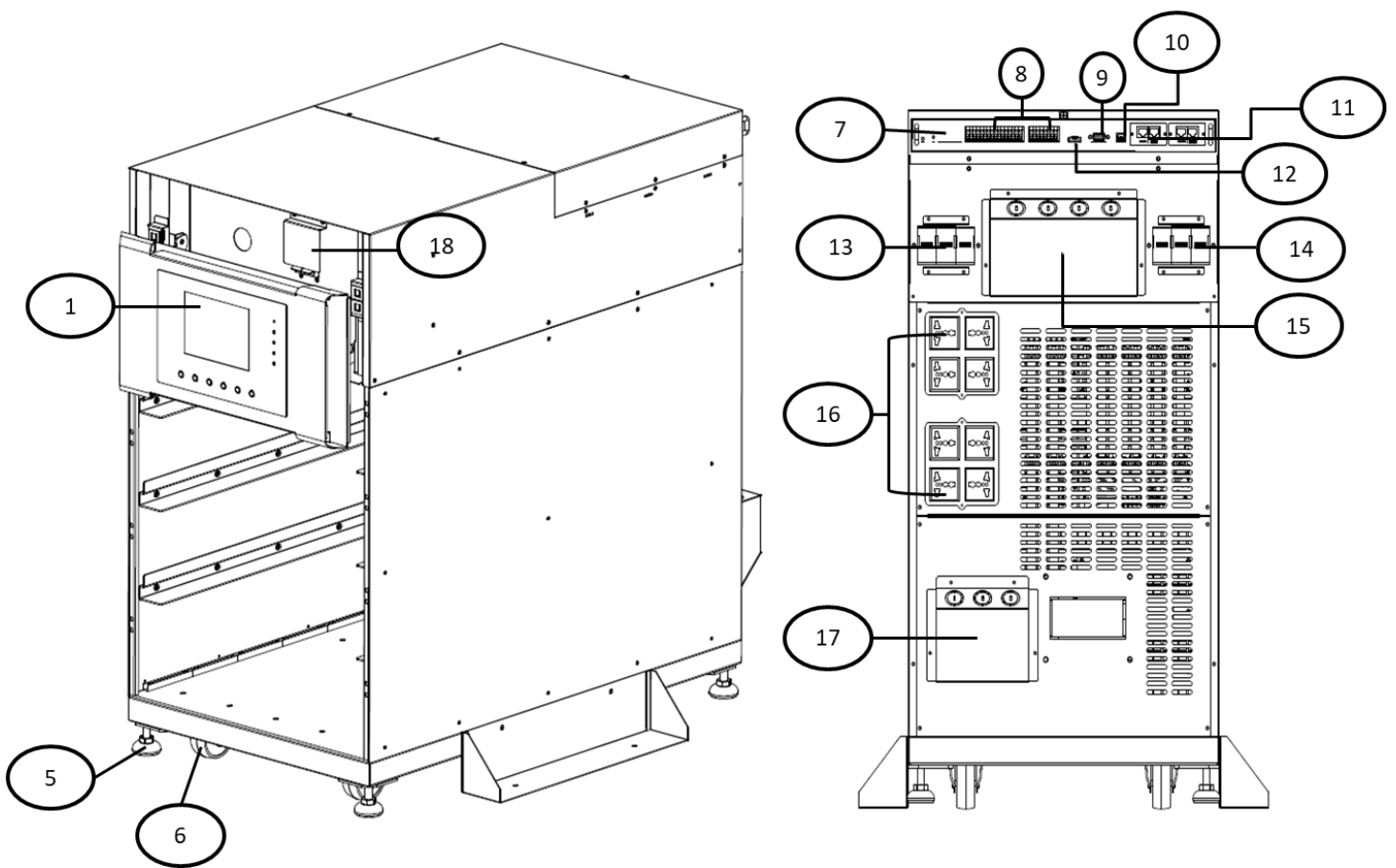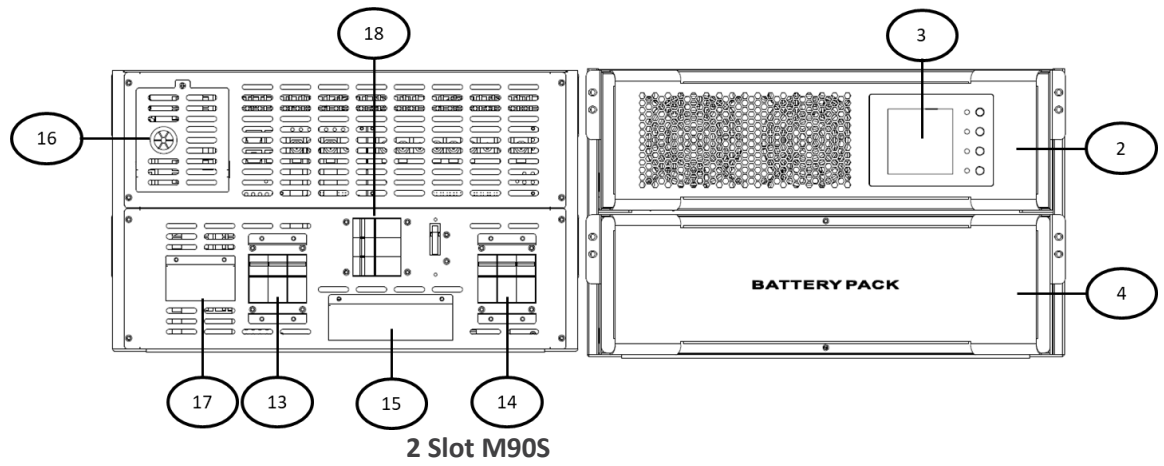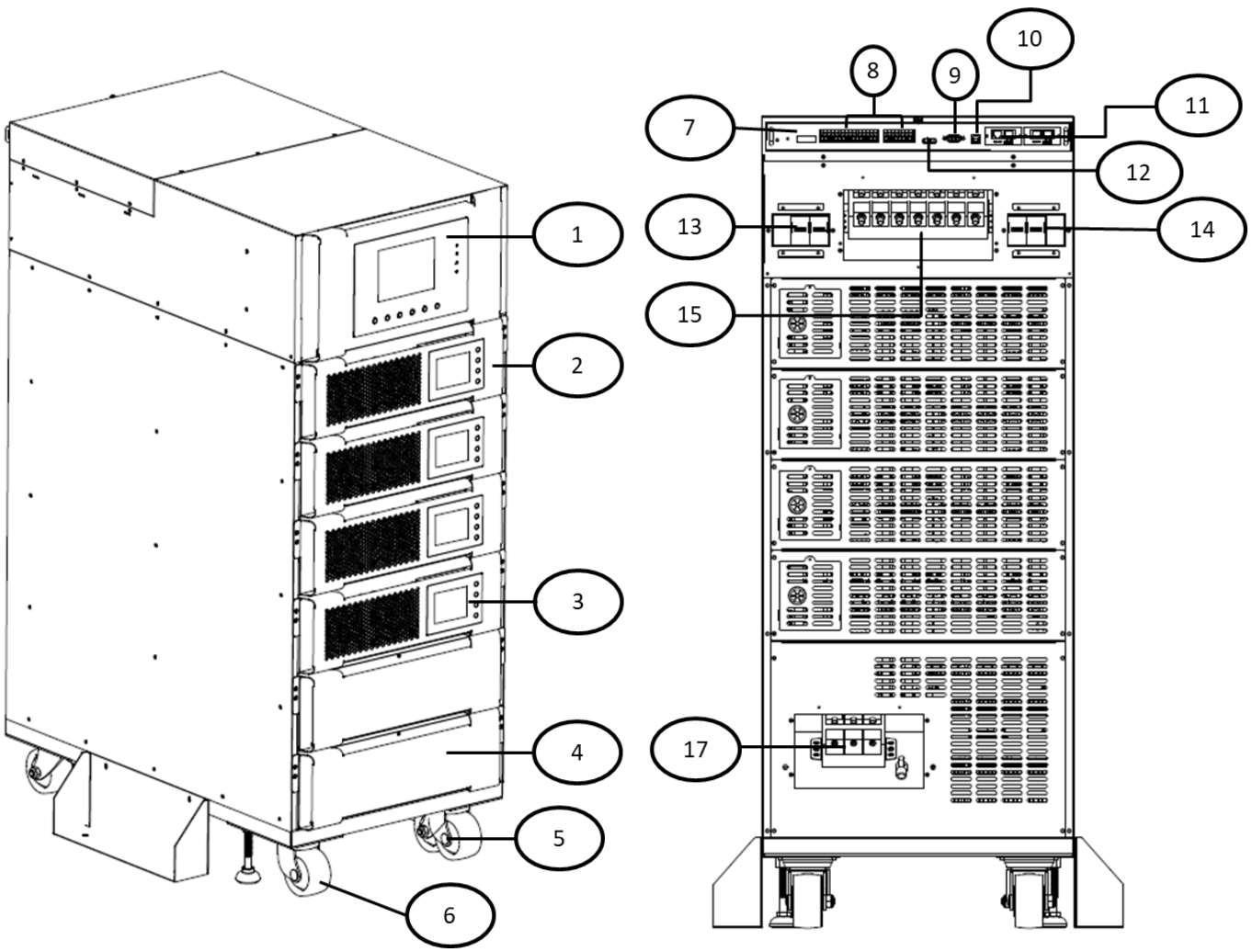
4 Slot M90S

6 Slot M90S
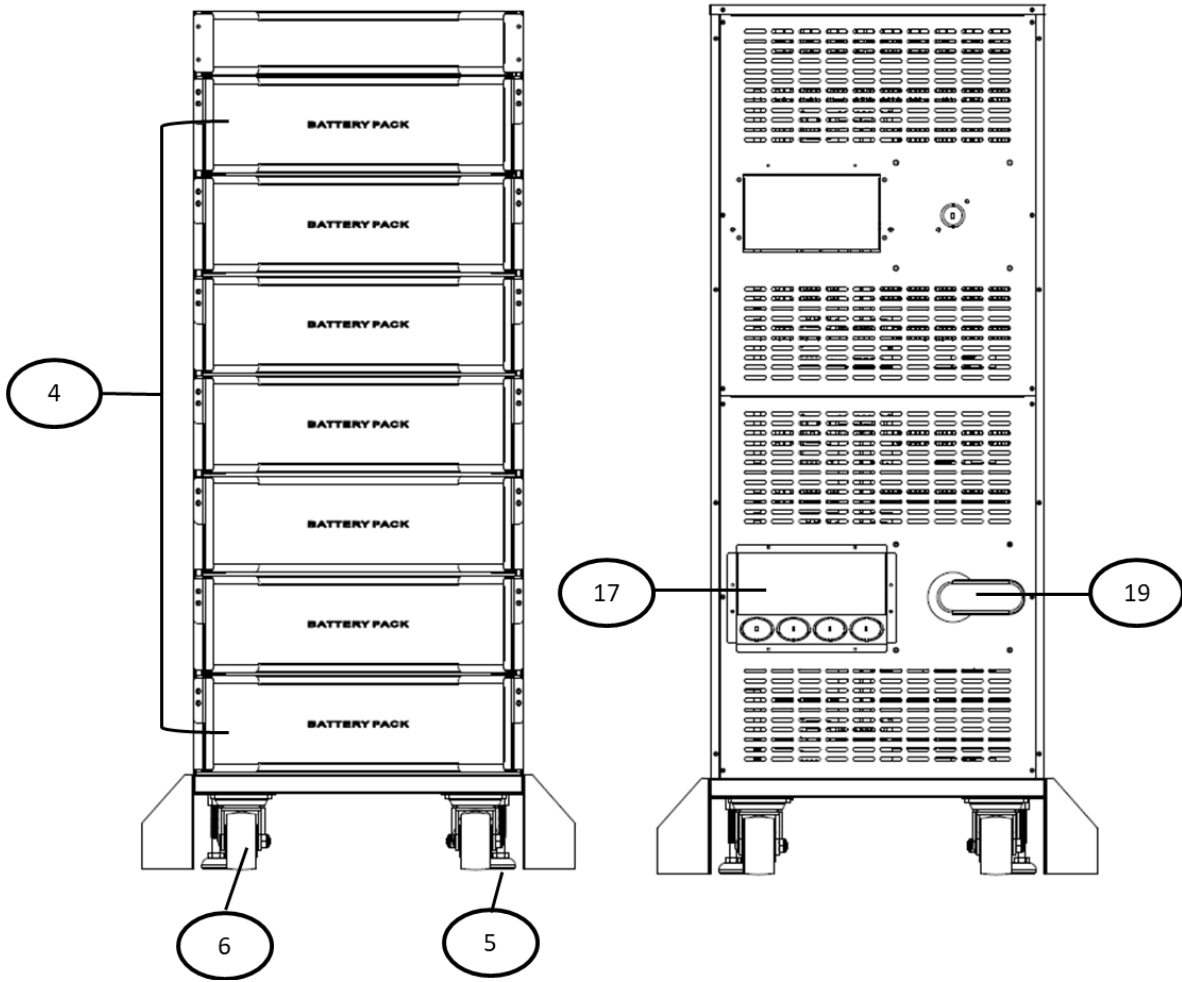
External Battery Cabinet

1. Control panel	10. USB port
2. Power module	11. Intelligent slot
3. LCD display on	12. Emergency power off port
Power module	13. AC input breaker
4. Battery module	14. AC output breaker
5. Leveling foot	15. AC terminal
6. Caster	16. Output receptacles (optional)
7. Controller module	17. External battery terminal
8. Dry contact	18. Maintenance bypass switch
9. RS-232 port	19. DC Disconnect Switch

Controller Module

Battery start button · Status LED · Output dry contacts · input dry contacts · battery dry contacts · EPO · RS232 · USB · Communication slots
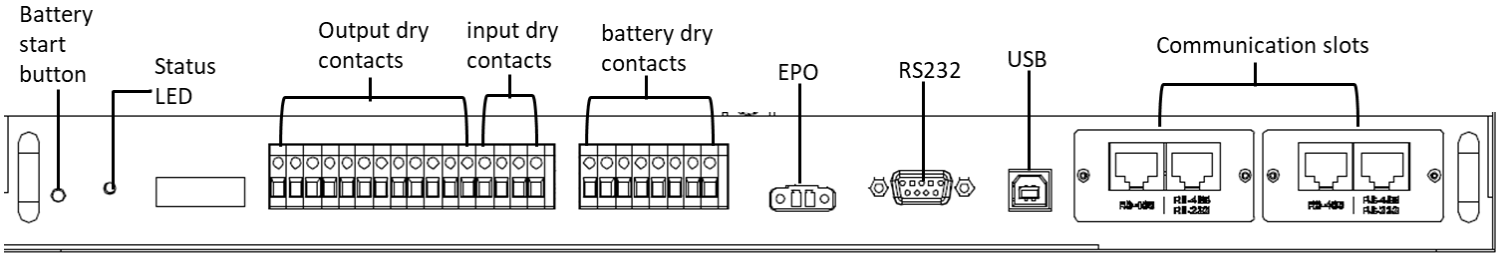
2.6.1 Mechanical Data

Dimensions			
UPS cabinet	**Width**	**Depth**	**Height**
2 Slot	17.36"	30.59"	10.51"
4 Slot	17.44"	33.74"	33.07"
6 Slot	17.44"	33.74"	45.43"
7 Slot Battery	17.44"	32.79"	45.43"

17.4" · 10.5" · 30.6" · 29.6"
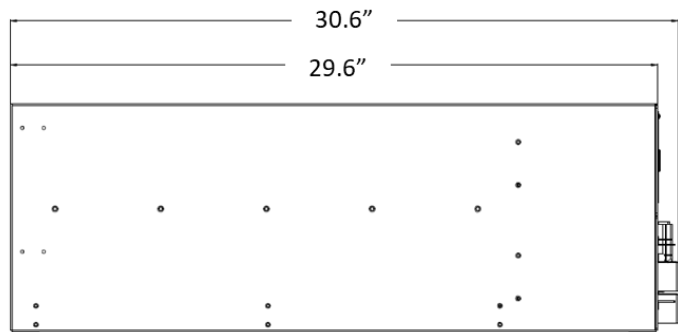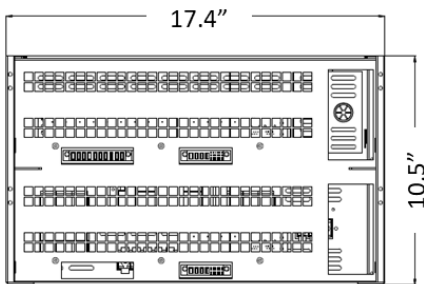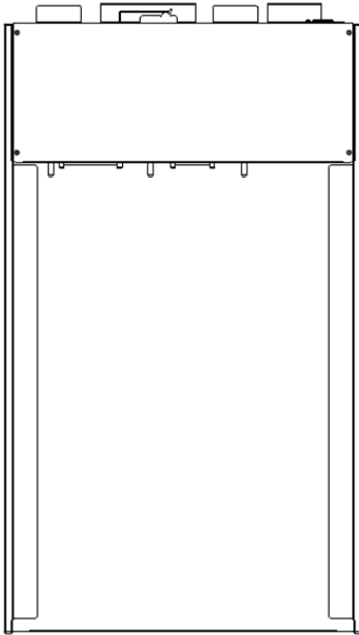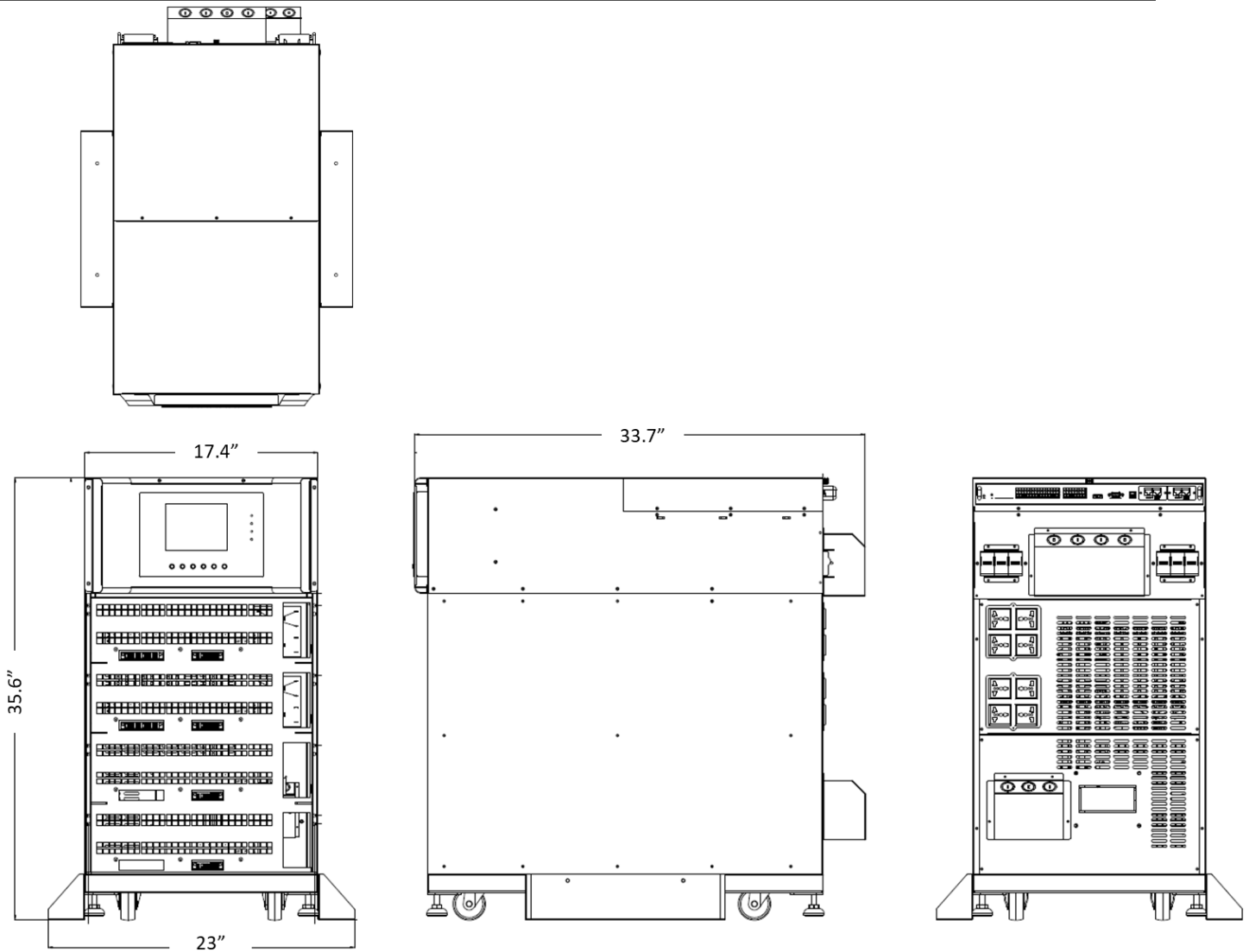
2 Slot Chassis

4 Slot Chassis
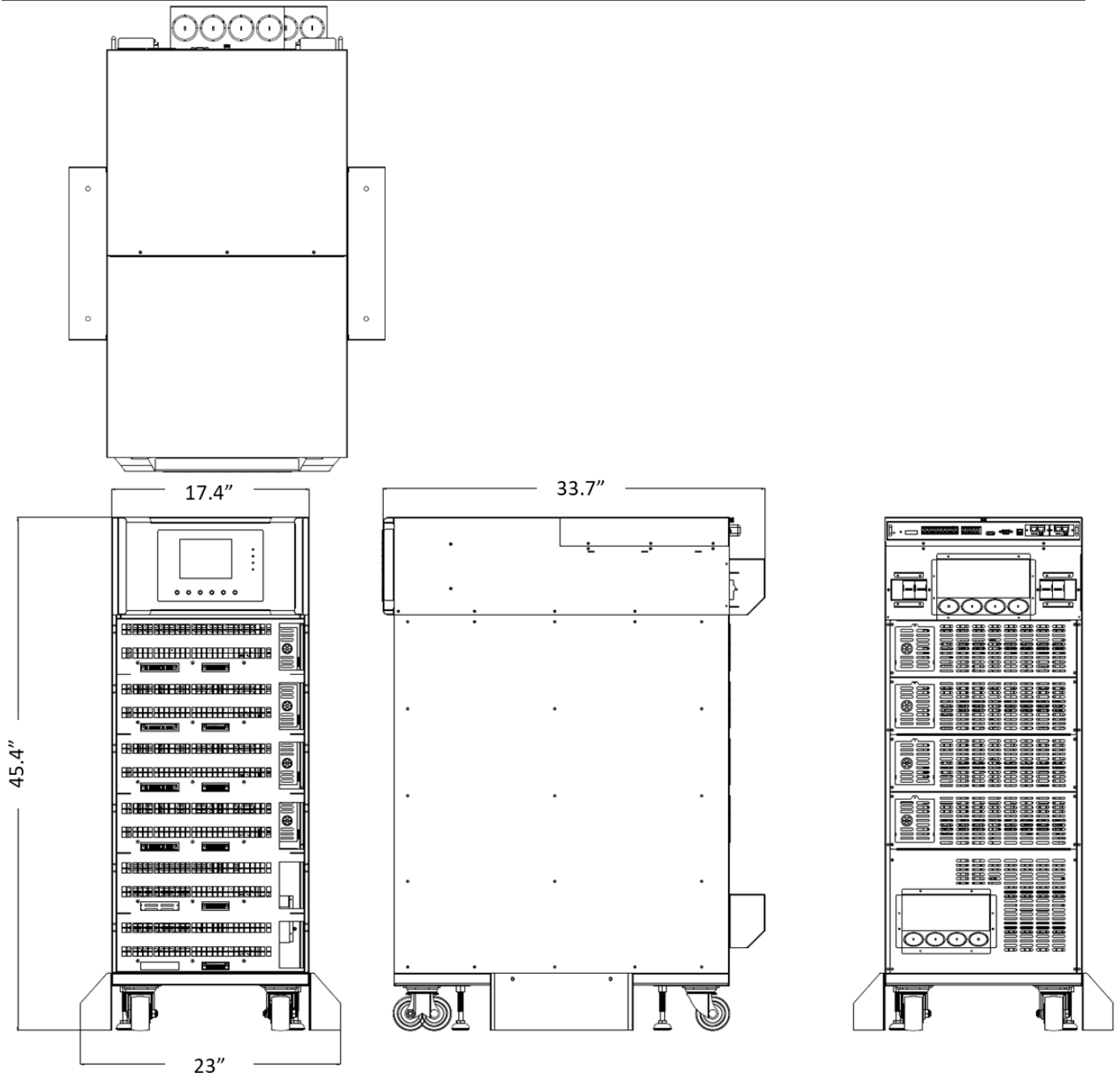
6 Slot Chassis
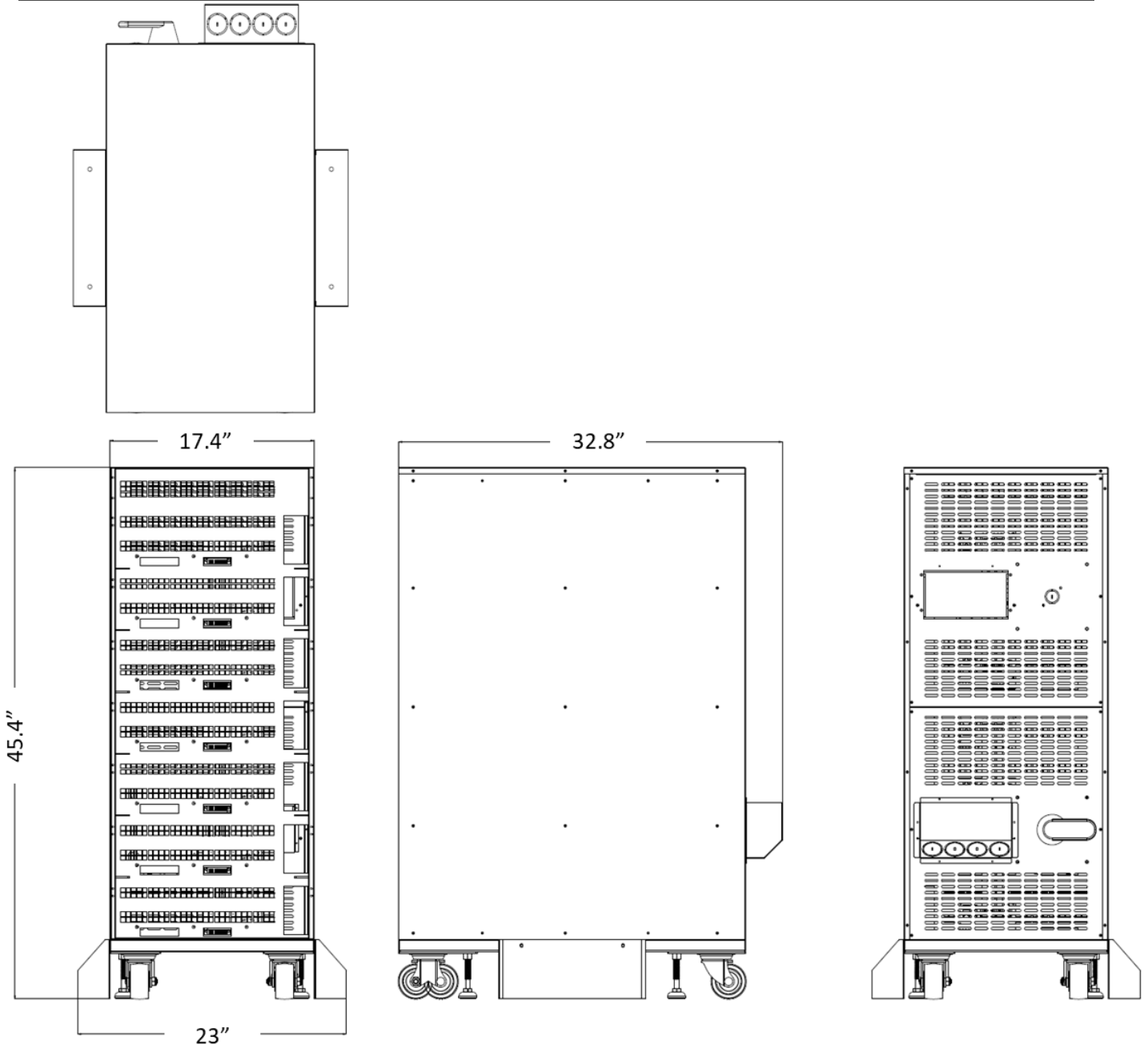
7 Slot Battery Pack

2.6.2 Front / Rear Open View
Front open view: After removing panel covers, you will see the empty module slots and control panel.
Rear open view: You will see the breakers, terminal blocks, receptacle panels, and communication ports installed on the cabinet.
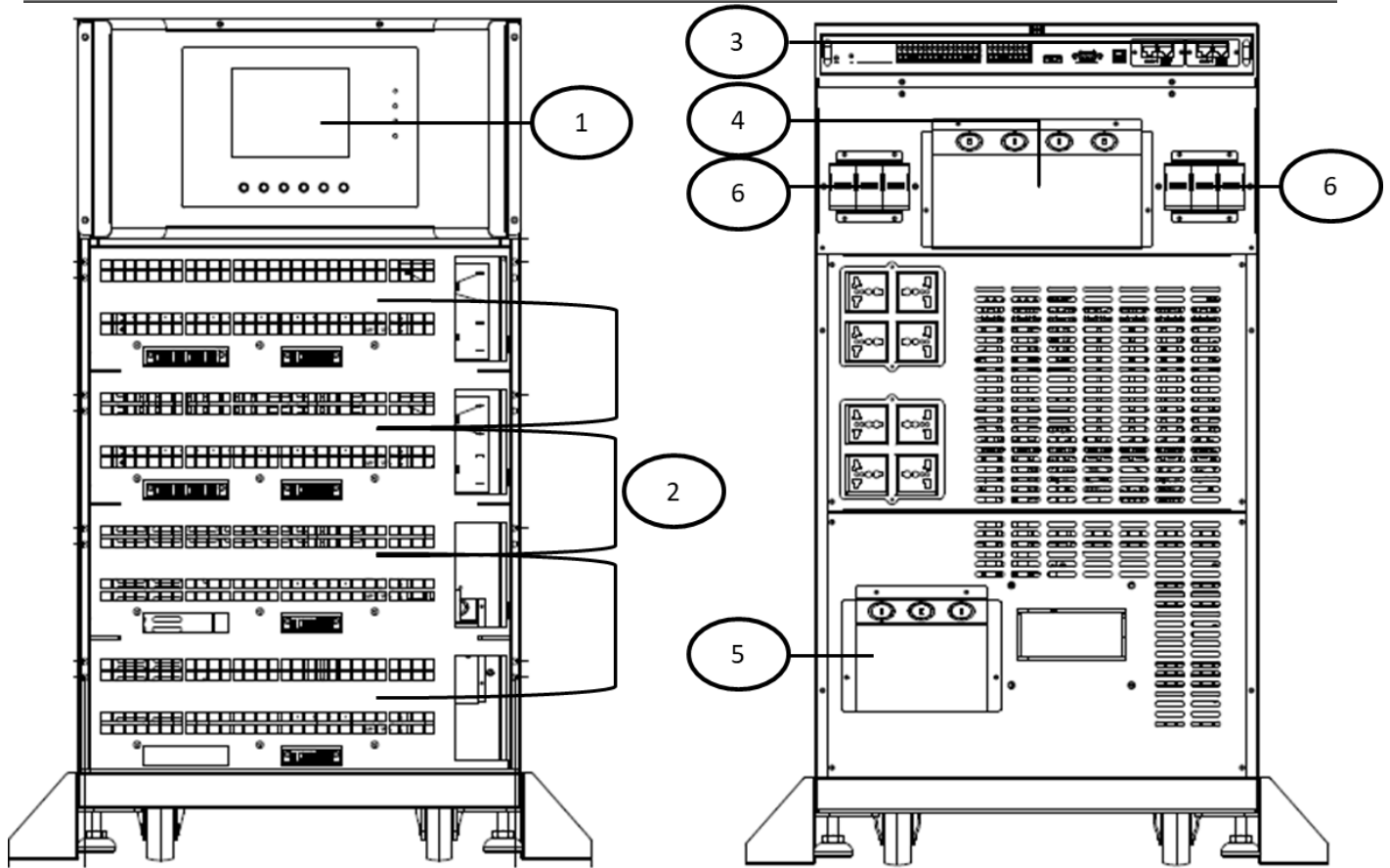
Front view   Rear view

1. Control panel
2. Power/battery module slots
3. Communication port
4. AC terminals
5. DC terminals
6. AC breakers

2.7 Internal Mechanisms

2.7.1 Breakers
At the rear panel of the cabinet, you can see AC Input/Output breakers. Refer to the diagram below.
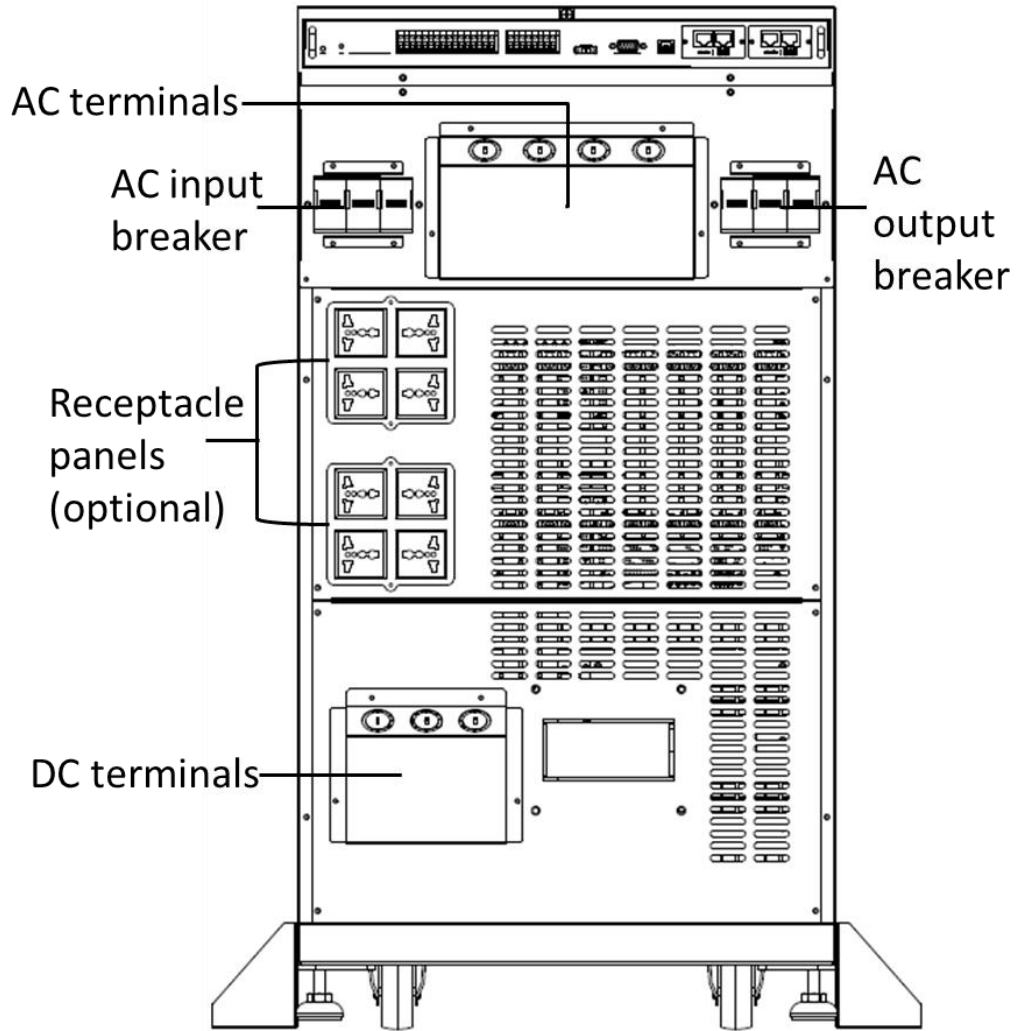
Rear View/Output, and Input Breakers

2.7.2 Wiring Terminal Blocks
Remove all panel covers and you will see the wiring terminal block for the UPS input/output wiring,

please check below chart and table.

Terminal Block Descriptions

	Item	Function	Description
AC Terminal	Output Block (O/P-L1, O/P-L2, O/P-N)	Connects the critical loads	Includes L1, L2 and Neutral terminals.
	AC Input Block (L1, L2, N)	Connects main AC source	Includes L1, L2 and Neutral terminals.
	For UPS Grounding (PE)	For UPS grounding	Includes one grounding terminal - PE.
DC Terminal	DC Terminal Block (BAT+, BAT-N, BAT-)	Connects an external battery pack	Includes Positive (+), Negative (-) and Neutral (N) terminals.
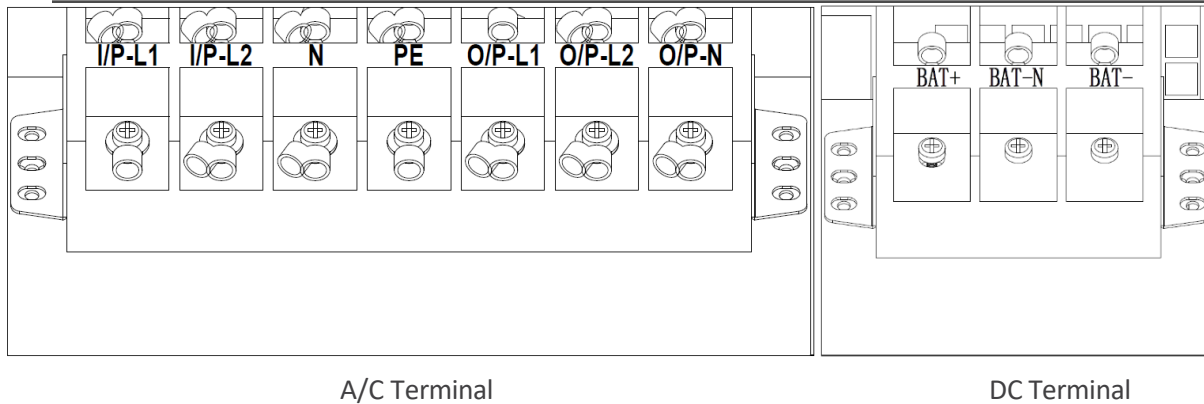
A/C Terminal   DC Terminal

2.8 Power Cable
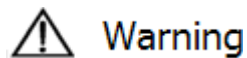
⚠ **Warning**

Please follow the local wiring regulations. Follow environmental conditions and refer to IEC60950-1.

2.8.1 AC input and output maximum current, recommended OCPD, and power cable configuration.

AC Input

Model	6KVA	12KVA	18KVA	24KVA
Current (A)	35	71	106	141
Recommended OCPD	45	90	130	175
Power cable AWG (mm2)	8 (4)	6 (10)	4 (21)	2 (35)
Torque force (lb-in)	20	20	20	20

AC Output

Model	6KVA	12KVA	18KVA	24KVA
Current (A)	28.9	57.7	86.6	115.4
Recommended OCPD	40	75	110	150
Power cable AWG (mm2)	8 (4)	6 (10)	4 (21)	2 (35)
Torque force (lb-in)	20	20	20	20

2.8.2 DC input maximum current and power cable configuration.

Model	6KVA	12KVA	18KVA	24KVA
Current (A)	41.6	83.2	124.8	166.3
Power cable AWG (mm2)	6 (10)	4 (16)	2 (33)	1/0 (50)
Torque force (lb-in)	20	20	20	20

Warning:

1. One standard battery module contains 16 pcs of 12V 580W batteries (8 pcs Pos+/8pcs Neg-). One battery module is capable of supplying enough current for two power modules. You must install at least one battery module per two power modules. You may install a maximum of 8 battery modules per power module.

2.9 Wiring

WARNING:
- Before wiring, make sure the AC input and battery power are completely cut off.
- Make sure the breakers, including AC input breaker, AC output breaker and DC breaker, are all in the OFF position.
- If installing two slot chassis please ensure chassis is installed in rack before wiring is installed. (Refer to section 2.11).

2.9.1   Installation Drawing
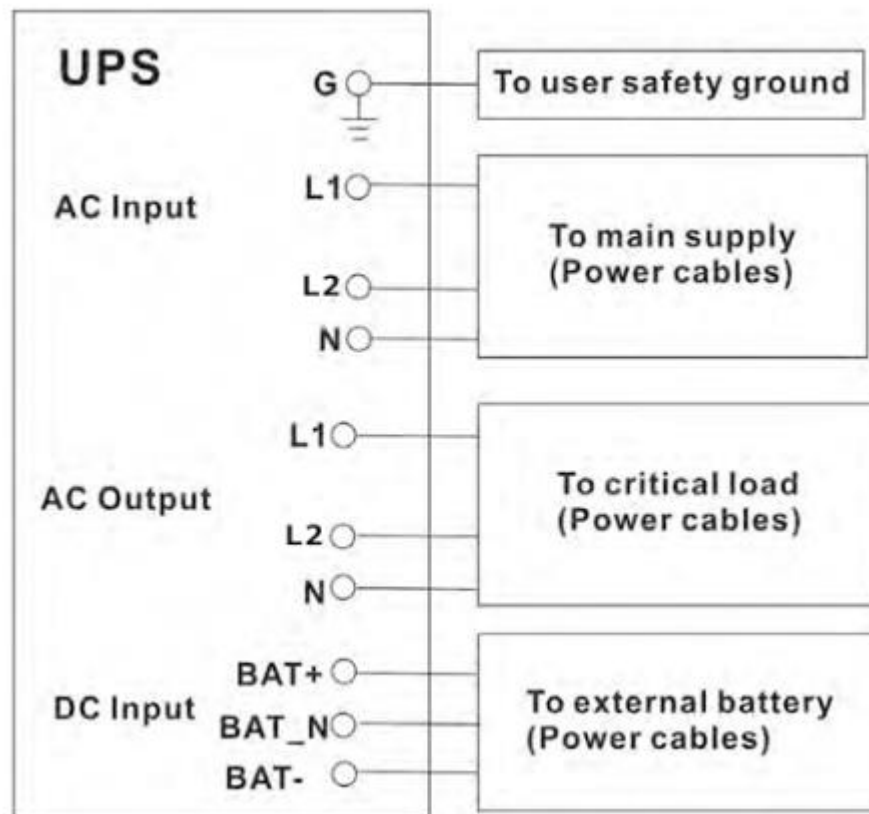
UPS Chassis Wiring

2.9.2   AC source connection

Connect AC input to the AC power source. Please refer to Installation Drawing for UPS wiring.
The polarity of two phase (L1 phase and L2 phase) are not critical. The wrong polarity will not cause an alarm for UPS system when the UPS is powered.
The Neutral wire must be connected properly. A warning message will be indicated if the Neutral wire is not connected properly. The UPS will show warning message as "Warning! Bypass Input N Error". Then the UPS will transfer to battery mode if battery pack is connected or transfer to standby mode and no output if no battery pack is connected.

2.9.3   External Battery Pack Connection
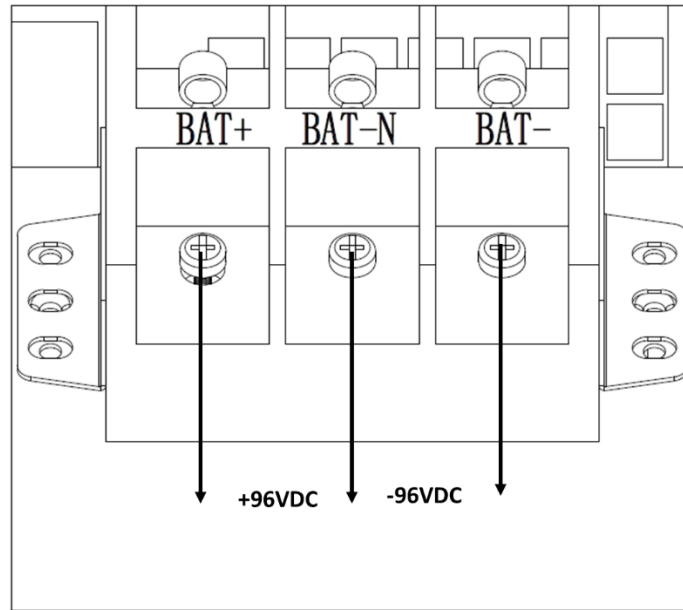
After the battery pack is completely installed, be sure to set up nominal battery voltage, battery capacity and maximum charging current in LCD setting. Otherwise, if battery setting is different from actual installation, the UPS will keep alarming. Please refer to section 5.1.2 battery setting list for details.

2.10 2 Slot Rackmount Chassis Installation

Step 1: Install included rail kits into user supplied rack.
Step 2: Install 2 slot chassis on top of installed rail kit in rack. Secure two slot chassis with included brackets and screws.
Step 3: Install power module into top slot of 2 slot chassis.
Step 4: Install battery module into bottom slot of 2 slot chassis.
Step 5: Connect input and output electrical wiring to terminal block on rear of 2 slot chassis. (Refer to section 2-10)

2.11 Power Module/Battery Pack Installation

2.11.1 Insert the power module

Warning: The power modules installed in the same cabinet must be at the same rating. (1) Insert the power module into an unoccupied slot by two persons.
NOTE: The power module must be inserted into a universal slot.

Universal Slots	
2 Slot Chassis	Upper Slot
4 Slot Chassis	Upper 2 Slots
6 Slot Chassis	Upper 4 Slots
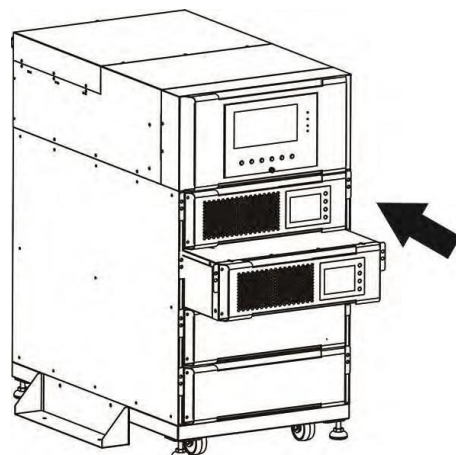
2. Secure the power module to the cabinet with the screws at the front panel of the power module.
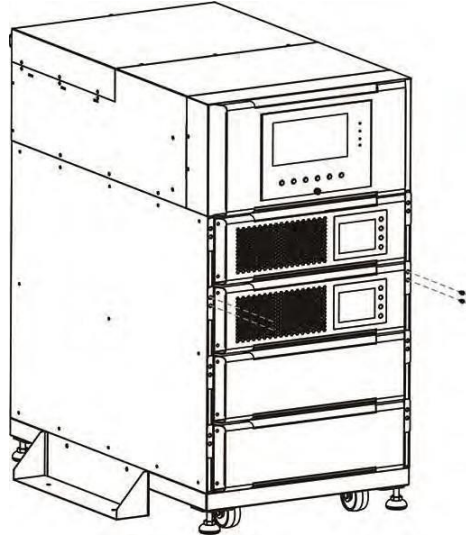
2.11.2 Remove the power module

Warning:
Before removing any power module, make sure the remaining power modules can support the critical loads.
At least one power module MUST stay in the UPS cabinet in case the UPS system is operating in Maintenance Bypass Mode. (1.)

Use a screwdriver to remove the four screws securing the power module to the UPS chassis.

Two people pull out together and remove the power module from its slot.

2.11.3 Battery Module Installation/Removal

Please follow power module installation/removal steps to install and remove battery packs.
    NOTE: Battery modules can be installed in any slot.

3. Control Panel and Power Module LCD Descriptions

3.1 Control Panel

In front panel, there is a control panel to monitor and control the whole system, including LCD display, 4 LED indicators and 6 function keys.
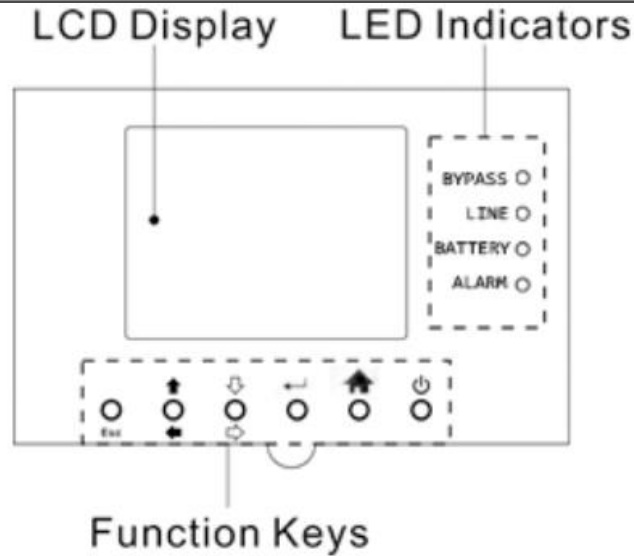
3.1.1 LED Indicators

Mode	BYPASS	LINE	BATTERY	ALARM
UPS Power On	●	●	●	●
Standby mode	○	○	○	○
Bypass mode	●	○	○	○
Line mode / Converter mode	○	●	○	○
Battery mode	○	○	●	○
Fault mode	○	○	○	●
Battery Test mode	○	●	●	○
ECO mode	●	●	○	○

Note:● means LED is lighting, and ○ means LED is off.

3.1.2 Function Keys

Control Key	Description
Esc	- When it is the Main screen, you can enter menu by pressing ESC key. - Return to previous screen, when screen is not in Main screen. - Return to previous value in the same row, so you can change it. For example, when changing 4-digit password, press "Esc" to allow cursor back to previous digit. - Silence alarm by pressing and holding "Esc" for 3 seconds.
(Up) (Left)	Key for menu page navigation or digit modification.
(Down) (Right)	Key for menu page navigation or digit modification.
Enter	Confirmation of commands, or cursor displacement.
Home	Return to Main screen.
⏻ Power On/Off	Turn on UPS or turn off UPS.

3.1.3 Audible Alarm

Audio Type	Description	Can be muted
Power on/off	Buzzer sounds two seconds	No

Bypass Mode	Beeping once every 2 minutes	Yes
Battery / Battery-test mode (normal battery voltage)	Beeping once every 4 seconds	Yes
Battery / Battery-test mode (low battery voltage)	Beeping once every second	Yes
Fault	Beeping continuously	Yes
Warnings (except overload)	Beeping once every second	Yes
Overload	Beeping once every second	No

3.2 Power module

Each power module is shipped with its own package. It has to be installed during the whole system installation. The capacity of each power module is 6kVA/6kW. It includes a power factor
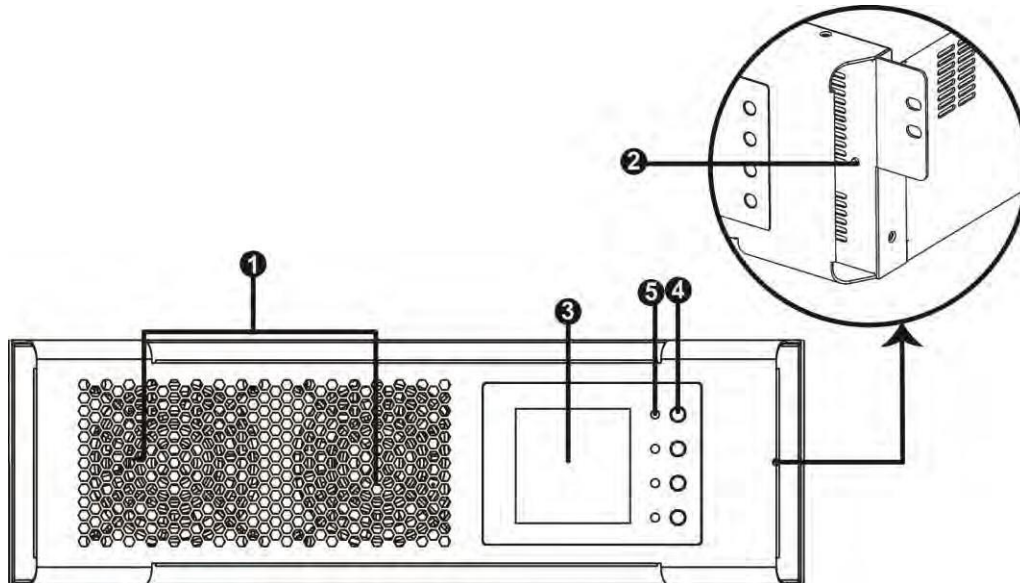
correction rectifier, a battery charger, an inverter, a static bypass circuit and control circuit.

No.	Item	Description
1	Fan	The power Module uses forced convection cooling by these fans. Cooling air enters the module through ventilation grills and exhalation exhausts through grills located at the rear of the module. Please do not block the ventilation area.
2	Battery Start Button	When AC input is not available, use this button to start battery power for UPS.
3	LCD display	There is an LCD display on the power module. It can show the power module information.
4	Function Keys	There are four function keys in the power module. They can control and monitor the single power module. Please refer to function key table for the details.

5	LED indicators	There are four LED indicators to show power module working status. Please refer to LED indicator table for the details.
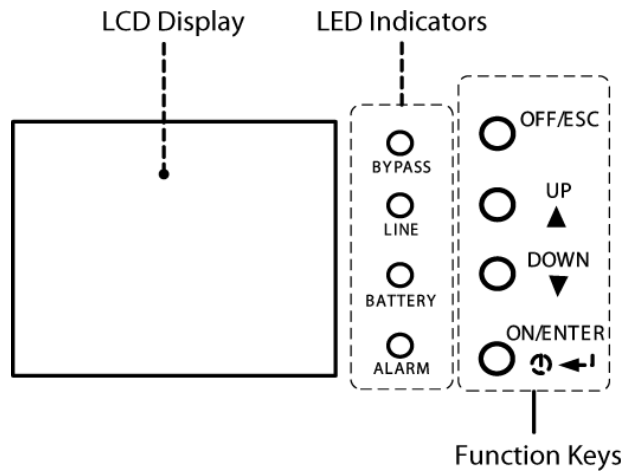
Power Module Interface Display

3.2.1 LED indicators for Power module

LED Mode	BYPASS	LINE	BATTERY	ALARM
UPS Power On	●	●	●	●
Standby mode	○	○	○	○
Bypass mode	●	○	○	○
Line mode / Converter mode	○	●	○	○
Battery mode	○	○	●	○
Fault mode	○	○	○	●
Battery Test mode	○	●	●	○
ECO mode	●	●	○	○

Note: ● means LED is lit, and ○ means LED is off.

3.2.2 Power Module Function Key Descriptions

Control key	Press this button to turn on the power module. Or press it to confirm the selection in the menu.
ON/ENTER	Press this button to turn on the power module. Or press it to confirm the selection in the menu.
OFF/ESC	Press this button to turn off the power module. Or press it to return to the last menu.
UP	Press this button to select the previous item in the menu. Or press this button to jump to previous page in the screen. Or press this button to increase the number in the setting.
DOWN	Press this button to select the next item in the menu. Or press this button to jump to next page in the screen. Or press this button to decrease the number in the setting.

UP + DOWN	To allow LCD display to rotate 90 automatically, press these two buttons at the same time.

3.3 UPS System Functional Description

The modular and hot-swappable design of power modules makes it a highly cost-effective solution to meet your power requirement. The number of power modules installed in the UPS Chassis can be based on the initial needs. Once the power requirement increases, you can easily install more power modules without interrupting the operation of the system.
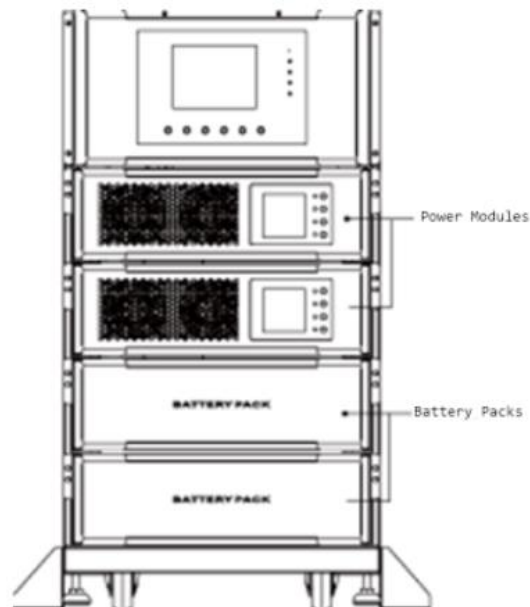
3.3.1 Operation Mode
This modular UPS is a two-phase, three wire on-line, double-conversion and reverse-transfer UPS that permits operation in the following modes:

- Standby Mode
- Line Mode
- Battery Mode
- Bypass Mode
- ECO Mode
- Shutdown Mode

3.3.2 Standby Mode
Upon connecting to utility input power, the UPS is in Standby mode before UPS is turned on (if BYPASS enable setting is Disabled), and charger function will be active when the battery is present. The load is not powered under this mode.
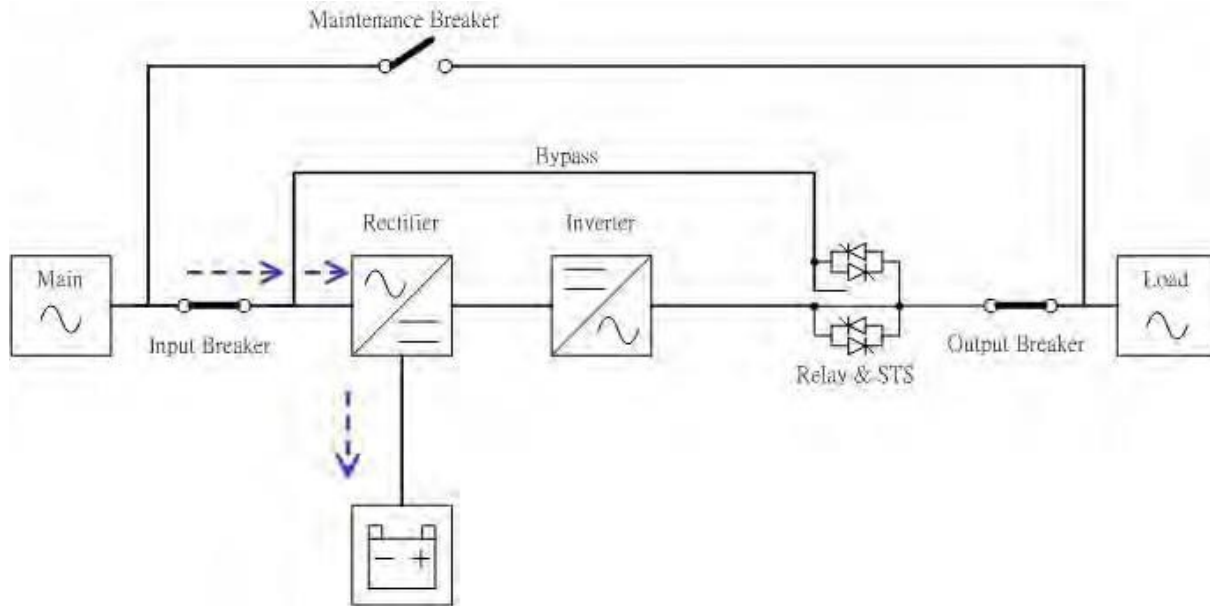
Standby Mode Diagram

3.3.3 Line Mode
In Line Mode, the rectifier derives power from the utility power and supplies DC power to the inverter and the charger charges the battery. The inverter filters the DC power and converts it into pure and stable AC power to the load.
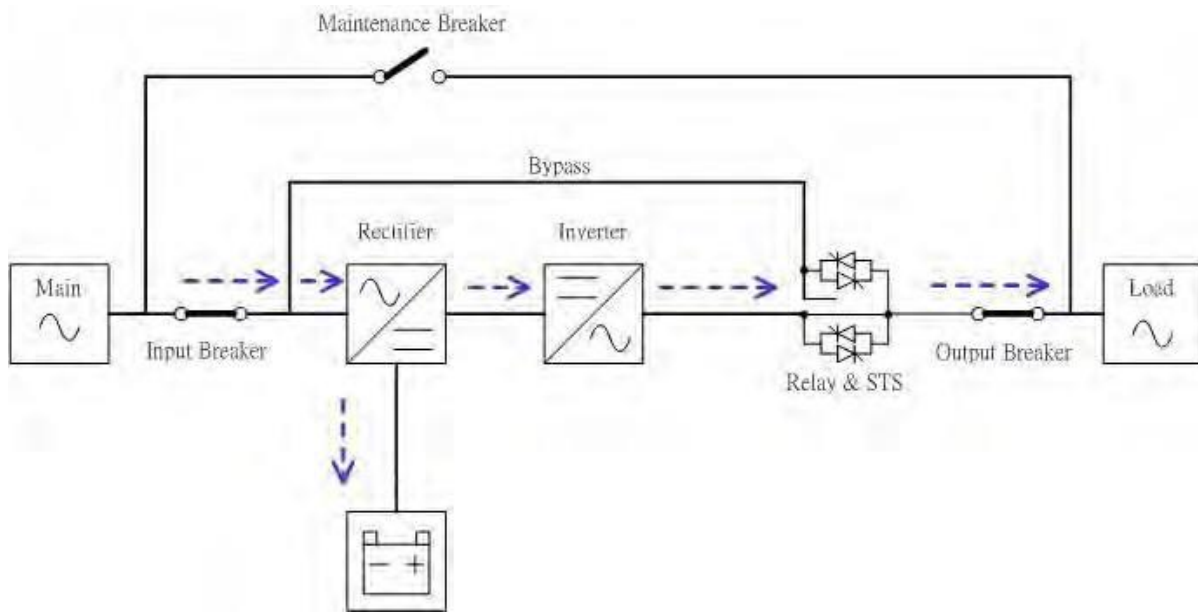
Line Mode Diagram

3.3.4 Battery Mode

The UPS automatically transfers to Battery mode if the utility power fails. There is no interruption in power to the critical load upon failure. In battery mode, the rectifier derives power from the battery and supplies DC power to the inverter. The inverter filters the DC power and converts it into pure and stable AC power to the load.
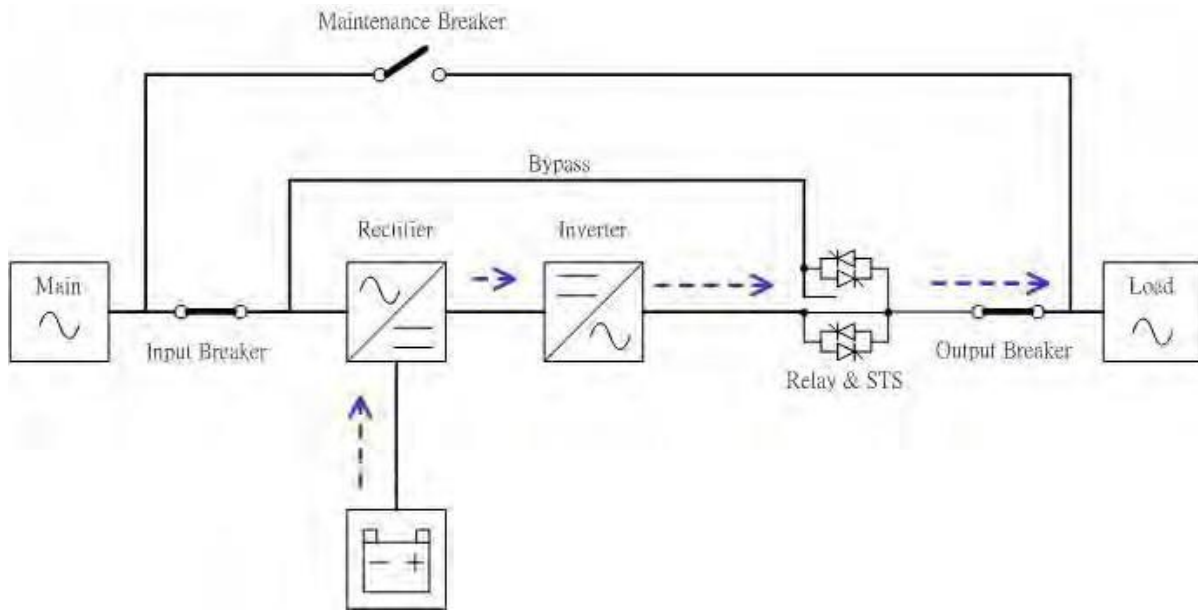
Battery Mode Diagram

3.3.5 Bypass Mode
Upon connecting to utility input power, the UPS is in Bypass mode before UPS is turned on (if BYPASS enable setting is Enabled), and charger function will be active when battery is present. After UPS has been turned on, if the UPS encounters abnormal situations (over-temperature, overload …, etc.), the static transfer switch will perform as a transference of the load from the inverter to the bypass source with no interruption. If the transference is caused by a recoverable reason, the UPS will turn back to line mode when abnormal situation is solved.
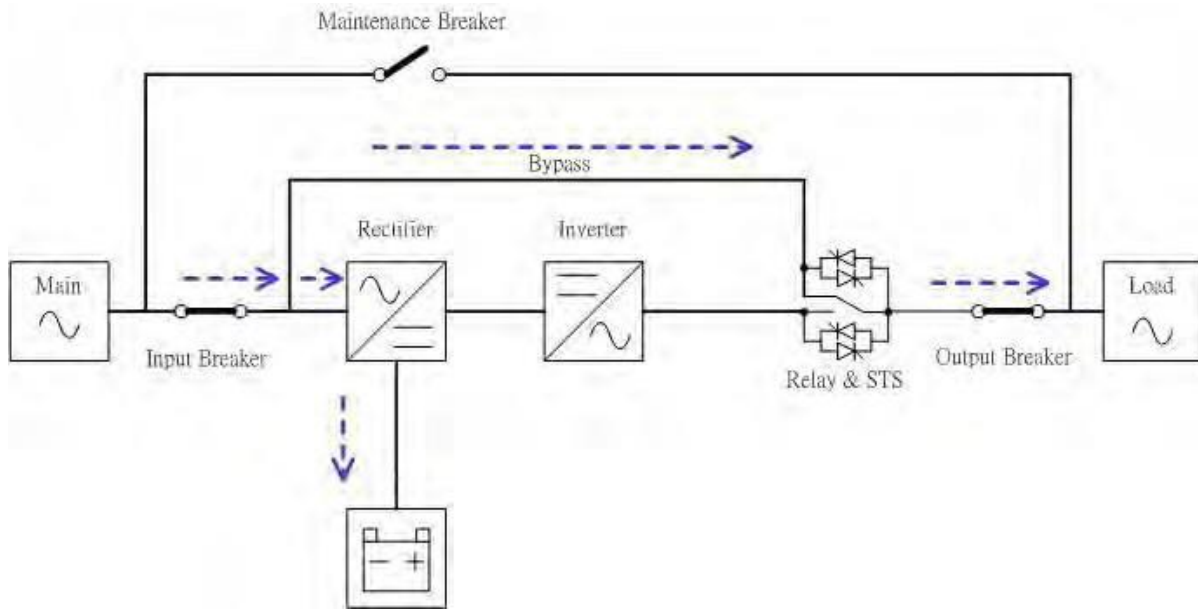
Bypass Mode Diagram

3.3.6 ECO Mode
The ECO Mode is enabled through the LCD setting menu. In ECO mode, the load is powered by bypass when the bypass voltage and frequency are within the acceptable ranges. If the bypass is out of range, the UPS will transfer

the power source of load from bypass to inverter. In order to shorten the transfer time, the rectifier and inverter are working when the UPS is in ECO mode.
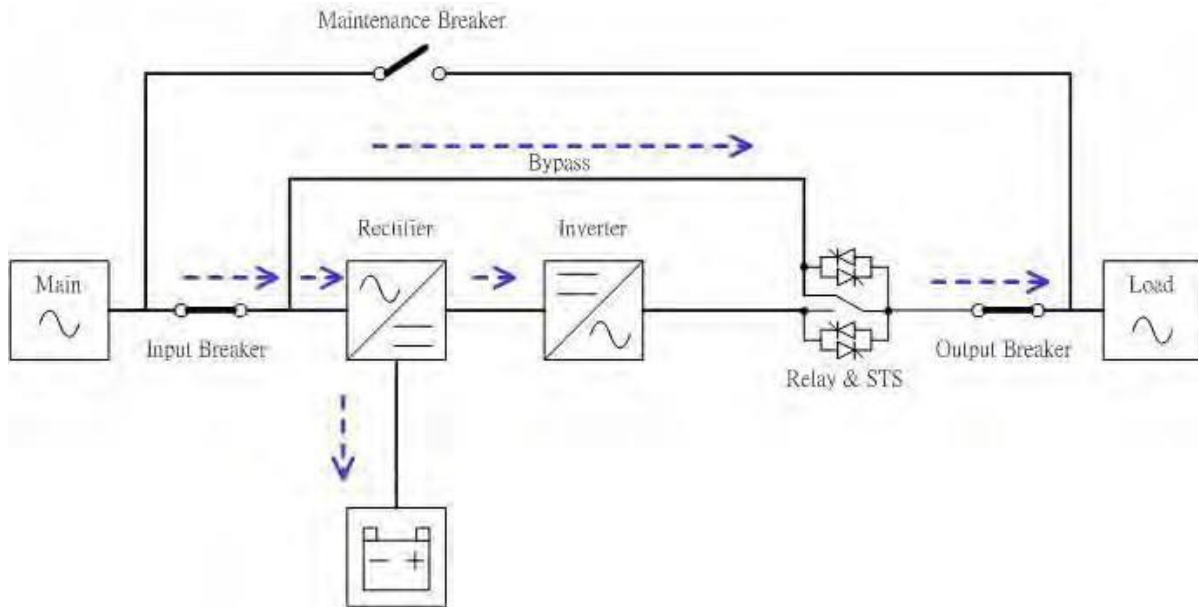
ECO Mode Diagram

3.3.7 Shutdown Mode

When the UPS is in the off state and the utility power source is absent, the UPS will enter into shutdown mode. Or when the UPS has discharged the battery to the cut-off level, the UPS will enter into shutdown mode as well. When the UPS enters this mode, it is going to shut off the control power of UPS. The rectifier, charger and inverter are all in off state.
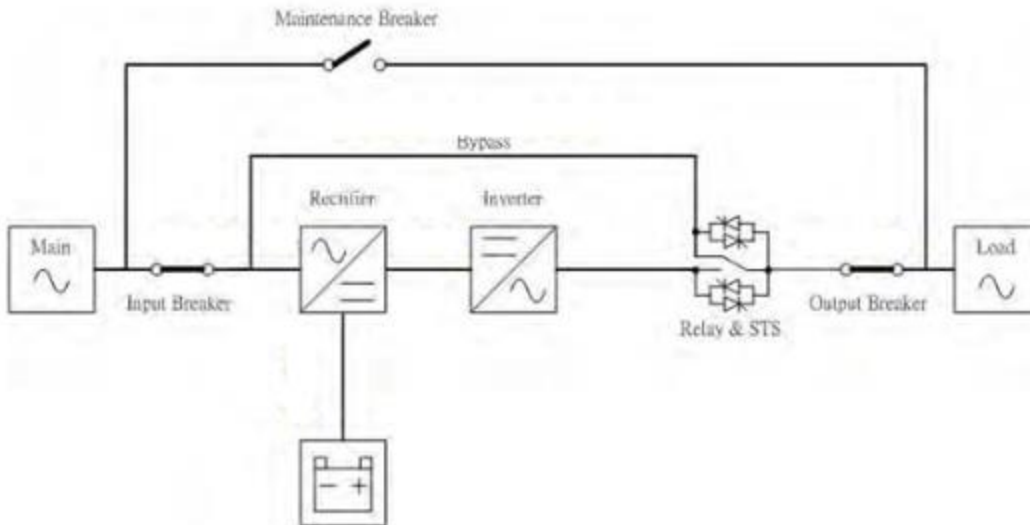
Shutdown Mode Diagram

4. Operation

- Do not start the UPS until the installation is completed.
- Make sure the wiring is correct and the power cables are properly connected.
- Make sure all the breakers are switch OFF.

4.1 AC Startup

Ensure to follow this procedure when turning on the UPS from a fully powered-down condition.

The operating procedures are as follows:

Step 1: Refer to the "Installation Section" to connect the power cables and install the Power Modules and the battery required for the UPS system.

Step 2: Switch ON the battery breaker on the External Battery Pack if installed.

Step 3: Switch ON the external power switch to power the UPS.

Step 4: Switch ON the input breaker (Q1). The UPS will enter into Standby Mode, if the setting of Bypass mode is disabled (default).
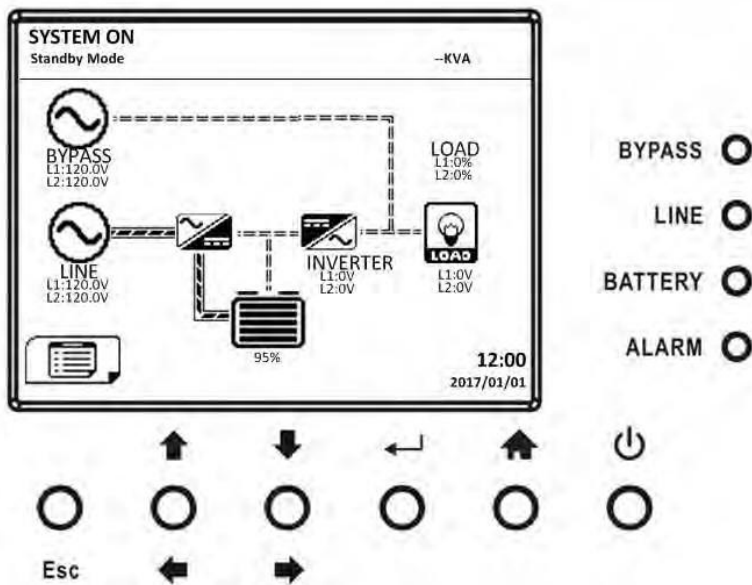
Or the UPS will enter into Bypass Mode, if the setting of Bypass mode is enabled.
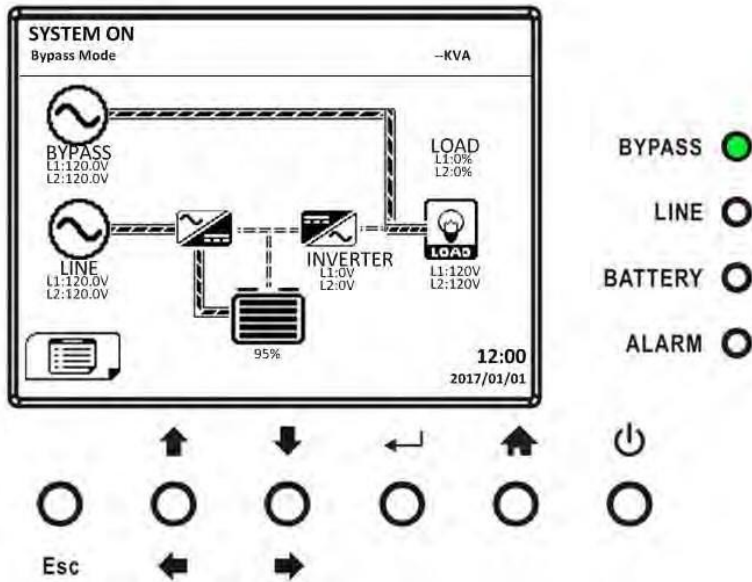
 Step 5: Make sure there is no warning or fault event happening. If there is, please refer to Chapter 6 Troubleshooting to solve it.
Step 6: Press Power ON/OFF button for two seconds to enter into Line Mode as shown below.
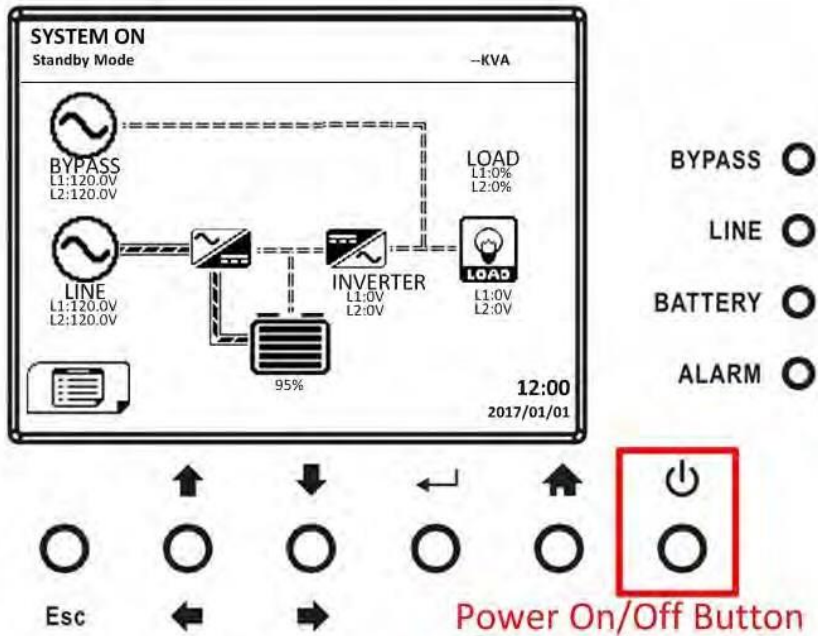
After turned on, UPS will do self-test and start Inverter up. UPS will be transferred to Line mode when all power modules are ready.
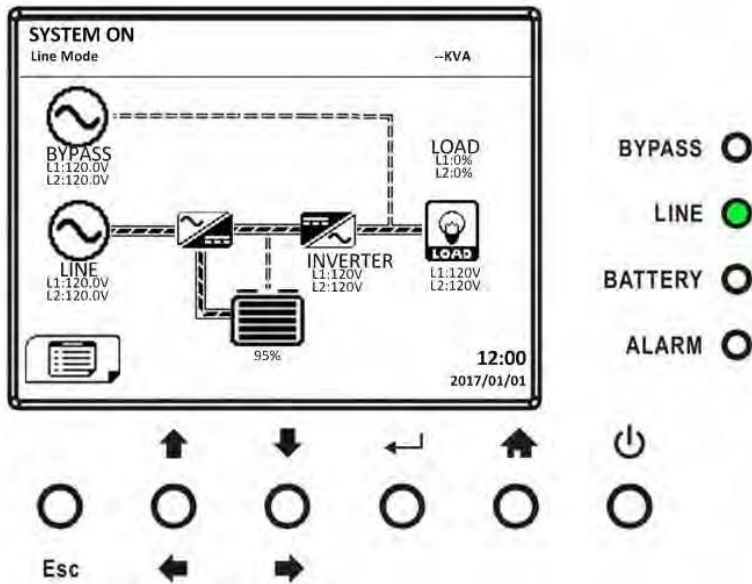
Step 7: Switch ON the output breaker. AC startup procedure is complete.

4.2 Cold Start Startup (Start up with no AC Power pressed)

Step 1: Insert battery pack to 19U mini rack system.
Step 2: Press the "Battery Start" button on each power module to start up the control power of all power modules as shown below.

Battery Start Button
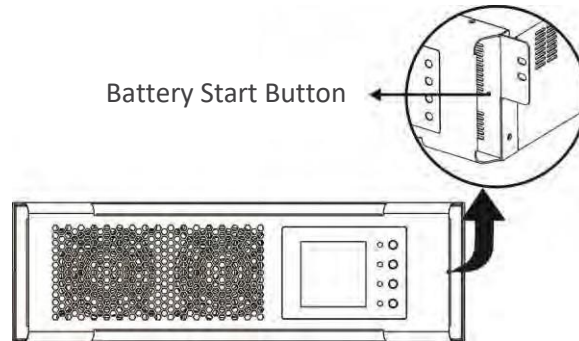
Step 3: Press the "Battery Start" button on communication module to start up the power as shown below.
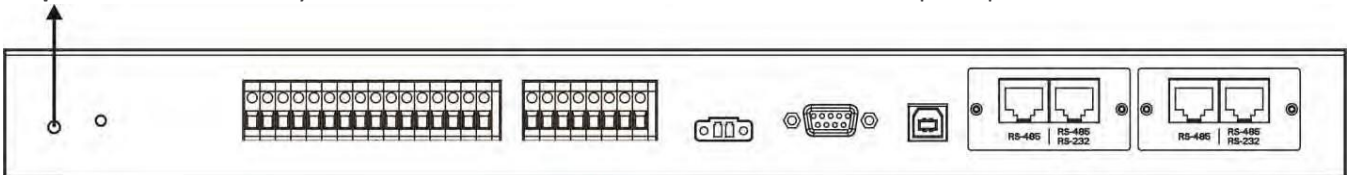
Step 4: After pressing the "Battery Start" button, UPS will enter into Standby mode. Refer to the diagram below for LCD display.
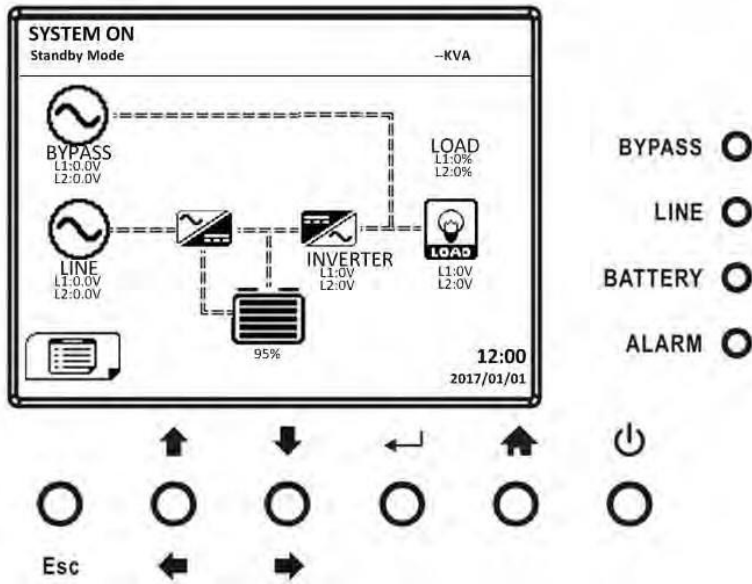
Step 5: Before UPS enters into shutdown mode, please press "Power On/Off" button for 2 seconds immediately as shown in the diagram below
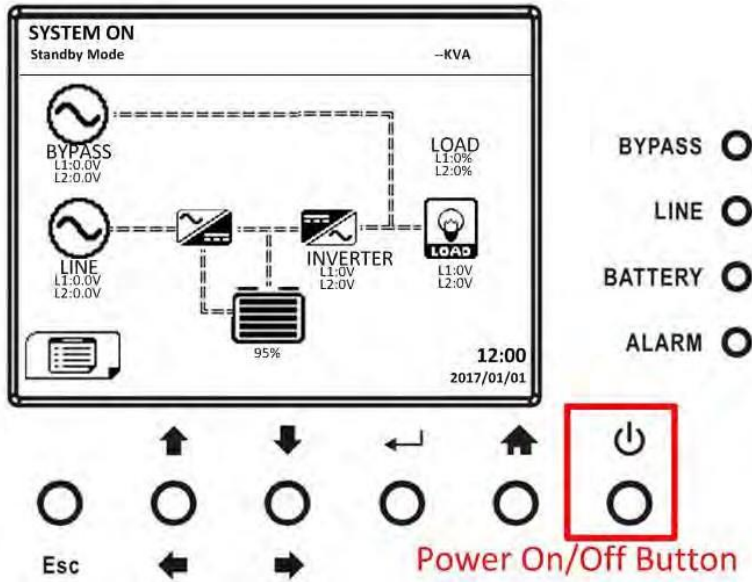
Step 6: UPS will enter Battery Mode as shown in the diagram below.
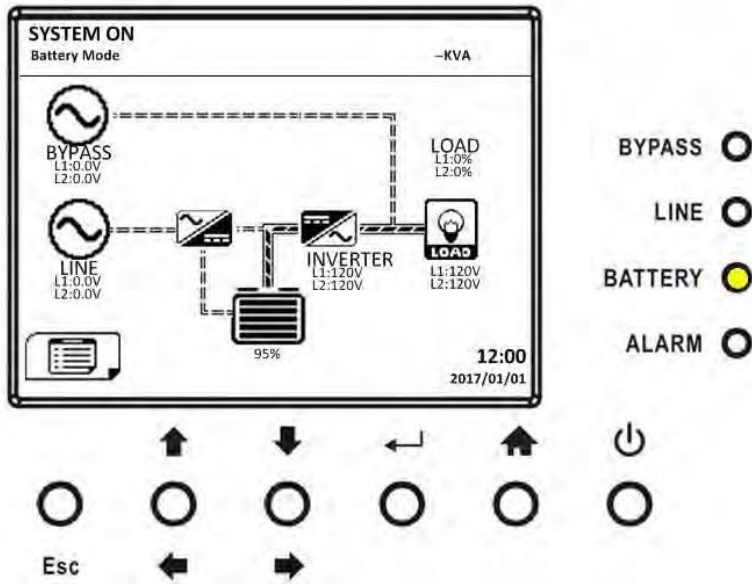
Step 7: Switch ON the output breaker. Cold start startup procedure is complete.
Follow the instruction to transfer to Maintenance Bypass and UPS protection as below.

4.3 Turn off Operation

4.3.1 Bypass Mode/ Standby Mode Turn Off Operation
The UPS operates in the Standby Mode or Bypass Mode depending on the "Bypass Mode" Setting.
The LCD diagrams are shown below.

Bypass Mode Setting is Disabled	Bypass Mode Setting is Enabled
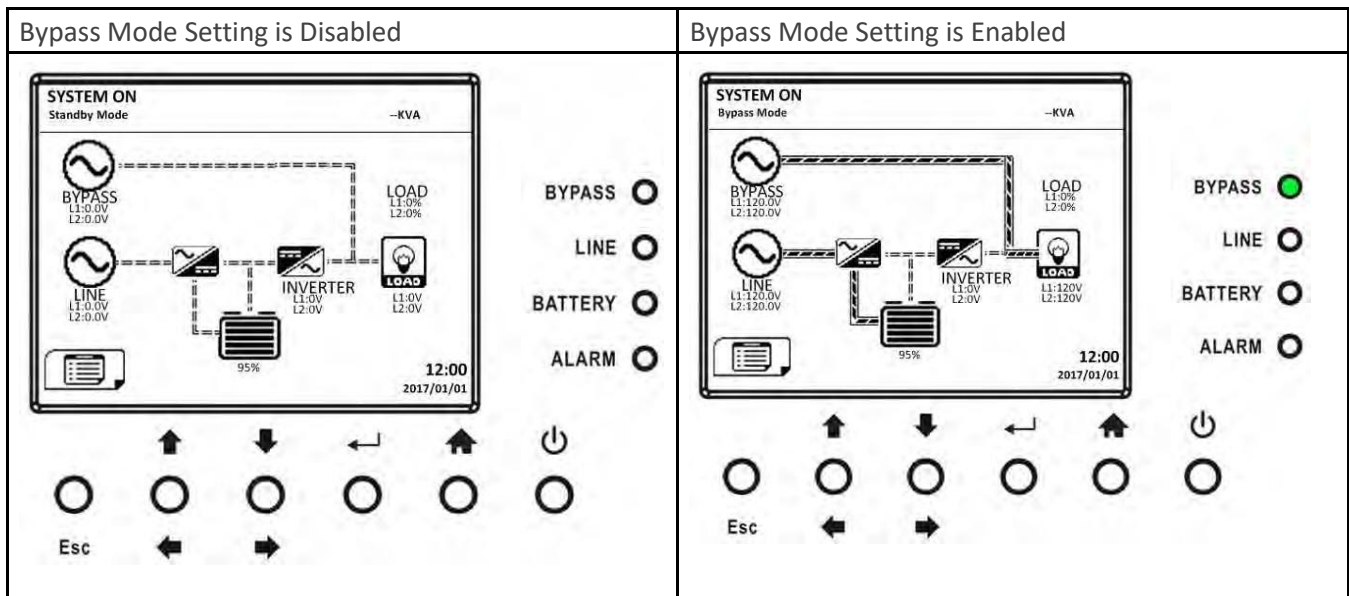
Step 1: Switch OFF the AC input breaker. The LCD diagrams are shown below. Wait until the LCD is OFF.

Bypass Mode Setting is Disabled	Bypass Mode Setting is Enabled
UPS enters Shutdown Mode	UPS enters Standby Mode
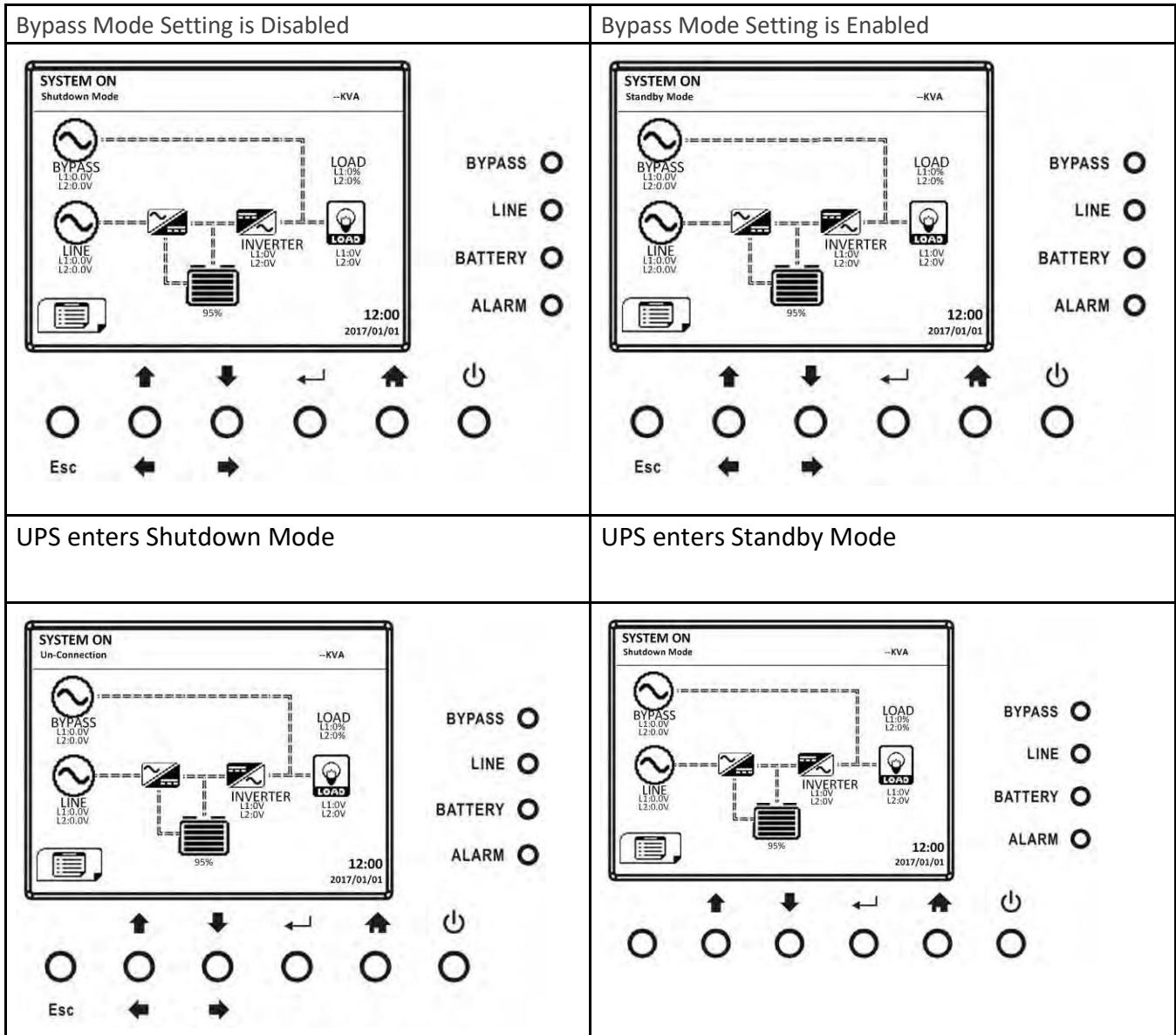
It is normal to show "Un-Connection" screen when power modules have shut off their control power.	UPS enters Shutdown Mode.
	It is normal to show "Un-Connection" screen when UPS modules have shut off their control power.
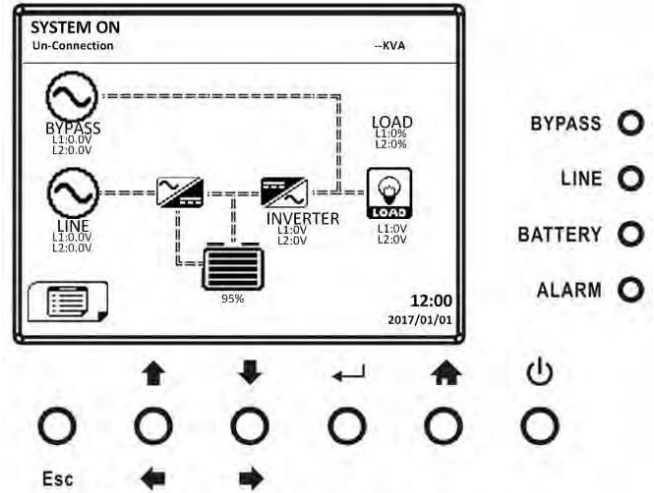
4.3.2   Line Mode Turn Off Operation

The LCD diagrams are shown below when the UPS operates in the Line Mode.
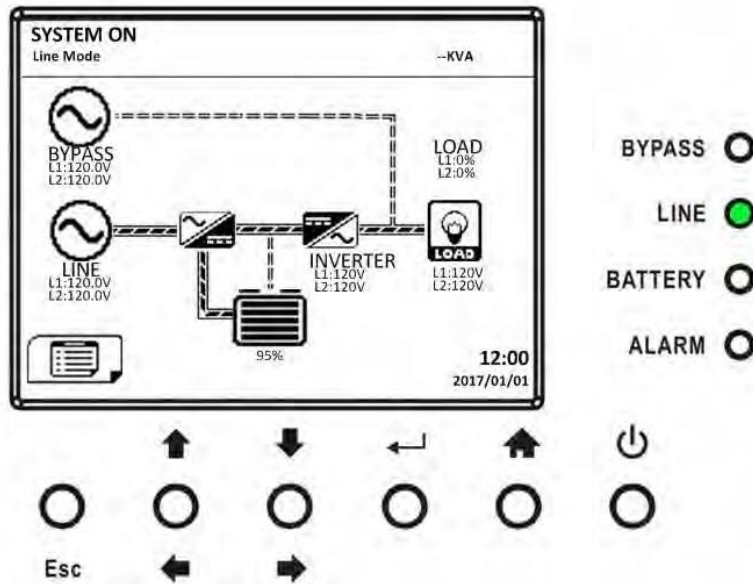
Press "Power On/Off" button for 2 seconds to turn off the UPS. Or use the Menu-Control-System Turn Off to turn off the UPS.
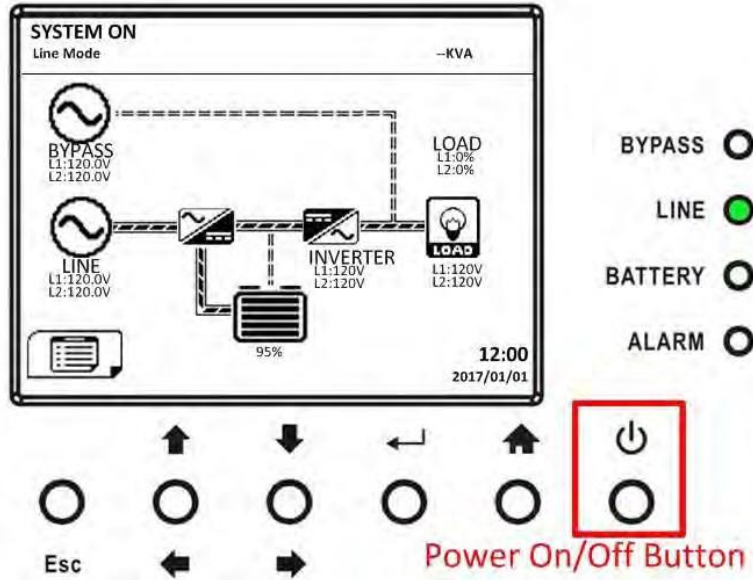
After turning off, the UPS will transfer to Standby Mode or Bypass Mode depending on the "Bypass Mode" Setting.

Next, follow the Bypass Mode/ Standby Mode Turn Off Operation procedure.

4.4 Battery Mode Turn Off Operation

The LCD diagram is shown below when the UPS operates in the Battery Mode.
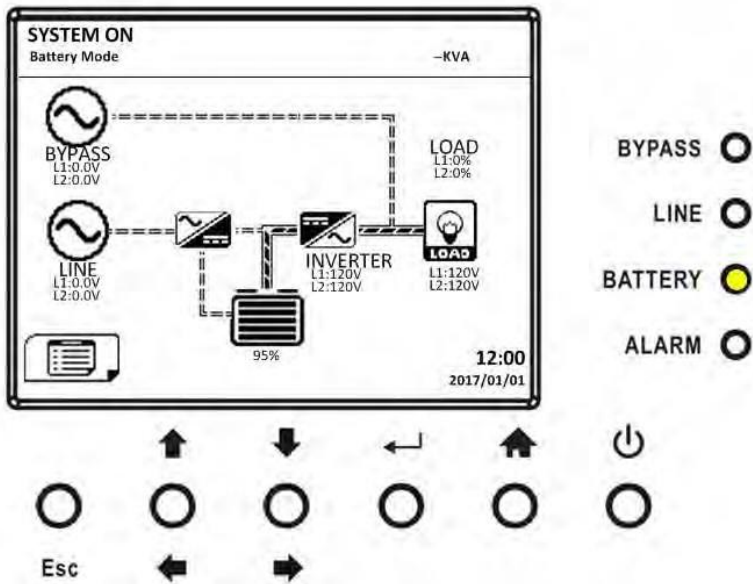
Press "Power On/Off" button for 2 seconds to turn off the UPS. Or use the Menu-Control-System

Turn Off to turn off the UPS.
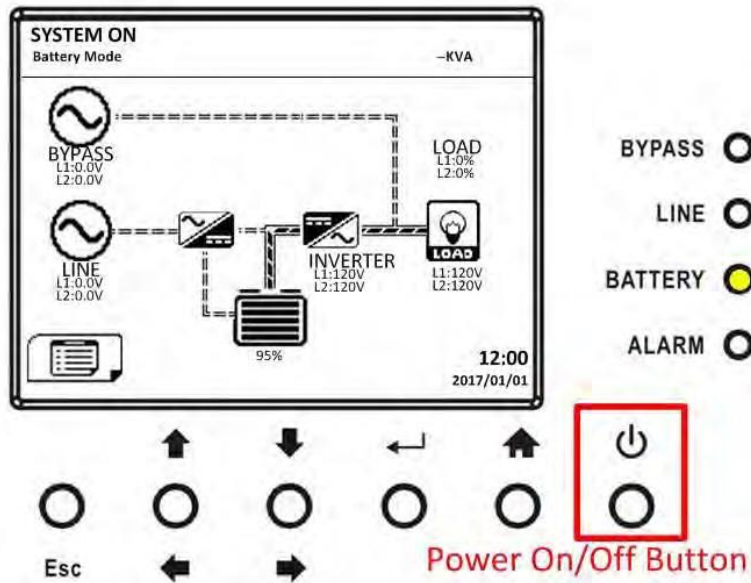
After turning off, the UPS will transfer to Standby Mode.
Next, follow the Bypass Mode/ Standby Mode Turn Off Operation procedure.

4.5 Maintenance Bypass Switch Operation

4.5.1 Transfer to Maintenance Bypass
Step 1: Pull the outside edges of the LCD Display panel housing out and down to gain access to the maintenance bypass switch.
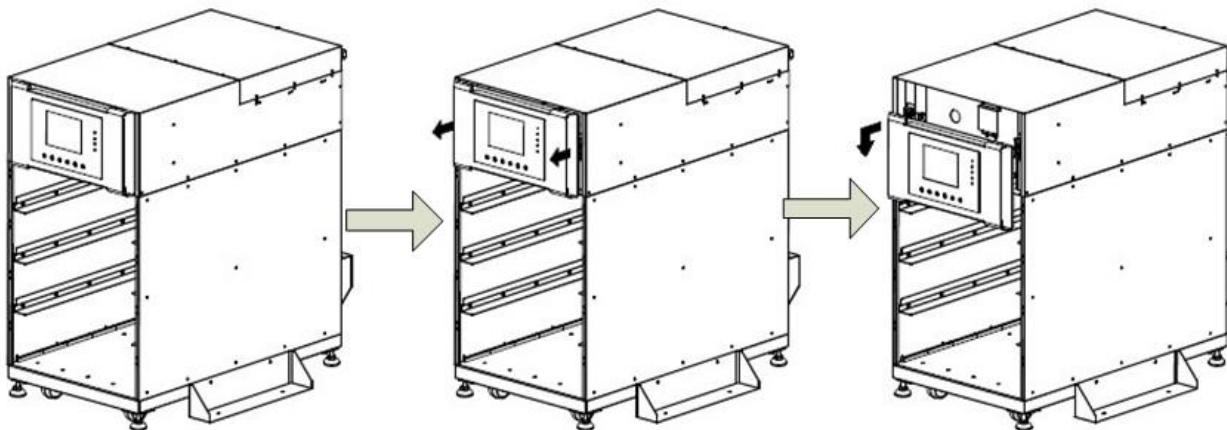
Step 2: Remove the MBS small metal cover with 2 screws:
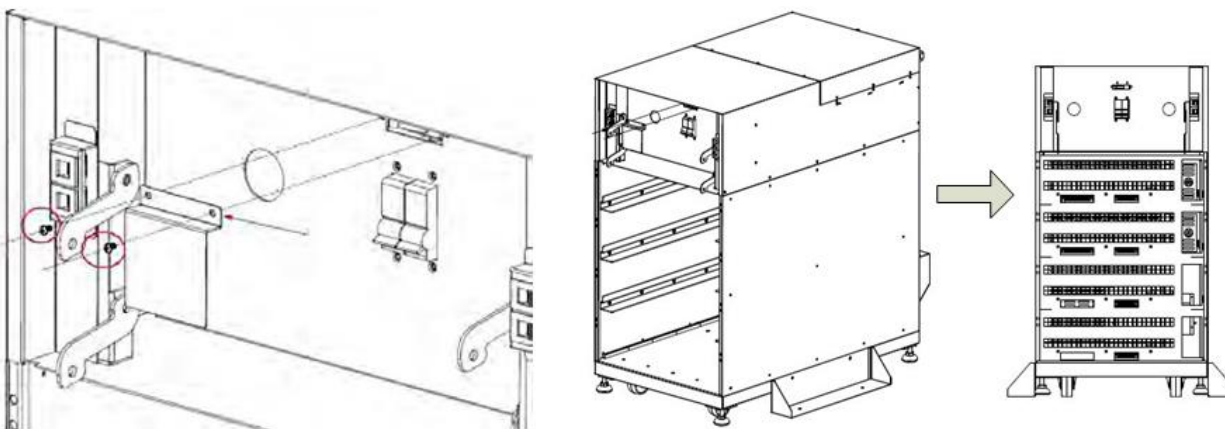
Step 3: Make sure the UPS is operating in static Bypass mode.
Step 4: Switch ON the Maintenance Bypass Breaker as shown below:
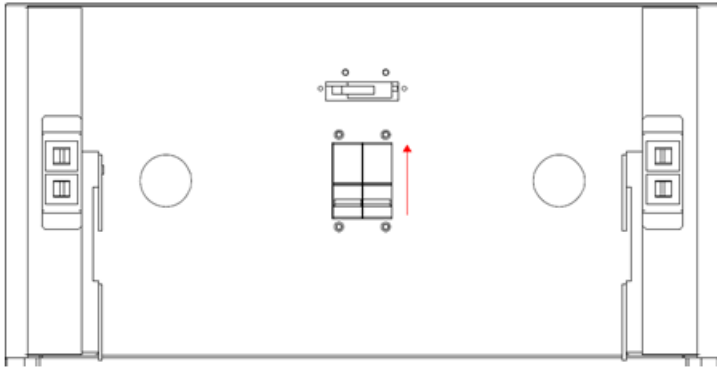
Now it is possible to perform maintenance on the UPS without affecting the load equipment.

4.5.2 Transfer from Maintenance Bypass
Step 1: After the maintenance is completed, make sure all Modules have been installed properly.
Step 2: Please enter LCD SETUP MENU then choose "SYSTEM" to ensure that the "Static Bypass mode" is enabled. If the "Static Bypass mode" is disabled, you have to enable it. Then, exit the SETUP menu and ensure that the UPS operates in static bypass mode.
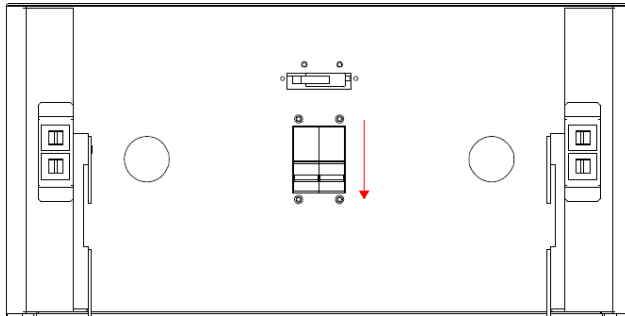
Step 3: Switch OFF the Maintenance Bypass Breaker as shown below:
Step 4: re-insert the 2 screws on the MBS breaker cover. For the four and six slot chassis re-install the LCD display panel housing.

Two slot Chassis

4 and 6 slot Chassis

0
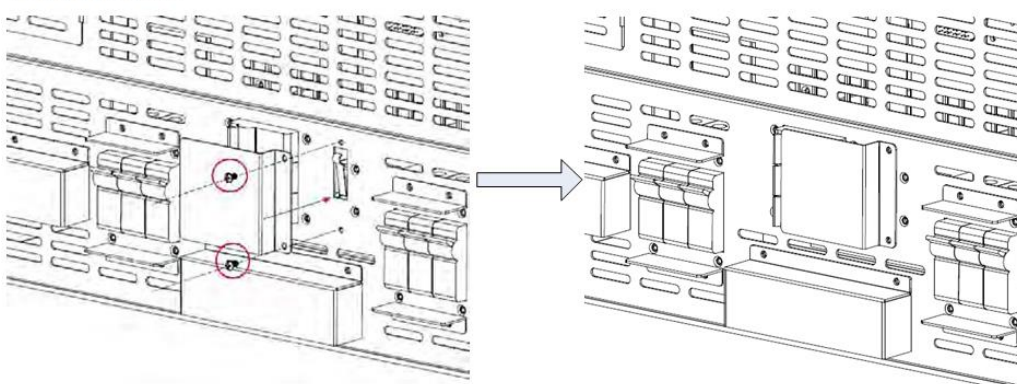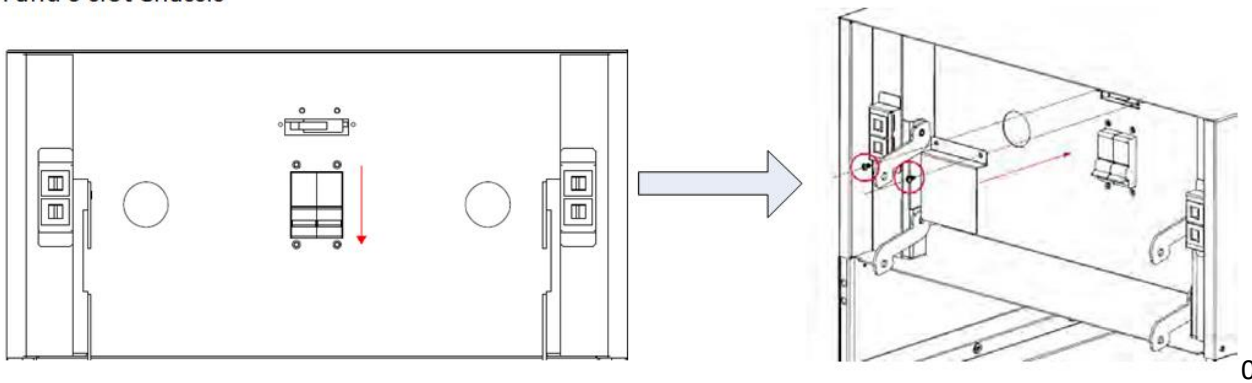
Step 5: Turn on the UPS inverter

5 Control Panel and Display Description

5.1 System 5.7" LCD Screen Description

Upon starting, the UPS executes self-test. The initial screen displays and remains still for approximately 5 seconds as shown in Figure 5-1.
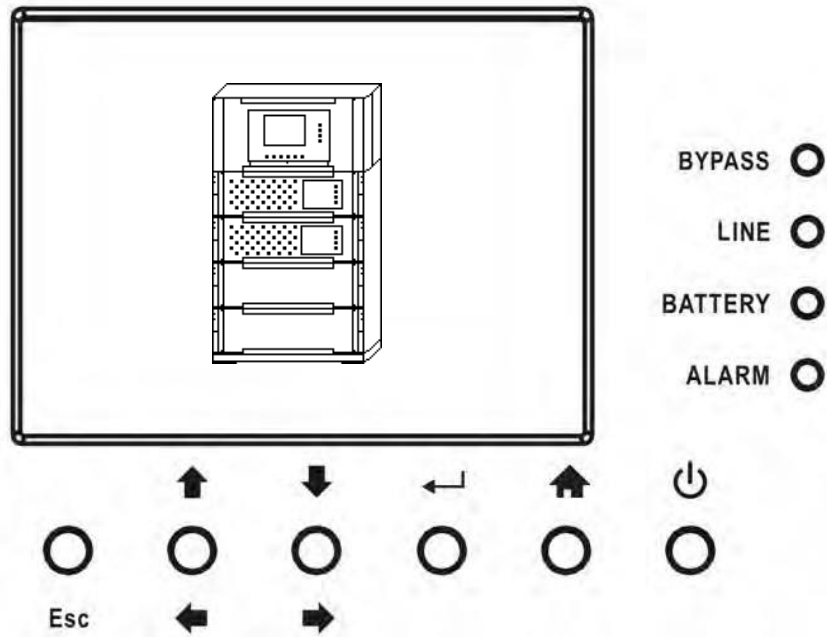
Figure 5-1 Initial screen

- **Main Screen**

After initialization, the main screen will display as Figure 5-2. Main screen is divided into five parts.
(1) UPS Mode: Current operation mode.
(2) UPS Flow Chart: Current flow chart and measurement data.
(3) Menu: Press "Esc" button to enter Menu screen.
(4) UPS model name with power rating. If the power rating followed with (R), it means the UPS system is in redundant configuration.
(5) Date and Time.
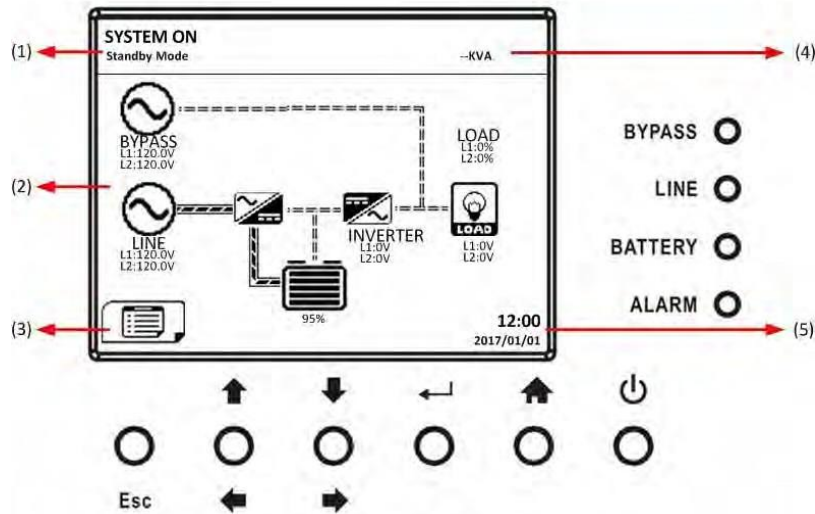
Figure 5-2 Main screen

• **MENU Screen**

In the Main Screen, press "Esc" button to enter the MENU screen
Use " ⬆ " or " ⬇ " buttons to choose different menus, and Press " ↵ " button to enter the sub screen, as shown in Figure 5-3 and 5-4.

Figure 5-3 Menu tree
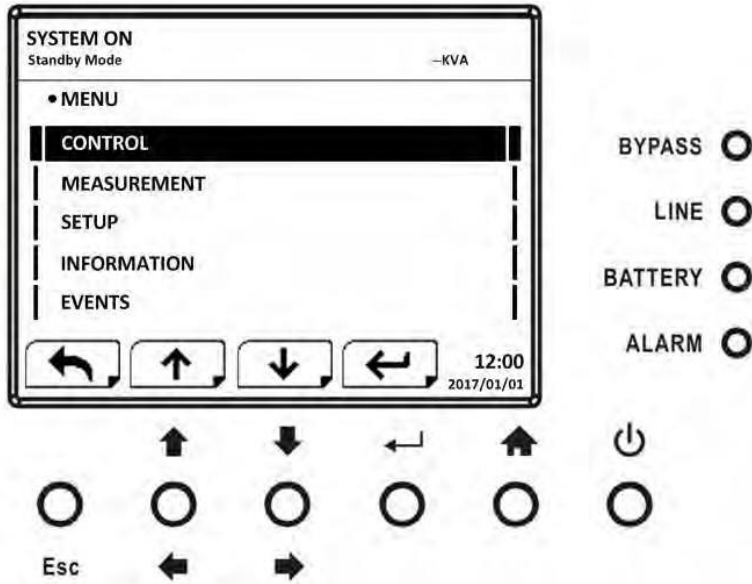
Figure 5-4 Menu screen

- **Control Screen**
  Use "↑" or "↓" buttons to choose CONTROL option, and press "↵" button to enter the submenu, as shown in Figure 5-5, 5-6 and 5-7.
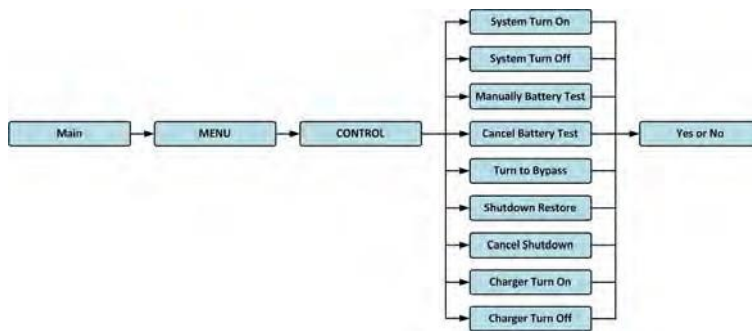
Figure 5-5 Control submenu tree
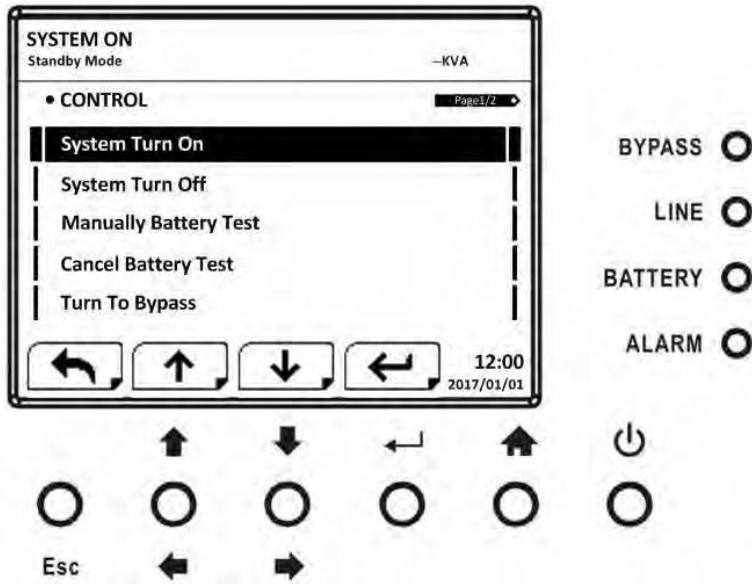
Figure 5-6 Control screen page 1
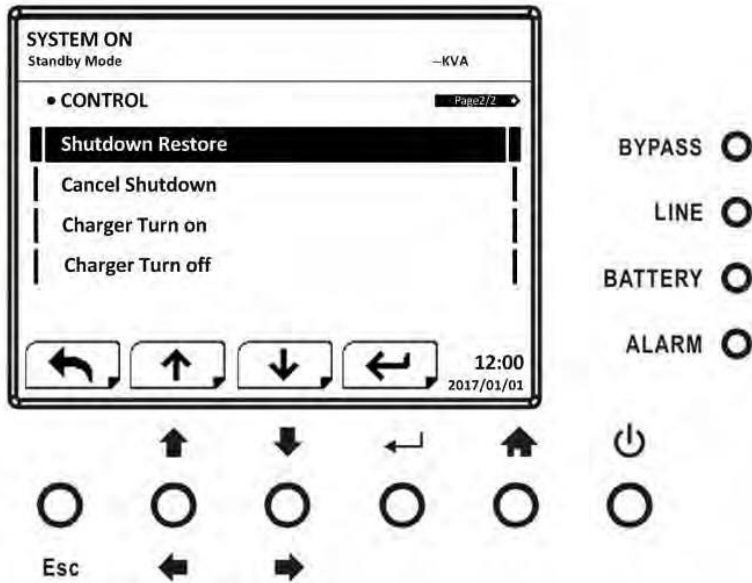
Figure 5-7 Control screen page 2

When the control option is selected by pressing " ⬅ " button, the confirmation screen will pop up. Use " ⬅ " or " ➡ " button to choose " ☑ " (YES) or "X" (NO). Choose " ☑ " and press " ⬅ " button to confirm command or choose "X" to cancel command, as shown in Figure 5-8.
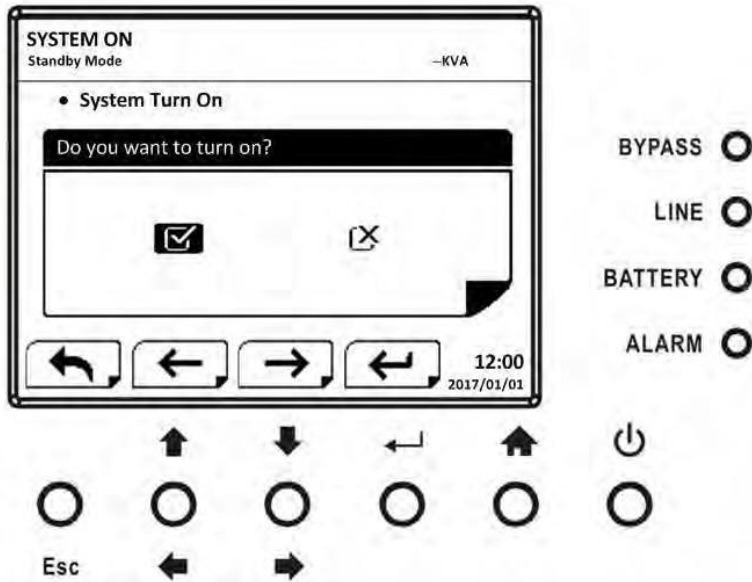
Figure 5-8 Confirmation screen

• **Measurement Screen**

Use "⬆" or "⬇" button to choose MEASUREMENT option, and press "⬅" button to go into the submenu, as shown in Figure 5-9 and 5-10.
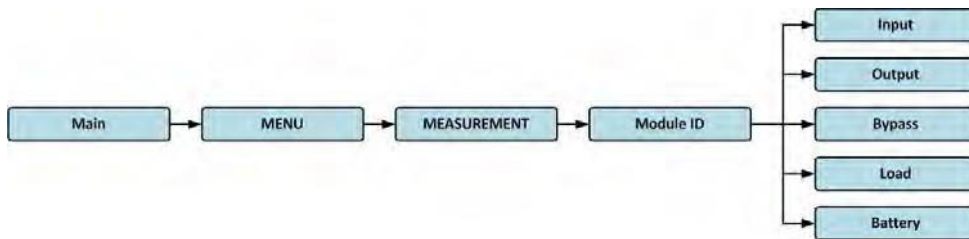
Figure 5-9 Measurement menu
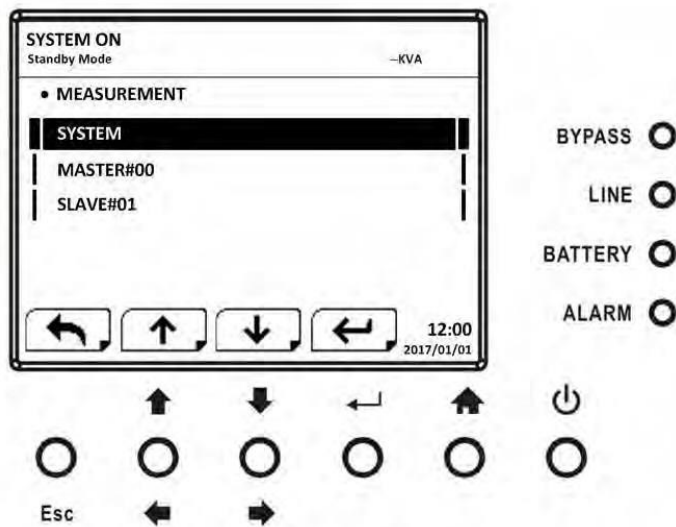
Figure 5-10 Measurement Menu Screen

Use "⬆" or "⬇" button to choose System and UPS module option (MASTER#00 or SLAVE#01). Then, press "⬅" button to go into the submenu, as shown in Figure 5-11.
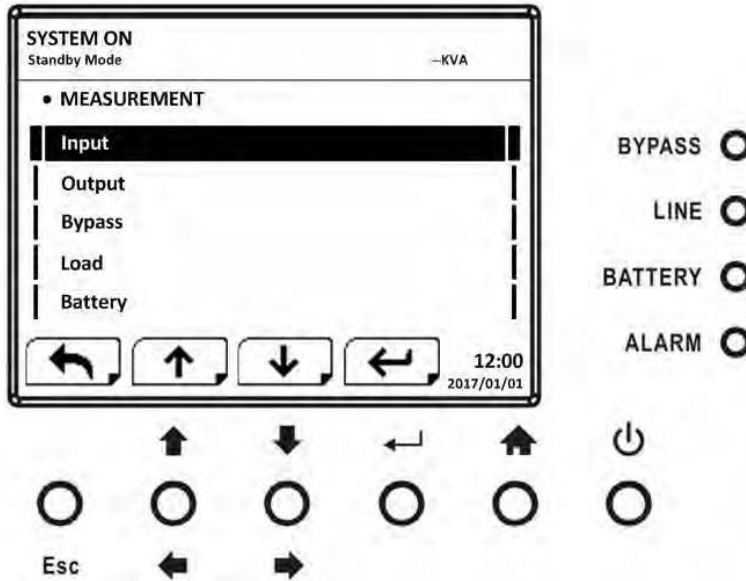
Figure 5-11 Measurement source selection Screen

Use "⬆" or "⬇" button to choose Input, Output, Bypass, Load, and Battery option, and press "⬅" button to go into submenu. The measurement can be read as listed in Table 4-1.

Table 5-1: Measurement data

Menu	Item	Explanation
Input	L-N Voltage (V)	Input phase voltage (L1, L2). Units 0.1V.
	Frequency (Hz)	Input Frequency (L1, L2). Units 0.1Hz.
Output	L-N Voltage (V)	Output phase voltage (L1, L2). Units 0.1V.
	L-N Current (A)	Output phase current (L1, L2). Units 0.1A.
	Frequency (Hz)	Output Frequency (L1, L2). Units 0.1Hz.
	Power Factor	Output Power Factor (L1, L2).
Bypass	L-N Voltage (V)	Bypass phase voltage (L1, L2). Units 0.1V.
	Frequency (Hz)	Bypass Frequency (L1, L2). Units 0.1Hz.
	Power Factor	Bypass Power Factor (L1, L2).
Load	Sout (KVA)	Apparent power (L1, L2). Units 0.01KVA.
	Pout (KW)	Active power (L1, L2). Units 0.01KW.
	Load Level (%)	The percentage of the UPS rating load (L1, L2). Units 1%.

	Positive Voltage (V)	Battery Positive Voltage. Units 0.1V.
	Negative Voltage (V)	Battery Negative Voltage. Units 0.1V.
	Positive Current (A)	Battery Positive Current. Units 0.1A.
	Negative Current (A)	Battery Negative Current. Units 0.1A.
	Remain Time (Sec)	Battery run time remaining. Units 1Min.
	Capacity (%)	The percentage of the capacity of the battery. Units 1%.
Battery	Test Result	Battery test result
	Charging Status	Battery charging status
	Temperature1(°C)	Internal temperature of UPS System. Units 0.1°C.
	Temperature2(°C)	Battery cabinet temperature of extra communication card T1. Units 0.1°C.
	Temperature3(°C)	Battery cabinet temperature of extra communication card T2. Units 0.1°C.

- **Setup Screen**

Use "⬆" or "⬇" button to choose SETUP options. It's required to enter password to access GENERAL, SYSTEM, BATTERY and PRE-ALARM sub-menus, as shown in Figure 5-12.
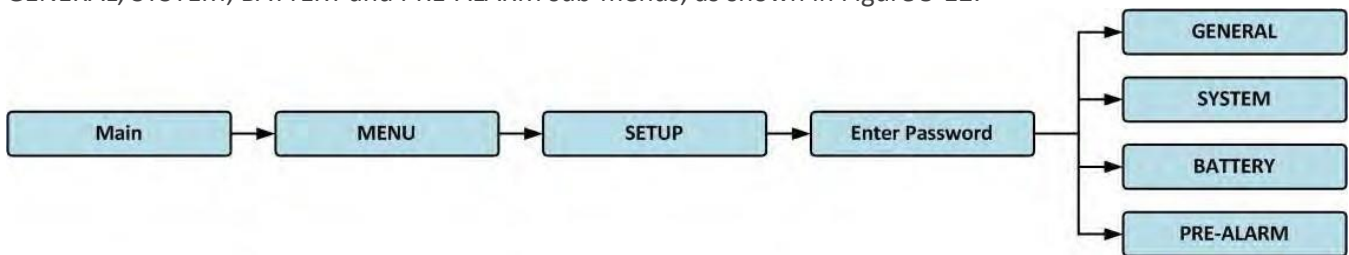
Figure 5-12 Setup menu

When the SETUP option is selected by pressing " ⬅ " button, it will pop up a screen requesting to enter password will pop up, as shown in Figure 5-13.
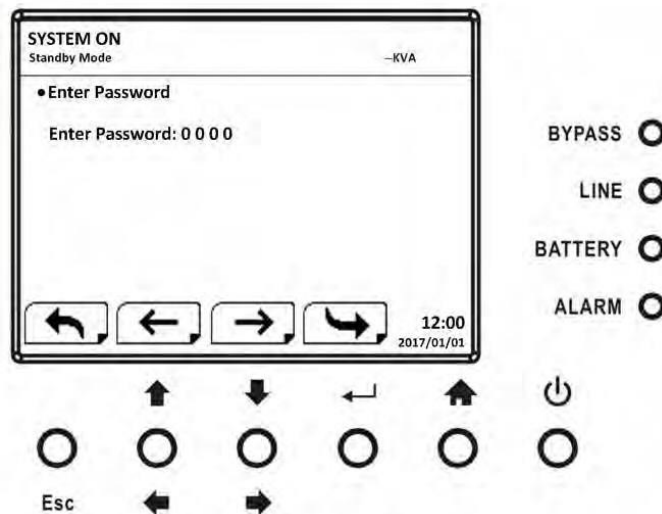
Figure 5-13 Enter password Screen

It's required to enter 4-digit password to enter SETUP submenu. If incorrect password is entered, the LCD screen will ask for re-entry.

If correct password is entered, the LCD will enter the SETUP submenu, as shown in Figure 4-14.
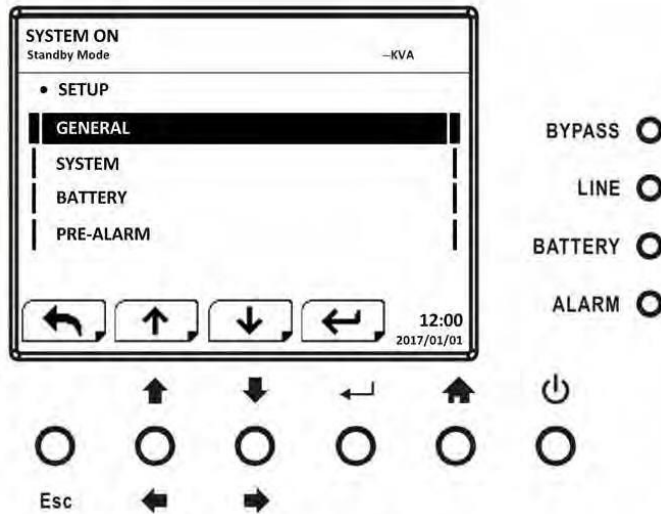
Figure 5-14 SETUP Submenu Screen

There are two levels of password protection, user password and service password.

The default password for user is "0000". It could be changed by user. The default password for service is "0729". This password is controlled by service personnel and can be chanced as appropriate.
Entering different levels of password gives access to different settings. The setting can be changed in different operational modes. Table 5-2 lists the relevant information.

Table 5-2: All setting items in Setup Menu

Setting item		UPS operation Mode								Authorization	
		Stand-by	Bypass	Line	Bat-tery	Bat-tery Test	Fault	Con-verter	Eco	User	Service
General	Model Name	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Language	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	TIME	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Change	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Password	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Audible Alarm	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Factory Reset	Y	Y								Y
	EPO Function	Y									Y
	Output Voltage	Y	Y								Y
	ECO Voltage Range	Y	Y	Y					Y		Y

Category	Item										
System	ECO Frequency Range	Y	Y	Y					Y		Y
	Bypass Voltage Range	Y	Y								Y
	Bypass Frequency Range	Y	Y								Y
	ECO Mode	Y	Y	Y					Y		Y
	Bypass Mode	Y	Y								Y
	Converter Mode	Y	Y								Y
	Battery Mode Delay Time	Y	Y	Y			Y	Y	Y		Y
	Cold Start	Y	Y	Y	Y	Y	Y	Y	Y		Y
	System Shutdown Time	Y	Y	Y	Y	Y	Y	Y	Y		Y
	System Restore Time	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Redundancy	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Charger Test	Y	Y	Y				Y	Y		Y
Battery	Nominal Bat- tery Voltage	Y	Y								Y
	Battery Capac- ity in Ah	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Battery Groups	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Maxi mum Charg ing Curre nt	Y	Y								Y
	Battery Low/Shutd own Setting	Y	Y	Y			Y	Y	Y		Y
	Periodic Battery Test	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Battery Test Interval	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Battery Test Type	Y	Y	Y	Y		Y	Y	Y		Y
	Battery Age Alert	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Pre-Alarm	Y	Y	Y	Y	Y	Y	Y	Y		Y

"Y" means that this setting item can be set in this operation mode.

5.2 Setup-General Screen

Use "⬆" or "⬇" buttons to choose between different sub-menus, and press "⏎" button to go into the GEN-ERAL setting screen, as shown in Figure 5-15 and 5-16. General setting can be set in any operating mode and Setup-General setting list is shown in Table 5-3.
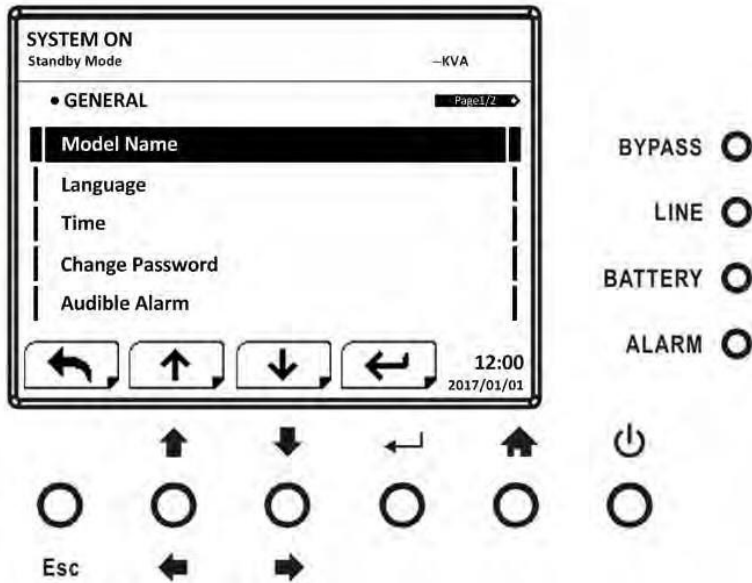
Figure 5-15 Setup-General Screen page 1
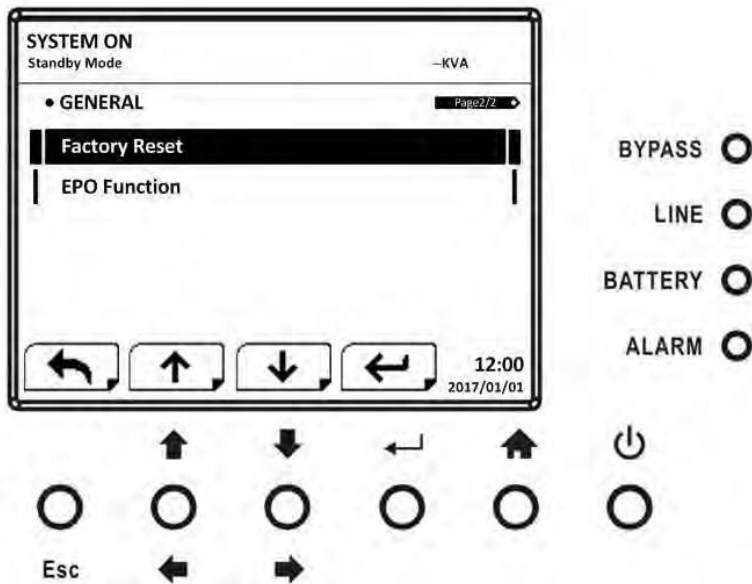
Figure 5-16 Setup-General Screen page 2

Use " ⬆" or " ⬇" buttons to choose the setting options for setting requirement, then press

"⏎" button. The confirmation screen will pop up. Use "⬆" or "⬇" button to choose " ☑ "
(YES)

or "X" (NO). Choose " ☑ " and press " ⏎" button to confirm setting or choose "X" to cancel the setting, as shown in Figure 5-17.
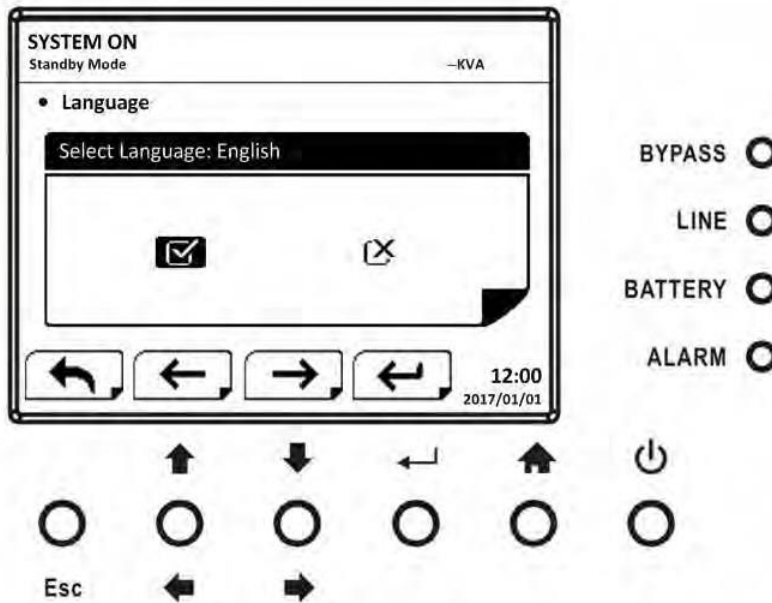
Figure 5-17 SETUP Confirmation screen

Table 5-3: Setup-General setting list

Setting Item	Sub Item	Explanation
Model Name		Enter UPS Name (xxxxxxxxxx). The max. Length is 10 characters.
Language	--	Provides 3 optional LCD languages: English (Default) Traditional Chinese Simplified Chinese
TIME	Adjust Time	Set current date and time. (yyyy / mm / dd hour : min : sec) MUST be set after UPS installation
	System Installed Date	Set system installed date (yyyy / mm / dd) 2017/1/1 (Default) MUST be set after UPS installation
	System Last Maintain Date	Set system latest maintenance date (yyyy / mm / dd) 2017/1/1 (Default) MUST be set after UPS installation
	Battery Installed Date	Set battery installed date (yyyy / mm / dd) 2017/1/1 (Default) MUST be set after UPS installation
	Battery Last Maintain Date	Set battery latest maintenance date (yyyy / mm / dd) 2017/1/1 (Default) MUST be set after UPS installation
Change Password	--	Change Password

Audible Alarm	Audible Mute	It is to mute the buzzer when UPS in any mode. • Disable (Default) • Enable
	Battery Mute	It is to mute the buzzer when UPS in battery mode. • Disable (Default) • Enable
	Fault Mute	It is to mute the buzzer when UPS in fault mode. • Disable (Default) • Enable
	Bypass Mute	It is to mute the buzzer when UPS in bypass mode. • Disable (Default) • Enable
Factory Reset	--	Restore to factory default setting
EPO Function		Set EPO active status • Normal Close Active (Default) • Normal Open Active

Setup-System Screen

Use "⬆" or "⬇" button to choose between different sub-menus, and press "⬅" button to go into the SYSTEM setting screen, as shown in Figure 5-18, 5-19 and 5-20.
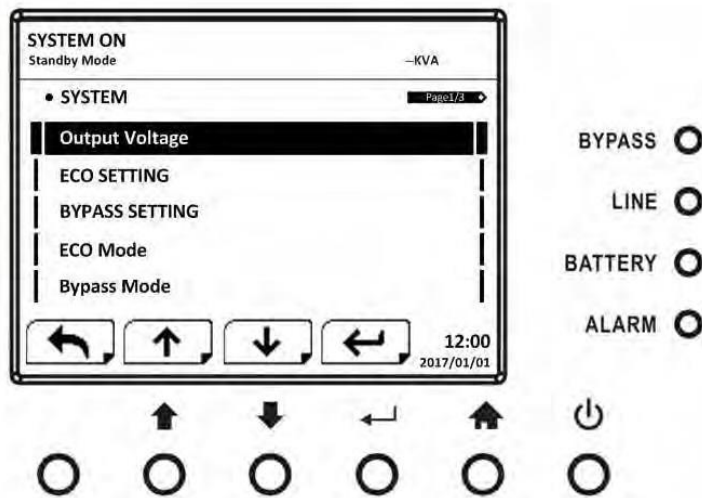
Figure 5-18 Setup-System Screen page 1
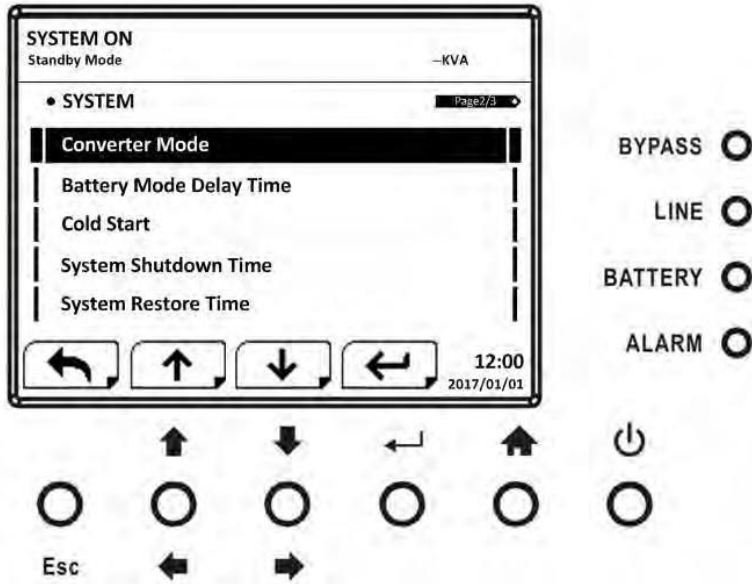
Figure 5-19 Setup-System Screen page 2
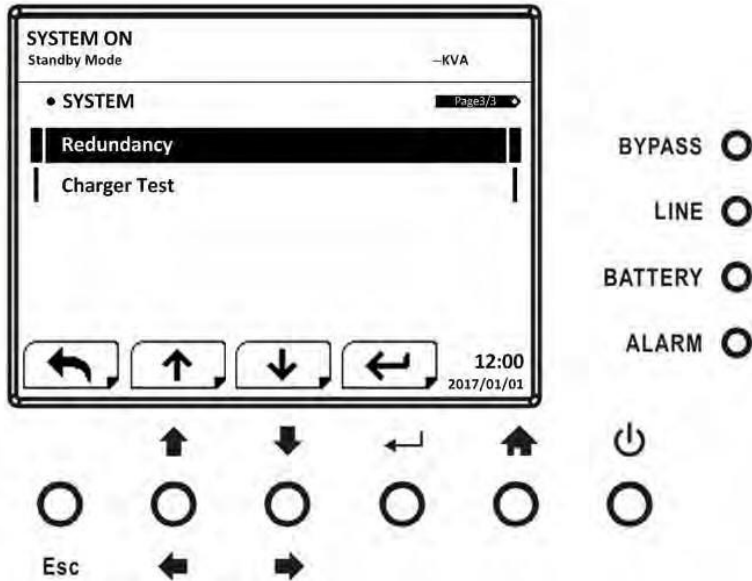
Figure 5-20 Setup-System Screen page 3

System setting can be set only when UPS is operating in certain mode. Please check Table 5-2 for the available operation modes. If it's not able to set up in specific mode, the warning screen will appear, as shown in Figure 5-21.
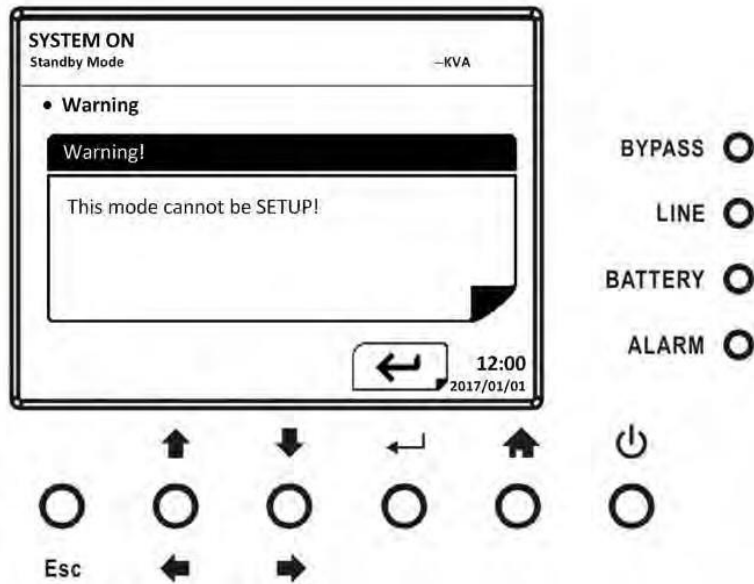
Figure 5-21 Warning screen

Setup-System setting list is shown in Table 5-4.
Table 5-4: Setup-System setting list

Output Voltage	--	Set output voltage • 100Vac • 110Vac • 115Vac • 120Vac (Default) • 127Vac MUST be reviewed after UPS installation
ECO Setting	ECO Voltage Range	Set ECO voltage range: Upper Range • (Output Setting Voltage +6V) ~ (Output Setting • Voltage +12V) • (Output Setting Voltage +6V) (Default) Lower Range • (Output Setting Voltage -6V) ~ (Output Setting • Voltage -12V) • (Output Setting Voltage -6V) (Default)
	ECO Frequency Range	Set bypass Frequency range: Upper/ Lower limit • +/- 2Hz (Default) • +/- 3Hz • +/- 4Hz=

Bypass Setting	Bypass Voltage Range	Set bypass voltage range: Upper Range • (Output Setting Voltage +6V) ~ 155V • 140V (Default) Lower Range • (Output Setting Voltage -6V) ~ 88V • 88V (Default)
	Bypass Frequency Range	Set bypass Frequency range: Upper/ Lower limit • +/- 1Hz • +/- 2Hz • +/- 3Hz • +/- 4Hz (Default)
ECO Mode	--	Set ECO mode • Disable (Default) • Enable
Bypass Mode	--	Set bypass mode • Disable • Enable (Default) MUST be reviewed after UPS installation. If you need the Bypass power when UPS is OFF, please enable it.
Converter Mode	--	Set converter mode • Disable (Default) • Enable Set Output Frequency • 50Hz (Default) • 60Hz
Battery Mode Delay Time	--	Set system shutdown delay time in battery mode (Disable or 10~990Min). • Disable (Default) • Not 0: Enable When this feature is enabled, UPS will shut off output after UPS operates in Battery mode for certain seconds.
Cold Start	--	Set system shutdown time (0.2~99min) • 0.2 min (Default) This delay time will start counting when the CONTROL-Shutdown Restore command is executed.

System Shutdown Time	--	Set system restore time (0~9999min) • 1 min (Default) This delay time will start counting after shutdown time is elapsed when the CONTROL-Shutdown Restore command is executed.
Redundancy	--	Set redundancy Redundancy: the QTY of redundant UPS module (0~9) • 0(Default) MUST be set after UPS installation
Charger Test	--	Set charger test • Disable (Default) • Enable

5.2.1 Setup-Battery Screen

Use "⬆" or "⬇" button to switch different sub-menus. Press "⏎" button to go into the BATTERY setting screen, as shown in Figure 5-22 and 5-23.
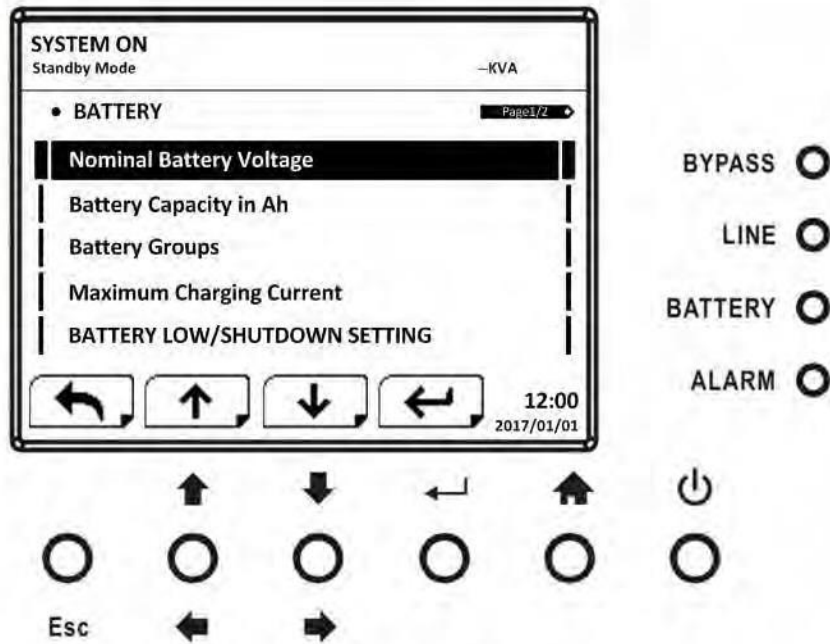
Figure 5-22 Setup-Battery Screen page 1
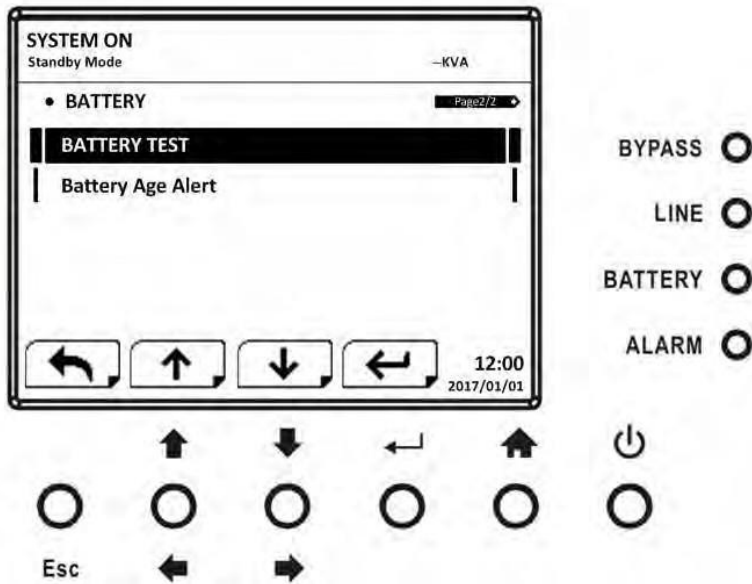
Figure 5-23 Setup-Battery Screen page 2

Battery setting can be set only when UPS is operating in standby mode. If it's not in standby mode, the warning screen will appear as shown in Figure 5-24. See Setup-Battery setting list in Table 5-5.
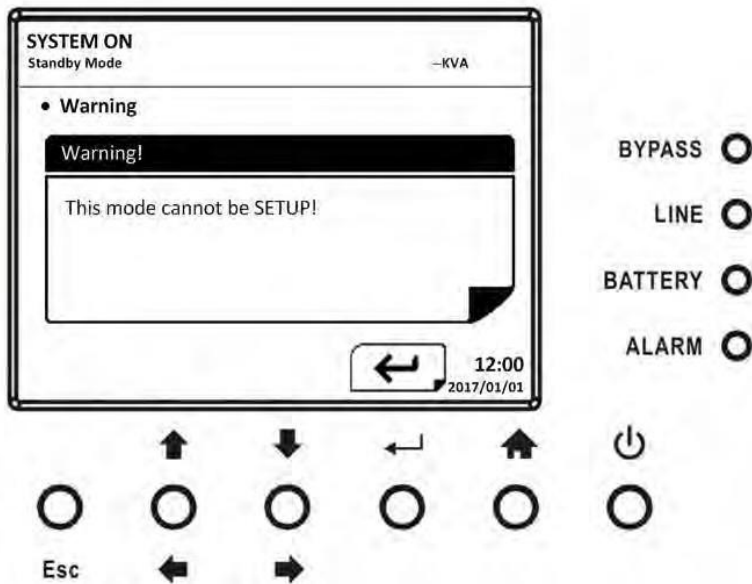
Figure 5-24 Warning screen

5.2.2 Setup-Battery setting list

Table 5-5: Setup-Battery Setting list

Setting Item	Sub Item	Explanation
Nominal Battery Voltage	--	Set battery nominal voltage • 8x12V (Default) • 9x12V • 10x12V **MUST be set after UPS installation**

Battery Capacity in Ah	--	Set battery capacity. • 7, 9 (Default), 10, 12, 17, 26, 40, 65, 100Ah **MUST be set after UPS installation or Battery capacity is changed. For the standard 580W battery set battery capacity to 10.**
Battery Groups		Set battery Groups 1 – default. Set for number of battery modules installed in the system.
Maximum Charging Current	--	Set battery maximum charging current (1~10) • 4A (Default) **MUST be set after UPS installation or Battery capacity is changed.**
Battery Low/ Shutdown SETTING	Battery Low Voltage	Set battery low voltage (10.5~11.5V)x(battery Number) • 11.2V x Battery Number (Default)
	Battery Low Capacity	Set battery low capacity (20~50%) • 20% (Default)
	Battery Shutdown Voltage	Set battery voltage point for system shutdown in battery mode (10.0~11V) x (battery Number) • 9.6V x Battery Number (Default)
BATTERY TEST	Periodic Battery Test	Set periodic battery test disable or enable • Disable (Default) • Enable
	Battery Test Interval	Set battery test interval (7~99 Days) • 30 Days (Default)
	Battery Test Type	Set testing time for battery test (10~1000sec) • Short Time(10S) (Default) • Long Time(0.1M~0.9M) • Long Time(1M~99M) • Till Battery Low
Battery Age Alert	Battery Age Alert (Months)	Set battery age for replacement. (Disable,12~60Months) • Disable (Default) If this feature is enabled and the battery has been installed over this period, there is a warning "Battery Age Alert" to indicate it.

5.2.3 Pre-Alarm Screen

Use UP and DOWN buttons to switch different sub-menus. Press ENTER button to go into the Pre-Alarm setting screen.
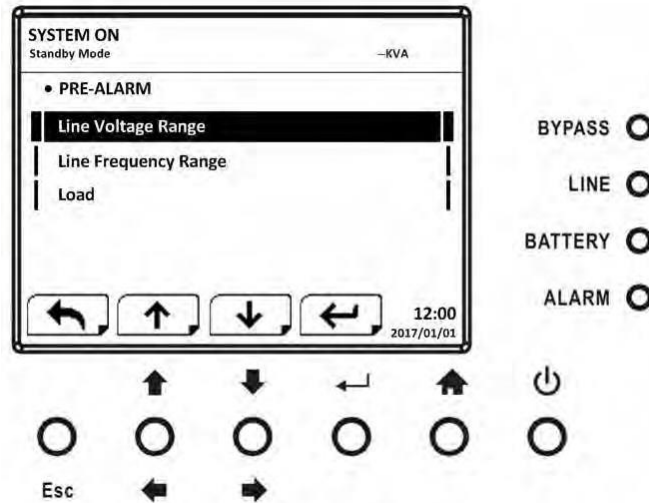
Figure 5-25 Setup-Pre-Alarm screen

Pre-Alarm setting can be set in any operation mode. See Setup-Pre-Alarm setting list in Table 5-6.

Table 5-6: Setup-Pre-Alarm screen

Setting Item	Sub Item	Explanation
Line Voltage Range	--	Set line voltage range: Upper limit • +5% • +10% • +15% • +20% (Default) Lower limit • -5% • -10% • -15% • -20% (Default)
Line Frequency Range	--	Set line frequency range: Upper / Lower limit • +/- 1Hz • +/- 2Hz • +/- 3Hz • +/- 4Hz (Default)
Load	--	Set UPS Overload percentage (40~100%) • 100% (Default) Set UPS load unbalance percentage (20~100%) • 100% (Default)

5.2.4 Information Screen

In INFORMATION menu, you can check the serial number, firmware versions, system configuration and settings of the UPS. There are submenus under the INFORMATION, including Identification, System and Battery.
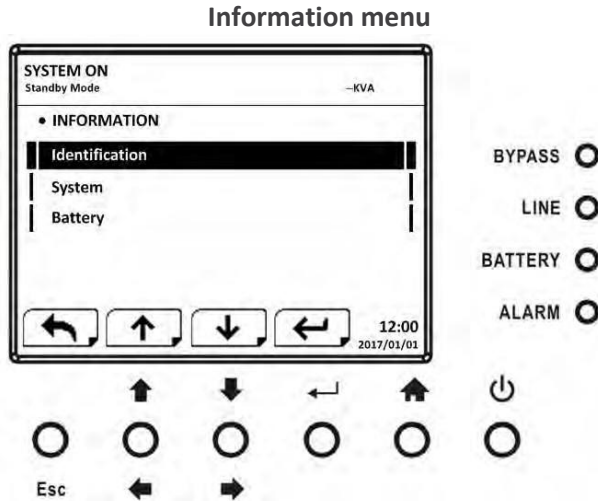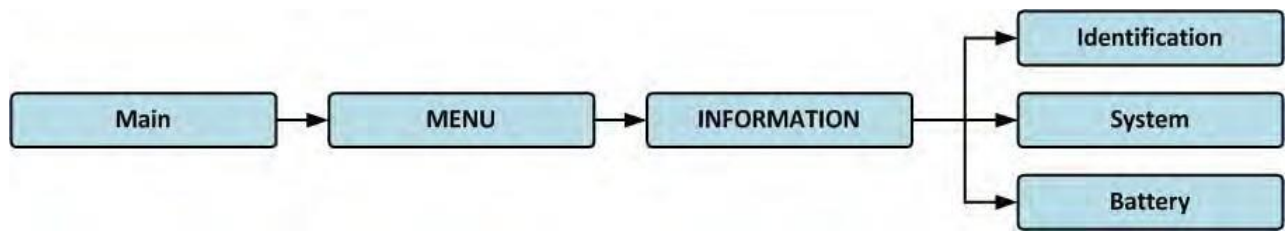
Information menu

Figure 5-27 INFORMATION screen

5.2.4.1 INFORMATION - Identification Screen
When Identification submenu is selected, the Model Name, Serial No. and Firmware Version will be displayed. Use UP and DOWN buttons to switch between different pages.
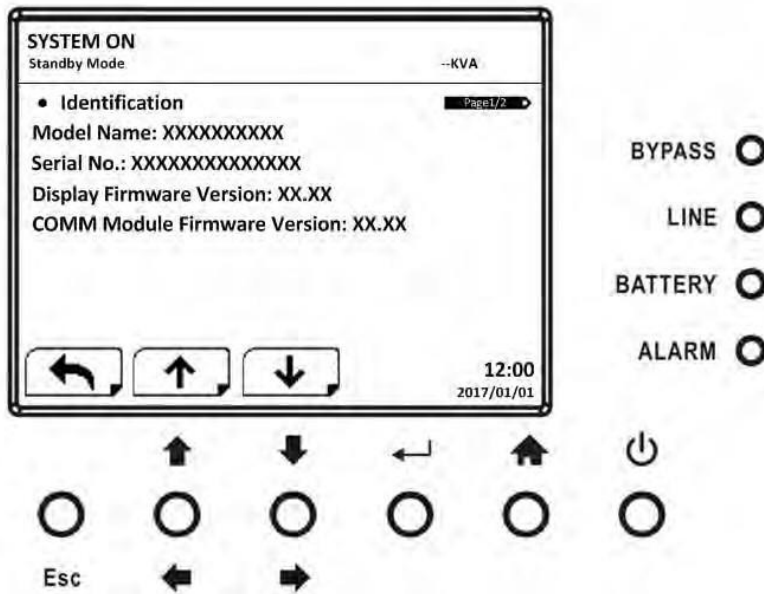
Identification screen page 1
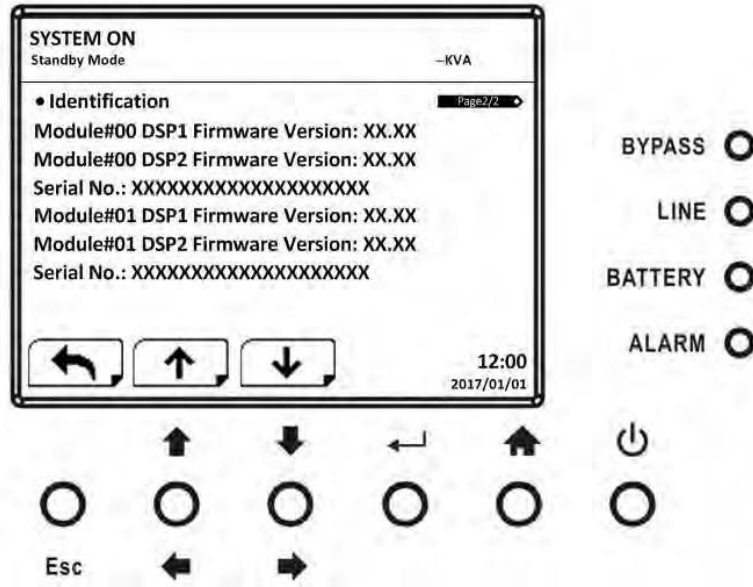
Identification screen page 2

5.2.4.2 INFORMATION - System Screen
When System submenu is selected, the system power, nominal voltage, nominal frequency … etc. information will be displayed. Use UP and DOWN buttons to switch between different pages.
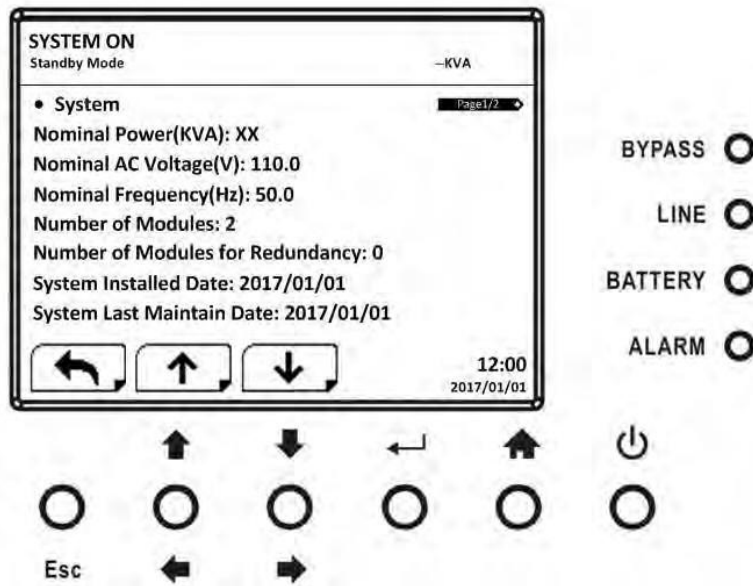
INFORMATION System screen page 1
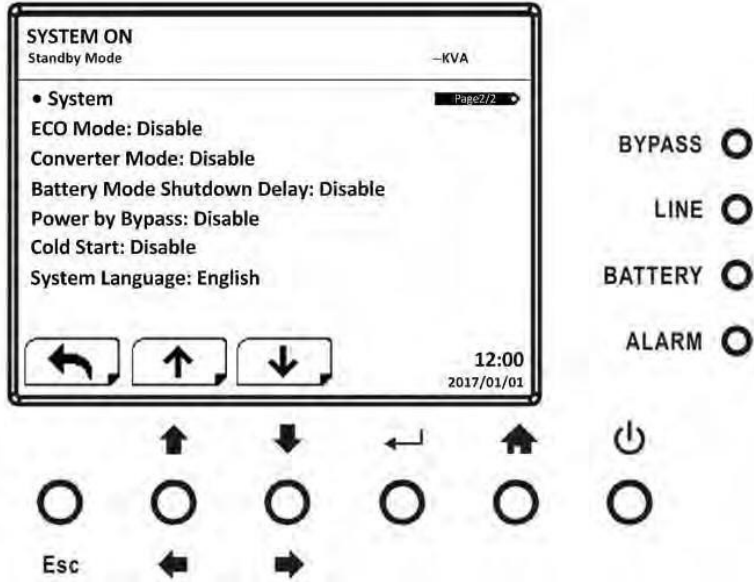
INFORMATION System screen page 2

5.2.4.3 INFORMATION - Battery Screen

When Battery submenu is selected, the Battery nominal voltage, capacity, charging current … etc. information will be displayed. Use UP and DOWN buttons to switch between different pages.
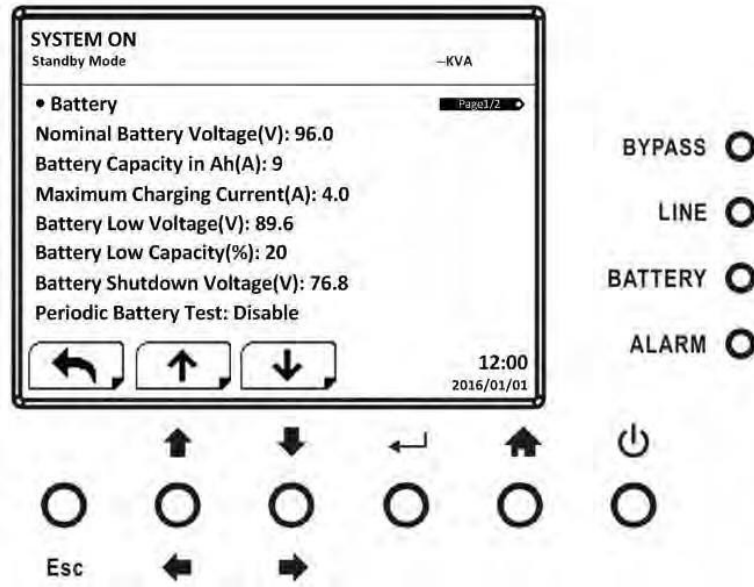
INFORMATION Battery screen page 1
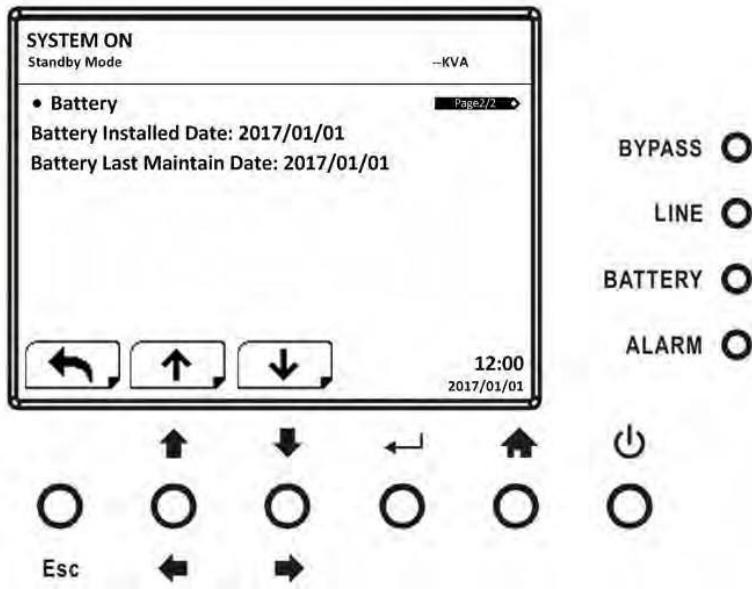
INFORMATION Battery screen page 2

5.2.5   Events Screen
In EVENT menu, you can check the current events, history events and reset all events.
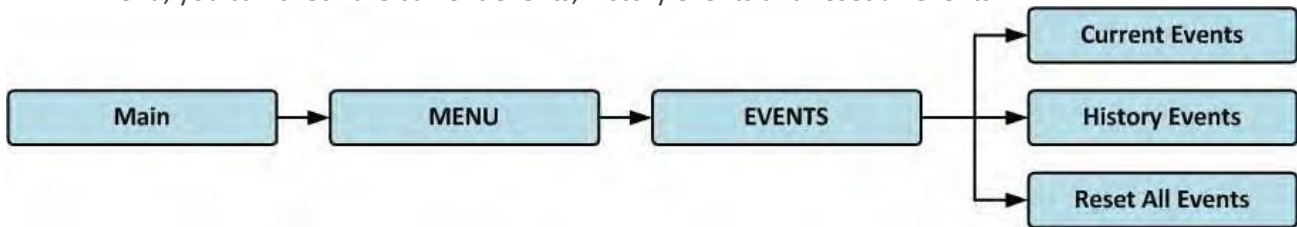
Events menu
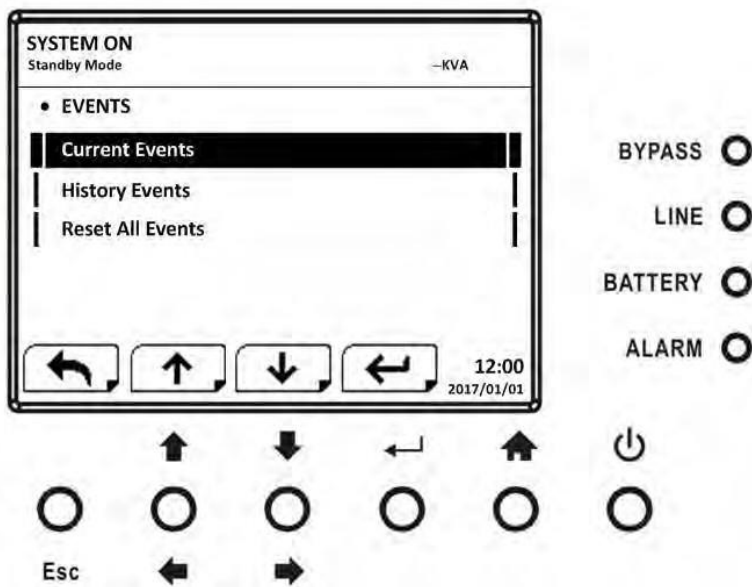
Events screen

When event occurs, you will see flashing warning text in the Main Screen.
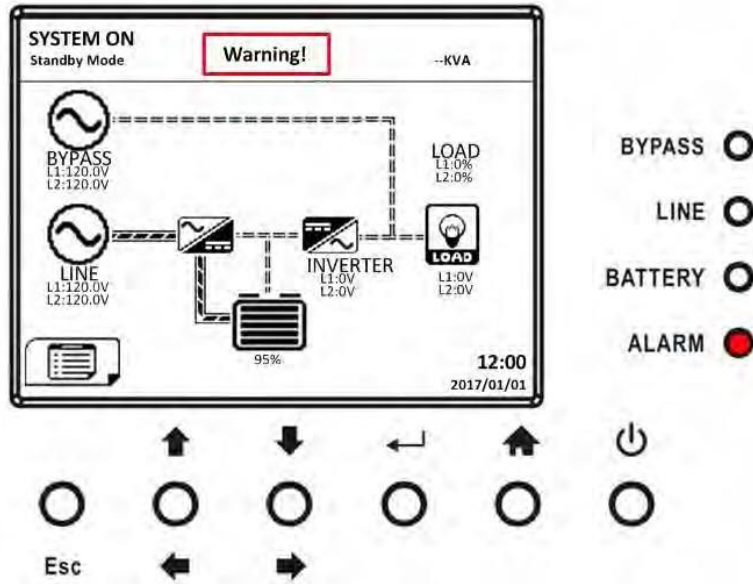
Alarm warning screen

5.2.5.1 Current Events

When any event occurs, it will display Module ID and alarm code in Current Events screen. It can save up to 50 events in current list. Only 4 events can be listed in one page. Therefore, if it exceeds more than four, you have to press UP or DOWN button to read other events.
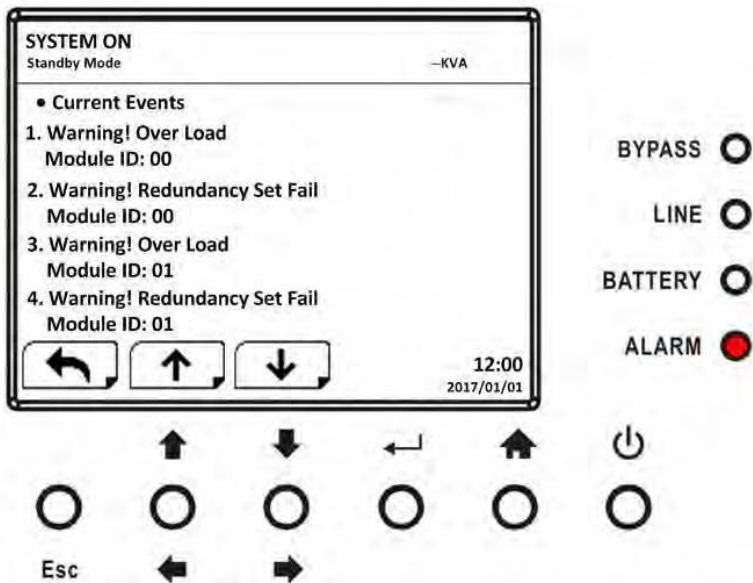
Current Events screen

5.2.5.2 History Events

The detailed event information is saved in history events. It can save up to 500 events in history events. When warning occurs, it will display alarm code, alarm time and Module ID. When fault event occurs, it will display alarm code, alarm time, Module ID and data 1~2. In order to record more historical information about the UPS system, the important setting changed, UPS operation mode changes and control action executes will be saved in History Events.
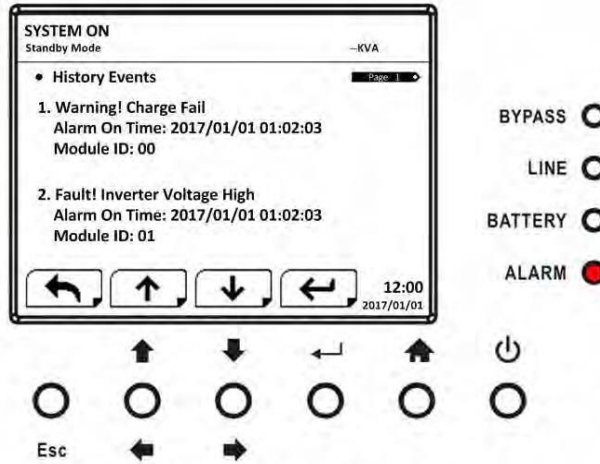
History Events screen

5.2.5.3 Reset All Events
The service password is required to enter Reset All Events screen as shown in Figure 4-42. Then, use LEFT and RIGHT buttons to choose YES or NO. Choose YES and press ENTER button to reset all events or choose NO to cancel this action.
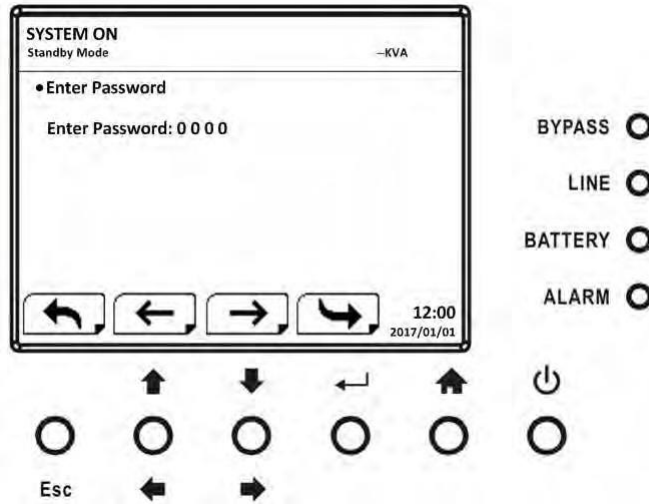
Reset All Events screen
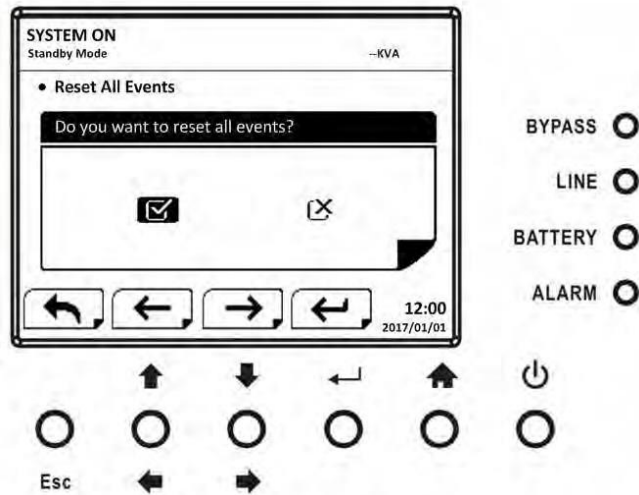
Reset All Events Confirmation screen

5.2.6 History Record
Table 5-8: Important setting changed

Item No.	Description	Item No.	Description
1	Setup! Model Name	2	Setup! Language
3	Setup! Adjust Time	4	Setup! System Installed Date
5	Setup! System Last Maintain Date	6	Setup! Battery Installed Date
7	Setup! Battery Last Maintain Date	8	Setup! Change Password
9	Setup! Audible Alarm	10	Setup! Factory Reset
11	Setup! EPO Function	12	Setup! Output Voltage
13	Setup! ECO Voltage Range	14	Setup! ECO Frequency Range
15	Setup! Bypass Voltage Range	16	Setup! Bypass Frequency Range
19	Setup! ECO Mode	20	Setup! Bypass Mode
21	Setup! Converter Mode	22	Setup! Battery Mode Delay Time
23	Setup! Cold Start	24	Setup! System Shutdown Time
25	Setup! System Restore Time	26	Setup! Redundancy
27	Setup! Charger Test	28	Setup! Nominal Battery Voltage
29	Setup! Battery Capacity in Ah	30	Setup! Battery Group
31	Setup! Maximum Charging Current	32	Setup! Battery Low Voltage
33	Setup! Battery Low Capacity	34	Setup! Battery Shutdown Voltage
35	Setup! Periodic Battery Test	36	Setup! Battery Test Interval
37	Setup! Battery Test Type	38	Setup! BATTERY Age Alert
39	Setup! Line Voltage Range	40	Setup! Line Frequency Range
41	Setup! Load	42	

Table 5-9: UPS Control

Item No.	Description	Item No.	Description
1	UPS Mode! Power On Mode	2	UPS Mode! Standby Mode
3	UPS Mode! Bypass Mode	4	UPS Mode! Line Mode
5	UPS Mode! Battery Mode	6	UPS Mode! Battery Test Mode
7	UPS Mode! Fault Mode	8	UPS Mode! Converter Mode
9	UPS Mode! ECO Mode	10	UPS Mode! Shutdown Mode
11	UPS Mode! Un-Connection	12	

Table 5-10: Control execution

Item No.	Description	Item No.	Description
1	Control! System Turn On	2	Control! System Turn Off
3	Control! Manual Battery Test	4	Control! Cancel Battery Test
5	Control! Turn To Bypass	6	Control! Shutdown Restore
7	Control! Cancel Shutdown	8	Control! Charger Turn On
9	Control! Charger Turn Off	10	

5.3 LCD Screen in UPS Module
5.3.1   ASLCD Structure
The entire LCD structure is demonstrated as below diagram.

LCD Structure
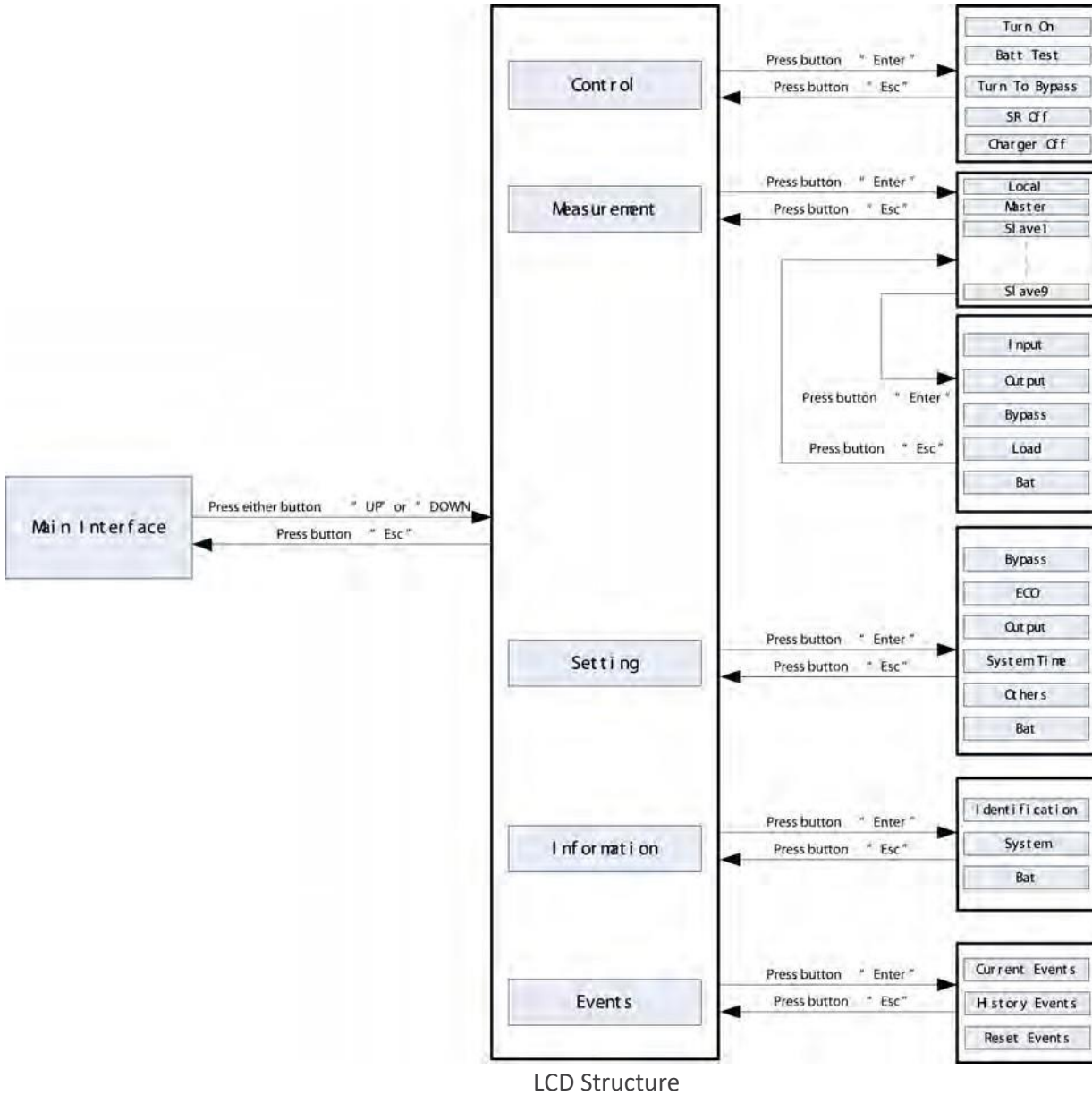
5.3.2   Main interface (Home Page)

1) UPS Mode: Current operation mode.
2) It will display the UPS running status mode and parallel information as below table.

Short Description	Description
N	New adding module into parallel system.
M	Master
S<n>	Slave, <n> means the number of slave module.

3) Input and output information.

4) Battery capacity, load level and backup time/warning or fault codes. When alarms happen, the warning or fault information will display. When UPS is operated in Battery mode or Battery Test mode, the backup time will display.

When the front panel is not operated for 2 minutes, the display page will return back to home page.
Press the "UP" or "DOWN" button to enter the operation menu (Refer to 4.2.3).

When it displays home page in LCD, if UPS is in bypass or standby, you could press the "ON/ENTER" button to turn on the UPS to line / converter / ECO / battery mode according to the setting and input status.

```
    Bypass Mode M                              Line   Mode M
IP1:120.0V/60.0Hz        Turn On ?         IP1:120.0V/60.0Hz
IP2:120.0V/60.0Hz                          IP2:120.0V/60.0Hz
-----------------                          -----------------
OP1:120.0V/60.0Hz           →Yes           OP1:120.0V/60.0Hz
OP2:120.0V/60.0Hz            No             OP2:120.0V/60.0Hz
-----------------                          -----------------
Bat: 96.0V/ 96.0V                          Bat: 96.0V/ 96.0V
Load:100/100/---%                          Load:100/100/---%
```
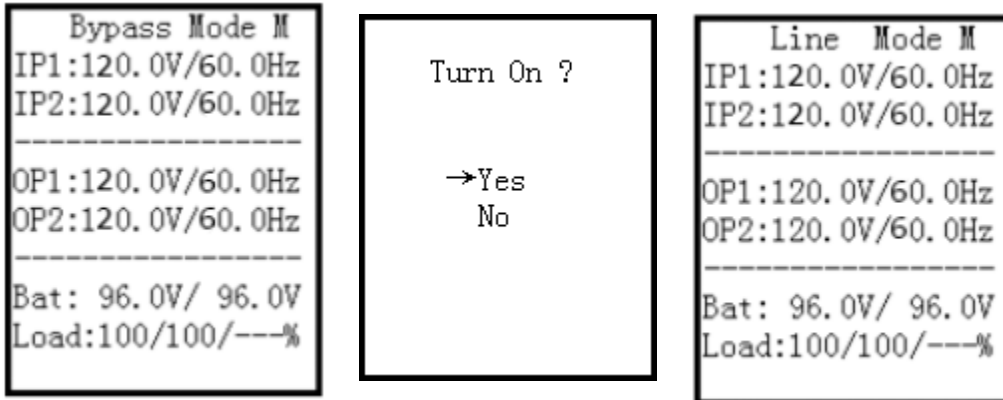
fWhen the UPS is turned on, you could press the "OFF/ESC" button to allow UPS to bypass mode or standby.

```
    Line   Mode M                              Bypass Mode M
IP1:120.0V/60.0Hz       Turn Off ?          IP1:120.0V/60.0Hz
IP2:120.0V/60.0Hz                           IP2:120.0V/60.0Hz
-----------------                           -----------------
OP1:120.0V/60.0Hz          Yes              OP1:120.0V/60.0Hz
OP2:120.0V/60.0Hz         →No               OP2:120.0V/60.0Hz
-----------------                           -----------------
Bat: 96.0V/ 96.0V                           Bat: 96.0V/ 96.0V
Load:100/100/---%                           Load:100/100/---%
```
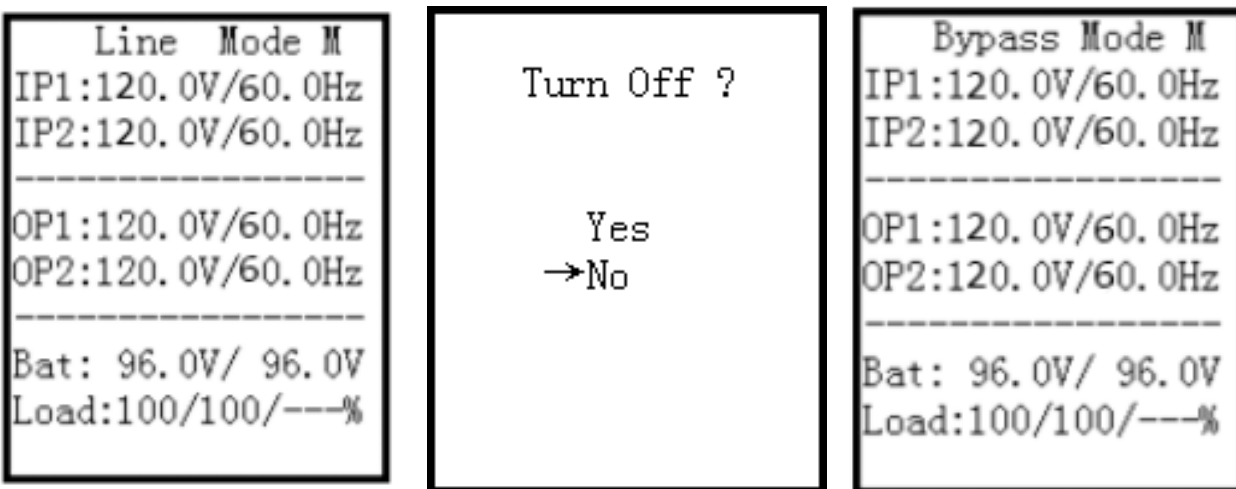
5.4 Operation menu
5.4.1 Main menu
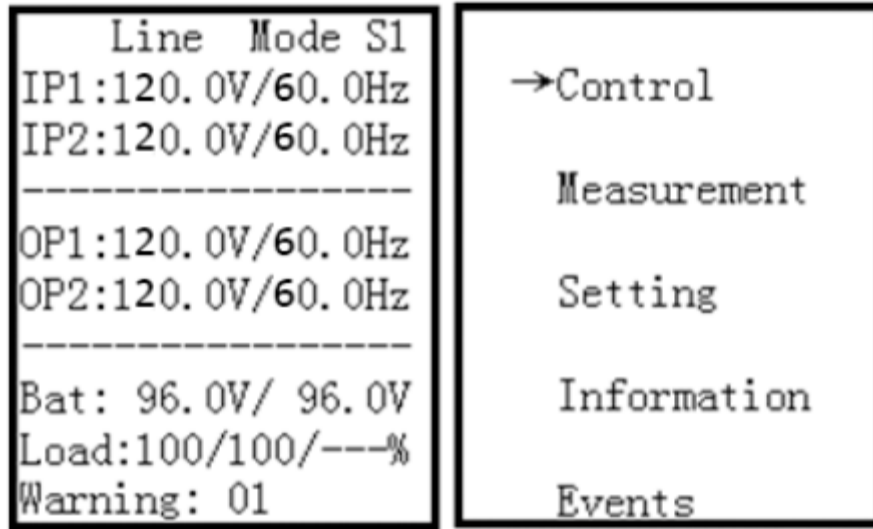
```
Line   Mode S1
IP1:120.0V/60.0Hz
IP2:120.0V/60.0Hz
-----------------
OP1:120.0V/60.0Hz
OP2:120.0V/60.0Hz
-----------------
Bat: 96.0V/ 96.0V
Load:100/100/---%
Warning: 01
```
```
→Control

  Measurement

  Setting

  Information

  Events
```
Main screen (Home page)   Main menu

1) After pressing the "UP" or "DOWN" button on the main screen (Home page), it will display five items in operation menu: Control / Measurement / Setting / Information / Events.

2) Press "UP" or "DOWN" button to select item.

3) Press "ON/ENTER" button to confirm the selection.

4) Press "OFF/ESC" button to return back to main scree (Home page).

Control

```
Control:

→Turn On
  Bat Test
  Turn To Bps
  SR Off
  Charger Off
```
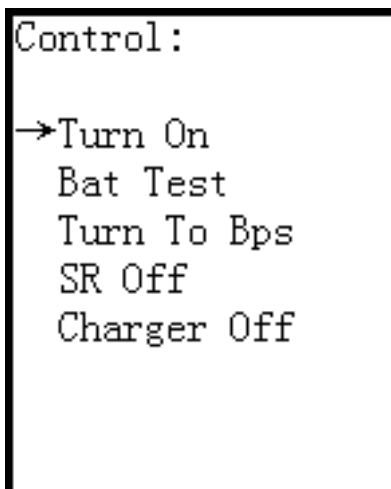
In "Control" screen, it's real-time command for UPS.
- "Turn On" will be displayed if UPS is not turned on. "Turn Off" will be displayed if UPS is turned on.
- "Bat Test" will be displayed if UPS is not in Battery Test Mode. "Cancel Test" will be displayed if UPS is in Battery Test Mode.

- "Turn to Bps" will be displayed all the time no matter what status UPS is. But this action is only effective when the input power is available.
- "SR Off" will be displayed if UPS is not turned on. "SR On" will be displayed if UPS is turned on.
- "Charger Off" will be displayed if charger is working. "Charger On" will be displayed if charger is turn off.

Generally speaking, only one selection will be displayed in the screen and it depends on UPS status.

Turn On/Turn Off

This item is for turning on/off the UPS.

a) On Bypass mode, it will display "Turn On" in control menu. If it is selected and confirmed, the UPS will transfer to line mode, converter mode, ECO mode, or battery mode according to the setting and input status.

```
Control:

→Turn On
  Bat Test
  Turn To Bps
  SR Off
  Charger Off
```

```
       Turn On ?


        →Yes
         No
```

```
     Line   Mode S1
IP1:120.0V/60.0Hz
IP2:120.0V/60.0Hz
-----------------
OP1:120.0V/60.0Hz
OP2:120.0V/60.0Hz
-----------------
Bat: 96.0V/ 96.0V
Load:100/100/---%
Warning: 01
```

NOTE: You may simply turn on UPS by pressing "ON/ENTER" button in main scree (Home page). It's not necessary to enter control menu to turn on the UPS.

b) On line mode, converter mode, ECO mode or battery mode, it will display "Turn Off" in control menu. If it is selected and confirmed, the UPS will transfer to bypass mode or shutdown mode.

```
Control:

→Turn Off
  Cancel Test
  Turn To Bps
  SR On
  Charger On
```

```
       Turn Off ?


        →Yes
         No
```

```
    Bypass Mode M
IP1:120.0V/60.0Hz
IP2:120.0V/60.0Hz
-----------------
OP1:120.0V/60.0Hz
OP2:120.0V/60.0Hz
-----------------
Bat: 96.0V/ 96.0V
Load:100/100/---%
```

NOTE: You may simply turn off UPS by pressing "OFF/ESC" button in main scree (Home page). It's not necessary to enter control menu to turn off the UPS.

2) Battery Test / Cancel Test

a) It is to check if the UPS could work well in battery mode and test the battery performance.

Except UPS is in Battery Test mode, "Battery Test" selection will be displayed under all operation modes.

```
Control:

  Turn On
→ Bat Test
  Turn To Bps
  SR Off
  Charger Off
```

```
Bat Test Type:

→ Short Time
   10 Second
```

```
Bat Test ?



→ Yes
  No
```

```
 Bat Test Mode S1
IP1:120.0V/60.0Hz
IP2:120.0V/60.0Hz
-----------------
OP1:120.0V/60.0Hz
OP2:120.0V/60.0Hz
-----------------
Bat: 96.0V/ 96.0V
Load:100/100/---%
Backup Time: 10M
```
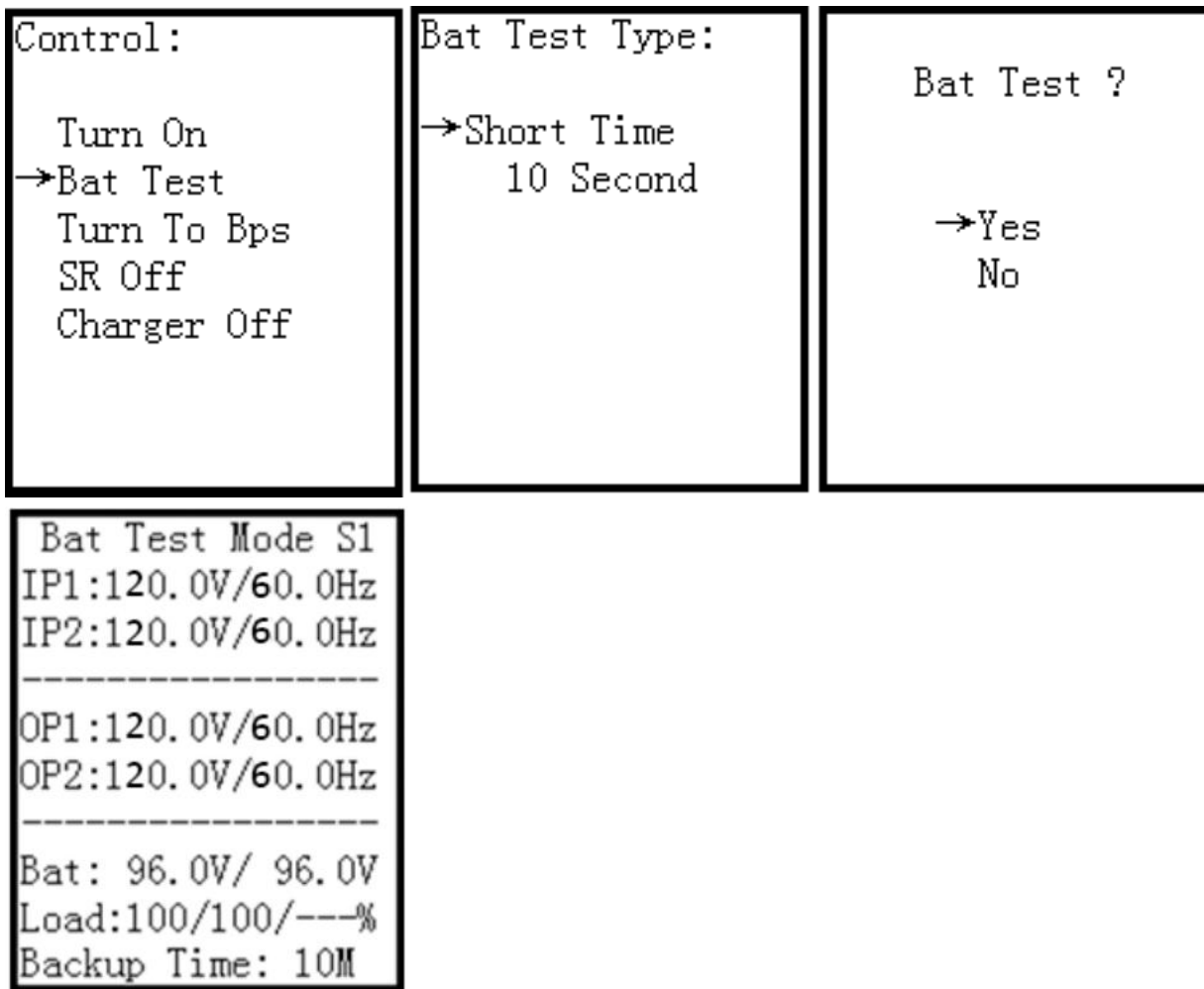
However, it could execute this test in Line/Converter mode and reminder will pop up in the screen. When "Yes" is selected, the screen will return back to home page with "Battery Test Mode" displayed on top. If the test is completed, the displayed status will change back to UPS current mode. There are three battery test types to select. Refer to Table 5 -11.

Table 5-11: Battery Test Type

Setting Item	Sub Item	Explanation
	Short Time	10-second test time.
Bat Test Type	Long Time	When testing time is longer than 1 minute, please select "Long Time" and the duration is able to set up. (1~99min) -10 min (Default)
	Till to Bat Low	Test until the battery is low voltage.

b) On Battery Test mode, it will display "Cancel Test" in control menu. When "Cancel Test" is selected, the screen will change back to UPS current mode.

```
Control:              |                      | Line  Mode S1
                      |  Cancel Test ?       | IP1:120.0V/60.0Hz
   Turn On            |                      | IP2:120.0V/60.0Hz
 →Cancel Test         |                      | -----------------
   Turn To Bps        |     →Yes             | OP1:120.0V/60.0Hz
   SR On              |      No              | OP2:120.0V/60.0Hz
   Charger On         |                      | -----------------
                      |                      | Bat: 96.0V/ 96.0V
                      |                      | Load:100/100/---%
                      |                      | Warning: 01
```

3) Turn to Bypass

If it is selected and confirmed, the UPS will transfer from Line mode to Bypass mode.

```
Control:              |                      | Bypass Mode M
                      |  Turn To Bps ?       | IP1:120.0V/60.0Hz
   Turn On            |                      | IP2:120.0V/60.0Hz
   Bat Test           |                      | -----------------
 →Turn To Bps         |     →Yes             | OP1:120.0V/60.0Hz
   SR Off             |      No              | OP2:120.0V/60.0Hz
   Charger Off        |                      | -----------------
                      |                      | Bat: 96.0V/ 96.0V
                      |                      | Load:100/100/---%
```

4) SR On / SR Off

a) On Line/Battery/Battery Test/Converter/ECO mode, it will display "SR On" in control menu. If it is selected and confirmed, the screen will return back to home page. Shutdown and restore time can be selected as in Table 4-12.

When "Shutdown Time" countdown ends, the UPS will turn off. Then, the "Restore Time" will start to count. When countdown ends, the UPS will be turned on and back to current mode.

```
Control:          | SR Time:            |                  | Bypass Mode
                  |                     | SR On ?          |  M IP1:230.0V/50.0Hz
   Turn On        | →Shutdown Time:     |                  |   IP2:230.0V/50.0Hz
   Cancel Test    |   99.0 Minute       |                  |   IP3:230.0V/50.0Hz
   Turn To Bps    |   Restore Time:     |    →Yes          |   OP1:230.0V/50.0Hz
 →SR On           |   9999 Minute       |     No           |   OP2:230.0V/50.0Hz
   Charger On     |                     |                  |   OP3:230.0V/50.0Hz
                  |                     |                  |   Bat:192.0V/192.0V
                  |                     |                  | Load:  0/  0/   0%
```

```
     Line   Mode M
IP1:120.0V/60.0Hz
IP2:120.0V/60.0Hz
_____
OP1:120.0V/60.0Hz
OP2:120.0V/60.0Hz
_____
Bat: 96.0V/ 96.0V
Load:100/100/---%
```
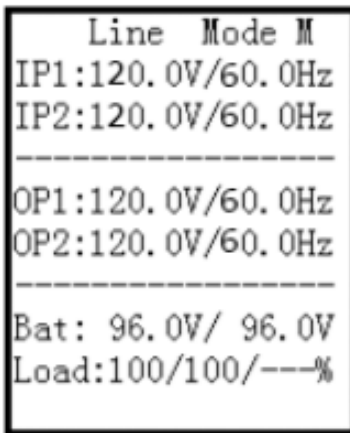
Table 5-12: Shutdown Restore Time

Setting Item	Sub Item	Explanation
SR On	Shutdown Time	Set system shutdown time (0.2~99min) -0.2 min (Default)
	Restore Time	Set system restore time (0~9999min) -1 min (Default)

b) On Standby/Bypass/Fault mode, it will display "SR Off" in control menu. If it is selected and confirmed, the screen will return back to home page and system will back to current mode.

If "SR On" is selected and confirmed, When UPS in Line/Battery/Battery Test/Converter/ECO mode, it will display "SR Off" in control menu. If it is selected and confirmed, the screen will return back to home page and system will cancel this function.

```
Control:            SR Off ?          Bypass Mode M
                                      IP1:120.0V/60.0Hz
   Turn On                            IP2:120.0V/60.0Hz
   Bat Test                           _____
   Turn To Bps      →Yes              OP1:120.0V/60.0Hz
→SR Off             No                OP2:120.0V/60.0Hz
   Charger Off                        _____
                                      Bat: 96.0V/ 96.0V
                                      Load:100/100/---%
```
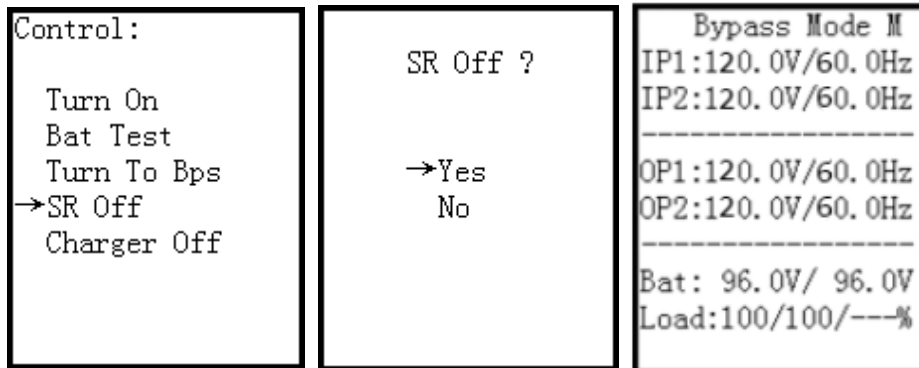
5) Charger Off / Charger On

a) "Charger Off" will be displayed under all operation modes when charger is working. If it is selected and confirmed, the screen will return back to home page. And charger will stop charging the battery.

```
Control:                    |
                            |    Charger Off ?
   Turn On
   Bat Test
   Turn To Bps
   SR Off                         →Yes
  →Charger Off                      No
```
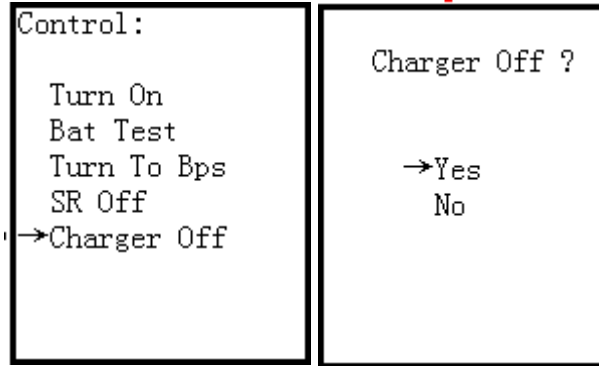
b) "Charge On" will be displayed under all operation modes when charger is turned off. If it is selected and con-firmed, the screen will return back to home page. And charger will charge the battery.

```
Control:                    |
                            |    Charger On ?
   Turn On
   Cancel Test
   Turn To Bps
   SR On                          →Yes
  →Charger On                      No
```
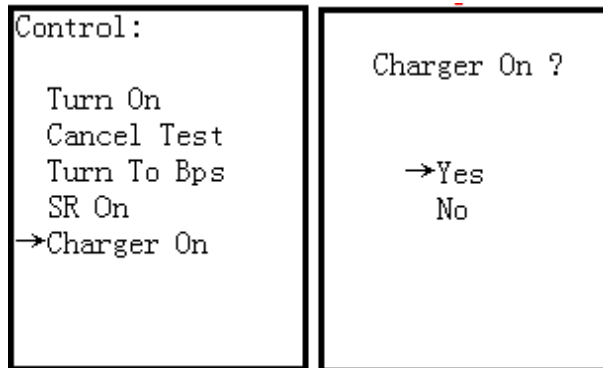
5.4.2 Measurement
Measurement displays the measurement value of the parameters such as voltage / current / frequency / power / capacity / time etc. Every UPS could display the measured value of the whole system. Press up or down button to explore the pages.

```
            ▼
                          Measurement:
     Control
                           →Local
   →Measurement             Master
                            Slave1
    Setting                 Slave2
                            Slave3
    Information

                            >>>
    Events
```
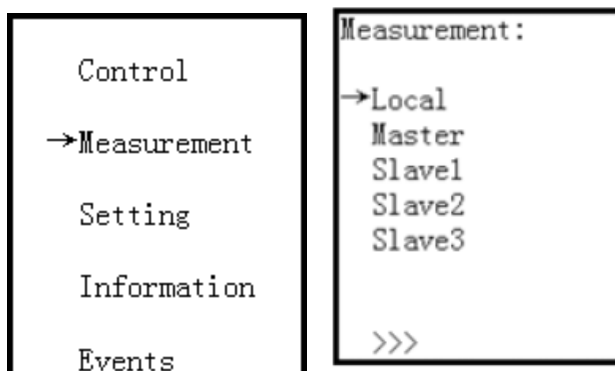
"Local" means the current UPS module. "Master" and "Slave<n>" means the other UPS module in this parallel system.

Measurement: →	Input:	Output	Current
Input Output		Volt1: 230.0V	
Bypass	Volt1: 230.0V	Volt2: 230.0V	Curr1: 15.0A
Load	Volt2: 230.0V	Volt3: 230.0V	Curr2: 15.0A
Bat	Volt3: 230.0V	Inv1: 230.0V	Curr3: 15.0A
	Freq: 50.0Hz	Inv2: 230.0V	<<<<
	Phase: 120	Inv3: 230.0V	
		Freq: 50.0Hz	

Volt1: 230.0V	Load:	Load:
Volt2: 230.0V	Sout1: 3300VA	Load1: 100%
Volt3: 230.0V	Sout2: 3300VA	Load2: 100%
Freq: 50.0Hz	Sout3: 3300VA	Load3:100%
Phase: 120	Pout1: 3300VA	<<<<<
	Pout2: 3300VA	
	Pout3: 3300VA	

5.4.3 Setting

This page is used to configure the parameter settings. It's necessary to enter password to enter submenus. The default password is 0729. There are submenus under the Setting, including Bypass, ECO, Output, System Time, Others and Battery, as shown below.

```
Control

Measurement

→Setting

Information

Events
```

```
Setting:

Enter Password:


  _ _ _ _
```

```
Setting:

 →Bypass
  ECO
  Output
  SystemTime
  Others
  Bat
```
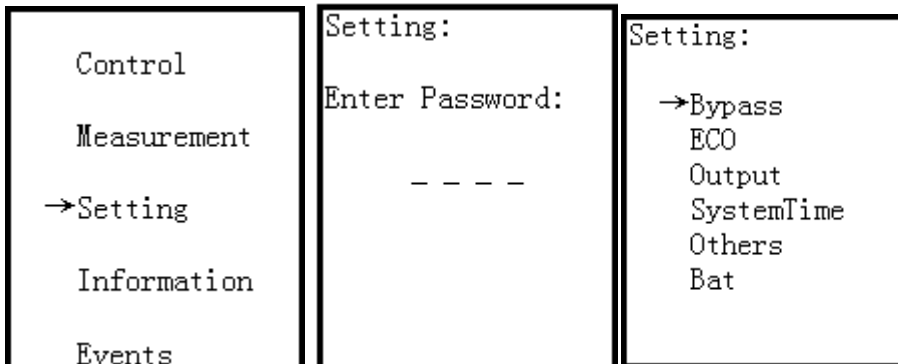
NOTE: Some settings will be only available in some operation modes. If the setting is not available in current mode, the LCD will show prompt message with "Item can't be set in this mode". Press any button or just wait for several seconds until this message fades.

1) Bypass setting (only available or effective on bypass mode and standby mode)

Interface	Description
Bypass: →Status: Open Enable HighLoss V:140V LowLoss V: 88V Highloss F:54Hz LowLoss F:46Hz	1. Status 1.1 Open/Forbid: Open: Bypass allowed. When selected, UPS will run at Bypass mode depending on bypass enabled/disabled setting. Forbid: Bypass not allowed. When selected, it's not allowed for running in By-pass mode under any situations. The default setting is Open. 1.2 Enable/Disable This option appears only when Bypass status is set to "Open". Enable: Bypass enabled. When selected, Bypass mode is activated. Disable: Bypass disabled. When selected, automatic bypass is acceptable, but "manual bypass" is not available. "Manual bypass" means users manually operate UPS to Bypass mode (for example, in AC mode turning off the UPS to Bypass mode). Then, the UPS will go to bypass mode but without output if it is turned off in AC mode. The default setting is Enable. NOTE: The following items are only available in bypass mode: 2. HighLoss V: Set the acceptable high voltage for bypass. Setting range is from (Rated Output Volt +6V) to 155V and the default value is 140V. 3. LowLoss V: Set the acceptable low voltage for bypass. Setting range is from 88V to (Rated Output Volt - 6V) and the default value is 88V. 4. HighLoss F: Set the acceptable high frequency for bypass. 50 Hz: Setting range is from 51Hz to 54 Hz. 60 Hz: Setting range is from 61Hz to 64Hz. The default value is 54.0Hz/64.0Hz. 5. LowLoss F: Set the acceptable high frequency for bypass. 50 Hz system: Setting range is from 46.0Hz to 49.0Hz. 60 Hz system: Setting range is from 56.0Hz to 59.0Hz. The default value is 46Hz/56Hz.

2) ECO setting(only available or effective on bypass mode, standby mode, Line mode and ECO mode)

Interface	Description

ECO:
 	
→Status :Disable
  HighLoss V:126V
  LowLoss V:114V
  Highloss F:52Hz
  LowLoss F:48Hz
	1. Status
	Enable: Enable ECO Function
	Disable: Disable ECO Function
	If ECO function is disabled, voltage range and frequency range for ECO mode still can be set, but it is meaningless unless the ECO function is enabled. The default setting is
	Disable.
	2. HighLoss V: High voltage point in ECO mode. The setting range is from (Rated Output Volt +6V) to (Rated Output Volt +12V) and the default setting is (Rated Output Volt +6V).
	3. LowLoss V: Low voltage point in ECO mode. The setting range is from (Rated Output Volt -12V) to (Rated Output Volt -6V) and the default setting is (Rated Output Volt -6V).
	4. HighLoss F: Set High frequency point for ECO mode.
	50 Hz system: Setting range is from 52Hz to 54Hz.
	60 Hz system: Setting range is from 62Hz to 64Hz. The default value is 52Hz/62Hz.
	5. LowLoss F: Set Low frequency point for ECO mode.
	50 Hz system: Setting range is from 46Hz to 48Hz.
	60 Hz system: Setting range is from 56Hz to 58Hz. The default value is 48Hz/58Hz.

3) Output setting (only available or effective on bypass mode and standby mode)

Interface	Description

Output:
 	
→Volt: 110V
  Freq: 60Hz
  CVCF: Disable
	1. Volt:
	100: Presenting the rated output voltage with 100Vac
	110: Presenting the rated output voltage with 110Vac
	115: Presenting the rated output voltage with 115Vac
	120: Presenting the rated output voltage with 120Vac
	127: Presenting the rated output voltage with 127Vac
	The default value is 120Vac.
	2. Freq:
	50Hz: The output frequency is setting for 50Hz.
	60Hz: The output frequency is setting for 60Hz. NOTE: CVCF should be enabled to modify this item.
	If CVCF is disabled, output frequency will be decided according to the latest normal utility frequency. If it is within 46Hz and
	54Hz, the output frequency will be 50.0Hz. If it is within 56Hz
	and 64Hz, the output frequency will be 60.0Hz.
	3. CVCF:
	Enable or disable converter mode.
	Enable: The output frequency will be fixed at 50Hz or 60Hz according to setting of "Freq". The input frequency could be from 46Hz to 64Hz.
	Disable: The output frequency will synchronize with the input frequency within 46~54 Hz for 50Hz system or within 56~64 Hz for 60Hz system.
	NOTE: CVCF means Constant Voltage and Constant Frequency.
	It represents converter mode.
	The default setting is Disable.

4) System Time setting (available or effective on all mode)

Interface	Description

ECO:
 	
→Status :Disable
  HighLoss V:126V
  LowLoss V:114V
  Highloss F:52Hz
  LowLoss F:48Hz
	1. Status
	Enable: Enable ECO Function
	Disable: Disable ECO Function
	If ECO function is disabled, voltage range and frequency range for ECO mode still can be set, but it is meaningless unless the ECO function is enabled. The default setting is
	Disable.
	2. HighLoss V: High voltage point in ECO mode. The setting range is from (Rated Output Volt +6V) to (Rated Output Volt +12V) and the default setting is (Rated Output Volt +6V).
	3. LowLoss V: Low voltage point in ECO mode. The setting range is from (Rated Output Volt -12V) to (Rated Output Volt -6V) and the default setting is (Rated Output Volt -6V).
	4. HighLoss F: Set High frequency point for ECO mode.
	50 Hz system: Setting range is from 52Hz to 54Hz.
	60 Hz system: Setting range is from 62Hz to 64Hz. The default value is 52Hz/62Hz.
	5. LowLoss F: Set Low frequency point for ECO mode.
	50 Hz system: Setting range is from 46Hz to 48Hz.
	60 Hz system: Setting range is from 56Hz to 58Hz. The default value is 48Hz/58Hz.
	It represents converter mode.
	The default setting is Disable.

5) Battery

Interface	Description
Bat: →DisChg Protect: 　　　　Enable Backup Time: 　　990 Minute Cold Start: 　　　　Enable Charger Test >>> Bat: →Low Volt: 11.2V UnderVolt:10.7V Periodic Test: 　　　　Enable Periodic Time: 　　　　30 Day >>> Bat: →BatNum:　　　8 ChgCur:　　04A Bat　Groups: 01 Bat　Cap:　9AH Factor:　　1.0 <<<	1. Dischg Protect: Enable or disable battery discharge protection. Enable: Battery discharge protection function is enabled. When UPS have been continuously working in "battery/battery test mode", the UPS will automatically shut down when the backup time set next is achieved. Disable: Battery discharge protection function is disabled. Backup Time: When discharge protection is enabled, this setting time can be counted. 1~990: The maximum discharge time can be set from 1 to 990 minutes. UPS will shut down to protect battery after backup time arrives when the "Dischg Protect" is enabled. If "Dischg protect" is disabled, then this setting does not make sense whatever the value is. The default value for this setting is 990 minutes. 2. Cold Start: Enable: UPS could be turned on without mains. Disable: UPS could not be turned on without mains. 3. Charger Test: Test the battery charger even without battery. After entering this item, it will pop up a screen showing "Yes" and "No". If selecting "Yes", the UPS will execute charger test. After test, the LCD screen will return to main scree (home page) and show battery voltages on BAT+ and BAT-. 4. Low Volt: Set battery low warning voltage. The setting range is from 10.5~11.5V per piece. The default value is 11.2V. 5. Under Volt: Set battery low cut off voltage. The setting range is from 9.6~10.7V per piece. The default value is 9.6V. 6. Periodic Test: Enable: UPS will test the battery periodically. Disable: UPS will not test the battery periodically. 7. Periodic Test: When periodic test is enabled, please set up battery test interval. The setting range is from 7 days to 99 days. The default value is 30-day. 8. BatNum: Set battery number in the system. The setting range is from 8 to 10 pieces. The default value is 8. 9. Chg Curr: Set maximum charge current. The setting range is from 0~40A. The default value is 4A. 10. Bat Groups: Set the number of battery group ranging from 1 to 10. The default value is 1 group ; 11. Bat Cap: Set the battery capacity such as 7AH, 9AH, 10AH, 12AH, 17AH, 26AH, 40AH, 65AH, 100AH and so on. The default value is 9AH. 12. Factor: Calibrate the displayed backup time by adjusting this multiplier fac-tor. The formulation is listed below:

5.4.5   Information

In Information page, you can check the serial number, firmware version, system configuration and settings of the UPS. There are submenus under the Information, including Identification, System and Battery, as shown below. Information displays all parameter setting value and status.

1) Identification shows the UPS Module name, serial no, UPS display version, controller module version, CPU version and system LCD version.

```
Information:          Identification:       Identification:
→Identification       Module Name:          Control Ver:
 System                 Arena 3-3             00.00
 Bat                   Serial NO:            Main Ver:
                        ********              30.01
                        ********              30.01
                       Display Ver:          MiniLcd Ver:
                        00.21                 02.36
                       >>>                   <<<
```
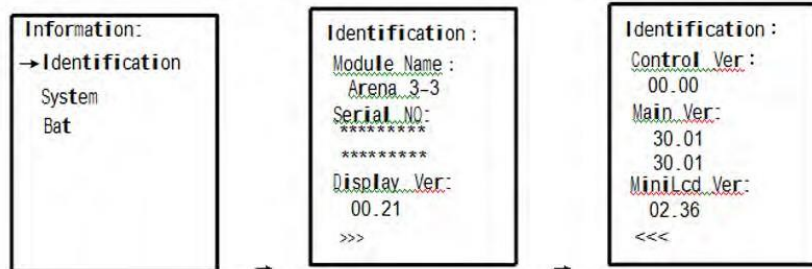
2) System shows the UPS configuration.

```
Information:          System: Bypass        System: ECO
 Identification       Status:      Open      Status:    Disable
→System                          Disable    HighLoss V:  240V
 Bat                  HighLoss V:   240V     LowLoss   V: 218V
                      LowLoss   V:  110V     HighLoss  F: 52Hz
                      HighLoss  F:  54Hz     LowLoss   F:  48Hz
                      LowLoss   F:  46Hz     >>>
                      >>>
```

```
Output:              System: TimeTemp      System: Others
 Volt:       230V     System Time:          Hot Standby:
 Freq:       Auto      2018-05-23                    Disable
 CVCF:     Disable     20:26:30             Audible Mute:
 >>>                   Wednesday                     Disable
                      Temperature:          Language:
                        28C                          English
                      >>>                   >>>
```

```
System: Others       System: Others
 Bat Mute:            Redunduancy:    00
          Disable     Parallel:    02+01
 Fault Mute:          Standard Mode:
          Disable                 Enable
 Bypass Mute:         <<<
          Disable
 >>>
```

3) Battery shows the battery configuration.

```
Information:            Bat:                    Bat:                    Bat:

  Identification        DisChg Protect:         Low Volt:  11.2V        BatNum:      16
  System                        Enable         UnderVolt: 10.7V         ChgCur:     04A
→Bat                    Backup Time:            Periodic Test:          BatGroups:   01
                                990 Minute              Enable         BatCap:     9AH
                        Cold Start:             Periodic Time:          Factor:     1.0
                                Enable                  30 Day         <<<
                        >>>                     >>>
```
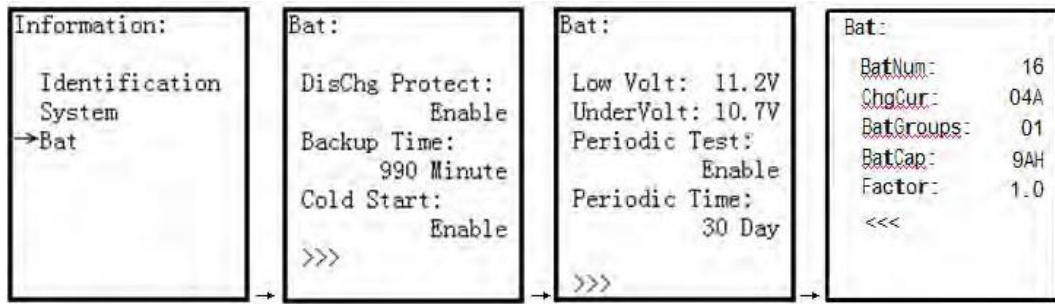
5.4.6 Events

In Event page, you can check the current events, history events and reset events.

1) Current Events

When an event occurs, it will display alarm code in Current Events page. If events exceed more than one page, press "⬆" or "⬇" button to read other events.


```
Events:                          Current Events:

  →Current  Events               Fault Events:
   History   Events                     No Fault
   Reset Events                 Warning Events:
                                 01:BatLow
                                 02:BatOpen
```

2) History Events

The detailed event information is saved in history events. It can save up to 160 pages in history events. When a warning occurs, it will display alarm code, alarm time and UPS mode. When a fault event occurs, it will display fault code, alarm time/date and UPS operation mode. (Refer to Chapter 6 Troubleshooting)


```
Events:                          History Events:

   Current Events                Fault:     10/160
  →History  Events               01:Bus Start Fail
   Reset Events                  Warning:
                                 01:BatLow
                                 02:BatOpen

                                       Bypass Mode
                                       2018-04-20
                                       11:16:33
```
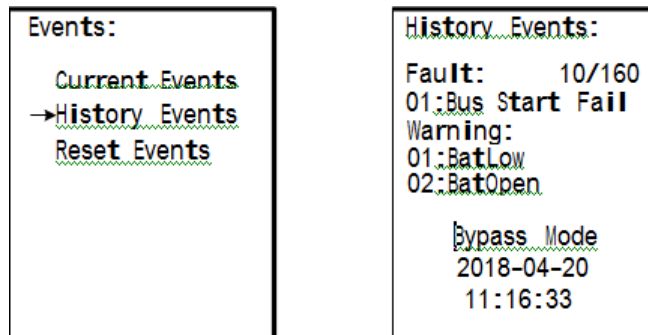
3) Reset Events

It's necessary to enter password to enter Reset Events page as shown below. Then, press "⬆" or "⬇" button to choose "Yes" to clear all history events or "No" to cancel the reset action. The default password is 0729.

5.5 Controller Module

Front View:
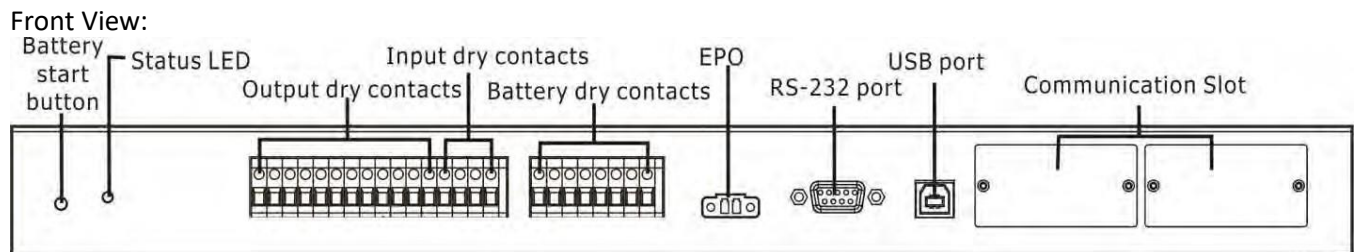
Back View:

EMBS port (external maintenance bypass signal port)
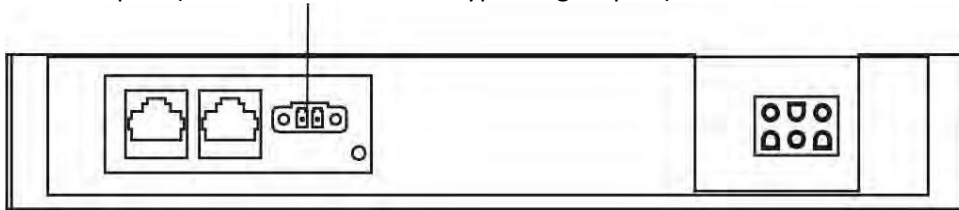
5.6 Battery Start Button

The controller module can be turned on without connecting to utility by pressing Battery Start Button.

5.6.1 Status LED

The green LED represents operation status of controller module.

Color	Status	Definition
Green	Flashing	Communications: On/0.1s, Off/0.4s. Un-Connection: On/0.1s, Off/0.4s.
	Off	ID conflict or Power off

5.7 Output Dry Contact Port

These 6 output dry contacts are normally open. It's also able to set the feature for each dry contact port through the Dry Contact Config tool. Please refer to next section for the detailed installation and configuration.
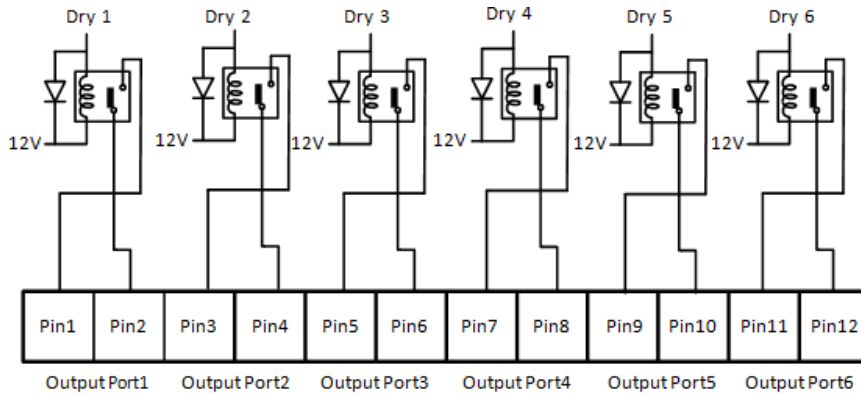
Figure 5-2 Dry Contact Output Port

5.8 Configuration

Step 1: Please access the www.power-software-download.com and select Communication Setting Tool icon. Please download and install this tool in your computer. After this tool is installed successfully, it will leave a short icon on the desktop.

Step 2: Start this tool in your computer. Then, it will pop up a screen as below.
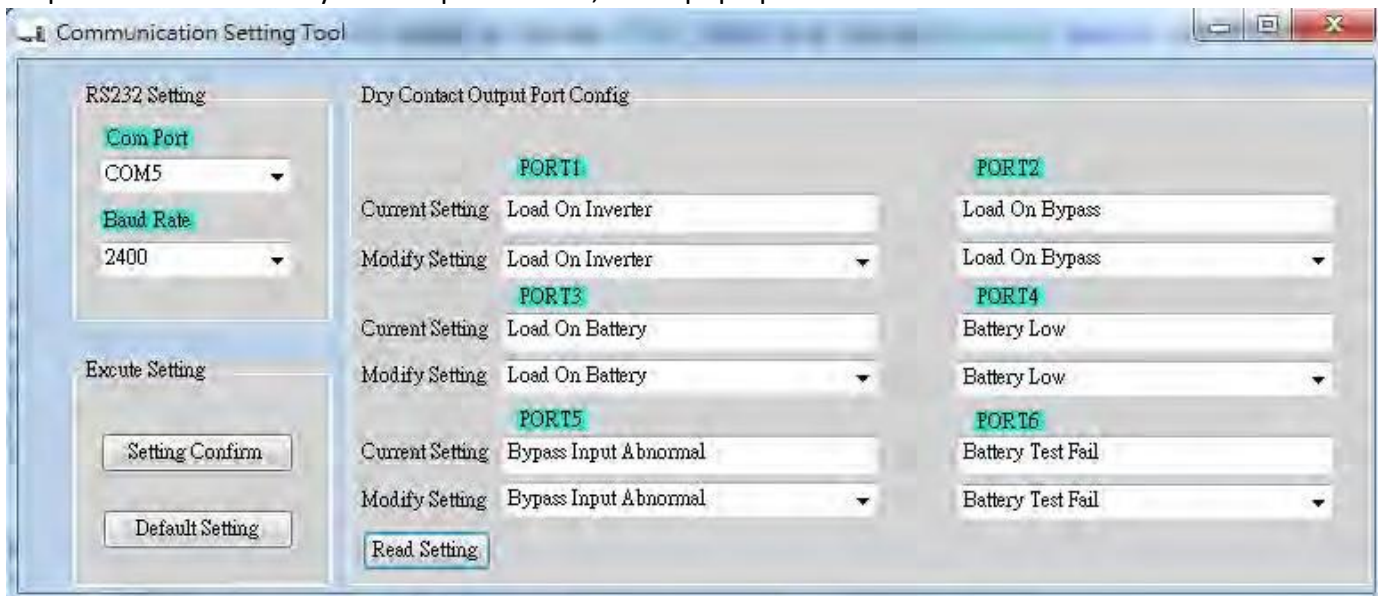
Step 3: Click "Read Setting" button to check the current setting of the output dry contact port.
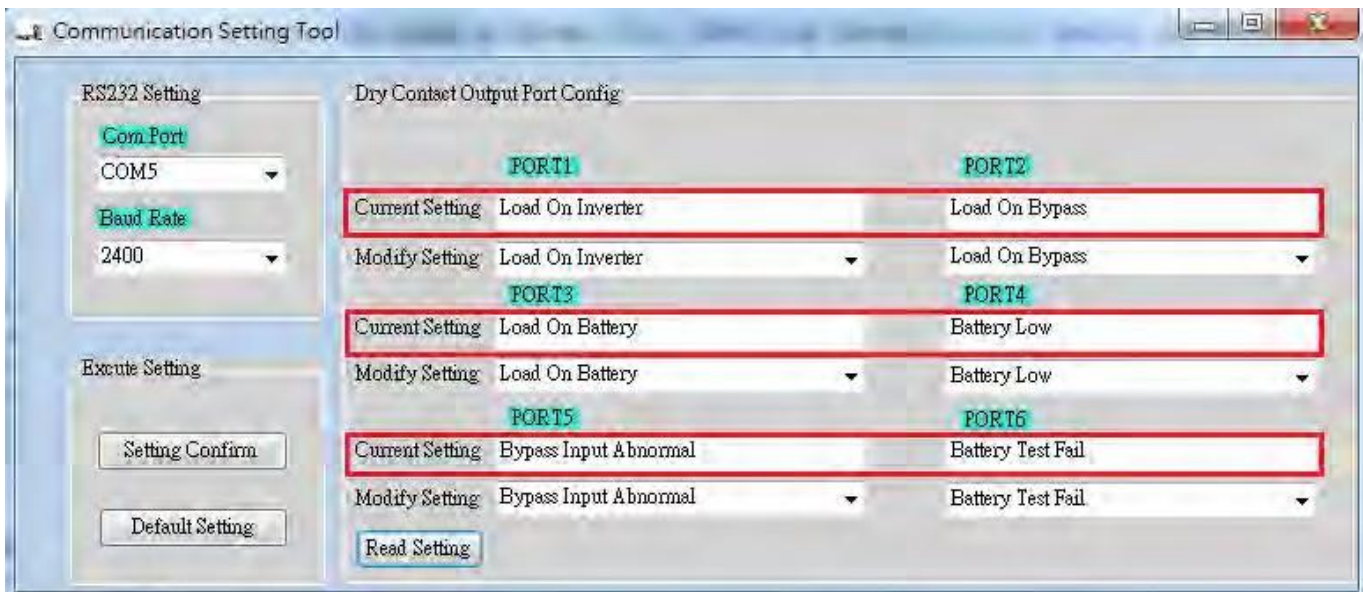
Step 4: Check all settings. There are 18 options to select for contact and listed in Table 5-1. Once output dry contact settings are selected, click "Setting Confirm" button
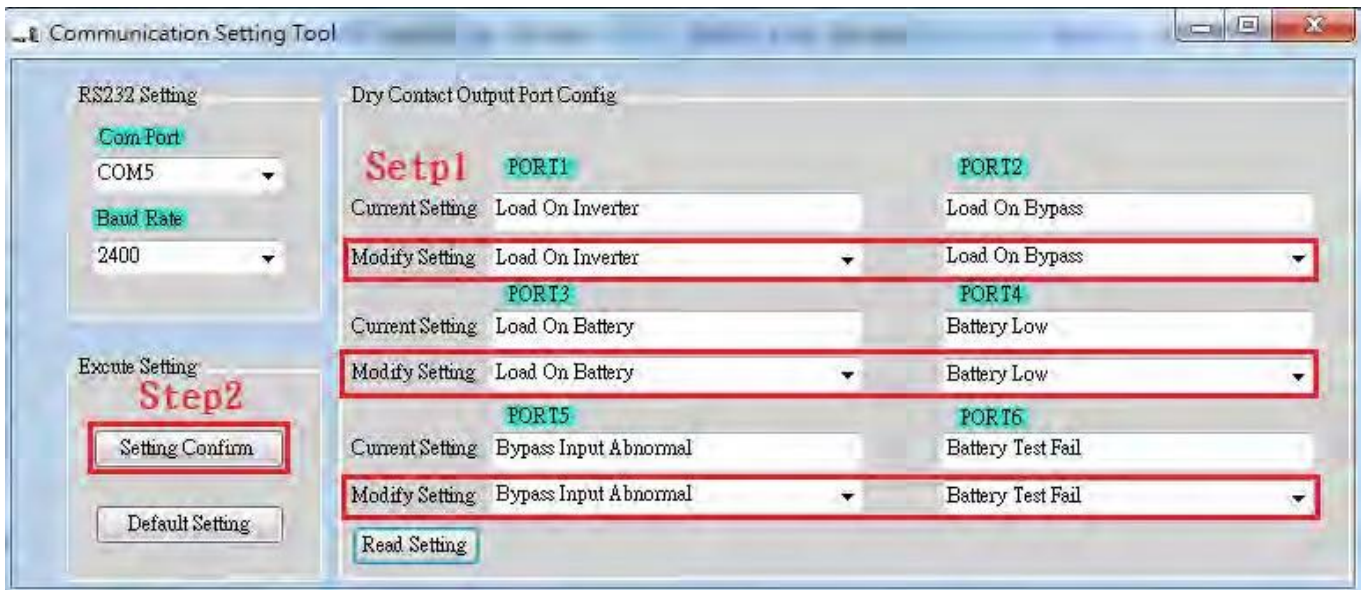
Table 5-1: Output Dry Contact List

Contact	Message	Description
1	Load on inverter	The UPS is working normally.
2	Load on bypass	The UPS is in Bypass mode.
3	Load on Battery	The UPS is in Battery mode.
4	Low battery	The battery voltage is low.
5	Bypass input abnormal	The bypass voltage or frequency is abnormal.
6	Battery test failure	Performs the battery test. The battery test fails.
7	Internal communication failure	DSP and MCU stop communication in UPS module.
8	External parallel communication failure	Communication error between UPS modules.
9	Output overload warning/shutdown	Connected load is over rated output of the UPS.
10	UPS module fault shutdown	The module fails and the UPS shuts down.
11	UPS module warning	The module has errors, but the UPS can still function normally.
12	EPO Active	Urgently power off the UPS.
13	Maintain Bypass	The UPS transfers to Maintain bypass mode.
14	Module over temperature warning/shutdown	The temperature is too high.
15	Battery replacement	Overdue for battery replacement (Compared with system setup.)
16	Bypass static switch fault	The bypass "static transfer switch" is abnormal.
17	Line AC fail	Power failure
18	Redundancy failure	Redundancy setting error.

Step 5: "Default setting" button: It's to reset all configurations back to default value.
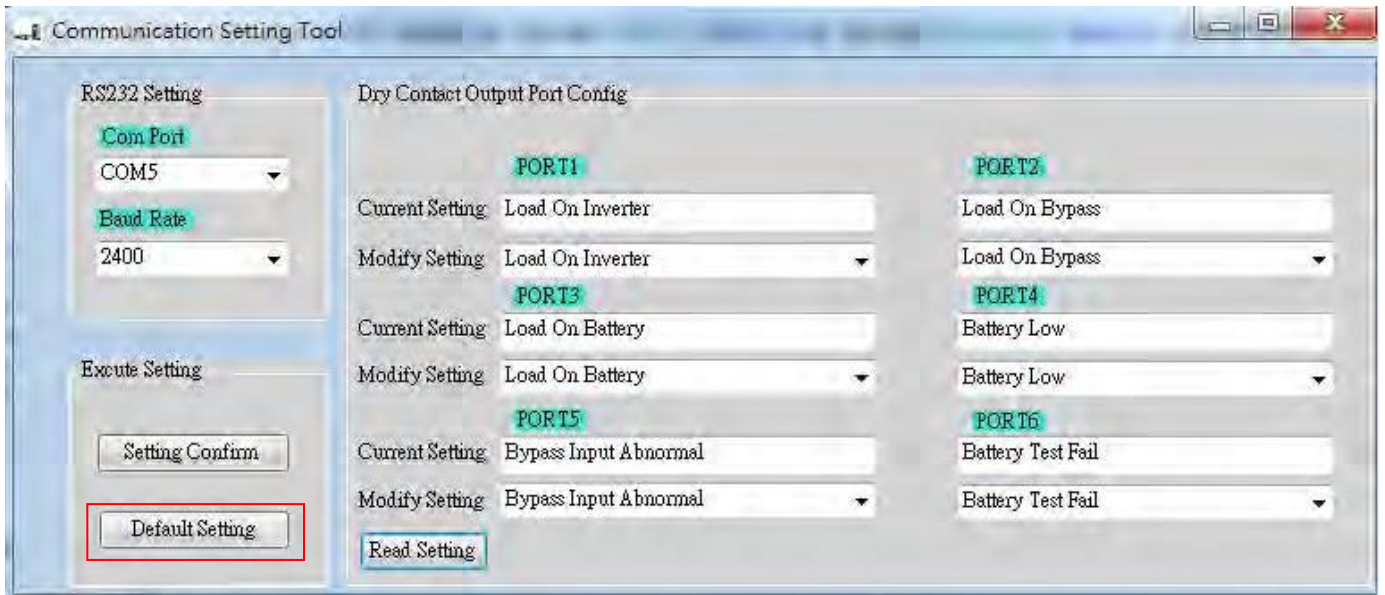
5.9 Input Dry Contact Port

There are two sets of input dry contact to receive external signals for UPS to take response.
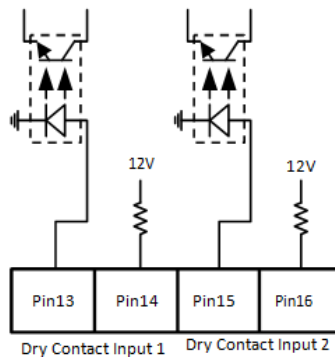
5.10 Battery Dry Contacts (Option)

This port is to detect the temperature of external battery packs. It's necessary to install "sensor kit" (optional accessory) when using these battery dry contacts.
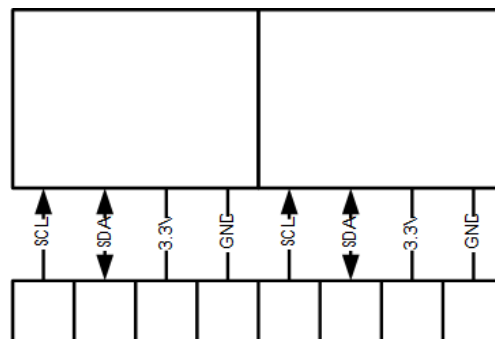
5.11 EPO Port

This UPS is equipped with an Emergency Power off (EPO) port that can be operated by a remote contact assigned by the user. Users can set the logic (N.C or N.O) of this EPO function through LCD panel.
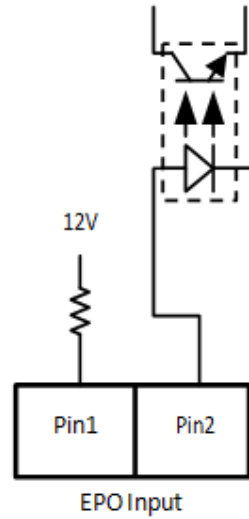
Table 5-2 Description of EPO port

EPO logic setting	Position	Description
N.C (Default)	Pin1 & Pin2	EPO activated when Pin1 & Pin2 is open status.
N.O	Pin1 & Pin2	EPO activated when Pin1 & Pin2 is short circuited.

If EPO logic setting is Normal Closed (N.C), EPO is triggered when pin1 and pin2 is open. Otherwise, EPO logic setting is Normal Opened (N.O). EPO is triggered when pin1 and pin2 is connected.

5.12 External Maintenance Bypass Signal Port (EMBS)

On the back panel of controller module, there is an external maintenance bypass signal port. The jumper on the EMBS port is electrically in series with the microswitch under the MBS cover on the UPS. If the jumper is missing the UPS will be force to static bypass. This port can be connected to external maintenance bypass switch. If not in use, please connect the terminal port as below for UPS normal operation.
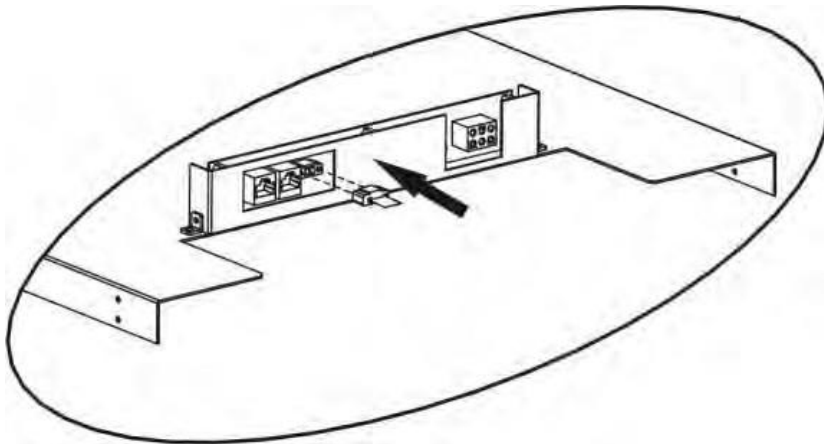
5.13 Other Communication Interfaces

5.13.1 Local Communication Ports – RS232 & USB

Note: The RS232 and USB ports can't work simultaneously.

5.13.2 Communication Slot

The SNMP card, Modbus card or AS400 card can be inserted into this slot to work with the UPS.

6 Service

This chapter introduces how to replace the UPS module.

Warning:

1. Only the customer service engineers can do this service.
2. Remove the UPS modules from top to bottom, so as to prevent cabinet from toppling due to high center of gravity.

6.1 UPS Module Replacement

Warning:

- Confirm UPS is in Line mode or Bypass mode.
- Confirm at least one UPS module remains in the UPS cabinet after one UPS module is removed.
- If all UPS modules have to be removed, the replacement MUST be under Maintenance Bypass Operation Mode.

1. The ALARM LED (RED) is lit on the UPS module to indicate the UPS module output is off and disconnected from UPS system.
2. Use a screwdriver to remove the four screws from fixing holes.
3. Two people pull out together and remove the UPS module from its slot together.
4. After servicing the module, push the module into the cabinet and tighten the screws on both sides. If there are more than one UPS module to re-install, please wait 30-second before installing another module.
5. The re-installed UPS module will be turned on automatically when UPS is in line mode.

7 Troubleshooting

Most of the fault and warnings need to be released by authorized service personnel. Few of them can be solved by users themselves.

7.1 Fault Code Descriptions

Fault 01:Bus Start Fail	The rectifiers could not start within specified time due to low DC-bus voltage.	Turn off UPS and then restart the UPS. If it fails again, contact service personnel.
Fault 02:Bus Over Volt	DC-bus voltage exceeds the maximum voltage.	Contact service personnel.
Fault 03:Bus Under Volt	DC-bus voltage is lower than the minimum value.	Contact service personnel.
Fault 04:Bus Unbalance	DC-bus voltage is not balanced	Contact service personnel.
Fault 05:Bus Volt Vary	DC-bus voltage changes too fast.	Contact service personnel.
Fault 06:PFC Over Curr	PFC current is higher than the maximum current.	Contact service personnel.
Fault 07:Over Temperature	The temperature in UPS is higher than 85°C. At this time, the UPS is off.	Check if the ambient temperature is over specification. Or contact service personnel.
Fault 08:Batt SCR Short	Battery SCR is short circuited.	Contact service personnel.
Fault 11:Inv Start Fail	Inverter voltage cannot reach desired voltage within specified time.	Turn off UPS and then restart it. If it fails again, contact service personnel.
Fault 12:Inv Volt High	Inverter voltage is too high.	Contact service personnel.
Fault 13:Inv Volt Low	Inverter voltage is too low.	Contact service personnel.
Fault 14:Inv Short R	R phase inverter output is short circuited	Contact service personnel.
Fault 15:Inv Short S	S phase inverter output is short circuited	Contact service personnel.
Fault 16:Inv Short T	T phase inverter output is short circuited	Contact service personnel.
Fault 17:Inv Short RS	R-S inverter output is short circuited	Contact service personnel.
Fault 18:Inv Short ST	S-T inverter output is short circuited	Contact service personnel.
Fault 19:Inv Short TR	T-R inverter output is short circuited	Contact service personnel.
Fault 1A:Nega Power R	R phase inverter output negative power is beyond the range.	Contact service personnel.
Fault 1B:Nega Power S	S phase inverter Output Negative Power is beyond the range.	Contact service personnel.

Fault 1C:Nega Power T	T phase inverter Output Negative Power is beyond the range.	Contact service personnel.
Fault 21:Inv STS Open	Inverter relay or STS is open.	Contact service personnel.
Fault 22:Inv STS Short	Inverter relay or STS is short circuited.	Contact service personnel.
Fault 23:Op STS Open	Output relay or STS is open.	Contact service personnel.
Fault 24:Op STS Short	Output relay or STS is short circuited.	Contact service personnel.
Fault 25:Wiring Fail	The wiring is wrong.	Contact service personnel.
Fault 26:Bat Fuse Open	Battery fuse is broken.	Contact service personnel.
Fault 27:Charge Short	The battery is short circuited.	Contact service personnel.
Fault 31:Para Comm Fail	The communication between UPS modules is interrupted.	Contact service personnel.
Fault 32:Host Line Fail	The host line between UPS modules fails.	Contact service personnel.
Fault 33:OP Curr Unbal	The load share line between UPS modules fails	Contact service personnel.
Fault 34:Ver Incompat	The firmware version between UPS modules is incompatible.	Contact service personnel.
Fault 41:DSP Comm Fail	The internal communication in UPS module is interrupted.	Contact service personnel.
Fault 42:Over load	Heavy overload causes UPS fault.	Reduce some load.
Fault 43:Charger Fail	Battery polarity is connected reversely or charger voltage is abnormal.	
Fault 44:Model Fault	UPS model is not able to identify.	Contact service personnel.
Fault 45:Mcu Comm Fail	As stated.	Contact service personnel.
Fault 46:CT Satiation	Load current sensor is abnormal.	Contact service personnel.
Fault 47:Fan Fault	The two fans are stuck or broken.	Make sure fans work well when UPS is working.
Warning 01:BatLow	Battery voltage is low.	Charge the battery when the mains is normal.
Warning 02:BatOpen	Battery is not connected.	1. Check battery breaker status. 2. Check if the battery connection is well connected. 3. Check the setting of Nominal Battery voltage. 4. Contact service personnel if necessary
Warning 03:BatPhaseLoss	The voltage between positive and negative battery is different.	Check the battery connection.
Warning 04:LineIpNLoss	Neutral loss	Check if the Neutral connection is well and contact service personnel.
Warning 05:LinePhaseError	As stated	Check if the Mains phase sequence is correct and contact service personnel.

Warning 06:LineVoltError	As stated.	Check if the input wiring is correct or contact service personnel
Warning 07:LinePhaseFail	As stated.	Contact service personnel
Warning 08:OverCharge	Battery voltage is too high.	Check the setting of Nominal Battery voltage and contact service personnel.
Warning 09:ChgFail	Battery voltage is detected as low level. However, the charge is able to work.	Contact service personnel.
Warning 0A:OverTemp	The temperature in UPS is higher than 75°C. At this time, the UPS is still running.	Check if the ambient temperature is over specification. Or contact service personnel.
Warning 0B:PFCCurUnbal	PFC current is unbalance.	Contact service personnel
Warning 0C:FanError	Fan error.	Check if the fan is blocked or contact service personnel.
Warning 0D:LineFuseOpen	Fuse is broken.	Turn off UPS and replace a good one with the broken one. If UPS fails again after you do this, contact the service personnel.
Warning 0E:IICEepromFail	EEPROM operation error	Contact service personnel.
Warning 11:BypassIpNLoss	Neutral loss.	Check if the Neutral connection is well and contact service personnel.
Warning 12:BpsPhaseError	Bypass phase error.	Check if the Bypass phase sequence is correct and contact service personnel.
Warning 13:BpsVoltError	Bypass voltage error.	Check the wiring or contact service personnel
Warning 14:BpsPhaseFail	As stated.	Contact service personnel
Warning 15:OverLoad	In line mode, the connected devices are demanding more power than the UPS can supply	Reduce some load and check output Load-Capacity in specification.
Warning 16:OverLoadLock	The connected devices are demanding more power than the UPS can supply. UPS will transfer to bypass mode from line mode.	Reduce some load and check output Load-Capacity in specification
Warning 17:EpoActive	Check the EPO connector.	Check if the connector is loose when EPO acts abnormally.
Warning 18:MaintainOpen	The UPS is in maintenance mode.	Check if EMBS port is not connected to 2-pin EPO port on the controller module when it acts abnormally.
Warning 19:LineDiff	Each module gets different line voltage when they are in parallel.	Contact service personnel.
Warning 1A:BypassDiff	Each module gets different bypass voltage when they are in parallel.	Contact service personnel.
Warning 1B:InvCurUnbal	As stated.	Contact service personnel.

Warning 1C:BpsUnstable	UPS switches between bypass mode and standby mode five times in 30 minutes due to abnormal utility.	Contact service personnel.
Warning 1D:RedundancyFail	As stated.	Check if redundancy setting is correct or not. Then, contact service personnel.
Warning! Battery Age Alert	Battery life is expired.	Check if the battery has been used over its service age. Or contact service personnel.
Warning! Dry Contact Input Alarm 1	As stated.	Remove the node
Warning! Dry Contact Input Alarm 2	As stated.	Remove the node
Warning! COMM Module SPS 1 Fault	As stated.	Contact service personnel.
Warning! COMM Module SPS 2 Fault	As stated.	Contact service personnel.

7.2 Control Panel Audible Alarms

Audio Type	Description	Can be muted
Power on/off	Buzzer sounds two seconds	No
Bypass Mode	Beeping once every 2 minutes	Yes
Battery / Battery-test mode (normal battery voltage)	Beeping once every 4 seconds	Yes
Battery / Battery-test mode (low battery voltage)	Beeping once every second	Yes
Fault	Beeping continuously	Yes
Warnings (except overload)	Beeping once every second	Yes
Overload	Beeping once every second	No

8 Specifications

M90S-2S

	MODEL NUMBER	M90S-2S6K
CAPACITY	Power Rating	6kVA/6kW
INPUT	Voltage/frequency nominal	120/208V or 120/240V & 50/60Hz auto-sensing (2PH+N+G)
	Voltage/frequency range	121–253VAC* (L-L) / 40–70Hz
OUTPUT	Voltage / Frequency	120/208V or 120/240V & 50/60Hz ± 0.1Hz; (2PH+N)
	THD (full load)	< 2%
	Efficiency	Up to 98% ECO mode, 93% online mode
	Overload capacity	105%-110% for 60min; 110%-125% for 10min; 126%-150% for 1min; >150% for 200ms
BATTERY SYSTEM	Nominal voltage	+/-96V
	Max charging (adjustable)	4A
	Optional Battery Enclosure	7 Slots for additional battery modules
DIMENSIONS	Power module	16.3"W x 24" D x 5.2"H (3U) / 49.6 lbs
	Battery module	16.3"W x 24"D x 5.2"H (3U) / 115 lbs
& WEIGHT	Battery Enclosure	17.4"W x 33.7"D x 45.5"H (24U) / 162 lbs
ENVIRONMENT	Temperature	0–40°C (32–104°F)**
	Altitude	5,200 ft above sea level**
	Audible noise	< 58dBA at 1m
APPROVALS		UL-1778 (TUV), cUL, FCC A, RoHS
WARRANTY		3 year electronics, 3 year battery (USA and Canada)
COMMUNICATIONS INTERFACE		RS-232, USB, EPO, (1) intelligent slot for optional cards (Web/SNMP, Relay, Modbus)
INCLUDED IN BOX		User manual, USB cable, RS-232 cable, ViewPower Software
AVAILABLE OPTIONS		EL14-30P Line Cord (6kVA), Receptacle Panel, Extended Battery Cabinet, 5 year extended warranty, output distribution, 4-post rail kit, 2-post shelf kit

*Depending on load level **Battery Life is reduced above 30°C, UPS Capacity derates above 30°C and 5,200 ft above sea level.*

M90S-4S

	MODEL NUMBER	M90S-4S6K	M90S-4S12K
CAPACITY	Power Rating	6kVA/6kW	12kVA/12kW
INPUT	Voltage / frequency nominal	120/208V or 120/240V & 50/60Hz auto-sensing (2PH+N+G)	
	Voltage / frequency range	121–253VAC* (L-L) / 40–70Hz	
OUTPUT	Voltage & Frequency	120/208V or 120/240V & 50/60Hz ± 0.1Hz; (2PH+N)	
	Efficiency / THD (full load)	Up to 98% ECO mode, 93% online mode / < 2%	
	Overload capacity	105%-110% for 60min; 110%-125% for 10min; 126%-150% for 1min; >150% for 200ms	
BATTERY SYSTEM	Nominal voltage	+/-96V	
	Max charging (adjustable)	4A	8A
MODULE DIMENSION	Power module	16.3"W x 24"D x 5.2"H / 49.6 lbs	
& WEIGHT	Battery module	16.3"W x 24"D x 5.2"H / 115 lbs	
SYSTEM ENCLOSURE	Dimensions & Weight	UPS 17.4"W x 33.7"D x 33"H (20U) & 150lbs / EBC 17.4"W x 33.7"D x 45.5"H & 162lbs	
	Maximum Capacity	12kVA	
	Enclosure Capacity	4 slots including 2 universal slots + 2 battery only slots	
	Optional Battery Enclosure	7 slots for additional battery modules	
	Output Connections	Terminal blocks and/or up to 2 receptacle panels	
ENVIRONMENT	Temperature	0–40°C (32–104°F)**	
	Altitude	5,200 ft above sea level**	
	Audible noise	< 58dBA at 1m	
APPROVALS		UL-1778 (TUV), cUL, FCC A, RoHS	
WARRANTY		3 year electronics, 3 year battery (USA and Canada)	
COMMUNICATIONS INTERFACE		RS-232, USB, Dry Contacts, EPO, (2) intelligent slot for optional cards (Web/SNMP, Relay, Modbus)	
INCLUDED IN BOX		User manual, USB cable, RS-232 cable, ViewPower Software, anchor brackets	

*Depending on load level **Battery Life is reduced above 30°C, UPS Capacity derates above 30°C and 5,200 ft above sea level.*

M90S-6S

MODEL NUMBER		M90S-6S6K	M90S-6S12K	M90S-6S18K	M90S-6S24K
CAPACITY	Power Rating	6kVA/6kW	12kVA/12kW	18kVA/18kW	24kVA/24kW
INPUT	Voltage/Frequency Nominal	120/208V or 120/240V // 50/60Hz auto-sensing (2PH+N+G)			
	Voltage/Frequency Range	121–253VAC* (L-L) / 40–70Hz			
OUTPUT	Voltage & Frequency	120/208V or 120/240V & 50/60Hz ± 0.1Hz; (2PH+N)			
	Efficiency / THD (full load)	Up to 98% ECO mode, 93% online mode / < 2%			
	Overload Capacity	105%-110% for 60min; 110%-125% for 10min; 126%-150% for 1min; >150% for 200ms			
BATTERY SYSTEM	Nominal Voltage	+/-96V			
	Max charging (adjustable)	4A	8A	12A	16A
MODULE DIMEN-SION	Power Module	16.3"W x 24"D x 5.2"H / 49.6 lbs			
	Battery Module	16.3"W x 24"D x 5.2"H / 115 lbs			
SYSTEM ENCLOSURE	Dimensions & Weight	17.4"W x 33.7"D x 45.5"H (UPS & BAT ENC) // UPS=180lbs / Battery=162lbs			
	Maximum Capacity	24kVA			
	Enclosure Capacity	6 Slots including 4 universal slots + 2 battery only slots			
	Optional Battery Enclosure	7 Slots for additional battery modules			
	Output Connections	Terminal blocks and/or up to 4 receptacle panels			
ENVIRONMENT	Temperature	0–40°C (32–104°F)**			
	Altitude	5,200 ft above sea level**			
	Audible noise	< 58dBA at 1m			
APPROVALS		UL-1778 (TUV), cUL, FCC A, RoHS			
WARRANTY		3 year electronics, 3 year battery (USA and Canada)			
COMMUNICATIONS INTERFACE		RS-232, USB, Dry Contacts, EPO, (2) intelligent slot for optional cards (Web/SNMP, Relay, Modbus)			
INCLUDED IN BOX		User manual, USB cable, RS-232, ViewPower Software, anchor brackets			
AVAILABLE OPTIONS		L14-30P Line Cord (6kVA), Receptacle Panels (2 max), Extended Battery Cabinet, 5 year extended warranty, output distribution, 4-post rail kit, 2-post shelf kit.			

*Depending on load level **Battery Life is reduced above 30°C, UPS Capacity derates above 30°C and 5,200 ft above sea level.*

9 Obtaining Service

If the UPS requires Service:
1. Use the TROUBLESHOOTING section in this manual to eliminate obvious causes.
2. Verify there are no circuit breakers tripped.
3. Callyourdealerforassistance.Ifyoucannotreachyourdealer,oriftheycannotresolvetheproblem,callXtreme Power Conversion Corp Technical Support at 800.582.4524. Technical support inquiries can also be made at support@xpcc.com. Please have the following information available BEFORE calling the Technical Support Department:
   - Your name and address.
   - The serial number of the unit.
   - Where and when the unit was purchased.
   - All of the model information about your UPS.
   - Any information on the failure, including LED's that may or may not be illuminated.
   - A description of the protected equipment, including model numbers if possible.
   - A technician will ask you for the above information and, if possible, help solve your problem over the phone. In the event that the unit requires factory service, the technician will issue you a Return Material Authorization number (RMA).

If you are returning the UPS to Xtreme Power for service, please follow these procedures:
1. Pack the UPS in its original packaging. If the original packaging is no longer available, ask the Technical Support Technician about obtaining a replacement set of packaging material. It is important to pack the UPS properly in order to avoid damage in transit. Never use Styrofoam beads for a packing material.
2. Include a letter with your name, address, daytime phone number, RMA number, a copy of your original sales receipt, and a brief description of the problem.
3. Mark the RMA number on the outside of all packages. Xtreme Power cannot accept any package without the RMA number marked on the outside of the boxes.
4. Return the UPS by insured, prepaid carrier to the address provided by the Technician.
5. Refer to the Warranty statements in this manual for additional details on what is covered.

10 Xtreme Power Conversion Limited Warranty

Xtreme Power Conversion (XPC) Corporation warrants Xtreme Power Conversion equipment, when properly applied and operated within specified conditions, against faulty materials or workmanship for a period of **three years for M90S-Series products** from the date of purchase. XPC Corporation warrants **batteries for a period of three years** from the date of purchase. For equipment sites within the United States and Canada, this warranty covers repair or replacement, at the sole discretion of XPC Corporation. The customer is responsible for the costs of shipping the defective product to XPC Corporation. XPC Corporation will pay for ground shipment of the repaired or replacement product. This warranty applies only to the original purchaser.

If equipment provided by XPC Corporation is found to be **Dead-on-Arrival (DOA)**, the customer must request and received a **Return Material Authorization (RMA)** number. DOA equipment is defined as equipment that does not properly function according to user documentation when initially received and connected in conjunction with proper procedures as shown in the user documentation or via support provided by XPC Corporation personnel or authorized agents.

This warranty shall be void if (a) the equipment is repaired or modified by anyone other than XPC Corporation or a XPC Corporation approved third party; (b) the equipment is damaged by the customer, is improperly used or stored, is subjected to an adverse operating environment, or is operated outside the limits of its electrical specifications; or (c) the equipment has been used or stored in a manner contrary to the equipment's operating manual, intended use or other written instructions. Any technical advice furnished by XPC Corporation or a XPC Corporation authorized representative before or after delivery with regard to the use or application of Xtreme Power Conversion equipment is furnished on the basis that it represents XPC Corporations best judgment under the situation and circumstances, but it is used at the recipient's sole risk.

EXCEPT AS STATED ABOVE, XPC Corporation DISCLAIMS ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCEPT AS STATED ABOVE, IN NO EVENT WILL XPC Corporation BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF Xtreme Power Conversion EQUIPMENT, including but not limited to, any costs, lost profits or revenue, loss of equipment, loss of use of equipment, loss of software, loss of data, cost of substitutes, or claims by third parties. Purchaser's sole and exclusive remedy for breach of any warranty, expressed or implied, concerning Xtreme Power Conversion equipment, and the only obligation of XPC Corporation under this warranty, shall be the repair or replacement of defective equipment, components, or parts; or, at XPC Corporations sole discretion, refund of the purchase price or substitution of an equivalent replacement product.

11 Xtreme Power Conversion Load Protection Policy

THIS POLICY IS NOT A WARRANTY. REFER TO **THE XPC CORPORATION, INC. LIMITED WARRANTY** FOR INFORMATION CONCERNING THE WARRANTY FOR YOUR XPC PRODUCT. THE LIMITATIONS AND CONDITIONS CONTAINED IN THIS POLICY DO NOT AFFECT **THE TERMS OF THE XPC LIMITED WARRANTY.**

Definitions:
1. "Product" means a Standard 120, 208, or 240 Volt power protection device that is used in the United States and Canada. This policy does not include custom manufactured products.
2. "Power Disturbance" means an AC power line transient (telephone line or Local Area Network, if applicable), spike or surge.
3. "Connected Equipment" properly connected electronic equipment
4. "Fair Market Value" of damaged Connected Equipment as determined by XPC shall be the lower of (a) the average price the same or similar items are being sold for on eBay, (b) the price list of Orion Blue Book (or if such price list is no longer published, a published or announced price list reasonably selected by XPC), (c) the lowest price the same or similar items can be purchased for in the United States or (d) the total amount of all payment(s) you have or are entitled to receive from insurance, other warranties, extended warranties, a legal liability claim or from other sources or persons for the damaged Connected Equipment.
5. "Purchaser" means the person or entity that originally purchased the Product from an authorized reseller or distributor of XPC Products.

The Purchaser of this Product is protected, for the term of the XPC Limited Warranty, against certain losses caused by a Power Disturbance for properly connected electronic equipment (referred to as the "Connected Equipment") subject to certain terms and conditions provided below.

This policy applies only to the original purchaser of the Product. If the Product is transferred or sold to another person or entity, this policy is void.

Load Protection Policy Dollar and Period Limits

For purchasers that meet the qualifications and conditions set forth in this policy, XPC will provide reimbursement (cost of repair or fair market value as determined by XPC) during the period limits and up to the dollar limits stated as follows:

PRODUCT	DOLLAR LIMIT	PERIOD OF COVERAGE
XVT, XST, S70	25,000	Term of XPC Limited Warranty
V80, P80, P80, NXRT, NXRT, P91, P90L, P90g, P90Lg, P91, T90, T91, TX90, TX90i, XPRT, M90S	50,000	Term of XPC Limited Warranty

This Load Protection Policy is not deemed "first dollar" coverage. XPC's obligation is reduced by any amounts that the Purchaser is entitled to recover, from other sources regarding the Connected Equipment, including, but not limited to, insurance, other warranty, extended warranty, or legal liability, regardless of whether or not the Purchaser makes a claim for recovery.

Eligibility for Coverage Under the Load Protection Policy

The Product must be registered on the XPC website, www.xpcc.com, within 10 days of purchase. All re-quired information must be provided, and Purchaser should retain a copy for Purchaser's records. When registering on the website, Purchaser must list all connected equipment that is directly connected to the product. Only those devices registered in that manner will be covered.
2. All Connected Equipment must be UL or CSA approved.

3. The Product must be plugged into a properly wired and grounded outlet. Use of input surge devices, extension cords, adapters, ground wires, or electrical connections not manufactured by XPC voids the XPC Load Protection Policy. No other surge protection device may be connected to the output sockets of the Product. The installation must comply with all applicable electrical and safety codes set forth pursuant to the NEC.

4. The Product must have undeniable physical evidence of a Power Disturbance that directly and proximately caused the damage;

5. The Connected Equipment must have been damaged by a Power Disturbance on a properly installed, grounded, and National Electric Code, ("NEC"), code-compliant 120, 208, 240 Volt AC power line in the United States or Canada, by a Power Disturbance on standard telephone land line or PBX telephone equipment line that is properly installed and connected to an RJ11 port on the Product; or by a Power Disturbance on a standard Local Area Network connection that is properly installed and connected to an RJ45 port on the Product and (d) is directly plugged into, and properly connected to, the Product in its original condition which was properly operated when a Power Disturbance passed through the Product and (i) exhausts the protection capacity of the Product or (ii) damages the Product.

6. The Load Protection Policy does not apply if the Product has been operated in a failure mode or not in compliance with XPC operating instructions in the Product user's manual, or if the Connected Equipment has not been operated in compliance with the instructions and manuals of its manufacturer/vendor.

7. This policy is null and void if, XPC determines, in its sole discretion, that the Product has been tampered with or altered in any way.

What is Not Covered Under the Load Protection Policy:
The following damage is not covered by this Policy:
1. Restoration of lost data and reinstallation of software.
2. Damage from a cause other than AC power-line transients, except for damage due to telephone line, Local Area Network, or CATV transients, which is covered only if the Product offers such protection.
3. DAMAGE CAUSED BY FAILURE TO PROVIDE A SUITABLE INSTALLATION ENVIRONMENT FOR THE PRODUCT (INCLUDING, BUT NOT LIMITED TO, LACK OF A PROPER SAFETY GROUND).
4. Damage caused by the use of the Product for purposes other than those for which it was designed.
5. Damage caused by accidents, or natural disasters, including but not limited to, fire, flood, and wind.
6. Damage caused by abuse, misuse, alteration, modification, or negligence.
7. Any labor costs or travel, room and board expenses associated with the repair and/or restoration of lost or damaged hardware, software or data.

EXCEPT AS EXPRESSLY PROVIDED IN THIS POLICY, XPC SHALL NOT BE LIABLE FOR ANY DAMAGES WHATSOEVER, INCLUDING, BUT NOT LIMITED TO, DIRECT, INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR MULTIPLE DAMAGES ARISING OUT OF THE USE OF THE PRODUCT OR DAMAGE TO THE CONNECTED EQUIPMENT, REGARDLESS OF THE LEGAL THEORY ON WHICH SUCH CLAIM IS BASED, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. SUCH DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, LOSS OF PROFITS, LOSS OF SAVINGS OR REVENUE, LOSS OF USE OF THE PRODUCT OR THE CONNECTED EQUIPMENT OR ANY ASSOCIATED EQUIPMENT, LOSS OF SOFTWARE, COST OF CAPITAL, COST OF ANY SUBSTITUTE EQUIPMENT, FACILITIES OR SERVICES, DOWNTIME, THE CLAIMS OF THIRD PARTIES, INCLUDING CUSTOMERS, AND INJURY TO PROPERTY.

Submitting a Load Protection Policy Claim:
1. Any claim under the Load Protection Policy must be made within 10 days of the date of alleged damage to the Connected Equipment.
2. Call the XPC technical support department at 1-800- 582-4524 and obtain a Load Protection Policy Returned Material Authorization (RMA) number. Have information on all applicable insurance or other resources of recovery/payment that is available to the Purchaser and the name of the power utility

supplier for the location of the Connected Equipment. XPC will forward to the Purchaser a Load Protection Policy claims form, which must be completed and filed with XPC within 30 days.

- Mark the Load Protection Policy RMA number on the Product the Purchaser is returning.
- Pack the Product in its original packaging or similar packing materials if the original packaging has been discarded. Enclose the completed Load Protection Policy claim form and a copy of the Purchaser's original sales receipt for the Product in the box.
- Mark the RMA number clearly on the outside of the box.
- Ship the Product (one-way shipping charges paid by the Purchaser) to:

<div align="center">

XPC Corporation
230 Yuma Street
Denver, CO 80223
1.800.582.4524

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