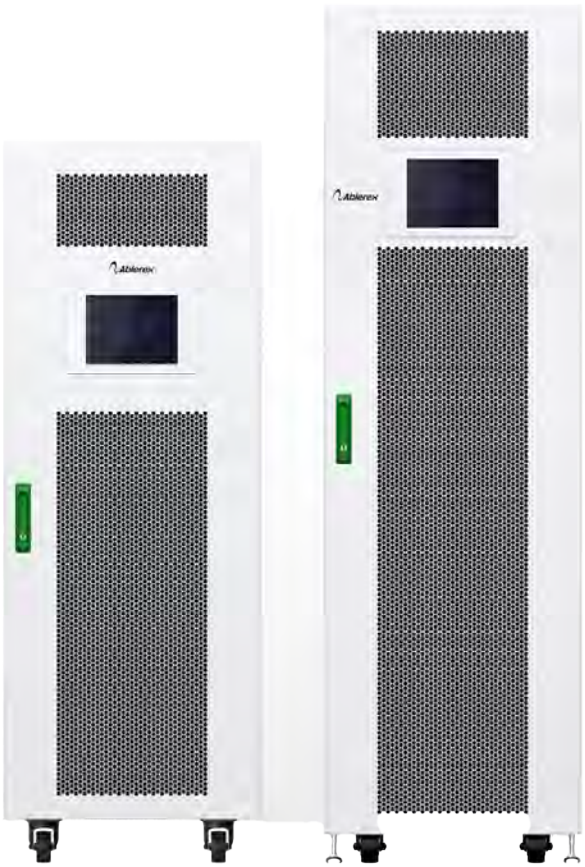
User Manual



Modular Online UPS
TAURMHL70K-SA & TAURMHL140K-SA
70KW Power Module

Uninterruptible Power Supply System

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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 and must not be used 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 must be in an environmentally 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 to the load even when disconnected from the utility power. Only after disconnecting the utility and DC power should authorized service personnel 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 type and number of sealed, lead-acid batteries.
- Do not open or mutilate the battery. Released electrolyte is harmful to the skin and eyes and may be toxic.

1.5 Recycling the used battery

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.

CAUTION：

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTION.

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 is found, report it to the carrier immediately.
2. Verify the product label is correct.
3. If the equipment needs to be returned, carefully repack the equipment using the original packing material.

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 (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 through ventilation holes on the cabinet front door and exits through the cabinet top cooling fans. 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 below 40°C and humidity within 90%. If necessary, install a system of room extractor fans to keep temperature below 40C.
6. Air filters are necessary if the UPS operates in a dusty environment.
7. If an external battery cabinet is used, it is recommended that the external battery cabinet is located right next to the UPS cabinet. We recommend the following clearances:
   - Keep a clearance of 100cm from the top of the UPS for maintenance, wiring and 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:
   - Keep CO2 or dry powder fire extinguishers near the installation area.
   - Install the UPS in an area where walls, floors and ceilings were constructed with 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 installation area. Refer to Figure 2-1. Please make sure the bearing capacity of forklift is sufficient.
2. Please follow the orders in Figure 2-2 to remove carton and foams.

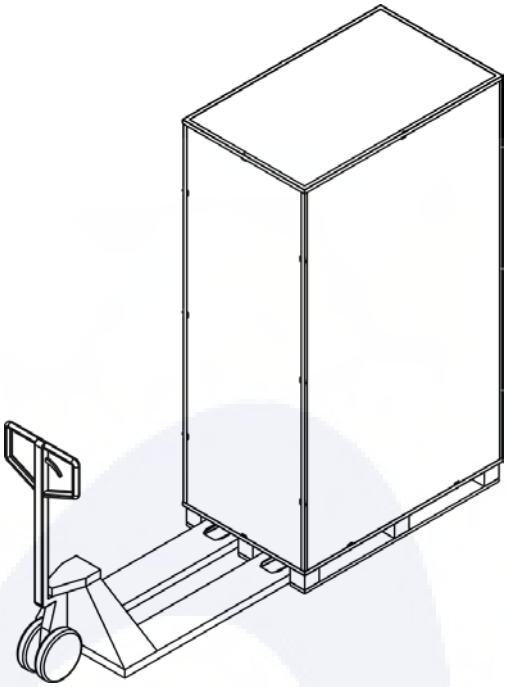


Figure 2-1

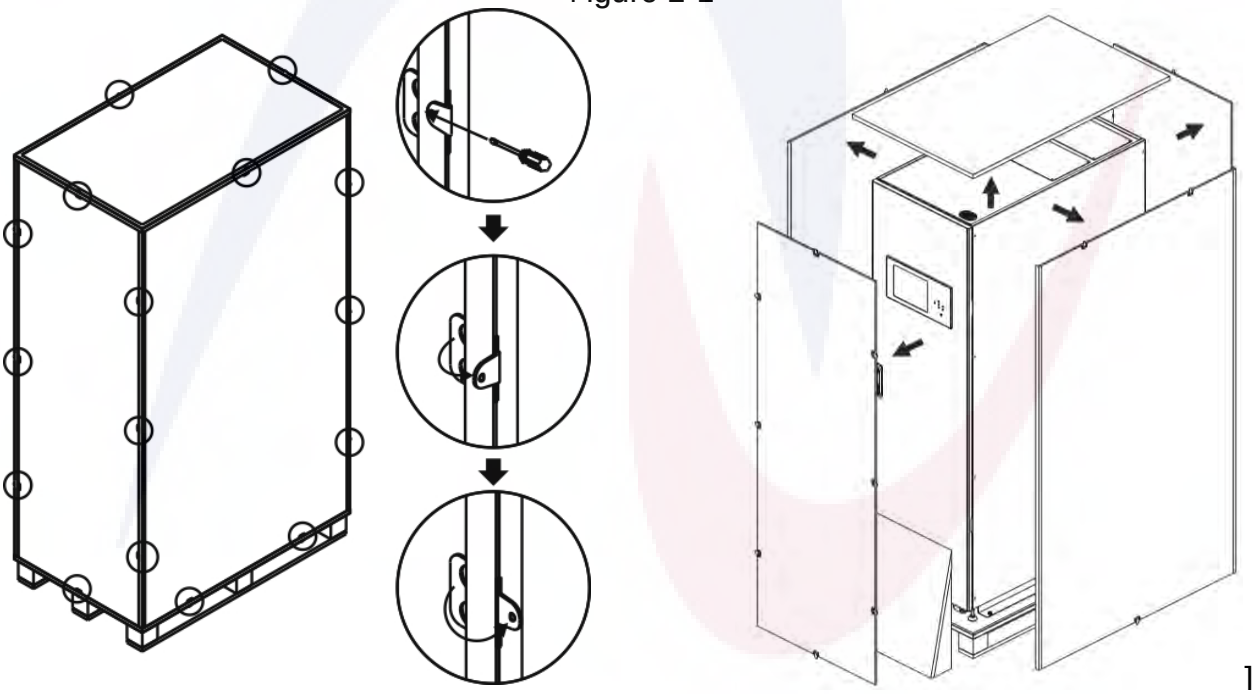


Figure 2-2

3. Put the ramp in the front of the cabinet. Refer to Figure 2-3.

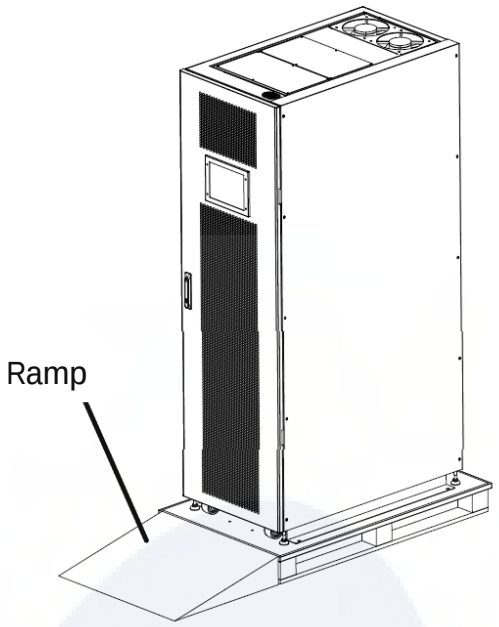


Figure 2-3

4. Remove 2 fixing cabinet plates and loosen leveling feet by rotating them counterclockwise. Then, move the cabinet from the pallet. Refer to Figure 2-4.
5. To fix the cabinet in position, simply rotate leveling feet clockwise. Refer to Figure 2-5.

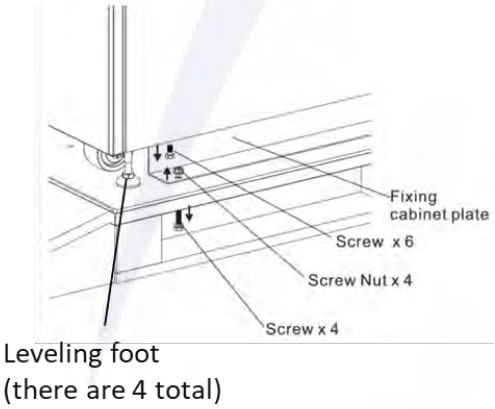


Figure 2-4

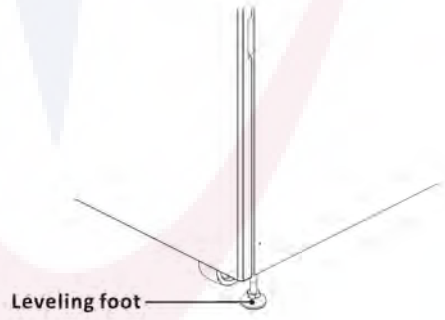


Figure 2-5

2.4 Moving the Cabinet

⚠ Warning
The UPS is fixed on the pallet with 2 fixing cabinet plates. When removing them, 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 an 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 third 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 bearing capacity of any handling equipment.
5. At the bottom of the UPS, the four casters help you move the UPS to a designated area. Before you move the UPS, please turn the four leveling feet counterclockwise to raise them off the ground. This protects the leveling feet from being damaged.
6. To fix the cabinet in position, simply rotate leveling feet clockwise.
7. One can re-use the 2 fixing cabinet plates to fix the cabinet firmly to the ground. Refer to Figure 2-6.

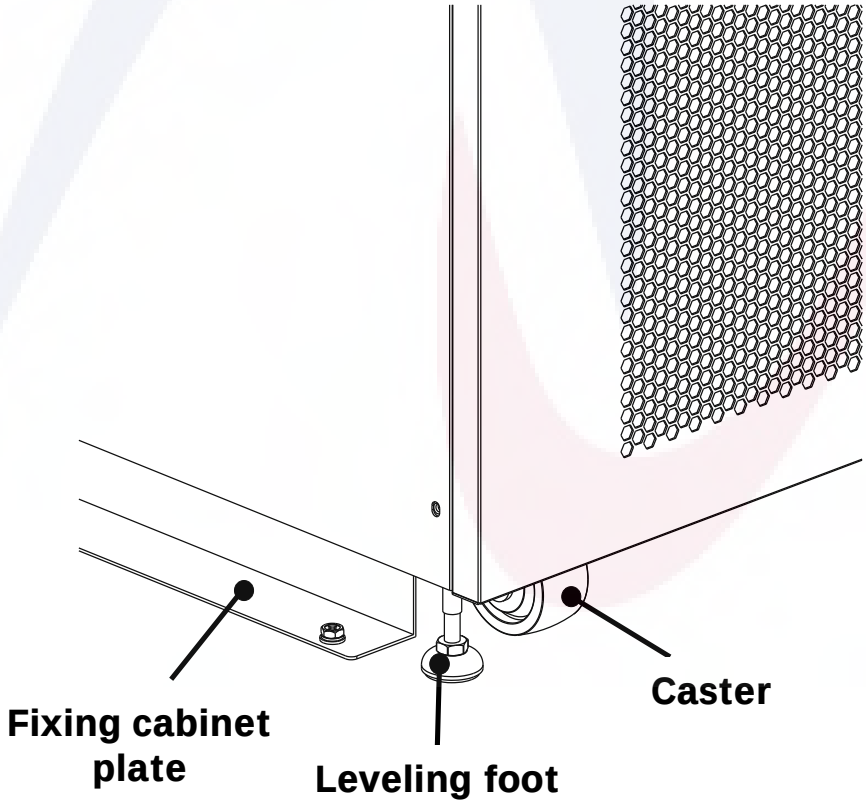
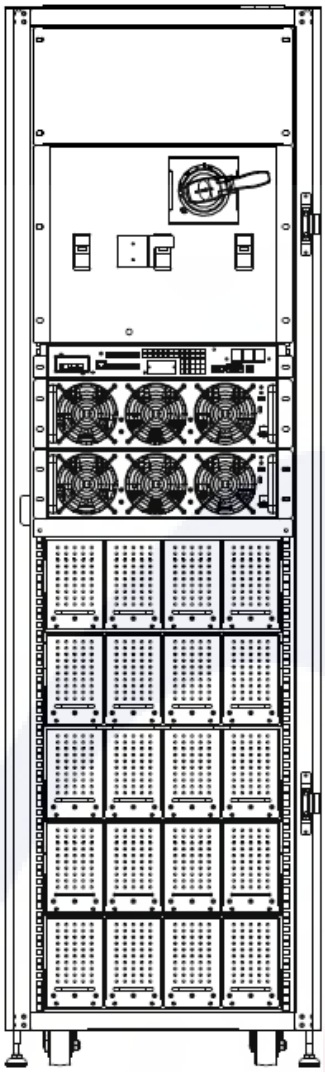
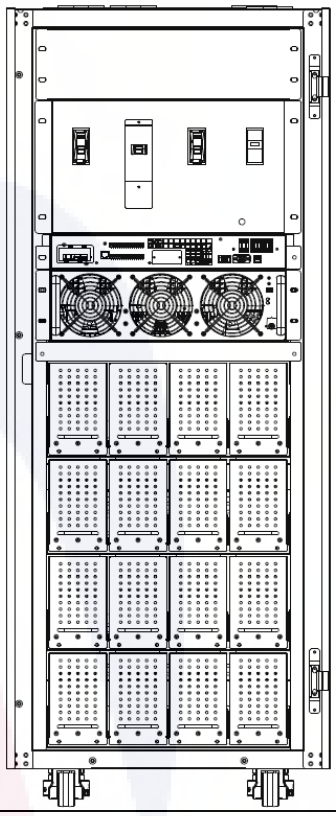


Figure 2-6

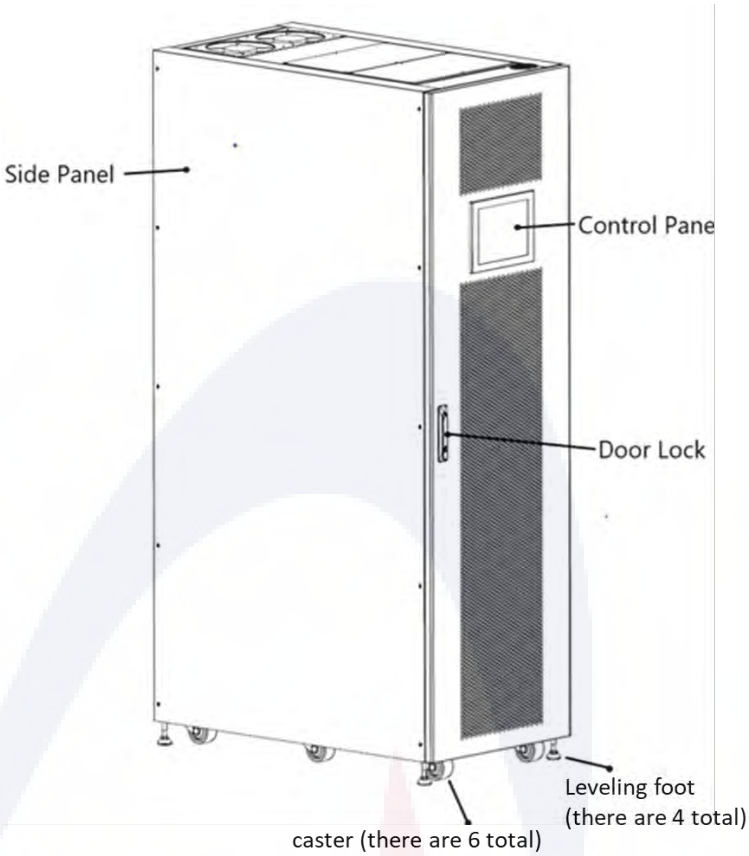
2.5 UPS Cabinet

-

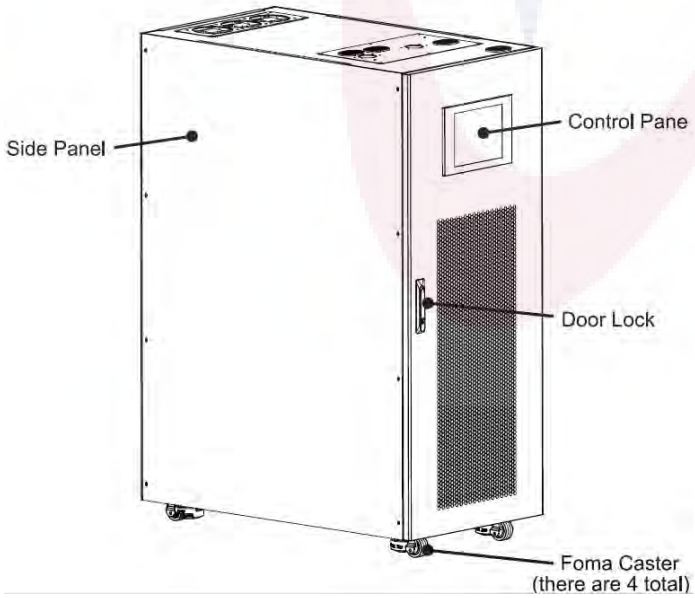
Model	140K	70K
Drawing		
Cabinet Height	42U	33U
Monitor Module	1	1
Max. Power Module	2	1
Max Power	140kVA	70kVA

2.6 Exterior

On the UPS front door, there are control interface (LCD Panel) and door lock.
The side panels are lockable. The casters at the bottom of the UPS cabinet can be used to move the UPS over a short distance. There are four leveling feet to fix and stabilize the UPS cabinet on the ground. Refer to Figure 2-7.
Inside the cabinet, there are Breakers, a Monitor Module and Power Module slots. All wiring terminal blocks are in the front of cabinet.



140K

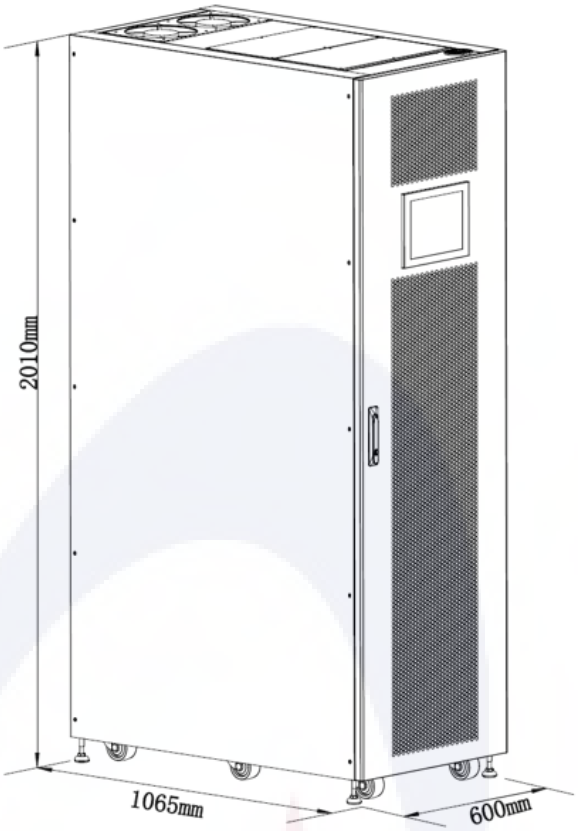


70K

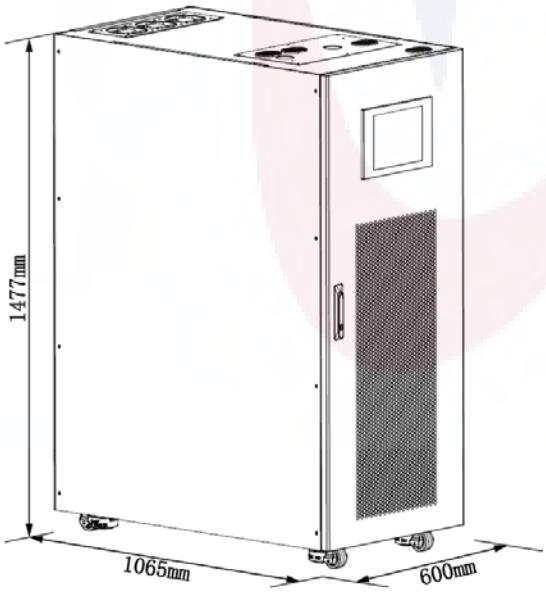
Figure 2-7 Exterior

2.6.1 Mechanical Data

Dimensions		
Width	Depth	Height
600mm	1065m	2010mm
600mm	1065m	1477mm



140K

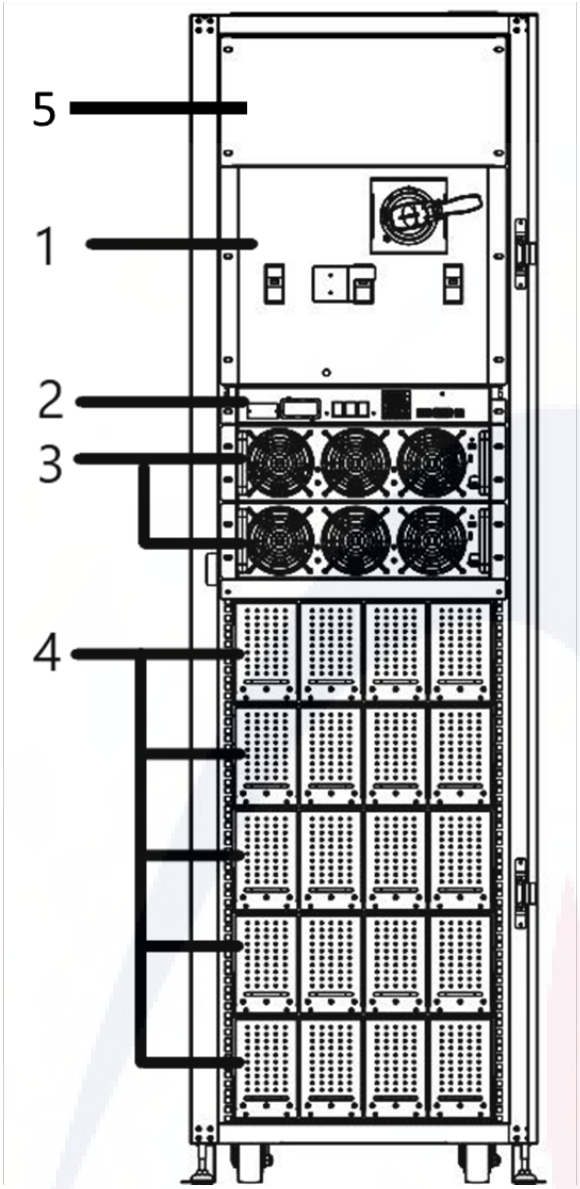


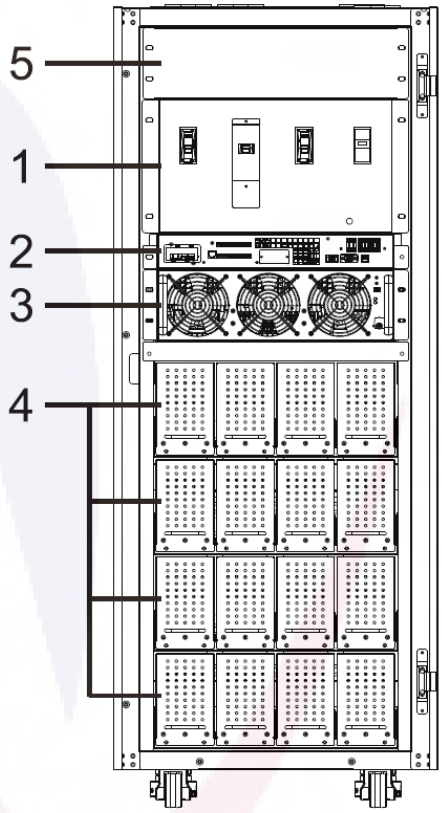
70K

Figure 2-8 Dimensions

2.6.2 Front View

Unlock and open the front door and you will see a top cover (terminal blocks are behind it), the Main Breaker (Q1), Maintenance Breaker (Q2), Output Breaker (Q3), Monitor Module, Power Module slots and Battery Module slots.





140K
1. Breakers
2. Monitor module
3. Power modules
4. Battery modules
5. Top cover(terminals block are behind it

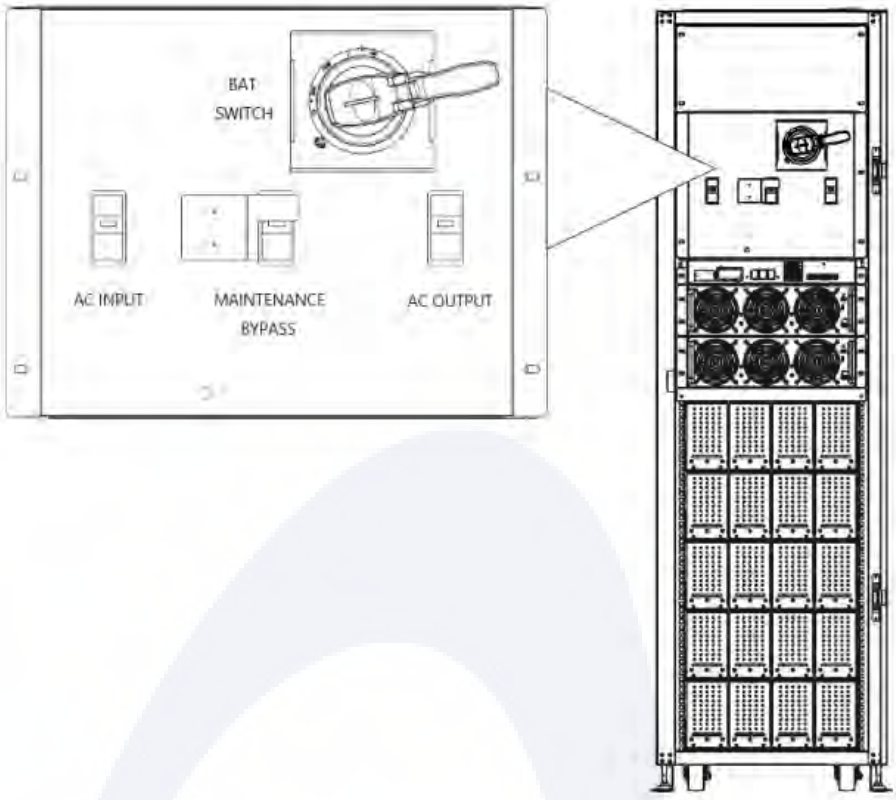
70K
1. Breakers
2. Monitor module
3. Power module
4. Battery modules
5. Top cover(terminals block are behind it

Figure 2-9 Front View

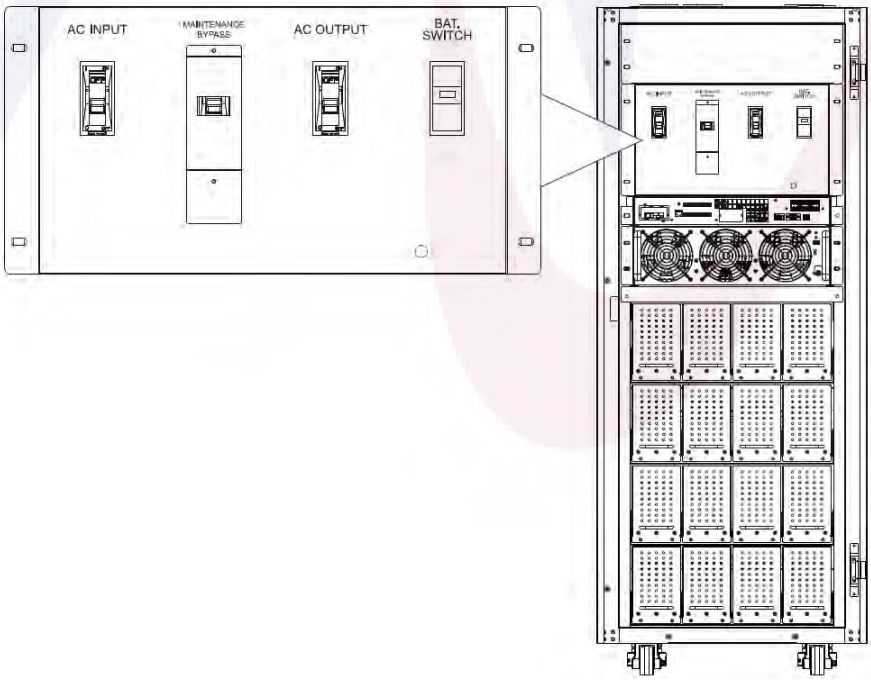
2.7 Internal Mechanisms

2.7.1 Breakers

There are four breakers: Main Breaker, Maintenance Breaker, Output Breaker and Battery Breaker.



140K



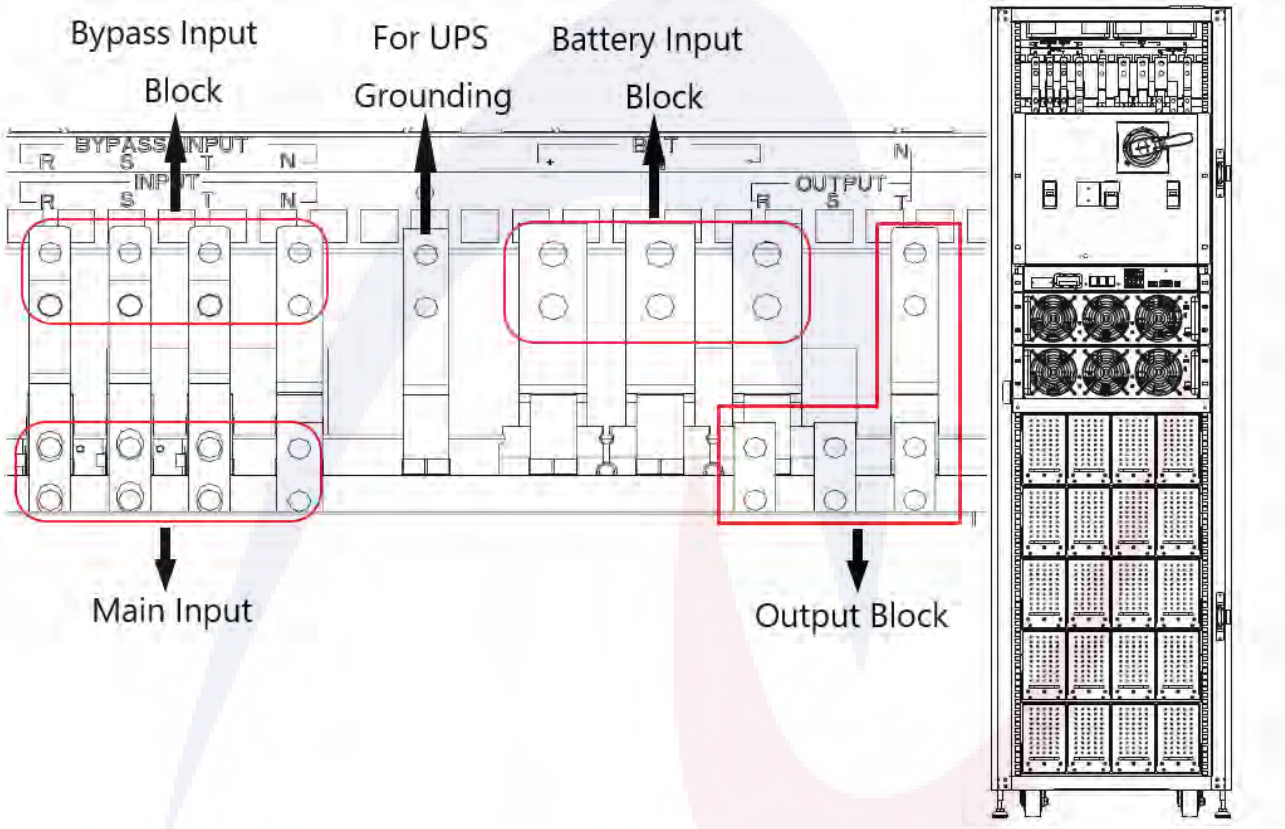
70K

Figure 2-10 Breakers (front view)

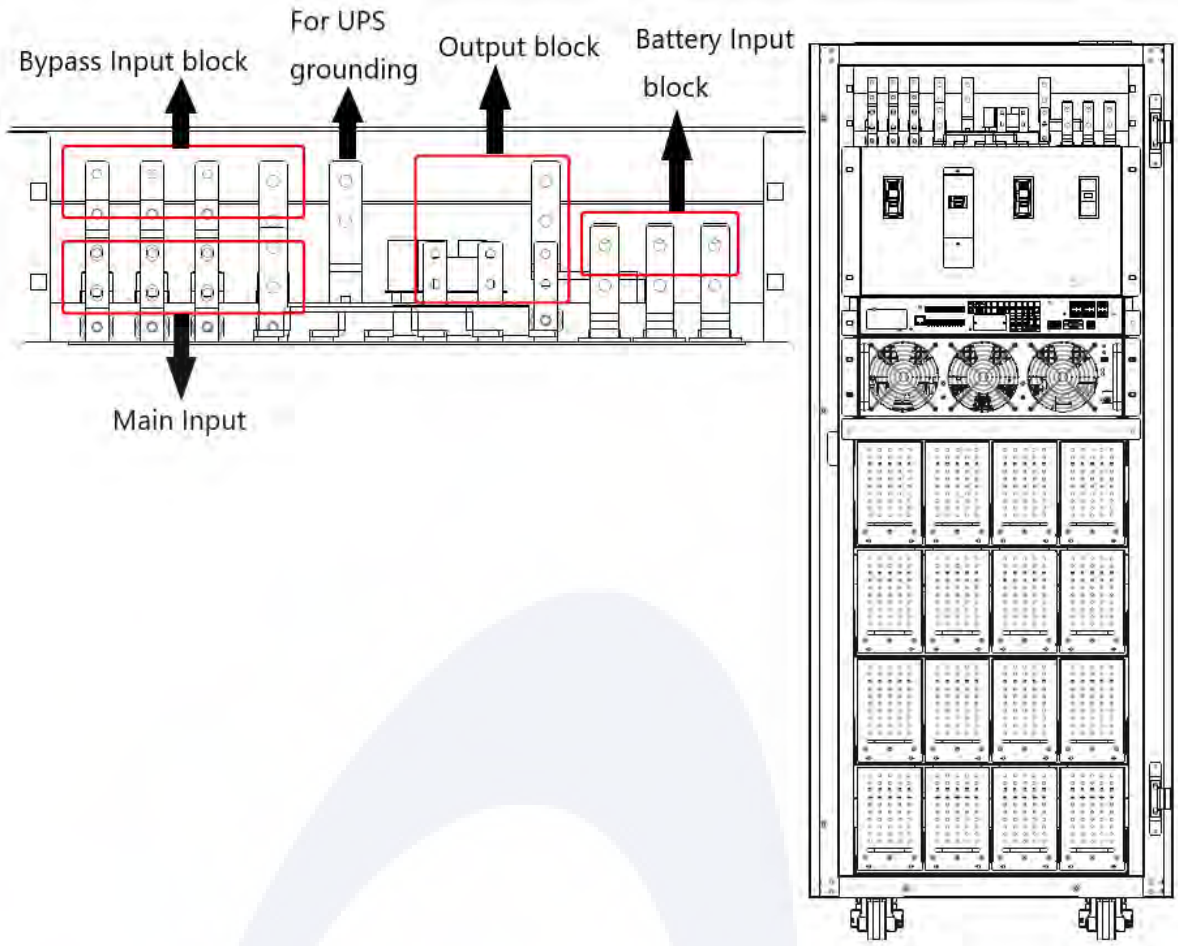
2.7.2 Wiring Terminal Blocks

Open the UPS's front door and remove the top cover, and you will see the wiring terminal blocks. For UPS cabinet wiring, please refer to Figure 2-11.

No.	Item	Function	Description
①	Output Block	Connects the loads	Includes R, S, T
②	Bypass Input Block	Connects bypass AC source	Includes R, S, T
③	Main Input Block	Connects main AC source	Includes R, S, T
④	For UPS Grounding	For UPS grounding	Includes one grounding terminal.
⑤	Battery Input Block	Connects an external battery cabinet	Includes Positive (+), Negative (-) and Neutral (N) terminals.



140K



70K

Figure 2-11 Terminal Blocks

2.8 Control Panel

2.8.1 LCD Display

The touch screen color LCD display shows the UPS' operation mode, In addition, a user can also view measurement, parameters, versions of firmware , warnings and etc. on the LCD , as well as controlling the UPS and setting various parameters. For detailed information, please refer to Chapter 4.

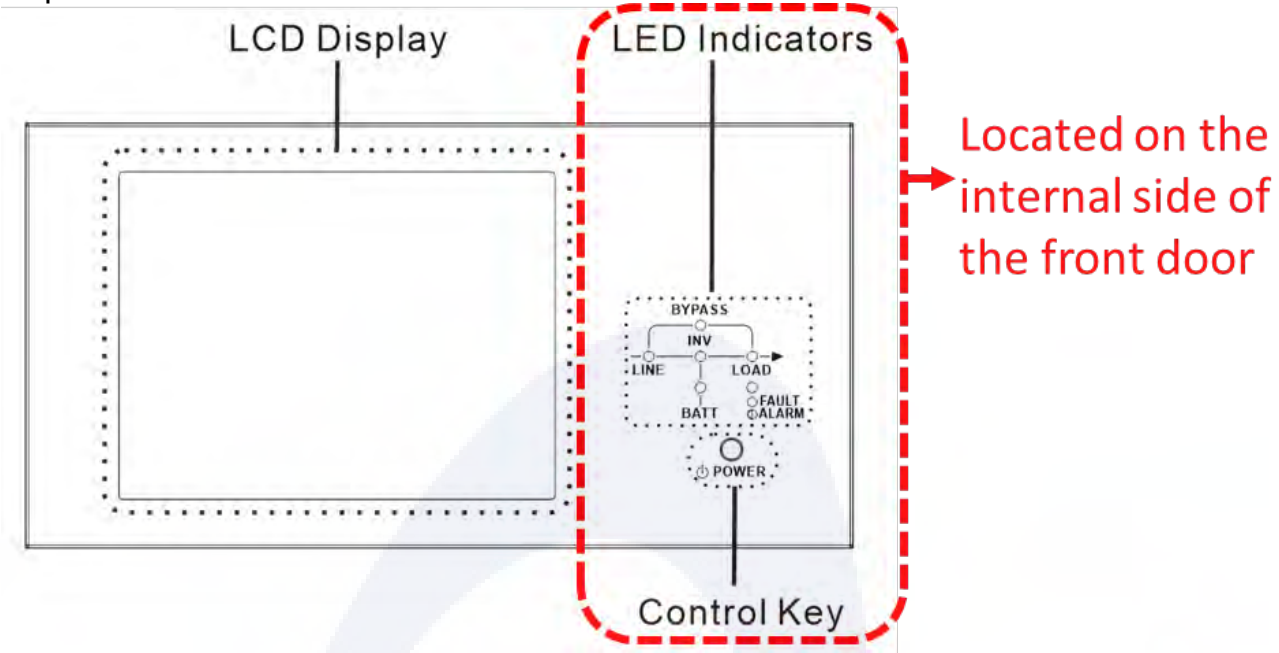


Figure 2-12 Control Panel

2.8.2 LED Indicators

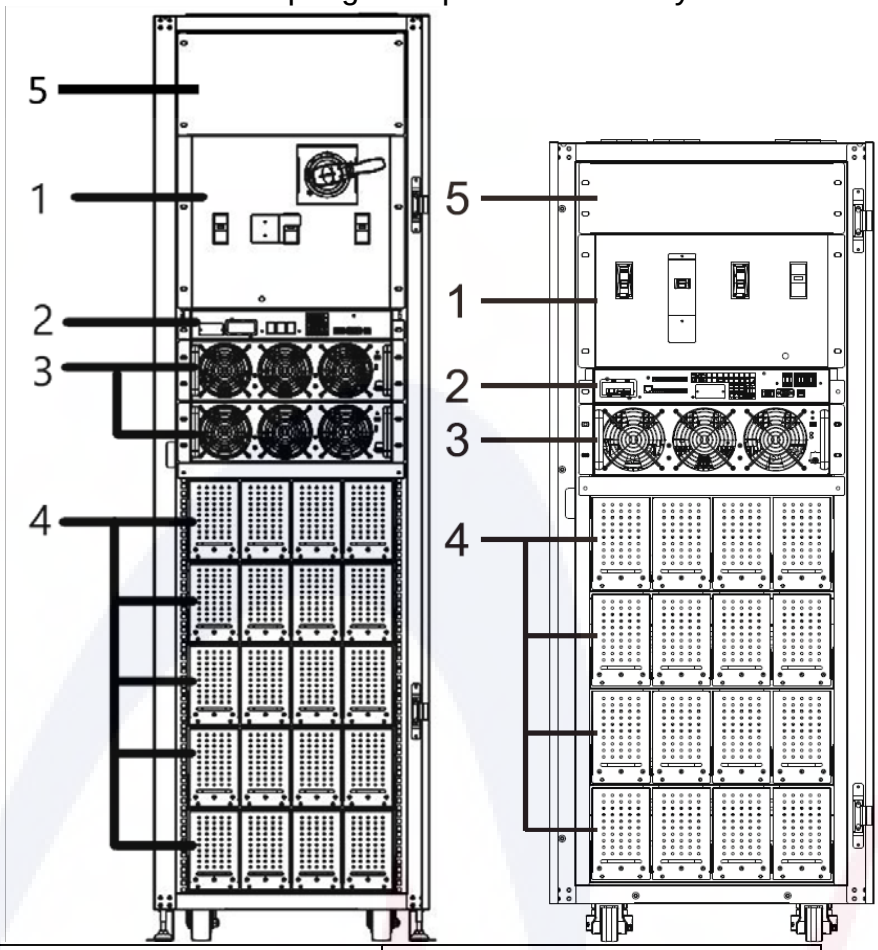
LED	Color	Status	Definition
LINE	Green	On	Input source is normal.
		Flashing	Main Input source is abnormal.
		Off	No input source
BYPASS	Yellow	On	Load on Bypass.
		Flashing	Bypass Input source is abnormal.
		Off	Bypass circuit is not operating.
LOAD	Green	On	The UPS is outputting power to the load.
		Off	The UPS is not outputting power to the load.
INV	Green	On	Load on inverters.
		Off	Inverter circuit is not operating.
BATTERY	Red	On	UPS is in battery mode.
		Flashing	Battery voltage is low.
		Off	UPS isn't in battery mode and battery is fully charged.
FAULT/ ALARM	Red	On	UPS fault.
		Flashing	UPS alarm.
		Off	There is neither a fault nor an alarm

2.8.3 Control Key

Turn on or turn off the UPS.

2.9 Introduction of Modules

The modular and hot-swappable design of the Power Module makes it a highly cost-effective solution to meet your power requirement. The number of Power Modules installed in the UPS can be based on the initial needs. Once the power requirement changes, you can easily change the number of Power Modules without interrupting the operation of the system.



140K	70K
1.breakers	1.breakers
2.monitor module	2.monitor module
3.power modules	3.power module
4.battery modules	4.battery modules
5.top cover(terminals block are behind it	5.top cover(terminals block are behind it

Figure 2-13 Front View

2.9.1 Monitor Module

The Monitor Module is installed at factory , which includes communication interfaces. For detailed information, please refer to Chapter 5.

No.	Item	Description
①	SNMP Slot	An optional card such as an SNMP, AS400 or Modbus card can be inserted into this slot.
②	Extra SNMP Slot	This slot can insert an SNMP card of another size.
③	Dry contact ports	For detailed information, please refer to Chapter 5.
④		
⑤		
⑥		
⑦	LCD Port	This port connects to Control Panel by a cable installed at factory.
⑧	RS232 port	Local communication interface.
⑨	USB port	Local communication interface.
⑩	LED	Power light
⑪		
⑫	RJ45 to RS232 port	Local communication interface.

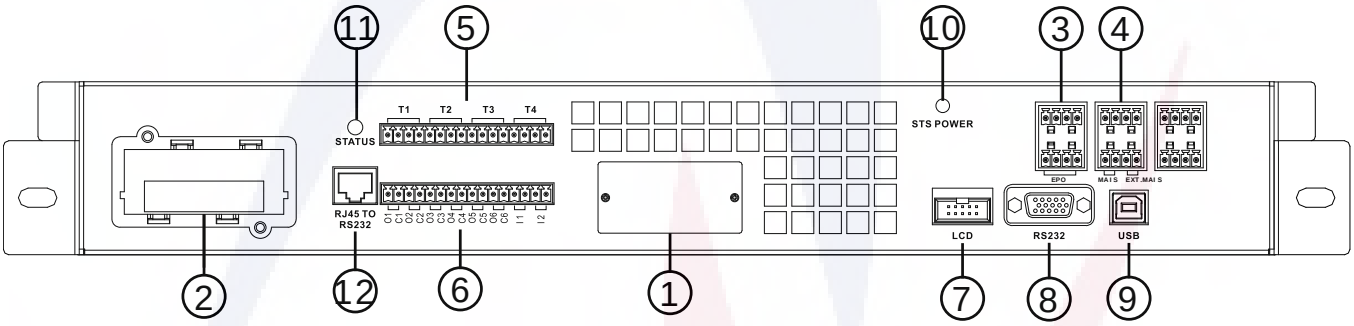


Figure 2-14 Monitor Module

2.9.2 Power Module

Each Power Module is shipped in its own package and installed during the UPS system installation. The capacity of each Power Module is 50KVA/50KW or 70kVA/70kW. It includes a power factor correction rectifier, a battery charger , an inverter , STS and control circuit.

No.	Item	Description	
①	Fan	These fans provide forced convection cooling. Cooling air enters the module through ventilation grills in front of the fans and exits through grills located in the rear of the module. Do not block the ventilation area.	
②	Ready Switch	Unlock it before removing the Power Module. Lock it when the Power Module is well installed. Then the Power Module can start to work.	
③	DIP Switches	There are five DIP switches for Power Module address ID setting. In the same cabinet, each Power Module ID MUST be exclusive. The setting method is shown in **Table 2-1**.	
④	Battery Start Button	When AC input is not available, use this button to start the UPS with battery power.	
⑤	FAULT LED	ON	The Power Module is in fault condition, or the Ready Switch is unlocked.
		ON/OFF 0.5 sec	The Power Module ID is set to the same as another Power Module in the system (IDs conflict).
⑥	RUN LED	ON	The Power Module works normally as a slave module.
		ON/OFF 0.5 sec	The Power Module works normally as a master module.
		ON/OFF 0.15 sec	CAN Bus communication fails.

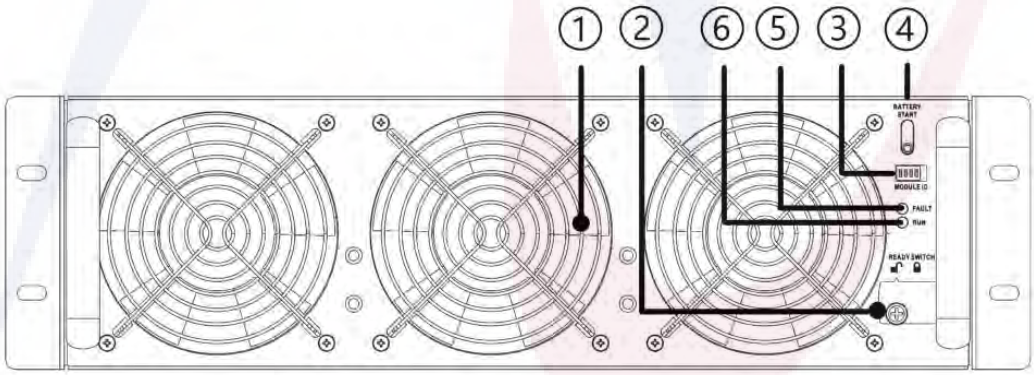


Figure 2-15 Power Module

RACK 1		RACK 2	
Module Address	DIP SWITCH	Module Address	DIP SWITCH
1		21	
2		22	
3		23	
4		24	
5		25	
6		26	
7		27	
8		28	
9		29	
10		30	
11		31	
12		32	
13		33	
14		34	
15		35	

Table 2-1 DIP switch setting and Module Address

Power Module ID Assignment

The Power Module address ID assignment is shown in **Table 2-1**. The DIP switches are mounted on the Power Module front panel, identified as ③ in Fig 2-15 .

The DIP switch positions are set at factory. It's not necessary to change them for single UPS(RACK 1) system application. But for Parallel UPS system application, please follow the instructions in Chapter 9 " UPS Installation for Parallel Rack System".

2.10 Power Cable

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

2.10.1 AC input and output nominal current and cable fixation force.

Power rating	50KVA	100KVA	70KVA	140KVA
Output Current (A)	60	84	120	168
Mains Input Current (A)	62	87	124	174
Bypass Input Current (A)	60	84	120	168
Fixation torque force (lb-in)	60	60	60	60

2.10.2 DC input nominal current and cable fixation force.

Power rating	50KVA	100KVA	70KVA	140KVA
DC Current (A)	110	154	220	309
Fixation torque force (lb-in)	60	60	60	60

2.11 Wiring

WARNING:

- Before connecting any wire, make sure the AC input and battery power are completely cut off.
- Make sure Main Breaker (Q1), Maintenance Breaker (Q2), Output Breaker (Q3) and battery breaker are all in the **OFF** position.
- The power cables MUST enter the cabinet from top of the cabinet. Or the cables will block the cooling ventilation and result in over temperature failure.

2.11.1 Installation Drawing

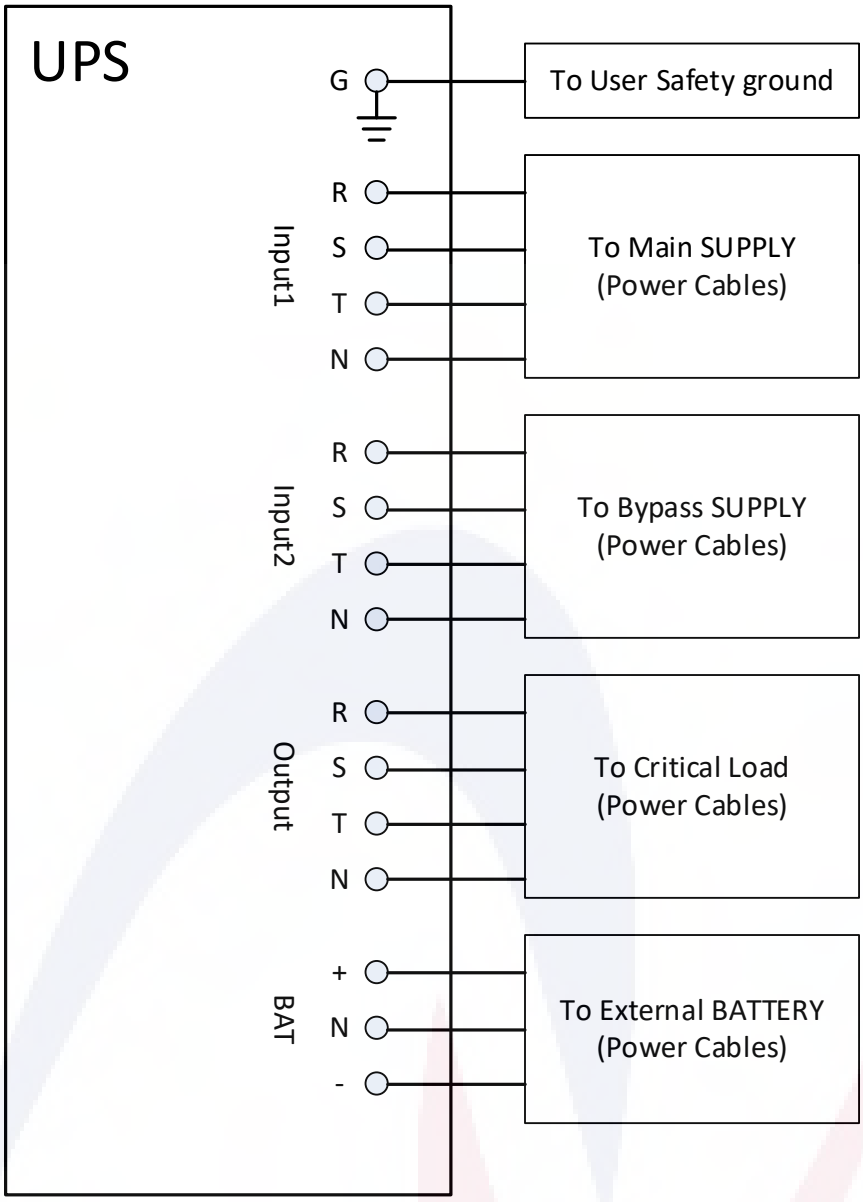


Figure 2-16 UPS Cabinet Wiring

2.11.2 AC source connection

UPS comes configured for single-input from the factory. Remove jumpers if feeding the UPS with dual inputs.

The sequence of three phases, R, S and T, must be connected accordingly. The wrong sequence will alarm a warning when the UPS is powered.

2.11.3 External Battery Cabinet Connection

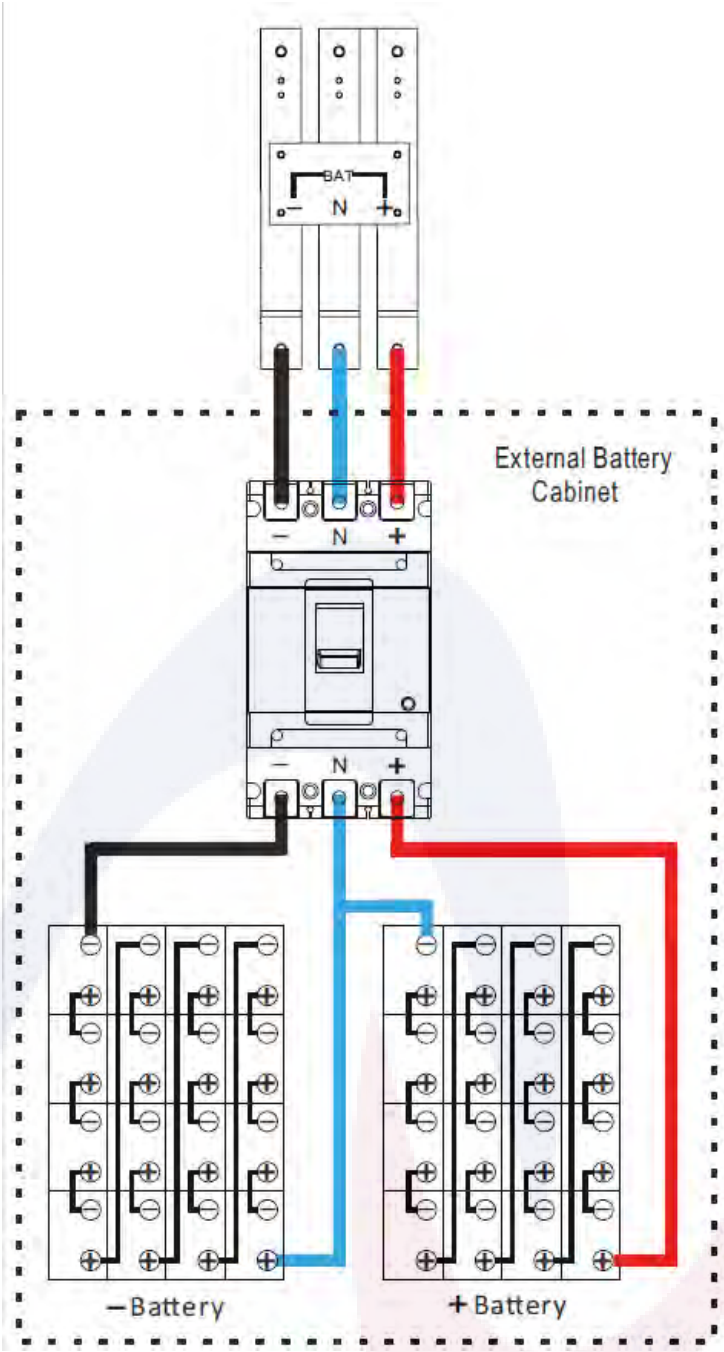


Figure 2-17 External Battery Cabinet Wiring

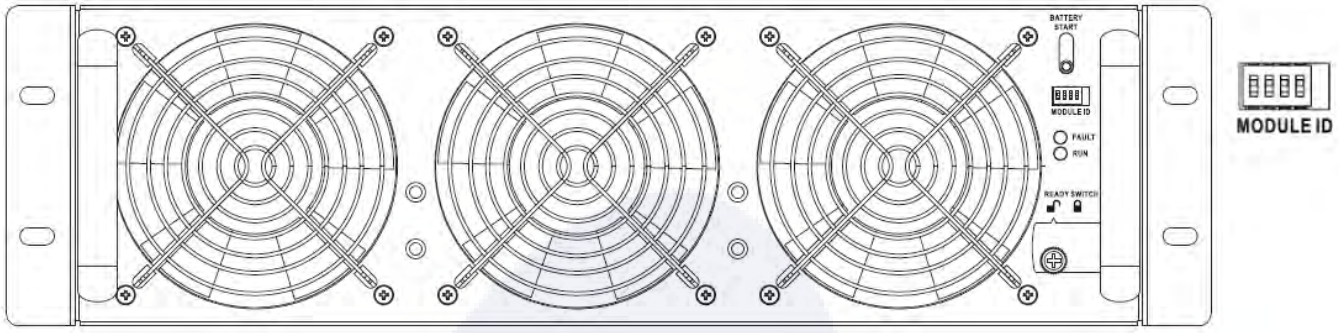
After the battery installation is completed, be sure to set up nominal battery voltage, battery capacity and maximum charging current on LCD. Otherwise, if battery setting is different from actual installation, the UPS will keep warning. Please refer to section 4.2.6.3 and **Table 4-9** for the details.

2.12 Power Module Installation

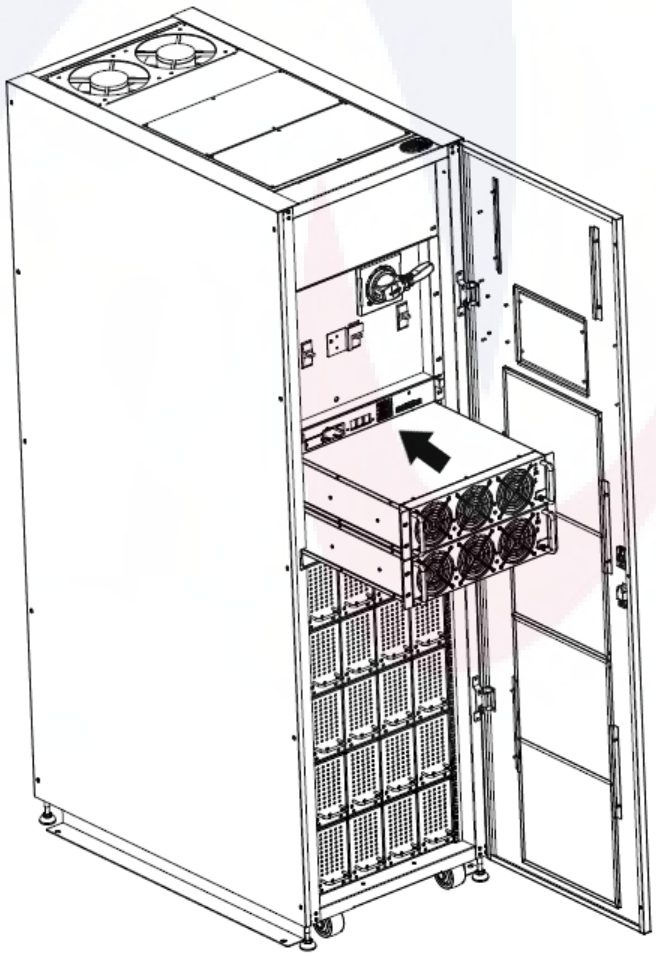
⚠ Warning
The weight of Power Module is over 30Kg. Therefore, at least two people are required for handling it.

2.12.1 Insert the Power Module

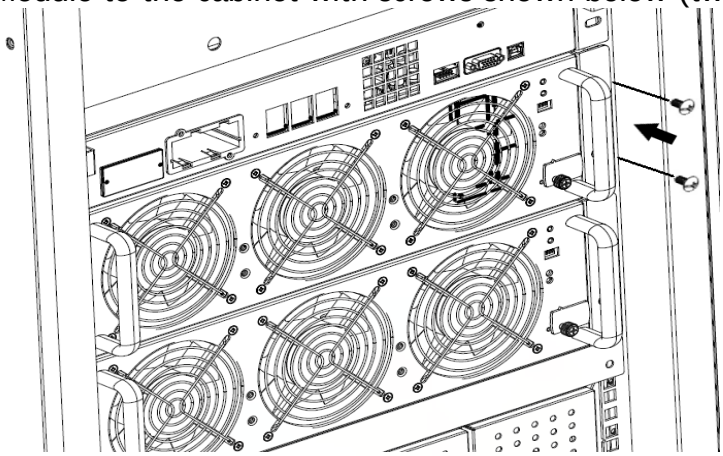
(1.) Adjust the DIP switch positions to set the different Module Address ID. Refer to **Table 2-1**.



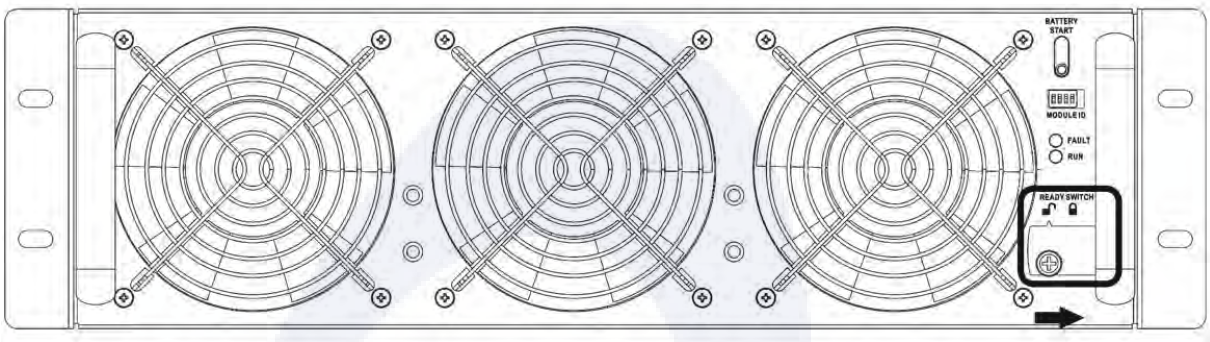
(2.) Switch the ready switch on the front panel of the module to the "🔓" position.
(3.) Two people insert the Power Module into an unoccupied slot.



(4.) Secure the Power Module to the cabinet with screws shown below (two on each side).



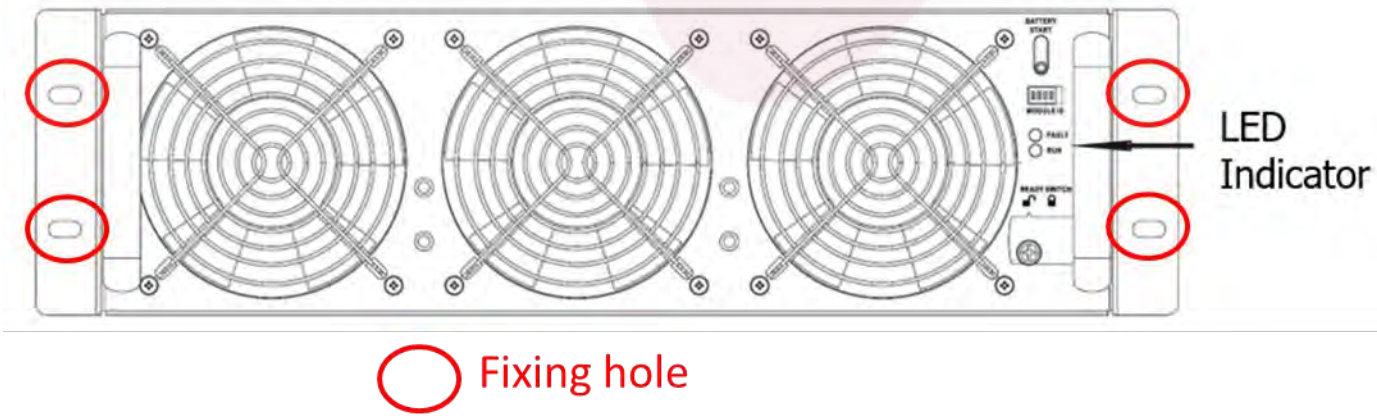
(5.) Move the ready switch to the "🔒" position.



2.12.2 Remove the Power Module

⚠ Warning
● Before removing any Power Module, make sure the remaining Power Modules can support the loads. ● At least one Power Module MUST stay in the UPS cabinet.

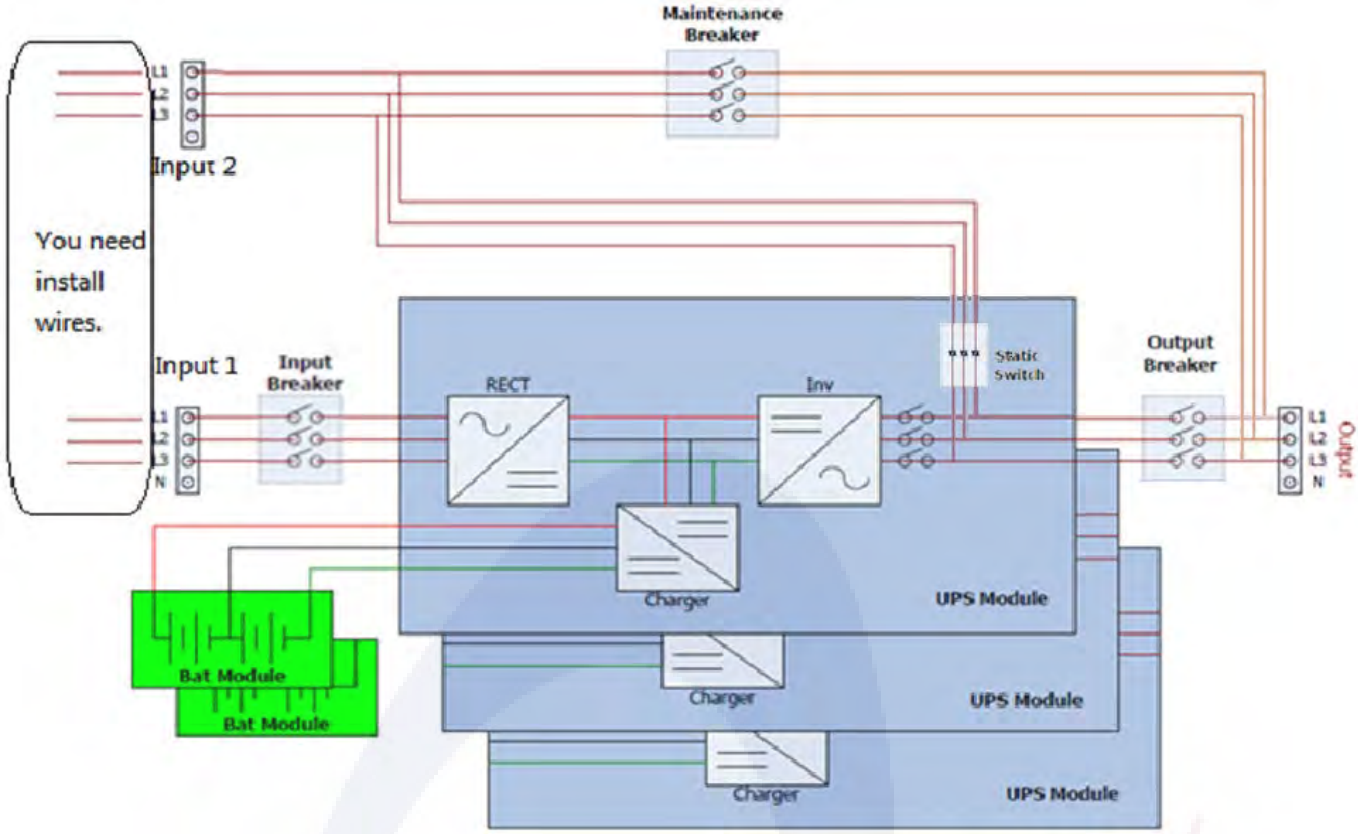
(1.) Switch the ready switch to the "🔓" position.
(2.) FAULT LED (RED) is lit to indicate the Power Module is turned off and disconnected from UPS system.



(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.

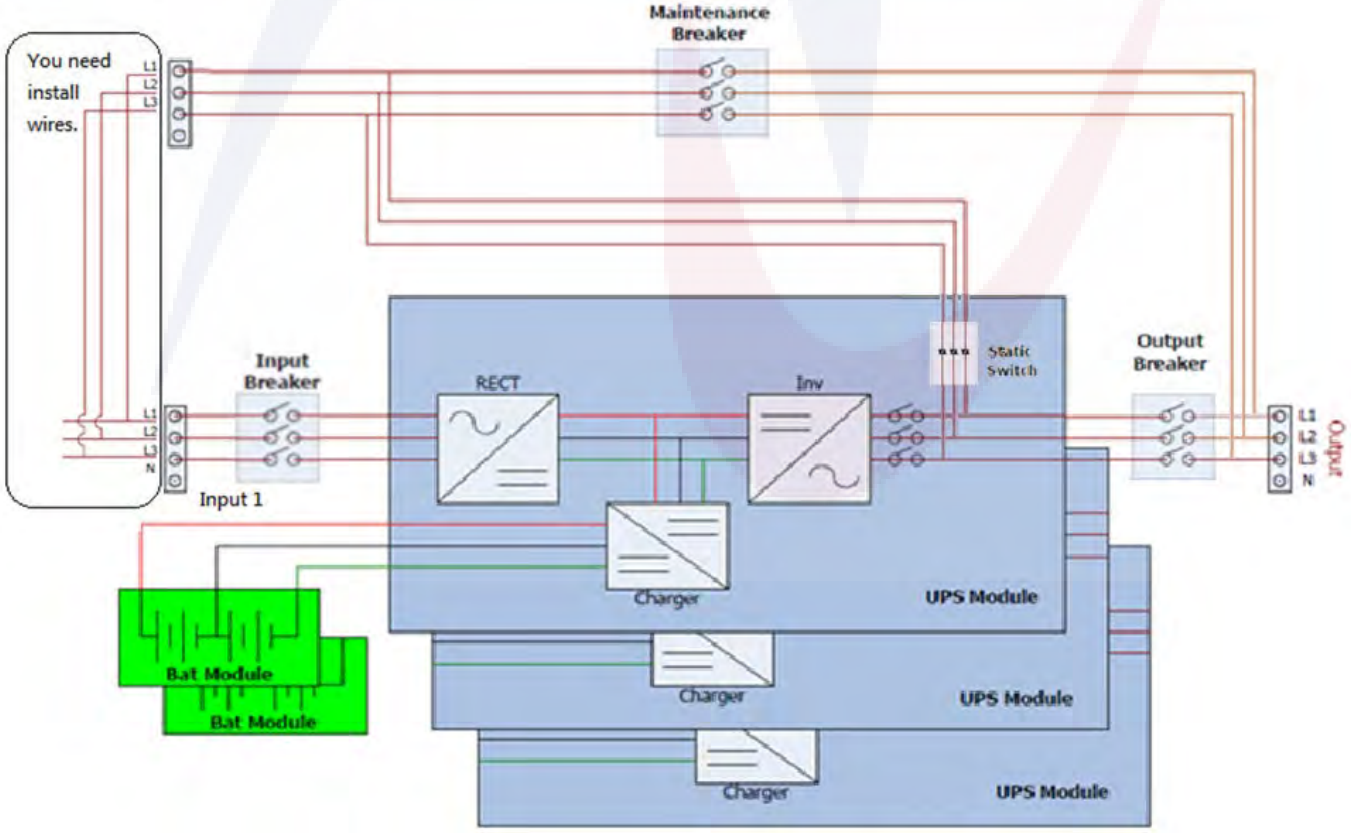
3. Operation Mode and UPS Operation

3.1 Block diagram of UPS



Wiring diagram for dual inputs

Figure 3-1



Wiring diagram for single input

Figure 3-2

3.2 Operation Mode

This modular UPS is a three-phase, four 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
- Maintenance Bypass Mode (manual bypass)

3.2.1 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 in this mode.

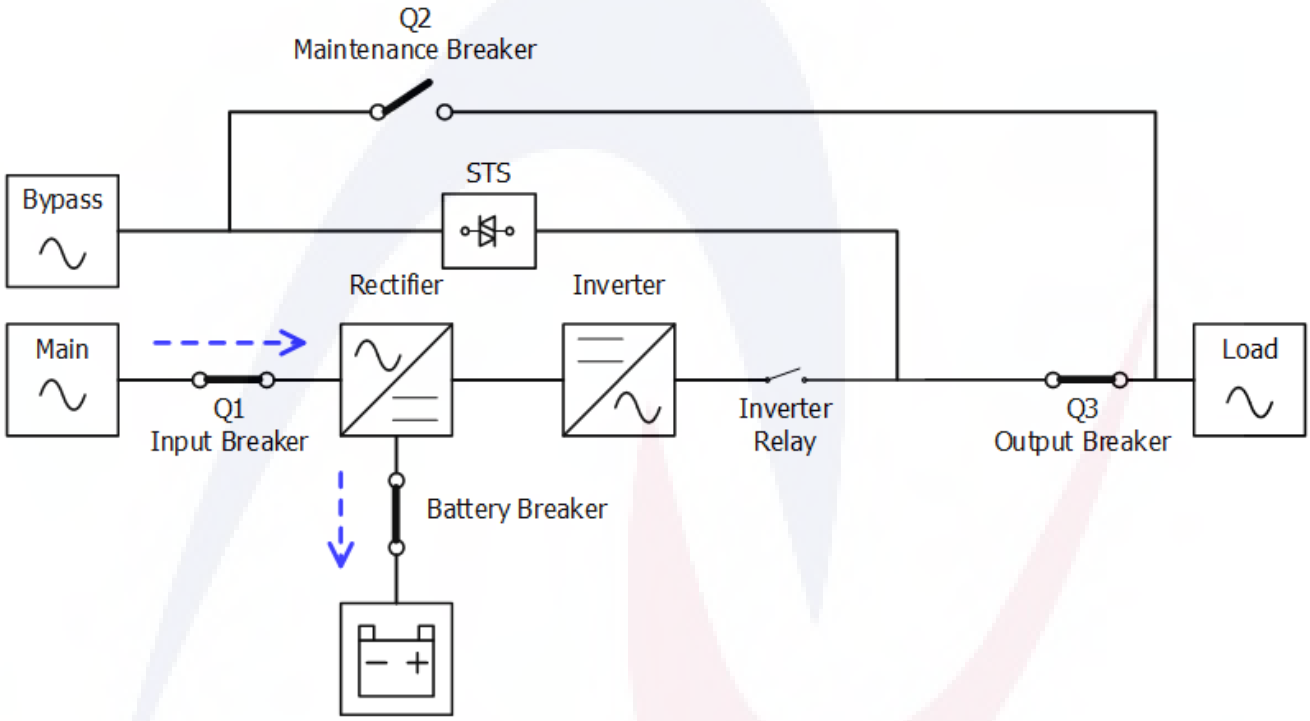


Figure 3-3 : Standby Mode Diagram

3.2.2 Line Mode

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

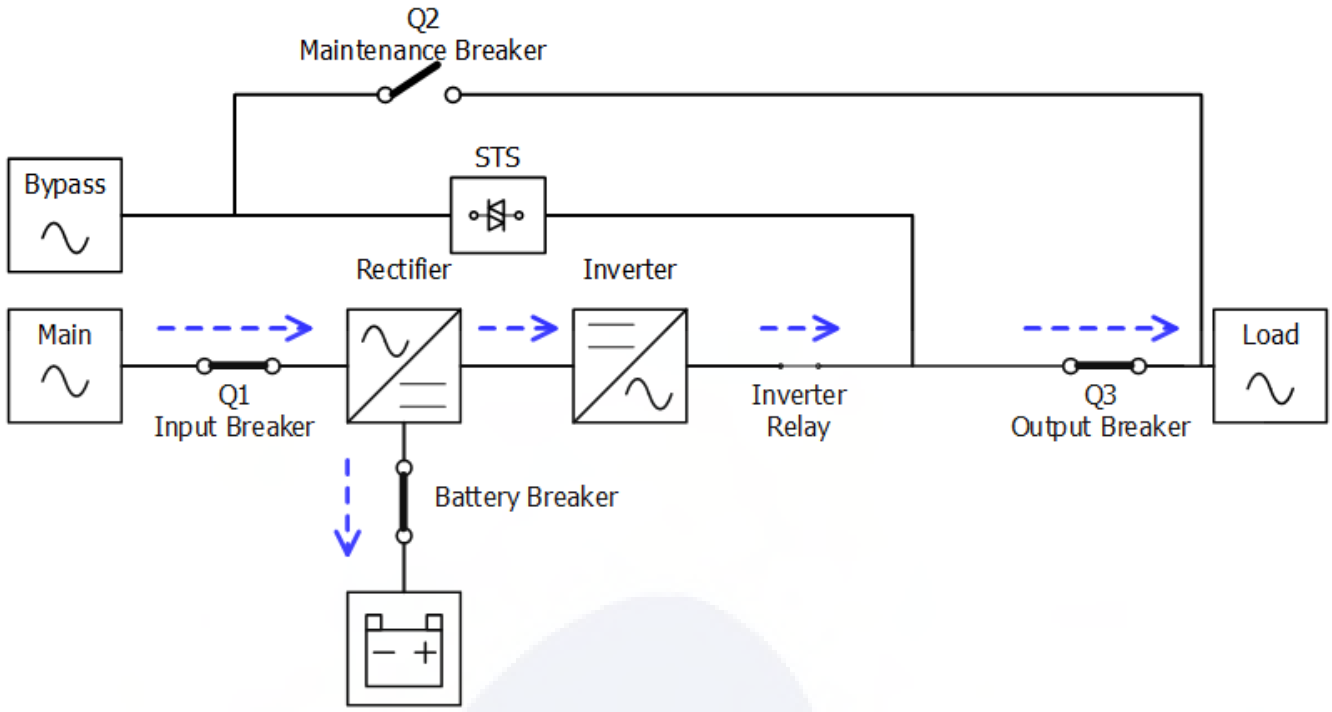


Figure 3-4 : Line Mode Diagram

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 load upon utility power 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 stable pure sinewave AC power to the load.

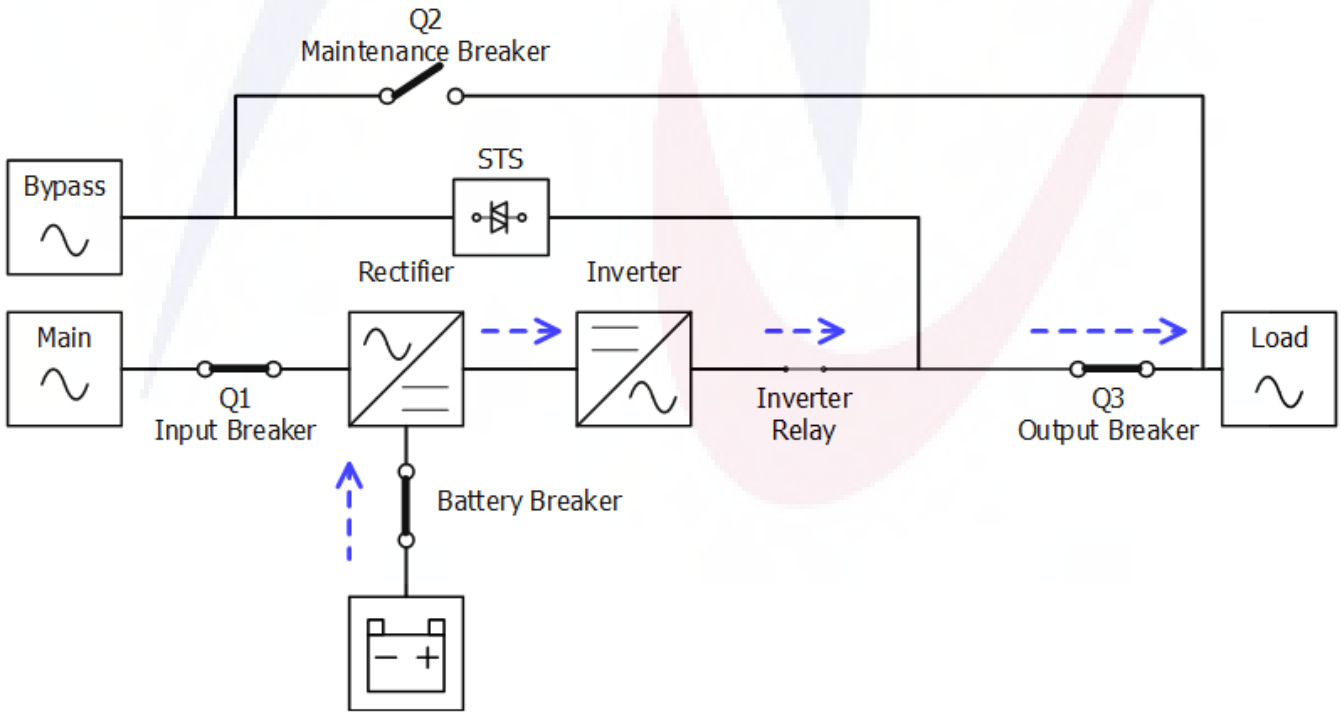


Figure 3-5 : Battery Mode Diagram

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.

While UPS operates in line mode, if the UPS detects something abnormal (over-temperature, overload, and etc.), the UPS will transfer to bypass mode, i.e., disconnect inverter output from the load and supply power to the load through the static transfer switch. Once the abnormal condition is gone, the UPS will revert to line mode

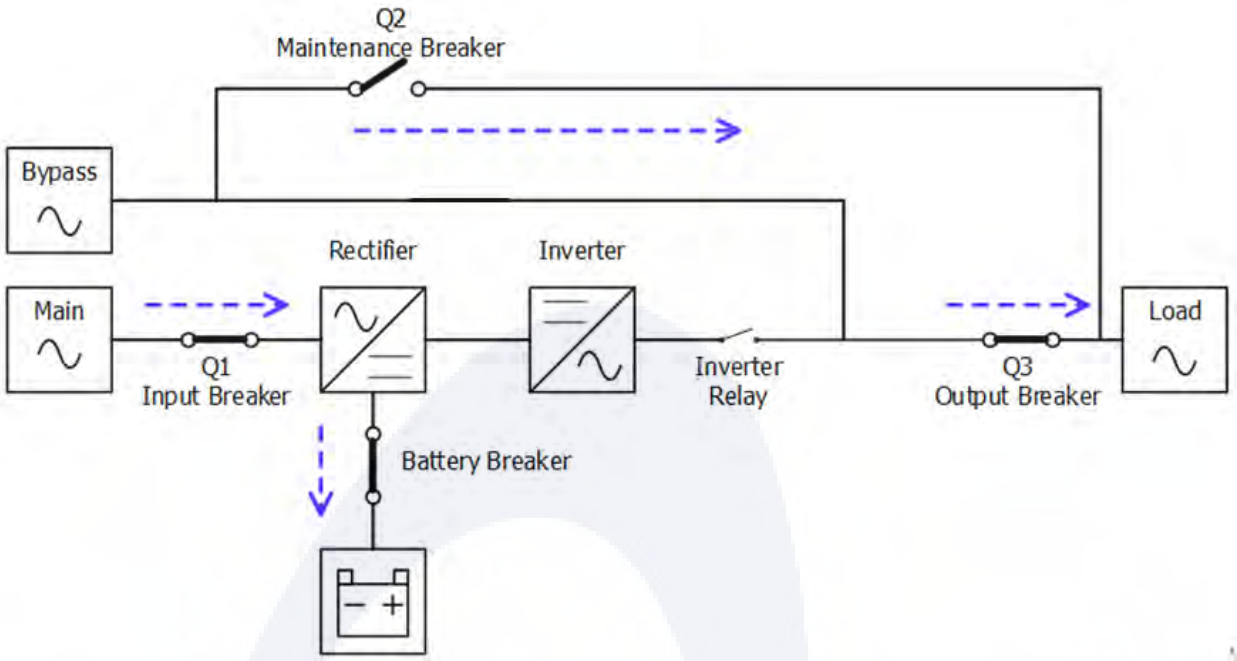


Figure 3-6 : Bypass Mode Diagram

3.2.5 ECO Mode

The ECO Mode is enabled through the setting menu of LCD panel. In ECO mode, the load is powered through the static transfer switch when the bypass input voltage and frequency are within the acceptable ranges. If the bypass input is out of range, the UPS will transfer to line mode and power the load with inverter output . In order to shorten the transfer time, the rectifier and the inverter are both running when the UPS is in ECO mode.

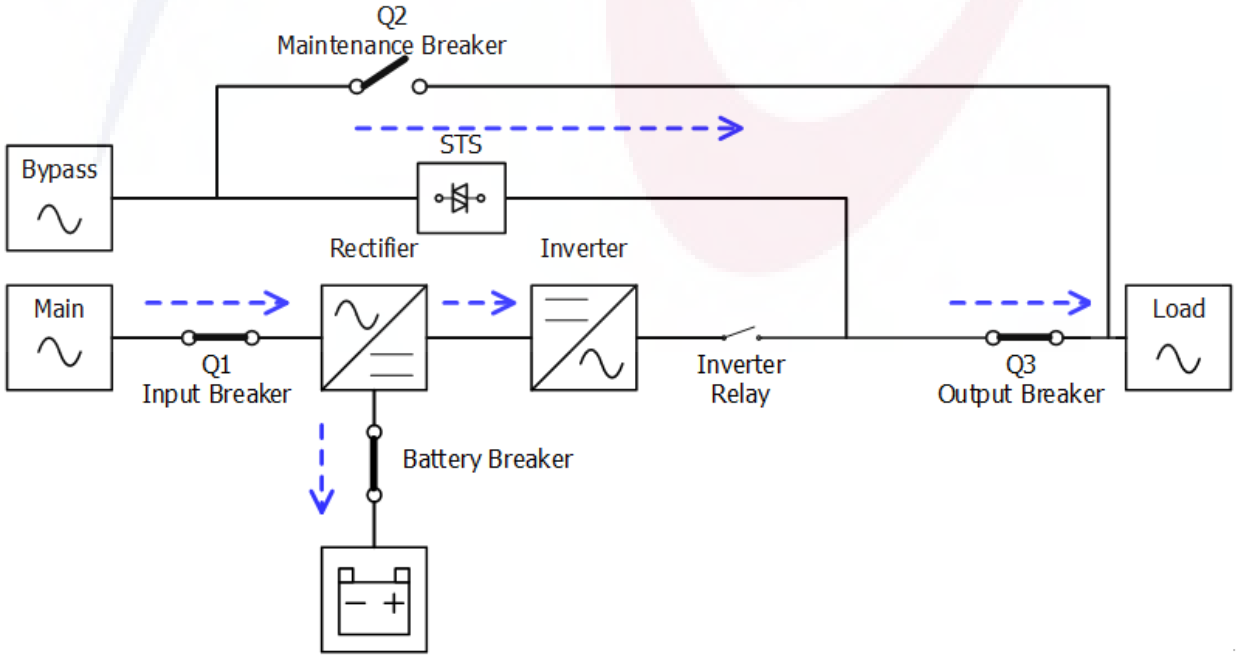


Figure 3-7 : ECO Mode Diagram

3.2.6 Shutdown Mode

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

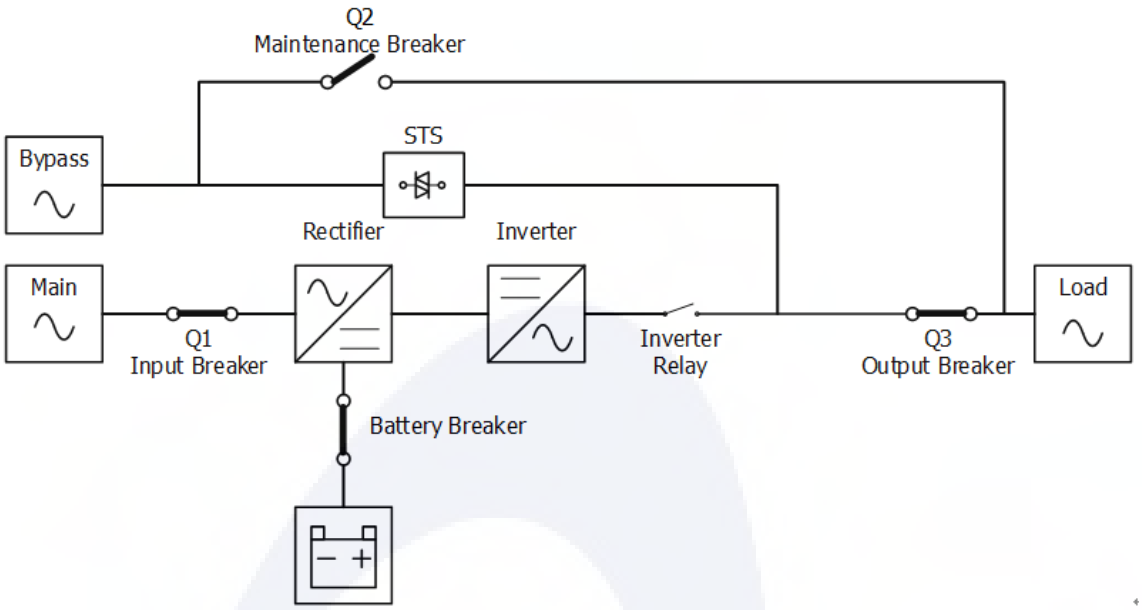


Figure 3-8 : Shutdown Mode Diagram

3.2.7 Maintenance bypass Mode

A manual bypass switch is available to ensure continuity of power supply to the load when the UPS becomes unavailable e.g. during a maintenance procedure. Before starting a maintenance procedure, make sure the bypass input power source is normal.

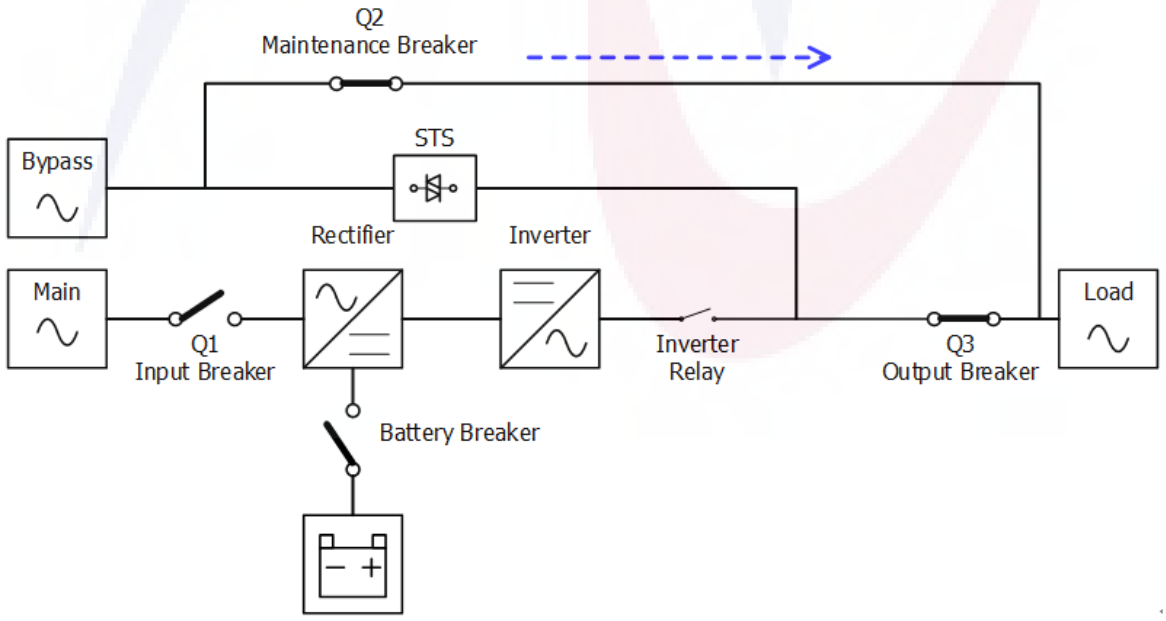


Figure 3-9 : Maintenance Bypass Mode Diagram

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 the Power Modules' address IDs have been configured. Refer to section 2.9.2 ● Make sure the ready switch on the Power Module has been switched to the "Locked" position. ● Make sure all the breakers are switched **OFF**.

3.3.1 AC Startup

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

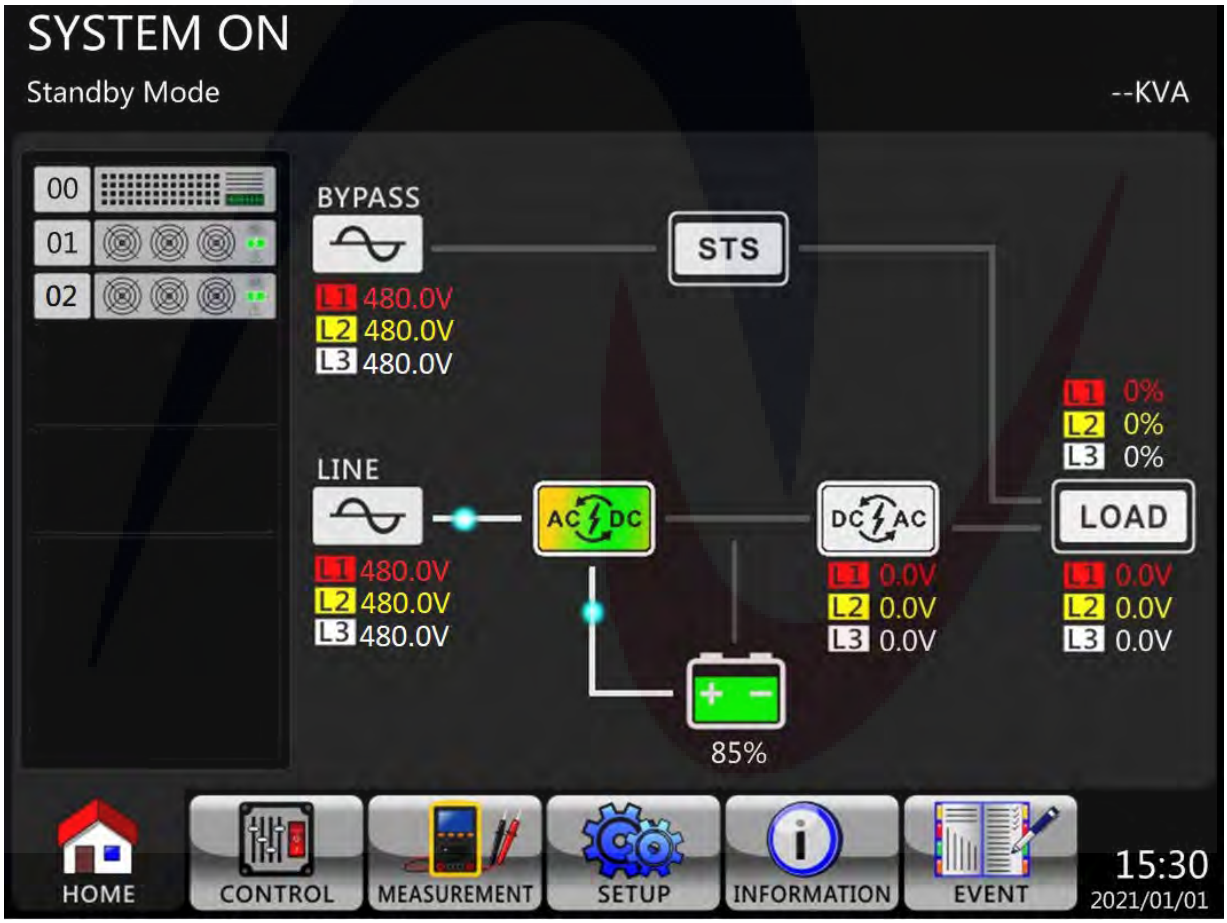
The operating procedures are:

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

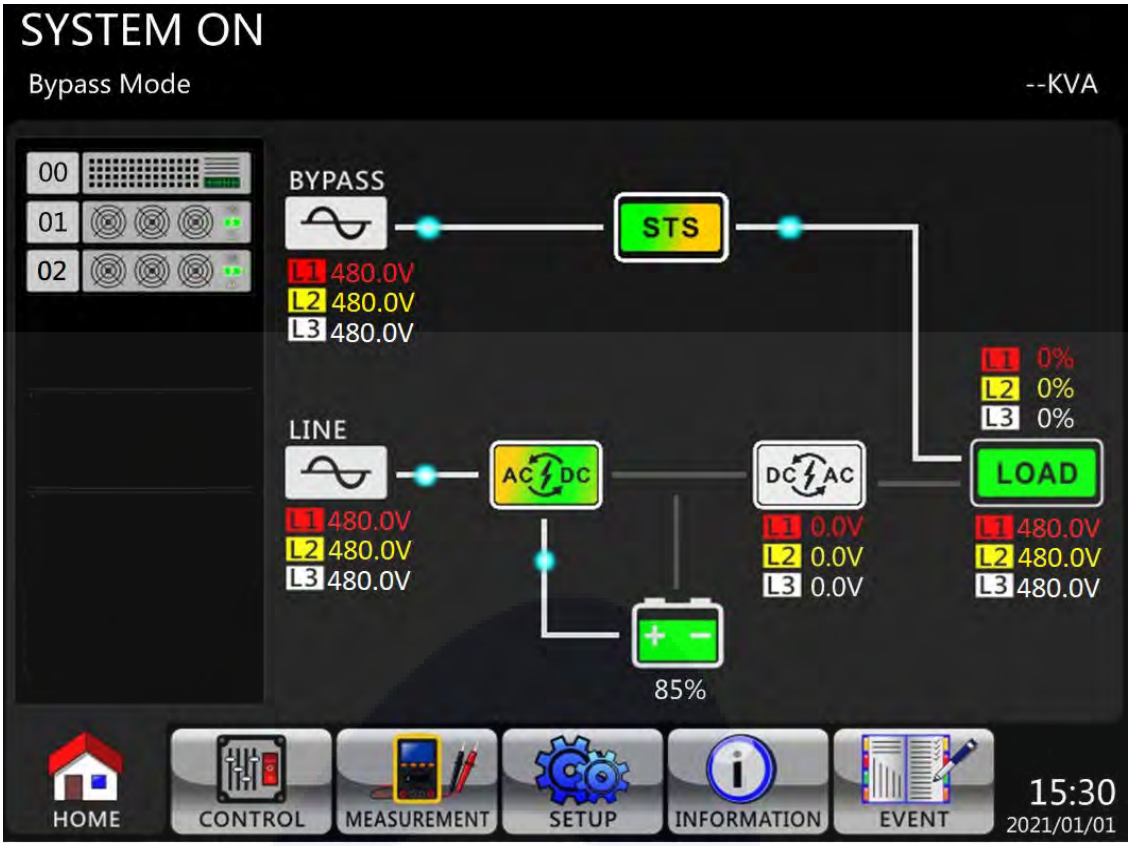
Step 2: Switch ON the battery breaker.

Step 3: Switch ON the external power switch in a distribution panel to power the UPS.

Step 4: Switch ON the input breaker(Q1). The UPS will enter Standby Mode, if the setting of Bypass mode is disabled.

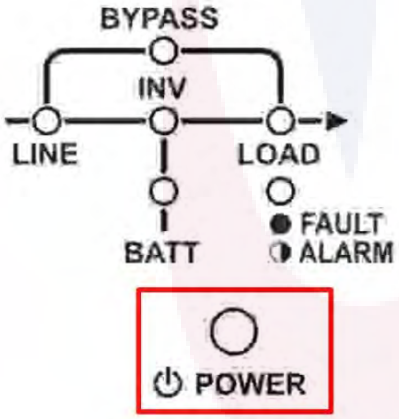


Or the UPS will enter Bypass Mode, if the setting of Bypass mode is enabled.



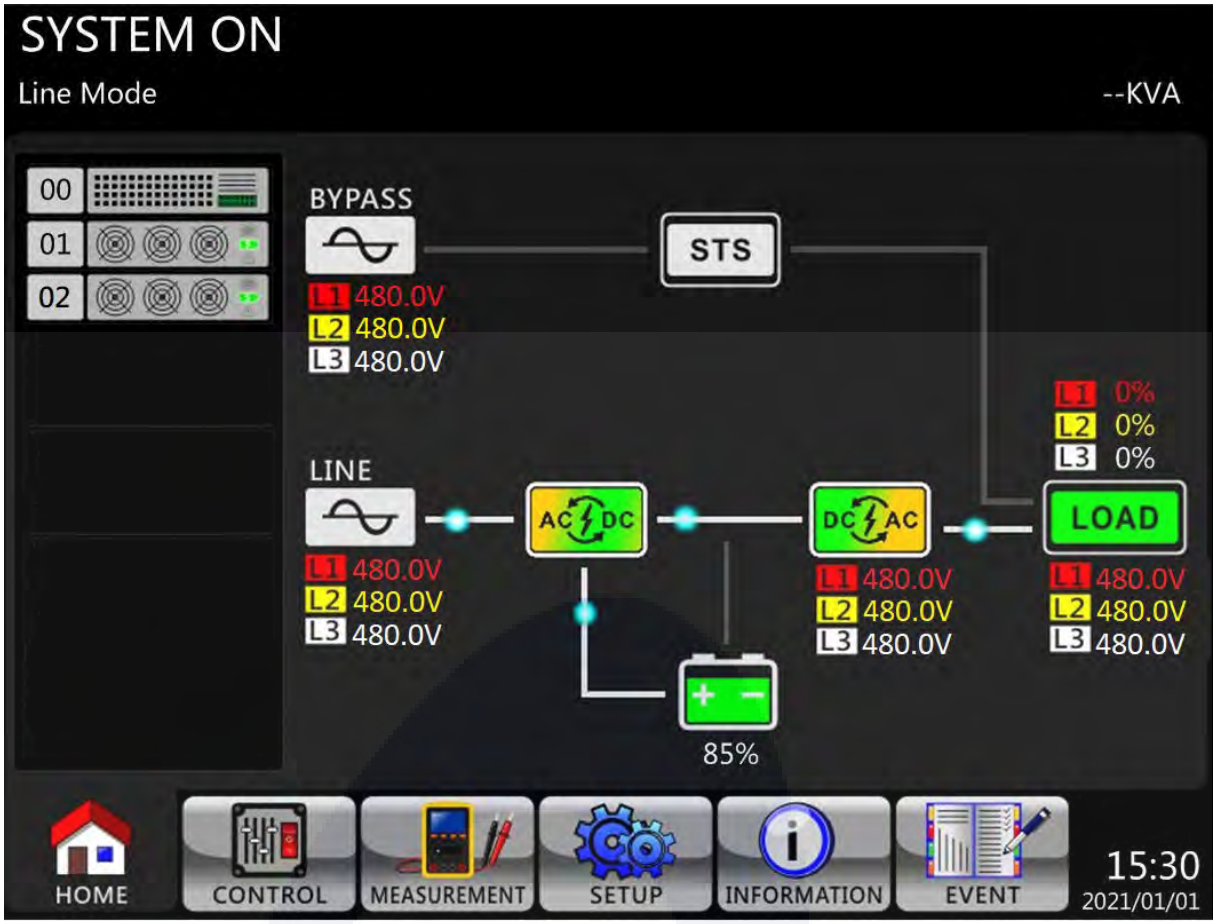
Step 5: Make sure that no warning or fault event occurs. If yes, please refer to Chapter 6 Troubleshooting to solve it.

Step 6: Press “Power” button for two seconds to turn on the inverter, as shown below.



Power On/Off Button

UPS will do self-test and start up the inverter. UPS will enter Line mode when all power modules are ready.



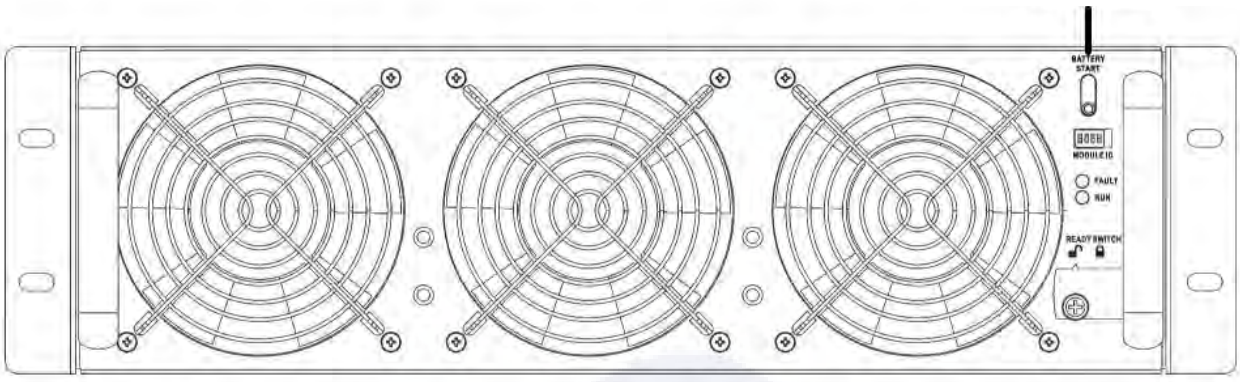
Step 7: Switch ON the output breaker (Q3).AC startup procedure is complete.

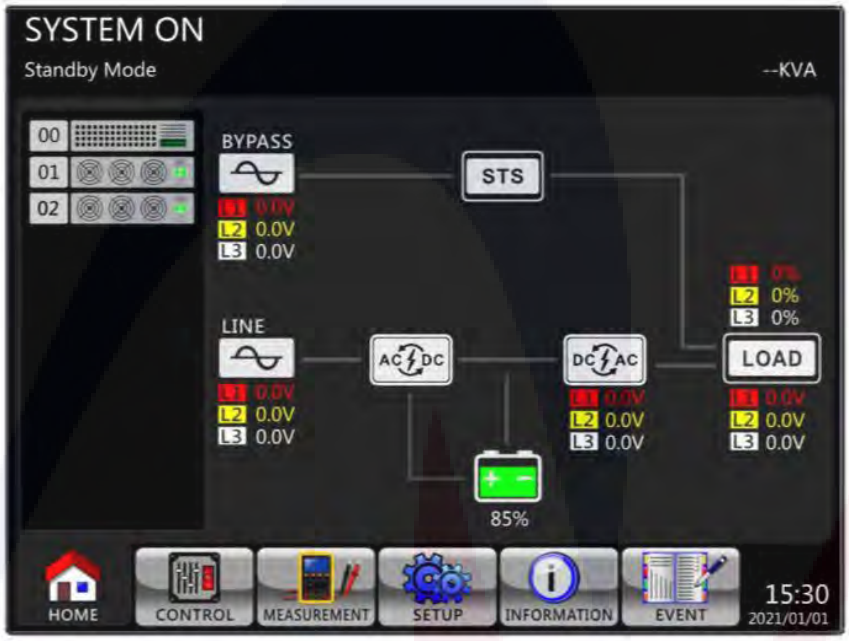
3.3.2 Cold Start Startup

Step 1: Switch ON the battery Breaker.

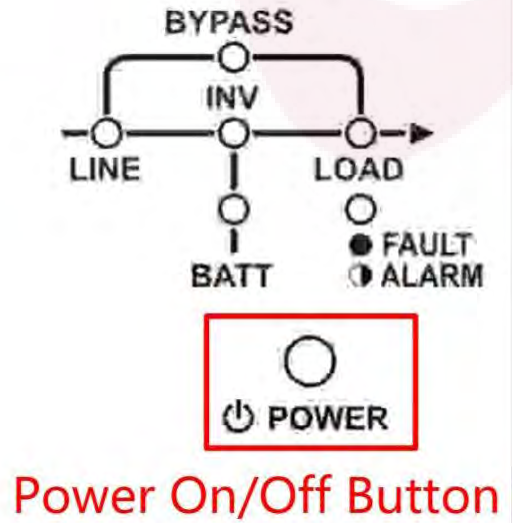
Step 2: Press the “Battery Start” button on any one of the Power Modules to start up the control power of all Power modules. UPS will enter into Standby mode.

Battery Start Button



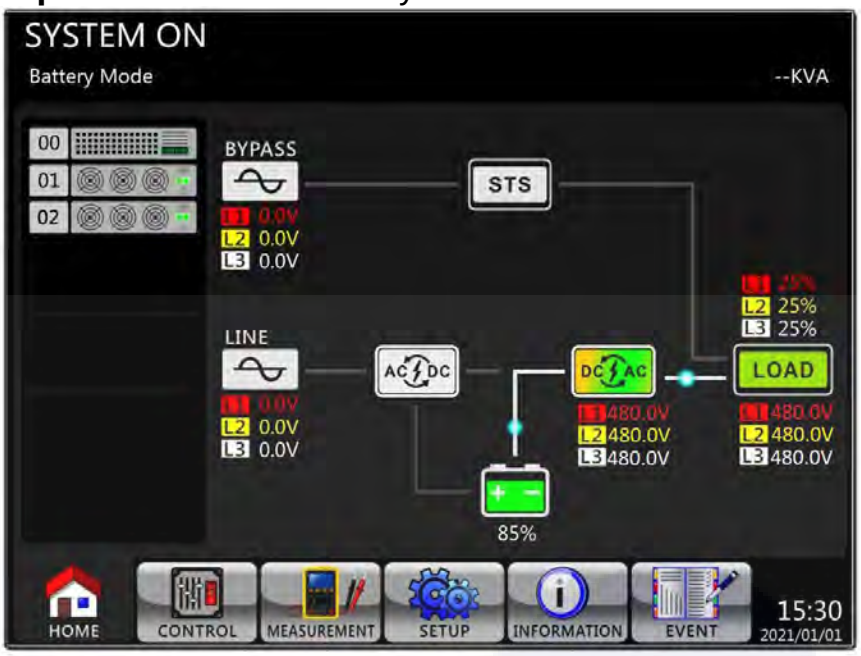


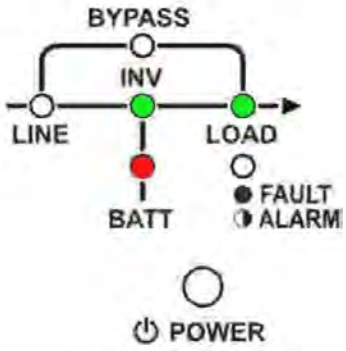
Step 3: Please press “POWER” button for 2 second immediately, before UPS enters shutdown mode.



Power On/Off Button

Step 4: UPS will enter Battery Mode.

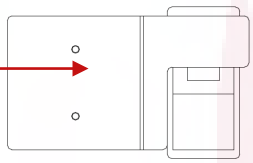
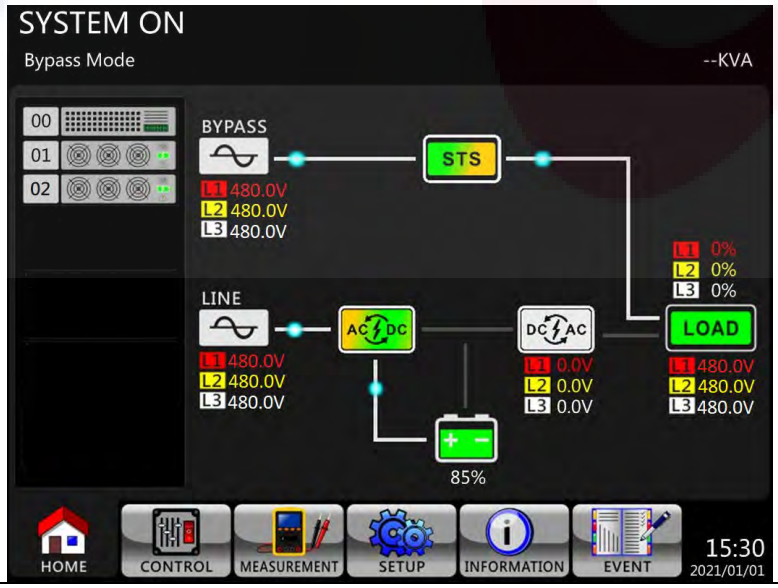


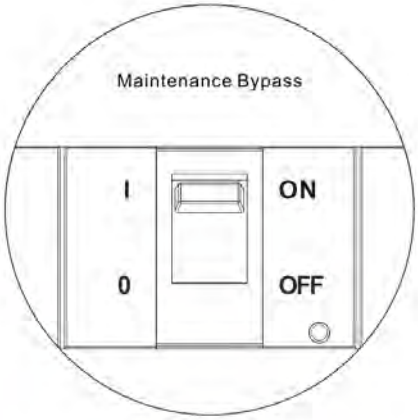


Step 5: Switch ON the output breaker (Q3). Cold start startup procedure is complete.

3.3.3 Maintenance Bypass Operation

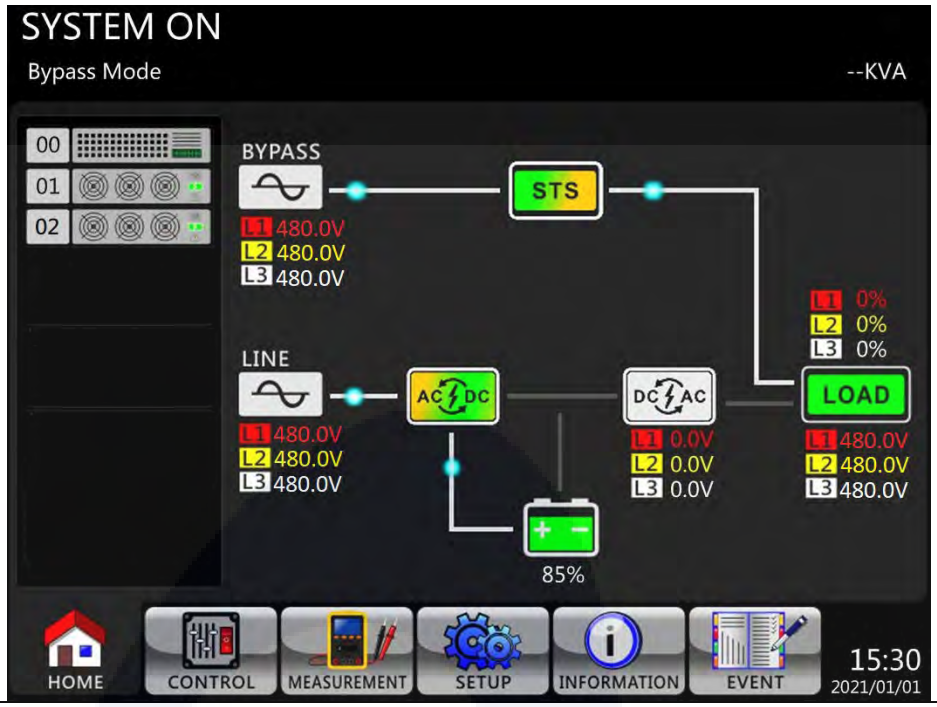
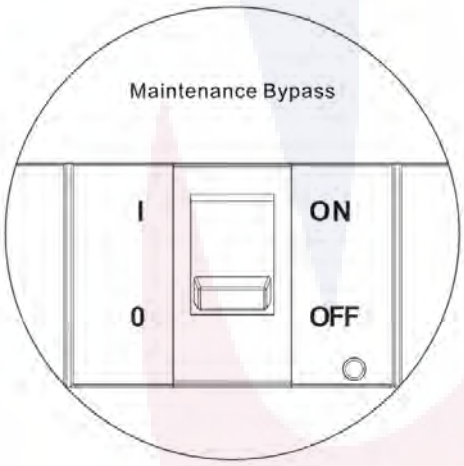
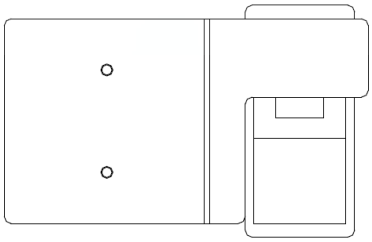
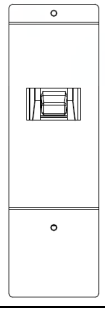
3.3.3.1 Transfer to maintenance bypass

Step 1:	Remove the mechanical lock plate of Maintenance Bypass Breaker.(140K) the mechanical lock plate → 	Remove the mechanical lock plate of Maintenance Bypass Breaker.(70K) the mechanical lock plate → 
Step 2	Make sure the UPS operates in Bypass mode as shown below. 	

Step 3	Switch ON the Maintenance Bypass Breaker as shown below. 
Step 4	Switch OFF the Main Breaker(Q1) as shown below. 
Step 5	Now one can change Power Module or Battery Module

3.3.3.2 Transfer to UPS Protection

Step 1	Make sure the maintenance is complete. The Power Modules and battery modules have been installed well.
Step 2	Switch ON the Main Breaker (Q1) as shown below. 

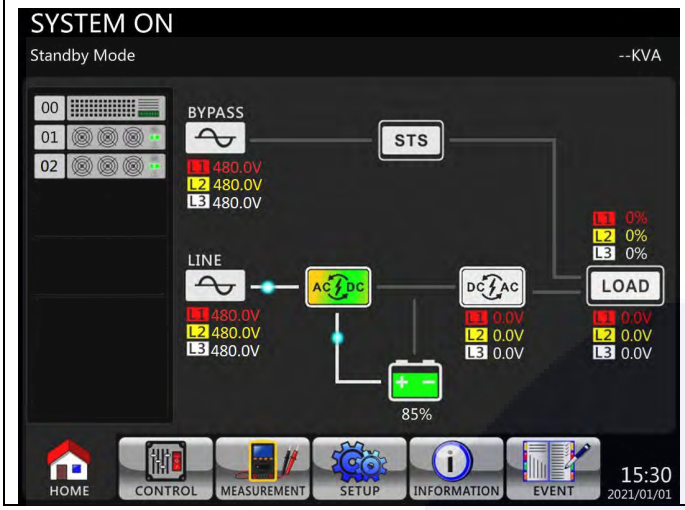
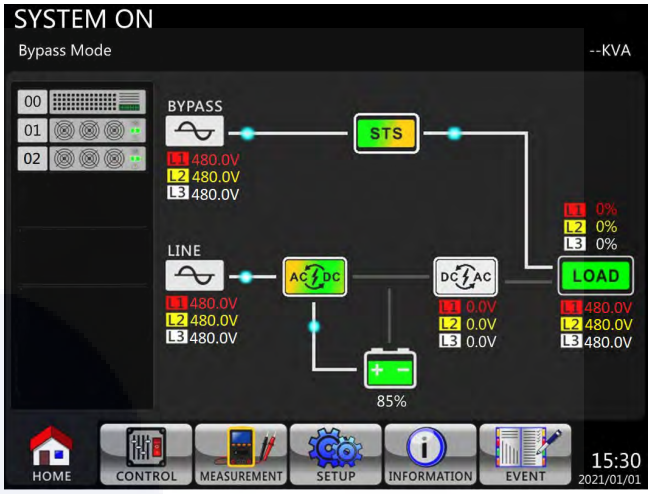
Step 3	Please enter LCD SETUP MENU and choose “SYSTEM” to ensure that the “Bypass mode” is enabled. If the “Bypass mode” is disabled, you have to change it to “enabled”. Then, exit the SETUP menu and check if the UPS operates in bypass mode. 	
Step 4	Turn off Maintenance Bypass Breaker as shown below. 	
Step 5	Lock back the mechanical lock plate as shown below. (140K) 	Lock back the mechanical lock plate as shown below. (70K) 

3.3.4 Turn off Operation

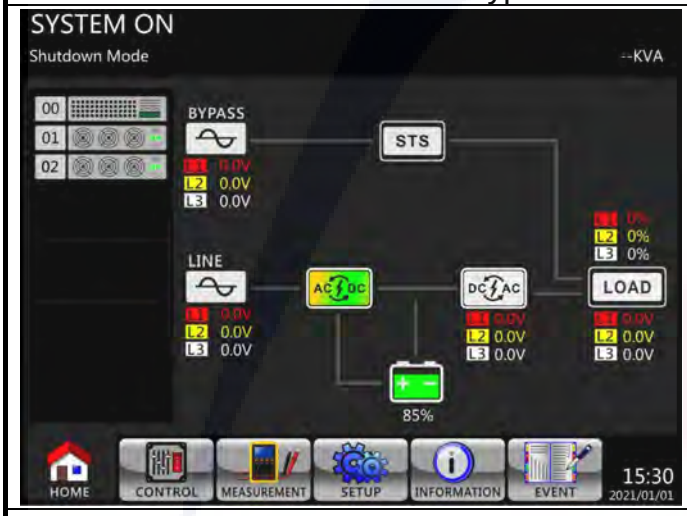
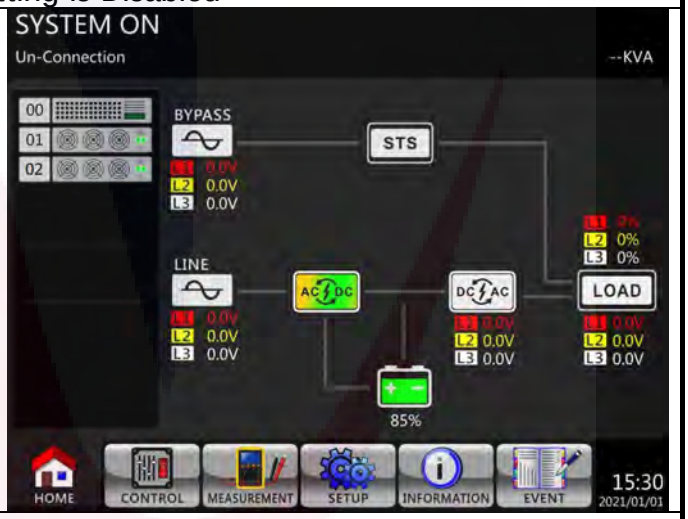
3.3.4.1 Turn Off Operation in Bypass Mode / Standby Mode

When the inverter is turned off, the UPS operates in the Standby Mode or Bypass Mode. It depends on the “Bypass Mode” Setting.

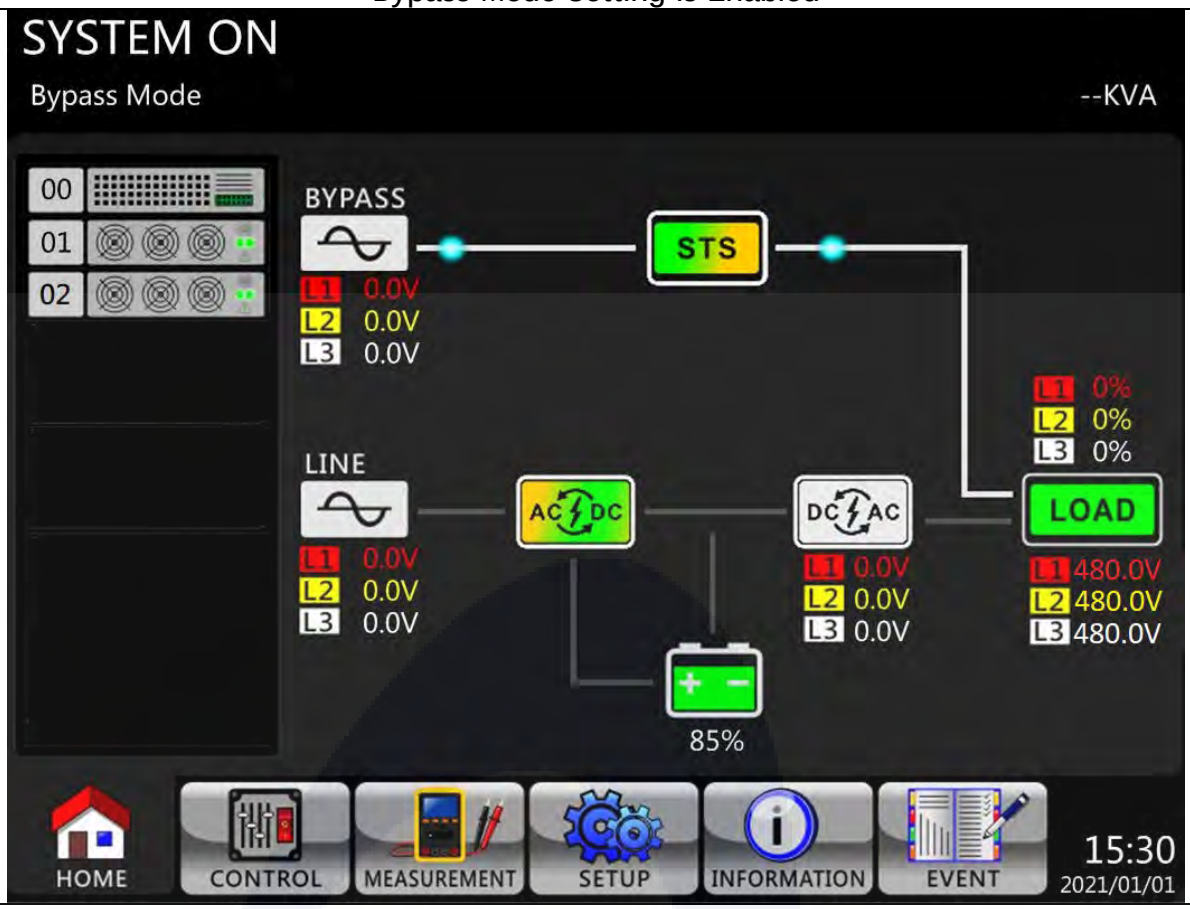
The LCD screens are shown below.

Bypass Mode Setting is Disabled	Bypass Mode Setting is Enabled
	

Step 1: Switch OFF the Main Breaker. The LCD screens are shown below.

Bypass Mode Setting is Disabled	
	
UPS enters Shutdown Mode.	It is normal that “Un-Connection” is shown when Power Modules have shut off their control power.

Bypass Mode Setting is Enabled



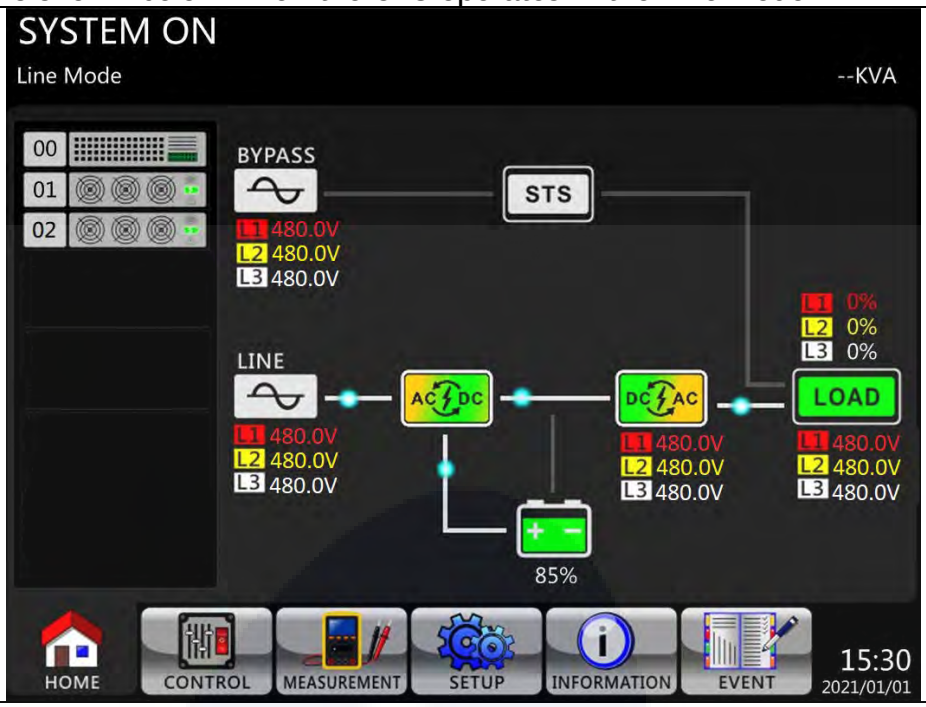
UPS stays in Bypass mode and No AC line input is indicated.

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

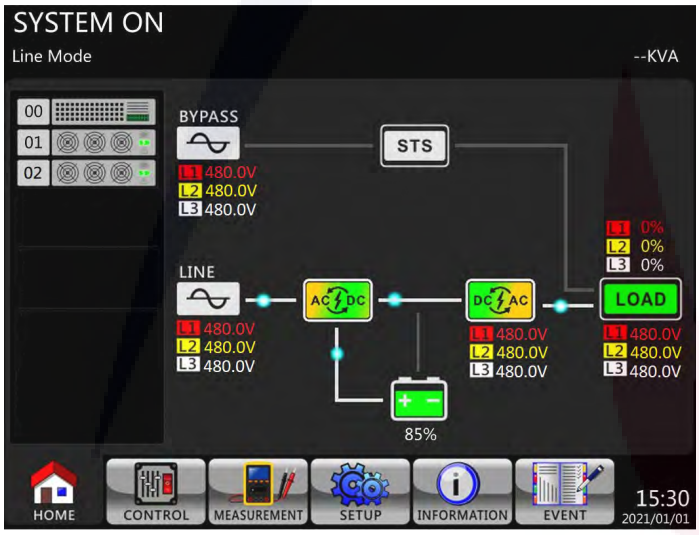
Step 3: Switch OFF the battery breaker if the UPS will be disconnected from AC power for a long time.

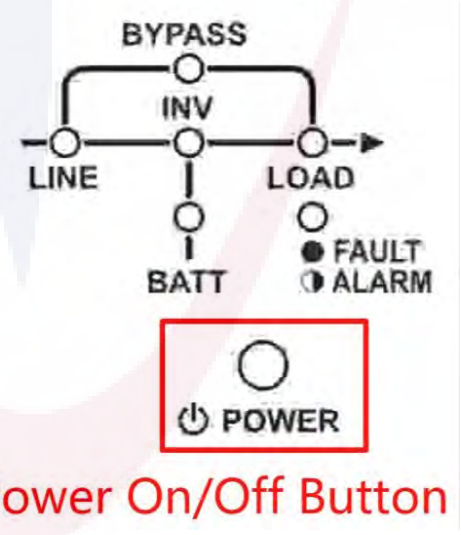
3.3.4.2 Turn Off Operation in Line Mode

The LCD screen is shown below when the UPS operates in the Line Mode.



Step 1: Press “POWER” button for 2 second to turn off the inverter. Or use the LCD operation (Control➔ Turn Off) to turn off the inverter.

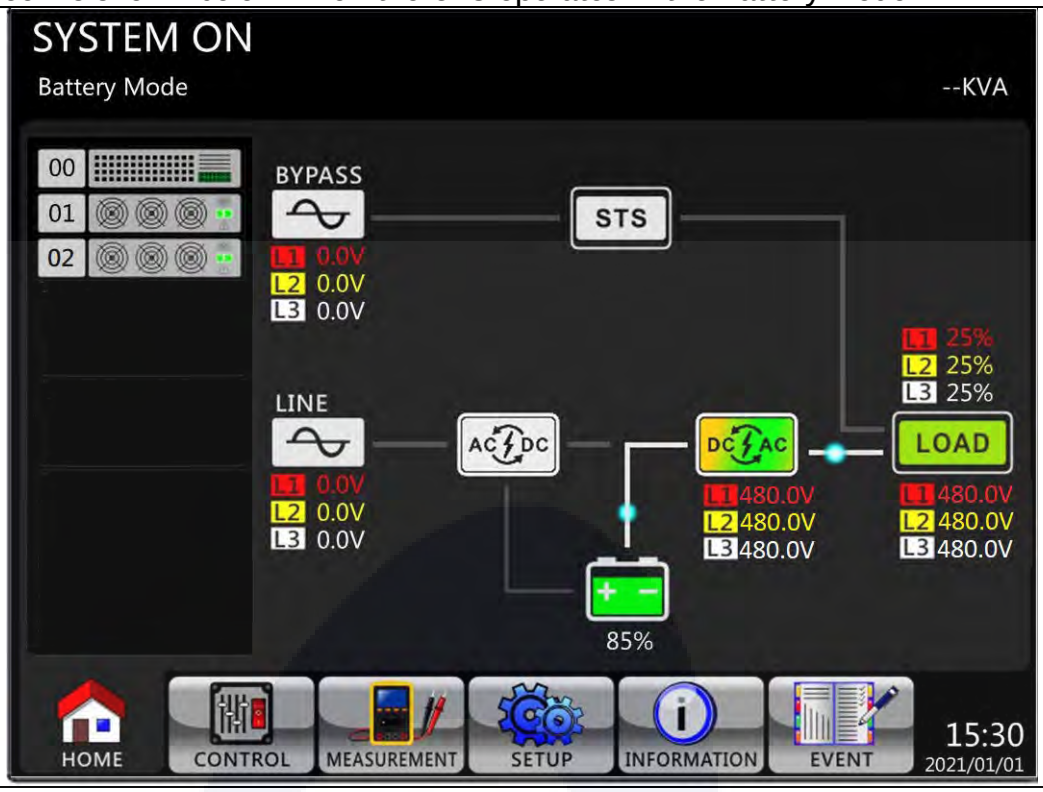




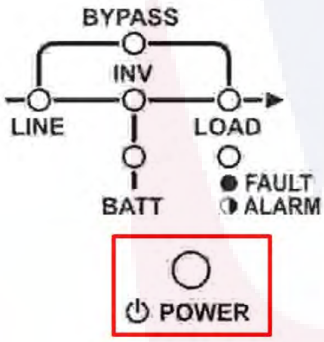
The UPS will then tranfer to Standby Mode or Bypass Mode depending on the “Bypass Mode” Setting. Next, follow the procedure in section **3.3.4.1 Turn Off Operation in Bypass Mode / Standby Mode.**

3.3.4.3 Turn Off Operation in Battery Mode

The LCD screen is shown below when the UPS operates in the Battery Mode.



Step 1: Press “POWER” button for 2 seconds to turn off the inverter. Or use the LCD operation (Control➔ Turn Off) to turn off the inverter.



Power On/Off Button

The UPS will then tranfer to Standby Mode. Next, follow the procedure in section **3.3.4.1 Turn Off Operation in Bypass Mode / Standby Mode.**

4. Control Panel and Display Description

4.1 Introduction

The control panel consists of a touch screen color LCD, LEDs and a power button. The LCD is on the external side of the front door and the LEDs and the power button are on the internal side of the front door. The audible alarm is also considered part of the control panel. Through the control panel, a user can control the UPS operation, monitor all measured parameters, UPS battery status/alarms and view or change settings.

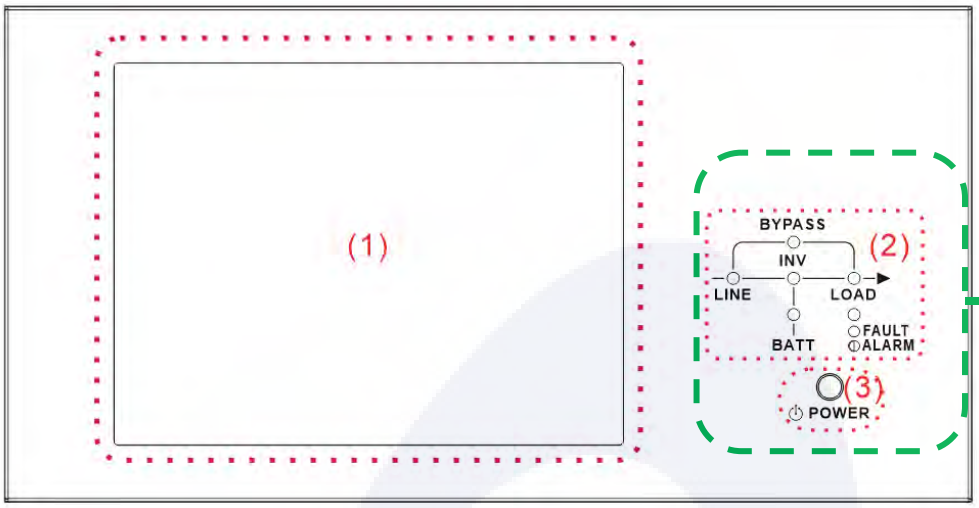


Figure 4-1 Control panel

(1) LCD display: Graphic display of real-time UPS status and all measured parameters.
(2) LED indications. Refer to **Table 4-1**.
(3) Power button. Refer to **Table 4-2**.
(4) Audible Alarm. Refer to **Table 4-3**.

Table 4-1: LED indications

LED	Color	Status	Definition
LINE	Green	On	Input source is normal.
		Flashing	Main Input source is abnormal.
		Off	No input source.
BYPASS	Yellow	On	Load on Bypass.
		Flashing	Bypass Input source is abnormal.
		Off	Bypass circuit is not operating.
LOAD	Green	On	The UPS is outputting power to the load.
		Off	The UPS is not outputting power to the load.
INV	Green	On	Load on inverters.
		Off	Inverter circuit is not operating.
BATTERY	Red	On	UPS is in battery mode.
		Flashing	Battery voltage is low.
		Off	UPS isn't in battery mode and battery is fully charged.

FAULT/ ALARM	Red	On	UPS fault.
		Flashing	UPS alarm.
		Off	There is neither a fault nor an alarm.

Table 4-2: Power button

Name	Description
Power button	Turn on UPS or Turn off UPS. (Press and Hold down for 2 seconds)

Table 4-3: Audible Alarm

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

4.2 Screen Description

4.2.1 Startup Screen

Upon starting, the UPS executes self-test. The LCD displays the Startup screen for 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. There are six areas of the main screen which we will explain below.

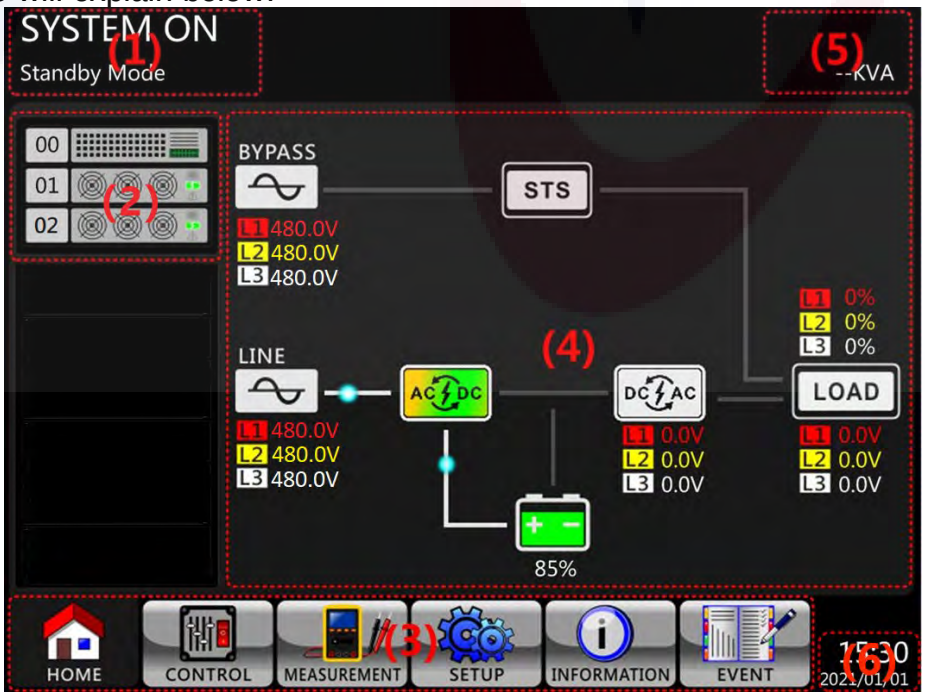


Figure 4-3 Main screen

(1) UPS Mode: Current operation mode.

(2) Module Status: It shows module icons. Touch module icon to enter its measurement screen. The meanings of the icons are listed as below.

Module icon	Explanation
	STS module with ID no. (140K does not have a separate STS module)
	Power module icon with ID no.
	No power module
	Power module output on
	Power module output off
	Power module charger on
	Power module charger off
	Power module faulted

(3) Main Menu: Touch icon to enter sub screen.

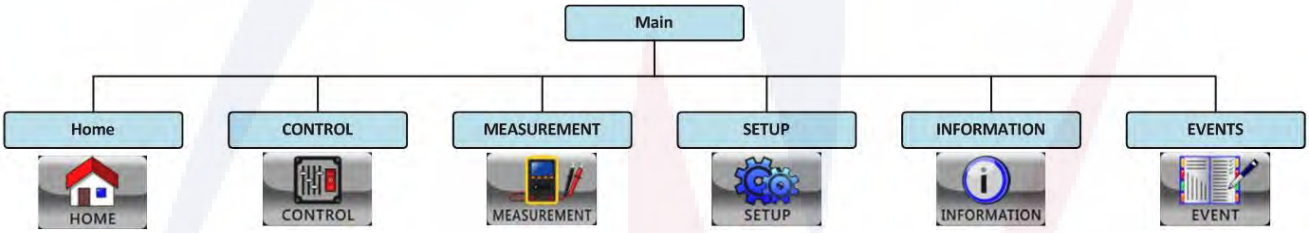


Figure 4-4 Menu tree

(4) UPS Flow Chart: Current flow chart and measurement data.

(5) UPS power rating.

(6) Date and Time.

4.2.3 Control Screen

Touch 

icon to enter the sub-menu as shown in Figure 4-5 and 4-6.

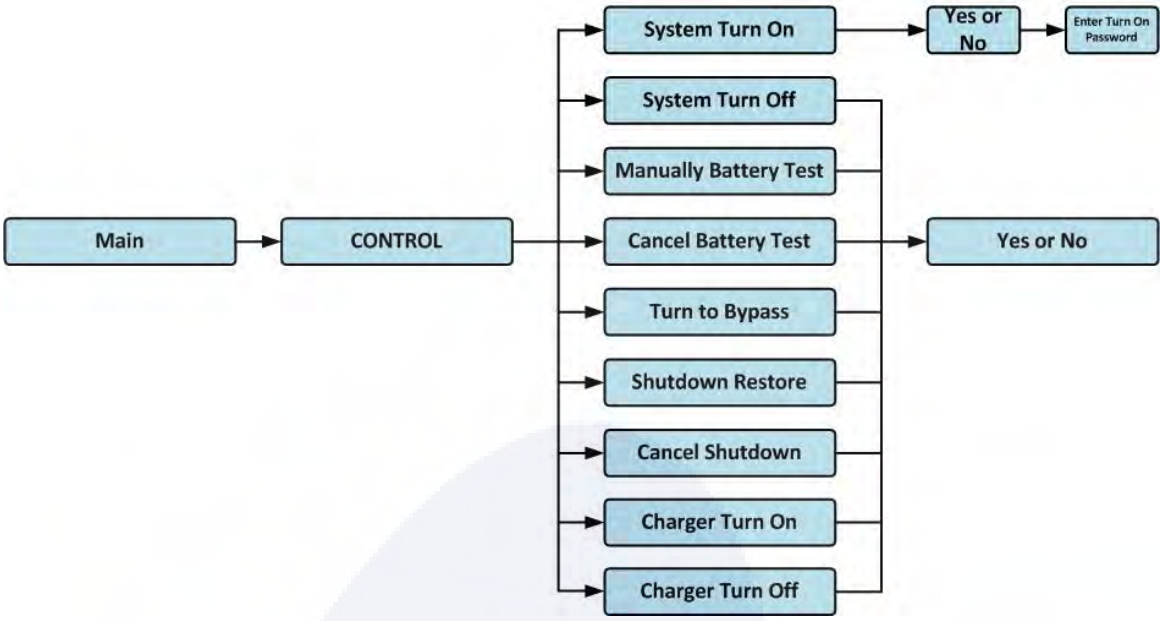


Figure 4-5 Control menu tree

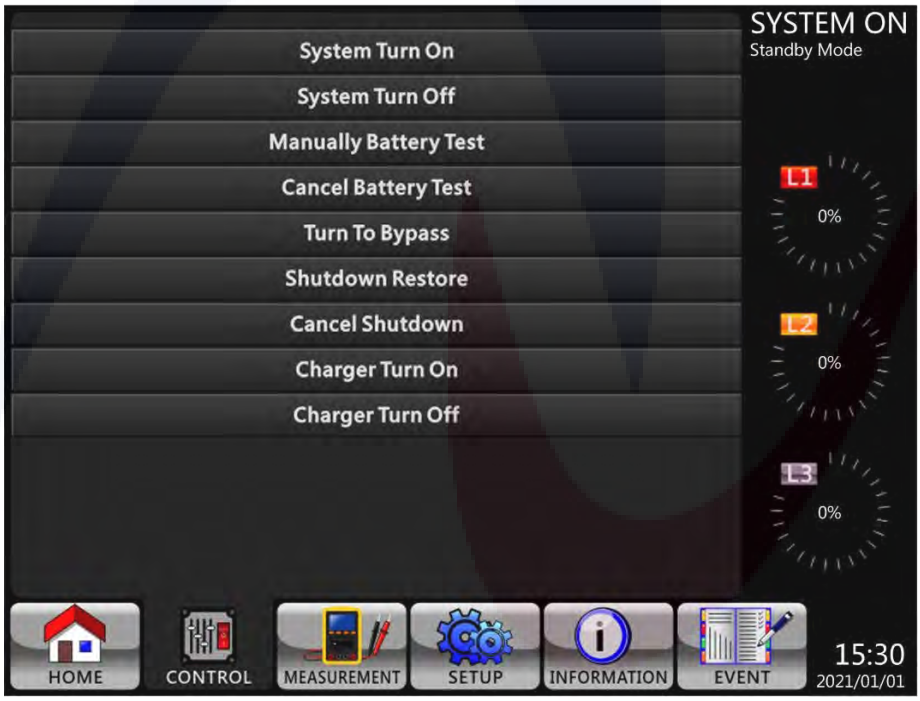


Figure 4-6 Control screen page

Touch any control option. Then, confirmation screen will pop up. Touch Yes icon to confirm command or touch No icon to cancel command as shown in Figure 4-7.



Figure 4-7 Confirmation screen

4.2.5 Measurement Screen

Touch MEASUREMENT icon to enter the sub-menu. There are two sub-menus, system measurement and module measurement. Touch SYSTEM icon to monitor system measurement values or MODULE icon to monitor module measurement values. Under each sub-menu you may choose Input, Output, Bypass, Load or Battery. Please refer to all screens in Figure 4-9 and 4-10. All measurement items are listed in Table 4-4.

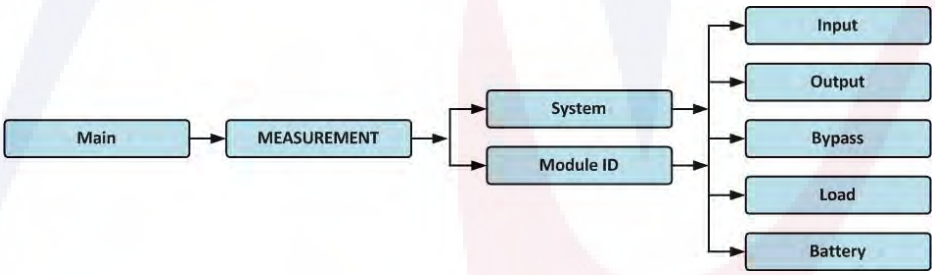


Figure 4-8 Measurement menu





Figure 4-9 System Measurement Screens



Figure 4-10 Module Measurement Screens

Table 4-4: Measurement item list

Menu	Item	Explanation
Input	L-N Voltage (V)	Input phase voltage (L1, L2, L3), accuracy: 0.1V
	Frequency (Hz)	Input Frequency (L1, L2, L3), accuracy: 0.1Hz
Output	L-N Voltage (V)	Output phase voltage (L1, L2, L3), accuracy: 0.1V
	L-N Current (A)	Output phase current (L1, L2, L3), accuracy: 0.1A
	Frequency (Hz)	Output Frequency (L1, L2, L3), accuracy: 0.1Hz
	Power Factor	Output Power Factor (L1, L2, L3)
Bypass	L-N Voltage (V)	Bypass phase voltage (L1, L2, L3), accuracy: 0.1V
	Frequency (Hz)	Bypass Frequency (L1, L2, L3) , accuracy: 0.1Hz
	Power Factor	Bypass Power Factor (L1, L2, L3)
Load	Sout (KVA)	Apparent power, accuracy: 0.1KVA
	Pout (KW)	Active power, accuracy: 0.1KW
	Load Level (%)	The percentage of the UPS rated load, accuracy: 1%
Battery	Positive Voltage (V)	Battery Positive half string voltage, accuracy: 0.1V
	Negative Voltage (V)	Battery Negative half string voltage, accuracy: 0.1V
	Positive Current (A)	Battery Positive half string current, accuracy: 0.1A
	Negative Current (A)	Battery Negative half string current, accuracy: 0.1A
	Remain Time (Sec)	Remaining Battery run time, accuracy: 1sec
	Capacity (%)	The percentage of remaining battery capacity, accuracy: 1%
	Test Result	Battery test result
	Charging Status	Battery charging status
	Temperature1(℃)	Battery cabinet temperature, accuracy: 0.1℃

4.2.6 Setup Screen

Touch the 

icon and the user will need to enter a password to access General, SYSTEM, BATTERY and PRE-ALARM sub-menus as shown in Figure 4-11 and 4-12.

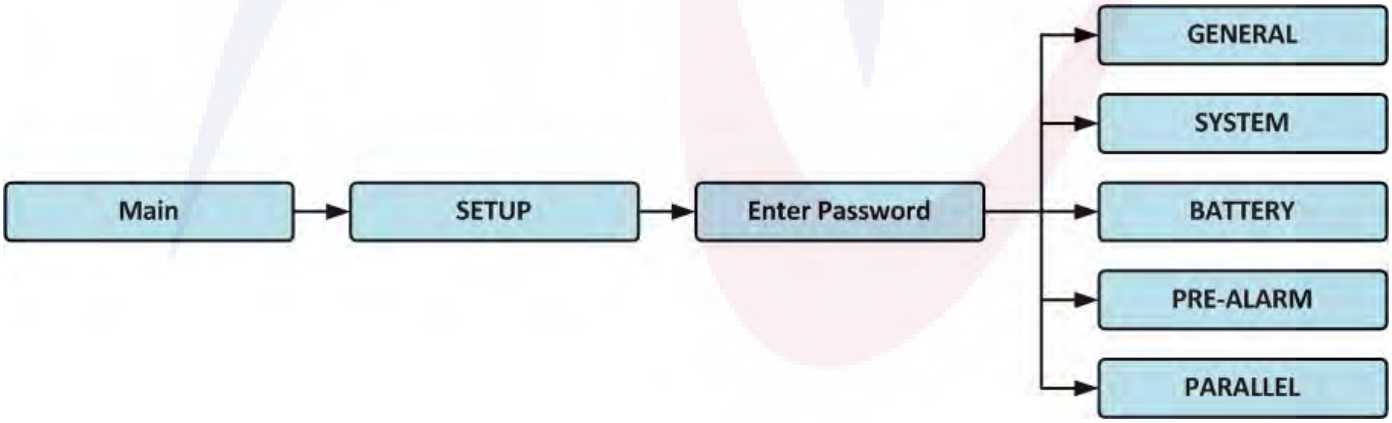


Figure 4-11 Setup menu

Touch the grey box and the number keyboard will pop up. Please enter 4-digit password and touch  icon to enter SETUP sub-menu. If an incorrect password is entered, the LCD screen will ask for retry.



Figure 4-12 Enter password screen

There are two levels of password protection, user password and maintainer password.
The user password is defaulted to be “0000”, but can be changed by a user.
The maintainer password is owned by service personnel.
User password and maintainer password allow access to different settings. Some settings can be changed in all operation modes and some can only be changed in standby or bypass mode. **Table 4-5** lists the relevant information.

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	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
	Baud Rate	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
	EEPROM Reset	Y									Y
	Save Setting	Y	Y							Y	Y
	Startup Screen	Y	Y	Y	Y	Y	Y	Y	Y		Y
System	Output Voltage	Y	Y								Y
	Bypass Voltage Range	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Bypass Frequency Range	Y	Y								Y
	Converter Mode	Y									Y
	ECO Mode	Y	Y								Y
	Bypass Mode	Y	Y								Y
	Auto-Restart	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Power Walk in	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Battery Mode Delay Time	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
	Power Rating Setting	Y	Y	Y	Y	Y	Y	Y	Y		Y

Battery	Nominal Battery Voltage	Y	Y								Y
	Battery Capacity in Ah	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
	Stop by Time	Y	Y	Y	Y		Y	Y	Y		Y
	Stop by Battery Voltage	Y	Y	Y	Y		Y	Y	Y		Y
	Stop by Battery Capacity	Y	Y	Y	Y		Y	Y	Y		Y
	Battery Age Alert	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Temperature Compensation	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Charging Voltage	Y	Y								Y
Pre-Alarm	Line Voltage Range	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Line Frequency Range	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Overload	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Load Unbalance	Y	Y	Y	Y	Y	Y	Y	Y		Y

“Y” means that this setting item can be changed in this operation mode or with this type of password access.

Setting Change Procedure

Step 1: Choose the setting item from GENERAL, SYSTEM, BATTERY or PRE-ALARM.

Step 2: Select the desired setting item and the screen will show its current value. Touch the current value and the screen will show a list of all alternative values. Choose the desired value.

Step 3: Touch  icon to confirm the setting change or choose  icon to cancel.



Figure 4-13 Setting change procedure

4.2.6.1 Setup-General Screen

The Setup-General screen and its setting list are shown in Figure 4-14 and **Table 4-6**. General setting can be set in any operation mode.



Figure 4-14 Setup-General screen

Table 4-6: Setup-General setting list

Setting Item	Sub Item	Explanation
Model Name		Set UPS Name (xxxxxxxxxx). The max. length is 10 characters.
Language	--	Provides 3 optional LCD languages: ● English (Default) ● Traditional Chinese ● Simplified Chinese
TIME	Adjust Date and Time	Set current date and time. (yyyy / mm / dd hour : min : sec) **MUST be set after UPS installation.**
	System Installation Date	Set system installation date (yyyy / mm / dd) 2015/1/1 (Default) **MUST be set after UPS installation.**
	System Last Maintain Date	Set system latest maintenance date (yyyy / mm / dd) **MUST be set after UPS installation and each system maintenance.**
	Battery Installation Date	Set battery installation date (yyyy / mm / dd) **MUST be set after UPS installation.**
	Battery Last Maintain Date	Set battery latest maintenance date (yyyy / mm / dd) **MUST be set after UPS installation and each battery maintenance.**
Baud Rate	--	Set COM Port0 Baud Rate ● 2400 (Default)

		● 4800 ● 9600 Set COM Port1 Baud Rate ● 2400 (Default) ● 4800 ● 9600
Audible Alarm	--	Set Audible Alarm ● Disable ● Enable (Default)
Factory Reset	--	Restore to factory default setting values Refer to **Table 4-7**
EEPROM Reset	--	Restore EEPROM default Refer to **Table 4-7**
Password	--	Set New User Password. 0000 (Default)
Save Setting	--	Save EEPROM **Use this feature to save the setting change(s) you have done.**

Table 4-7: EEPROM Reset Category list

Setting Item		Factory Reset	EEPROM Reset
General	Model Name		
	Language	Y	Y
	Adjust Time		
	System Installed Date		Y
	System Last Maintain Date		Y
	Battery Installed Date		Y
	Battery Last Maintain Date		Y
	Change Password		Y
	Baud Rate		Y
	Audible Alarm	Y	Y
	Factory Reset	--	--
	EEPROM Reset	--	--
	EPO Function		Y
	Save Setting	--	--
System	Output Voltage		Y
	Bypass Voltage Range	Y	Y
	Bypass Frequency Range	Y	Y
	Converter Mode	Y	Y
	ECO Mode	Y	Y
	Bypass Mode	Y	Y
	Auto-Restart	Y	Y
	Battery Mode Delay Time		Y
	System Shutdown Time	Y	Y
	System Restore Time	Y	Y
	Redundancy		Y
	Power Rating Setting		Y
	Charger Test	--	--
Battery	Nominal Battery Voltage		Y
	Battery Capacity in Ah		Y

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

4.2.6.2 Setup-System Screen

The Setup-System screen and setting list are shown in Figure 4-15 and table 4-8. System settings can be changed only when UPS is operated in certain modes. Please check table 4-5 for the details. If a setting item cannot be changed, a warning screen will appear. Refer to figure 4-16.



Figure 4-15 Setup-System screen

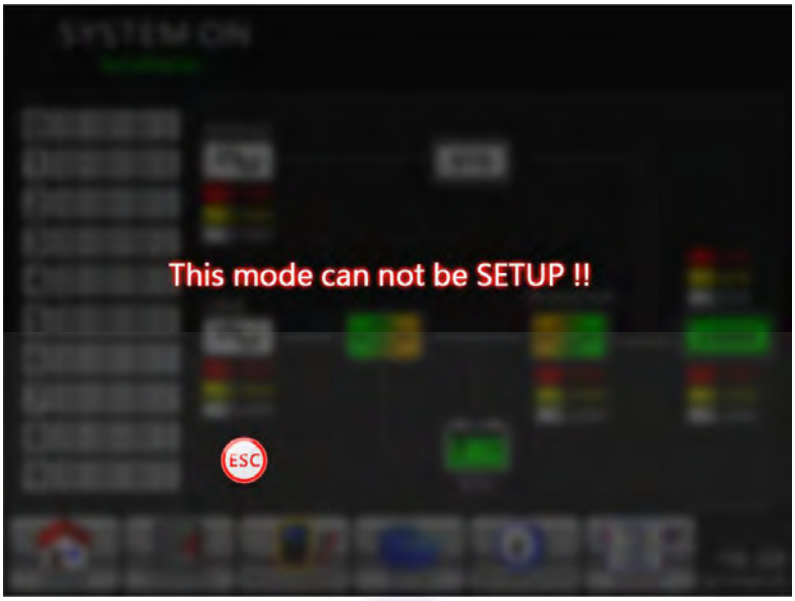


Figure 4-16 Warning screen

Table 4-8: Setup-System setting list

Setting Item	Sub Item	Explanation
Output Voltage	--	Set UPS output voltage ● 480Vac **MUST be reviewed after UPS installation.**
BYPASS SETTING	Bypass Voltage Range	Set bypass voltage range: Upper limit ● +10% ● +15% ● +20% (Default) Lower limit ● -10% ● -20% ● -30% (Default)
	Bypass Frequency Range	Set bypass Frequency range: Upper/ Lower limit ● +/- 1Hz ● +/- 2Hz ● +/- 4Hz (Default)
Converter Mode	--	Set converter mode ● Disable (Default) ● Enable ● 50Hz ● 60Hz ● AUTO
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 UPS to power the load when the inverter is OFF, this setting must be set to “Enable”.
Auto-Restart	--	Set auto-restart ● Disable ● Enable (Default) If set to “Enable”, the UPS will enter line mode once utility restores after the UPS has shut down upon full battery discharge.
Power Walk in		Set power walk in upper/lower limits ● +/- 1s time step (setting range: 1s ~ 10s)
Battery Mode Delay Time	--	Set system shutdown delay time in battery mode (0~990min). ● 0: Disable (Default) ● Not 0: Enable If set to “Enable ”, UPS will shut off output after UPS operates in Battery mode for the preset number of minutes.
Shutdown/ Restore	System Shutdown Time	Set system shutdown delay time (0.2~99min) ● 0.2 min (Default) The delay timer 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 timer will start counting after system shutdown time has elapsed.
Power rating setting	--	Set power rating value per module ● 50KVA ● 70KVA
Redundancy	--	Set total power and redundancy Redundancy: the QTY of redundant power module **MUST be set after UPS installation and after the QTY of Power Modules is changed.**

4.2.6.3 Setup-Battery Screen

The Setup-Battery screen and setting list are shown in Figure 4-17 and table 4-9. Battery settings can be changed only when UPS is operated in standby mode, otherwise, a warning screen will appear as shown in Figure 4-16.

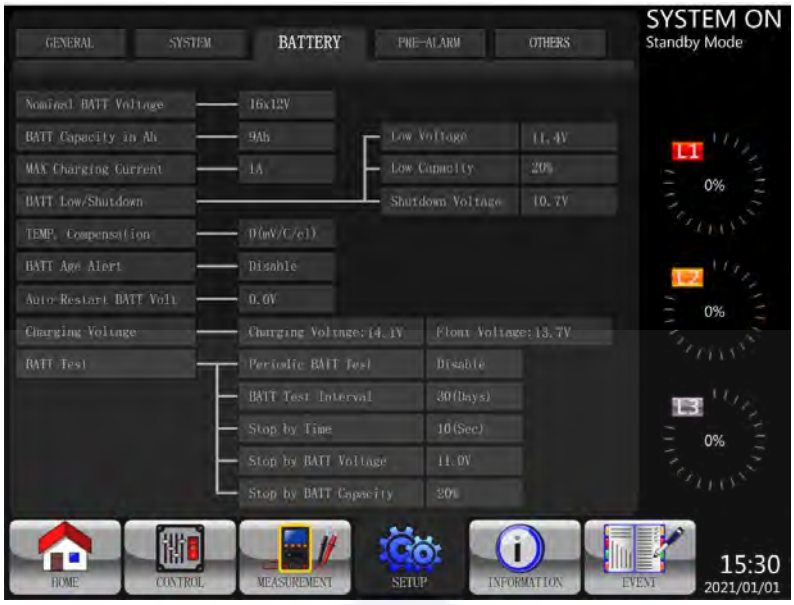


Figure 4-17 Setup-Battery Screen

Table 4-9: Setup-Battery setting list

Setting Item	Sub Item	Explanation
Nominal Battery Voltage	--	Set battery nominal voltage ● 16x12V (Default) ● 18x12V ● 20x12V **MUST be set after UPS installation.**
Battery Capacity in Ah	--	Set battery capacity. (0~999) ● 9Ah (Default) **MUST be set after UPS installation or after Battery capacity has been changed.**
Maximum Charging Current	--	Set battery maximum charging current (1~128A) 1A (Default) **MUST be set after UPS installation or after Battery capacity has been changed.**
Battery Low/ Shutdown Setting	Low Voltage	Set battery low voltage (10.5~11.5V)x(battery Number) ● 11.4V (Default)x Battery Number
	Low Capacity	Set battery low capacity (20~50%) ● 20% (Default)
	Shutdown Voltage	Set battery voltage point for system shutdown in battery mode (10.0~11V) x (battery Number) ● 10.7V (Default)x Battery Number
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)
	Stop by Time	Set time duration for battery test (10~1000sec) ● 10 sec (Default)
	Stop by Battery Voltage	Set the battery voltage at which battery test stops (11~12V) x (battery Number) ● 11V (Default)x Battery Number

	Stop by Battery Capacity	Set the battery capacity at which battery test stops (20~50%) ● 20% (Default)
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 for the set number of months, the UPS will alarm the warning “Battery Age Alert”.
Temperature Compensation	--	Set battery temperature compensation. (0~-5 (mV/C/cl)) ● 0(mV/C/cl) (Default)
Auto Restart BATT Volt	--	Set battery auto restart voltage ● 0V (Default)
Charging Voltage	--	Set battery charging voltage. (14.1~14.4V) ● 14.1V(Default) Set battery float voltage. (13.5~14.0V) ● 13.7V(Default)

4.2.6.4 Pre-Alarm Screen

The Setup-Pre-Alarm screen and setting list are shown in Figure 4-18 and table 4-9. Pre-Alarm settings can be changed in any operation mode.



Figure 4-18 Setup-Pre-Alarm screen

Table 4-10: Setup-Pre-Alarm setting list

Setting Item	Sub Item	Explanation
Line Voltage Range	--	Set line voltage range: Upper limit ● +5% ● +10% ● +15% ● +20% (Default)

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

4.2.6.5 Setup-OTHERS Screen

Use UP and DOWN icons to switch between different sub-menus. Press ENTER icon to go into the **OTHERS** setting screen, as shown in Figure 4-19.



Figure 4-19 Setup-**OTHERS** screen

4.2.7 Information Screen

Touch 

icon to enter the sub-menu. On Information screen, you can check the configurations of the unit. There are three sub-menus: Identification, System and Battery.



Figure 4-20 Information menu

4.2.7.1 INFORMATION - Identification Screen

Under “IDENTIFICATION” sub-menu are displayed Model Name, Serial No. and Firmware Version as shown in Figure 4-21.

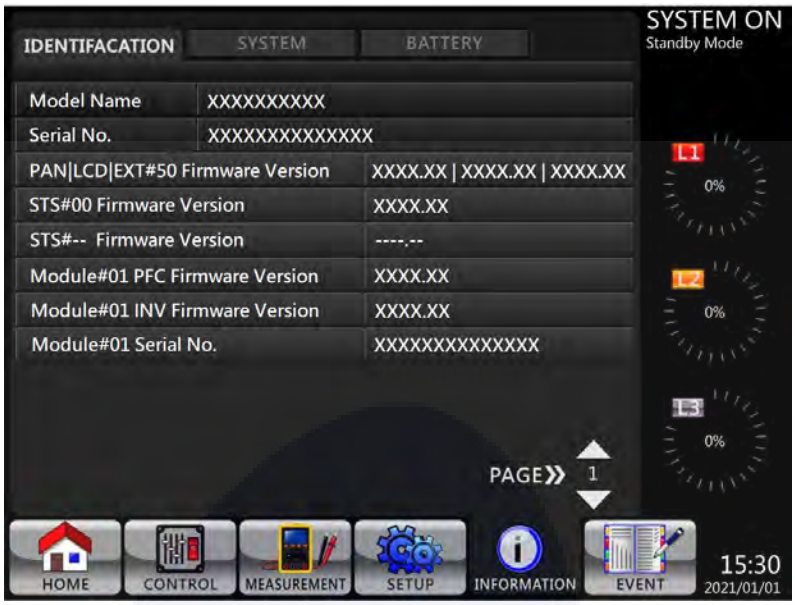


Figure 4-21 Identification screen page

4.2.7.2 INFORMATION - System Screen

Under “SYSTEM” submenu are displayed the system power, nominal voltage, nominal frequency ... etc. as shown in Figure 4-22 and 4-23. Touch UP and DOWN arrows to switch between different pages.



Figure 4-22 INFORMATION System screen page 1



Figure 4-23 INFORMATION System screen page 2

4.2.7.2 INFORMATION - Battery Screen

Under “BATTERY” submenu are displayed the Battery nominal voltage, capacity, charging current ... etc., as shown in Figure 4-24.



Figure 4-24 INFORMATION Battery screen page

4.2.8 Events Screen

When an event occurs, you will see flashing  icon on the Main Screen as shown in Figure 4-25.

Touch 

icon to check the latest event list, history event or to reset all events as shown in Figure 4-26.

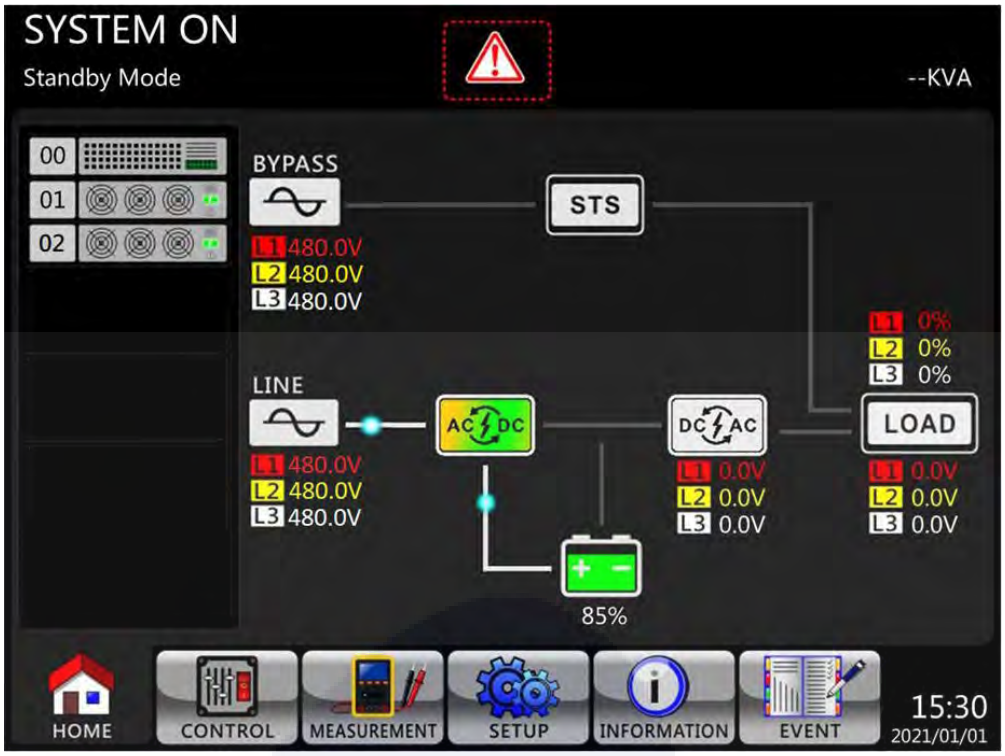


Figure 4-25 Alarm warning screen



Figure 4-26 Events menu

4.2.8.1 Current Events

Under “CURRENT EVENT” submenu is a list of current events. Each event entry shows the module ID# and event description. There can be up to 50 events in the list, with up to 10 events to be displayed per page. Touch UP and DOWN arrows to scroll through pages, as shown in Figure 4-27.



Figure 4-27 Current Events screen

4.2.8.2 History Events

Under “HISTORY EVENT” submenu is a list of events that have occurred, up to 500 events. Each entry displays module ID#, event description and event occurrence date/time. Events recorded include alarms (Refer to **Table 4-12** Alarm List), the important setting changes (refer to **Table 4-13** Important setting changes), UPS operation mode changes (refer to **Table 4-14** UPS mode changes) and control action executions (refer to **Table 4-15** Control execution). Refer to Figure 4-28 for display screen.



Figure 4-28 History Events screen

4.2.8.3 Reset All Events

The Maintainer password is required to enter Reset All Events screen as shown in Figure 4-29. After the correct Maintainer password is entered, a screen will pop up to ask for confirmation. Touch 

icon to reset all events or touch 

icon to cancel, as shown in Figure 4-30.



Figure 4-29 Reset All Events screen

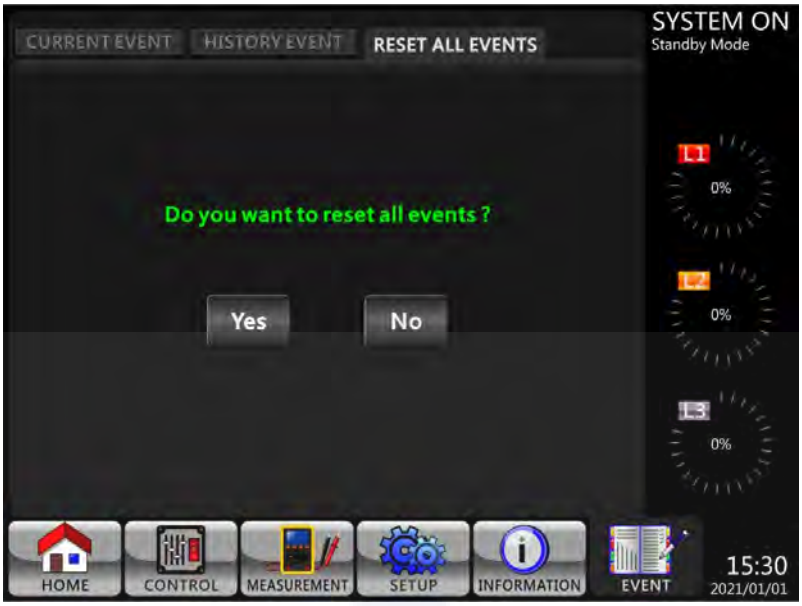


Figure 4-30 Reset All Events Confirmation screen

4.3 Alarm List

In **Table 4-12** is the complete list of UPS alarm messages.

Table 4-12: Alarm List

Text recorded in event lists shown on the LCD	Explanation
Fault! <01>Bus start fail	BUS soft start failed
Fault! <02>Bus over	BUS voltage high
Fault! <03>Bus under	BUS voltage low
Fault! <04>Bus unbalance	BUS voltage unbalanced
Fault! <06>Conv over cur	Converter over current
Fault! <11>INV start fail	Inverter soft start failed
Fault! <12>High INV VOL	Inverter voltage high
Fault! <13>Low INV VOL	Inverter voltage low
Fault! <14>INV A out SC	Phase A (Line to Neutral) output short circuited
Fault! <15>INV B out SC	Phase B (Line to Neutral) output short circuited
Fault! <16>INV C out SC	Phase C (Line to Neutral) output short circuited
Fault! <17>INV AB out SC	Phase A-Phase B (Line to Line) output short circuited
Fault! <18>INV BC out SC	Phase B-Phase C (Line to Line) output short circuited
Fault! <19>INV AC out SC	Phase C-Phase A (Line to Line) output short circuited
Fault! <1A>INV A N-fault	Phase A output negative power fault
Fault! <1B>INV B N-fault	Phase B output negative power fault
Fault! <1C>INV C N-fault	Phase C output negative power fault
Fault! <21>BATT SCR SC	Battery SCR short circuited
Fault! <23>INV relay open	Inverter relay open
Fault! <25>In&out swop	Line wiring fault
Fault! <29>BATT fuse broken	Battery fuse open
Fault! <31>Par commu fail	Parallel communication failed
Fault! <36>Par out cur unb	Parallel output current unbalanced
Fault! <41>Over temp	Over temperature
Fault! <42>DSP commu fail	DSP communication failed

Fault! <43>Overload	Heavy overload causes UPS to fault
Fault! <45>Charger error	As stated
Fault! <46>Incorrect UPS set	Incorrect UPS setting
Fault! <47>DSP&MCU commu fail	MCU communication failed
Fault! <49>In&out phase incomp	Input and output phase error
Fault! <61>BYP SCR SC	Bypass SCR short circuited
Fault! <62>BYP SCR open	Bypass SCR open
Fault! <63>INV R wave abnormal	Voltage waveform abnormal in R phase
Fault! <64>INV S wave abnormal	Voltage waveform abnormal in S phase
Fault! <65>INV T wave abnormal	Voltage waveform abnormal in T phase
Fault! <66>CT saturation	As stated
Fault! <67>BYP out SC	Bypass output short circuited
Fault! <68>BYP out line SC	Bypass output line to line short circuited
Fault! <69>INV SCR SC	Inverter Relay short circuited
Fault! <6C>Bus-VOL dec fast	BUS voltage drops too fast
Fault! <6D>CUR detect err	Current sampling value error
Fault! <6E>SPS Power fault	SPS Power fault
Fault! <6F>BATT reversal	Battery polarity reversed
Fault! <71>R PFC IGBT fault	PFC IGBT over-current in R phase
Fault! <72>S PFC IGBT fault	PFC IGBT over-current in S phase
Fault! <73>T PFC IGBT fault	PFC IGBT over-current in T phase
Fault! <74>R INV IGBT fault	INV IGBT over-current in R phase
Fault! <75>S INV IGBT fault	INV IGBT over-current in S phase
Fault! <76>T INV IGBT fault	INV IGBT over-current in T phase
Fault! <77> ISO Over temp	Isolation transformer over temperature
Fault! <79> Power Module Connect Fail	As stated
Warning! <01> BATT open	Battery not connected
Warning! <02> IP N loss	Input Neutral loss
Warning! <03> IP site fail	Input site failed
Warning! <04> Line phase error	As stated
Warning! <05> Bypass phase error	As stated
Warning! <06> Bypass FRE unstable	Bypass frequency unstable
Warning! <07> BATT over charge	Battery over charge
Warning! <08> BATT low	Battery voltage is too low.
Warning! <09> Overload warning	As stated
Warning! <0A> Fan lock warning	As stated
Warning! <0B> EPO active	As stated
Warning! <0D> Over temperature	As stated
Warning! <10> L1 IP fuse fail	L1 Input fuse failed
Warning! <11> L2 IP fuse fail	L2 Input fuse failed
Warning! <12> L3 IP fuse fail	L3 Input fuse failed
Warning! <21> Line connect dif	Line connect different
Warning! <22> Bypass connect dif	Bypass connect different
Warning! <24> Par INV vol dif	Parallel output voltage setting different
Warning! <33> Lock BYP OL 3 times	Locked in bypass after overload 3 times in 30 min
Warning! <34> AC input CURR unb	Three-phase AC input current unbalanced
Warning! <35> Bat Phase loss	Battery phase loss
Warning! <36> INV CURR unb	Inverter current unbalanced
Warning! <3A> maintain is open	Cover of maintain switch is open

Warning! <3B> Auto Adapt Fail	Phase Auto Adapt failed
Warning! <3C> Utility ext unb	Utility extremely unbalanced
Warning! <3D> Bypass unstable	As stated.
Warning! <3E> BATT VOL High	Battery voltage is too High
Warning! <3F> BATT VOL Unbalance	Battery voltage unbalanced
Warning! <40> Charge Short	As stated.
Warning! <41> Bypass Loss	As stated.
Warning! <42> ISO Over temp	Isolation transformer over temperature
Warning! <43> BUS soft Error	BUS soft start failure
Warning! <44> Redundancy Error	As stated.
Warning! <45> cRedundancy OverLoad	As stated.
Warning! <46> EEPROM Fail	EEPROM operation error
Warning! <48> Power module unlock	As stated.

4.4 History Record

Table 4-13: Important setting changes

Item No.	Description	Item No.	Description
1	Setup! Model Name	2	Setup! Turn On Password
3	Setup! Language	4	Setup! Change Turn On Password
5	Setup! Adjust Time	6	Setup! Nominal Power Display
7	Setup! System Installed Date	8	Setup! Output Voltage
9	Setup! System Last Maintain Date	10	Setup! Bypass Voltage Range
11	Setup! Battery Installed Date	12	Setup! Bypass Frequency Range
13	Setup! Battery Last Maintain Date	14	Setup! Converter Mode
15	Setup! Change Password	16	Setup! ECO Mode
17	Setup! Baud Rate	18	Setup! Bypass Mode
19	Setup! Audible Alarm	20	Setup! Auto-Restart
21	Setup! Factory Reset	22	Setup! Battery Mode Delay Time
23	Setup! EEPROM Reset	24	Setup! Shutdown Restore Time
25	Setup! EPO Function	26	Setup! Redundancy
27	Setup! Save Setting	28	Setup! Charger Test
29	Setup! Power Rating Setting	30	Setup! Battery Capacity in Ah
31	Setup! Nominal Battery Voltage	32	Setup! Battery Low Voltage
33	Setup! Maximum Charging Current	34	Setup! Battery Shutdown Voltage
35	Setup! Battery Low Capacity	36	Setup! Stop By Time
37	Setup! Periodic Battery Test	38	Setup! Temperature Compensation
39	Setup! BATTERY Age Alert	40	Setup! PRE-ALARM
41	Setup! Charging Voltage	42	Setup! Independent Battery
43	Setup! UPS Parallel	44	Setup! Auto-Restart Battery Voltage

Table 4-14: UPS mode changes

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		

Table 4-15: Control executions

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		

5. Interface and Communication

5.1 Dry Contact Port

As shown in figure 5-1, the Monitor Module includes dry contact ports (③~⑥), Extra SNMP slot, SNMP slot, LCD connection port, STS Power LED and serial communication ports (RS232 port, USB port, RJ45 to RS232 port) on the front panel.

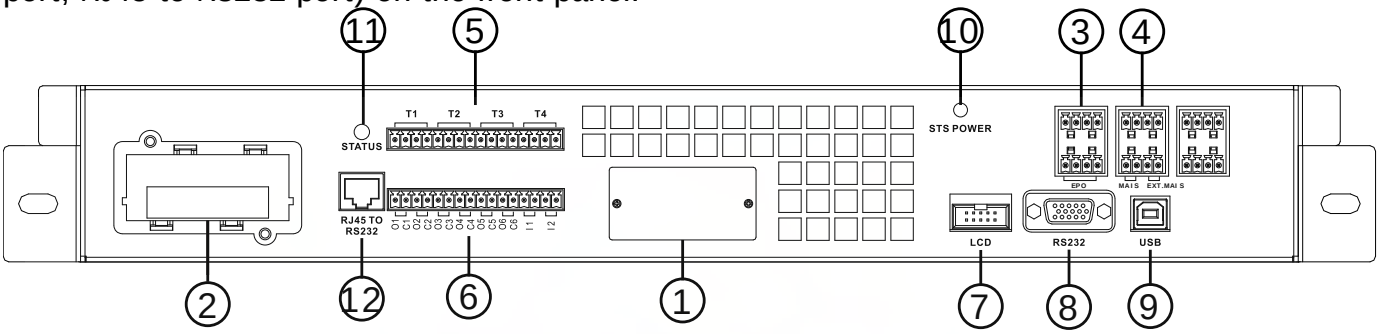


Figure 5-1 Front view of Monitor module

5.1.1 X1-Remote EPO Input Port

The Emergency Power off (EPO) function in UPS can be operated by an assigned remote contact. Logic N.C. turns off the UPS.

X1 is the remote EPO input port. The port is shown in Figure 5-2 and described in **Table 5-1**.

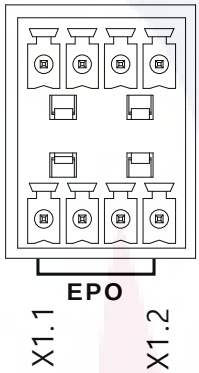


Figure 5-2 Remote EPO input port

Table 5-1: Description of remote EPO port

EPO Logic Setting	Position	Description
Short	X1.1 & X1.2	EPO is not activated when X1.1 & X1.2 shortened
Open	X1.1 & X1.2	EPO is activated when X1.1 & X1.2 opened

EPO Logic setting is Normal Closed (N.C), EPO is triggered when pins 1 and 2 of X1 are opened.

Note:

1. EPO function activates shutdown of the rectifiers, inverters and static transfer switch. But it does not internally disconnect the input power supply.

5.1.2 X4-Maintenance Bypass Switch State Port

X4 is the maintenance bypass switch port. The port is shown in Figure 5-3 and described in **Table 5-2**.

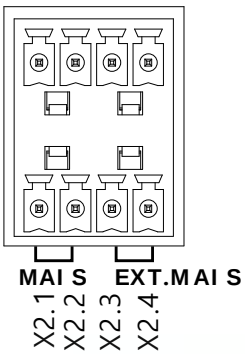


Figure 5-3 Maintenance Bypass Switch State port

Table 5-2: Description of Maintenance Bypass Switch State port

Name	Position	Description
Maintain Bypass Pin1	X2.1	Maintenance bypass switch state
Maintain Bypass Pin 2	X2.2	Maintenance bypass switch state
	X2.3	No use
	X2.4	No use

5.1.3 Dry Contact Output/ Input

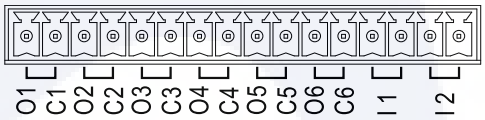
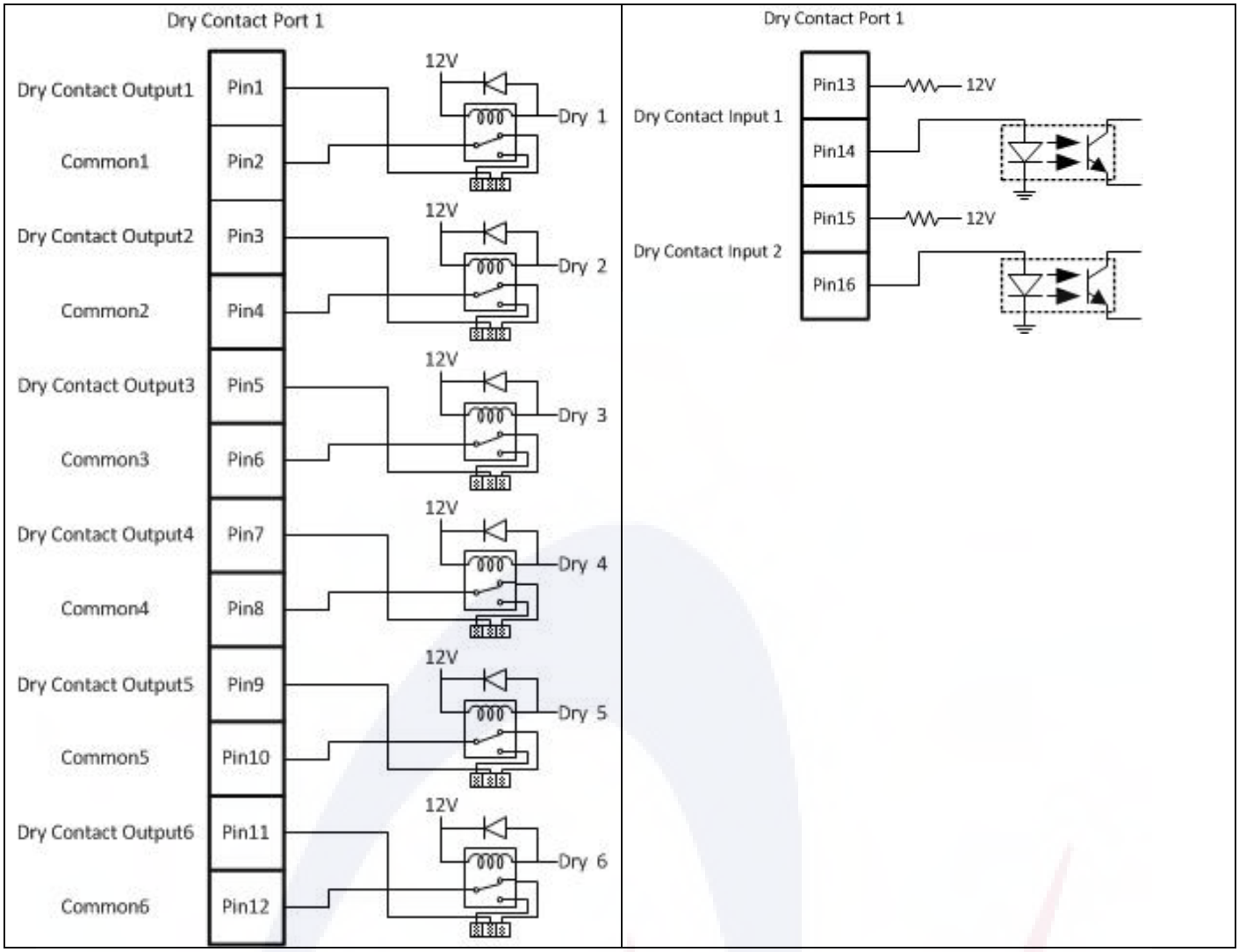


Figure 5-4 Dry Contact Output/ Input

O1C1~O6C6：These 6 dry contact outputs can be set to normally open or normally close by setting jumper. Please refer to the Chapter 5 Jumper Set-up for the details. It's also able to set the feature of each dry contact output port through the Extra Com Config tool software. Please refer to Chapter 4 Configuration for the details.	I1~I2：There are two sets of dry contact input to receive external signals for UPS to take response.



5.1.4 External Battery Cabinet Temperature (Option)

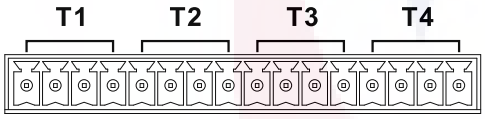
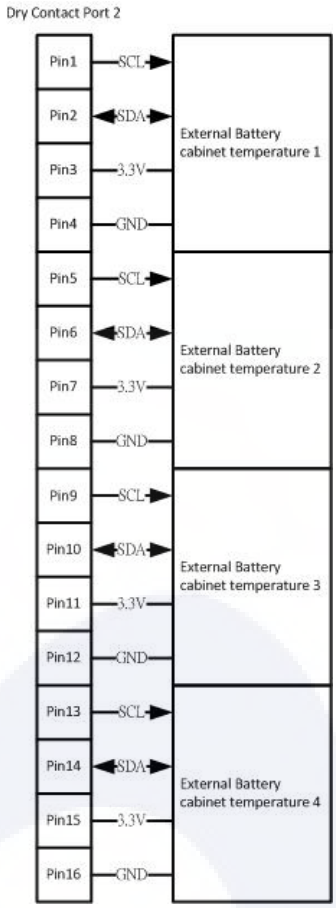


Figure 5-5 External Battery Cabinet Temperature

You may order “sensor kit” (optional accessory) to detect the temperature of external battery cabinet.



5.2 Extra SNMP Slot

This slot can insert an SNMP card of another size. This card can enhance the communication capability of the modular UPS.

Configuration:

Step 1: Please access www.power-software-download.com to install utility tool for Extra Communication in your computer. After software is installed successfully, it will pop up a plug icon in the tray.

Step 2: Start Extra Com Config software tool in your computer. Then, it will pop up a screen as Figure 5-6.

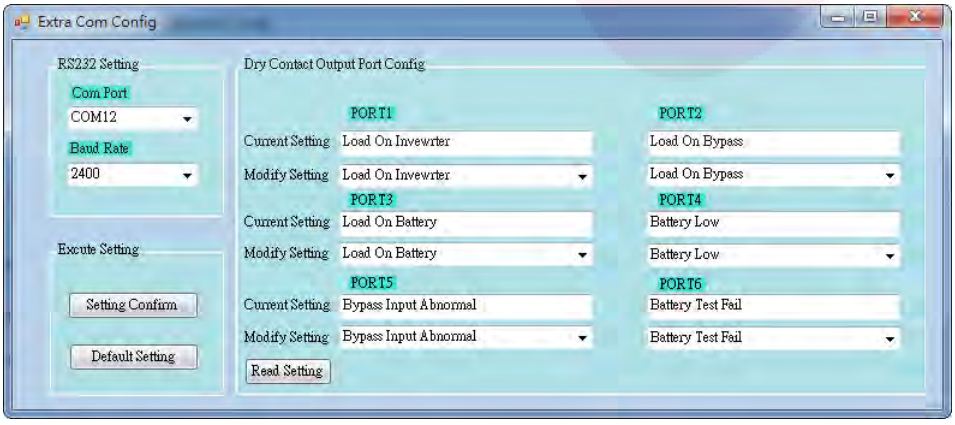


Figure 5-6

Step 3: Click “Read Setting” button to check the current setting of the dry contact output port. Refer to screen in Figure 5-7.

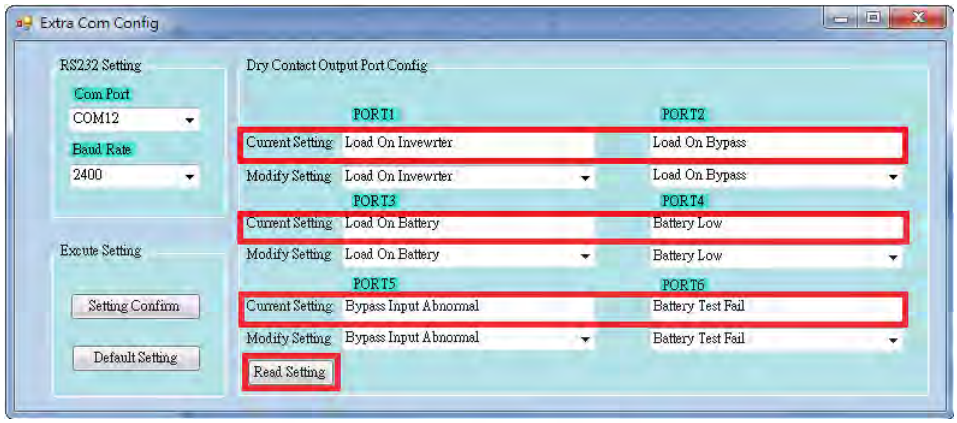


Figure 5-7

Step 4: Check all settings.
There are 20 messages to select for contact and listed in table 5-3. Once dry contact output settings are selected, click “Setting Confirm” button.

Table 5-3:

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 power module.
8	External parallel communication failure	Communication error between power modules.
9	Output overload warning/shutdown	Connected load is over rated output of the UPS.
10	Power module fault shutdown	The module fails and the UPS shuts down.
11	Power 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 (Please check with system setup.)
16	Bypass over temperature warning/shutdown	Bypass “static transfer switch” is over temperature.
17	Bypass static switch fault	The bypass “static transfer switch” is abnormal.
18	Line AC fail	Power failure
19	Bypass failure	Bypass source fails
20	Redundancy failure	Redundancy setting error.

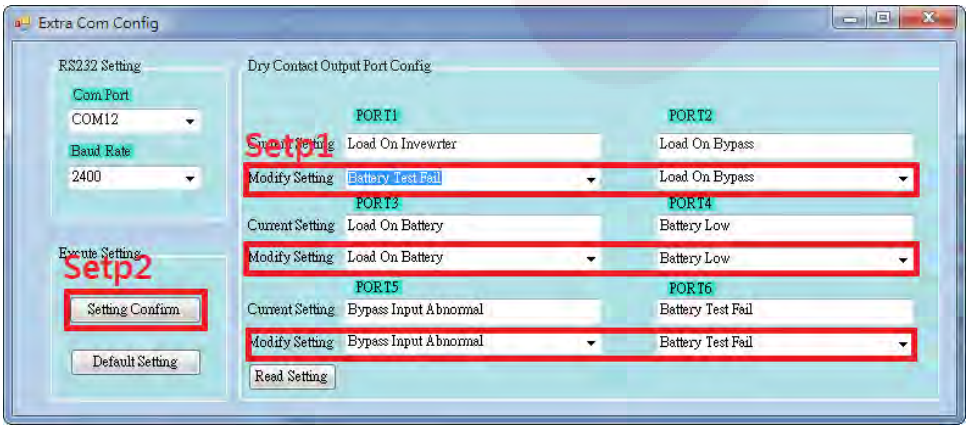


Figure 5-8

“Default Setting” button: It’s to set all configurations back to default value. Refer to Figure 5-9.

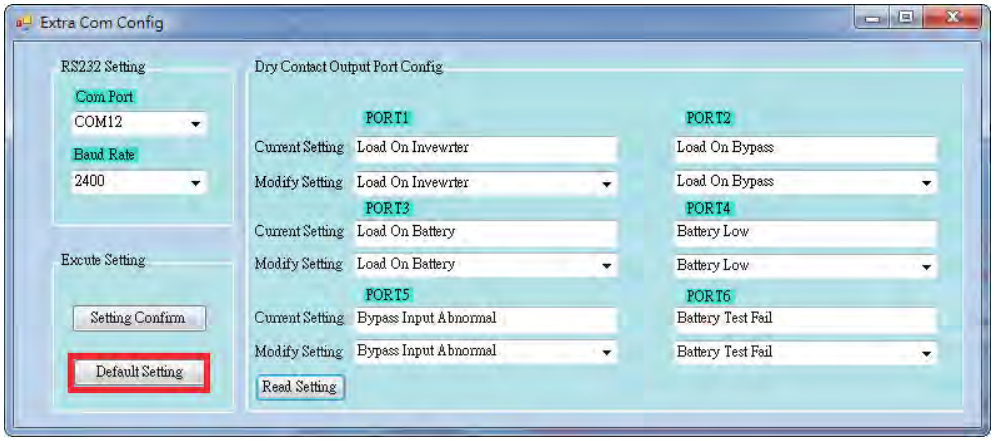


Figure 5-9

5.3 Local Communication Ports – RS232 & USB &RJ45

Simply use USB cable or RS232 cable or RJ45 to RS232 cable to connect USB port or RS-232 port to the PC as local communication.

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

5.4 SNMP Slot

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

6. Troubleshooting

A user will need to contact authorized service personnel to troubleshoot most of the Faults and Warnings.

LCD Message	Explanation	Solution
Fault! Bus Over Voltage	DC bus voltage is too high.	Contact service personnel.
Fault! Bus Under Voltage	DC bus voltage is too low.	Contact service personnel.
Fault! Bus Voltage Unbalance	Negative half DC bus voltage and positive half DC bus voltage are not balanced.	Contact service personnel.
Fault! Bus Soft Start Time Out	The rectifiers could not start within specified duration due to low DC bus voltage.	Turn off UPS and then restart the UPS. If it fails again, contact service personnel.
Fault! Inverter Soft Start Time Out	Inverter voltage cannot reach a desired level within specified duration.	Turn off UPS and then restart the UPS. If it fails again, contact service personnel.
Fault! Inverter Voltage High	Inverter Voltage is too high.	Contact service personnel.
Fault! Inverter Voltage Low	Inverter Voltage is too Low.	Contact service personnel.
Fault! R Inverter Voltage Short	R phase inverter Output is shorted.	Contact service personnel.
Fault! S Inverter Voltage Short	S phase inverter Output is shorted.	Contact service personnel.
Fault! T Inverter Voltage Short	T phase inverter Output is shorted.	Contact service personnel.
Fault! RS Inverter Voltage Short	R-S inverter Output is shorted.	Contact service personnel.
Fault! ST Inverter Voltage Short	S-T inverter Output is shorted.	Contact service personnel.
Fault! TR Inverter Voltage Short	T-R inverter Output is shorted.	Contact service personnel.
Fault! Inverter R Negative Power	R phase inverter Output Negative Power is out of range.	Contact service personnel.
Fault! Inverter S Negative Power	S phase inverter Output Negative Power is out of range.	Contact service personnel.
Fault! Inverter T Negative Power	T phase inverter Output Negative Power is out of range.	Contact service personnel.
Fault! Over Load Fault	Heavy load causes UPS to fault.	Reduce some load.
Fault! Over Temperature	Make sure adequate space is allowed for air circulation and the fans are working.	Check if the ambient temperature is over specification. Or contact service personnel.
Fault! CAN Fault	CAN communication fault	Contact service personnel.
Fault! DSP MCU Stop Communicate	As stated.	Contact service personnel.
Fault! Bypass SCR Fault	As stated.	Contact service personnel.
Warning! EPO Active	Check the EPO connector	Check if the pre-installed connector shorting X1.1 & X1.2 is loose or unplugged.
Warning! Over Load Fail	The load is demanding more power than the UPS can supply. UPS will transfer from Line mode to Bypass mode.	Lower the load within UPS capacity

Warning! Communicate CAN Fail	CAN communication error	Contact service personnel.
Warning! Over Load	In Line mode, the load is demanding more power than the UPS can supply.	Lower the load within UPS capacity
Warning! Battery Open	Battery not connected	1. Check battery breaker. 2. Check if the battery is well connected. 3. Check the setting of Nominal Battery voltage. 4. Contact service personnel if necessary.
Warning! Battery voltage High	Battery voltage is too High.	Check the setting of Nominal Battery voltage and contact service personnel.
Warning! Charge Fail	As stated.	Contact service personnel.
Warning! EEPROM Fail	EEPROM operation error	Contact service personnel.
Warning! Fan Lock	As stated.	Check if any fan is blocked or contact service personnel.
Warning! Line Phase Error	As stated.	Check if the Mains input phase sequence is correct and contact service personnel.
Warning! Bypass Phase Error	As stated.	Check if the Bypass input phase sequence is correct and contact service personnel.
Warning! N Loss	Neutral loss	Check if the Neutral connection is good and contact service personnel.
Warning! Redundancy Set Fail	As stated.	Check if the redundancy setting is correct and contact service personnel.
Warning! Maintenance Bypass	The UPS has entered maintenance bypass mode.	Check if the cable is plugged in well and if the mechanical lock plate on the Maintenance Bypass Breaker is locked well. Please refer to Figure 5-3-1.

7. Service

This chapter is about servicing the UPS, including the service procedures of the power module, control module and the replacement of air filter.

Warning:

1. Only authorized service personnel can service the power modules and battery modules.
2. Remove the power modules and battery modules from top to bottom to prevent the cabinet from toppling due to high center of gravity.

7.1 Procedure Of Replacing a Power Module

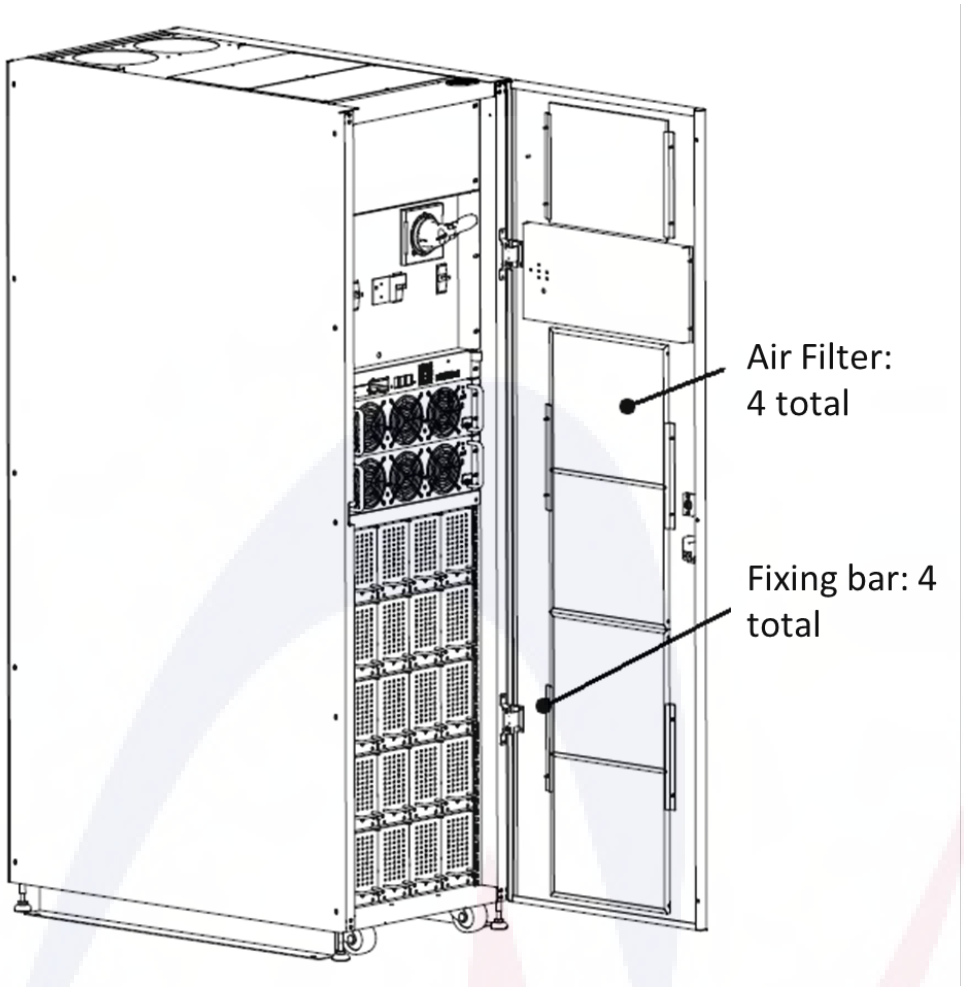
Warning:

- Make sure that UPS is in Line mode or Bypass mode.
- Make sure that at least one Power Module remains in the UPS cabinet after a Power Module is removed.
- If all power modules must be removed, the replacement MUST be performed in Maintenance Bypass Operation Mode.

1. Turn ready switch to “” position.
2. The Power Module FAULT LED (RED) indicator is lit to indicate that the Power Module has turned off its output and been disconnected from UPS system.
3. Use a screwdriver to remove the four screws from fixing holes.
4. Two people pull the Power Module out together and remove it from its slot.
5. After servicing the module, make sure that the DIP switch of the module is set correctly and that the ready switch is at “” position.
6. Push the module into the cabinet and tighten the screws on both sides into the fixing holes. Turn ready switch to “  ” position.
7. If the UPS has been in line mode, it will turn on the inverter of the re-installed Power Module automatically.

7.2 Procedure Procedures Of Replacing the Air Filter

As shown below, there are four air filters on the back of the UPS front door. They are secured to the front door by the four fixing bars.



The procedure for replacing an air filter is:

1. Open the front door of the UPS and you will see the air filters on the back of the door.
2. Remove a fixing bar on either side of the air filter to replace.
3. Remove the air filter and insert a clean one.
4. Replace the fixing bar.

8. Specifications

The chapter lists 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

* Safety	
Safety Conformance: IEC/EN 62040-1,UL1778 (5th Edition)	
Safety Markings : cTUVus, CE	
* EMI	
Conducted Emission.....: FCC PART15 CLASS A	
Radiated Emission.....: FCC PART15 CLASS A	
*EMS	
ESD.....:IEC/EN 61000-4-2	Level 4
RS..... ...:IEC/EN 61000-4-3	Level 3
EFT..... :IEC/EN 61000-4-4	Level 4
SURGE..... :IEC/EN 61000-4-5	Level 4
CS..... :IEC/EN 61000-4-6	Level 3
Power-frequency Magnetic field..... :IEC/EN 61000-4-8	Level 4
Low Frequency Signals.....:IEC/EN 61000-2-2	

8.2 Environmental Characteristics

Table 8-2: Environmental characteristics

Item	Unit	Specifications
Noise within 1 m	dB	Max. 75
Altitude	m	≤1000, derate power by 1% per 100m
Relative humidity	% RH	0 ~ 95, non-condensing
Operating temperature	°C	0 ~ 40°C
Storage and transport temperature for UPS	°C	-15 ~ 60°C

8.3 Mechanical Characteristics

Table 8-3: Mechanical characteristics

42U cabinet

Model	Unit	42U-140
Rated power	kVA/kW	140
Dimensions, W x D x H	mm	600 x 1065 x 2010
Weight	kg	392
Color	N/A	Black

33U cabinet

Model	Unit	33U-70
Rated power	kVA/kW	70
Dimensions, W x D x H	mm	600 x 1065 x 1477
Weight	kg	268
Color	N/A	Black

3U Power Module

Model	Unit	PM50	PM70
Rated power	kVA/kW	50KVA/50KW	70KVA/70KW
Dimensions, W x D x H	mm	750 x 438 x 130	750 x 438 x 130
Weight	kg	47	48

8.4 Electrical Characteristics (Input Rectifier)

Table 8-4: Rectifier AC input (mains)

Rated power (kVA)	Unit	50~140	
Rated AC input voltage	Vac	480(Ph-Ph)	
Input voltage tolerance	Vac	383~520; 330~382(output derated below 50%)	
Frequency	Hz	50/60 (tolerance: 40Hz ~ 70Hz)	
Power factor	kW/kVA	0.99 at full load) or 0.98 at half load	
Harmonic current distortion	THDI%	<4 (full load)	
Nominal current / phase	A	50kVA/50kW	62
		100kVA/100kW	87
		70kVA/70kW	124
		140kVA/140kW	174
Icc	kA	≤ 10kA	

8.5 Electrical Characteristics (Intermediate DC Circuit)

Table 8-5: Battery

Intermediate DC circuit		
Battery		External battery
Number of lead-acid cells	Nominal	216 (6cells x 36 12V battery blocks)
	Maximum	240 (6cells x 40 12V battery blocks)
	Minimum	192 (6cells x 32 12V battery blocks)
Float voltage	V/cell	2.28V/cell
Temperature compensation	mV/℃/cl	0~-5 (optional)
Ripple voltage	% V float	≤1
Ripple current	% C10	≤5
Boost voltage	VRLA	2.35V/cell
EOD voltage	V/cell	1.67-1.83V/cell (adjustable)
Battery charge	V/cell	Constant current and constant voltage charge mode
Battery charging power[1] max current	A	18A / per power module (adjustable)

Note:
1. At low input voltage the UPS recharging capability increases (up to the maximum capacity indicated).

8.6 Electrical Characteristics (Inverter Output)

Table 8-6: Inverter output (to load)

Rated power (kVA)	Unit	70/140	
Rated AC voltage[1]	Vac	480 (three-phase three-wire& three-phase four-wire&)	
Frequency	Hz	50/60 Auto Select	
Overload	%	105%~110% for 60min 110%~125% for 10min 126%~150% for 1min >150% for 200ms	
Steady state voltage stability	%	±1 (balanced load), ±2 (100% unbalanced load)	
Total harmonic voltage	%	<2 (linear load), <4 (non-linear load)	
Synchronization window		+/- 1Hz, +/- 2Hz, +/- 4Hz (default: 4Hz)	
Output rated current (480V)	A	70kVA/70kW 140kVA/140kW	84 168

8.7 Electrical Characteristics (Bypass Mains Input)

Table 8-7: Bypass mains input

Rated power (kVA)	Unit	70/140
Rated AC voltage1	Vac	480 (three-phase three-wire& three-phase four-wire&)
Overload	%	105%~110% for 60min 110%~125% for 10min 126%~150% for 1min >150% for 200ms
Upstream protection, bypass line	N/A	Circuit breaker, rated up to 100% of nominal output current.
Frequency	Hz	50/60 Auto Select
Transfer time (between bypass and inverter)	ms	Line ←→Battery 0ms Inverter ←→Bypass 0ms (When phase lock fails, <4ms interruption occurs from inverter to bypass) Inverter ←→ECO ≤10ms
Bypass voltage tolerance	%Vac	Upper limit: +10, +15 or +20, default: +15 Lower limit: -10, -20, -30 default: -20
Frequency Range	Hz	+/- 1Hz, +/- 2Hz, +/- 4Hz (default: 4Hz)