# User Manual

# Platinum Modular E Online UPS

PowerShield®

Designed by Australians for Australian Conditions

## Uninterruptible Power Supply System

**Version: 1.0**

# 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 designed for commercial and industrial purpose, it is forbidden to apply for any life sustainment and support.
- The UPS system contains its own energy source. The output terminals may carry live voltage even when UPS is disconnected from an AC source.
- To reduce the risk of fire or electrical shock, UPS installation has to be in a temperature and humidity controlled, indoor environment. Ambient temperature must not exceed 40°C. The system is not intended for outdoor use.
- Ensure all power is disconnected before performing installation or service.
- Service and maintenance should be performed by qualified service 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 controlled environment - installation restrictions or additional measures is necessary 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◦.
- Ground conductor is properly installed.
- Installation and Wiring must be performed in accordance with the local electrical laws and regulations.
- The disconnection device should break line and neutral conductors- four poles for three phases.

## 1.4 Maintenance

- UPS is designed to supply power even when disconnected from the utility power. After disconnecting the utility and DC power, authorized service personnel should attempt internal access to the UPS.
- Only qualified service personnel can perform the battery installation.
- Do not disconnect the batteries while the UPS is in Battery mode.
- Disconnect the charging source prior to connecting or disconnecting terminals.
- Batteries can present a risk of electrical shock or burn from high short circuit current.
- The following PRECAUTIONS should be stringently 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 the ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock is reduced if such grounds are removed during installation and maintenance.
- When replacing batteries, use the same number of sealed, lead-acid batteries.
- Do not dispose of battery in a fire. The battery may explode.
- Do not open or mutilate the battery. Leaking electrolyte is harmful to the skin and eyes, and may be toxic.

## 1.5 Recycling the used battery

- Do not dispose of the battery in a fire. Battery may explode. Proper disposal of battery is required. Refer to your local regulations for disposal requirements.
- Do not open or mutilate the battery. Leaking 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 of 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. Operation & structure

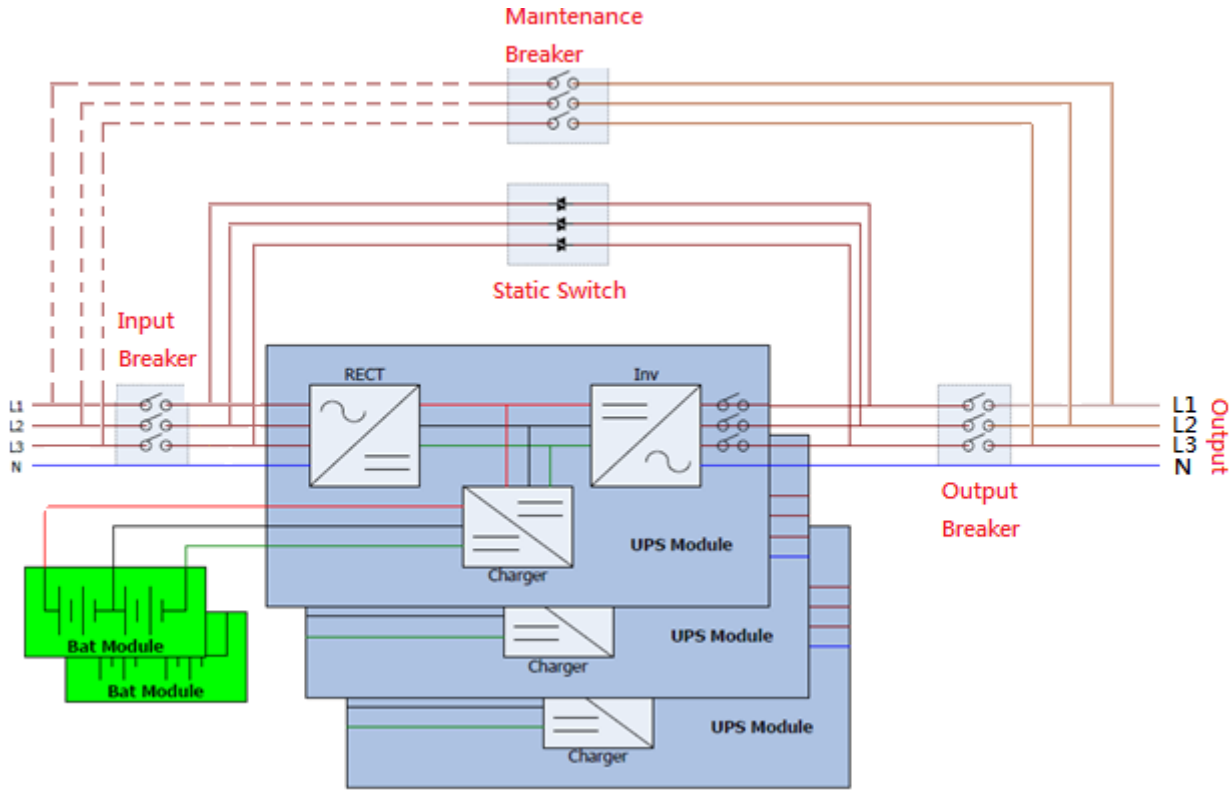



Figure 2-1: Wiring diagram

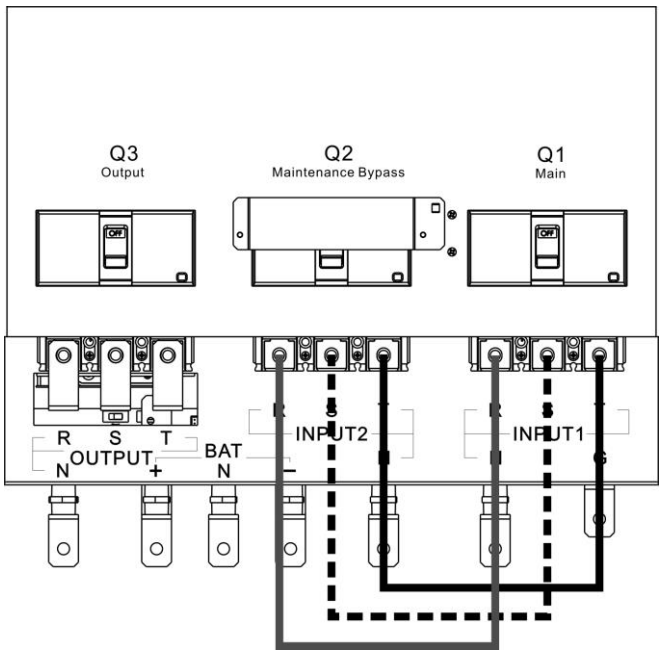



Figure 2-2: Wire connections for Input and Maintenance Bypass

**NOTE**: Connect 3 wires between Mains and Maintenance Breakers as Figure 2-2

# 3. Installation

## 3.1 Mechanism and Exterior

In the front of the UPS, there are control interface (LCD Panel). Inside the cabinet, there are an STS, 1~3 Power Module slots.

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

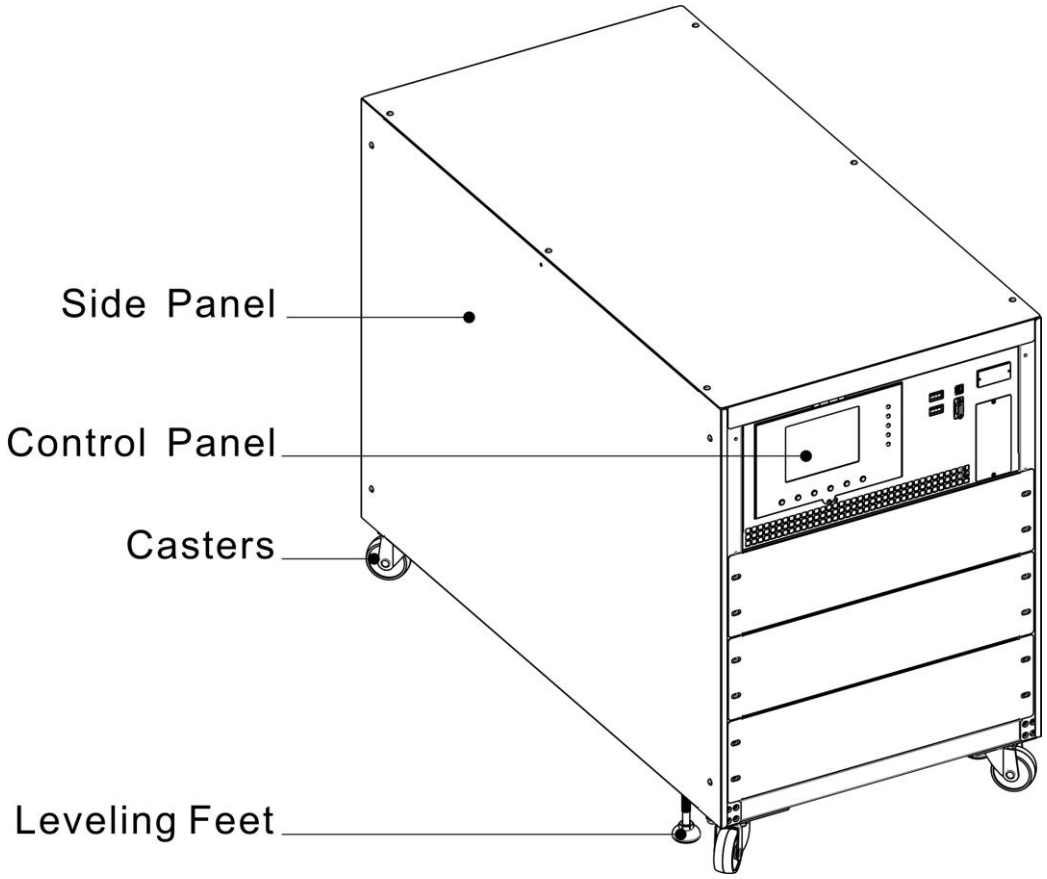



Figure 3-1: UPS Exterior

### 3.1.1 Mechanical Data

| Dimensions | | | |
|---|---|---|---|
| UPS cabinet | Width | Depth | Height |
| 30~90KW | 515mm | 1000mm | 760mm |

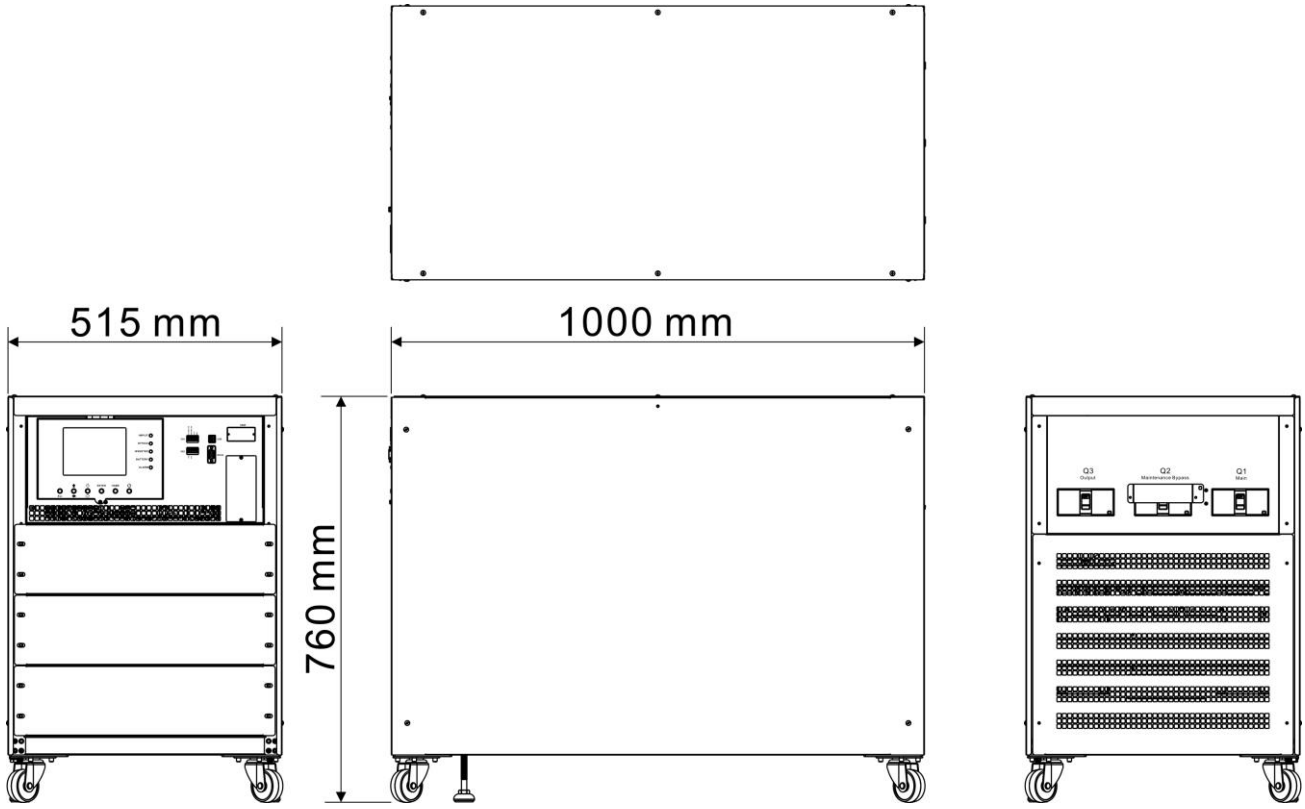
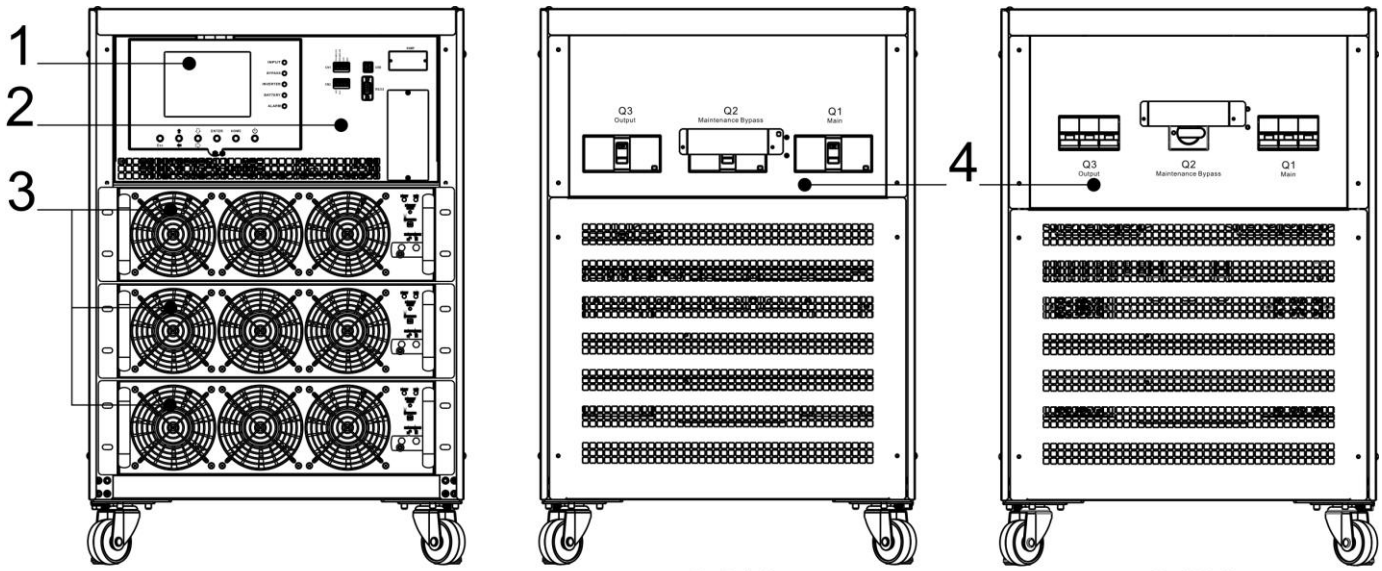



Figure 3-2: Dimensions

### 3.1.2 Other Views

At front side, you'll see the Power Module and control interface (LCD Panel).
At rear side, you'll the Switch unit (Main/Maintenance Bypass/Output).




|--------- Front View ----------| |---------- Rear View ----------|

1. LCD Panel
2. Control interface
3. Power module
4. Switch unit

Figure 3-3: Front and Rear View

### 3.1.3 Configurations

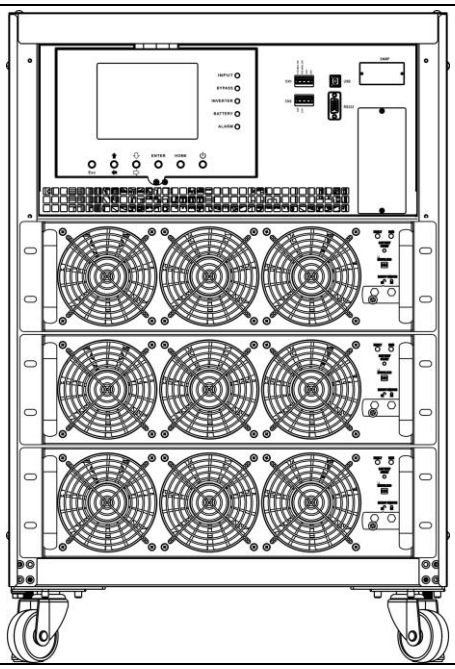
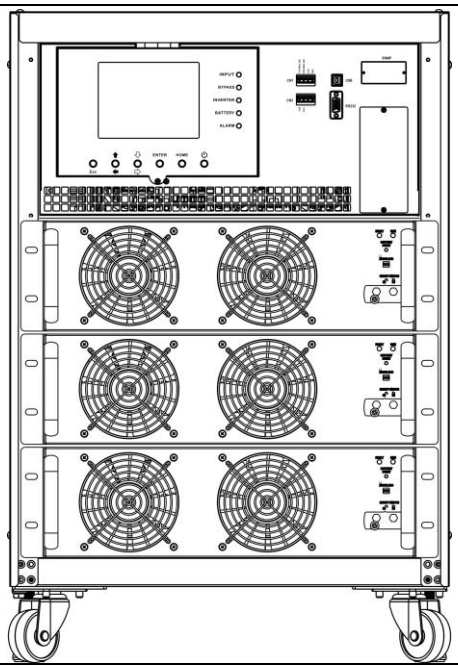
| Photo |  |  |
|---|---|---|
| Cabinet Height | 760mm | 760mm |
| Switch Unit | 1 | 1 |
| Max. Power Module | 3 (30K) | 3 (20K) |
| Max. Power Capacity | 90KVA | 60KVA |

Table 3-1: Configuration

## 3.2 Internal Mechanisms

At front of the cabinet, you can see the control interface (LCD Panel), Power module. A rear of the cabinet, you can see Main/Maintenance Bypass/Output breakers. Please refer to the following sections.

### 3.2.1 Input, Maintenance Bypass and Output Breakers

The Input Breaker, Maintenance Bypass Breaker and Output Breaker are located at the rear of the UPS. See Figure 3-4.

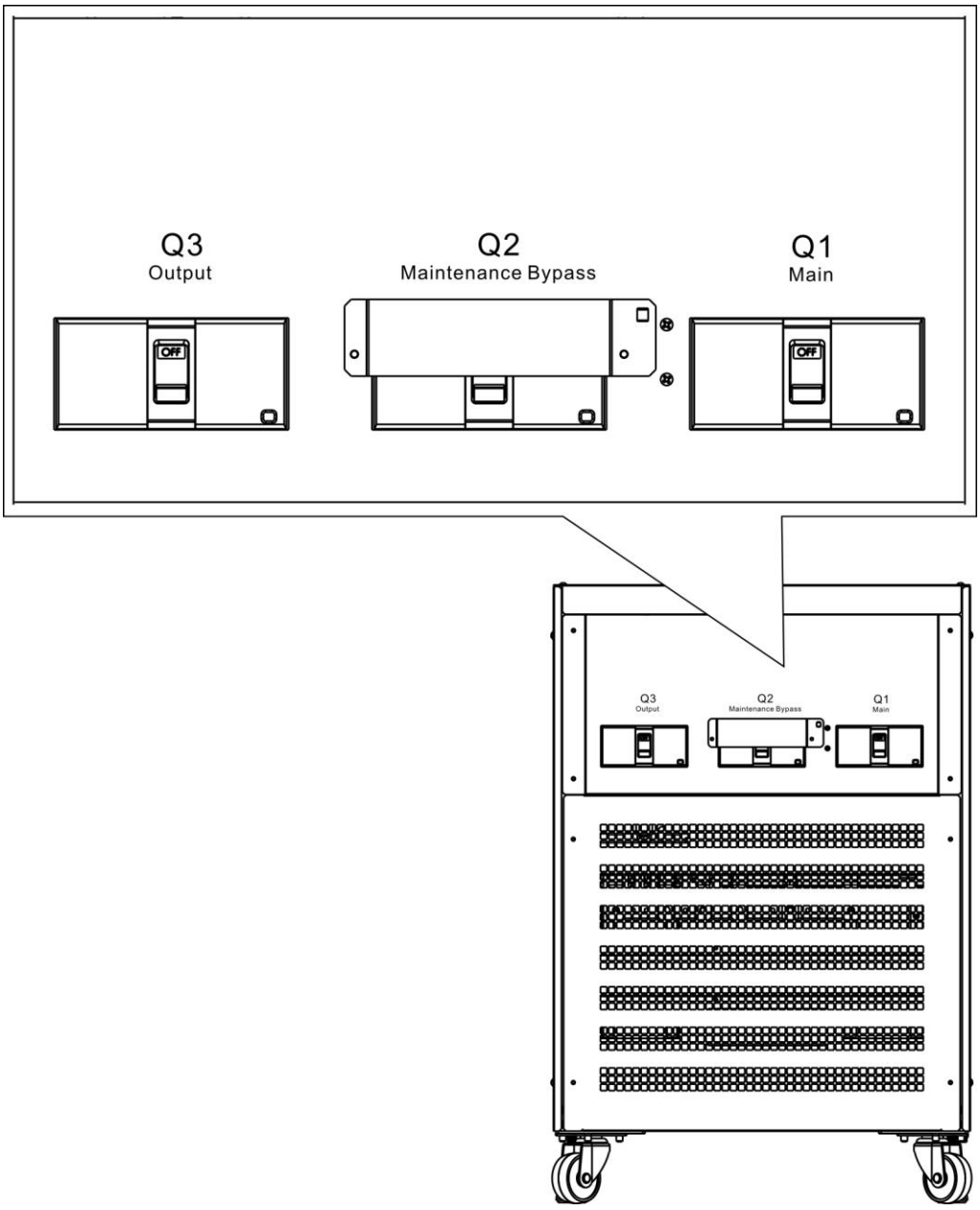



Figure 3-4: Rear View/Output, Maintenance Bypass, and Input Breakers

### 3.2.2 Wiring

Open the back doors of UPS and you will see the Breakers. For connection instructions, please refer to Figure 3-5.

| Item | Function | Description |
|---|---|---|
| Output Block | Connects the critical loads | Includes R, S, T and Neutral terminals. |
| Bypass Input Block | Connects bypass AC source | Includes R, S, T and Neutral terminals. |
| Input Block | Connects main AC source | Includes R, S, T and Neutral terminals. |
| For UPS Grounding | For UPS grounding | Includes one grounding terminal. |
| Battery Input Block | Connects an external battery cabinet | Includes Positive (+), Negative (-) and Neutral (N) terminals. |

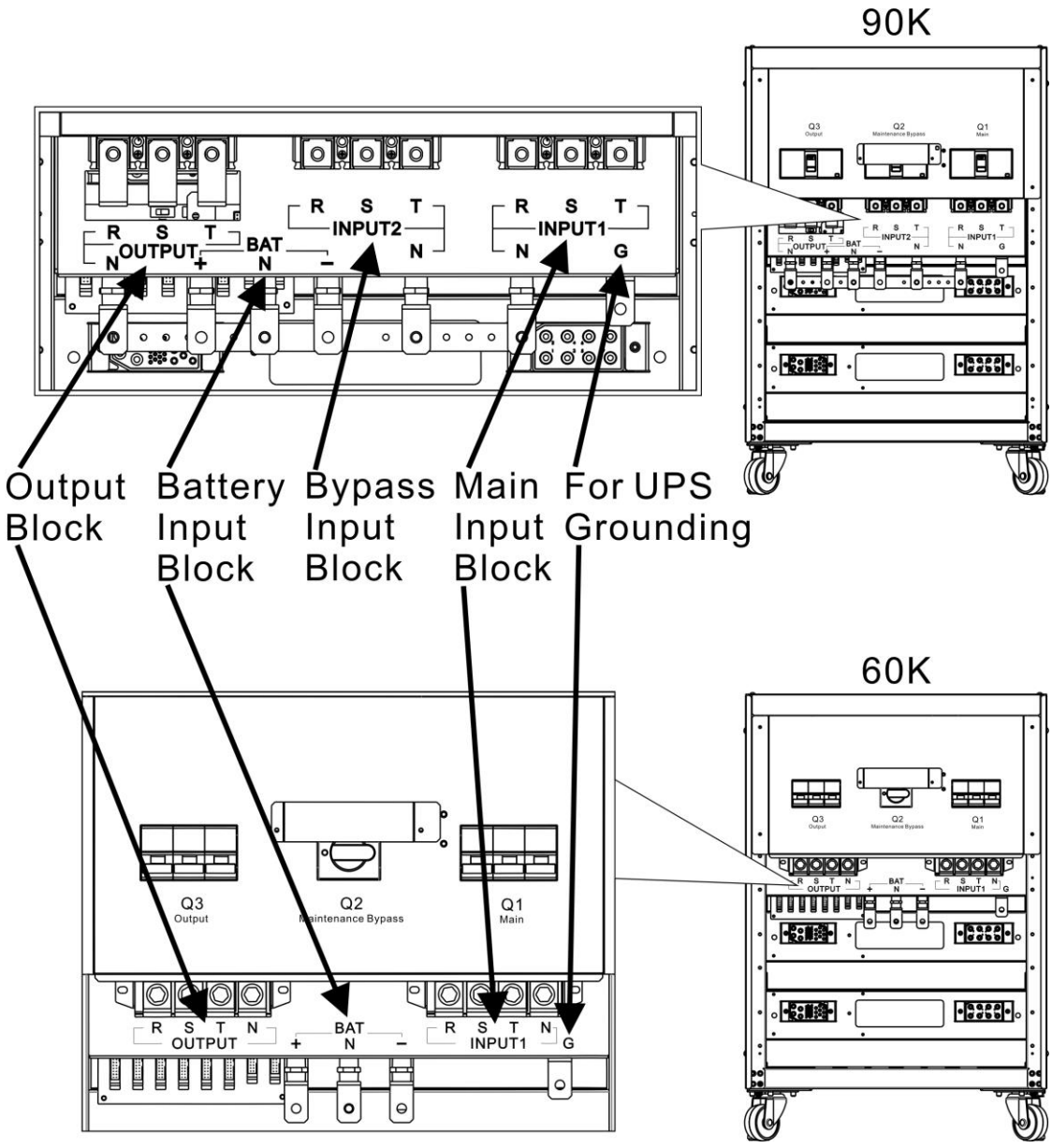
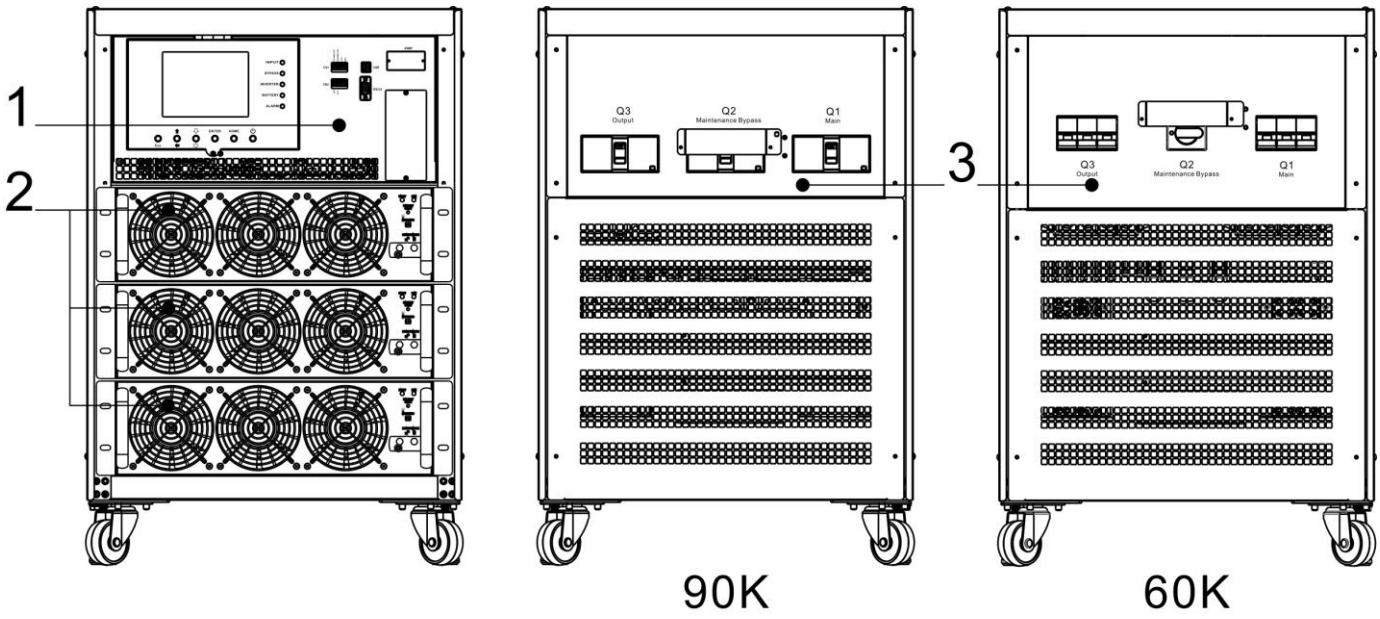



Figure 3-5: Rear View & Wiring Terminal Block

### 3.2.3 Modules

The Power Module allows quick maintenance, replacement and expansion. The module latches secure the modules in place.

- Control Module: It includes control, power, communication circuits, an internal Static Transfer Switch.
- Power Module: The power module capacity is either 30kVA/30kW or 20kVA/ 20kW. It includes a power factor correction rectifier, a battery charger, an inverter and control circuits.




1. STS & Control module
2. Power module
3. Switch Unit

Figure 3-6: Front View with Modules

## 3.3 Control Panel & interface

The front access Graphic Display & Control interface displays all measured parameter, UPS & Battery current states and Alarms. Through the interface, users can easily monitor the status and configure settings. For detailed information, please refer to Chapter 4.

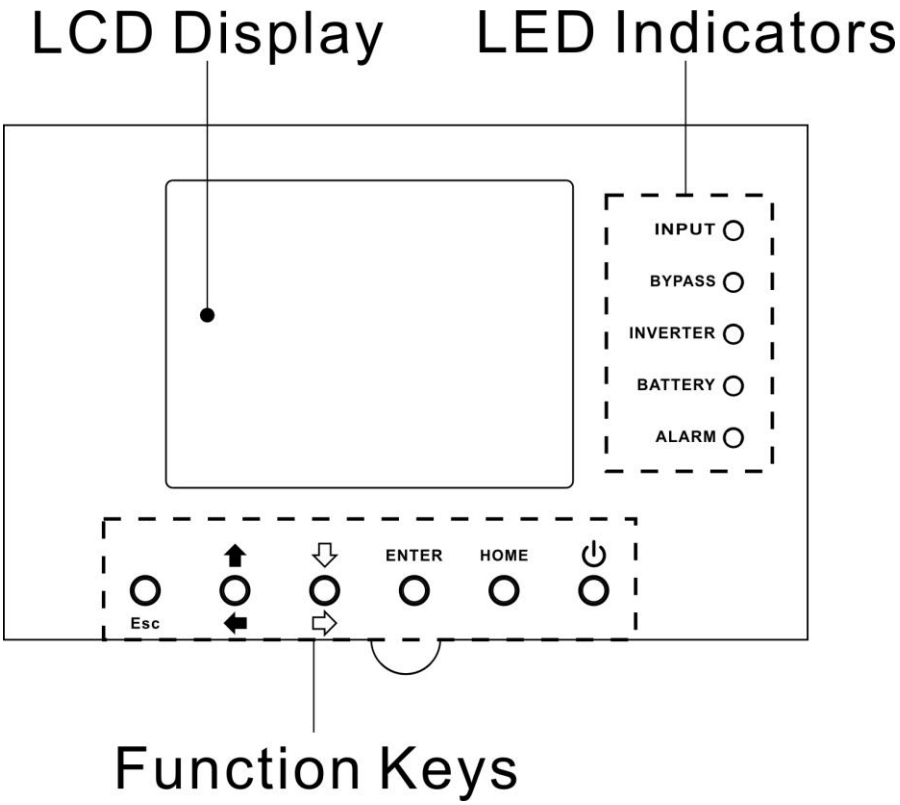



Figure 3-7: Control Panel

### 3.3.1 LED indications

| LED | Color | Status | Definition |
|---|---|---|---|
| INPUT | Green | On | Input source is normal. |
| | | Flashing | Input source is abnormal. |
| | | Off | No input source |
| BYPASS | Green | On | Load on Bypass. |
| | | Flashing | Input source is abnormal. |
| | | Off | Bypass not operating |
| INVERTER | Green | On | Load on inverters. |
| | | Off | Inverters not operating. |
| BATTERY | Yellow | On | Load on Battery. |
| | | Flashing | Low battery |
| | | Off | Battery converter is normal and battery is charging. |
| ALARM | Red | On | UPS fault. |
| | | Flashing | UPS alarm. |
| | | Off | Normal. |

### 3.3.2 LCD Display

Graphic display and all measured parameters.

### 3.3.3 Function Keys

| Control Key | Description |
|---|---|
| Esc | ● Return to previous screen. When screen is in Main screen, it will enter setting menu by pressing ESC key.<br>● Return back to change previous value in the same row. For example, if in the process of changing 4-digit password, press "Esc" to allow cursor back to previous digit. |
| Up(Left) | Key for menu page navigation or digit modification. |
| Down(Right) | Key for menu page navigation or digit modification. |
| Enter | Confirmation of commands, or cursor displacement. |
| Home | Return to Main screen. |
| Power On/Off | Turn on UPS or Turn off UPS. |

## 3.4 Installation and Wiring

### 3.4.1 Before Installation

Due to different installation environments, please read this user manual thoroughly before installation and wiring. Only authorized engineers or service personnel can perform installation and maintenance. If you want to install the UPS by yourself, installation must be under the supervision of authorized engineers or service personnel.

If you use a forklift or other equipment to move the UPS, please make sure its loading capacity is sufficient enough to lift the UPS.

### 3.4.2 Installation Environment

- The UPS is designed for indoor use only. Do not install or place it in an outdoor area.
- 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.
- Ensure that the installation area is big enough for maintenance and ventilation.
- Keep the ambient temperature of installation around 30°C and that of humidity within 90%. The highest operating altitude is 2000 meters above sea level.
- The UPS is intended for indoor installation and should be placed in an environment with clean air and with adequate ventilation to keep the ambient temperature within the specified operating range. The UPS is air-cooled with the aid of internal fans. Cold air enters the UPS through the ventilation grilles at the front of the cabinet.
- If necessary, install a system of room extractor fans to avoid the room temperature heating up. Air filters are necessary if the UPS is operated in a dusty environment.

**Note:** The UPS is suitable for mounting on concrete or other non-combustible surface only.

- The UPS is air-cooled with the aid of internal fans. Cold air enters the UPS through the ventilation grilles at the front of the cabinet and hot air is released through the grilles at the back. Do not cover the ventilation openings.
- Do not allow unauthorized personnel to enter the installation area. Assign specific personnel to keep the UPS key.

For safety concerns, we suggest that you shall:

1. Surroundings of the installation area with CO2 or dry powder fire extinguishers.
2. Install the UPS in an area where the walls, floors and ceilings were constructed by fireproof

materials.

It is recommended that you parallel the external battery cabinets to the UPS. The following clearances are suggested:

1. Keep a clearance of 100cm from the top of the UPS for maintenance, wiring and ventilation.
2. Keep a clearance of 100cm from the back of the UPS and the external battery cabinets for ventilation.
3. Keep a clearance of a 150cm from the front of the UPS and the external battery cabinets for maintenance and ventilation.

### 3.4.3 Transportation

| ⚠ Warning |
| --- |
| The UPS is fixed on the pallet with four balance supports. When removing them, pay attention to the movement of the casters to avoid accidents.<br>The cabinet can be pushed forward or backward only. Pushing it sideward is not allowed. When pushing the cabinet, take care not to overturn it as the gravity center is high. |

- 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 the UPS over a long distance.
- 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 use hands to hold a lateral side of the UPS, one person hold the other lateral side of the UPS with hands, and one person use hands to push the UPS either from the front side or from the back side until it is moved to the installation area and avoid tipping the UPS.
- 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 or tipping the UPS might damage the parts inside.
- Ensure that the weight of UPS is within the maximum weight loading of designated surface of any handling equipment.
- At the bottom of the UPS, there are four casters to 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. Please use sufficient manpower (at least six people) and equipment (e.g. forklift) to carefully move the UPS from pallet to ground. Please pay attention to the movement of the casters to avoid accidents.

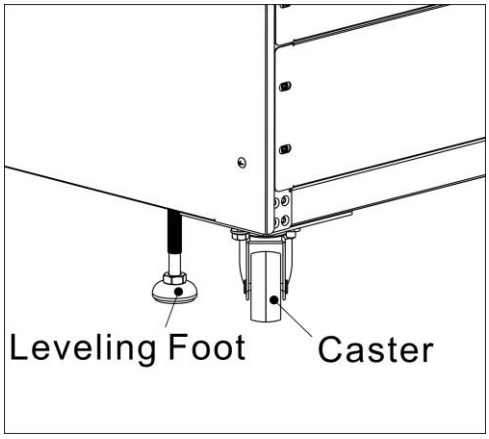



Figure 3-8: Leveling foot and caster

### 3.4.4 Unpacking

After the user received the product, first check the packaging list to ensure it arrived intact, and then open the package, check the equipment in good condition. If damaged, please immediately notify the carrier.

### 3.4.4.1 System Packaging

1. Use a forklift to move the product to installed area. Refer to Figure 3-9.
2. Please follow the order in Figure 3-10 to remove carton and foams.

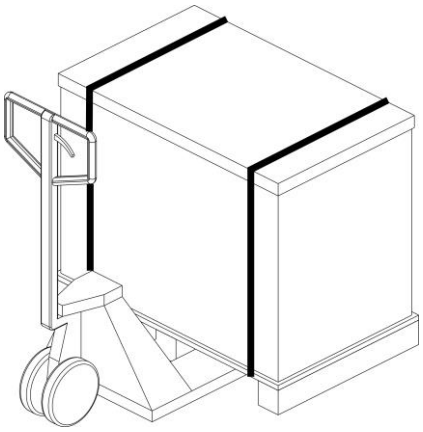


Figure 3-9

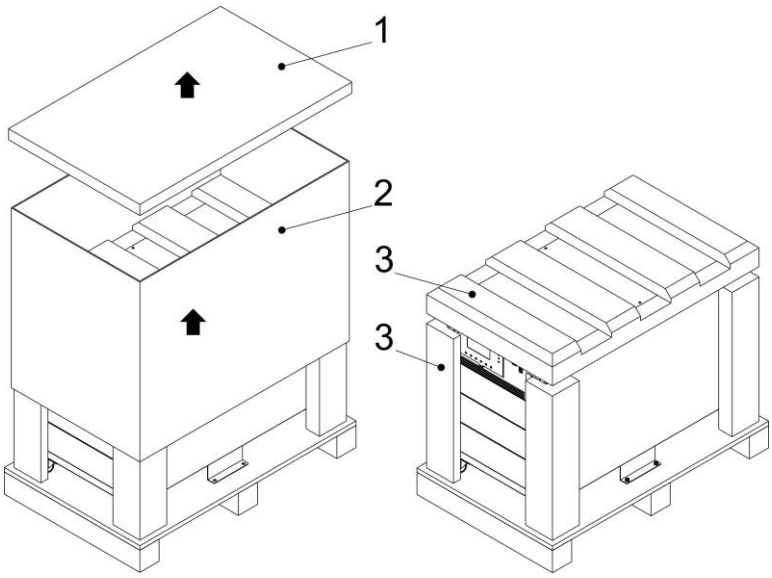



Figure 3-10

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

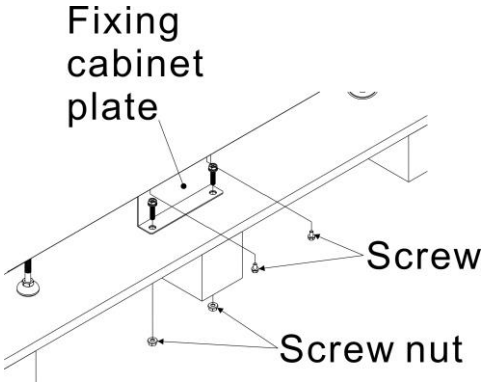



Figure 3-11

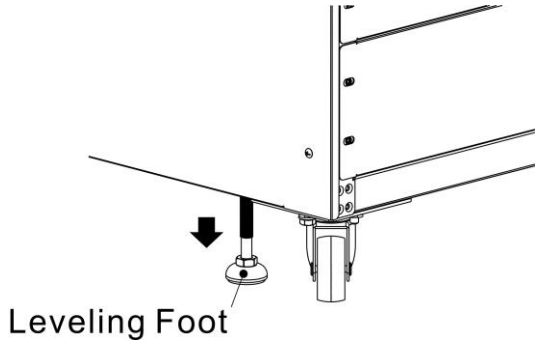



Figure 3-12

### 3.4.5 Positioning

Leveling feet are provided at the bottom of the UPS cabinet to prevent the UPS from moving once it has been placed to its final position. For optimum, the installed place must be:

- easy access
- enough space to easily work on the UPS
- sufficient air exchange space to dispel heat produced by UPS
- protection against atmospheric agents
- protection against excessive humidity and high heat sources
- protection against dust

- compliance with the current fire prevention requirements
- For VRLA (Valve Regulated Lead Acid) batteries, the operating environment temperature should be between 20°C and 25°C. VRLA batteries are at their maximum efficiency in this temperature range

## 3.5 Modules

The hot-swappable Power Modules allow quick maintenance and expansion. A latch located on the front of each module fixes and locks the module in its assigned slot. Each Power Module has an LED indicator to show its operation status.

### 3.5.1 Power Module

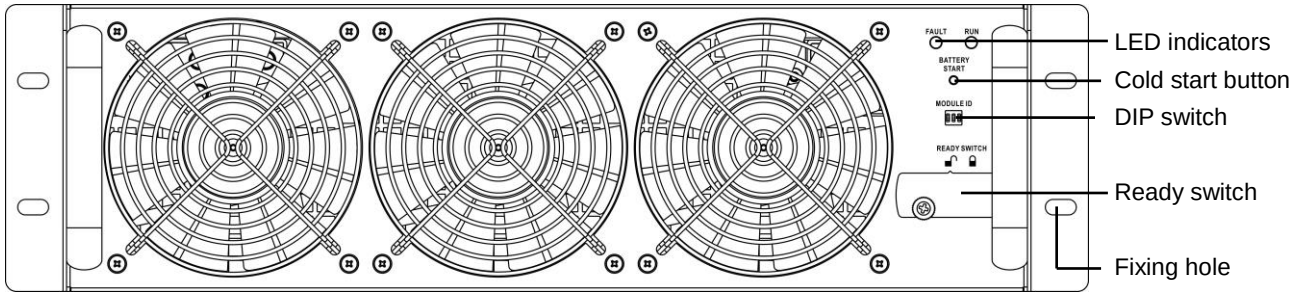



Figure 3-14: Power module

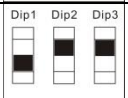
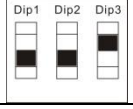
The Power Module's LED indicator shows its operation status. Please refer to the following table:

| No. | LED indicator | Description |
|---|---|---|
| 1 | FAULT | Steady red LED indicates that the system is abnormal. |
| 2 | FAULT | Flashing red LED indicates that the system is in parallel abnormal. |
| 3 | RUN | Flashing green LED indicates normal operation of the host UPS. |
| 4 | RUN | Steady green LED indicates normal operation of the slave UPS. |

### 3.5.2 Install a Power Module

Follow the procedures below to install the power module.

1. Use the DIP switch on the front panel of each Power module to set the module address. The setting range is from 1 to 3. The module address should be exclusive. The setting method is shown in Table 3-1.

| Module address | MODULE | DIP SWITCH | Parallel board |
|---|---|---|---|
| 0 | POWER |  | SW1 and SW2 DIP<br>Parallel board is located at the back of UPS cabinet. The appearance is shown in figure 3-15. |
| 1 | POWER |  | |
| 2 | POWER |  | |
| 3 | POWER |  | |

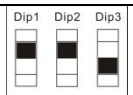
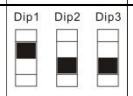
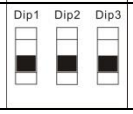
| | | | | |
|---|---|---|---|---|
| 4 | POWER | |  | |
| 5 | POWER | |  | |
| 6 | POWER | |  | |
| 7 | POWER | |  | |

Table 3-1 DIP switch setting method

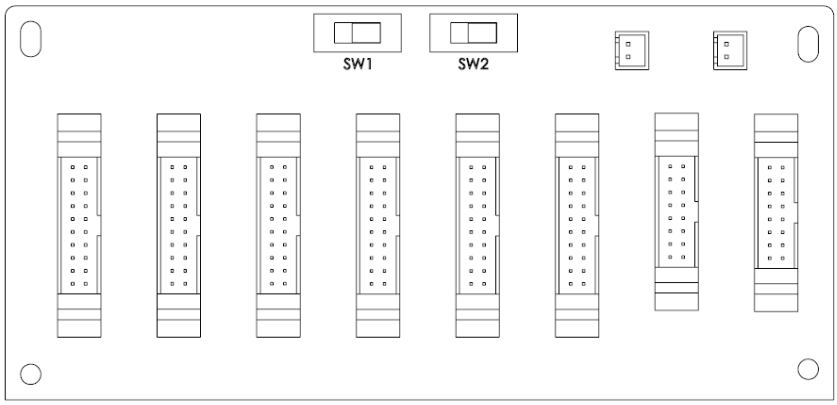



Figure 3-15 Parallel board

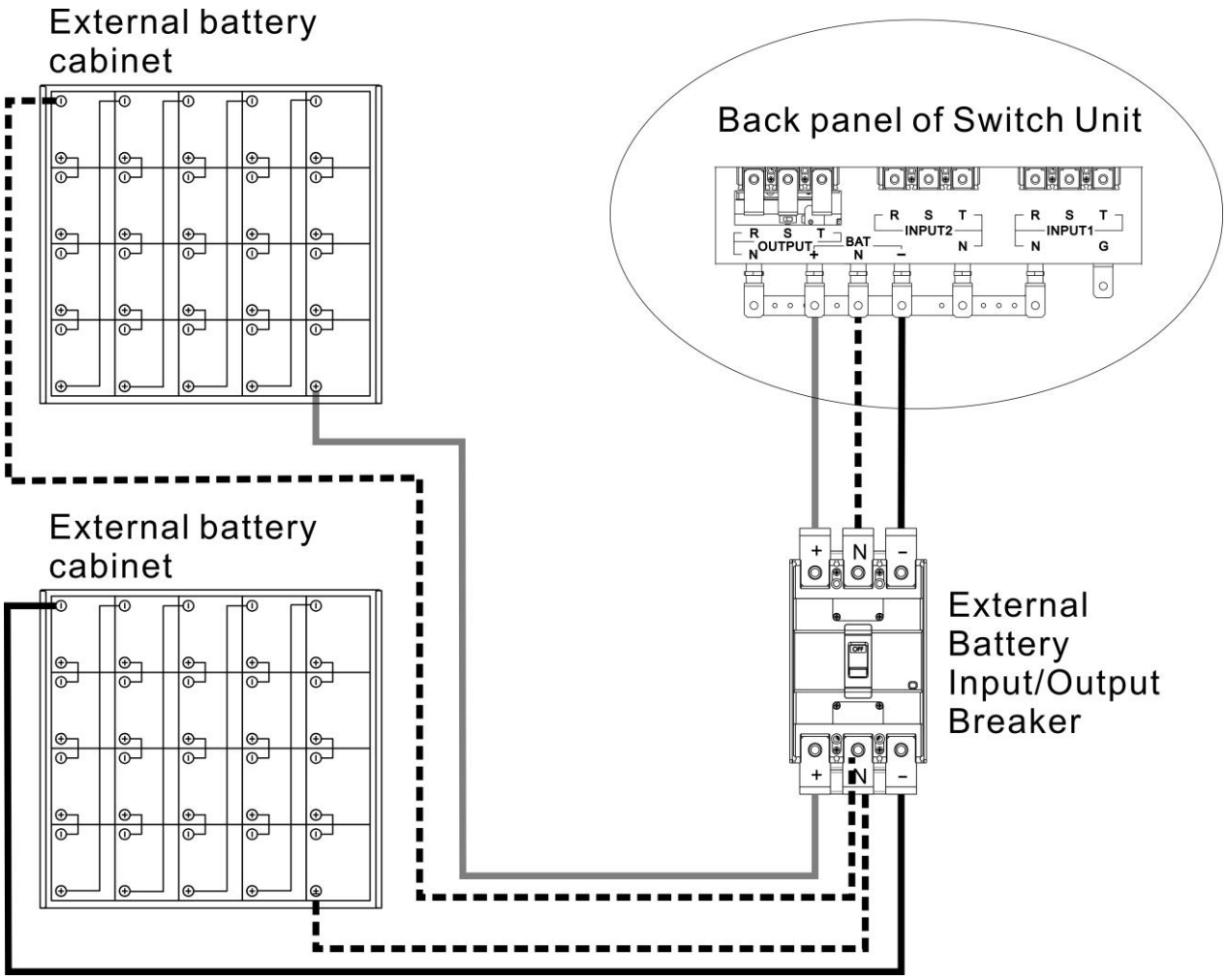
2. Place the ready switch on the front panel of the module to the "🔓" position (i.e., in unready state).
3. Insert one power module in the installation position and push it into the cabinet.
4. Secure the module to the cabinet through the fixing holes on both sides of the front panel of the module.
5. Place the ready switch to the "🔒" position (i.e., in ready state).

### 3.5.3 Remove a Power Module

| ⚠ Warning |
|---|
| Before removing any Power Module, make sure the remaining Power Modules can support the critical loads. |

1. Turn the ready switch to the "🔓" position.
2. The Power Module LED indicator is off to indicate the Power Module discharged and shut down completely.
3. Use a screwdriver to remove the four screws from fixing holes.
4. Two people pull out together and remove the Power Module from its slot.

**External Battery Cabinet Connection**




After battery 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 that in real installation, the UPS will keep warning. Please refer to section 4.2.6.3 and Table 5-17 for the details.

## 3.6 Power Cable

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

### 3.6.1 AC input and maximum output current and power cable configuration.

| Model | 20KVA | 40KVA | 60KVA |
|---|---|---|---|
| Current (A) | 38 | 76 | 114 |
| Power cable ($mm^2$) | 6.6 | 16 | 40 |
| Fixation torque force (lb-in) | 20 | 20 | 20 |

| Model | 30KVA | 60KVA | 90KVA |
|---|---|---|---|
| Current (A) | 57 | 114 | 171 |
| Power cable ($mm^2$) | 10 | 35 | 70 |
| Fixation torque force (lb-in) | 20 | 20 | 20 |

**Note:** Installer has to possibly consider the max. current and wiring gauge for future extension.

### 3.6.2 DC input maximum current and power cable configuration.

| Model | 30KVA | 60KVA | 90KVA |
|---|---|---|---|
| Current (A) | 100 | 200 | 300 |
| Power cable ($mm^2$) | 25 | 95 | 150 |
| Fixation torque force (lb-in) | 20 | 20 | 20 |

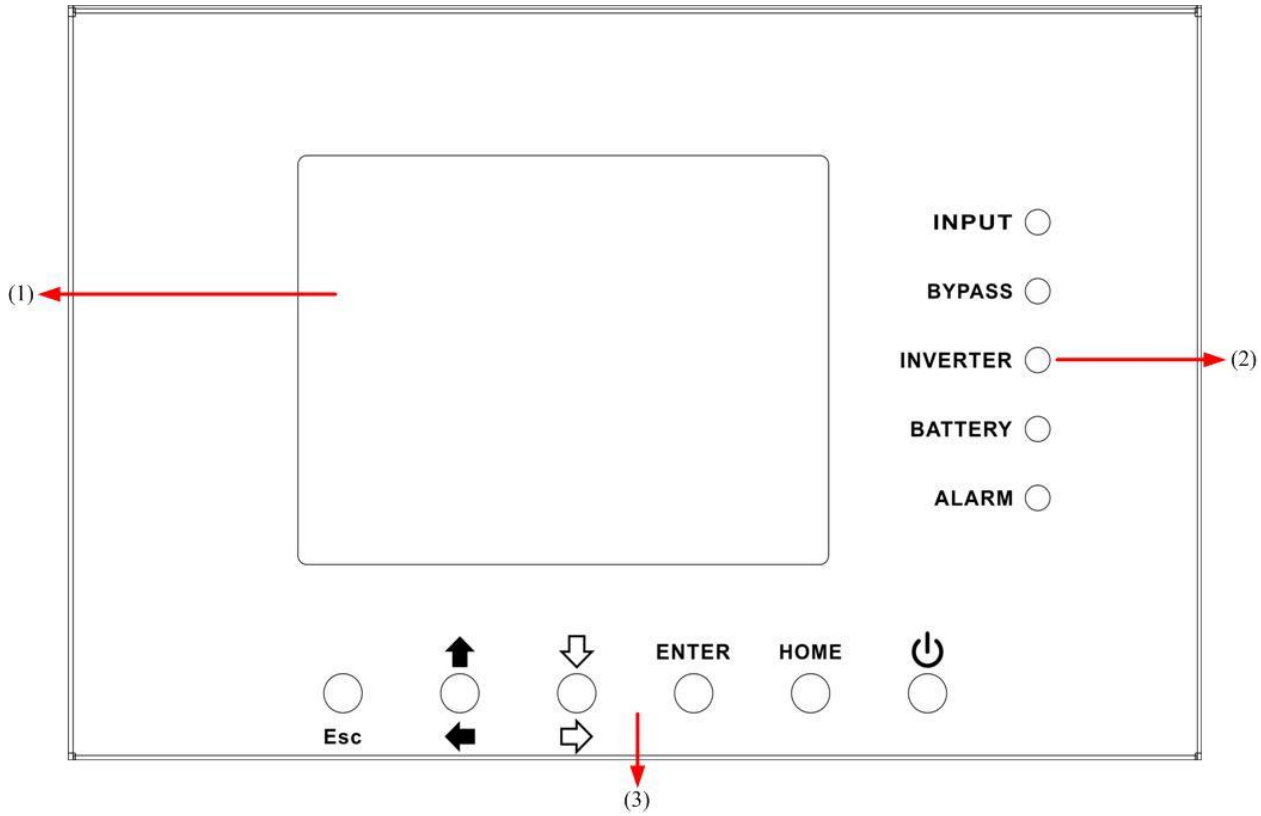
| Model | 20KVA | 40KVA | 60KVA |
|---|---|---|---|
| Current (A) | 67 | 134 | 200 |
| Power cable ($mm^2$) | 15 | 50 | 95 |
| Fixation torque force (lb-in) | 20 | 20 | 20 |

**Note:** Adjust to 90KVA if setting up external battery cabinet for standard model.

# 4. Control Panel and Display Description

## 4.1 Introduction

This control panel and display description is located at the front side of the UPS. It is the USER control panel monitoring all measured parameters, UPS and battery status and alarms. The control panel and display description is divided into four functional areas: (1) LCD display, (2) LED indications, (3) Control keys, (4) Audio Alarm, as shown in Figure 4-1.




1. LCD display: Graphic display and all measured parameters.
2. LED indications. Refer to table 4-1.
3. Control keys. Refer to table 4-2.

Figure 4-1 Control panel parts

Table 4-1: LED indications

| LED | Color | Status | Definition |
|---|---|---|---|
| INPUT | Green | On | Input source is normal. |
| | | Flashing | Input source is abnormal. |
| | | Off | No input source |
| BYPASS | Yellow | On | Load on Bypass. |
| | | Flashing | Input source is abnormal. |
| | | Off | Bypass not operating. |
| INVERTER | Green | On | Load on inverters. |
| | | Off | Inverters not operating. |
| BATTERY | Red | On | Load on Battery. |
| | | Flashing | Low battery |
| | | Off | Battery converter is normal and battery is charging. |
| ALARM | Red | On | UPS fault. |
| | | Flashing | UPS alarm. |
| | | Off | Normal. |

Table 4-2: Function key table

| Control Key | Description |
|---|---|
| Esc | ● Return to previous screen. When screen is in Main screen, it will enter setting menu by pressing ESC key.<br>● Return back to change previous value in the same row. For example, if in the process of changing 4-digit password, press "Esc" to allow cursor back to previous digit. |
| Up (Left) | Key for menu page navigation or digit modification. |
| Down (Right) | Key for menu page navigation, or digit modification. |
| Enter | Confirmation of commands, or cursor displacement. |
| Home | Return to Main screen. |
| Power On/Off | Turn on UPS or Turn off UPS. (hold 2-Sec) |

(1) Audible Alarm: Table 4-3

| Audio Type | Description |
|---|---|
| Power on/off | Buzzer sounds two seconds. |
| Battery mode | Buzzer sounds every 2 seconds. |
| Low battery | Buzzer sounds every half second. |
| UPS alarm | Buzzer sounds every 1 second. |
| UPS fault | Buzzer continuously sounding. |

## 4.2 Screen Description

### 4.2.1 Start Screen

Upon UPS starting, the UPS executes self-test. The initial screen displays and remains approximately 5 seconds as shown in Figure 4-2.

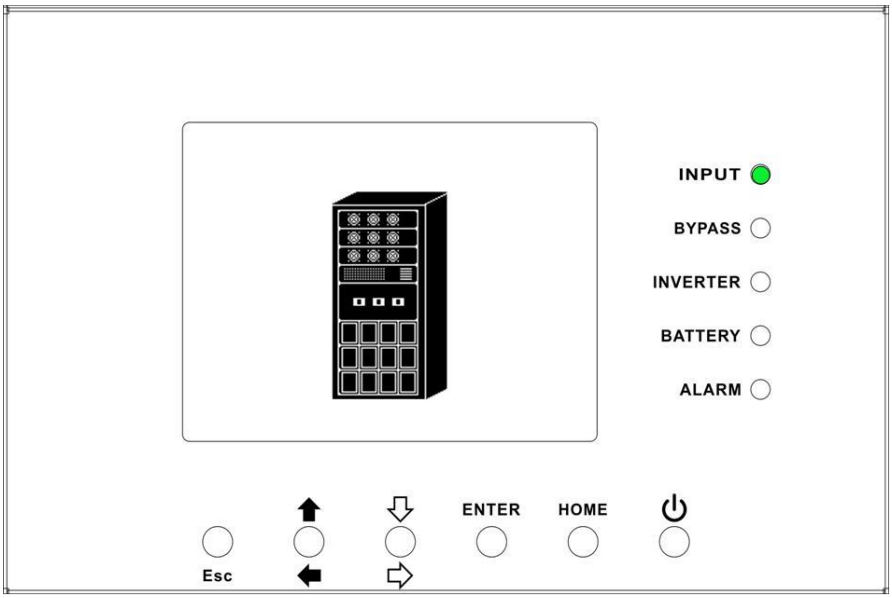



Figure 4-2 Initial screen

### 4.2.2 Main Screen

After initialization, the main screen will display as Figure 4-3. 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.

(5) Date and Time.

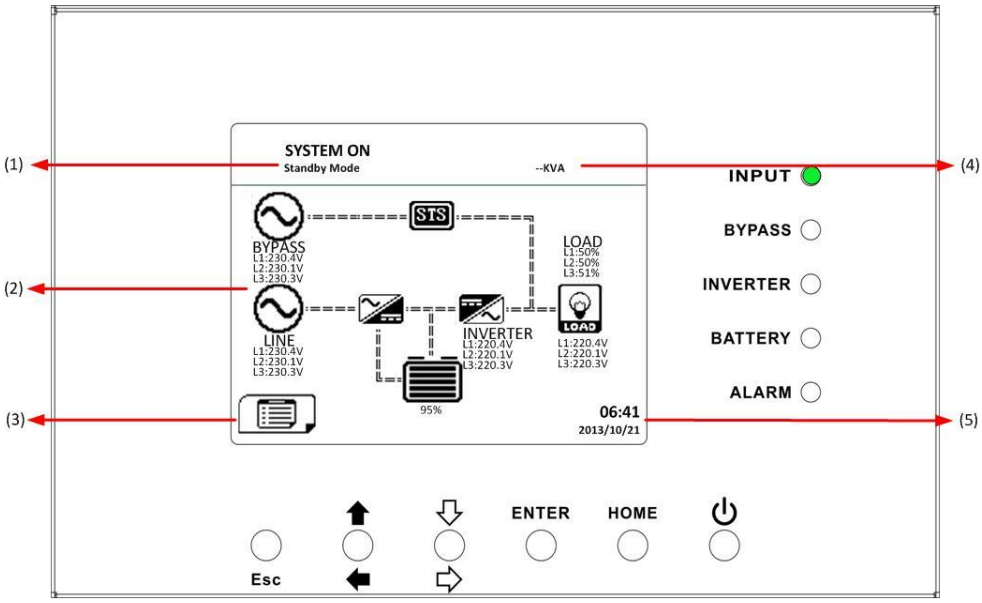



Figure 4-3 Main screen

### 4.2.3 Menu Screen

Use UP and DOWN buttons to choose between different menus, and Press ENTER to enter into the sub screen, as shown in Figure 4-4 and 4-5.

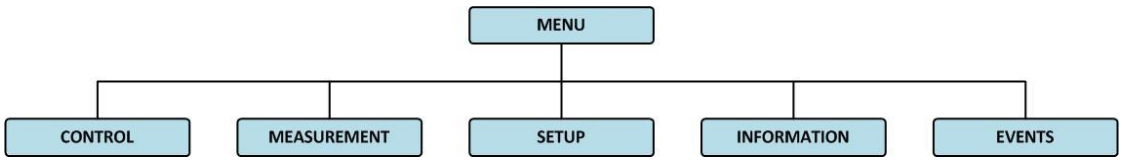



Figure 4-4 Menu tree

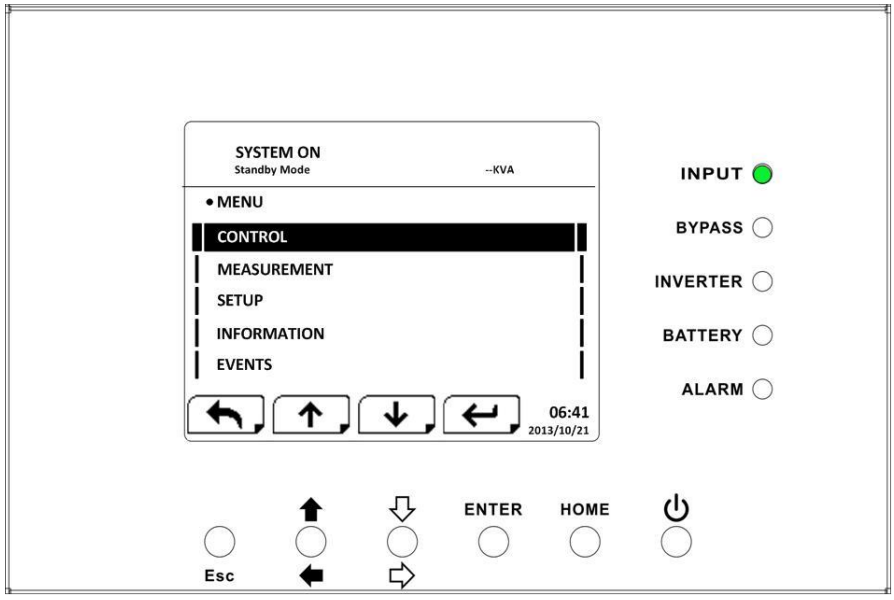



Figure 4-5 Menu screen

### 4.2.4 Control Screen

Use UP and DOWN buttons to choose CONTROL option, and press ENTER button to go into the submenu, as shown in Figure 4-6 and 4-7.

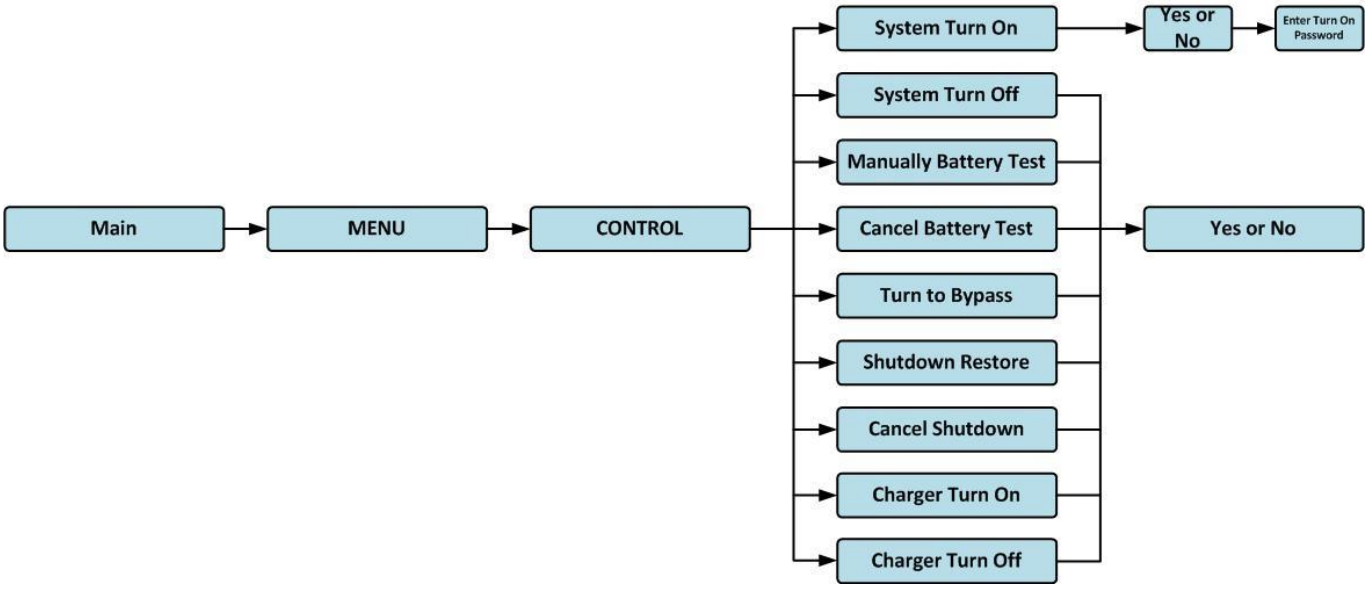



Figure 4-6 Control menu

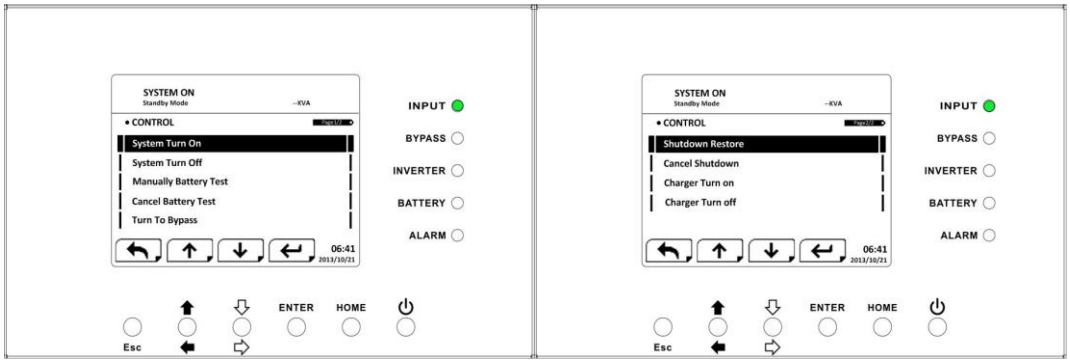



Figure 4-7 Control screen

Use LEFT and RIGHT buttons to choose YES or NO. Choose YES and press ENTER button to confirm command or choose NO to cancel command, as shown in Figure 4-8.

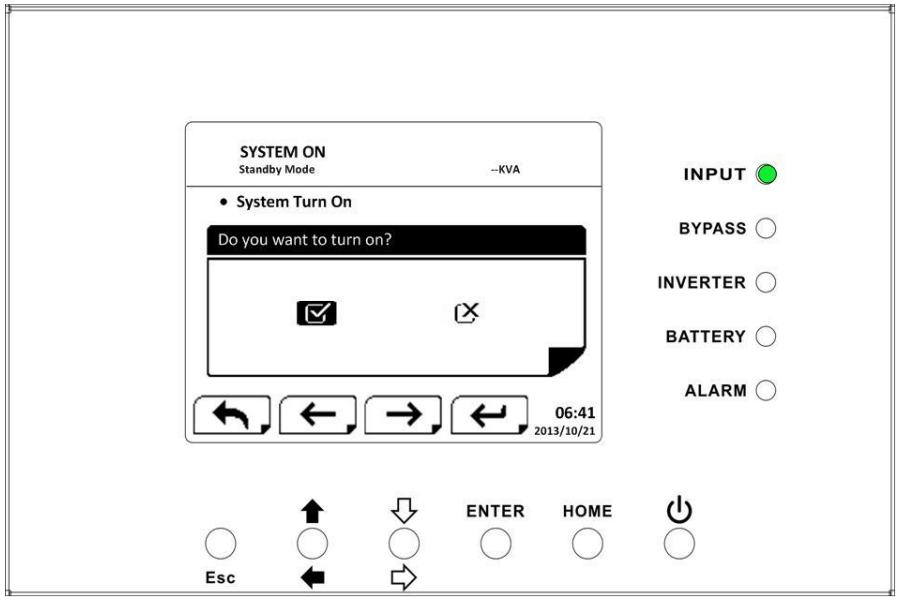



Figure 4-8 Yes or No screen

### 4.2.5 Measurement Screen

Use UP and DOWN buttons to choose MEASUREMENT option. Choose module ID number to measure Input, Output, Bypass, Load, and Battery of every module, as shown in Figure 4-9, 4-10 and Table 4-4.

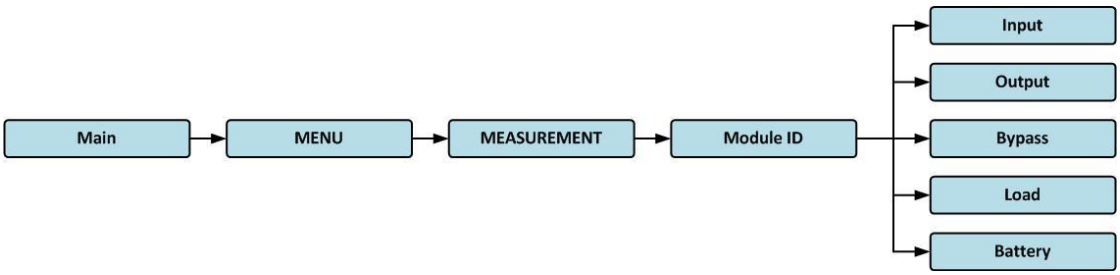



Figure 4-9 Measurement menu

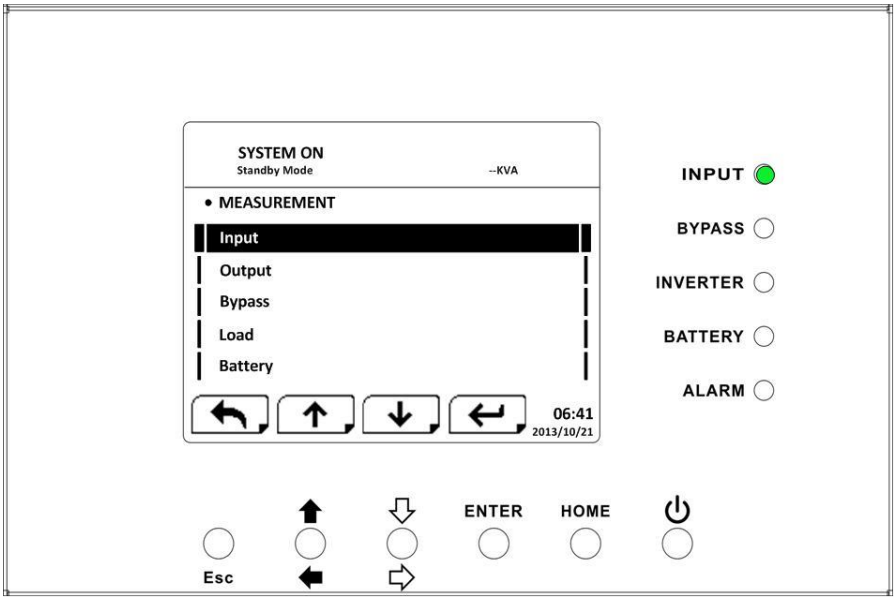



Figure 4-10 Measurement screen

Table 4-4

| Menu | Item | Explanation |
|---|---|---|
| Input | L-N Voltage (V) | Input phase voltage (L1, L2, L3). Units 0.1V. |
| | Frequency (Hz) | Input Frequency (L1, L2, L3). Units 0.1Hz. |
| Output | L-N Voltage (V) | Output phase voltage (L1, L2, L3). Units 0.1V. |
| | L-N Current (A) | Output phase current (L1, L2, L3). Units 0.1A. |
| | Frequency (Hz) | Output Frequency (L1, L2, L3). Units 0.1Hz. |
| | Power Factor | Output Power Factor (L1, L2, L3). |
| Bypass | L-N Voltage (V) | Bypass phase voltage (L1, L2, L3). Units 0.1V. |
| | Frequency (Hz) | Bypass Frequency (L1, L2, L3). Units 0.1Hz. |
| | Power Factor | Bypass Power Factor (L1, L2, L3). |
| Load | Sout (KVA) | Apparent power. Units 0.1KVA. |
| | Pout (KW) | Active power. Units 0.1KW. |
| | Load Level (%) | The percentage of the UPS rating load. 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 1sec. |
| | Capacity (%) | The percentage of the capacity of the battery. Units 1%. |
| | Test Result | Battery test result |
| | Charging Status | Battery charging status |

### 4.2.6 Setup Screen

Use UP and DOWN buttons to choose SETUP options. It's required to enter password to access to General, SYSTEM and BATTERY sub-menus, as shown in Figure 4-11, 4-12 and 4-13.

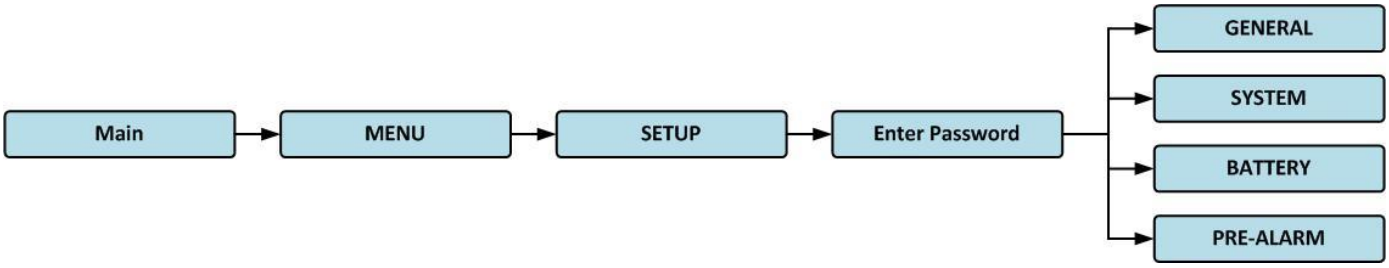



Figure 4-11: Setup menu

It's required to enter 4-digit password to enter SETUP menu. If incorrect password is entered, the LCD screen will show a dialoge to ask you to retry.

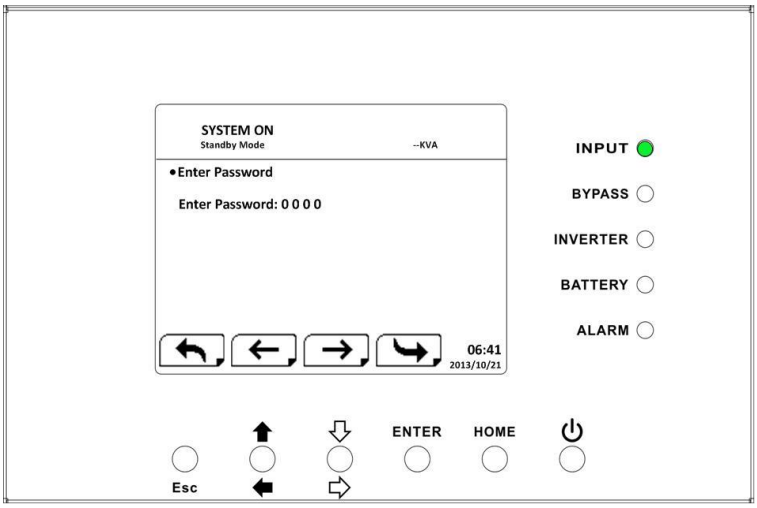



Figure 4-12 Enter password screen

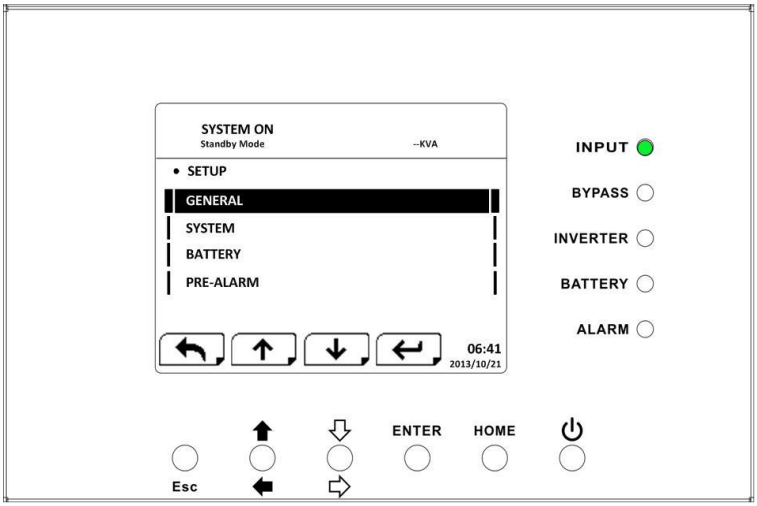



Figure 4-13: Setup screen

**Table 4-5: 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 |
|---|---|---|---|---|---|---|---|---|
| Model Name | Y | Y | Y | Y | Y | Y | Y | Y |
| Language | Y | Y | Y | Y | Y | Y | Y | Y |
| TIME | Y | Y | Y | Y | Y | Y | Y | Y |
| Change Password | Y | Y | Y | Y | Y | Y | Y | Y |
| Baud Rate | Y | Y | Y | Y | Y | Y | Y | Y |
| Audible Alarm | Y | Y | Y | Y | Y | Y | Y | Y |
| Factory Reset | Y | | | | | | | |
| EEPROM Reset | Y | | | | | | | |
| EPO Function | Y | | | | | | | |
| Save Setting | Y | Y | | | | | | |
| Turn On Password | Y | Y | Y | Y | Y | Y | Y | Y |
| Change Turn On Password | Y | Y | Y | Y | Y | Y | Y | Y |
| Output Voltage | Y | Y | | | | | | |
| Bypass Voltage Range | Y | Y | Y | Y | Y | Y | Y | Y |
| Bypass Frequency Range | Y | Y | | | | | | |
| Converter Mode | Y | | | | | | | |
| ECO Mode | Y | Y | Y | | | | | Y |
| Bypass Mode | Y | Y | | | | | | |
| Auto-Restart | Y | Y | Y | Y | Y | Y | Y | Y |
| Cold Start | Y | Y | Y | Y | Y | Y | Y | Y |
| Battery Mode Delay Time | Y | Y | Y | | | Y | Y | Y |
| System Shutdown Time | Y | Y | Y | Y | Y | Y | Y | Y |
| System Restore Time | Y | Y | Y | Y | Y | Y | Y | Y |
| Redundancy | Y | Y | Y | Y | Y | Y | Y | Y |
| Power Rating Setting | Y | | | | | | | |
| Nominal Battery Voltage | Y | Y | | | | | | |
| Battery Capacity in Ah | Y | Y | Y | | | Y | Y | Y |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Maximum Charging Current | Y | Y | | | | | | |
| Battery Low/Shutdown Setting | Y | Y | Y | | | Y | Y | Y |
| Periodic Battery Test | Y | Y | Y | Y | Y | Y | Y | Y |
| Battery Test Interval | Y | Y | Y | Y | Y | Y | Y | Y |
| Stop by Time | Y | Y | Y | Y | | Y | Y | Y |
| Stop by Battery Voltage | Y | Y | Y | Y | | Y | Y | Y |
| Stop by Battery Capacity | Y | Y | Y | Y | | Y | Y | Y |
| Battery Age Alert | Y | Y | Y | Y | Y | Y | Y | Y |
| Pre-Alarm | Y | Y | Y | Y | Y | Y | Y | Y |

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

#### 4.2.6.1 Setup-General Screen

Use UP and DOWN buttons to choose between different sub-menus, and press ENTER button to enter into the GENERAL setting screen, as shown in Figure 4-14. General setting can be adjusted in any operating mode and Setup-General setting list is shown in table 4-6.


Figure 4-14: Setup-General screen

Use LEFT and RIGHT buttons to choose YES or NO. Choose YES and press ENTER button to confirm the setting change or choose NO to cancel the setting, as shown in Figure 4-15.

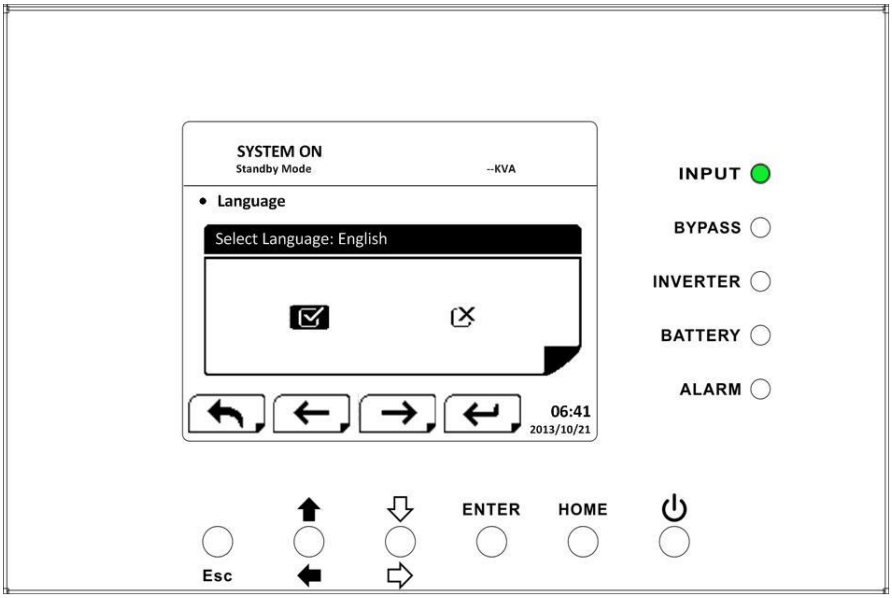



Figure 4-15: SETUP YES or NO screen

Table 4-6

| Setting Item | Sub Item | Explanation |
|---|---|---|
| Model Name | | Set UPS Name (xxxxxxxxxx) |
| Language | -- | 3 optional LCD languages are provided. (English, Traditional Chinese and Simplified Chinese ) |
| TIME | Adjust Time | Set current date and time (yyyy / mm / dd hour : min : sec) |
| | System Installed Date | Set system installed date (yyyy / mm / dd) |
| | System Last Maintain Date | Set system latest maintenance date (yyyy / mm / dd) |
| | Battery Installed Date | Set battery installed date (yyyy / mm / dd) |
| | Battery Last Maintain Date | Set battery latest maintenance date (yyyy / mm / dd) |
| Change Password | -- | Set New Password. |
| Baud Rate | -- | Set COM Port0 Baud Rate (2400, 4800, 9600)<br>Set COM Port1 Baud Rate (2400, 4800, 9600) |
| Audible Alarm | -- | Set Audible Alarm "Disable" or "Enable" |
| Factory Reset | -- | Restore to factory default setting |
| EEPROM Reset | -- | Set EEPROM default |
| EPO Function | -- | Set EPO "Normal Close Active" or "Normal |

| | | |
|---|---|---|
| | | Open Active” |
| Save Setting | -- | Save EEPROM |
| Turn On Password | -- | “Disable” or “Enable” password permission to turn on UPS. |
| Change Turn On Password | -- | Change “Turn On Password”. |

### 4.2.6.2 Setup-System Screen

Use UP and DOWN buttons to browse different menus and press ENTER button to go into the SYSTEM setting screen, as shown in Figure 4-16. System setting can be set only when UPS is operated in certain mode. Please check setting item availability table 4-5 for the details. If it’s not set up under specific mode, the warning screen will appear. Refer to figure 4-17 and Setup-System setting list is shown in table 4-7.


Figure 4-16: Setup-System screen

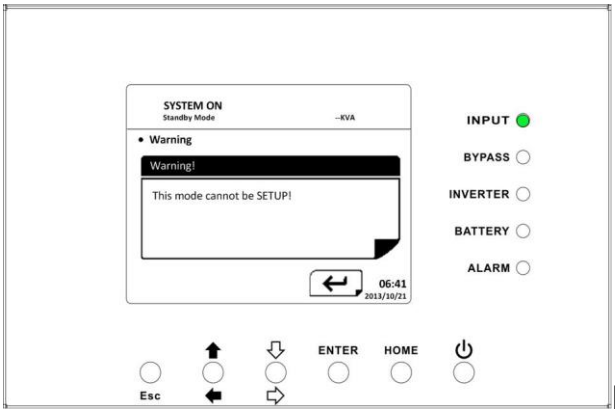



Figure 4-17: Warning screen

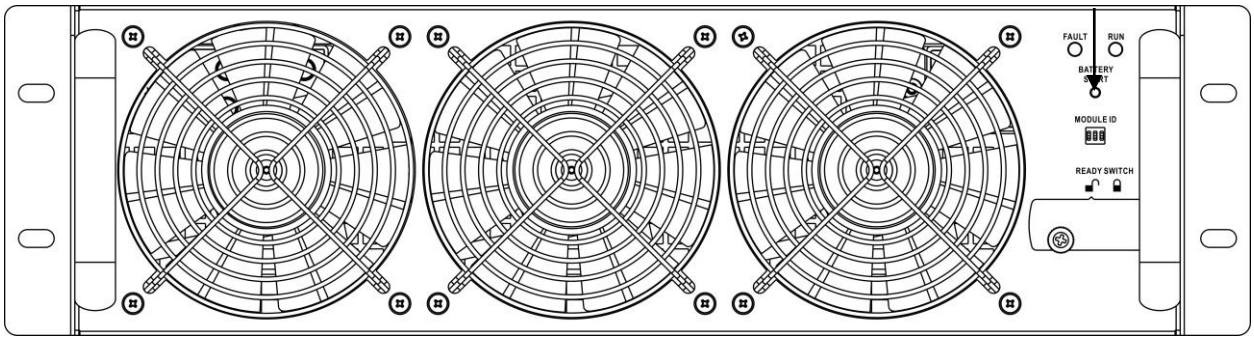
Table 4-7

| Setting Item | Sub Item | Explanation |
|---|---|---|
| Output Voltage | -- | Set output voltage (220Vac, 230Vac, 240Vac) |
| BYPASS SETTING | Bypass Voltage Range | Set bypass voltage range: upper limit (+10%, +15%, +20%) and lower limit (-10%, -20%, -30%) |
| | Bypass Frequency Range | Set bypass Frequency range: upper limit (+1Hz, +2Hz, +4Hz) and lower limit (-1Hz, -2Hz, -4Hz) |
| Converter Mode | -- | Set converter mode to "Disable" or "Enable" |
| ECO Mode | -- | Set ECO mode to "Disable" or "Enable" |
| Bypass Mode | -- | Set bypass mode to "Disable" or "Enable" |
| Auto-Restart | -- | Set auto-restart to "Disable" or "Enable".<br>After "Enable" is set up, once UPS shutdown occurs due to low battery and then utility restores, the UPS will return to line mode. |
| Cold Start | -- | Set cold start to "Disable" or "Enable".<br>After "Enable" is set, the UPS can be turned on without utility connection by pressing Battery Start Button. Refer to cold start operation for the details. |
| Battery Mode Delay Time | -- | Set system shutdown delay time in battery mode: 0~9990 sec |
| System Shutdown Time | -- | Set system shutdown time: 0.2~99 min |
| System Restore Time | -- | Set system restore time: 0~9999min |
| Redundancy | -- | Set total power and redundancy |
| Power Rating Setting | | Set Power Rating to "20KVA" or "30KVA." for each power module. If setting is not corresponding to power capacity of power module, it will show error message. |

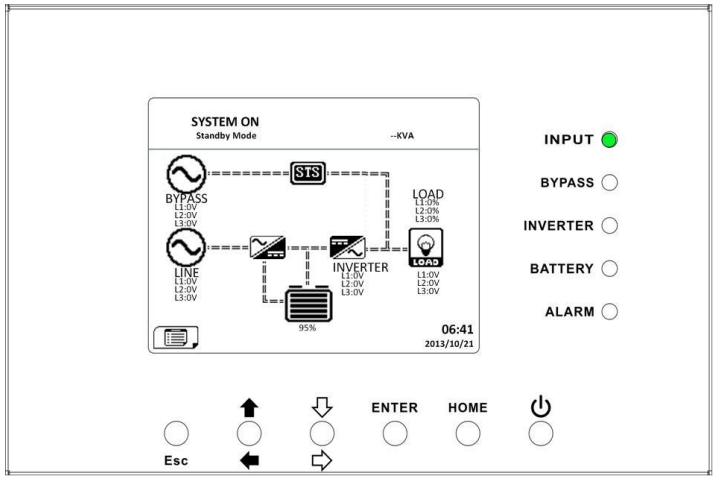
## Cold Start Operation

**Step 1**: Press "Cold Start" button as shown in chart below.

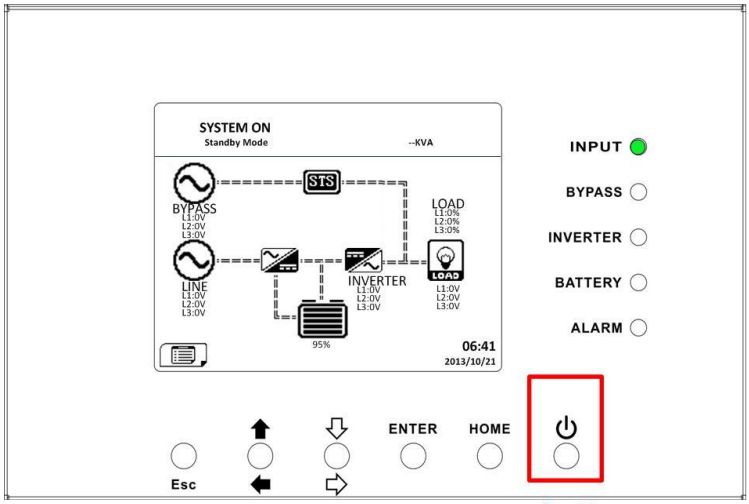
Cold Start Button




**Step 2:** After pressing Cold Start Button, UPS will enter Standby mode. Refer to the chart below for LCD display.

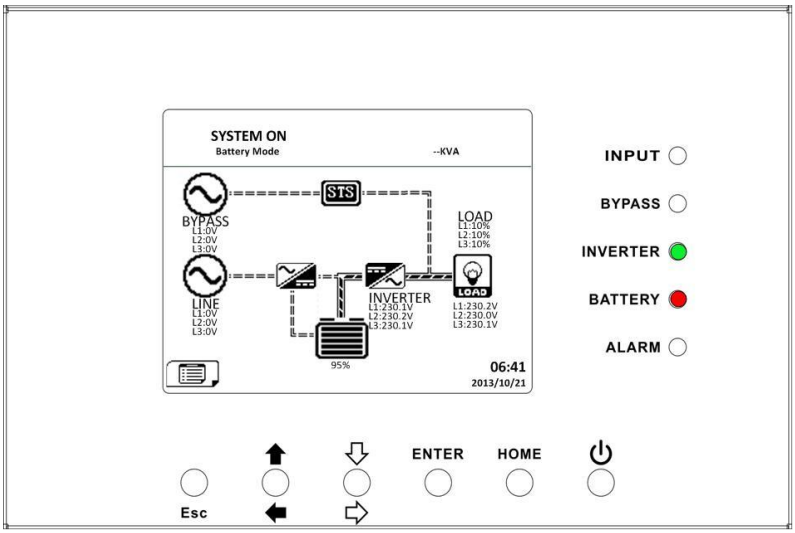



**Step 3:** Before UPS enters shutdown mode, please press "Power On/Off" button for 2 seconds immediately as shown in below chart.




Power On/Off Button

**Step 4:** Then, UPS will enter Battery Mode as shown in the chart below. Cold start procedure is complete.




### 4.2.6.3 Setup-Battery Screen

Use UP and DOWN buttons to switch between different sub-menus. Press ENTER button to go into the BATTERY setting screen, as shown in Figure 4-18. Battery setting can be set only when UPS is operated in standby mode. If it's not in standby mode, the warning screen will appear as shown in Figure 4-17. See Battery-System setting list in table 4-8.

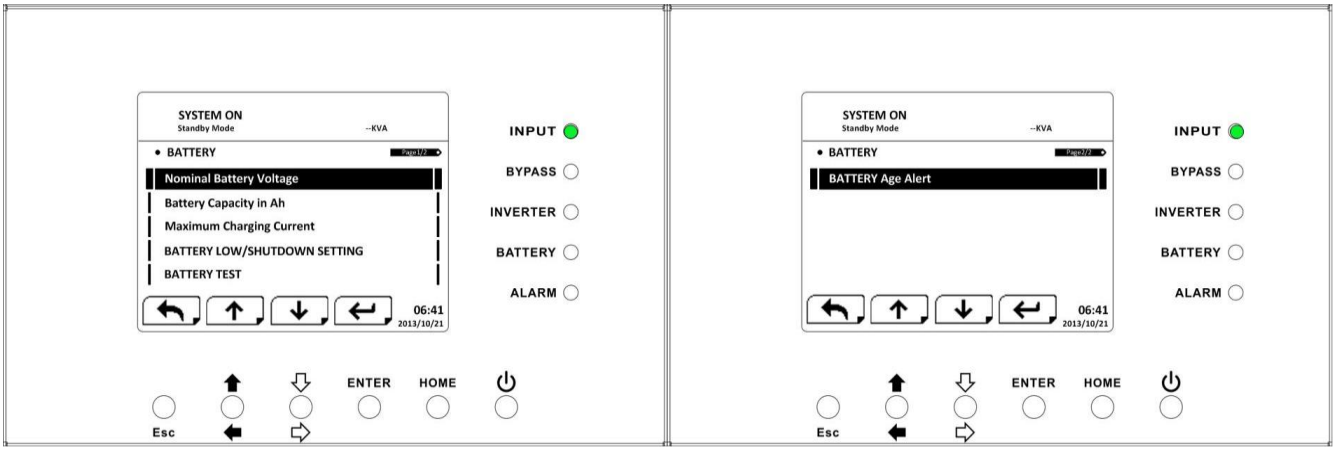



Figure 4-18: Setup-Battery Screen

Table 4-8

| Setting Item | Sub Item | Explanation |
|---|---|---|
| Nominal Battery Voltage | -- | Set battery nominal voltage: 16x12V, 18x12V, 20x12V |
| Battery Capacity in Ah | -- | Set battery capacity: 0~999 |
| Maximum Charging Current | -- | Set battery maximum charging current : 1~128A |
| BATTERY LOW/SHUTDOWN SETTING | Battery Low Voltage | Set battery low voltage: (10.5~11.5V)x(battery Number) |
| | Battery Low Capacity | Set battery low capacity: 20~50% |
| | Battery Shutdown Voltage | Set battery voltage point for system shutdown in battery mode: (10.0~11V) x (battery Number) |
| BATTERY TEST | Periodic Battery Test | Set periodic battery test to "Disable" or "Enable" |
| | Battery Test Interval | Set battery test interval: 7~99 Days |
| | Stop by Time | Set testing time for battery test: 10~1000sec |
| | Stop by Battery Voltage | Set stop battery voltage in battery test: (11~12V) x (battery Number) |
| | Stop by Battery Capacity | Set battery capacity to stop battery-testing: 20~50% |
| Battery Age Alert | Battery Age Alert (Months) | Set battery age for replacement: 12~60 Months |

### 4.2.6.4 Pre-Alarm Screen

Use UP and DOWN buttons to switch different sub-menus. Press ENTER button to go into the Pre-Alarm setting screen, as shown in Figure 4-19. Pre-Alarm setting can be set in any operation mode. See Setup-Pre-Alarm setting list in table 4-9.

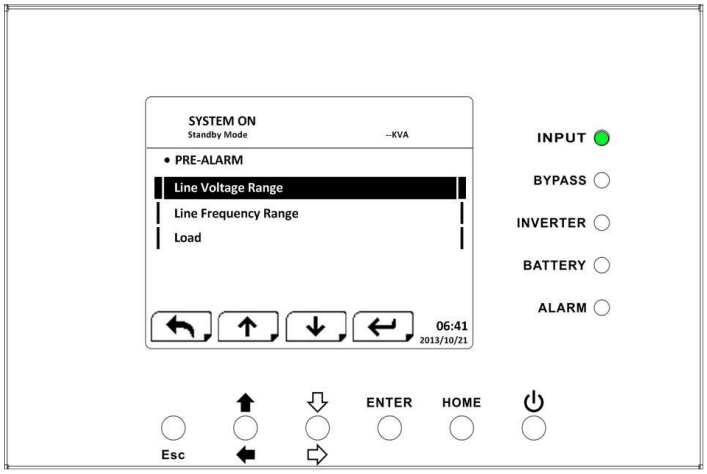



Figure 4-19: Setup Pre-Alarm screen

Table 4-9

| Setting Item | Sub Item | Explanation |
|---|---|---|
| Line Voltage Range | -- | Set line voltage range: upper limit (+5%, +10%, +15%, +20%) and lower limit (-5%, -10%, -15%, -20%) |
| Line Frequency Range | -- | Set line frequency range: upper limit (+1Hz, +2Hz, +3Hz, +4Hz) and lower limit (-1Hz, -2Hz, -3Hz, -4Hz) |
| Load | Overload | Set UPS Overload percentage: 40~100% |
| | Load Unbalance | Set UPS output load unbalance percentage: 20~100% |

### 4.2.7 Information Screen

In this Screen, you can check the UPS configuration of the unit, and INFORMATION is divided into Identification, System and Battery, as shown in Figure 4-20, 4-21, 4-22, 4-23 and 4-24.

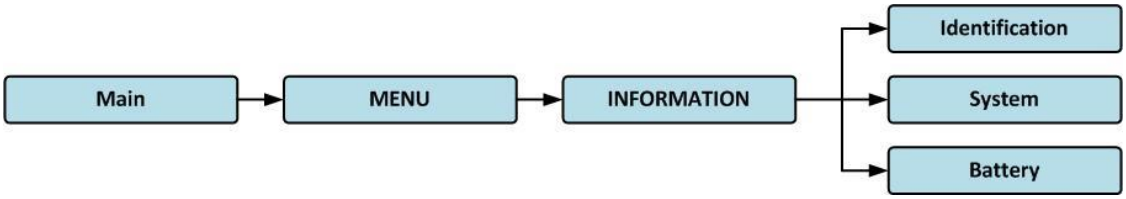



Figure 4-20: Information menu

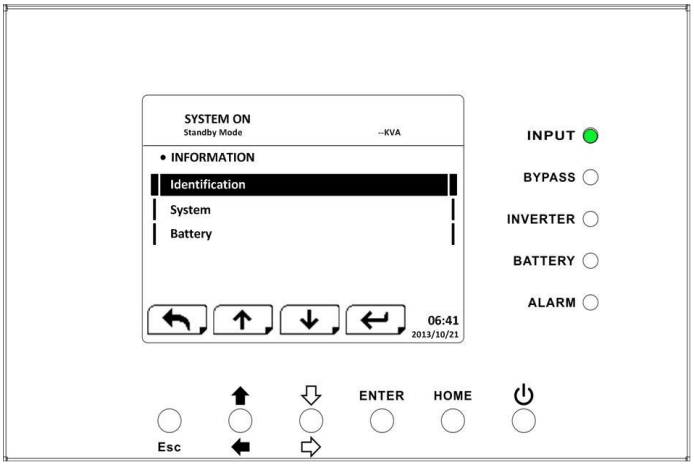



Figure 4-21: Information screen

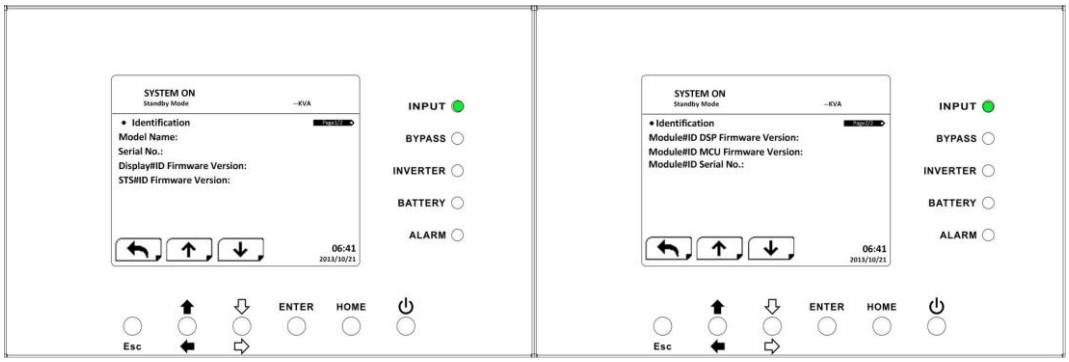



Figure 4-22: Information-Identification screen

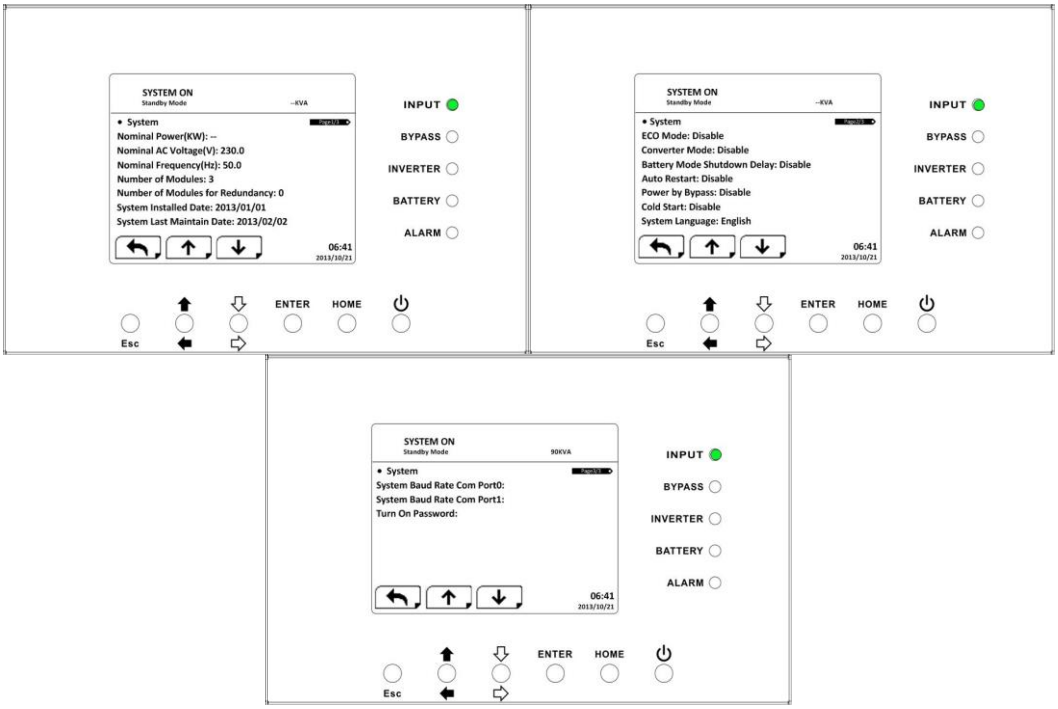



Figure 4-23: Information-System screen

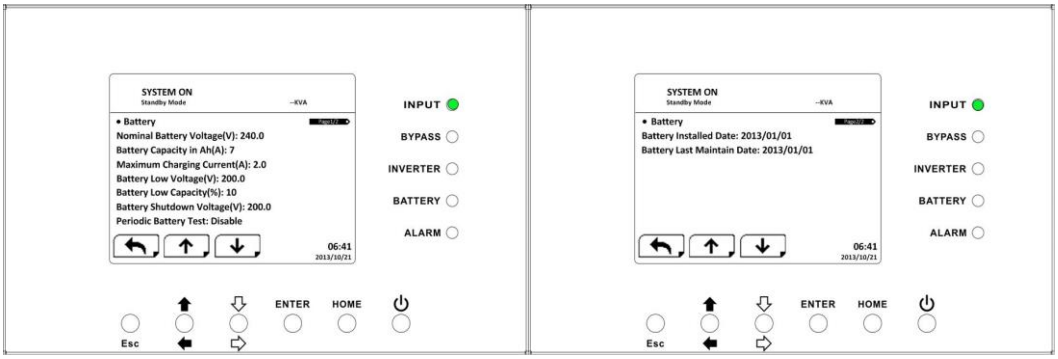



Figure 4-24: Information-Battery screen

## 4.2.8 Events Screen

When event occurs, you will see flashed warning text in the Main Screen as shown in Figure 4-25. Besides, you also can enter the EVENTS Menu to check the latest event lists and history events as shown in Figure 4-26 and 4-27.

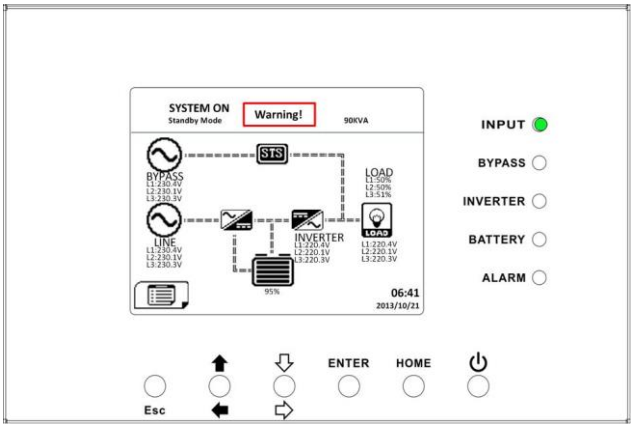



Figure 4-25: Alarm warning screen

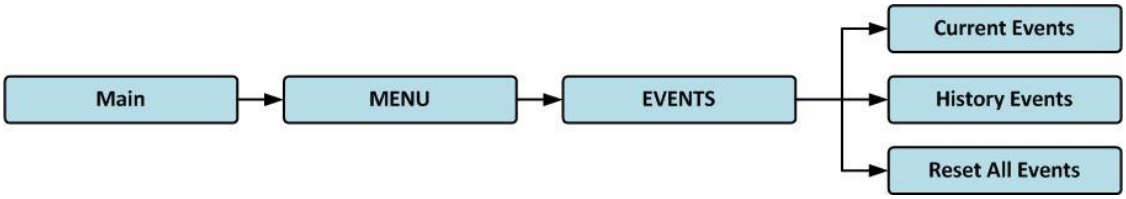



Figure 4-26: Events menu

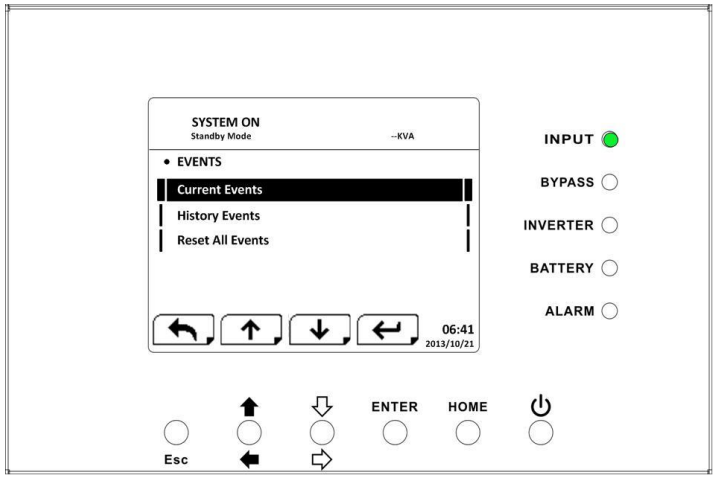



Figure 4-27: Events screen

### 4.2.8.1 Current Events

When event occurs, it displays Module ID and alarm code in Current Events screen. It can save up to 50 events in current events. Only 4 events can be listed in one page so you can press UP or DOWN button to browse other events as shown in Figure 4-28.

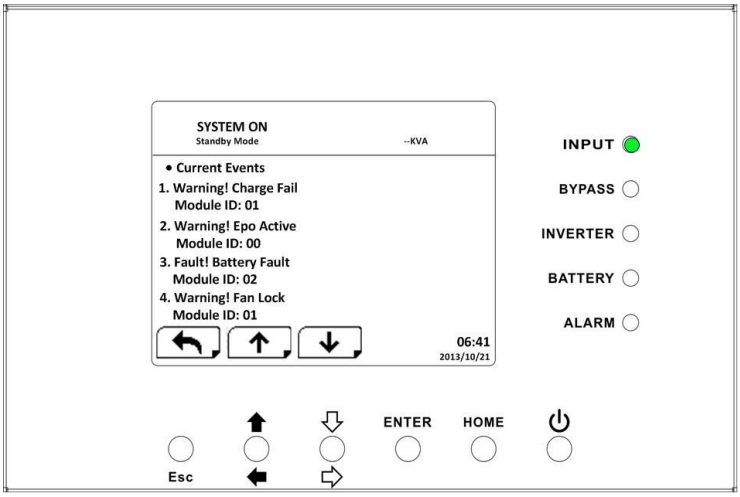



Figure 4-28: Current Events screen

### 4.2.8.2 History Events

It saved detailed information in history events. When warning occurs, it will display alarm code, alarm time and Module ID. When fault event occurs, it will display alarm code, alarm time, Module ID and data 1~2. Refer to Figure 4-29 for display screen.

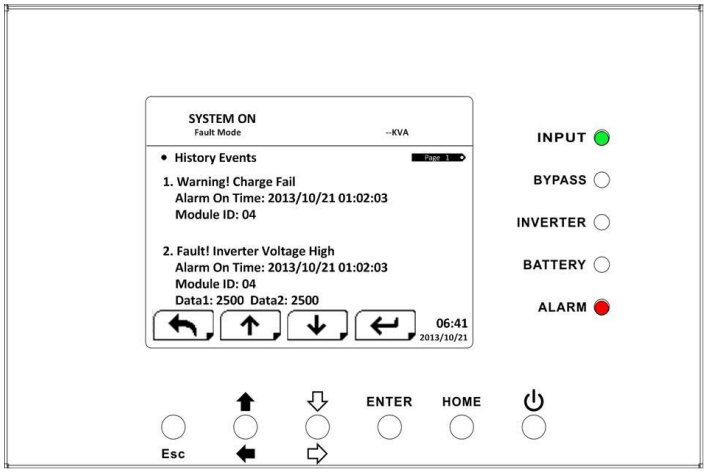



Figure 4-29: History Events screen

### 4.2.8.3 Reset All Events

It's required to enter 4-digit password to start Reset All Events screen as shown in Figure 4-30. Then, use LEFT and RIGHT buttons to choose YES or NO. Choose YES and press ENTER buttons to reset all events or choose NO to cancel this action as shown in Figure 4-31.

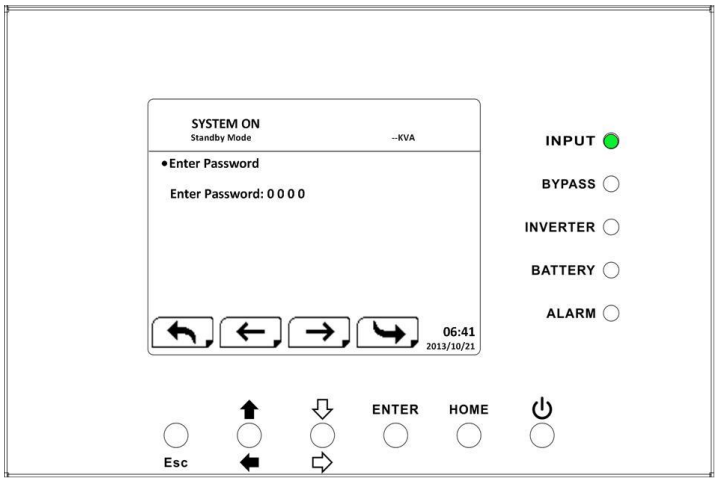



Figure 4-30 Reset All Events screen

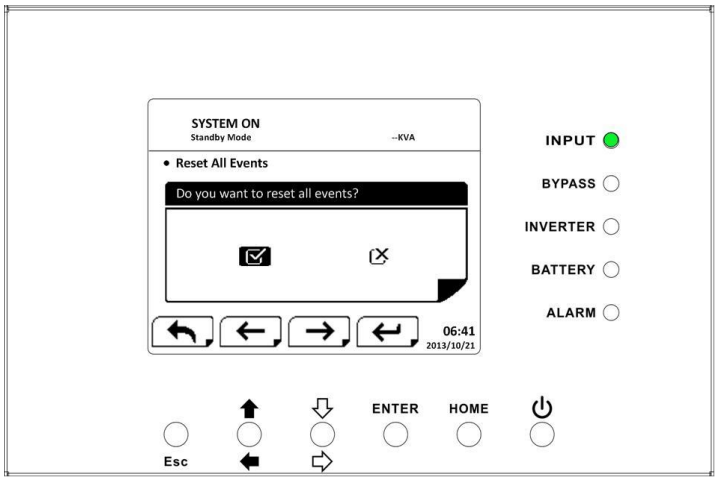



Figure 4-31 Reset All Events screen

## 4.3 Alarm List

In Table 4-10, it provides the complete list of UPS alarm messages.

Table 4-10

| **Representation in display LCD** | **Explanation** |
|---|---|
| Fault! Bus Over Voltage | DC bus voltage is too high |
| Fault! Bus Under Voltage | DC bus voltage is too low |
| Fault! Bus Voltage Unbalance | DC bus voltage does not balance |
| Fault! Bus Short | DC bus is short |
| Fault! Bus Soft Start Time Out | The rectifiers cannot start due to low DC bus voltage within specified duration |
| Fault! Inverter Soft Start Time Out | Inverter bus voltage cannot reach desired voltage within specified duration |
| Fault! Inverter Voltage Over | Inverter Voltage is over peak value. |
| Fault! Inverter Voltage High | Inverter Voltage is too high |
| Fault! Inverter Voltage Low | Inverter Voltage is too Low |
| Fault! R Inverter Voltage Short | R phase inverter Output is shorted |
| Fault! S Inverter Voltage Short | S phase inverter Output is shorted |
| Fault! T Inverter Voltage Short | T phase inverter Output is shorted |
| Fault! RS Inverter Voltage Short | R-S inverter Output is shorted |
| Fault! ST Inverter Voltage Short | S-T inverter Output is shorted |
| Fault! TR Inverter Voltage Short | T-R inverter Output is shorted |
| Fault! Inverter R Negative Power | R phase inverter Output Negative Power is over range |
| Fault! Inverter S Negative Power | S phase inverter Output Negative Power is over range |
| Fault! Inverter T Negative Power | T phase inverter Output Negative Power is over range |
| Fault! Over Load Fault | Heavy overload causes UPS fault. |
| Fault! Battery Fault | Batteries are installed reversely. |
| Fault! Over Temperature | Make sure adequate space is allowed for air vents and the fan is working |
| Fault! CAN Fault | CAN communication fault occurs |
| Fault! TRIG0 Fault | Synchronized trigger signal fault |
| Fault! Relay Fault | Inverter relay fault occurs |
| Fault! Line SCR Fail | Line SCR short circuit fault |
| Fault! EEPROM Fault | EEPROM operation error |
| Fault! Parallel Cable Loosen Fault | As stated. |
| Fault! DSP MCU Stop Communicate | As stated. |
| Fault! Bypass Temperature Fault | As stated |
| Fault! Bypass SCR Fault | As stated. |

| | |
|---|---|
| Line Fail | Utility lost or abnormal |
| Line Restore | Utility recovered to normal |
| Warning! EPO Active | Check the EPO connector |
| Warning! Over Load Fail | The load devices are demanding more power than what the UPS can supply. Line mode will transfer to Bypass mode. |
| Warning! Communicate CAN Fail | CAN communication error |
| Warning! Over Load | In Line mode, the load devices are demanding more power than what the UPS can supply. |
| Warning! Battery Open | Battery is not connected |
| Warning! Battery voltage High | Battery voltage is too High |
| Warning! Module Un-Lock | As stated. |
| Warning! Turn On Abnormal | As stated. |
| Warning! Charge Fail | As stated. |
| Warning! EEPROM Fail | EEPROM operation errors |
| Warning! Fan Lock | As stated. |
| Warning! Line Phase Error | As stated. |
| Warning! Bypass Phase Error | As stated. |
| Warning! N Loss | Neutral losses. |
| Warning! Internal Initial Fail | As stated. |
| Warning! Comm. Syn. Signal Fail | Communicate Synchronization Signal fails. |
| Warning! Comm. TRIG0 Fail | Communicate Trigger signal faults occurs. |
| Warning! Redundancy Set Fail | As stated. |
| Warning! Parallel Sys Config. Wrong | Parallel System Configure error |
| Warning! Maintenance Bypass | Enter maintenance |
| Warning! Battery Age Alert | Battery Life expiration |
| Warning! Parallel Rack Cable Loosen | As stated. |
| Warning! Parallel Rack Config. Wrong | Parallel Rack Configure error |
| Warning! Battery Voltage Low | Battery voltage is too low. |
| Warning! ID Conflict | Power module IDs conflict. |
| Pre-Alarm! Line Voltage Fail | Line voltage is over range |
| Pre-Alarm! Line Voltage Normal | Line voltage recovered to normal |
| Pre-Alarm! Line Frequency Unstable | Line frequency is over range |
| Pre-Alarm! Line Frequency Normal | Line frequency recovered to normal |
| Pre-Alarm! Over Load | Output Load is over range |
| Pre-Alarm! Load Normal | Output Load recovered to normal |
| Pre-Alarm! Load Unbalance | Output Load unbalance |

# 5. Interface and Communication

As shown in figure 5-1, the Static Transfer Switch (STS) Module includes dry contact Port (X1~X2), and communication port (RS232 Port, USB port, SNMP Card Port) on the front panel.

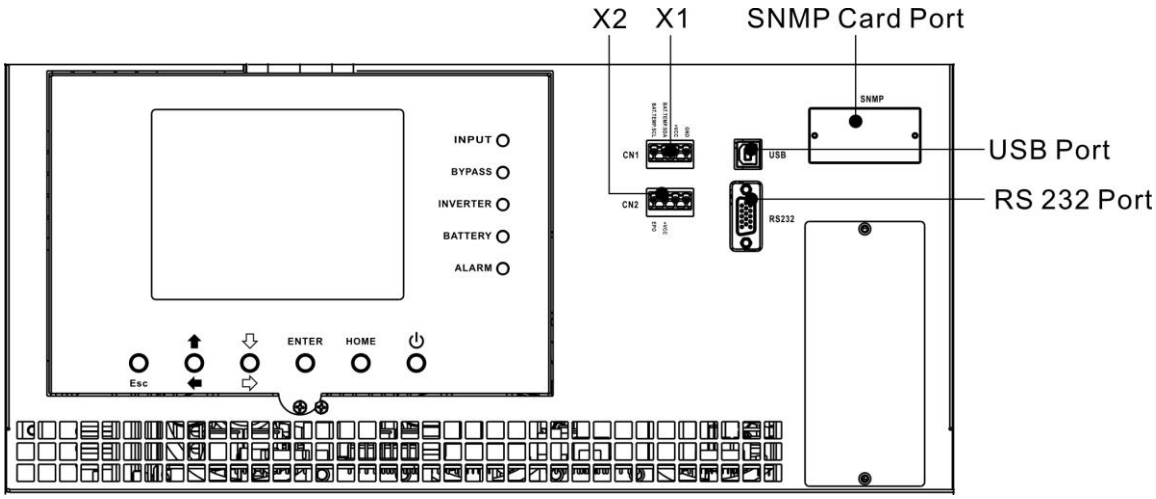



Figure 5-1 Dry contact ports and communication ports

| Dry Contact No. | Function |
|---|---|
| X1 | Battery Cabinet Temperature Detection Port– reserved function |
| X2 | Remote EPO input port |

## 5.1 Battery Cabinet Temperature Detection Port

The UPS has battery cabinet temperature detection function. UPS can check through the external battery cabinet temperature detection board to receive battery cabinet temperature. Communication between the UPS and Battery temperature detection board was by I2C communication protocol. X1 is the battery cabinet temperature detection port. The port is shown in Figure 5-2 and described in Table 5-1.

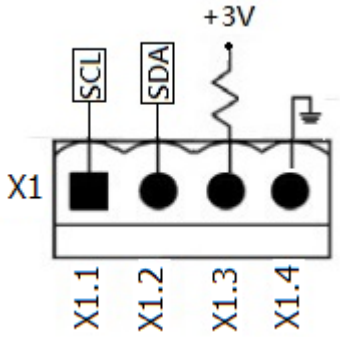



Figure 5-2: Battery Cabinet Temperature Detection Port

| Name | Position | Description |
|---|---|---|
| SCL | X6.1 | I²C communication SCL Signal |
| SDA | X6.2 | I²C communication SDA Signal |
| +3.0V | X6.3 | 3V |
| Power GND | X6.4 | GND |

Table 5-1: Description of Battery Cabinet Temperature Detection Port

## 5.2 Remote EPO Input Port

The UPS has an Emergency Power off (EPO) Function that can be operated by a remote contact provided previously by user. Users can set the logic (N.C or N.O) of this EPO Function through LCD panel.

X2 is the remote EPO input port. The port is shown in Figure 5-3 and described in Table 5-2.

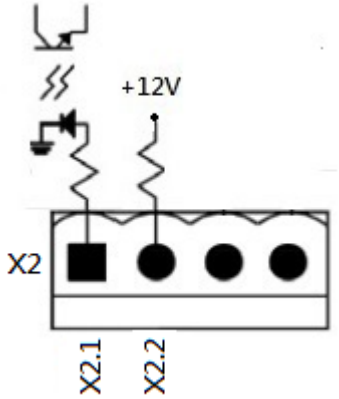



Figure 5-3: Remote EPO input port

Table 5-2: Description of remote EPO port

| EPO Logic Setting | Position | Description |
|---|---|---|
| N.C | X2.1 & X2.2 | EPO activated when Opened X2.1 & X2.2 |
| N.O | X2.1 & X2.2 | EPO activated when Shorted X2.1 & X2.2 |

If EPO Logic setting is in Normal Closed (N.C), EPO is triggered when pins 1 and 2 of X1 are opened. Otherwise, EPO Logic setting is in Normal Opened (N.O). EPO is triggered when pins 1 and 2 of X2 are opened.

**Note:**

1. EPO action shuts down the rectifiers, inverters and static transfer switch. But it does not internally disconnect the input power supply.
2. The default setting of the EPO function logic is in Normal Opened (N.O).

## 5.3 Other Communication Interface

The RS232 port and USB Port can be used in UPS communication and maintenance or monitoring the UPS information by Monitoring Software.

This UPS has built-in facility to fit SNMP Card options.

# 6. Maintenance

This chapter introduces the maintenance of UPS, including the maintenance procedures of the power module.

## 6.1 Replacement Procedures Of Power Module

### 6.1.1 Notes

1. Only the customer service engineers can repair the power modules.
2. Remove the power modules from top to bottom, so as to prevent cabinet from toppling over due to high center of gravity.
3. To ensure safety, before repairing the power modules, be sure to use a voltmeter to verify that the DC bus capacitor voltage is lower than 60Vdc, and that the voltages between the earth and the components you are going to work on are under dangerous voltage values; that is, they're lower than 60Vdc or 42.4Vac peak value.
4. The power modules should be repaired five minutes later and installed in the cabinet again ten minutes later after they are removed.

### 6.1.2 Power Module Replacement Procedures

Confirm UPS is in normal mode and bypass function/source is available.

1. Enter "menu" → control → Turn To Bypass → YES on the operator control and display panel for manually turn off the inverters. Then, the UPS is transferred to bypass mode.

2. Turn ready switch to "🔓" position on replaceable power module.

3. Two minutes later, remove the fixing screws on both sides of the front panel of the module and pull the module out from the cabinet.

**Note:** The module will be blocked by a metal safe locker on the left side of the module when the module is pulled out halfway from the cabinet. At this point, you must press the metal safe locker before you continue pulling the module out.

4. After repairing the module, confirm that the DIP switch of the module is set correctly and the ready switch is in unready state "🔓".

5. Push the module into the cabinet and tighten the screws on both sides. If it's more than one power module to re-install, please wait for 10 seconds before installing another module.

6. Wait for two seconds before turning ready switch of the module to "🔒" position, it will be added into the system automatically and begin to work a few seconds later.

7. Press manual →control → system turn on →YES on the operator control and display panel for two seconds to manually turn on the inverter mode.

# 7. Specifications

The chapter provides the UPS specifications.

## 7.1 Conformity And Standards

The UPS has been designed to conform to the European and international standards listed in Table 7-1.

Table 7-1: 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 | | 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 | |

## 7.2 Environmental Characteristics

Table 7-2: Environmental characteristics

| Item | Unit | Specifications |
|---|---|---|
| Noise within 1 m | dB | Max. 70 |
| 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<br>(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 transport temperature for UPS | °C | -15 ~ 60 |

## 7.3 Mechanical Characteristics

Table 7-3: Mechanical characteristics

| Model | | E-60 | E-90 |
|---|---|---|---|
| Rated power (kVA) | Unit | 60 | 90 |
| Dimensions, W x D x H | mm | 515 x 1000 x 760 | |
| Weight | kg | 182 | 183.5 |
| Color | N/A | Black | |
| Protection degree, IEC (60529) | N/A | IP20 (front door and back door is open or closed) | |

## 7.4 Electrical Characteristics (Input Rectifier)

Table 7-4: Rectifier AC input (mains)

| Rated power (kVA) | Unit | 20~60 | 30~90 |
|---|---|---|---|
| Rated AC input voltage | Vac | 380/400/415 (3-phase and sharing neutral with the bypass input) | |
| Input voltage tolerance | Vac | 305 ~ 477; 304 ~ 208 (output derated below 70%) | |
| Frequency | Hz | 50/60 (tolerance: 40Hz ~ 70Hz) | |
| Power factor | kW/kVA,<br>full load (half load) | 0.99 (0.98) | |
| Harmonic current distortion | THDI% FL | <3 | |

## 7.5 Electrical Characteristics (Intermediate DC Circuit)

Table 7-5: Battery

| Intermediate DC circuit | | | |
|---|---|---|---|
| Model | | E-60 | E-90 |
| Rated power (kVA) | Unit | 60 | 90 |
| Number of lead-acid cells | Nominal | 216 (6 cells x 36 12V battery block) | |
| | Maximum | 240 (6 cells x 40 12V battery block) | |
| | Minimum | 192 (6 cells x 32 12V battery block) | |
| Float voltage | V/cell | 2.3V/cell<br>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 | 2.35V/cell<br>Constant current and constant voltage charge mode | |
| EOD voltage | V/cell | 1.67V/cell | |
| Battery charge | V/cell | Limit current and constant voltage charge mode<br>Floating Voltage 2.3V/cell<br>Boost charging 2.35V/cell | |
| Battery charging power[1] max. current | A | 6 / per power module (adjustable) | 8 / per power module (adjustable) |
| Note:<br>1. At low input voltage, the UPS recharging capability increases while load decreases (up to the maximum capacity indicated). | | | |

## 7.6 Electrical Characteristics (Inverter Output)

Table 7-6: Inverter output (to critical load)

| Rated power (kVA) | Unit | 20 ~ 60 | 30 ~ 90 |
|---|---|---|---|
| Rated AC voltage[1] | Vac | 380/400/415 (three-phase four-wire, with neutral reference to the bypass neutral) | |
| Frequency | Hz | 50/60 Auto Selectable | |
| Overload | % | 105%~110% for 60min<br>110%~125% for 10min<br>126%~150% for 1min<br>>150% for 200ms | |
| Neutral current capability | % | 170% | |
| Steady state voltage stability | % | ±1 (balanced load), ±2 (100% unbalanced load) | |
| Total harmonic voltage | % | <1 (linear load), <4 (non-linear load3) | |
| Synchronization window | | +/- 1Hz, +/- 2Hz, +/- 4Hz (default: 4Hz) | |
| Note:<br>1. Factory setting is 400V. 380 or 415V is selectable by maintenance engineer. | | | |

## 7.7 Electrical Characteristics (Bypass Mains Input)

Table 7-7: Bypass mains input

| Rated power (kVA) | Unit | 30 ~ 90 | 20 ~ 60 |
|---|---|---|---|
| Rated AC voltage1 | Vac | 380/400/415 (Three-phase four-wire, sharing neutral with the rectifier input and providing neutral reference to the output) | |
| Rated current | A | 30U for 60KW ➔ 118, 380V / 113, 400V / 108.5, 415V<br>30U for 90KW ➔ 177, 380V / 169, 400V / 162, 415V | |
| Overload | % | 105%~110% for 60min<br>110%~125% for 10min<br>126%~150% for 1min<br>>150% for 200ms | |
| 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: ≤20ms | |
| Bypass voltage tolerance | %Vac | Upper limit: +10, +15 or +20, default: +15<br>Lower limit: -10, -20, -30 default: -20<br>(delay time to acceptable steady bypass voltage: 10s) | |
| Frequency Range | Hz | +/- 1Hz, +/- 2Hz, +/- 4Hz (default: 4Hz) | |
| Note:<br>1. Factory setting is 400V. 380 or 415V is selectable by maintenance engineer. | | | |