La Marche Manufacturing Company

www.lamarchemfg.com

Modular-UPS

Modular Online Uninterruptible Power Supply System

Installation and Operation Manual

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Instruction Drawing Number: P25-LMUPS-1
Rev. Date: 07/20 ECN: 22622

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 PERSONNEL ONLY. There are NO USER SERVICEABLE PARTS inside the UPS.

WARNING:

- The UPS is 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 to 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 40°C. 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 and should break line and neutral conductors - four poles for three phases.

1.4 Maintenance

WARNING:

- Only qualified service personnel should perform the battery installation.
- The following PRECAUTIONS should be observed
  (1.) Remove watches, rings, or other metal objects.
  (2.) Use tools with insulated handles.
  (3.) Wear rubber gloves and boots.
  (4.) Do not lay tools or metal parts on top of batteries or battery cabinets.
  (5.) Disconnect the charging source prior to connecting or disconnecting terminal.
  (6.) Check 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. Release electrolyte is harmful to the skin and eyes, and may be toxic.

1.5 Recycling the used battery

WARNING:

- 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 is 1000 meters 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 100cm from the top of the UPS for maintenance, wiring and ventilation.
   - Keep a clearance of 100cm from the back of the UPS and the external battery cabinets for ventilation.
   - Keep a clearance of 150cm 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 CO2 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. Refer to Figure 2-1. Please make sure the bearing capacity of forklift is sufficient.
2. Please follow the order in Figure 2-2 to remove carton and foams.

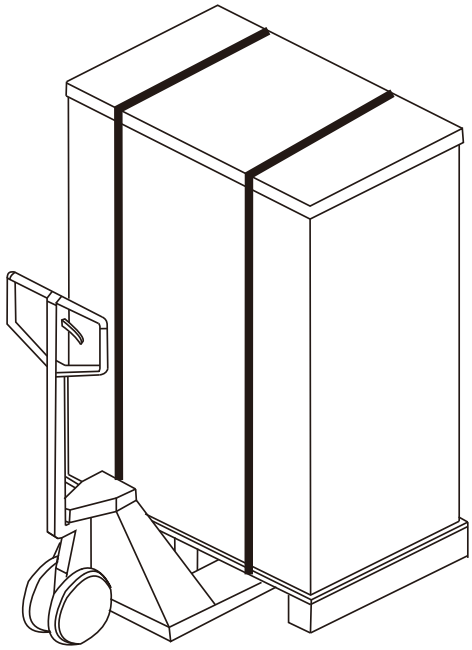


Figure 2-1

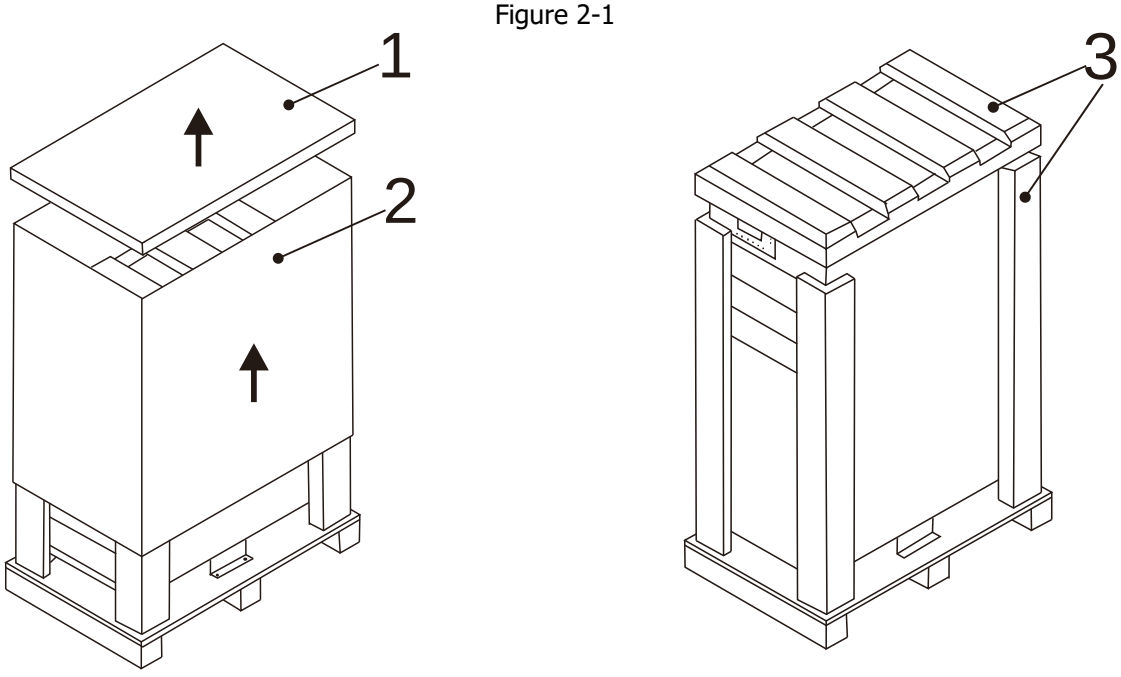


Figure 2-2

3. Remove 2 fixing cabinet plates and loosen leveling feet by rotating them counterclockwise. Then, move the cabinet from the pallet. Refer to Figure 2-3.
4. To fix the cabinet in position, simply rotate leveling feet clockwise. Refer to Figure 2-4.

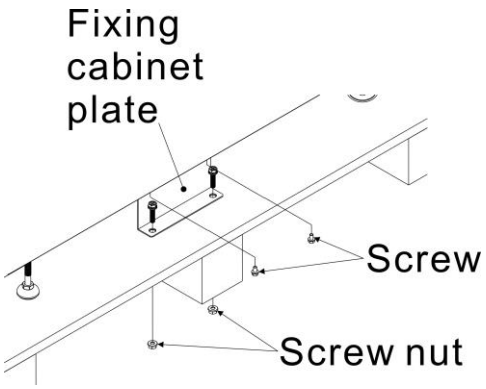


Figure 2-3

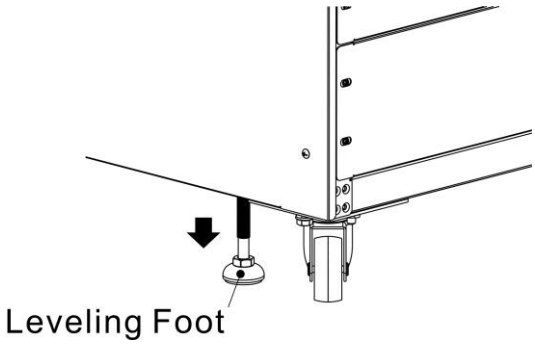


Figure 2-4

2.4 Moving the Cabinet

⚠ Warning
The UPS is fixed on the pallet with 2 fixing cabinet plates. 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 not to overturn it as the gravity center is high.

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 ground, 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 and 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 two casters help you to move the UPS to a designated area. Before you move the UPS, please turn the two leveling feet counterclockwise to raise them off the ground. This protects the leveling feet from damage when moving the UPS. Refer to Figure 2-5.

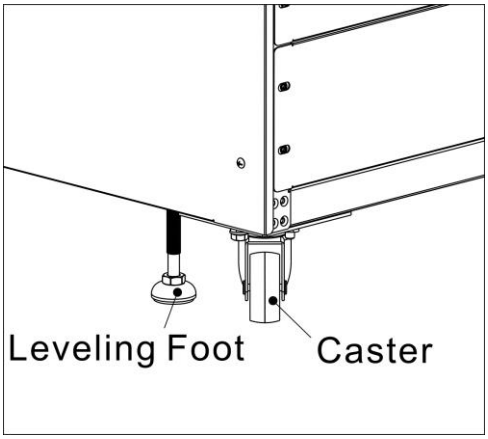


Figure 2-5

2.5 UPS Cabinet

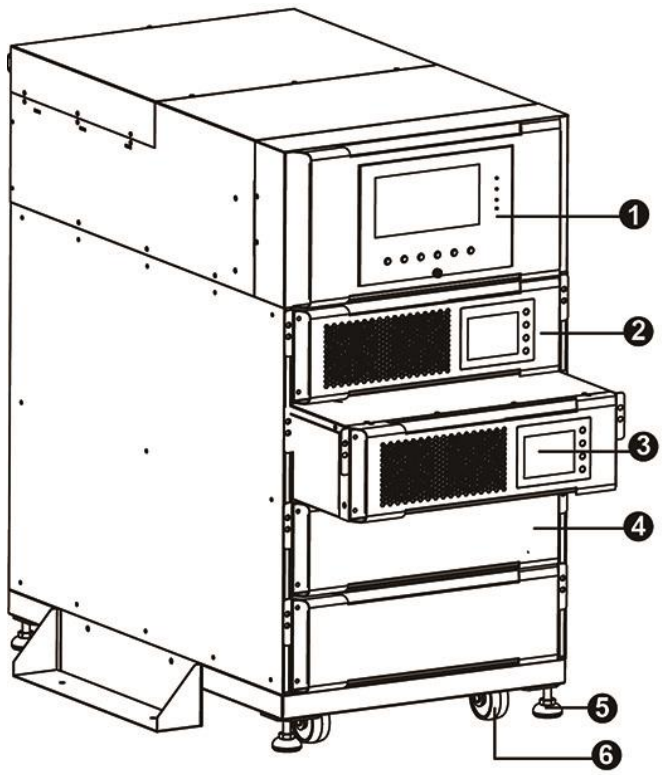
There are three options of UPS cabinet configuration:

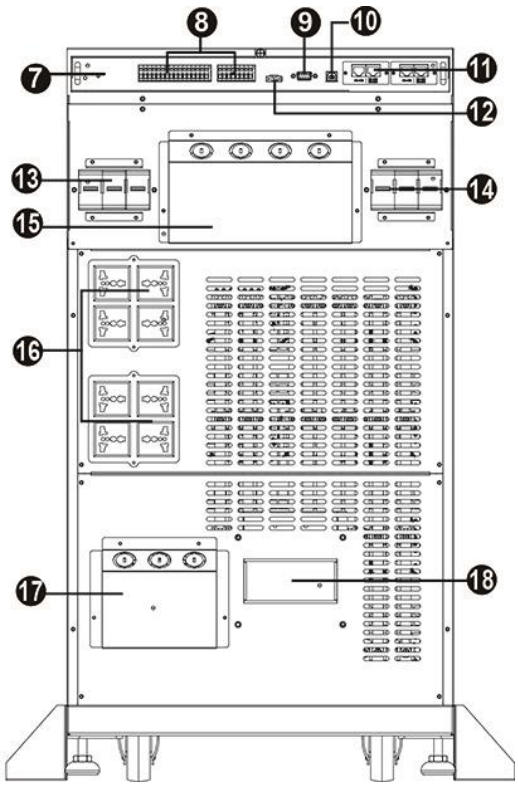
	With Battery	
Photo		
UPS Capacity	12KVA 20KVA	24KVA 40KVA
UPS Module Model	2-2 6K LV 3-3,3-1,1-1 10K OR 3-3 10K-LV	2-2 6K LV 3-3,3-1,1-1 10K OR 3-3 10K-LV
Max UPS Module no.	2	4

2.6 Exterior

In the front of the cabinet, there are control panel and 4 module slots. These module slots can be installed with UPS or battery modules. At the back of cabinet, communication slots, communication ports and dry contact are included.

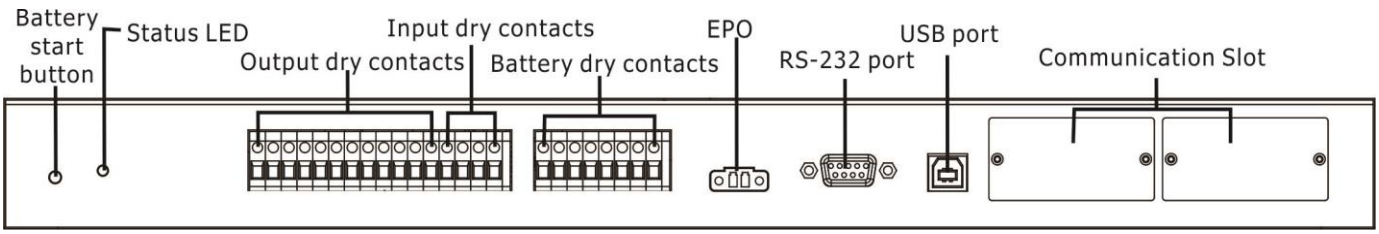
All wiring terminal blocks are allocated in the back of cabinet. The side panels are locked by screws. The casters at the bottom of the UPS cabinet can be used to move this cabinet for short distances. There are two leveling feet to fix and stabilize the UPS cabinet on the ground.





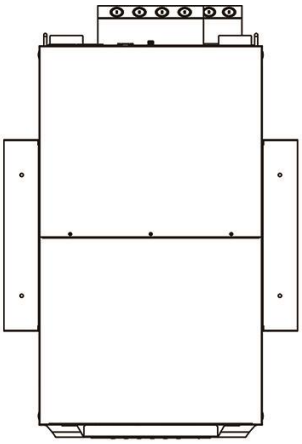
1. Control Panel
2. UPS Module
3. LCD Display on UPS Module
4. Battery Pack
5. Leveling Foot
6. Caster
7. Controller Module
8. Dry Contact
9. RS-232 Port
10. USB Port
11. Intelligent Slot
12. Emergency Power Off Port
13. AC Input Breaker
14. AC Output Breaker
15. AC Terminal
16. Output Receptacles (optional)
17. Battery Terminal
18. DC Breaker (optional)

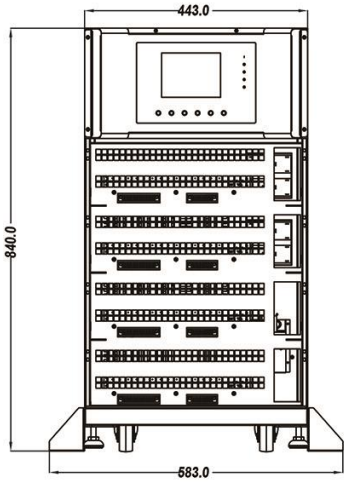
Controller Module

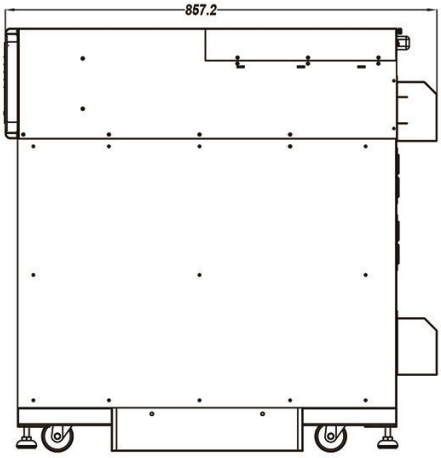


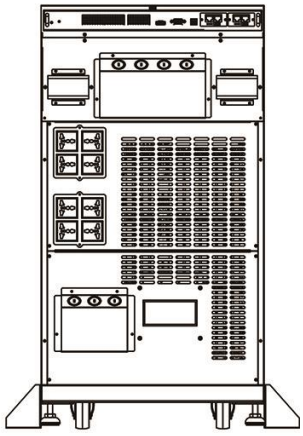
2.6.1 Mechanical Data

Dimensions			
UPS Cabinet	**Width**	**Depth**	**Height**
19U Rack	443mm	857mm	840mm





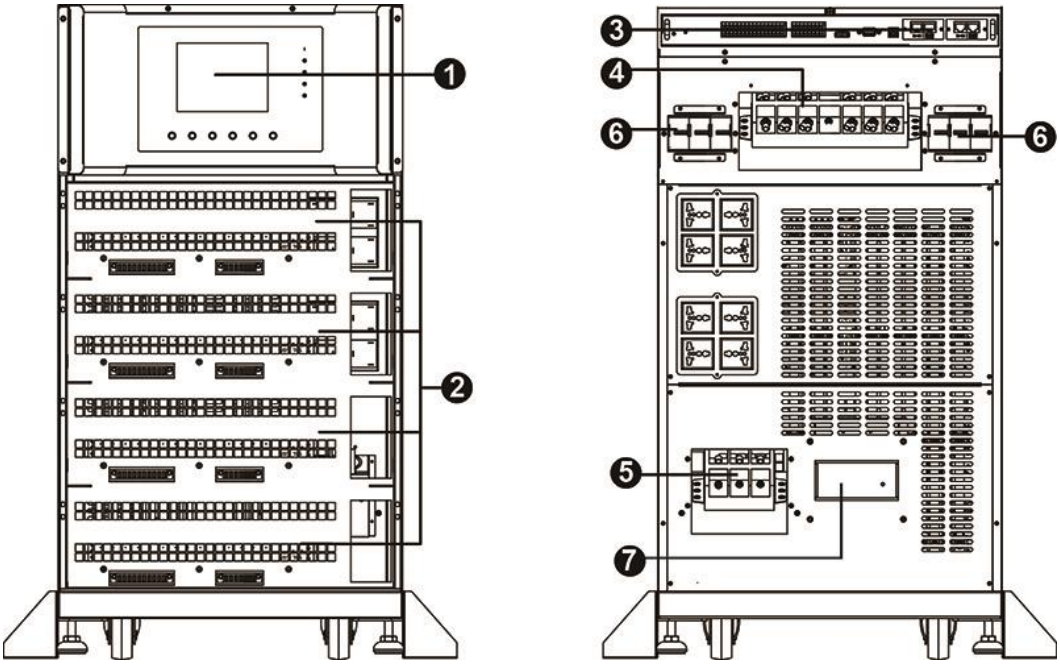




2.6.2 Front / Rear Open View

Front open view: After removing panel covers, module slot and control panel are visible.

Rear open view: Switch unit (Mains/Output) and AC breaker, communication ports are visible which are installed on the cabinet.



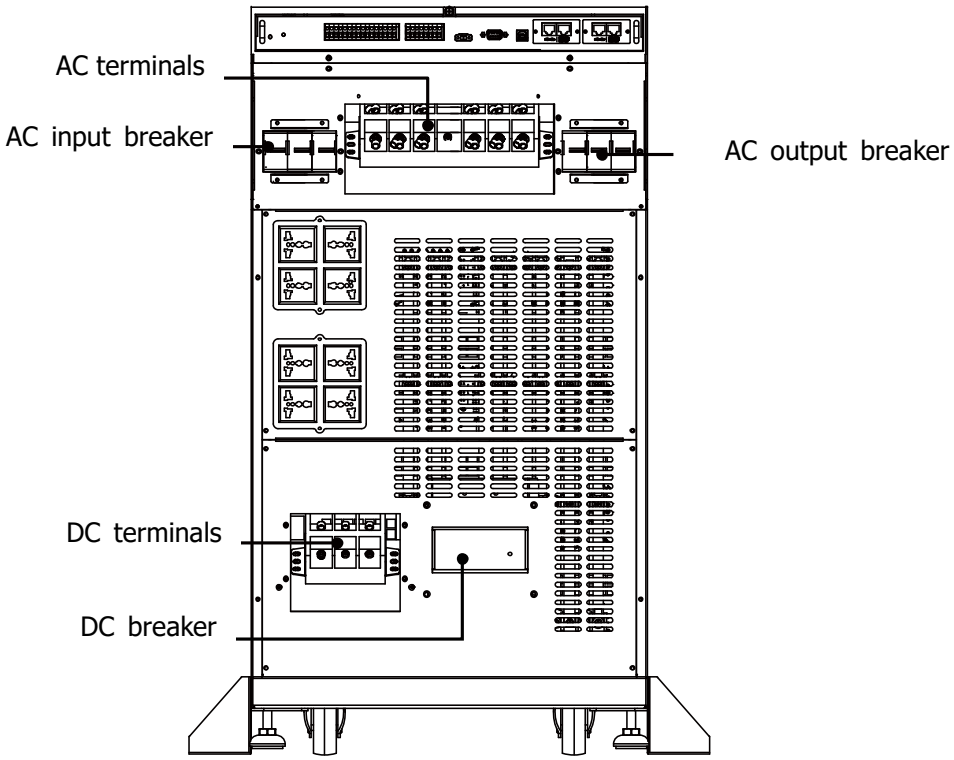
1. Control Panel
2. Power/Battery Module Slots
3. Communication Ports
4. AC Terminals
5. DC Terminals
6. AC Breakers
7. DC Breaker (optional)

Front and Rear Open View

2.7 Internal Mechanisms

2.7.1 Breakers

AC Input/Output breakers are located at the rear panel of the cabinet. Refer to figure below.



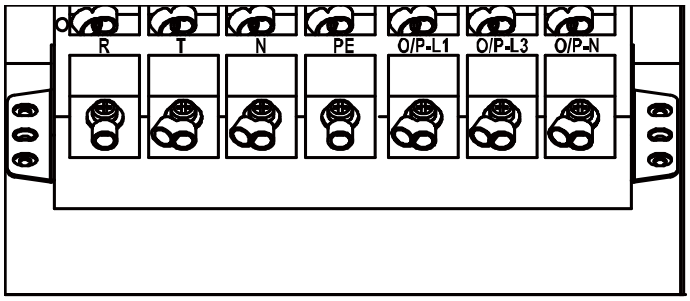
2.7.2 Wiring Terminal Blocks

Remove all panel covers and you will see the wiring terminal block. For UPS module wiring, please check below chart and table.

AC Terminal

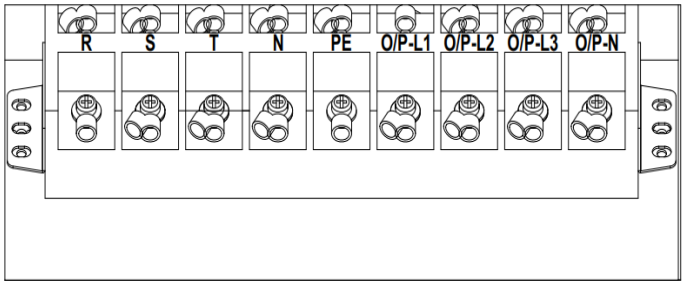
2-2 6K LV:

	Item	Function	Description
AC Terminal	Output Block (O/P-L1, O/P-L3, O/P-N)	Connects the critical loads	Includes L1, L3 and Neutral terminals.
	AC Input Block (R, T, N)	Connects main AC source	Includes R, T 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.



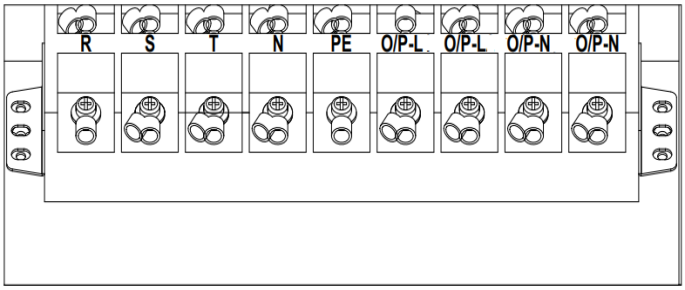
3-3 10K and 3-3 10K LV:

	Item	Function	Description
AC Terminal	Output Block (O/P-L1, O/P-L2, O/P-L3, O/P-N)	Connects the critical loads	Includes L1, L2, L3 and Neutral terminals.
	AC Input Block (R, S, T, N)	Connects main AC source	Includes R, S, T and Neutral terminals.
	For UPS Grounding (PE)	For UPS grounding	Includes one grounding terminal- PE.



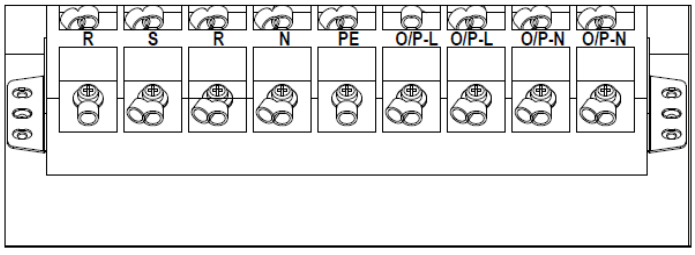
3-1 10K:

	Item	Function	Description
AC Terminal	Output Block (O/P-L, O/P-N)	Connects the critical loads	Includes L and Neutral terminals.
	AC Input Block (R, S, T, N)	Connects main AC source	Includes R, S, T and Neutral terminals.
	For UPS Grounding (PE)	For UPS grounding	Includes one grounding terminal- PE.



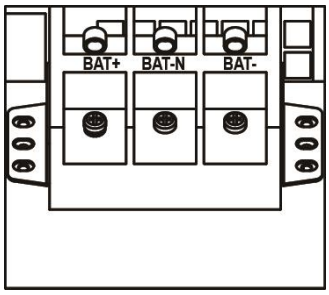
1-1 10K:

	Item	Function	Description
AC Terminal	Output Block (O/P-L, O/P-N)	Connects the critical loads	Includes L and Neutral terminals.
	AC Input Block (R, S, N)	Connects main AC source	Includes R, S and Neutral terminals.
	For UPS Grounding (PE)	For UPS grounding	Includes one grounding terminal- PE.



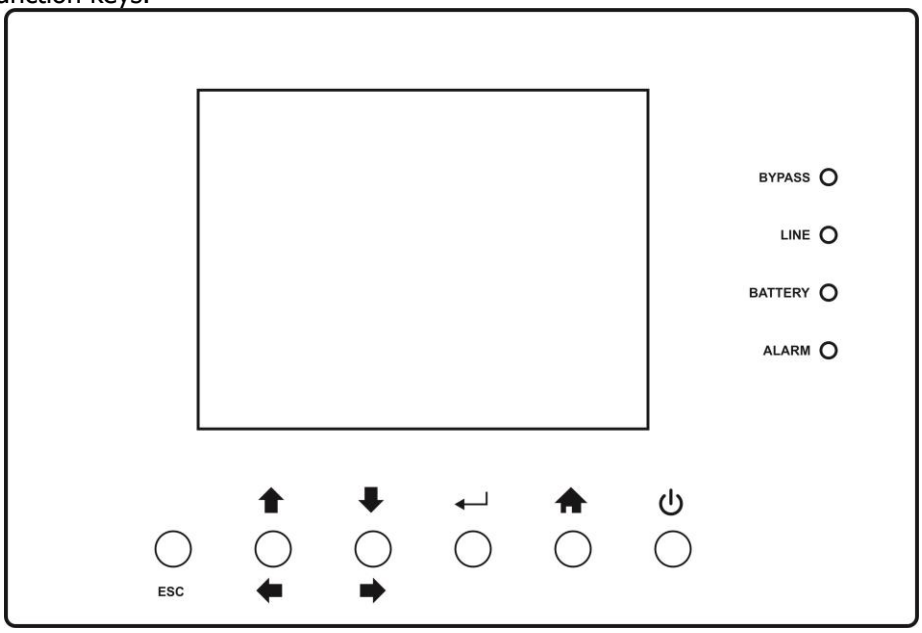
DC Terminal

	Item	Function	Description
DC Terminal	DC Terminal Block (BAT+, BAT-N, BAT-)	Connects an external battery pack	Includes Positive (+), Negative (-) and Neutral (N) terminals.



2.8 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.



Control Panel

2.8.1 LED Indicators

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 lighting, and ○ means LED is faded.

2.8.2 Function Keys

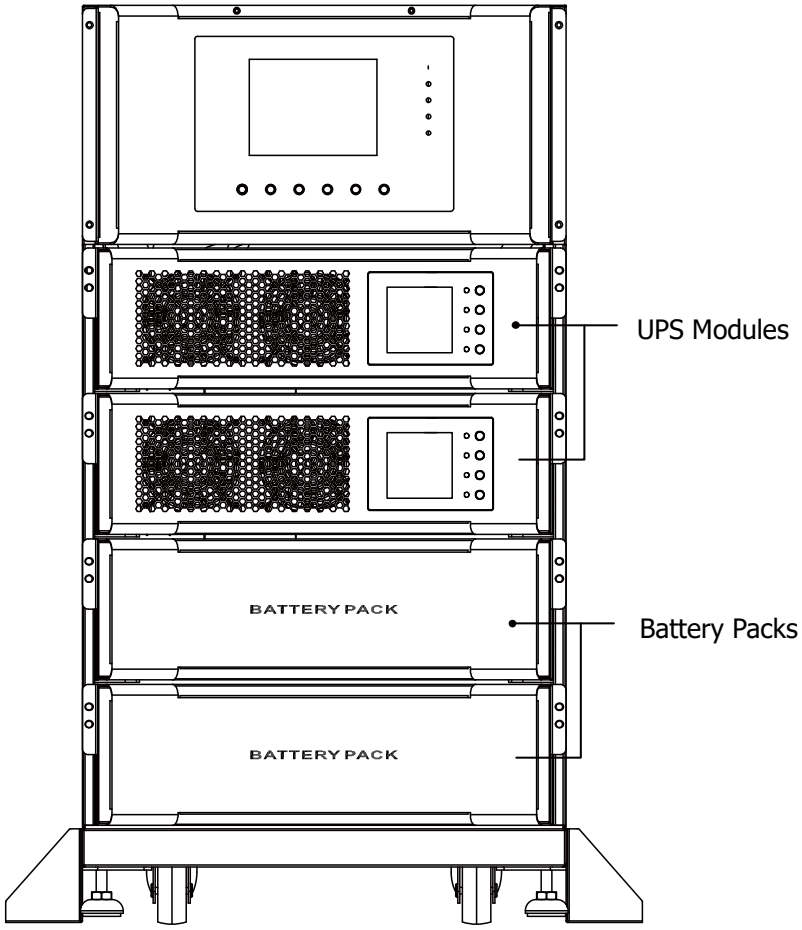
Function Key	Description
Esc	● When it is in Main screen, you can enter setting menu by pressing ESC key. ● Return to previous screen, when screen is not in Main screen. ● Return to previous value in the same row, so you can change it. For example, when changing 4-digit password, press "Esc" to allow cursor back to previous digit.
	Menu page navigation or digit modification.
	Menu page navigation or digit modification.
	Confirmation of commands, or cursor displacement.
	Return to Main screen.
	Turn on UPS or turn off UPS.

2.8.3 Audible Alarm

Audio Type	Description	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 twice every second	No

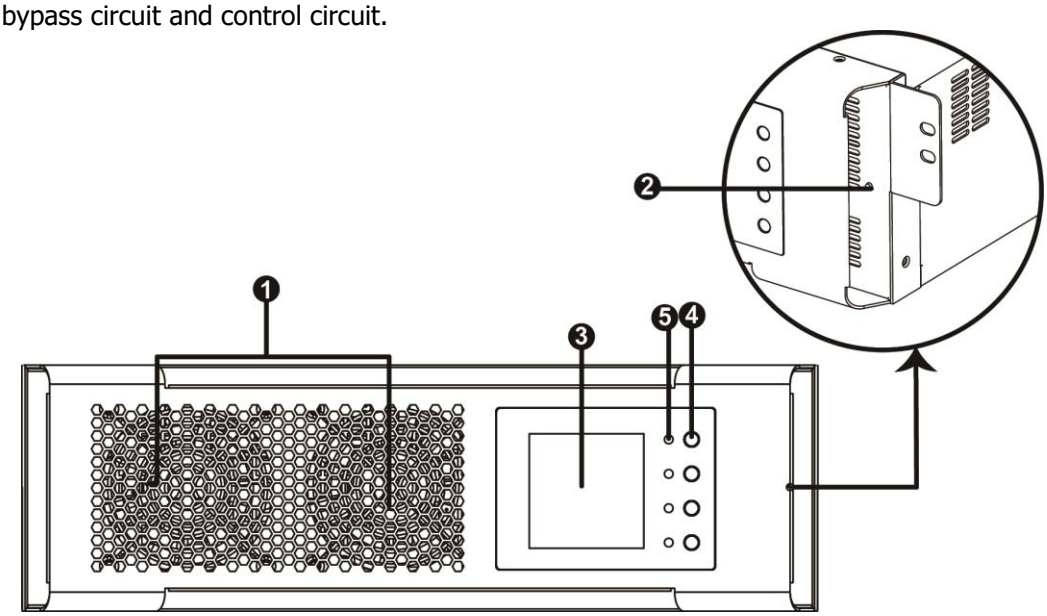
2.9 Introduction of Modules

The modular and hot-swappable design of UPS module makes it a highly cost-effective solution to meet your power requirement. The number of UPS modules installed in the 19” cabinet can be based on the initial needs. Once the power requirement increases, you can easily install more UPS modules without interrupting the operation of the system.



2.9.1 UPS module

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



No.	Item	Description
1	Fan	The UPS 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 existing, use this button to start battery power for UPS.
3	LCD display	There is LCD display on the UPS module. It can show the UPS information and the slave UPS information when operating in parallel.
4	Function Keys	There are four function keys in the UPS module. They can control and monitor the single UPS module. Please refer to function key table for the details.
5	LED indicators	There are four LED indicators to show UPS working status. Please refer to LED indicator table for the details.

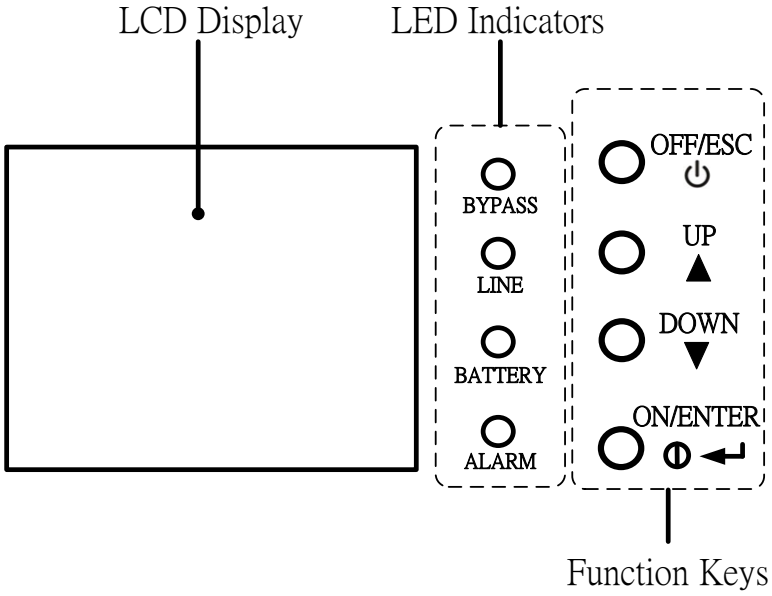


Table 2-1 The function keys for UPS module

Control Key	Description
ON/ENTER	● Press this button to turn on the UPS. ● Or press it to confirm the selection in the menu.
OFF/ESC	● Press this button to turn off the UPS. ● 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. This operation is used to configure the UPS in rack or tower display.

Table 2-2 LED indicators for UPS 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 lighting, and ○ means LED is faded.

2.10 Power Cable

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

2.10.1 AC input and output maximum current and power cable configuration.

AC Input

2-2 6Kand 3-3 10K LV:

UPS Module Model	**2-2 6K 3-3 10K LV**	**2-2 6K 3-3 10K LV**	**2-2 6K 3-3 10K LV**
UPS Capacity	6KVA 10KVA	12KVA 20KVA	24KVA 40KVA
Current (A)	30	60	120
Power cable (mm2)	5	10	20
Fixation torque force (lb-in)	20	20	20
Model	6KVA	12KVA	24KVA
Current (A)	34.1	68.2	136.4
Power cable (mm^2)	10	16	35
Fixation torque force (lb-in)	20	20	20

3-1 10K, 3-3 10K and 1-1 10K

UPS Capacity	10KVA	20KVA	40KVA
Current (A)	20.1	40.2A	80.4A
Power cable (mm^2)	3	5	10
Fixation torque force (lb-in)	20	20	20

AC Output

2-2 6K:

UPS Capacity	6KVA	12KVA	24KVA
Current (A)	27.3	54.6	109.2
Power cable (mm^2)	4	8	15
Fixation torque force (lb-in)	20	20	20

3-3 10K LV:

UPS Capacity	10KVA	20KVA	40KVA
Current (A)	30.3	60.6	121.2
Power cable (mm^2)	4	8	16
Fixation torque force (lb-in)	20	20	20

3-1 10K and 1-1 10K:

UPS Capacity	10KVA	20KVA	40KVA
Current (A)	45.5	91.0	181.8
Power cable (mm^2)	5	13	25
Fixation torque force (lb-in)	20	20	20

3-3 10K:

UPS Capacity	10KVA	20KVA	40KVA
Current (A)	15.2	30.4	60.8
Power cable (mm^2)	2	4	8
Fixation torque force (lb-in)	20	20	20

Note: Installer has to consider the max. current and wiring gauge when considering future extension.

2.10.2 DC input maximum current and power cable configuration.

2-2 6K:

UPS Capacity	6KVA	12KVA	24KVA
Current (A)	37.5	75	150
Power cable (mm^2)	5	10	20
Fixation torque force (lb-in)	20	20	20

3-3 10K LV:

UPS Capacity	10KVA	20KVA	40KVA
Current (A)	46.3	92.6	185.2
Power cable (mm^2)	6	13	25
Fixation torque force (lb-in)	20	20	20

3-3 10K, 3-1 10K and 1-1 10K:

UPS Capacity	10KVA	20KVA	40KVA
Current (A)	28.7	57.4	114.8
Power cable (mm^2)	4	8	15
Fixation torque force (lb-in)	20	20	20

Warning:

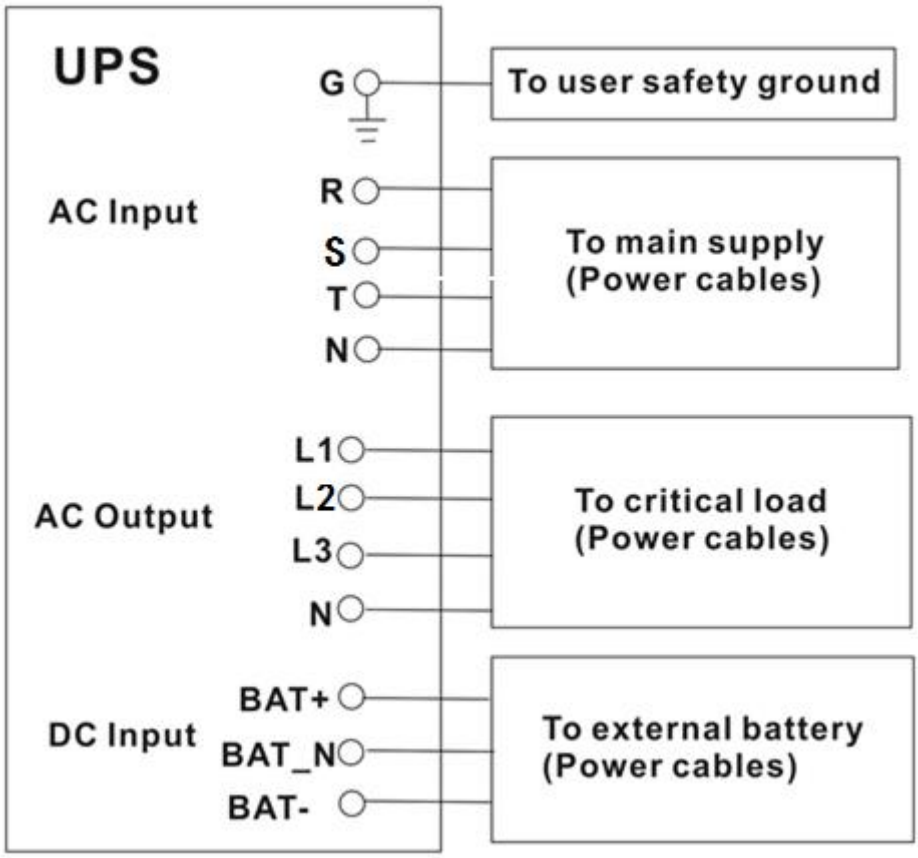
1. The standard battery pack can contain 16 pcs of 12V 9Ah battery (8 pcs Pos+/8pcs Neg-). If the load rating is over 6KVA, only one battery pack is not sufficient for the discharging current. At least one more battery pack has to be installed in parallel.

2.11 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.

2.11.1 Installation Drawing



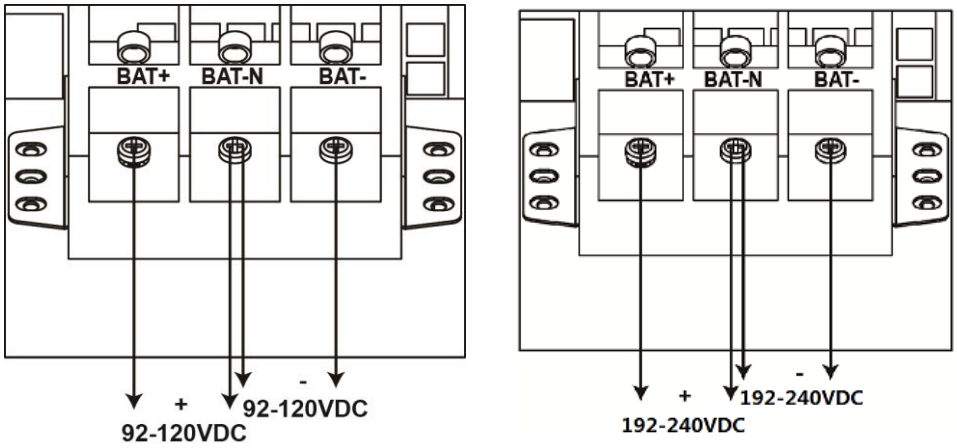
UPS Module Wiring

2.11.2 AC source connection

This UPS is for **Single input** application. Connect AC input to the AC power source. Please refer to Installation Drawing for UPS wiring.

The sequence of two phase (R phase and T phase) can be connected freely. The wrong sequence will not alarm for 2-phase UPS system when the UPS is powered.
The N wire must be connected firmly. A warning message will be indicated if the N wire is not connected well. 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.

2.11.3 External Battery Pack Connection



For 2-2 6K and 3-3 10K LV **For 3-3 10K, 3-1 10K and 1-1 10K**

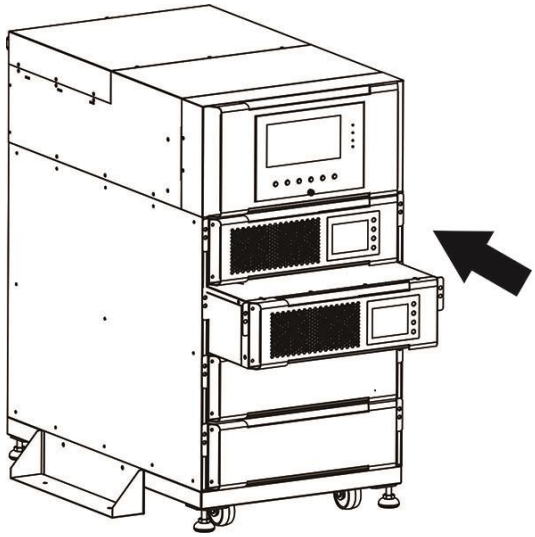
After the battery pack is completely installed, be sure to set up nominal battery voltage, battery capacity and maximum charging current in LCD setting. Otherwise, if battery setting is different from actual installation, the UPS will keep warning. Please refer to section 4.1.6.3 and **Table 4-6** battery setting list for details.

2.12 UPS module/Battery Pack Installation

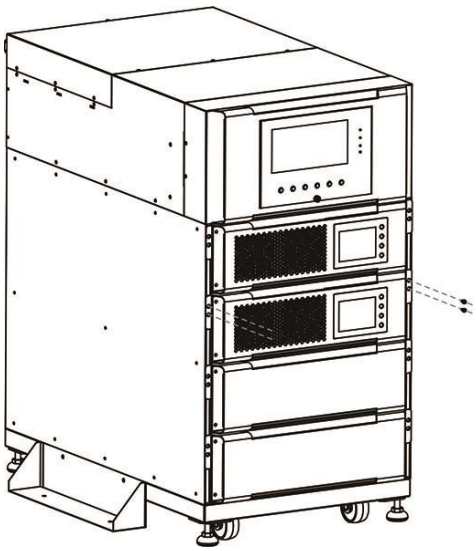
2.12.1 Insert the UPS module

Warning: The UPS modules installed in the same cabinet must be at the same rating.

(1.) Insert the UPS module into an unoccupied slot by two persons.



(2.) Secure the UPS module to the cabinet by fixing the screws at the front panel of the UPS module.



2.12.2 Remove the UPS module

⚠ Warning
• Before removing any UPS module, make sure the remaining UPS modules can support the critical loads. • At least one UPS 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 from fixing holes.

(2.) Two people pull out together and remove the UPS module from its slot.

2.12.3 Battery Pack Installation/Removal

Please follow UPS module installation/removal steps to install and remove battery packs.

3. Operation Mode and UPS Operation

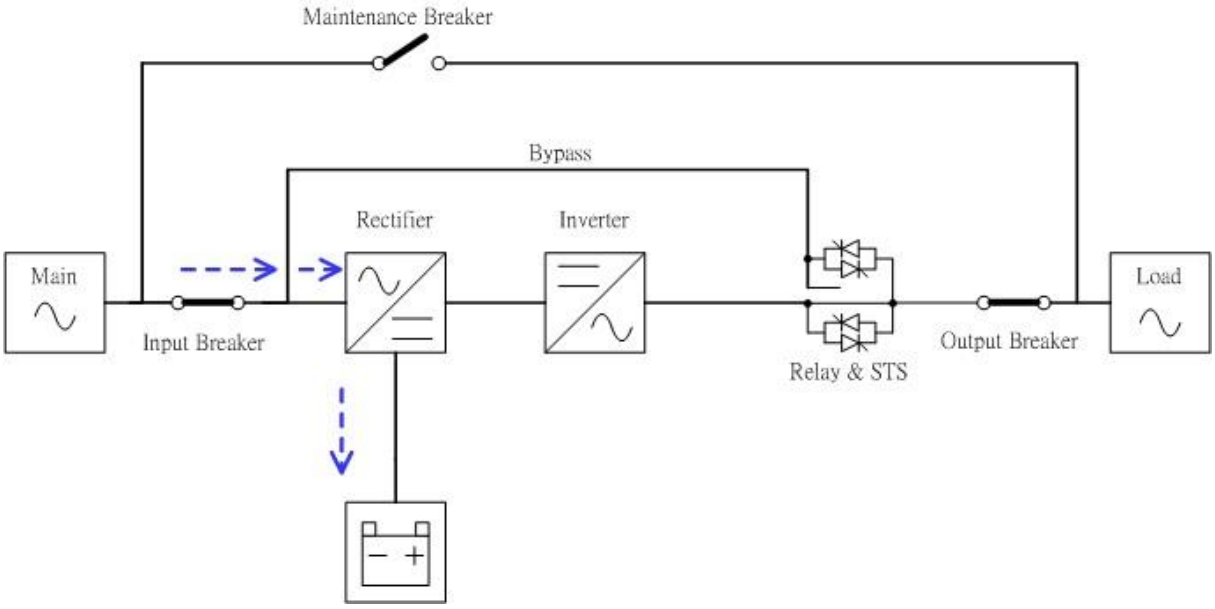
3.1 Operation Mode

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

3.1.1 Standby Mode

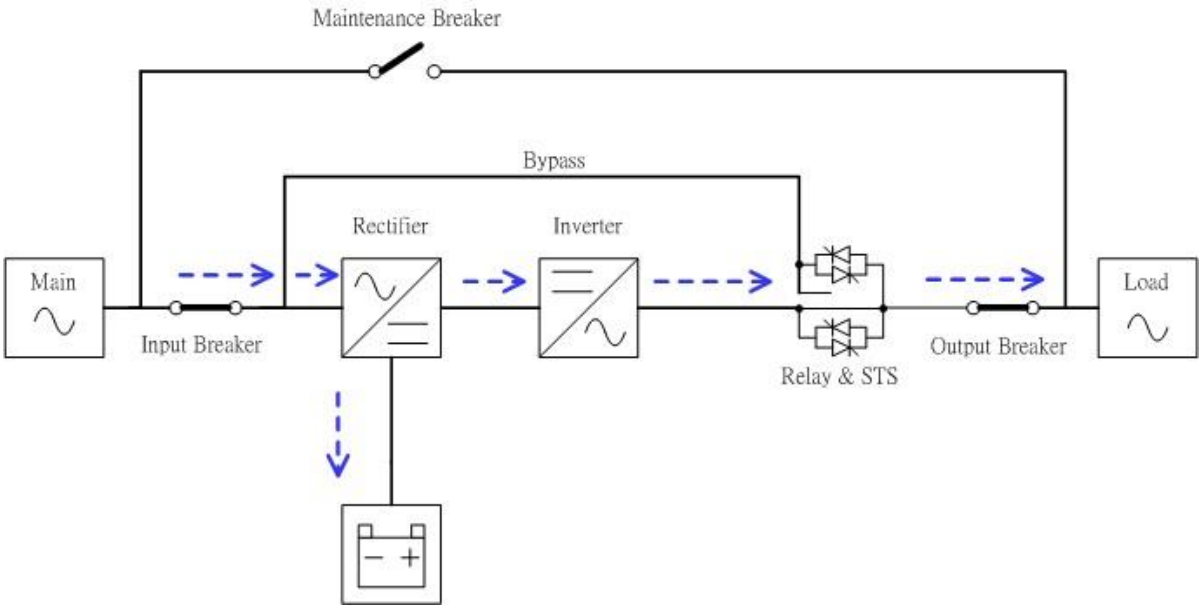
Upon connecting to utility input power, the UPS is in Standby mode before UPS is turned on (if BYPASS enable setting is Disabled), and charger function will be active when the battery is present. The load is not powered under this mode.



Standby Mode Diagram

3.2.2 Line Mode

In Line Mode, the rectifier derives power from the utility power, 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.

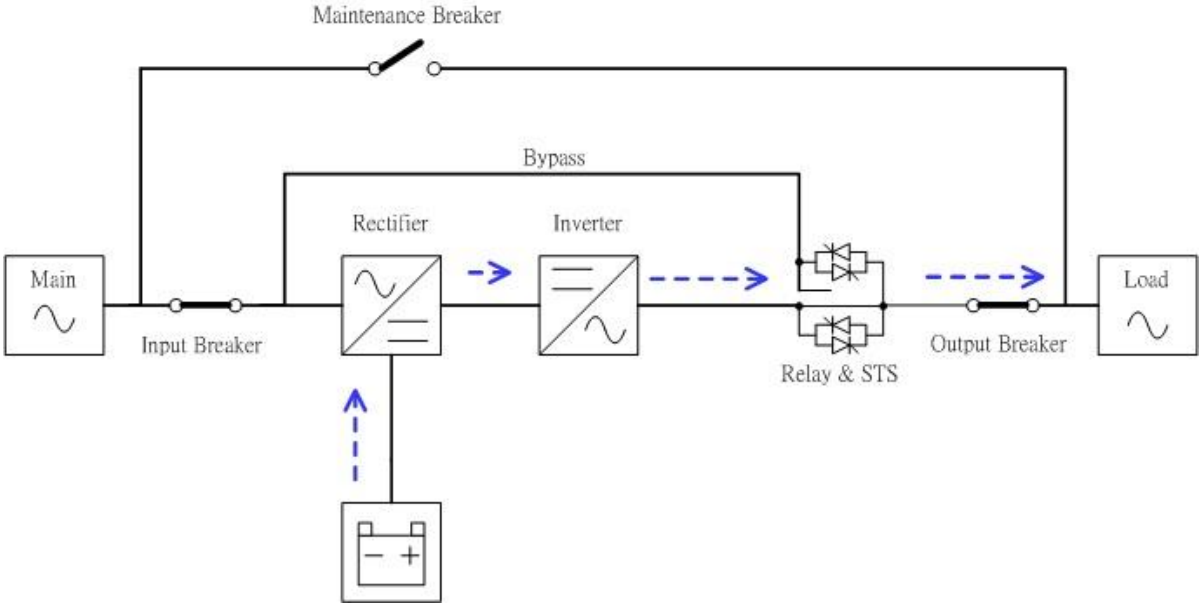


Line Mode Diagram

3.2.3 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.

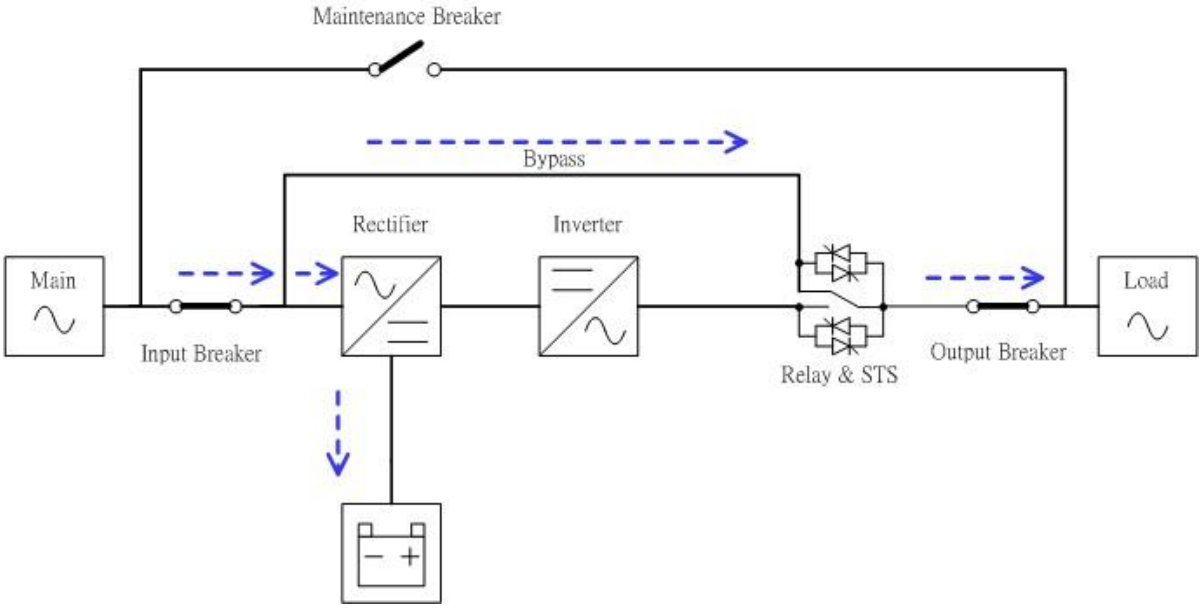


Battery Mode Diagram

3.2.4 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.

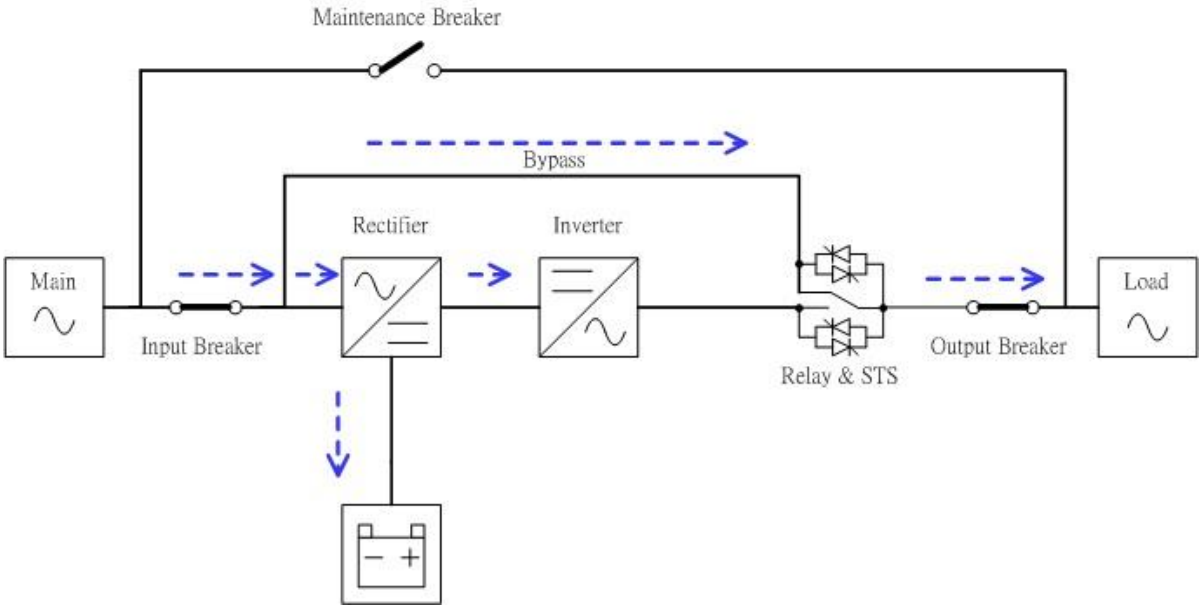
After UPS has been turned on, if the UPS encounters abnormal situations (over-temperature, overload …, etc.), UPS will perform the load from the inverter to the bypass source with no interruption. If the transference is caused by a recoverable reason, the UPS will turn back to line mode when abnormal situation is solved.



Bypass Mode Diagram

3.2.5 ECO Mode

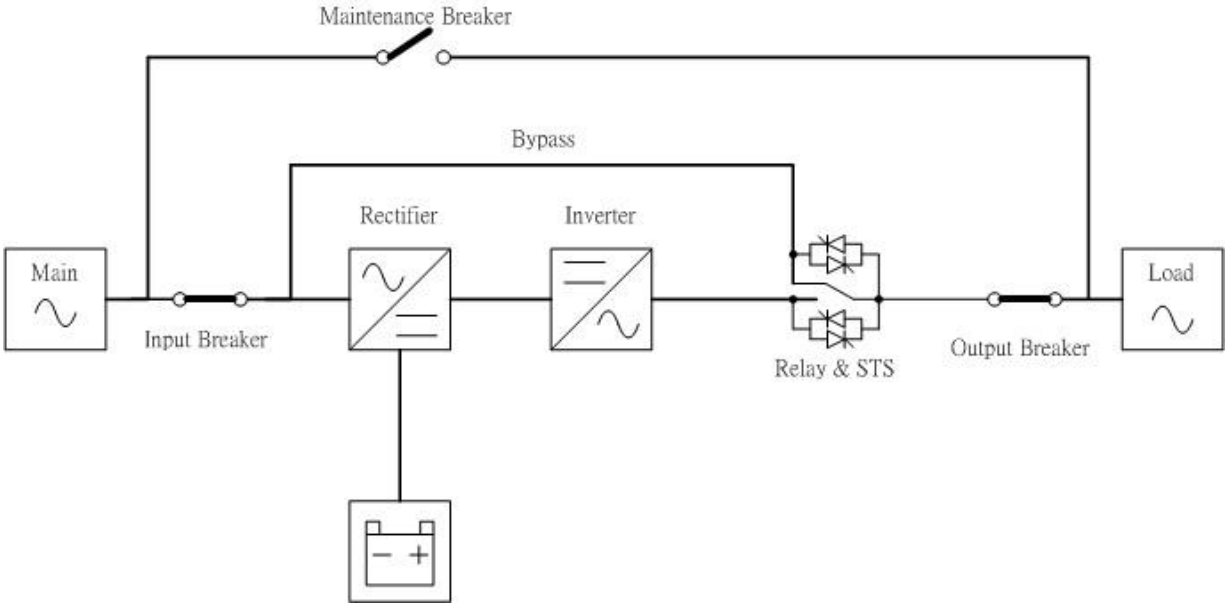
The ECO Mode is enabled through the LCD setting menu. In ECO mode, the load is powered by bypass when the bypass voltage and frequency are within the acceptable ranges. If the bypass is out of range, the UPS will transfer the power source of load from bypass to inverter. In order to shorten the transfer time, the rectifier and inverter are working when the UPS is in ECO mode.



ECO Mode Diagram

3.2.6 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

3.3 UPS Operation

⚠ Warning
● Do not start the UPS until the installation is completed. ● Make sure the wiring is correct and the power cables are fixed firmly. ● Make sure input and output breakers are switch **OFF**.

3.3.1 AC Startup

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

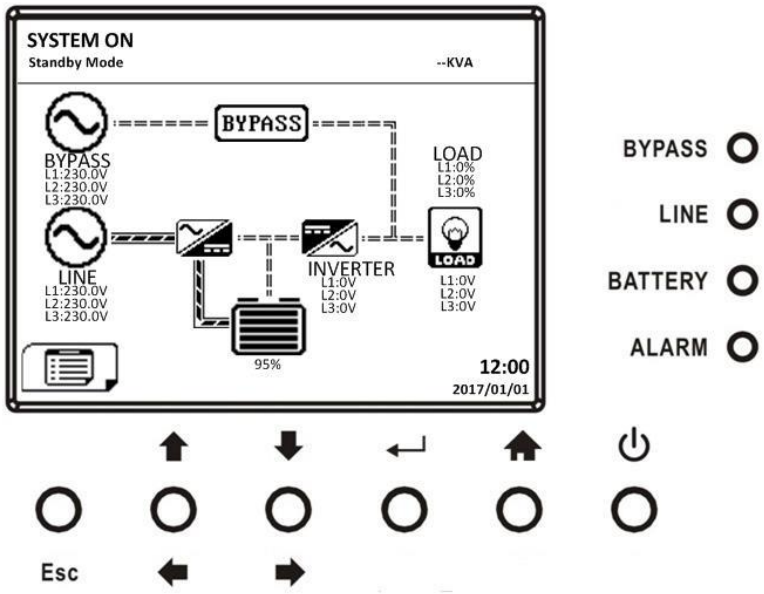
The operating procedures are as follows:

Step 1: Refer to "Chapter 2 Installation" to connect the power cables and install the UPS modules and the battery packs required for the UPS system.

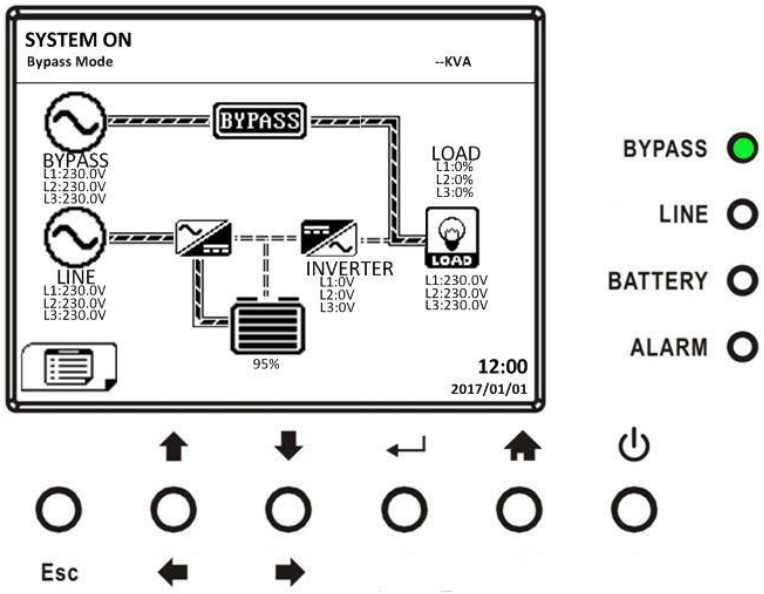
Step 2: Switch ON the DC breaker.

Step 3: Switch ON the AC input breaker to power the UPS.

Step 4: The UPS will enter into Standby Mode if the setting of Bypass mode is disabled.

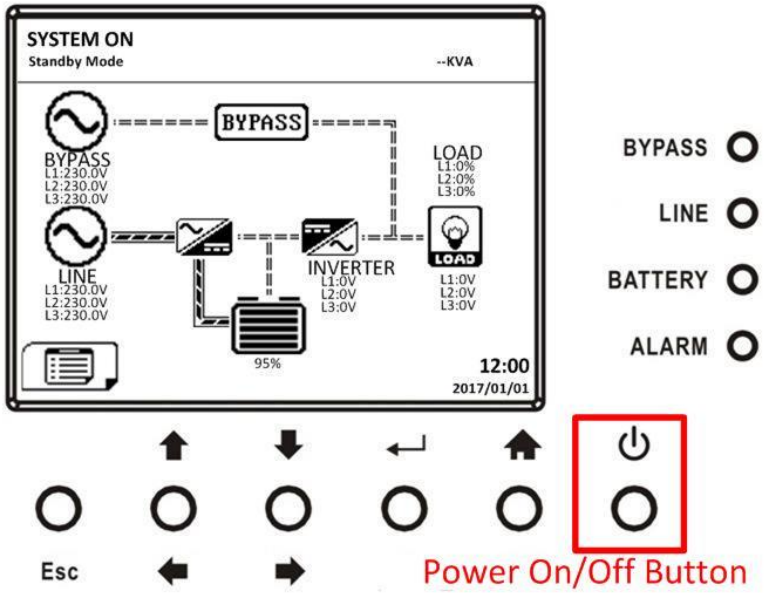


Or the UPS will enter into Bypass Mode, if the setting of Bypass mode is enabled.

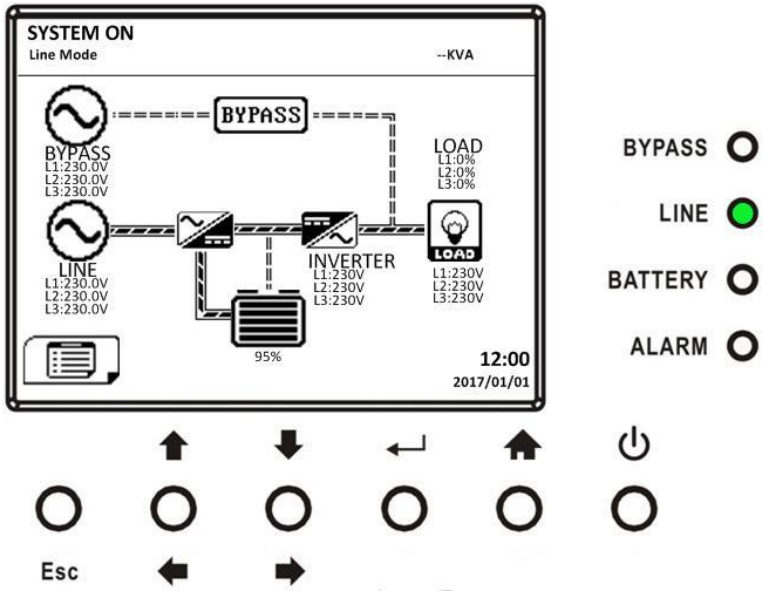


Step 5: Make sure there is no warning or fault event happening. If any warning or fault occurs, please refer to Chapter 6 Troubleshooting to solve it.

Step 6: Press Power ON/OFF button for two seconds to enter into Line Mode as shown below.



After turning on, UPS will do self-test and start up inveter. UPS will be transferred to Line mode when all UPS modules are ready.

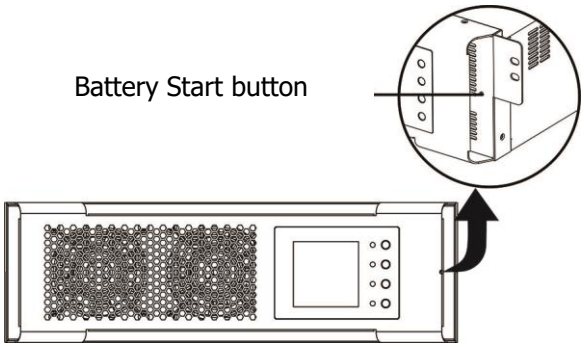


Step 7: Switch ON the output breaker. AC startup procedure is complete.

3.3.2 Cold Start Startup

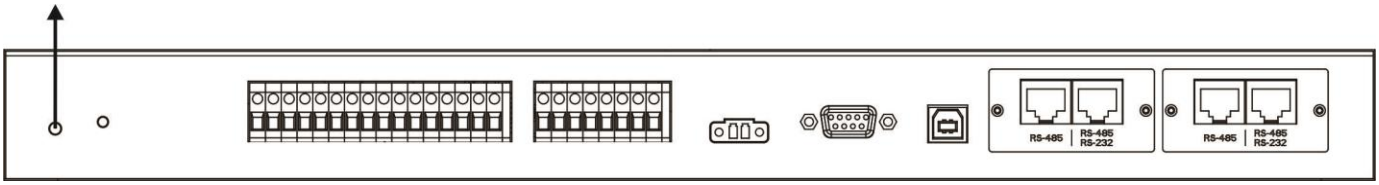
Step 1: Insert battery pack to 19U mini rack system.

Step 2: Press the "Battery Start" button on each UPS module to start up the control power of all UPS modules as shown below.

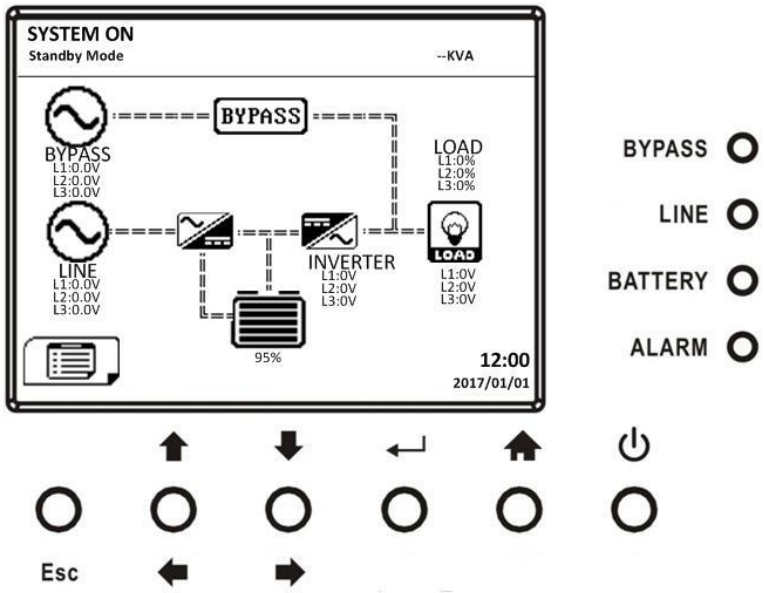


Step 3: Press the "Battery Start" button on controller module to start up the power as shown below.

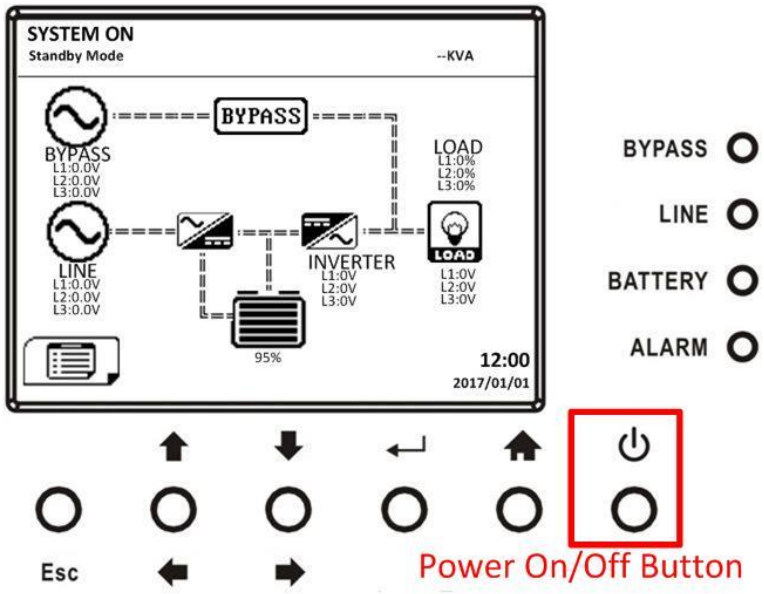
Battery start button



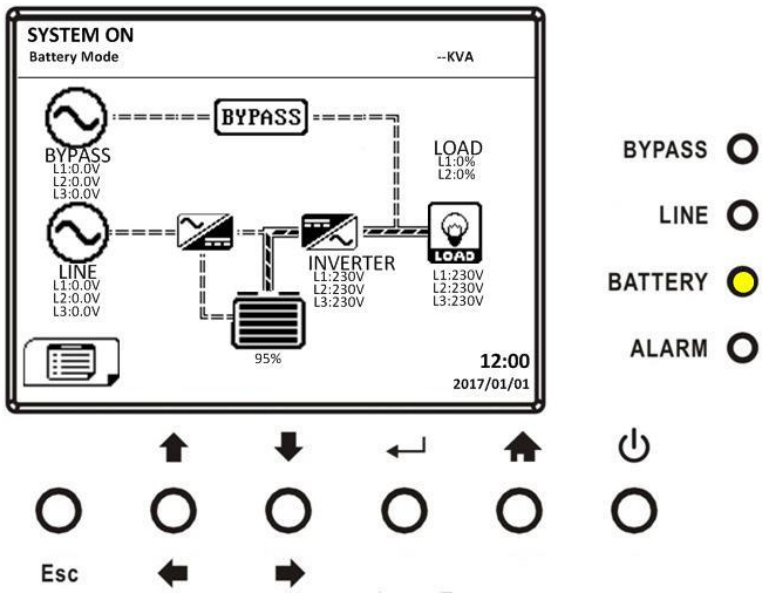
Step 4: After pressing the "Battery Start" button, UPS will enter into Standby mode. Refer to the diagram below for LCD display.



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: Then, UPS will enter Battery Mode as shown in the diagram below.

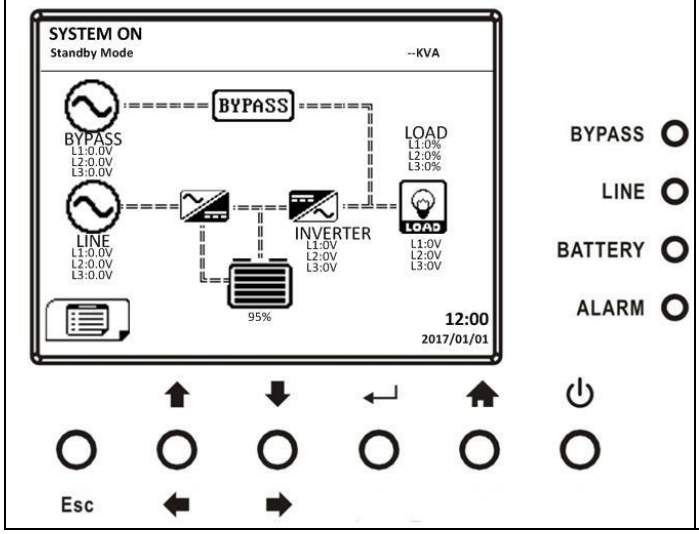
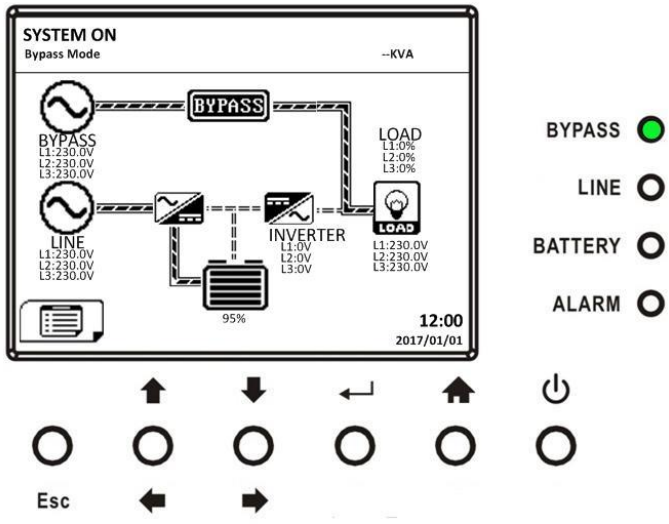


Step 7: Switch ON the output breaker. Cold start startup procedure is complete.

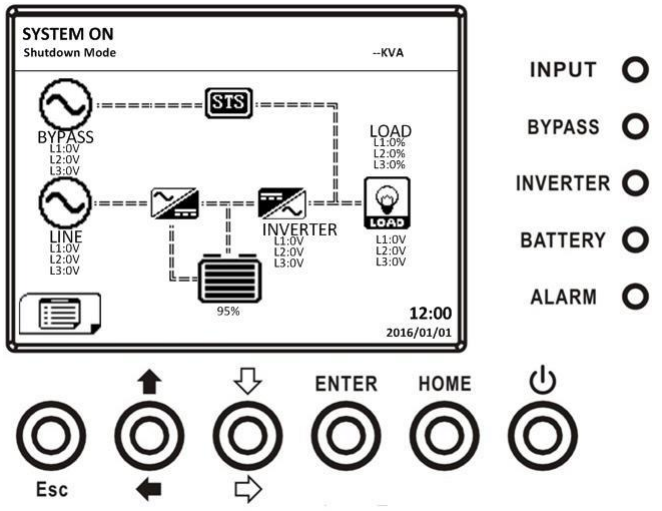
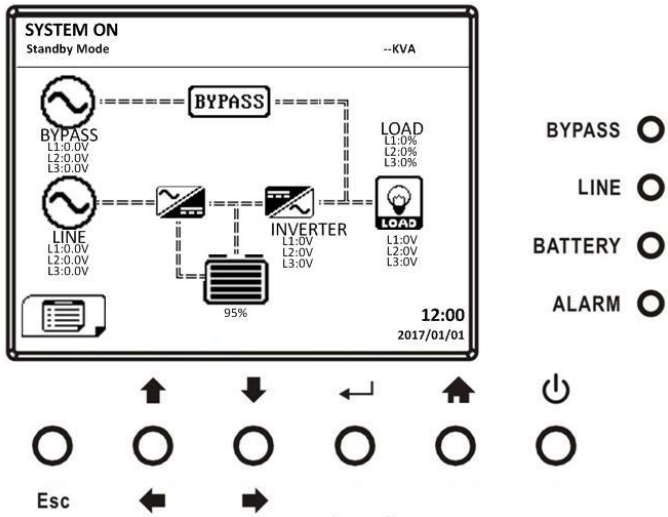
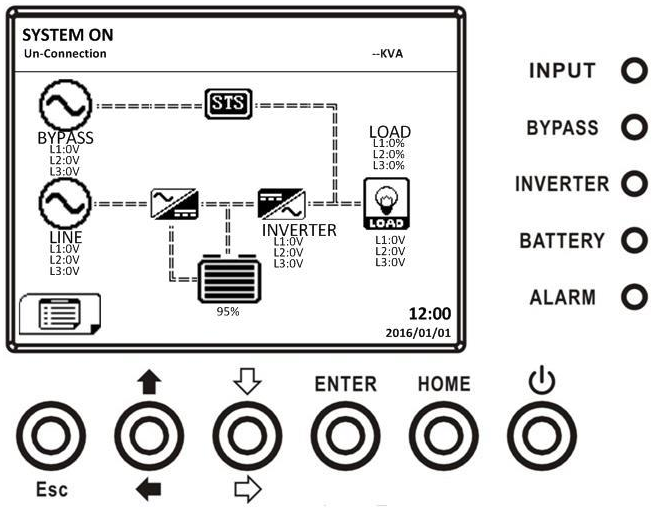
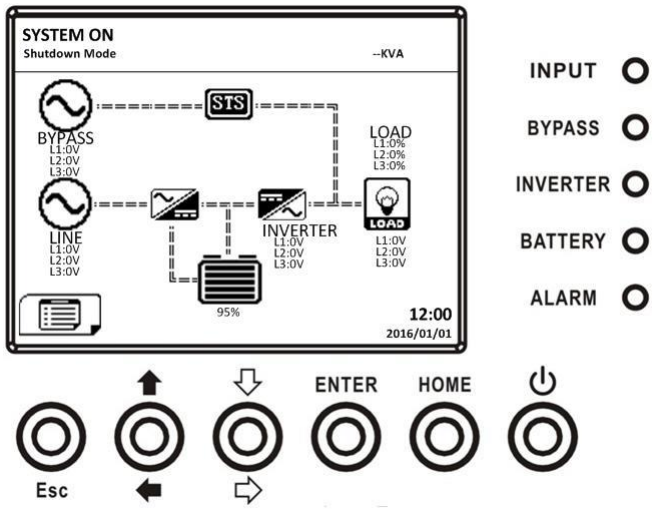
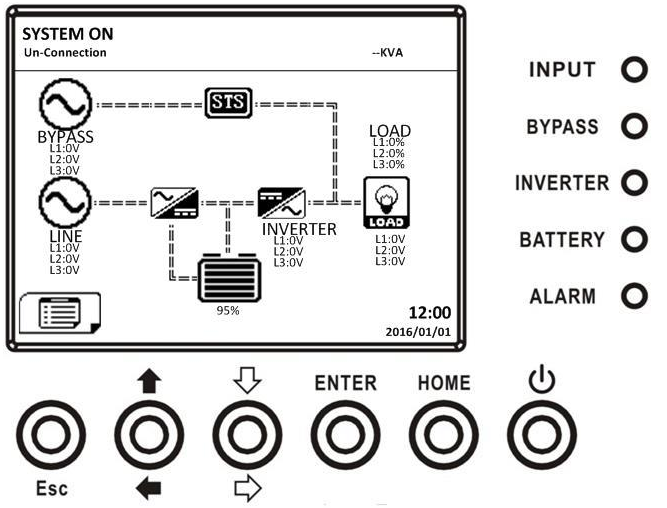
3.3.3 Turn off Operation

3.3.3.1 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.

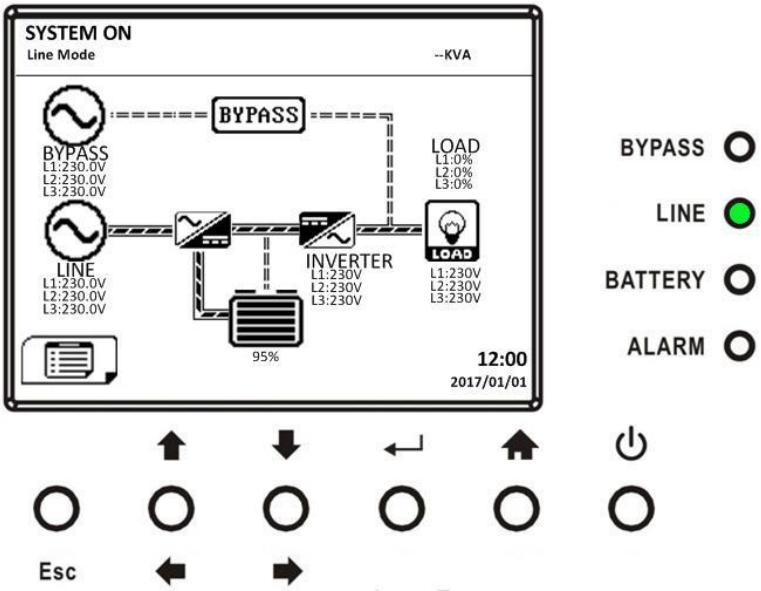
Bypass Mode Setting is Disabled	**Bypass Mode Setting is Enabled**
	
UPS enters Shutdown Mode.	**UPS enters Standby Mode.**
	
It is normal to show "Un-Connection" screen when UPS modules have shut off their control power.	**UPS enters Shutdown Mode.**  It is normal to show "Un-Connection" screen when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

Step 2: Switch OFF the AC input breaker to disconnect the AC power to the UPS. Wait until the LCD is OFF.

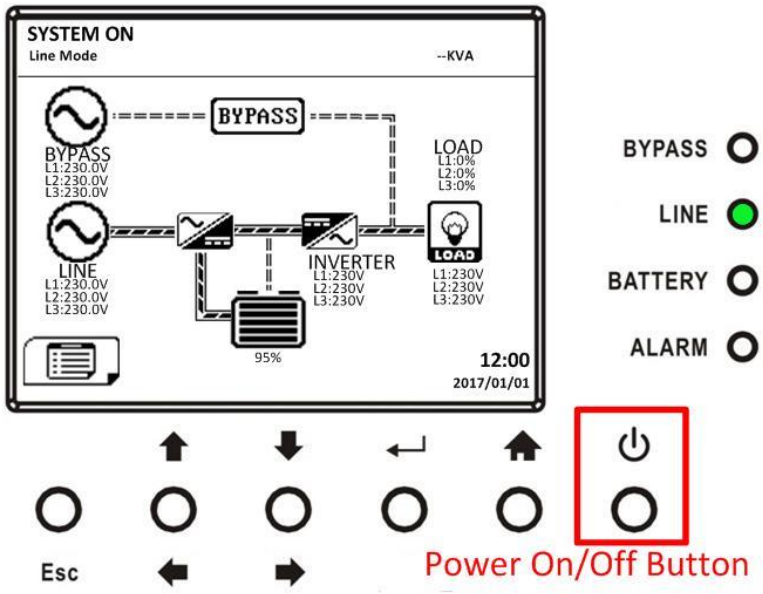
Step 3: Switch OFF the DC breaker if the UPS will disconnect the AC power for a long time.

3.3.4.2 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.

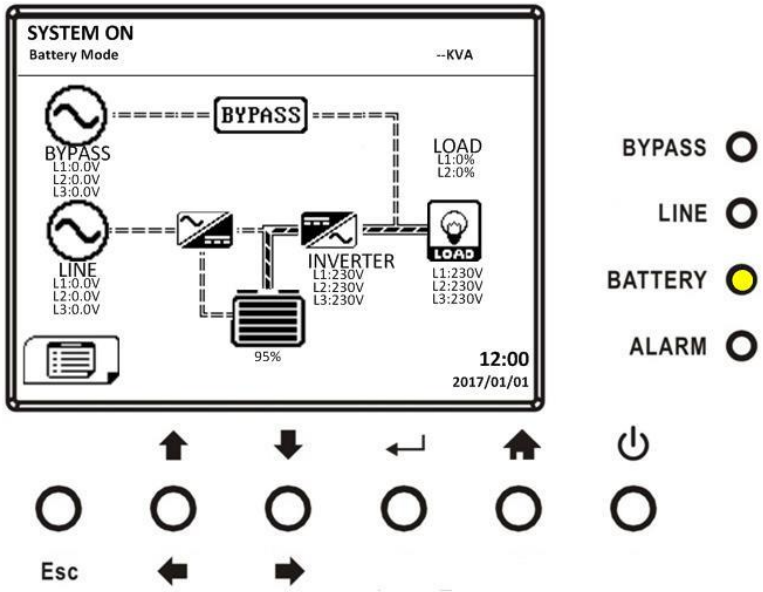


After turning off, the UPS will tranfer to Standby Mode or Bypass Mode depending on the "Bypass Mode" Setting.

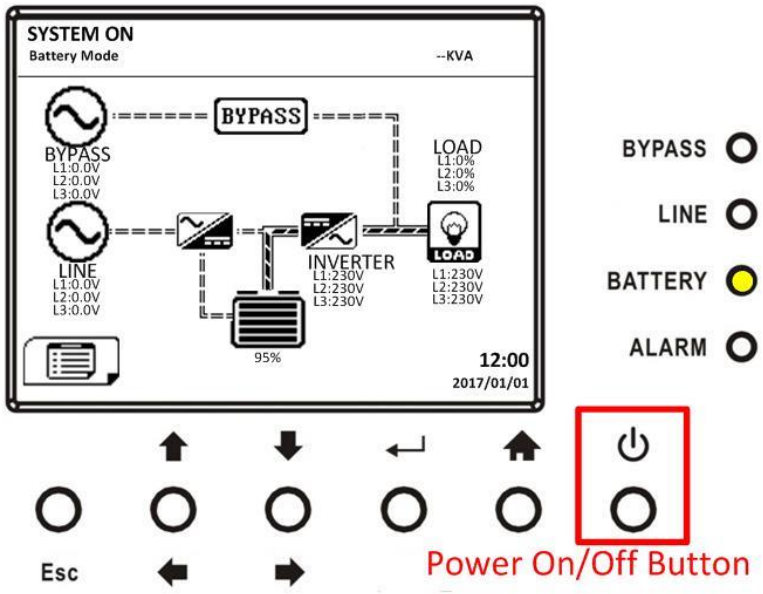
Next, follow the **Bypass Mode/ Standby Mode Turn Off Operation** procedure.

3.3.4.3 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 tranfer to Standby Mode.

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

4. Control Panel and Display Description

4.1 System 5.7” LCD Screen Description

4.1.1 Initial Screen

Upon starting, the UPS executes self-test. The initial screen displays and remains still approximately for 5 seconds as shown in Figure 4-1.

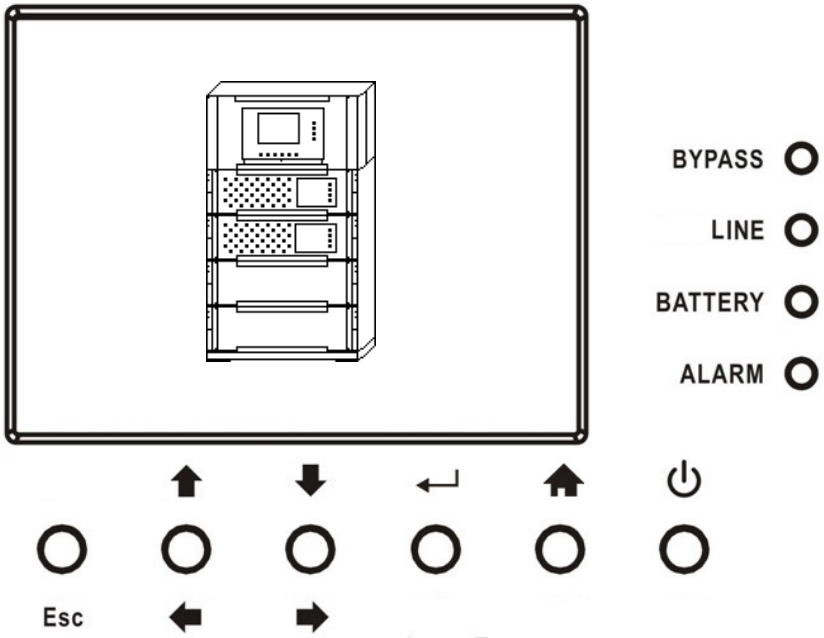


Figure 4-1 Initial screen

4.1.2 Main Screen

After initialization, the main screen will display as Figure 4-2. 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.

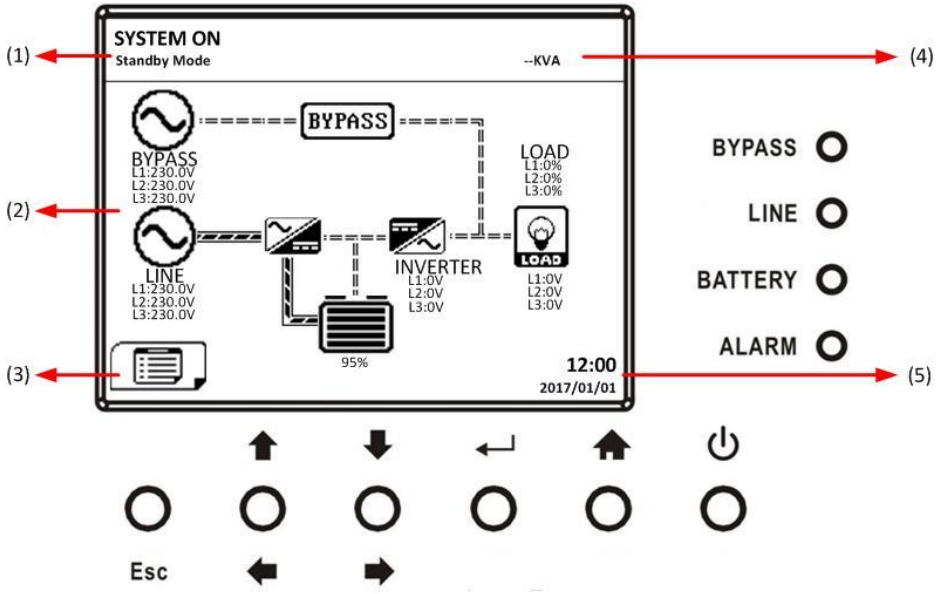


Figure 4-2 Main screen

4.1.3 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 4-3 and 4-4.

Figure 4-3 Menu Tree

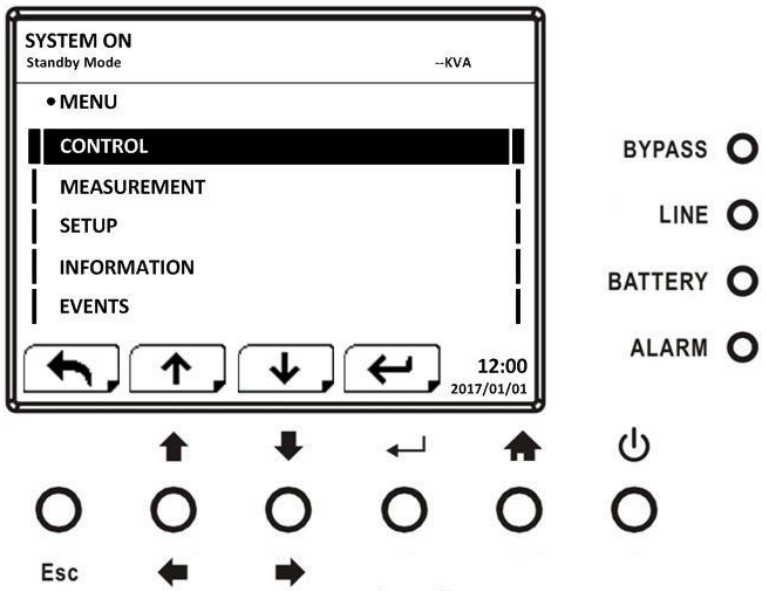


Figure 4-4 Menu screen

4.1.4 Control Screen

Use "↑" or "↓" buttons to choose CONTROL option, and press "↵" button to enter the submenu, as shown in Figure 4-5, 4-6 and 4-7.

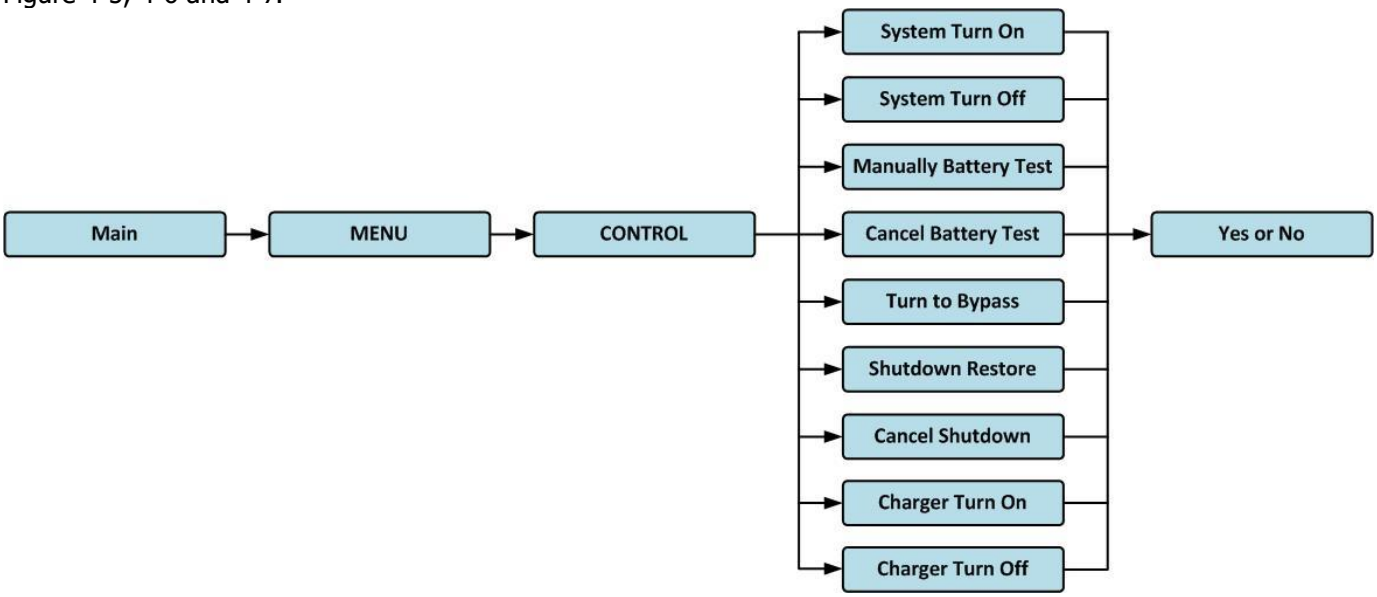


Figure 4-5 Control submenu tree

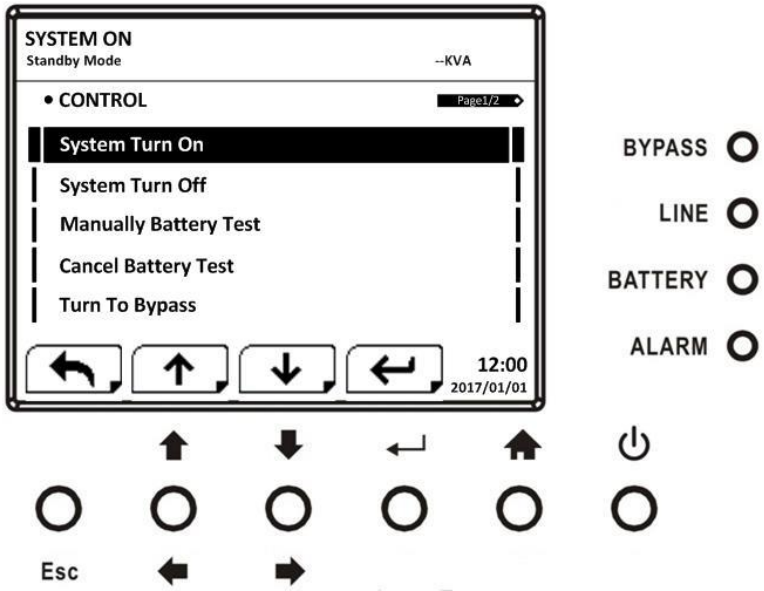


Figure 4-6 Control screen page 1

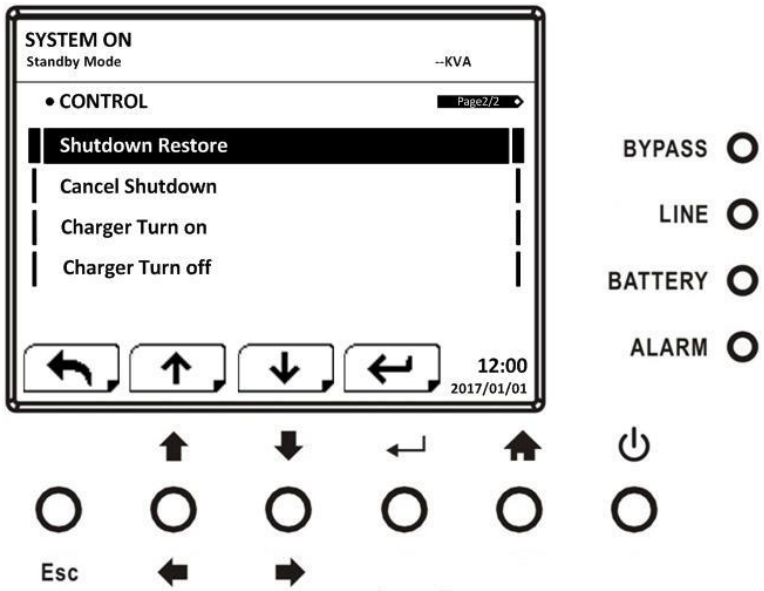


Figure 4-7 Control screen page 2

When the control option is selected by pressing "↵" button, the confirmation screen will pop up. Use "◀" or "▶" button to choose "V" (YES) or "X" (NO). Choose "V" and press "↵" button to confirm command or choose "X" to cancel command, as shown in Figure 4-8.

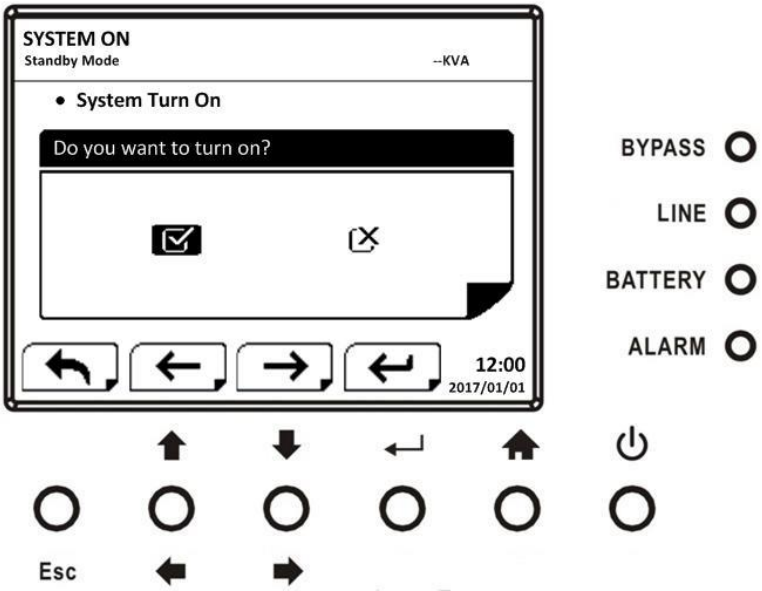


Figure 4-8 Confirmation screen

4.1.5 Measurement Screen

Use "↑" or "↓" button to choose MEASUREMENT option, and press "↵" button to go into the submenu, as shown in Figure 4-9 and 4-10.

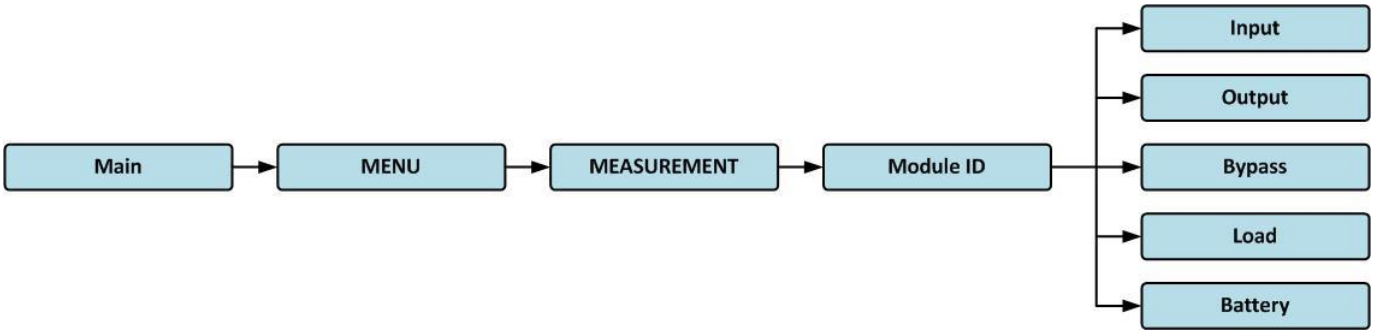


Figure 4-9 Measurement menu

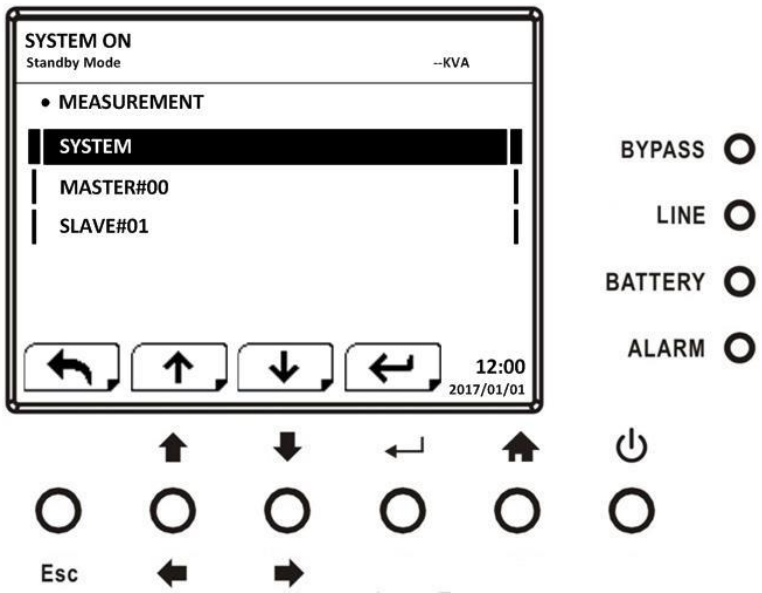


Figure 4-10 Measurement Menu Screen

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 4-11.

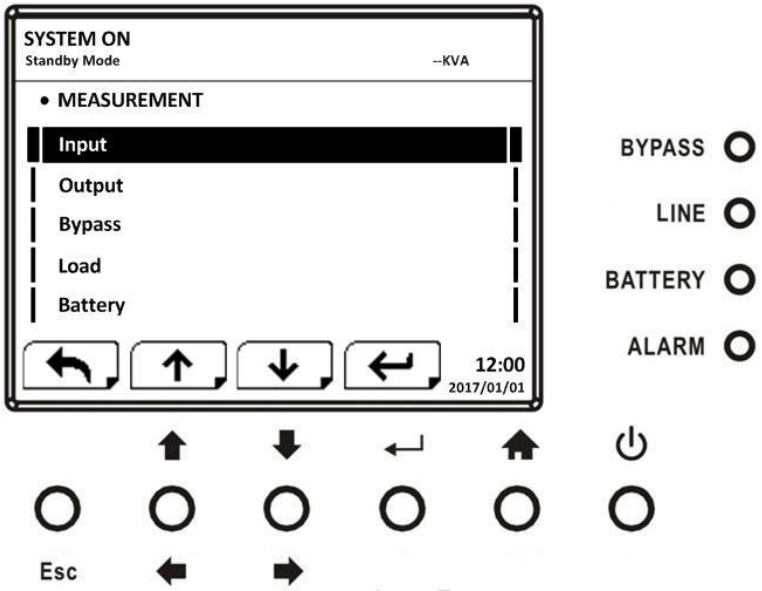


Figure 4-11 Measurement source selection Screen

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 4-1: Measurement data

Menu	Item	Explanation
Input	L-N Voltage (V)	Input phase voltage by phases*. Units 0.1V.
	Frequency (Hz)	Input Frequency by phases*. Units 0.1Hz.
Output	L-N Voltage (V)	Output phase voltage by phases. Units 0.1V.
	L-N Current (A)	Output phase current by phases*. Units 0.1A.
	Frequency (Hz)	Output Frequency by phases*. Units 0.1Hz.
	Power Factor	Output Power Factor by phases*.
Bypass	L-N Voltage (V)	Bypass phase voltage by phases. Units 0.1V.
	Frequency (Hz)	Bypass Frequency by phases*. Units 0.1Hz.
	Power Factor	Bypass Power Factor by phases*.
Load	Sout (KVA)	Apparent power by phases*. Units 0.01KVA.
	Pout (KW)	Active power by phases*. Units 0.01KW.
	Load Level (%)	The percentage of the UPS rating load by phases. Units 1%.
Battery	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%.
	Test Result	Battery test result
	Charging Status	Battery charging status
	Temperature1(°C)	Internal temperature of UPS module. 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.

**By phases: data will be shown based on UPS model. Three phase model will show data in three phases. Two phase model will show data in two phases.*

4.1.6 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 4-12.

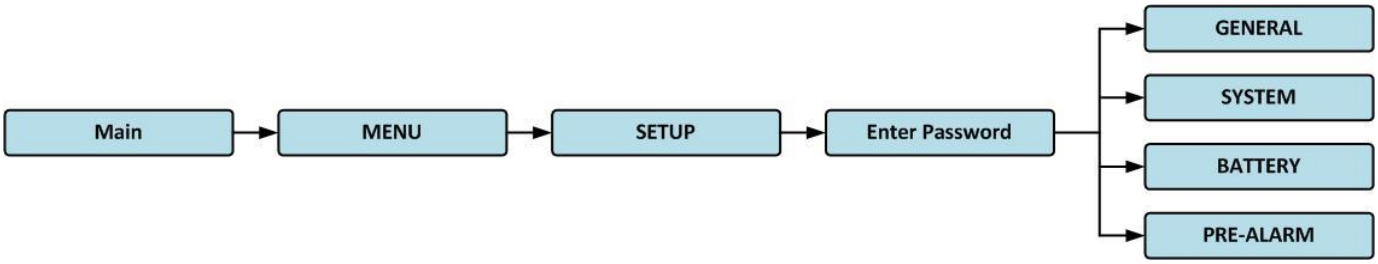


Figure 4-12 Setup menu

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 4-13.

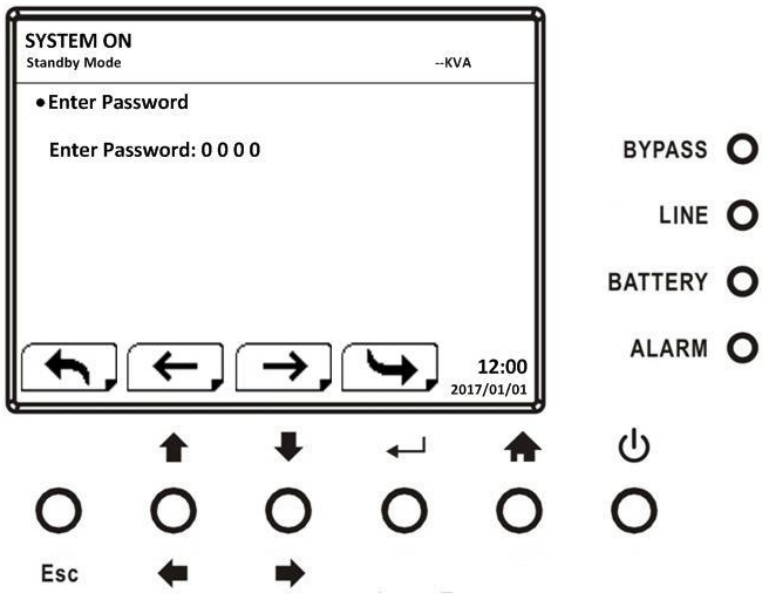


Figure 4-13 Enter password Screen

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

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

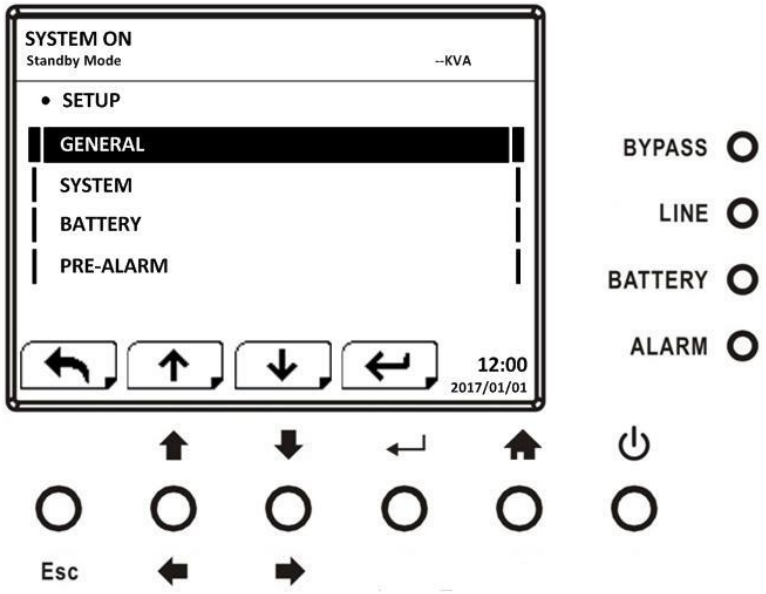


Figure 4-14 SETUP Submenu Screen

There are two levels of password protection, user password and maintainer password.
The default password for user is "0000". It could be changed by user.
The manitainer password is owned by service personnel.
Entering different level of password can access to differnet settings. The setting can be changed in different operation mode. **Table 4-2** lists the relevant information.

Table 4-2: All setting items in Setup Menu

	UPS operation Mode / Setting item	Standby Mode	Bypass Mode	Line Mode	Battery Mode	Battery Test Mode	Fault Mode	Converter Mode	ECO Mode	Authorization	
										User	Maintainer
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 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
	Standard Mode	Y	Y								Y
	EPO Function	Y									Y
System	Output Voltage	Y	Y								Y
	ECO Voltage Range	Y	Y	Y					Y		Y
	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
	Total Power	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Charger Test	Y	Y	Y				Y	Y		Y
Battery	Nominal Battery Voltage	Y	Y								Y
	Battery Capacity in Ah	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Battery Groups	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Maximum Charging Current	Y	Y								Y
	Battery Low/Shutdown 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.

4.1.6.1 Setup-General Screen

Use "↑" or "↓" buttons to choose between different sub-menus, and press "↵" button to go into the GENERAL setting screen, as shown in Figure 4-15 and 4-16. General setting can be set in any operating mode and Setup-General setting list is shown in **Table 4-3**.

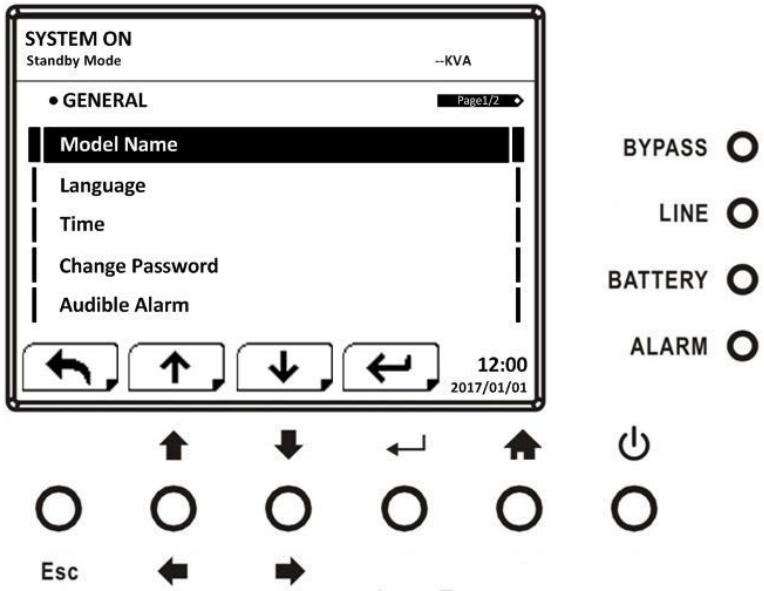


Figure 4-15 Setup-General Screen page 1

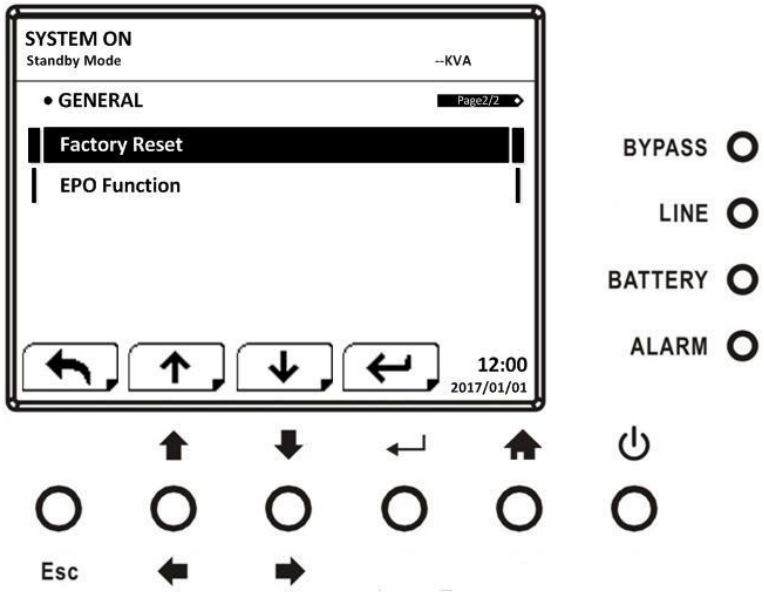


Figure 4-16 Setup-General Screen page 2

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 "V" (YES) or "X" (NO). Choose "V" and press "↵" button to confirm setting or choose "X" to cancel the setting, as shown in Figure 4-17.

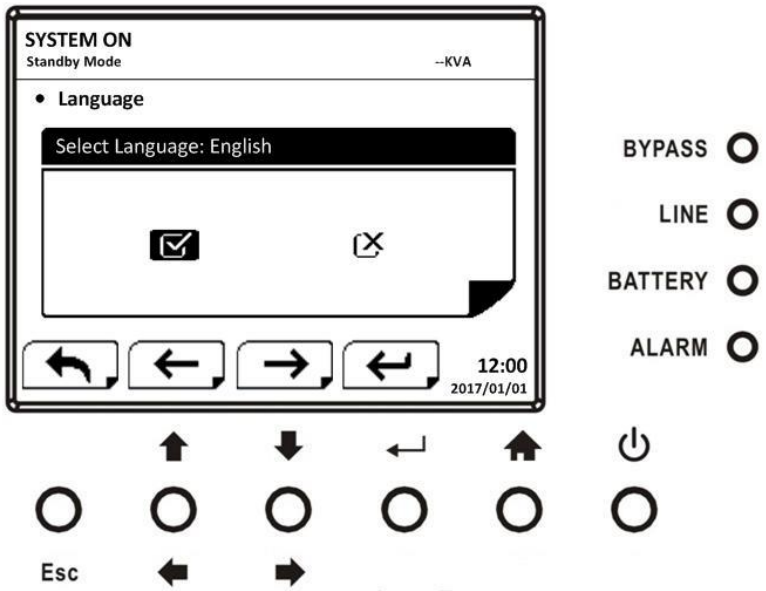


Figure 4-17 SETUP Confirmation screen

Table 4-3: 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	--	Set New Password. 0000 (Default)
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

4.1.6.2 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 4-18, 4-19 and 4-20.

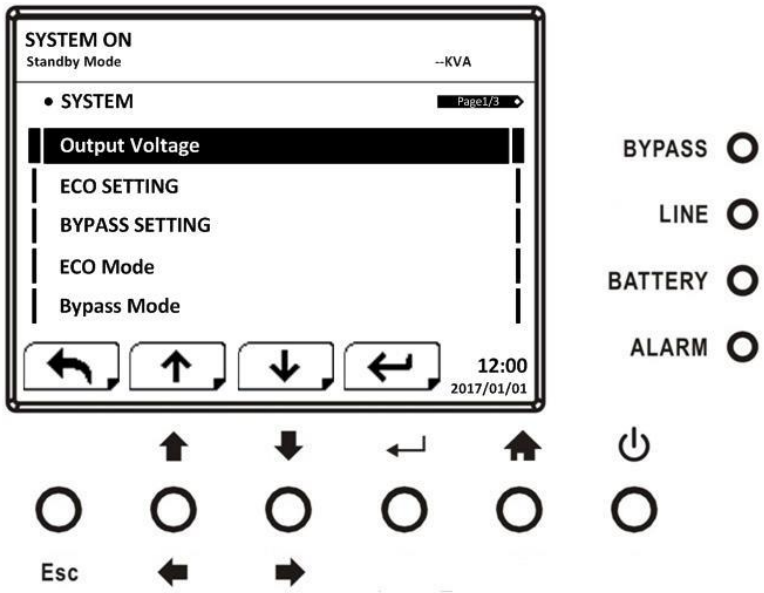


Figure 4-18 Setup-System Screen page 1

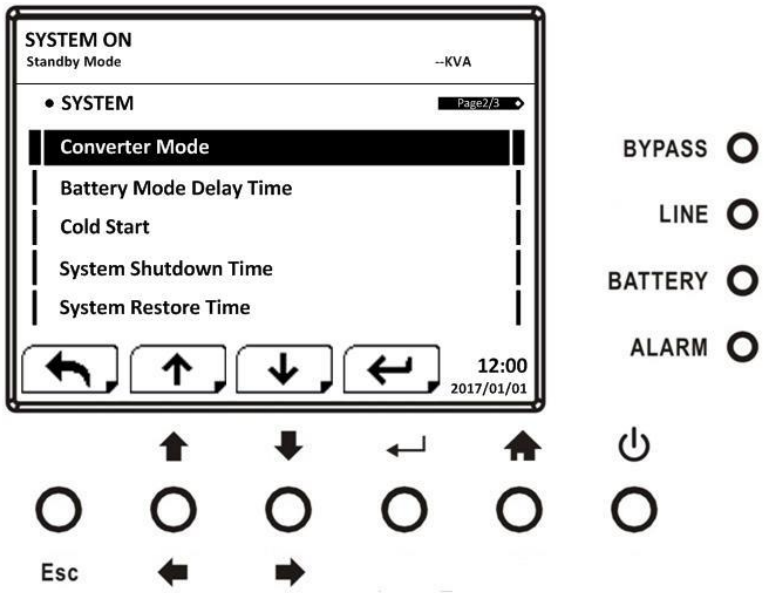


Figure 4-19 Setup-System Screen page 2

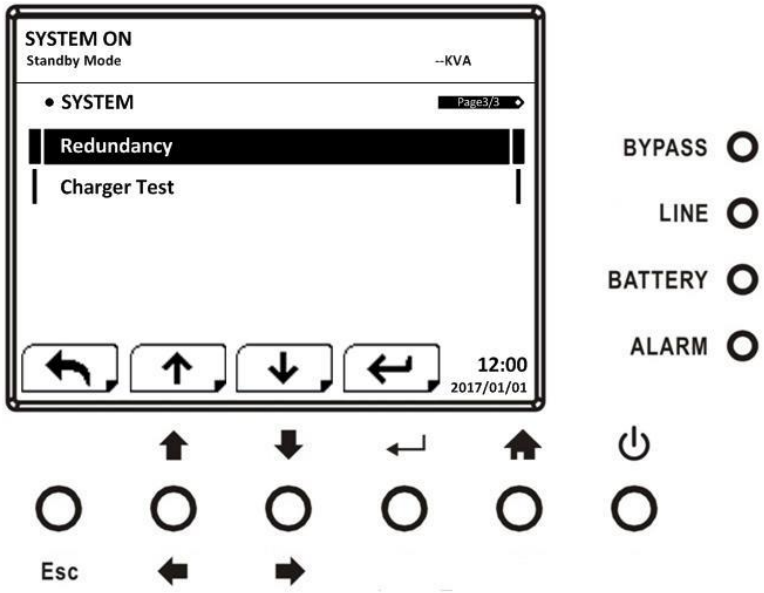


Figure 4-20 Setup-System Screen page 3

System setting can be set only when UPS is operating in certain mode. Please check Table 4-2 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 4-21.

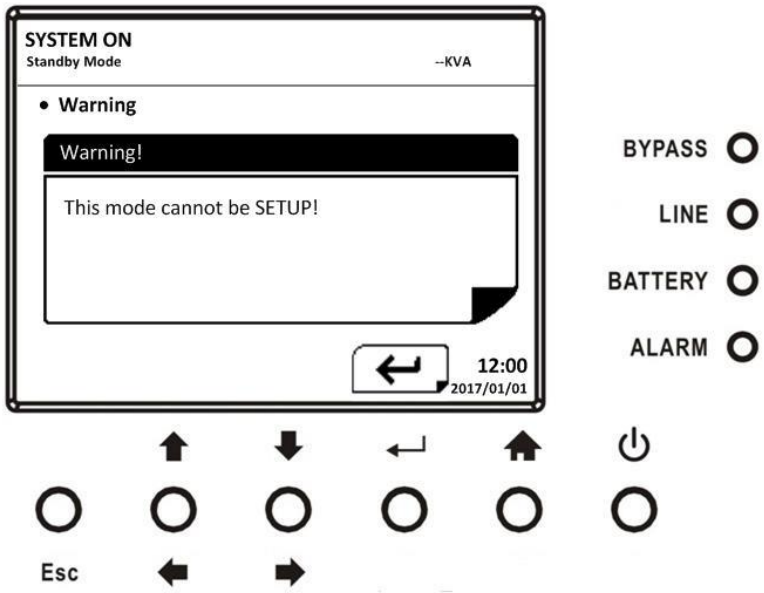


Figure 4-21 Warning screen

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

Table 4-5: Setup-System setting list

Setting Item	Sub Item	Explanation
Output Voltage	--	Set output voltage. For 3-3 10K, 3-1 10K and 1-1 10K models: ● 208Vac ● 220Vac ● 230Vac(Default) ● 240Vac For 3-3 10K LV and 2-2 6K models: ● 100Vac ● 110Vac ● 115Vac ● 120Vac(Default) ● 127Vac **MUST be reviewed after UPS installation**

ECO Setting	ECO Voltage Range	Set ECO voltage range: For 3-3 10K, 3-1 10K and 1-1 10K models: Upper Range ● (Output Setting Voltage +11V) ~ (Output Setting Voltage +24V) ● (Output Setting Voltage +11V) (Default) Lower Range ● (Output Setting Voltage -11V) ~ (Output Setting Voltage -24V) ● (Output Setting Voltage -11V) (Default) For 3-3 10K LV and 2-2 6K models: 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: For 3-3 10K, 3-1 10K and 1-1 10K models: Upper Range ● (Output Setting Voltage +11V) ~ 276V ● 264V (Default) Lower Range ● (Output Setting Voltage -11V) ~ 110V 110V (Default) For 3-3 10K LV and 2-2 6K models: 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 cold start ● Disable (Default) ● Enable After "Enable" is set, the UPS can be turned on without connecting to utility by pressing Battery Start Button. Refer to cold start operation for the details.
System Shutdown Time	--	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 Restore 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

4.1.6.3 Setup-Battery Screen

Use "↑" or "↓" button to switch different sub-menus. Press "↵" button to go into the BATTERY setting screen, as shown in Figure 4-22 and 4-23.

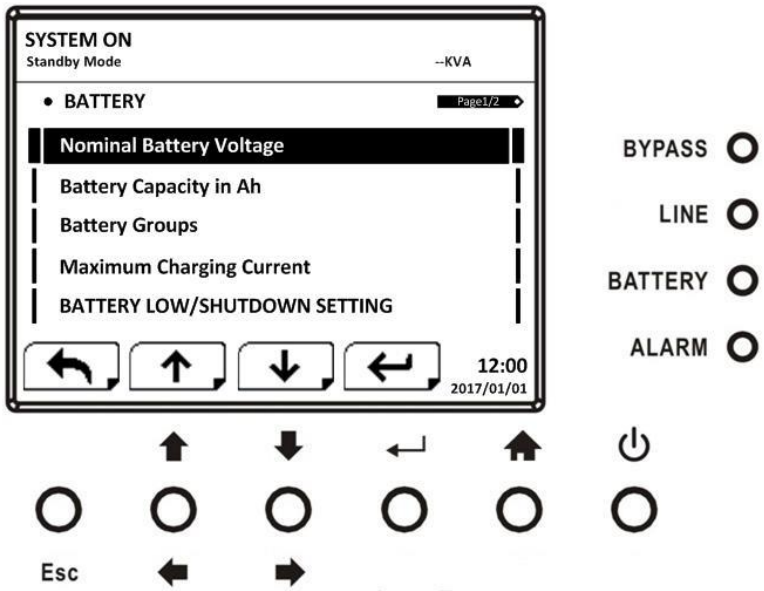


Figure 4-22 Setup-Battery Screen page 1

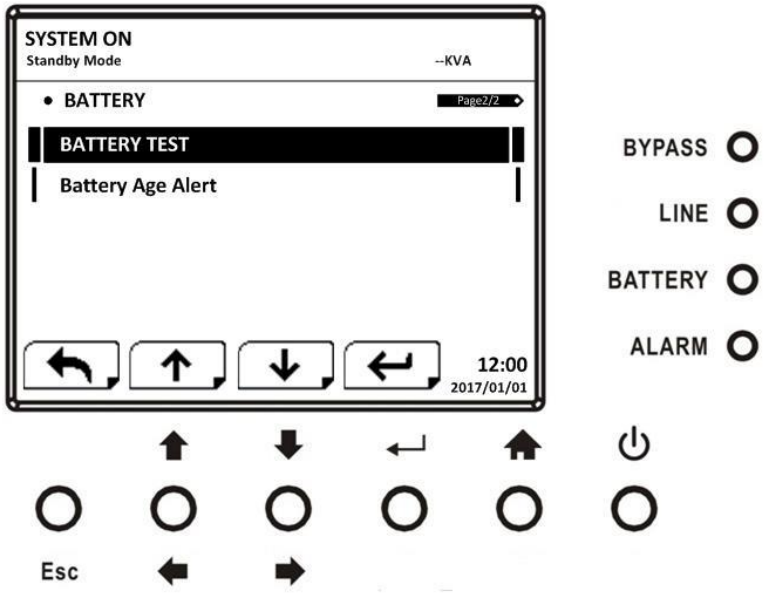


Figure 4-23 Setup-Battery Screen page 2

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 4-24. See Setup-Battery setting list in **Table 4-6**.

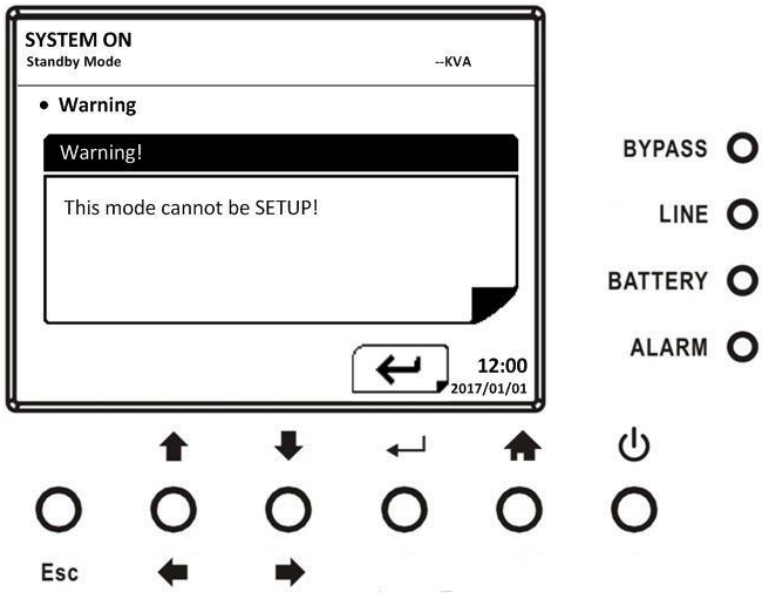


Figure 4-24 Warning screen

Table 4-6: Setup-Battery setting list

Setting Item	Sub Item	Explanation
Nominal Battery Voltage	--	Set battery nominal voltage. For 3-3 10K, 3-1 10K and 1-1 10K models: ● 16x12V (Default) ● 17x12V ● 18x12V ● 19x12V ● 20x12V For 3-3 10K LV and 2-2 6K models: ● 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.
Battery Groups		Set battery groups (1~10). ● 1 (Default)
Maximum Charging Current	--	Set battery maximum charging current (1~40A) ● 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 (9.6~10.7V) 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 ● 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.

4.1.7 Pre-Alarm Screen

Use "↑" or "↓" button to switch different sub-menus. Press "↵" button to go into the Pre-Alarm setting screen, as shown in Figure 4-25.

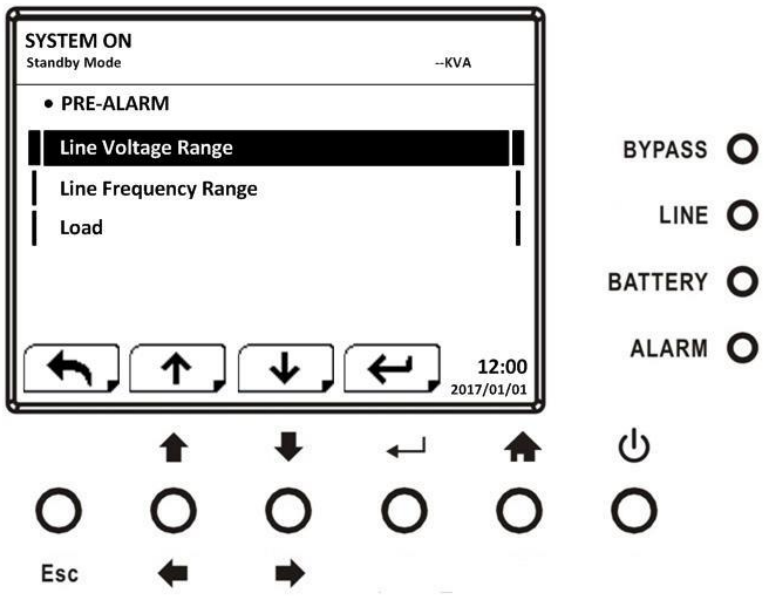


Figure 4-25 Setup-Pre-Alarm screen

Pre-Alarm setting can be set in any operation mode. See Setup-Pre-Alarm setting list in **Table 4-7**.

Table 4-7: Setup-Pre-Alarm setting list

Setting Item	Sub Item	Explanation
Line Voltage Range	--	Set line voltage range: Upper limit ● +5%

		● +10% ● +15% (Default) ● +20% 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)

4.1.8 Information Screen

In INFORMATION menu, you can check the serial number, firmware versions, system configuration and settings of the UPS. There are sub-menus under the INFORMATION, including Identification, System and Battery, as shown in Figure 4-26 and 4-27.

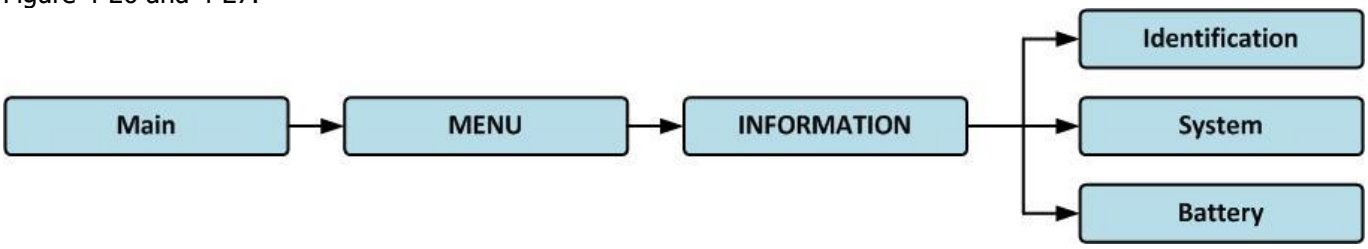


Figure 4-26 Information menu

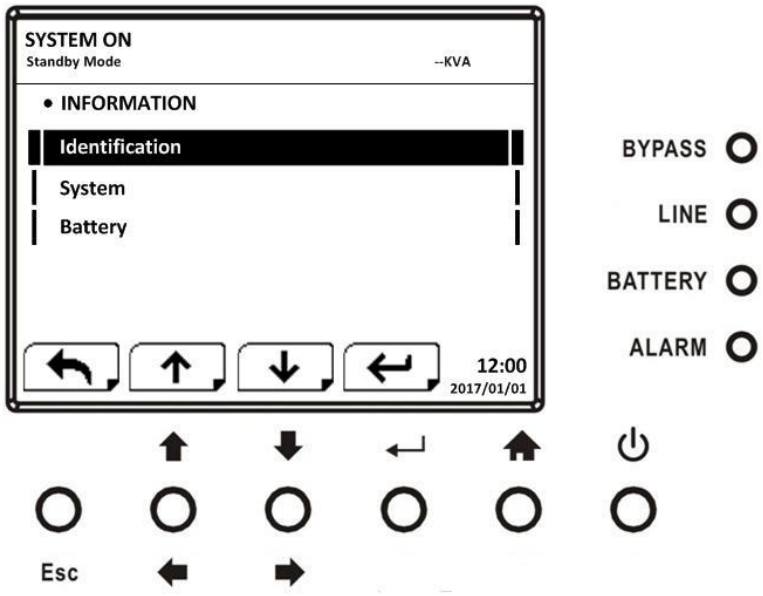


Figure 4-27 INFORMATION screen

4.1.8.1 INFORMATION - Identification Screen

When Identification submenu is selected, the Model Name, Serial No. and Firmware Version will be displayed, as shown in Figure 4-28 and 4-29. Use "⬆" or "⬇" button to switch between different pages.

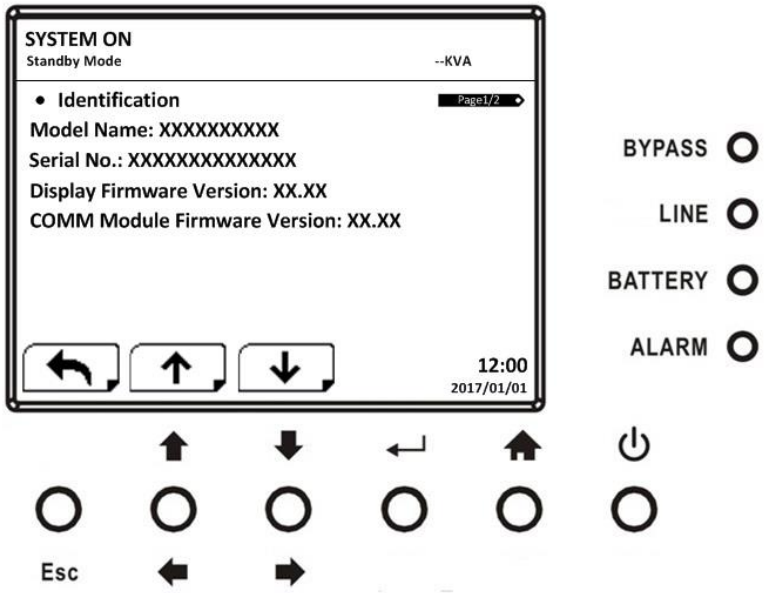


Figure 4-28 Identification screen page 1

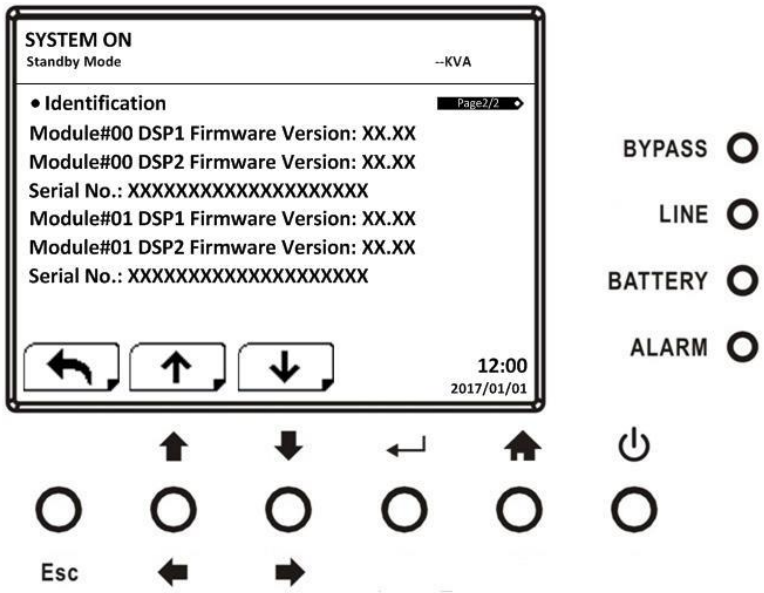


Figure 4-29 Identification screen page 2

4.1.8.2 INFORMATION - System Screen

When System submenu is selected, the information such as system power, nominal voltage, nominal frequency … etc. will be displayed, as shown in Figure 4-30 and 4-31. Use "⬆" or "⬇" button to switch between different pages.

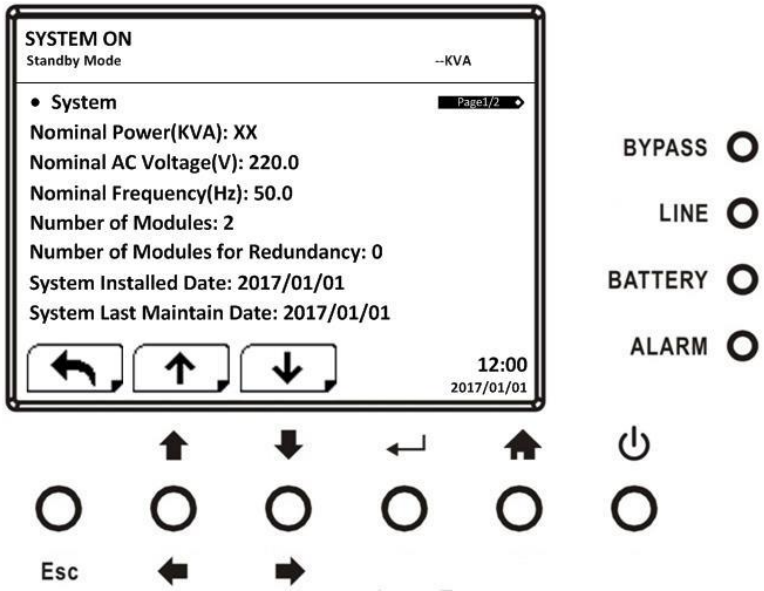


Figure 4-30 INFORMATION System screen page 1

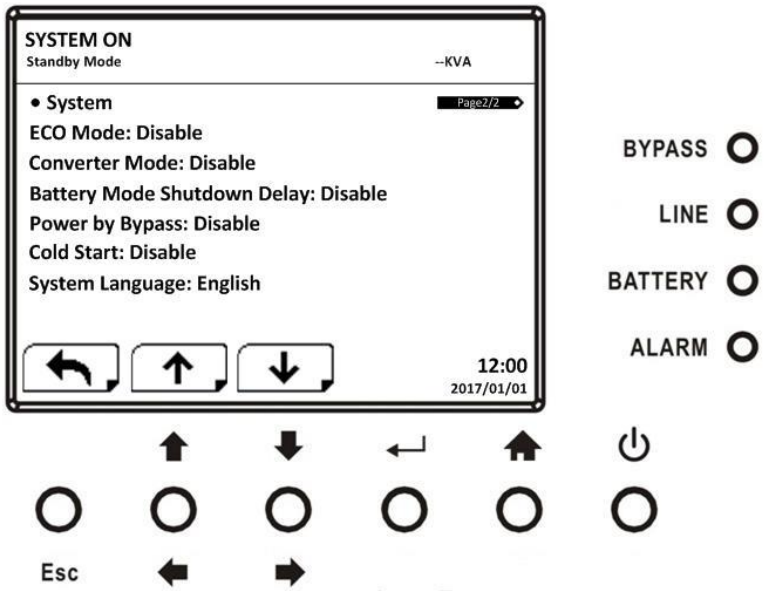


Figure 4-31 INFORMATION System screen page 2

4.1.8.3 INFORMATION - Battery Screen

When Battery submenu is selected, the battery information such as nominal battery voltage, capacity, charging current … etc. will be displayed, as shown in Figure 4-32 and 4-33. Use "⬆" or "⬇" button to switch between different pages.

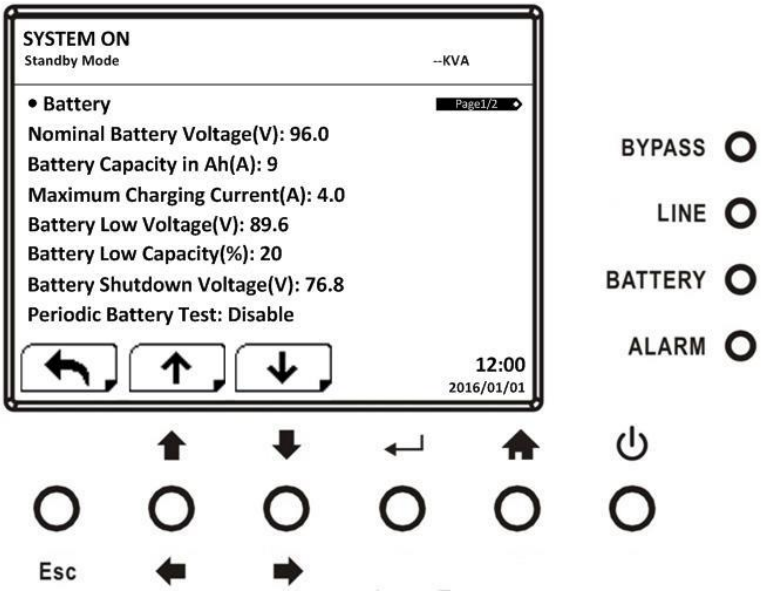


Figure 4-32 INFORMATION Battery screen page 1

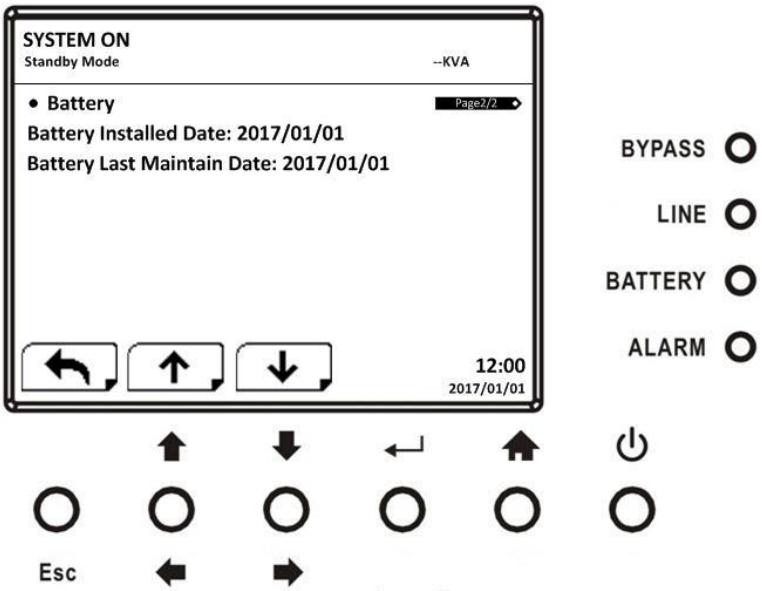


Figure 4-33 INFORMATION Battery screen page 2

4.1.9 Events Screen

In EVENT menu, you can check the current events, history events and reset all events, as shown in Figure 4-34 and 4-35.

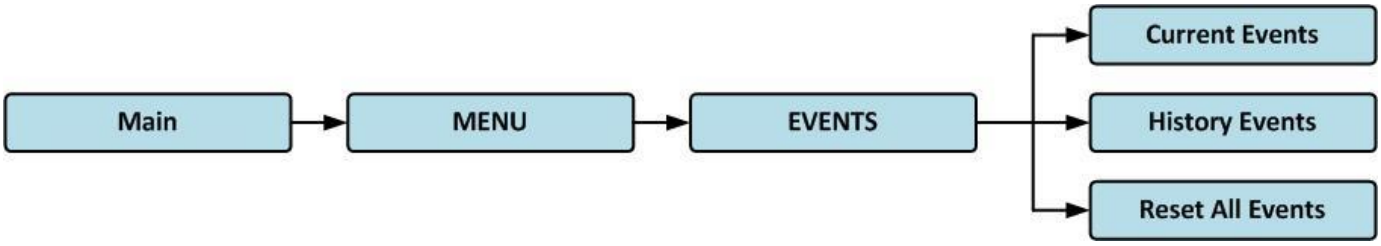


Figure 4-34 Events menu

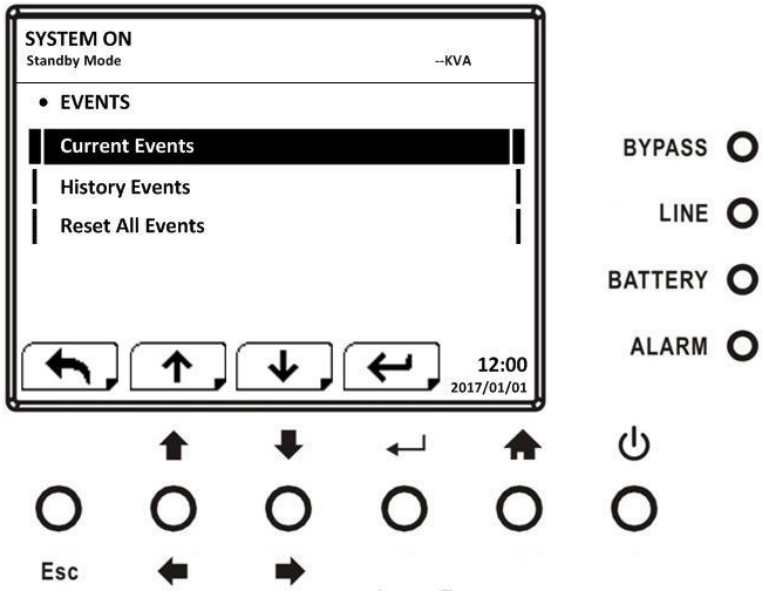


Figure 4-35 Events screen

When event occurs, you will see flashing warning text in the Main Screen as shown in Figure 4-36.

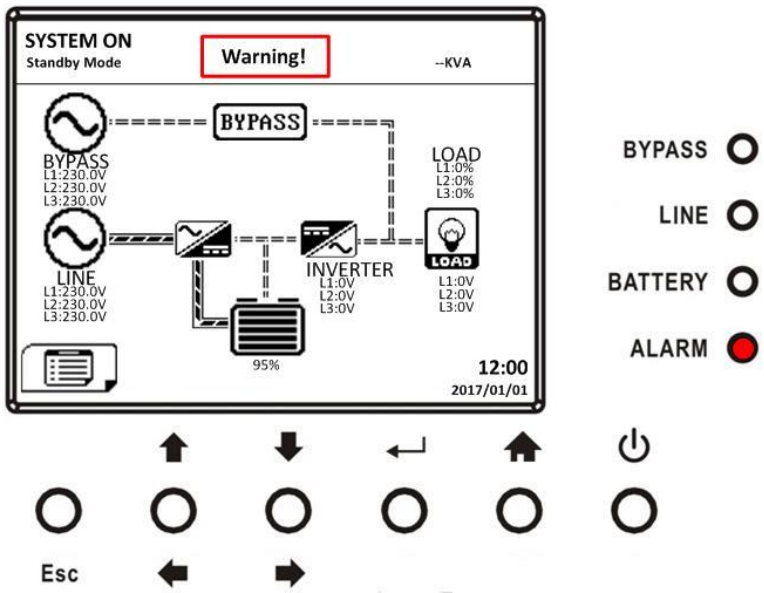


Figure 4-36 Alarm warning screen

4.1.9.1 Current Events

When 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 "⬆" or "⬇" button to read other events as shown in Figure 4-37.

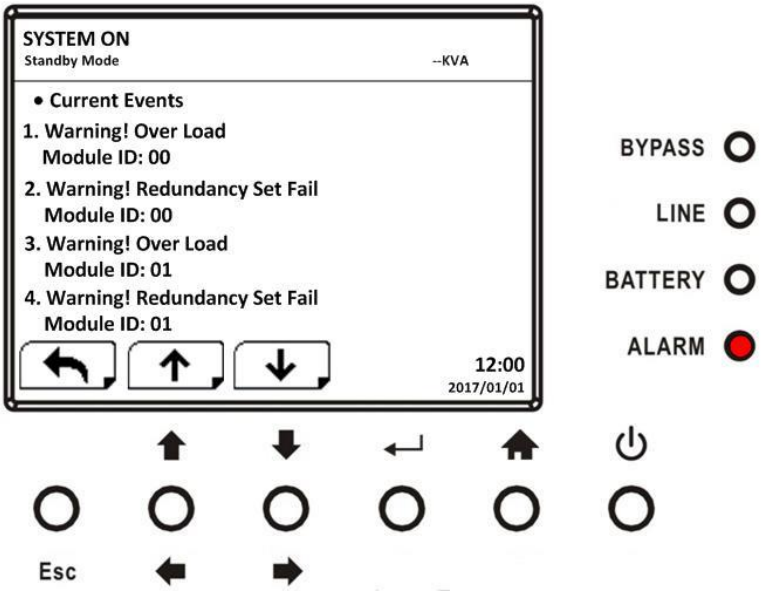


Figure 4-37 Current Events screen

4.1.9.2 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 and Module ID. (Refer to **Chapter6** Troubleshooting) In order to record more historical information about the UPS system, the important setting changed (refer to **Table 4-8** Important setting changed), UPS operation mode changes (refer to **Table 4-9** UPS mode change) and control action executes (refer to **Table 4-10** Control execution) will be saved in History Events. Refer to Figure 4-38 for display screen.

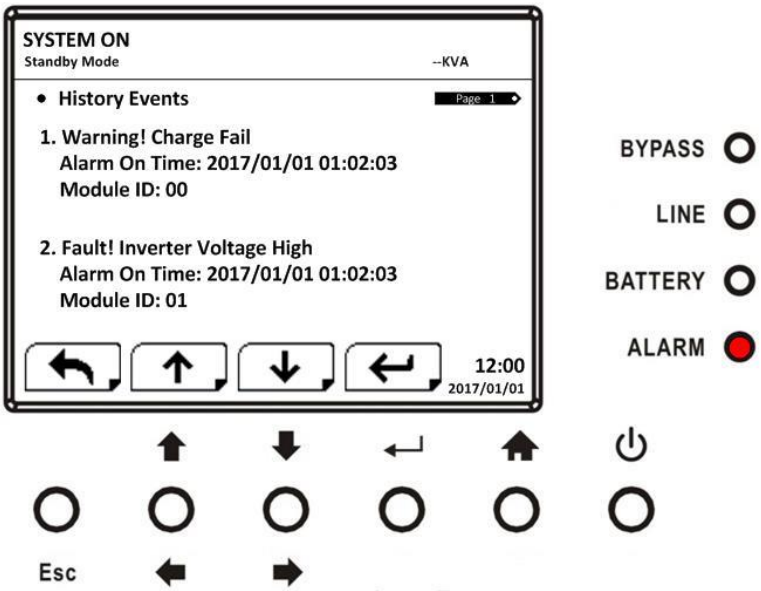


Figure 4-37 History Events screen

4.1.9.3 Reset All Events

The Maintainer password is required to enter Reset All Events screen as shown in Figure 4-38. Then, use"◀" or "▶" buttons to choose "V" (YES) or "X" (NO). Choose "V" and press "↵" button to reset all events or choose "X" to cancel this action as shown in Figure 4-39.

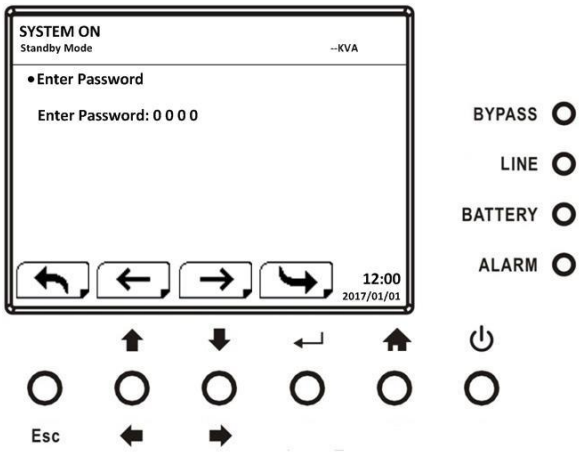


Figure 4-38 Reset All Events screen

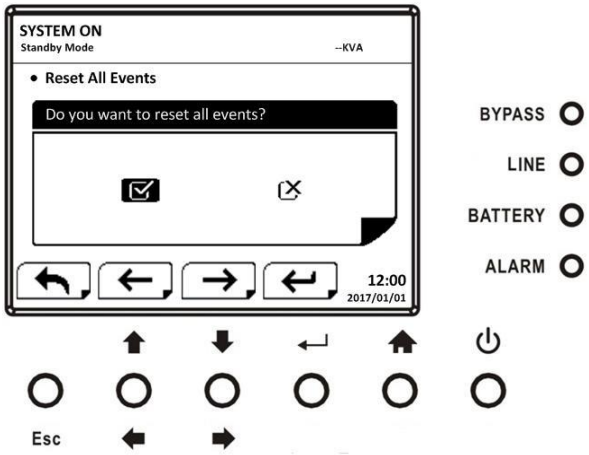


Figure 4-39 Reset All Events Confirmation screen

4.1.9.4 History Record

Table 4-8: 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 4-9: UPS mode change

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	

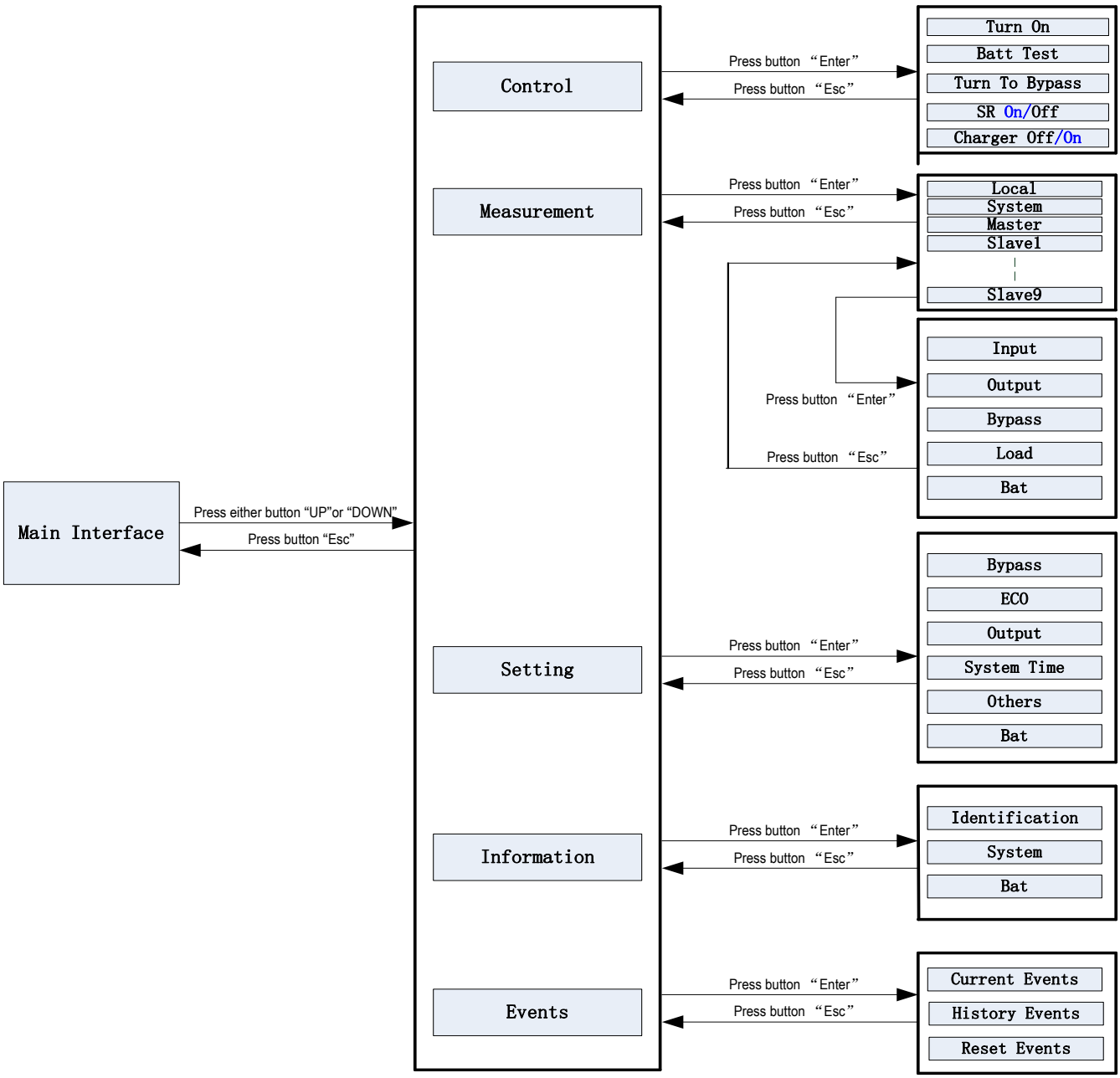
Table 4-10: Control execution

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	

4.2 LCD Screen in UPS Module

4.2.1 LCD Structure

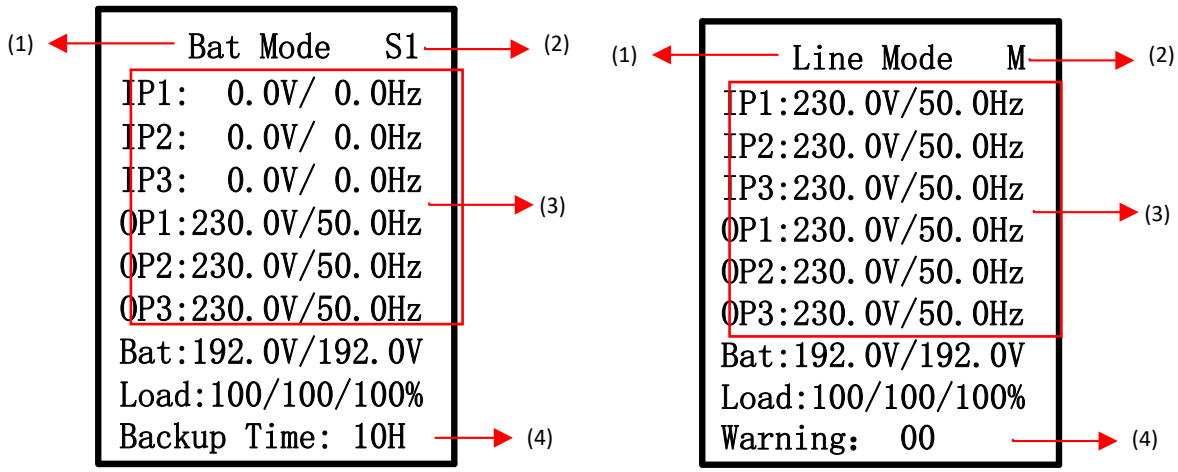
The entire LCD structure is demonstrated as below diagram.



LCD Structure

4.2.2 Main interface (Home Page)

After initialization, the main screen will display as below.



Main screen (Home Page)

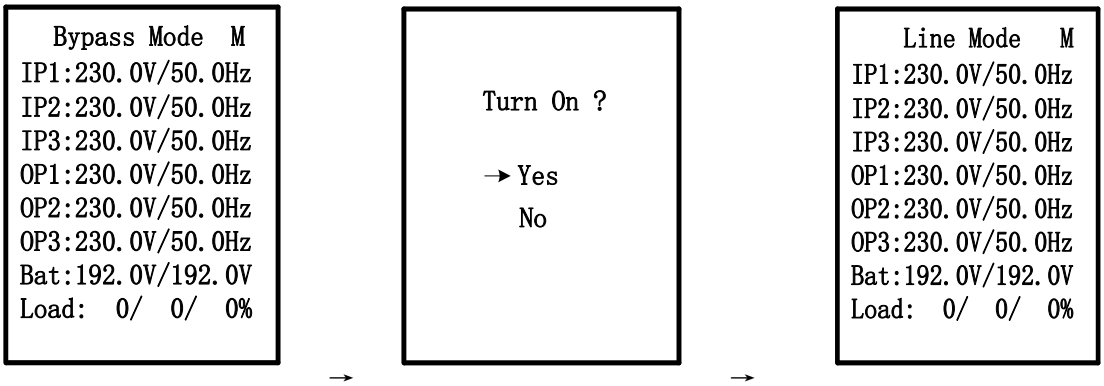
1) UPS Mode: Current operation mode.
2) It will display the UPS running status mode and parallel information as below table.

Short Description	Description
N	New adding module into parallel system.
M	The master module works in stand-alone.
M0	The master module works in parallel.
S<n>	Slave, <n> means the number of slave module.

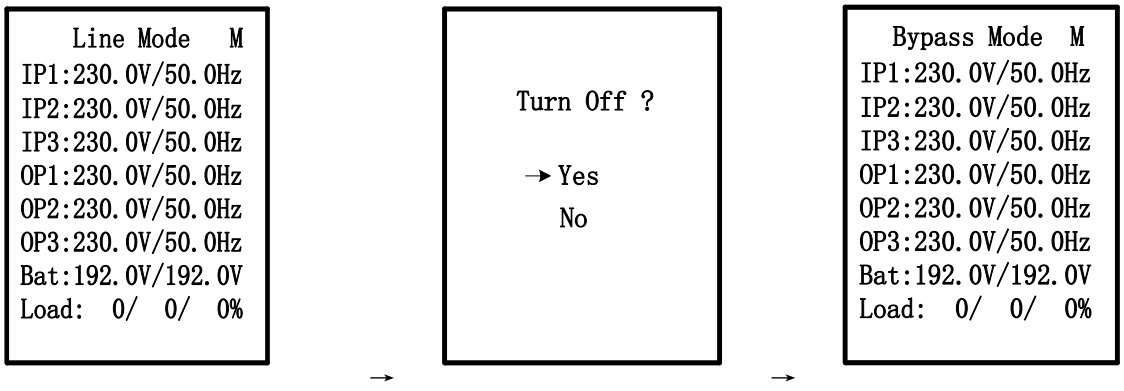
3) Input and output information.
4) Battery capacity, load level and backup time/warning or fault codes. When alarms happen, the warning or fault information will display. When UPS is operated in Battery mode or Battery Test mode, the backup time will display.

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.

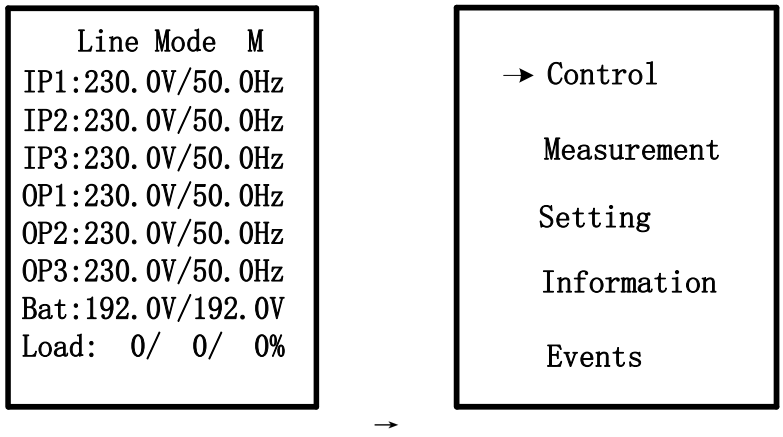


When UPS is turned on, you could press the "OFF/ESC" button to allow UPS to bypass or standby mode.



4.2.3 Operation menu

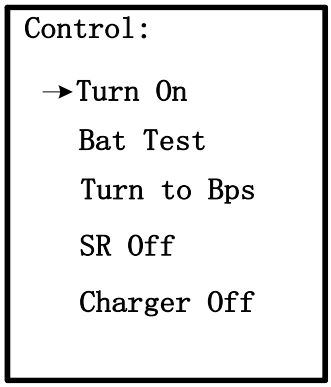
4.2.3.1 Main menu



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).

4.2.3.2 Control



In "Control" screen, it's real-time command for UPS.

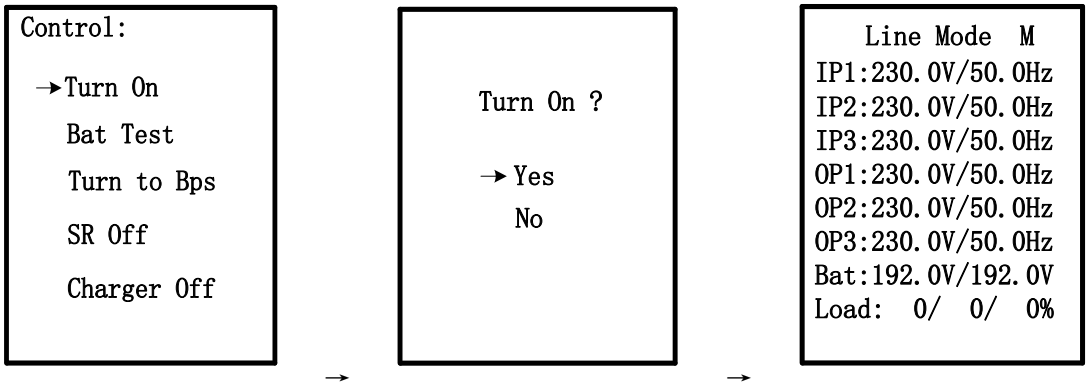
- "Turn On" will be displayed if UPS is not turned on. "Turn Off" will be displayed if UPS is turned on.
- "Bat Test" will be displayed if UPS is not in Battery Test Mode. "Cancel Test" will be displayed if UPS is in Battery Test Mode.
- "Turn to Bps" will be displayed all the time no matter what status 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.

1) Turn On/Turn Off

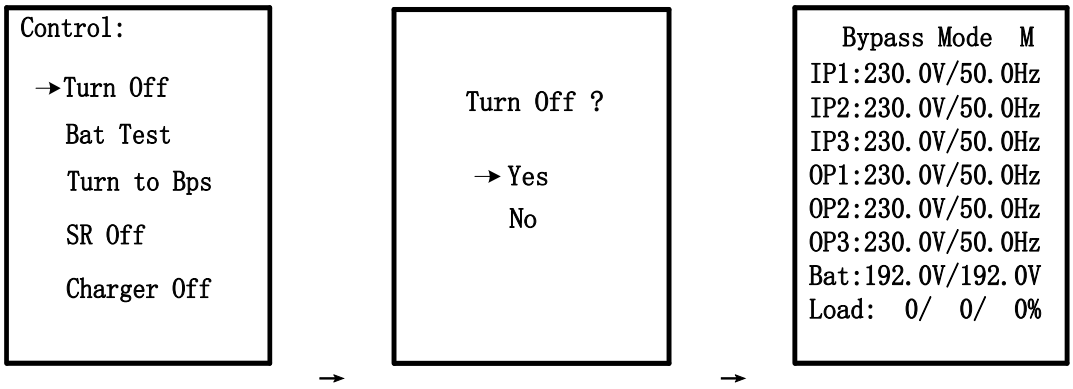
This item is for turning on/off the UPS.

a) On bypass mode or standby 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.



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.

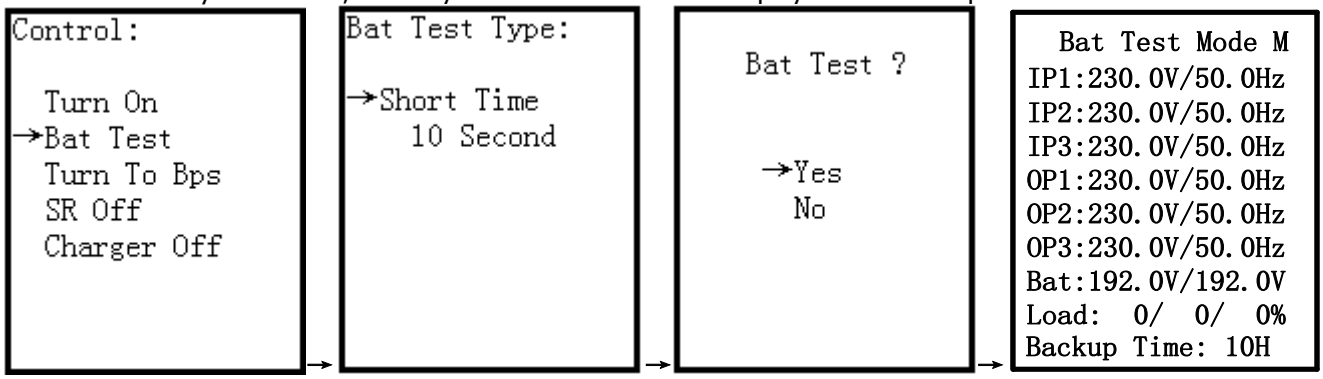
b) On line mode, converter mode, ECO mode or battery mode, it will display "Turn Off" in control menu. If it is selected and confirmed, the UPS will transfer to bypass mode or standby mode.



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.

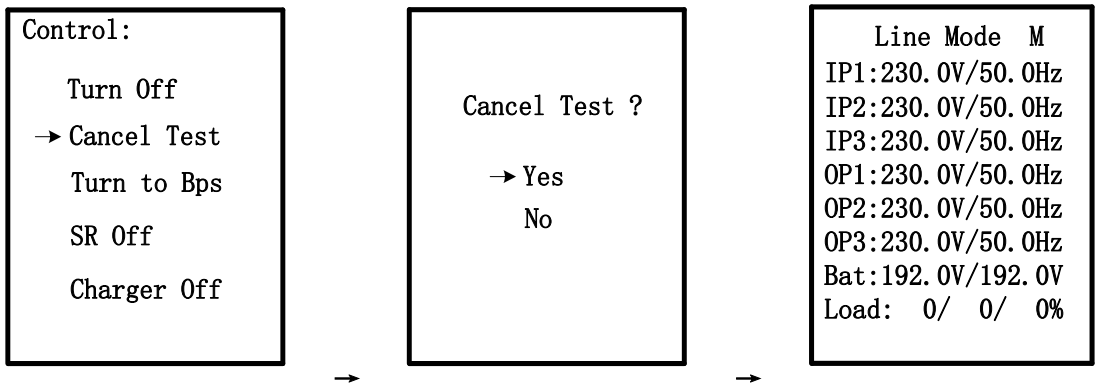


However, it could execute this test in Line/Converter mode and reminder will pop up in the screen. When "Yes" is selected, the screen will return back to home page with "Battery Test Mode" displayed on top. If the test is completed, the displayed status will change back to UPS current mode. There are four battery test types to select. Refer to Table 4-11.

Table 4-11: Battery Test Type

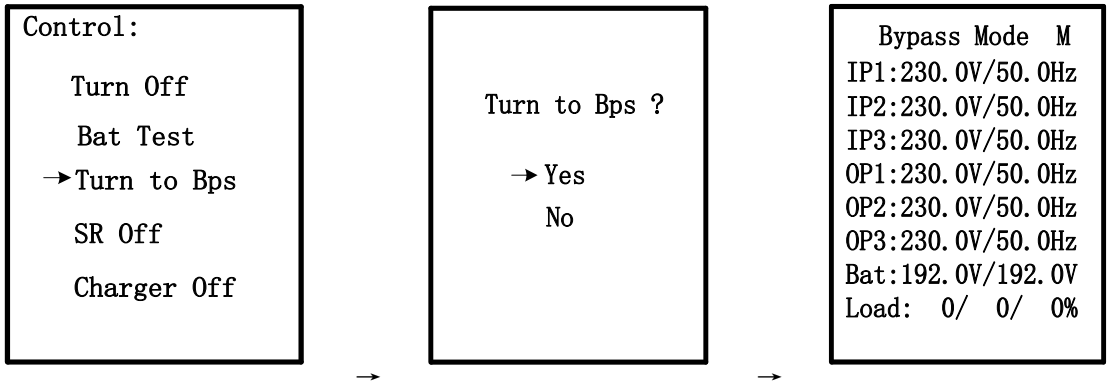
Setting Item	Sub Item	Explanation
Bat Test Type	Short Time	10-second test time.
	Long Time 10 Minute	When selected, the duration is able to set up and the time unit is minute. The setting value is from 1 to 99 by pressing "up" and "down" button. 10 min is default setting.
	Long Time 12 Second	When selected, the time unit is second. The available settings is 12s, 18s, 24s, 30s, 36s, 42s, 48s and 54s. The default setting is 12s.
	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.



3) Turn to Bypass

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



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.

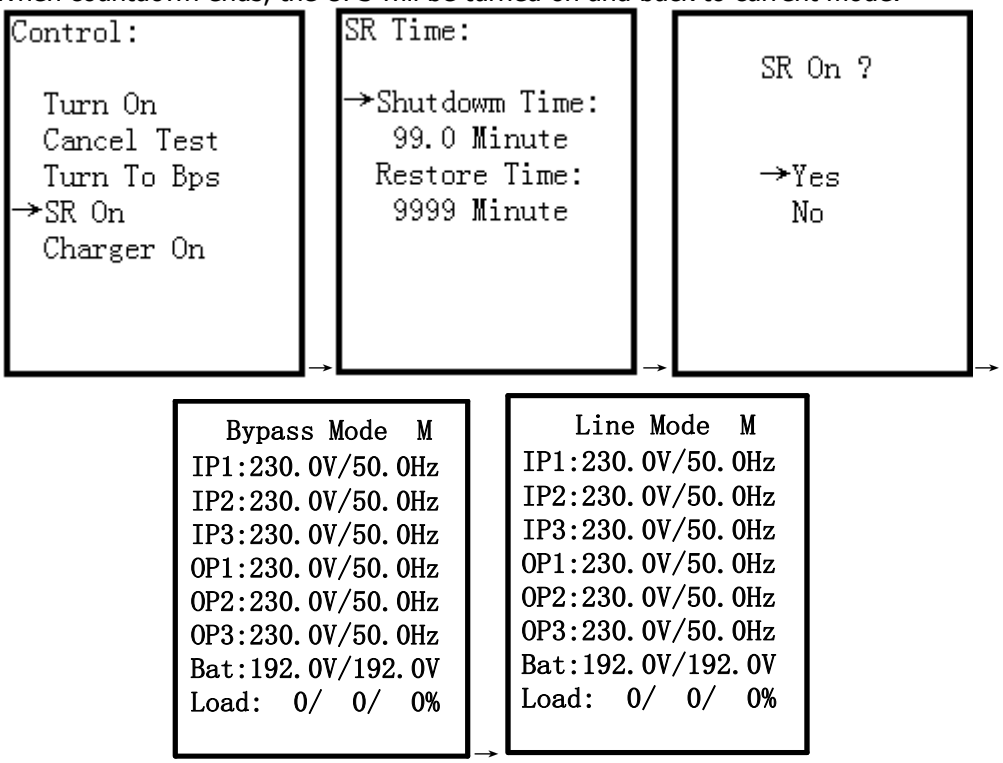
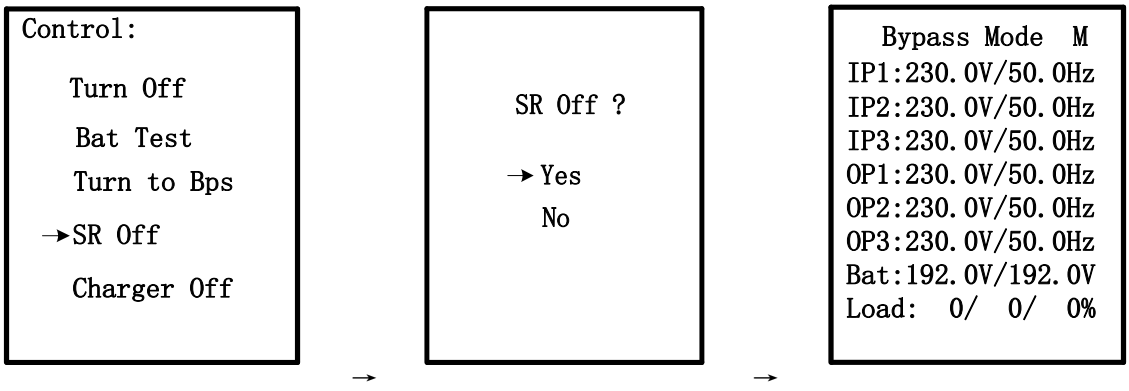


Table 4-12: Shutdown Restore Time

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)

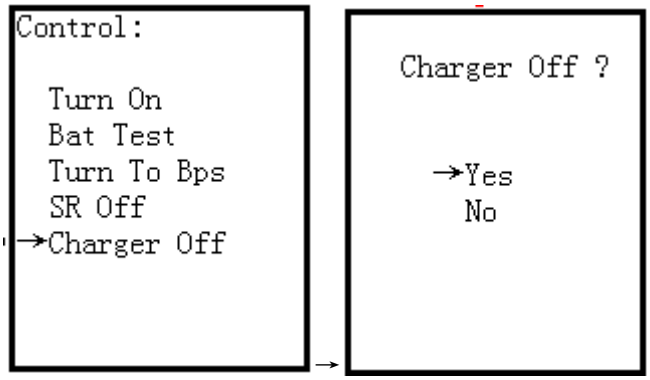
b) On Standby/Bypass/Fault mode, it will display "SR Off" in control menu. If it is selected and confirmed, the screen will return back to home page and system will back to current mode.

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.

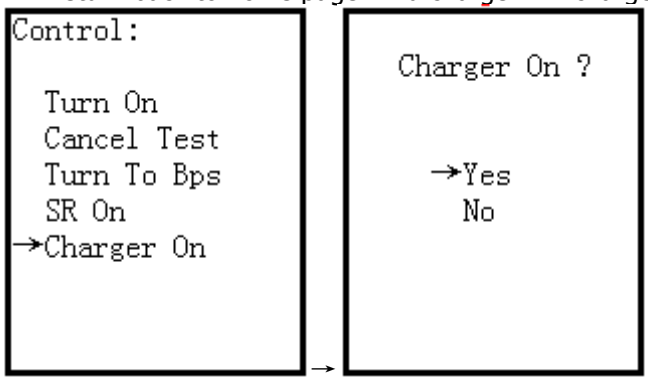


5) Charger Off / Charger On

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.

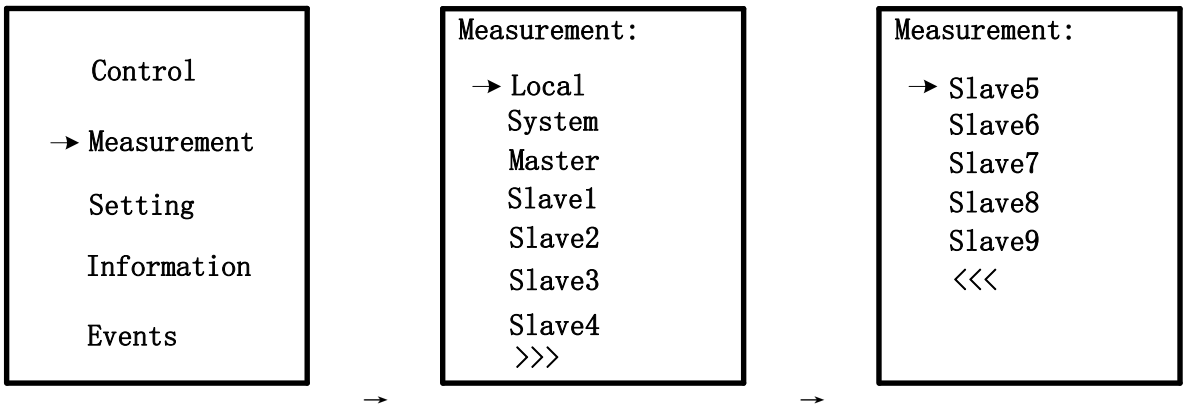


b) "Charge On" will be displayed under all operation modes when charger is turned off. If it is selected and confirmed, the screen will return back to home page. And charger will charge the battery.

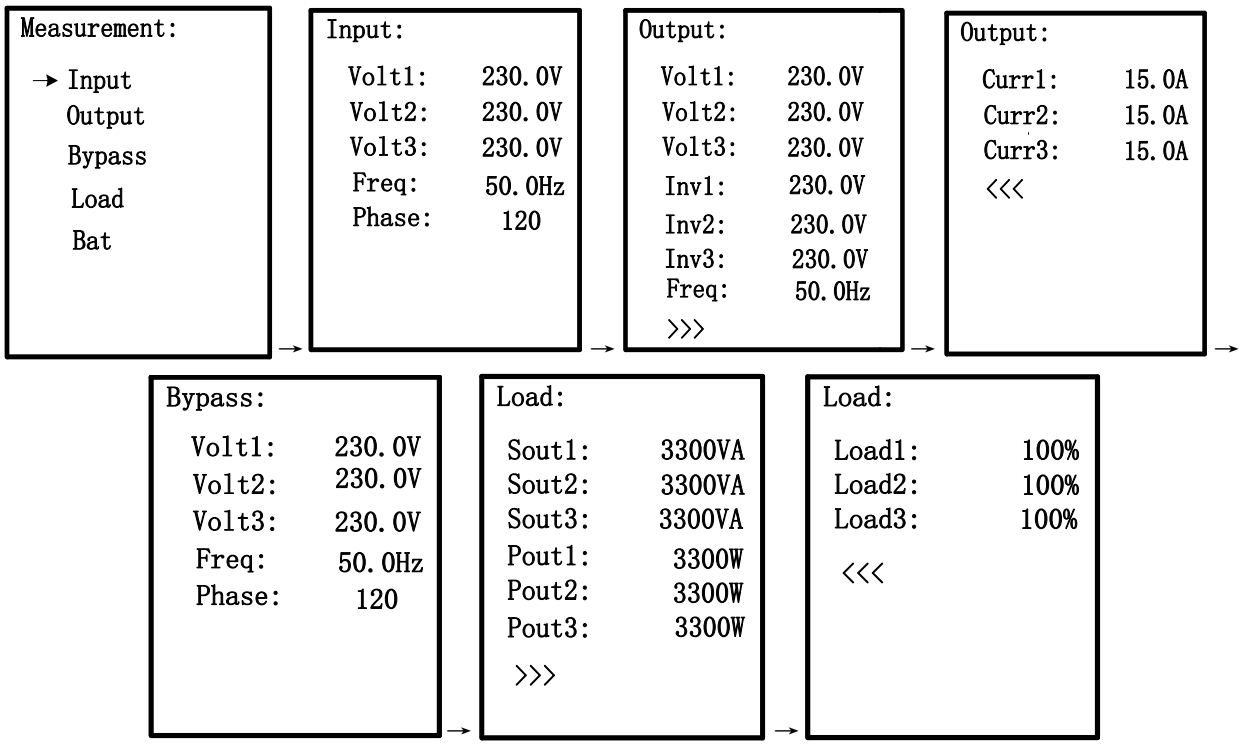


4.2.3.3 Measurement

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 "⬆" or "⬇" button to explore the pages.

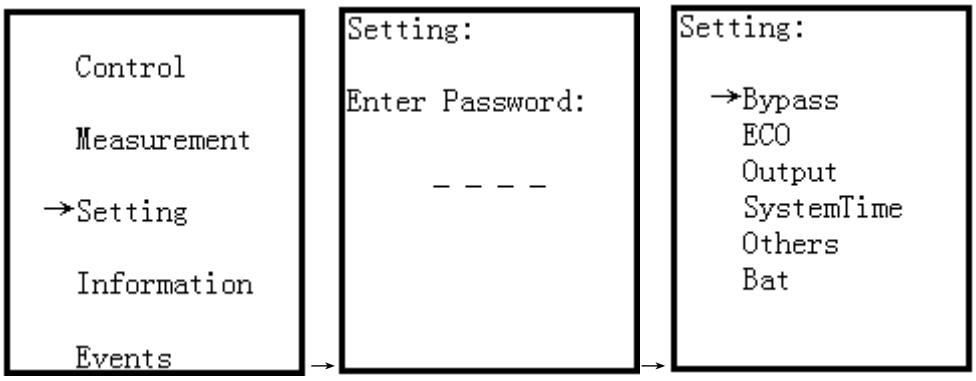


"Local" means the current UPS module. "Master" and "Slave<n>" means the other UPS module in this parallel system.



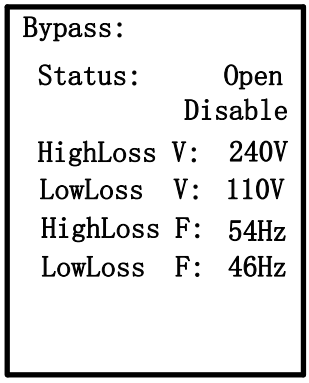
4.2.3.4 Setting

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, SystemTime, Others and Battery, as shown below.

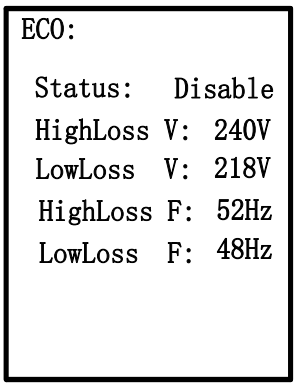


NOTE: Some settings will be only available in some operation modes. If the setting is not available in current mode, the LCD will show prompt message with "Item can't be set in this mode". Press any button or just wait for several seconds until this message fades.

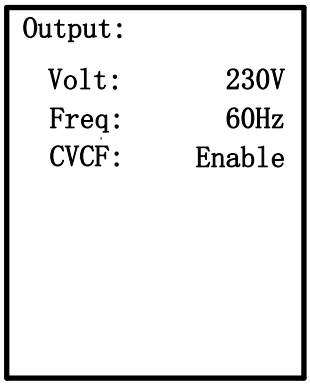
1) Bypass setting (only available or effective on bypass mode and standby mode)

Interface	Description
	**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 Bypass 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. For 3-3 10K, 3-1 10K and 1-1 10K models: Setting range is from (Rated Output Volt +11V) to 276V and the default value is 264V. For 2-2 6K and 3-3 10K LV models: 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. For 3-3 10K, 3-1 10K and 1-1 10K models: Setting range is from 110V to (Rated Output Volt - 11V) and the default value is 110V. For 2-2 6K and 3-3 10K LV models: 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 system: Setting range is from 51Hz to 54 Hz. 60 Hz system: Setting range is from 61Hz to 64Hz. The default value is 54.0Hz/64.0Hz. **5. LowLoss F**: Set the acceptable low 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.

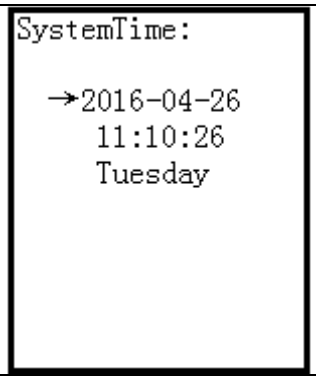
2) ECO setting (only available or effective on bypass mode, standby mode, Line mode and ECO mode)

Interface	Description
	**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. For 3-3 10K, 3-1 10K and 1-1 10K models: The setting range is from (Rated Output Volt +11V) to (Rated Output Volt +24V) and the default setting is (Rated Output Volt +11V). For 2-2 6K and 3-3 10K LV models: 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. For 3-3 10K, 3-1 10K and 1-1 10K models: The setting range is from (Rated Output Volt -24V) to (Rated Output Volt-11V) and the default setting is (Rated Output Volt -11V). For 2-2 6K and 3-3 10K LV models: 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.**

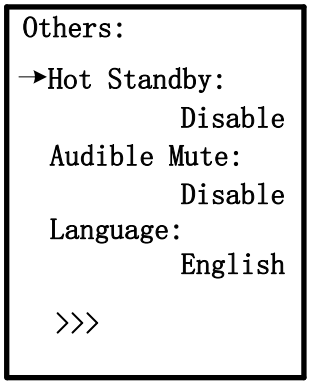
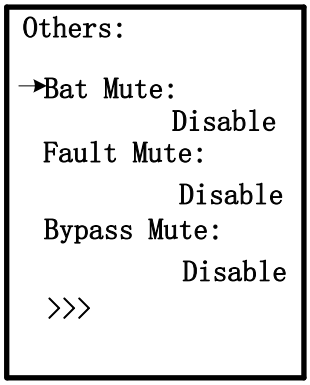
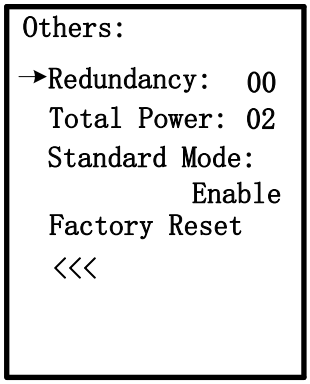
3) Output setting (only available or effective on bypass mode and standby mode)

Interface	Description
	**1. Volt:** For 3-3 10K, 3-1 10K and 1-1 10K models: **208:** Presenting the rated output voltage with 208Vac **220:** Presenting the rated output voltage with 220Vac **230:** Presenting the rated output voltage with 230Vac **240:** Presenting the rated output voltage with 240Vac The default value is **230Vac.** For 2-2 6K and 3-3 10K LV models: **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.**

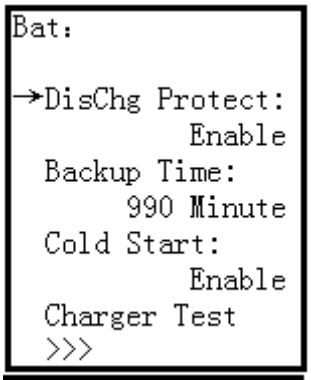
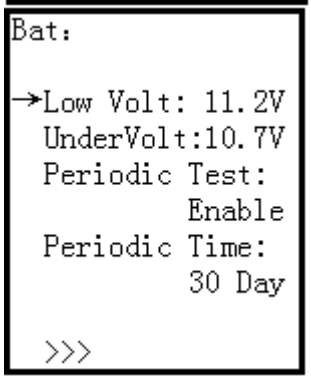
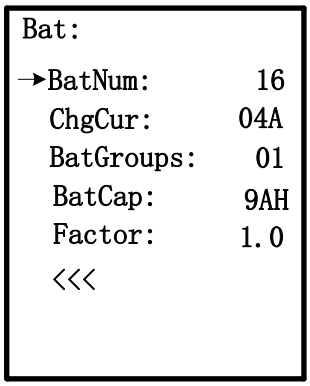
4) SystemTime setting (available or effective on all mode)

Interface	Description
	**SystemTime:** Date, Time and Week can be modified via this interface. Input the actual Time, the unit will automatically adjust timer after "↵" button is pressed.

4) Others setting

Interface	Description
  	**1. Hot standby**(only available or effective on bypass mode and standby mode)**:** **Enable:** Hot standby function is enabled. It means that the current UPS is set to be host of hot standby system, and it will automatically restart after AC recovery even without battery connected. **Disable:** Hot standby function is disabled. The UPS is running at normal mode and can't restart without battery. The default setting is **Disable**. **2. Audible Mute**(available or effective for all modes)**:** **Enable:** It is to mute the buzzer. **Disable:** It is to enable the buzzer when UPS have alarms or UPS is working in bypass mode or Battery mode. The default setting is **Disable.** **3. Language**(available or effective for all mode): **English:** All interface will show in English **4. Bat Mute**(available or effective on all modes)**:** **Enable:** It is to mute the buzzer when UPS in Battery mode. **Disable:** It is to enable the buzzer in Battery mode. The default setting is **Disable.** **5. Fault Mute**(available or effective on all mode)**:** **Enable:** It is to mute the buzzer when UPS in Fault mode. **Disable:** It is to enable the buzzer in Fault mode. The default setting is **Disable.** **6. Bypass Mute**(available or effective on all mode)**:** **Enable:** It is to mute the buzzer when UPS in Bypass mode. **Disable:** It is to enable the buzzer in Bypass mode. The default setting is **Disable.** **7. Redundancy** (available or effective on all modes)**:** The setting is quantity of redundant UPS module. The setting range is 0~9. The setting quantity must be less than the number of UPS modules in the system. The default value is 0. **8**. **Total Power** (available or effective on all mode): The parallel number we set in system. **9.Standard Mode**(only available or effective on bypass mode and standby mode): **Enable:** It is a compatible mode for dynamo. **Disable:** It is a normal mode. The default setting is **Enable.** **10. Factory Reset** (only available or effective on bypass mode and standby mode): Restore to factory default setting.

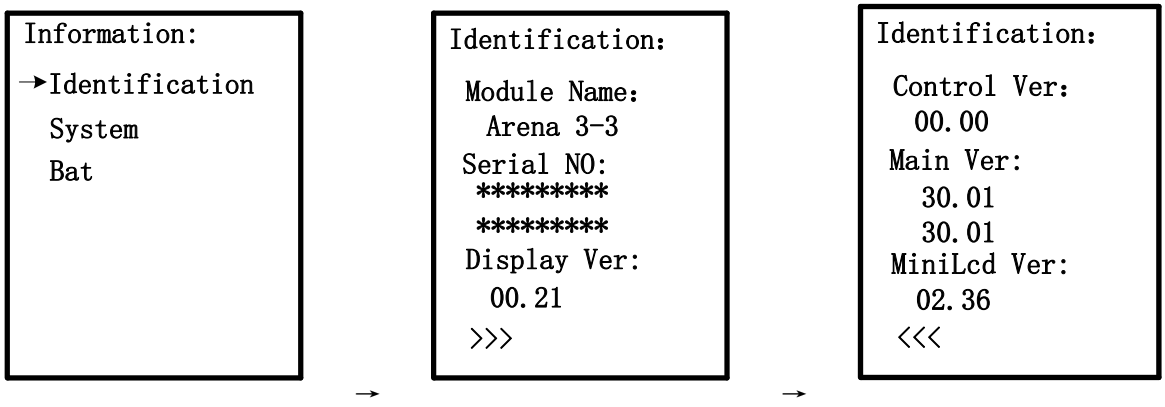
5) Battery

Interface	Description
  	**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 Time:** 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. For 3-3 10K, 3-1 10K and 1-1 10K models: The setting range is from 16 to 20 pieces and the default value is 16. For 2-2 6K and 3-3 10K LV models: The setting range is from 8 to 10 pieces and the default value is 8. **9. Chg Curr:** Set maximum charge current. The setting range is from (0~ 4A) x N. N represents the parallel unit number. The default value is 4A. If parallel unit number is 10, the maximum setting value can be 40A. **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 factor. The formulation is listed below: Displayed backup time=Original calculated backup time×Multiplier factor The value of default factor is 1.0. The setting range is from 0.5 to 2. **Item 10~12 are used for the battery backup time calculation.**

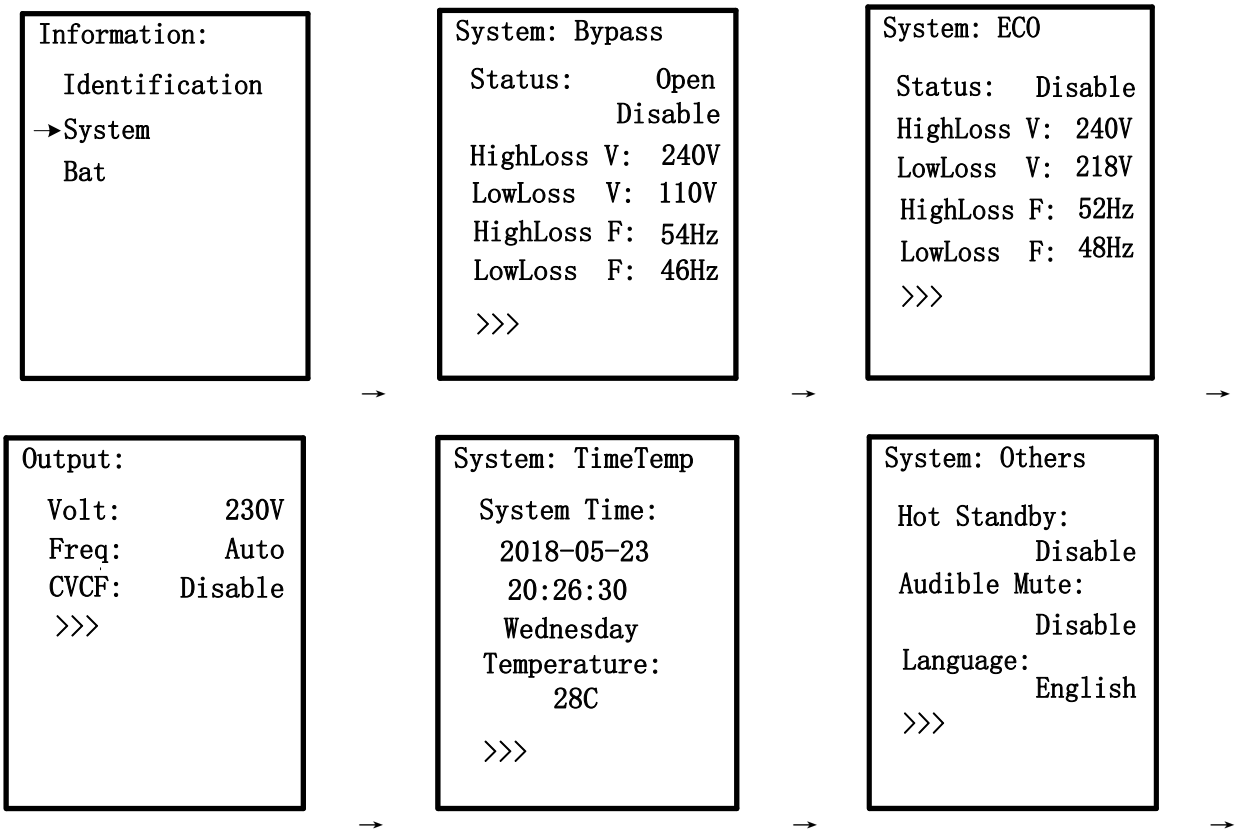
4.2.3.5 Information

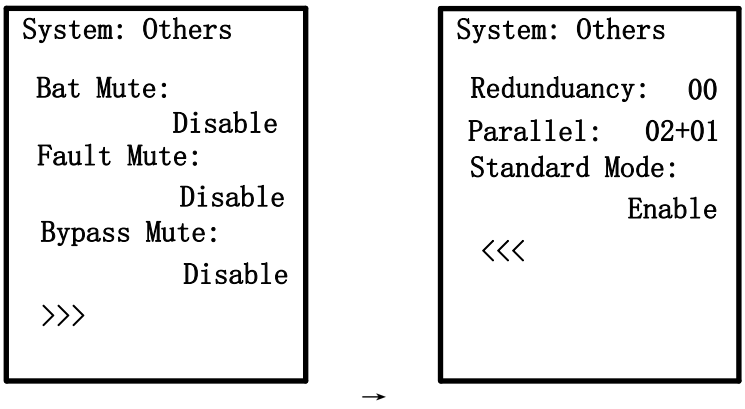
In Information page, you can check the serial number, firmware version, system configuration and settings of the UPS. There are submenus under the Information, including Identification, System and Battery, as shown below. Information displays all parameter setting value and status.

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

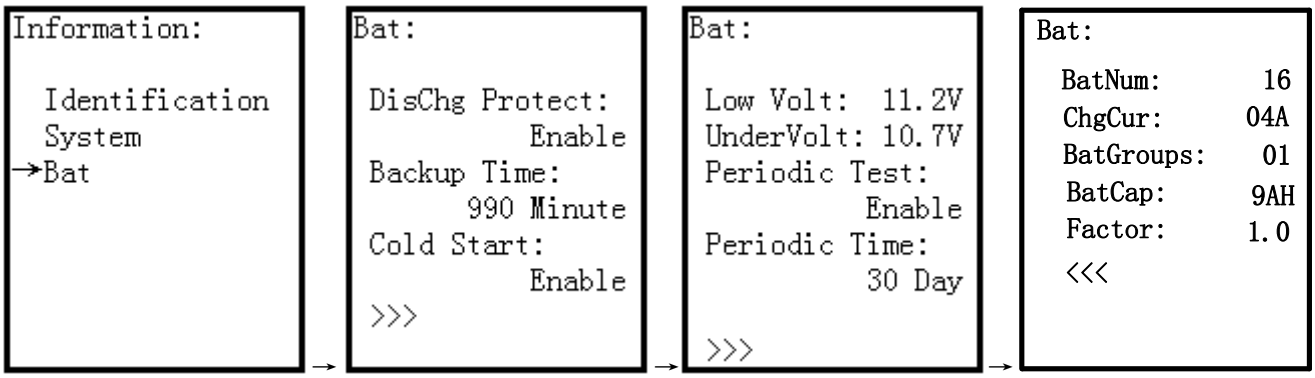


2) System shows the UPS configuration.





3) Battery shows the battery configuration.

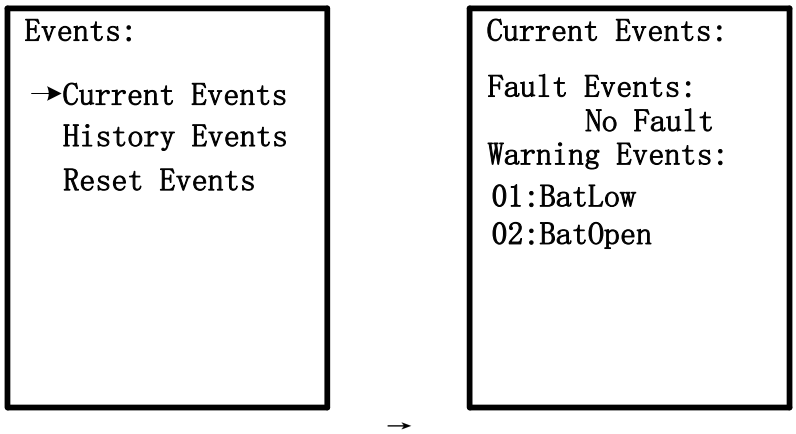


4.2.3.6 Events

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

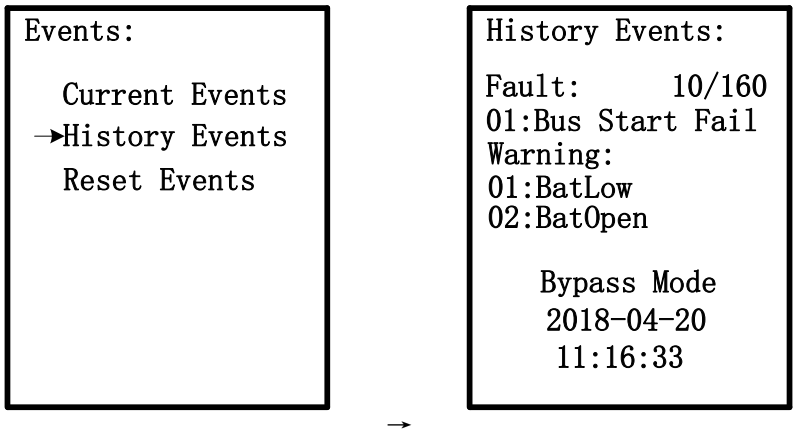
1) Current Events

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.



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)

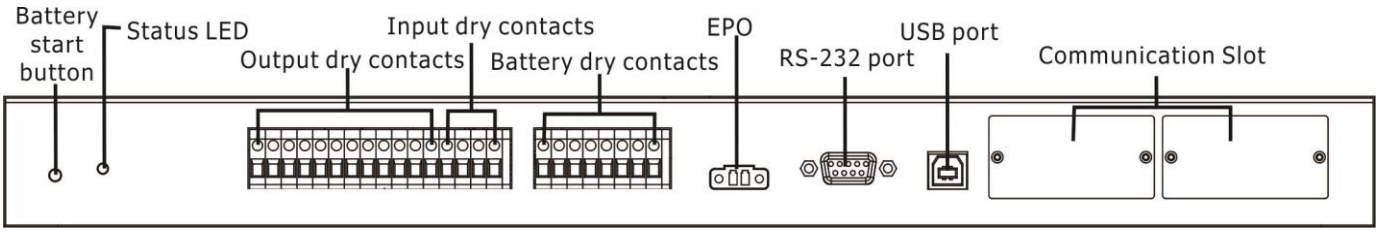


3) Reset Events

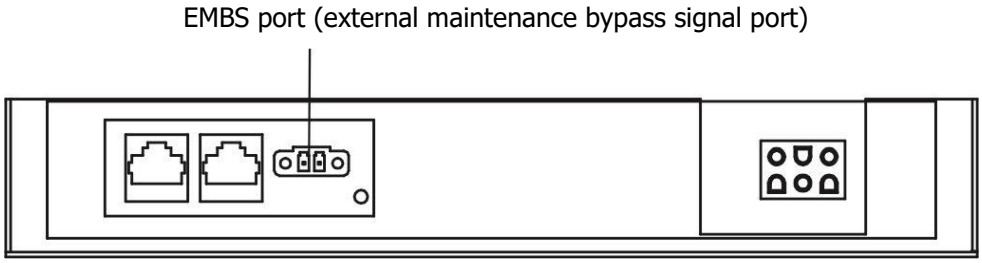
It's necessary to enter password to enter Reset Events page as shown below. Then, press "⬆" or "⬇" button to choose "Yes" to clear all history events or "No" to cancel the reset action. The default password is 0729.

5. Controller Module

Front View:



Back View:



5.1 Battery Start Button

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

5.2 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

5.3 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.

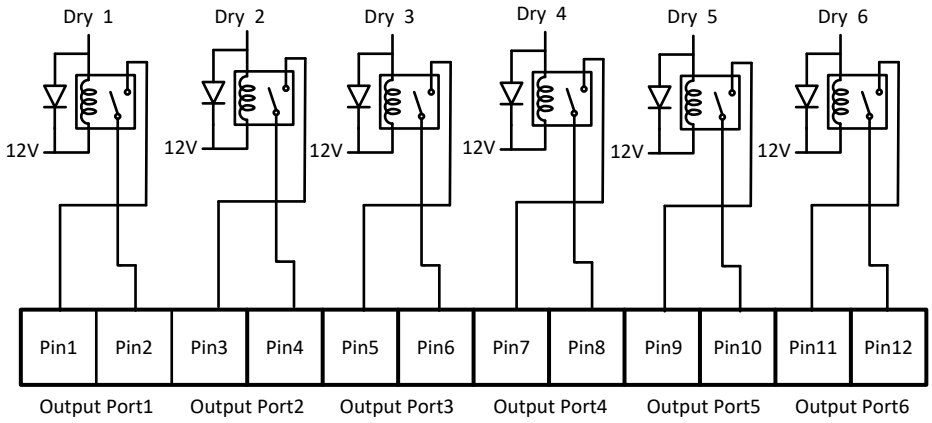
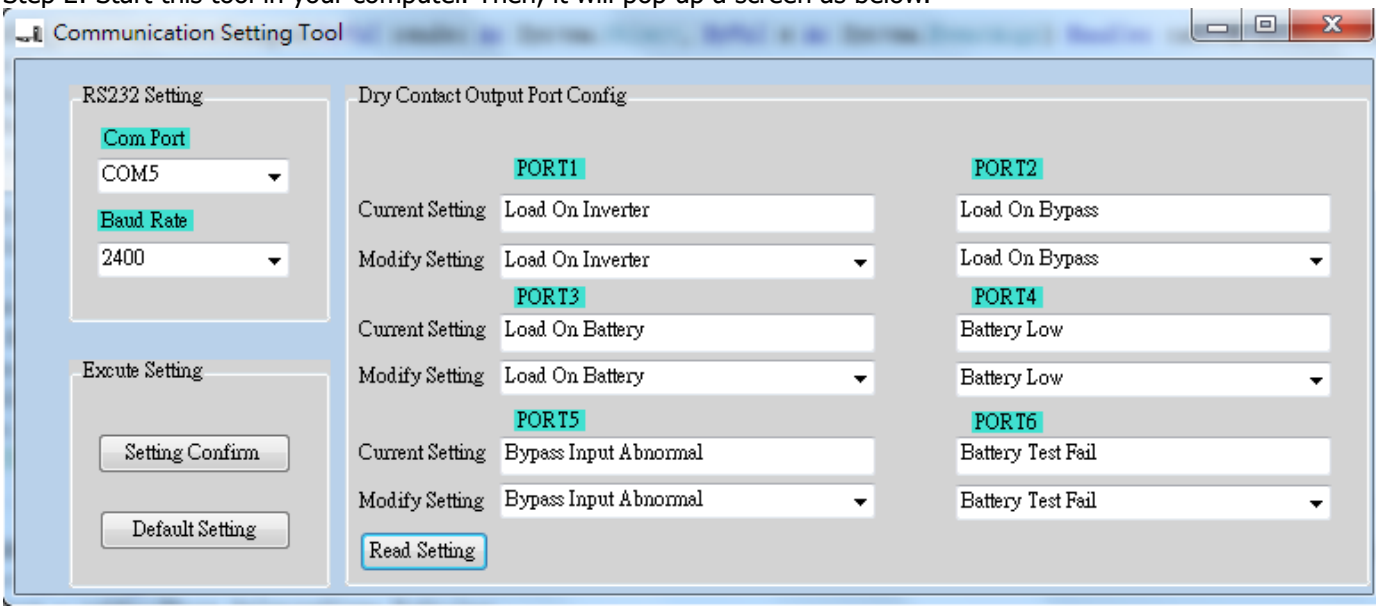


Figure 5-2 Dry Contact Output Port

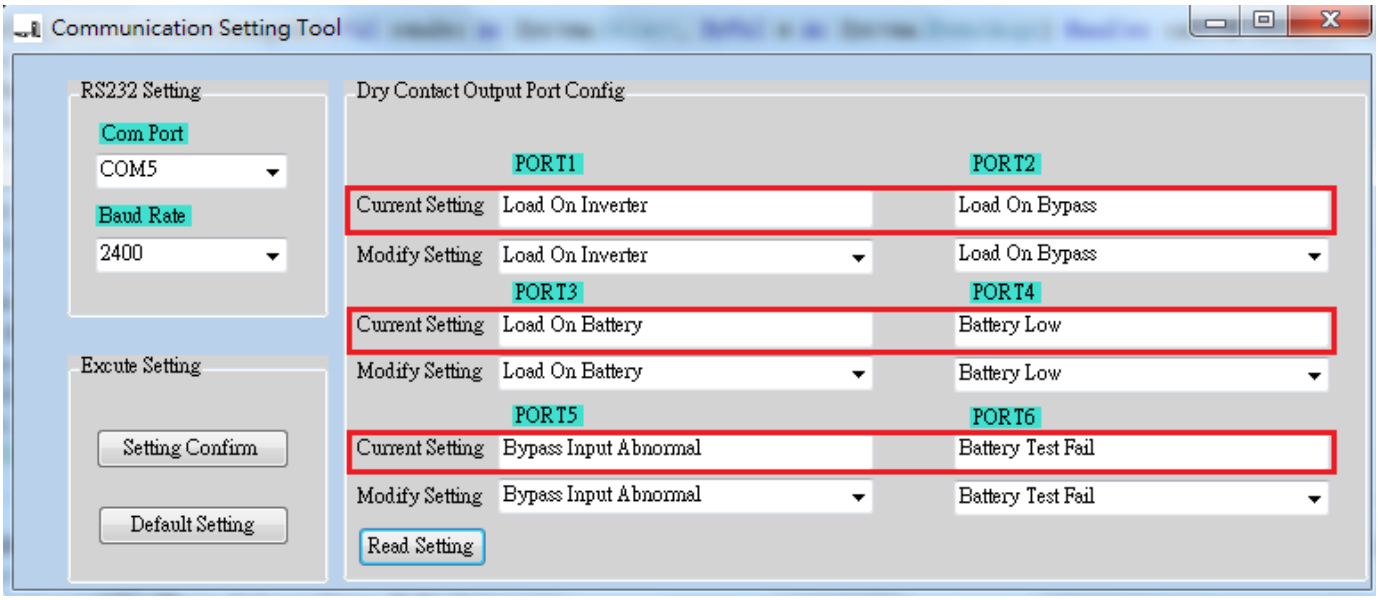
5.3.1 Configuration

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.

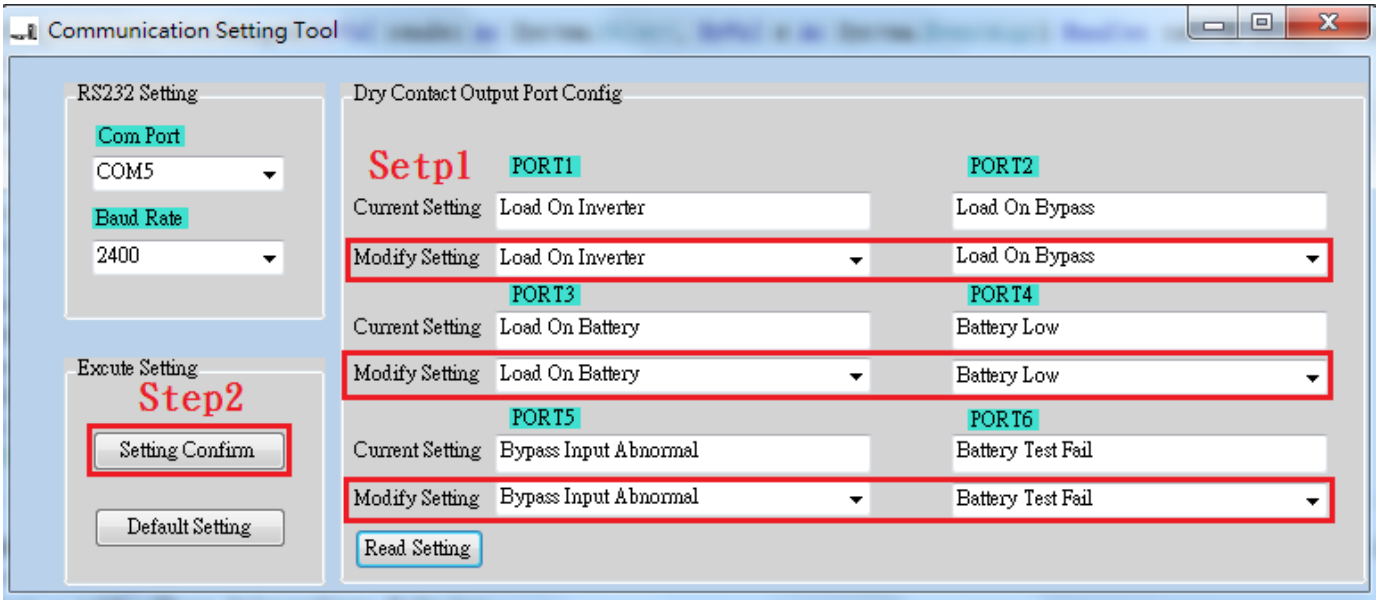
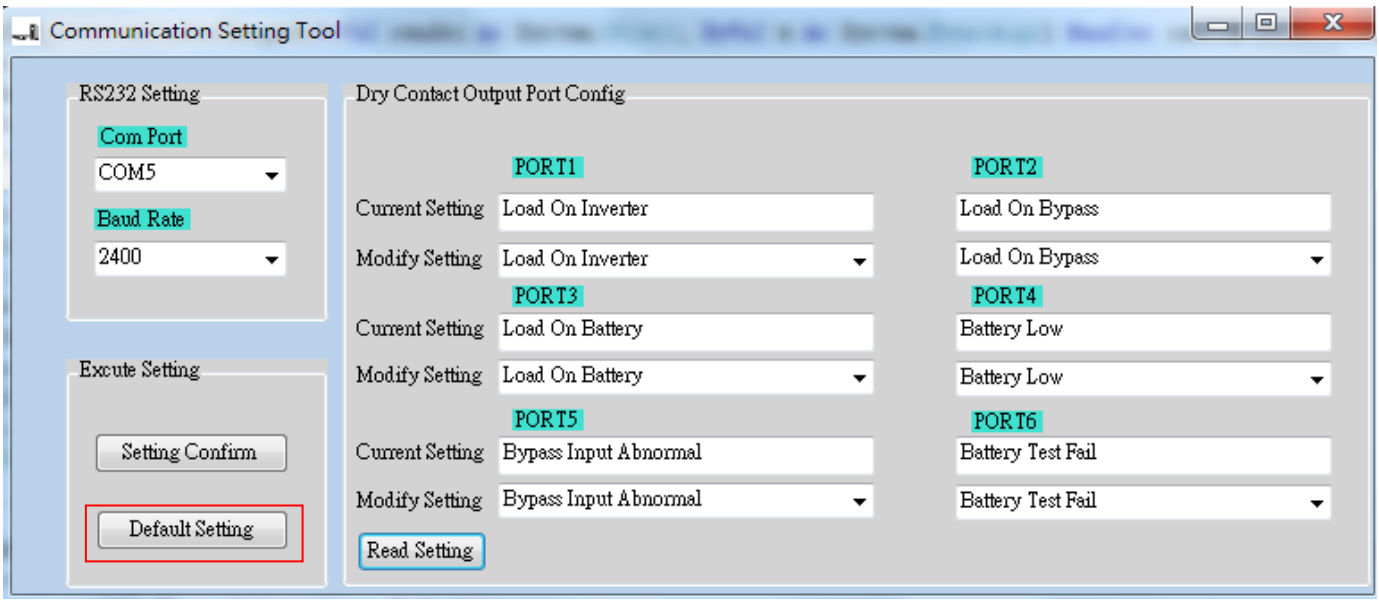


Table 5-1: Output Dry Contact List

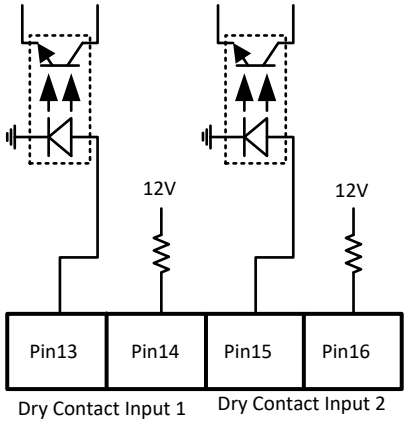
Contact	Message	Description
1	Load on inverter	The UPS is working normally.
2	Load on bypass	The UPS is in Bypass mode.
3	Load on Battery	The UPS is in Battery mode.
4	Low battery	The battery voltage is low.
5	Bypass input abnormal	The bypass voltage or frequency is abnormal.
6	Battery test failure	Performs 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.



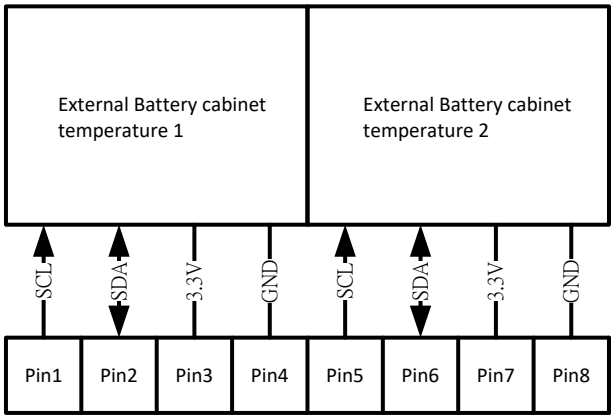
5.4 Input Dry Contact Port

There are two sets of input dry contact to receive external signals for UPS to take response.



5.5 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.



5.6 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.

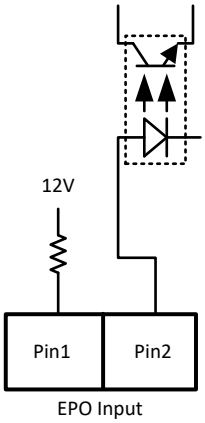


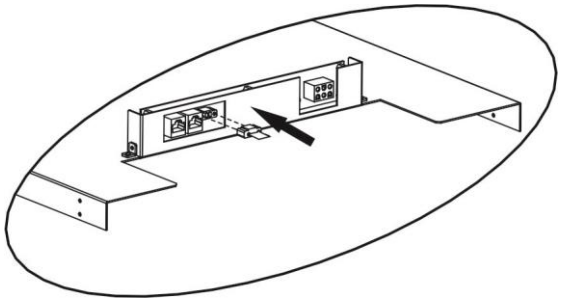
Table 5-2 Description of EPO port

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.

5.7 External Maintenance Bypass Signal Port (EMBS)

On the back panel of controller module, there is an external maintenance bypass signal port. 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.



5.8 Other Communication Interface

5.8.1 Local Communication Ports – RS232 & USB

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

5.7.2 Communication Slot

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

6. Troubleshooting

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

LCD Message	Explanation	Solution
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	Contact service personnel.

	modules fails.	
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.	Contact service personnel.
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. 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.

7.1 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.

8. Specifications

The chapter states the specifications of UPS.

8.1 Conformity and Standards

The UPS has been designed to conform to the European and international standards listed in **Table 8-1**.

Table 8-1: European and international standards

Item	**Normative reference**
Uninterruptible power systems (UPS) –Part 1: General and safety requirements for UPS	IEC/EN62040-1
Electromagnetic compatibility (EMC) requirements for UPS For 2-2 6K and 3-3 10K LV Models For 3-3 10K, 3-1 10K and 1-1 10K Models	FCC 47 CFR15, Subpart B IEC/EN62040-2
Method of specifying the performance and test requirements of UPS	IEC/EN62040-3
Notes:	
ESD	IEC/EN 61000-4-2 Level 3
RS	IEC/EN 61000-4-3 Level 3
EFT	IEC/EN 61000-4-4 Level 3
Surge	IEC/EN 61000-4-5 Level 3
CS	IEC/EN 61000-4-6 Level 3
Power-Frequency Magnetic field	IEC/EN 61000-4-8 Level 3
Low Frequency Signals	IEC/EN 61000-2-2 Level 10V
Conduction	IEC/EN62040-2 Category C3
Radiation	IEC/EN62040-2 Category C3

8.2 Environmental Characteristics

Table 8-2: Environmental characteristics

Item	**Unit**	**Specifications**
Noise within 1 m	dB	For 2-2 6K and 3-3 10K LV Models: Max. 60 For 3-3 10K, 3-1 10K and 1-1 10K Models: Max. 50
Altitude	m	≤1000, derate power by 1% per 100m between 1000m and 2000m
Relative humidity	% RH	0 ~ 95, non-condensing
Operating temperature	°C	0 ~ 40°C (Output capacity will be derated when temperature is over 30°C. It will be derated to 90% at 35°C and 80% at 40°C.)
Storage and transportation temperature for UPS	°C	-15 ~ 60

8.3 Mechanical Characteristics

Table 8-3: Mechanical characteristics

UPS Model		**3-3 10K** **3-1 10K** **1-1 10K** **2-2 6K** **3-3 10K LV**
Rated power (kVA)	Unit	10 10 10 6 10
Dimensions, W x D x H	mm	418x580x132
Weight	kg	20.5 20.5 20.5 18.5 20.5
Color	N/A	Silver
Protection degree, IEC (60529)	N/A	IP20

8.4 Electrical Characteristics (Input Rectifier)

Table 8-4: Rectifier AC input (mains)

For 2-2 6K model:

Rated power (kVA)	**Unit**	**6**
Rated AC input voltage	Vac	100/200, 110/220, 120/208, 120/240, 127/220 VAC(2Ph+N+PE)
Input voltage range	Vac	88 ~ 155 (L-N) ; 152 ~ 269 (L-L) (output derated below 70%)
Frequency	Hz	50/60 (tolerance: 40Hz ~ 70Hz)
Power factor	kW/kVA	0.99 (0.98) full load(half load)
Harmonic current distortion	THDI%	<4 (full load)

For 3-3 10K LV model:

Rated power (kVA)	**Unit**	**10**
Rated AC input voltage	Vac	173/190/200/208/220VAC(3Ph+N+PE+PE)
Input voltage Range	Vac	152-268 VAC(L-L)
Frequency	Hz	50/60 (tolerance: 40Hz ~ 70Hz)
Power factor	kW/kVA	0.99 (0.98) full load(half load)
Harmonic current distortion	THDI%	<4 (full load)

For 3-1 10K, 3-3 10K and 1-1 10K models:

Rated power (kVA)	**Unit**	**10**
Rated AC input voltage	Vac	360VAC/380VAC/400VAC/415VAC(3Ph+N+PE)
Input voltage Range	Vac	190-520 VAC (3-phase) @ 50% load 305-478 VAC (3-phase) @100% load
Frequency	Hz	50/60 (tolerance: 40Hz ~ 70Hz)
Power factor	kW/kVA	0.99 (0.98) full load(half load)
Harmonic current distortion	THDI%	<4 (full load)

8.5 Electrical Characteristics (Intermediate DC Circuit)

Table 8-5: Battery

Intermediate DC circuit		
Model		**3-3 10K** **3-1 10K** **1-1 10K** **2-2 6K** **3-3 10K LV**
Rated power (kVA)	Unit	10 10 10 6 10
Battery voltage (Number of lead-acid cells)	Nominal	240V (20 cells x 2 pieces of 12V battery block) 120V (10 cells x 2 pieces of 12V battery block)
	Maximum	240V (20 cells x 2 pieces of 12V battery block) 120V (10 cells x 2 pieces of 12V battery block)
	Minimum	192V (16 cells x 2 pieces of 12V battery block) 96V (8 cells x 2 pieces of 12V battery block)
Float voltage	V/cell	2.275V/cell Constant current and constant voltage charge mode
Temperature compensation	mV/ /cl	-3.0 (Option)
Ripple voltage	% V float	≤1
Ripple current	% C10	≤5
Boost voltage	VRLA	2.4V/cell Constant current and constant voltage charge mode
EOD voltage	V/cell	1.6V/cell
Battery charge	V/cell	Limit current and constant voltage charge mode Floating Voltage 2.275V/cell Boost charging 2.4V/cell
Battery charging power[1] max current	A	4 / per UPS module (adjustable)
Note: 1. At low input voltage the UPS recharging capability increases and load decreases (up to the maximum capacity indicated).		

8.6 Electrical Characteristics (Inverter Output)

Table 8-6: Inverter output (to critical load)

Model	**Unit**	**3-3 10K** **3-1 10K** **1-1 10K** **2-2 6K** **3-3 10K LV**
Rated power (kVA)		10~40 10~40 10~40 6~24 10~40
Rated AC voltage	Vac	360/380/400/415VAC (3Ph+N) 208/220/ 230/240VAC (1Ph+N) 100/200, 110/220, 120/208, 120/240, 127/220VAC (2Ph+N)

		173/191/ 200/208/ 220VAC (3Ph+N)
Frequency	Hz	50/60 Auto Selectable
Overload	%	30 min 1~1.1 Pn 5min 1.1~1.3 Pn 10s 1.3 ~1.5 Pn 200ms>1.5Pn
Neutral current capability	%	170%
Steady state voltage stability	%	±1 (balanced load), ±2 (100% unbalanced load)
Total harmonic voltage	%	<2 (linear load), <4 (non-linear load3)
Synchronization window		+/- 1Hz, +/- 2Hz, +/- 4Hz (default: 4Hz)

8.7 Electrical Characteristics (Bypass Mains Input)

Table 8-7: Bypass mains input

Rated power (kVA)	**Unit**	**3-3 10K** **3-1 10K** **1-1 10K** **2-2 6K** **3-3 10K LV**
Rated AC voltage	Vac	360/380/ 400/415VAC (3Ph+N+PE) 208/220/ 230/240VAC (1Ph+N+PE) 208VAC/220VAC/ 230VAC/240VAC (1Ph+N+PE) 100/200, 110/220, 120/208, 120/240, 127/220VAC (2Ph+N+PE) 173/191/ 200/208/ 220VAC (3Ph+N+PE)
Rated current	A	16A 48A 48A 30A 30A
Overload	%	30 min 1~1.1 Pn 5min 1.1~1.3 Pn 10s 1.3 ~1.5 Pn 200ms>1.5Pn
Upstream protection, bypass line	N/A	Circuit breaker, rated up to 100% of nominal output current.
Current rating of neutral cable	A	1.7 × In
Frequency	Hz	50/60 Auto Selectable
Transfer time (between bypass and inverter)	ms	Synchronous transfer: ≤10ms

Bypass voltage range	%Vac	Default Value 110~264V (L-N) 190~457V (L-L) Setting Value 110~276V (L-N) 190~478V (L-L) Default Value 110~264V V (L-N) Setting Value 110~276V (L-N) Default Value 110~264V (L-N) Setting Value 110~276V (L-N) Default Value 88~140V(L-N) Setting Value 88~150V(L-N) Default Value 88~140V (L-N) 152~242V (L-L) Setting Value 88~155V (L-N) 152~ 268V(L-L)
Frequency Range	Hz	+/- 1Hz, +/- 2Hz, +/- 4Hz (default: 4Hz)