User Manual

3/3 100K~200K Online UPS

Uninterruptible Power Supply System

Version: 1.0

Please comply with all warnings and operating instructions in this manual strictly. Save this manual properly and read carefully the following instructions before installing the unit. Do not operate this unit before reading through all safety information and operating instructions carefully.

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1. Safety and EMC instructions

Please read carefully the following user manual and the safety instructions before installing the unit or using the unit!

1-1. Transportation and Storage

Please transport the UPS system only in the original package to protect against shock and impact.

The UPS must be stored in the room where it is ventilated and dry. Ambient temperature must not exceed 40°C

1-2. Preparation

Condensation may occur if the UPS system is moved directly from cold to warm environment. The UPS system must be absolutely dry before being installed. Please allow at least two hours for the UPS system to acclimate the environment.

Do not install the UPS system near water or in moist environments.

Do not install the UPS system where it would be exposed to direct sunlight or nearby heater.

Do not block ventilation holes in the UPS housing.

1-3. Installation

Do not connect appliances or devices which would overload the UPS (e.g. big motor-type equipment)) to the UPS output sockets or terminal.

Place cables in such a way that no one can step on or trip over them.

Do not block air vents in the housing of UPS. The UPS must be installed in a location with good ventilation. Ensure enough space on each side for ventilation.

UPS has provided earthed terminal, in the final installed system configuration, equipotential earth bonding to the external UPS battery cabinets.

The UPS can be installed only by qualified maintenance personnel.

An appropriate disconnect device as short-circuit backup protection should be provided in the building wiring installation.

An integral single emergency switching device which prevents further supply to the load by the UPS in any mode of operation should be provided in the building wiring installation.

Connect the earth before connecting to the building wiring terminal.

Installation and Wiring must be performed in accordance with the local electrical laws and regulations.

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.

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. Connection Warnings

- This UPS should be connected with **TN** earthing system.
- The power supply for this unit must be three-phase rated in accordance with the equipment nameplate. It also must be suitably grounded.

WARNING
HIGH LEAKAGE CURRENT
EARTH CONNECTION ESSENTIAL
BEFORE CONNECTING SUPPLY

- Use of this equipment in life support applications where failure of this equipment can reasonably be expected to cause the failure of the life support equipment or to significantly affect its safety or effectiveness is not recommended. Do not use this equipment in the presence of a flammable anesthetic mixture with air, oxygen or nitrous oxide.
- Connect your UPS Power Stage's grounding terminal to a grounding electrode conductor.
- This is a product for commercial and industrial application in the second environment – installation restriction or additional measures may be needed to prevent disturbances.
- In accordance with safety standard EN-IEC 62040-1, installation has to be provided with a《Backfeed Protection》 system, as for example a contactor, which will prevent the appearance of voltage or dangerous energy in the input mains during a mains fault (see figure 24 and respect the wiring diagram of «Backfeed Protection» depending if the equipment is with signal or three phase input).

There can be no derivation in the line that goes from the «Backfeed Protection» to the UPS, as the standard safety would be infringed.

- Warning labels should be placed on all primary power switches installed in places away from the device to alert the electrical maintenance personnel of the presence of a UPS in the circuit. The label will bear the following or an equivalent text:

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

Risk of Voltage Backfeed

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

1-5. Operation

Do not disconnect the earth conductor cable on the UPS or the building wiring terminals in any time since this would cancel the protective earth of the UPS system and of all connected loads.

In order to fully disconnect the UPS system, first press the "OFF" button and then disconnect the mains.

Ensure that no liquid or other foreign objects can enter into the UPS system.

The UPS can be operated by any individuals with no previous experience.

1-6. Standards

*** Safety**	
IEC/EN 62040-1	
*** EMI**	
Conducted Emission.....:IEC/EN 62040-2	Category C3
Radiated Emission.....:IEC/EN 62040-2	Category C3
***EMS**	
ESD.....:IEC/EN 61000-4-2	Level 3
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
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.	

2. Installation and Operation

There are two different types of online UPS: single input and dual input models. Please refer to the following model table.

Model	Type	Model	Type
100KVA	Single input	100KVA DUAL	Dual input
120KVA		120KVA DUAL	
160KVA		160KVA DUAL	
200KVA		200KVA DUAL	

2-1. Unpacking and Inspection

1. Use a forklift to move the product to installed area. Refer to Figure 2-1. Please make sure the bearing capacity of forklift is sufficient.
2. Please follow the order in Figure 2-2 to remove carton and foams.
3. Remove two fixing plates located on the two sides of the unit as shown 1, 2 and 3 in Figure 2-3. Loosen leveling feet as shown 4 in Figure 2-3 by rotating them in counterclockwise. Then, move the cabinet from the pallet.
4. To fix the cabinet in position, simply rotate leveling feet clockwise. Refer to Figure 2-4.

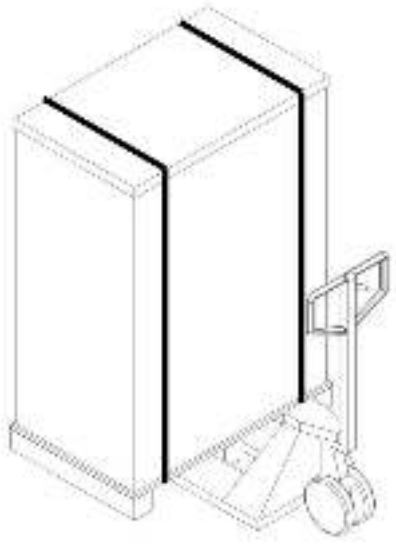


Figure 2-1

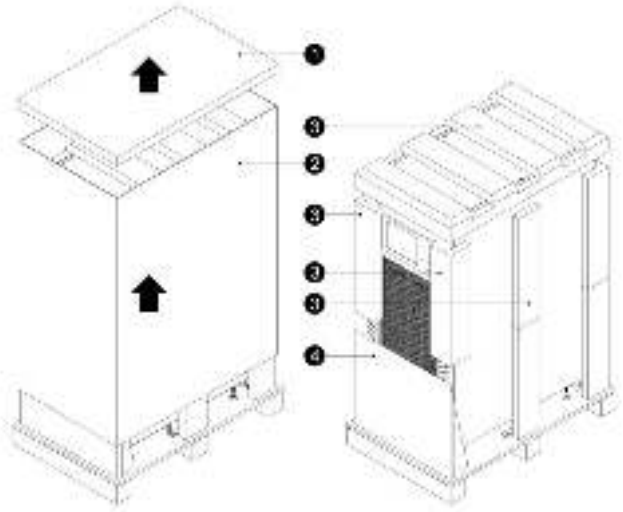


Figure 2-2

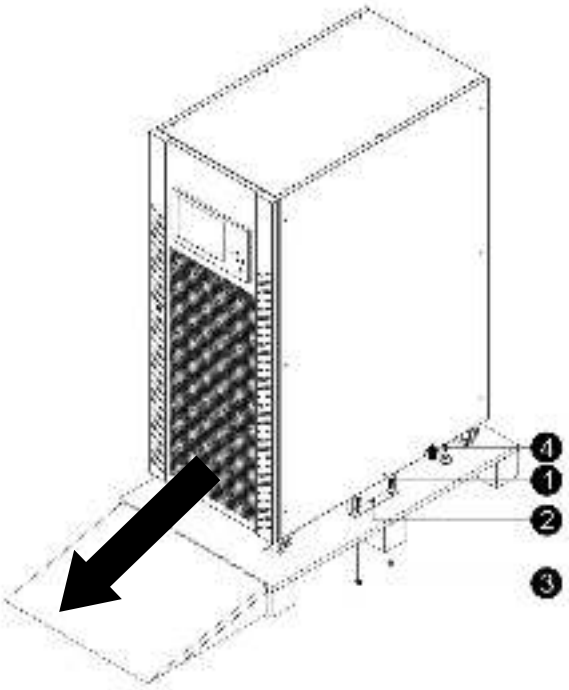


Figure 2-3

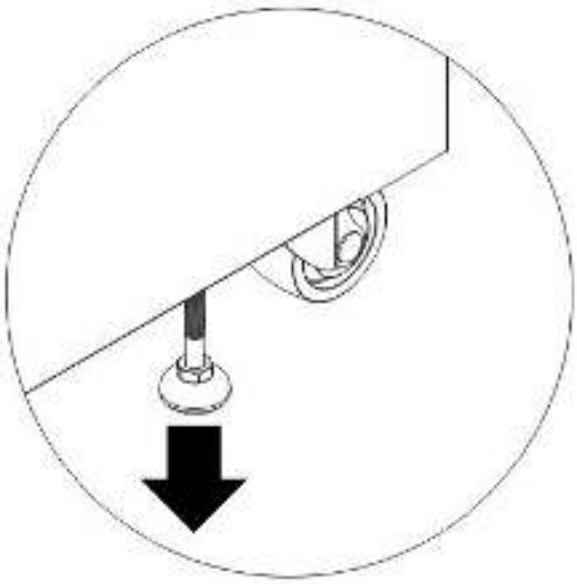


Figure 2-4

Unpack the package and check the package contents. The shipping package contains:

user manual

monitoring software CD

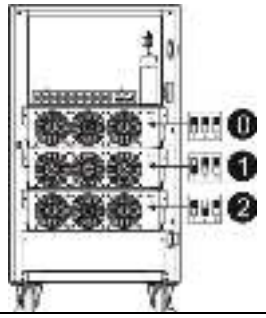
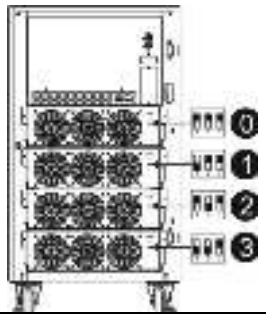
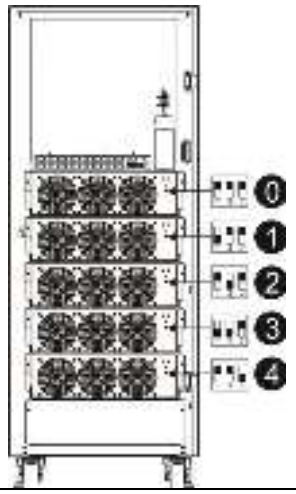
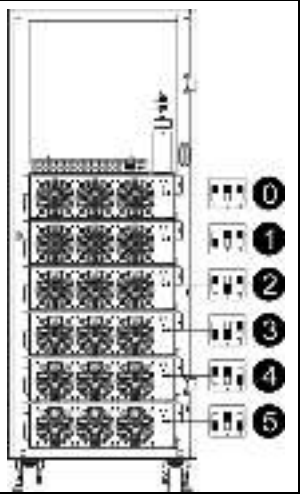
RS-232 cable

USB cable

NOTE: Before installation, please inspect the unit. Be sure that nothing inside the package is damaged during transportation. Do not turn on the unit and notify the carrier and dealer immediately if there is any damage or lacking of some parts. Please keep the original packages in a safe place for future use. It is recommended to keep each equipment and battery set in their original packages because they have been designed to assure the maximum protection during transportation and storage.

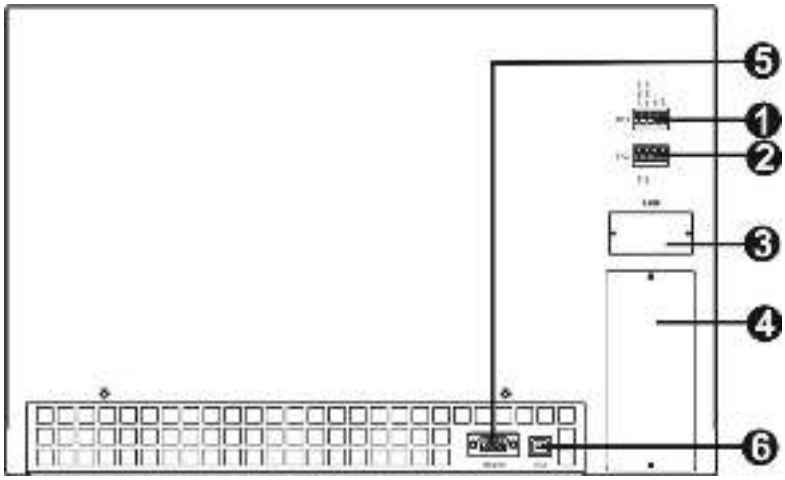
2-2. Open Front Panel View

Each UPS is equipped with a front door key. After opening the front door, you will see communication area and several power stages inside. And from each power stage, you can easily identify their ID as shown below:

Power Rating	100K	120K	160K	200K
Power stage ID				

Interface and Communication

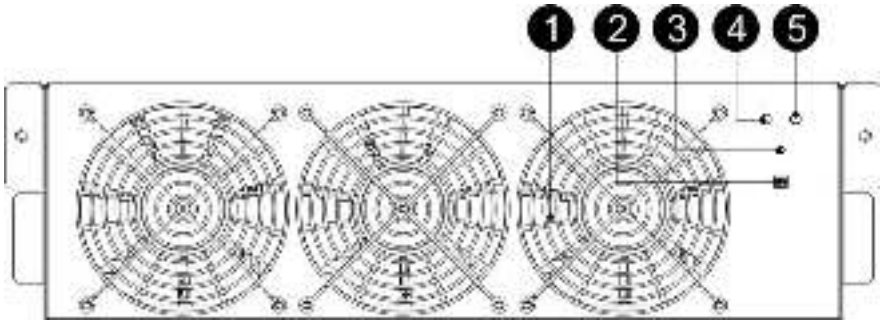
This UPS is equipped with various communications. For the detailed operation, please check chapter 4 Interface and Communication.



1. Dry contact port X1
2. Dry contact port X2
3. SNMP slot
4. Extended communication slot
5. RS-232 port
6. USB port

Power Stage

Each power stage includes a power factor correction rectifier, a battery charger, an inverter and control circuit.

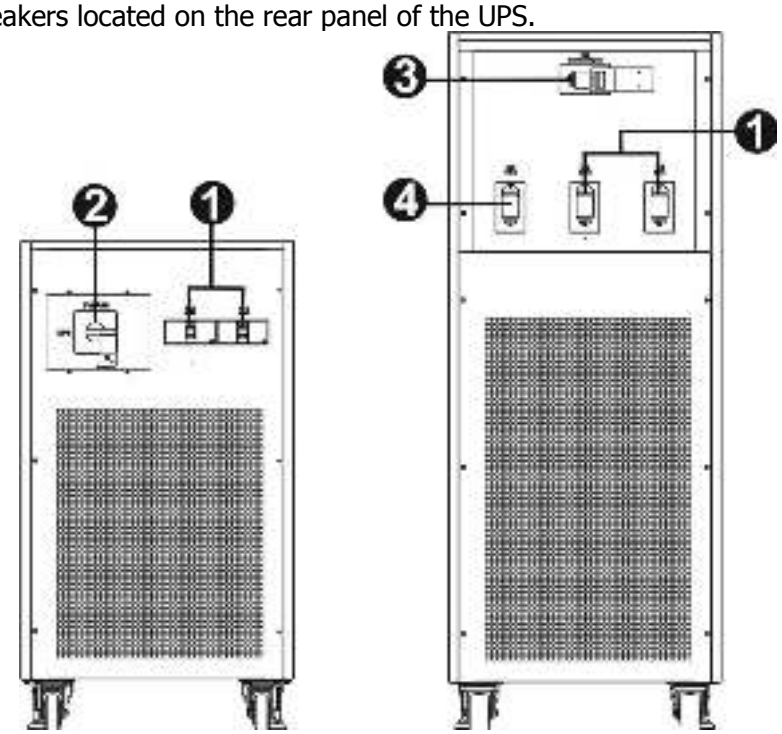


No.	Item	Description
①	Fan	This power stage uses forced convection cooling by these fans. Cooling air enters the power stage through ventilation grills and exhausted through grills located in the rear of the power stage. Please do not block the ventilation area.
②	DIP Switches	There are three DIP switches for Power Stage address setting. In the same cabinet, each Power Stage ID MUST be exclusive. Please refer to power stage

		ID table above.	
③	Battery Start Button	When AC input is not existing, use this button to start battery power for UPS.	
④	FAULT LED	ON	The power stage is in fault condition.
		ON/OFF 0.5 sec	The power stage IDs in conflict.
⑤	RUN LED	ON	The power stage normally works as a slave stage.
		ON/OFF 0.5 sec	The power stage normally works as a master stage.
		ON/OFF 0.15 sec	The CAN Bus communication doesn't work.

2-3. Rear Panel View

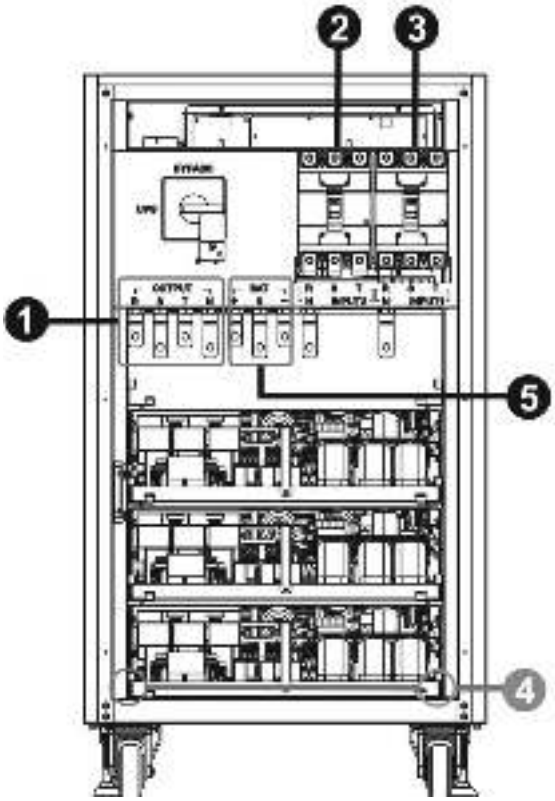
There are several breakers located on the rear panel of the UPS.



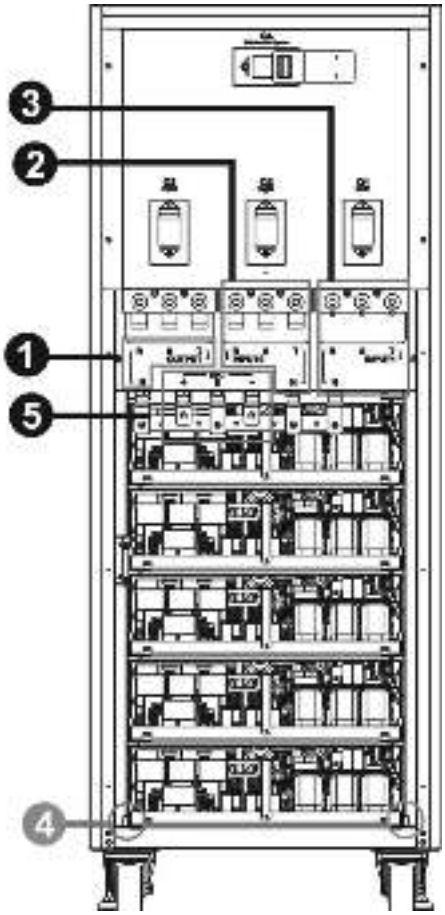
100KVA/120KVA **160KVA/200KVA**

1. Input breaker Q1 and Q2
2. Maintenance bypass switch
3. Maintenance bypass breaker (Q4)
4. Output breaker Q3

2-4. Wiring Terminal View



100KVA/120KVA



160KVA/200KVA

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

2-5. Single UPS Installation

Installation and wiring must be performed in accordance with the local electric laws/regulations and execute the following instructions by professional personnel.

1) Make sure the mains wire and breakers in the building are enough for the rated capacity of UPS to avoid the hazards of electric shock or fire.

NOTE: Do not use the wall receptacle as the input power source for the UPS, as its rated current is less than the UPS's maximum input current. Otherwise the receptacle may be burned and destroyed.

2) Switch off the mains switch in the building before installation.

3) Turn off all the connected devices before connecting to the UPS.

4) Prepare wires based on the following table:

Model	Power cable (mm^2)				
	Input(Ph)	Output(Ph)	Neutral	Battery	Ground
100KVA	70 mm^2	70 mm^2	70 mm^2	150 mm^2	70 mm^2
120KVA	95 mm^2	95 mm^2	95 mm^2	240 mm^2	95 mm^2
160KVA	150 mm^2	150 mm^2	150 mm^2	120mm^2x 2	150 mm^2
200KVA	185 mm^2	185 mm^2	185 mm^2	185mm^2x 2	185 mm^2

Table 2-1

WARNING:

- Before connecting any wires, make sure the AC input and battery power is completely cut off.
- Make sure the breakers, input1 breaker (Q1), input2 breaker (Q2), output breaker (Q3), maintenance breaker (Q4), and battery breaker are all in the "**OFF"** position.
- Make sure the maintenance bypass switch is in "UPS" position.

5) Remove the terminal block cover on the rear panel of UPS. Then, connect the input1, input2 (only available for dual input model), output and battery wires according to the function indicated in terminal block. (Connect the earth wire first when making wire connection. Disconnect the earth wire in the last when making wire disconnection!)

NOTE 1: Make sure that the wires are connected tightly with the terminals.

NOTE 2: Please install the output breaker between the output terminal and the load. It's necessary that this breaker should be qualified with leakage current protective function.

6) Put the terminal block cover back to the rear panel of the UPS.

Warning:

- Make sure the UPS is not turned on before installation. The UPS should not be turned on during wiring connection.

Warning:

- Make sure a DC breaker or other protection device between UPS and external battery pack is installed. If not, please install it carefully. Switch off the battery breaker before installation.

NOTE: Set the battery pack breaker in "OFF" position and then install the battery pack.

- Pay highly attention to the rated battery voltage marked on the label. If you want to change the numbers of the battery pack, please make sure you modify the setting simultaneously. The connection with wrong battery voltage may cause permanent damage of the UPS. Make sure the voltage of the battery pack is correct.
- Make sure the protective earth ground wiring is correct. The current spec, color, position, connection and conductance reliability of the wires should be checked carefully.
- Make sure the utility input & output wiring is correct. The current spec, color, position, connection and conductance reliability of the wires should be checked carefully. Make sure the L/N site is correct, not reverse or short-circuited.

2-6. UPS Installation for Parallel System

The section introduces how to install and set up the multiple UPSs to run parallel UPS system.

Warning:

- The input harmonic current distortion will be higher than 3% and less than 4.5% in parallel UPS system.
- You need to order the parallel cables for this kind of application. They are required for the installation and operation.
- If you want to install the parallel UPS system by yourself, installation must be under the supervision of authorized engineers or service personnel.

2-6-1. Input and Output Wiring

1. When install the parallel system, the length of input wires (R, S, T, N) in the one UPS of the parallel system must be equal to another UPS input wires. Likewise, the length of output wires (R, S, T, N) in the one UPS of the parallel system must be equal to another UPS output wires. The same length of input and output wires of two UPS s are required. Otherwise, it will cause the unbalance current on output load.
2. Refer to section "2-5. Single UPS Installation" about the input and output wiring and battery wiring methods in User Manual.

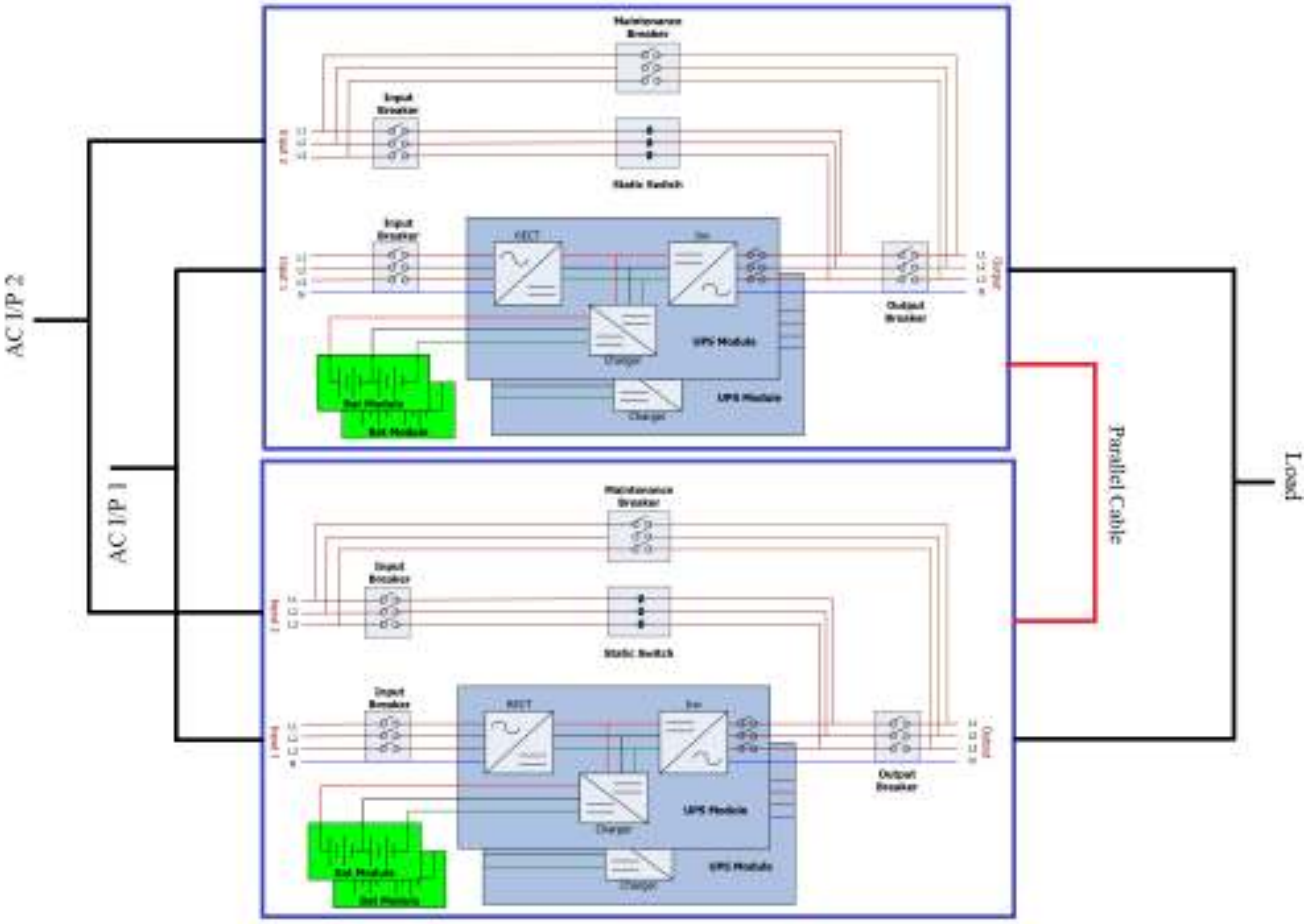


Figure 2-5 Dual input wiring in parallel system

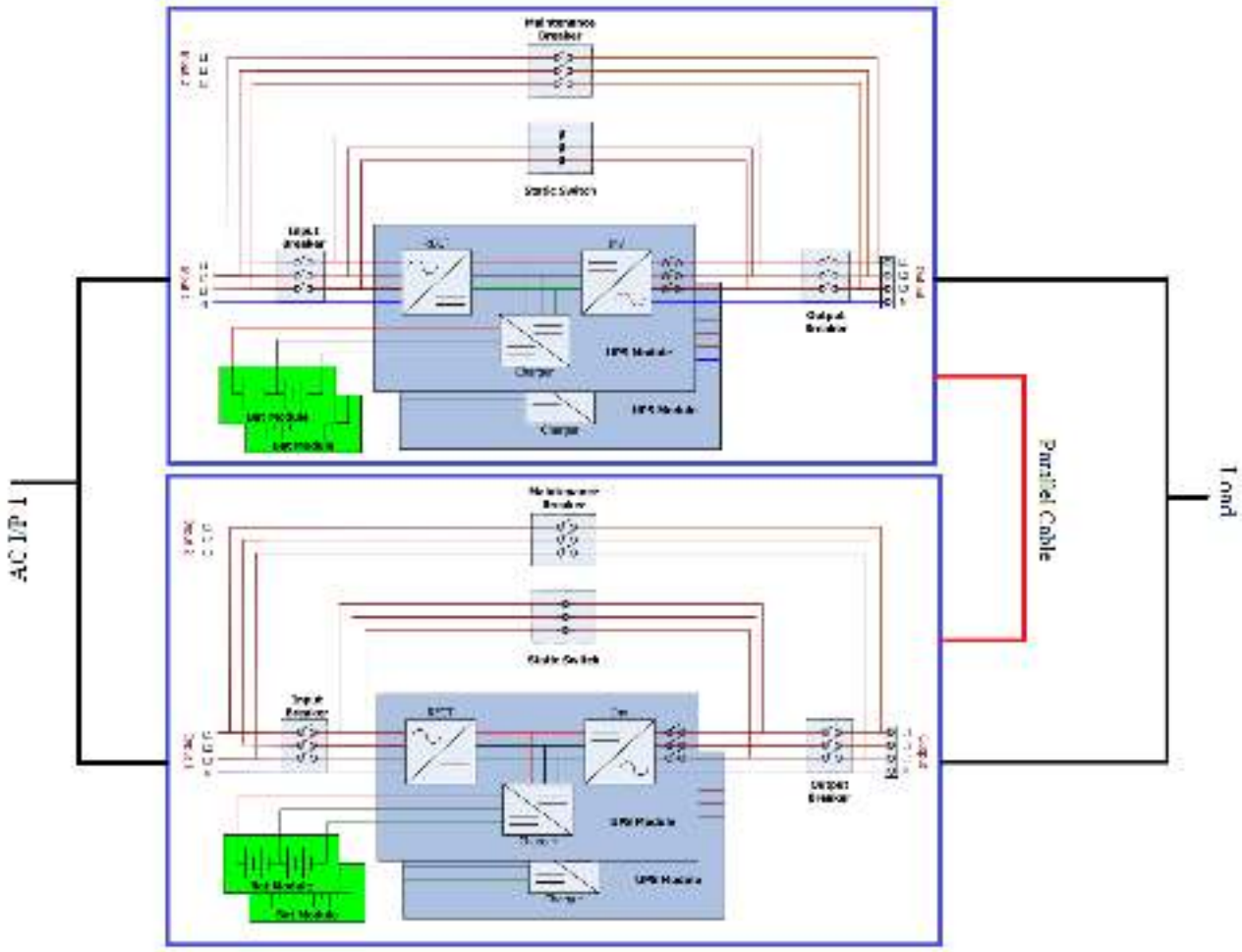
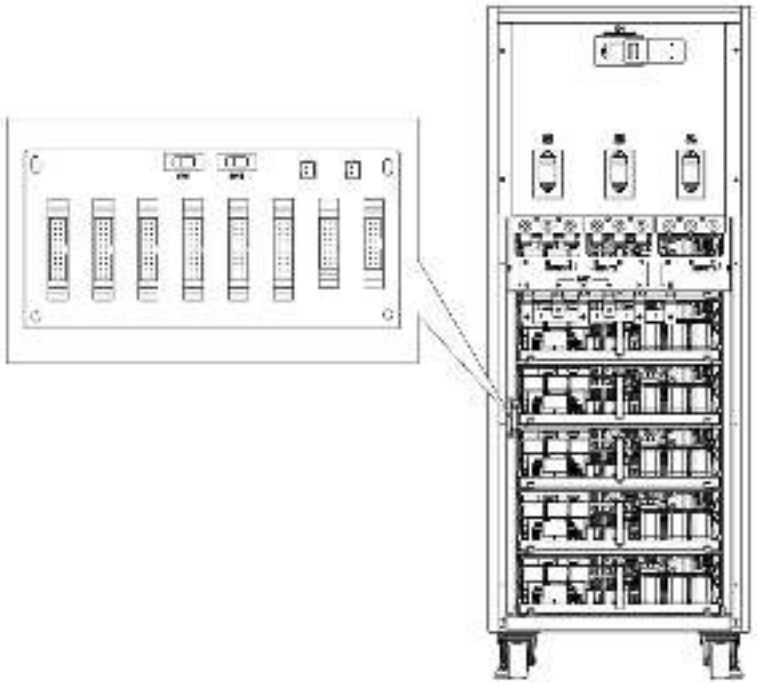


Figure 2-6 Single input wiring in parallel system

2-6-2. Parallel Board Setting

2-6-2-1. Install Parallel Board of UPS 1

1. Please set SW2 on the parallel board of the UPS 1 to the right side as shown in the Figure 2-7.



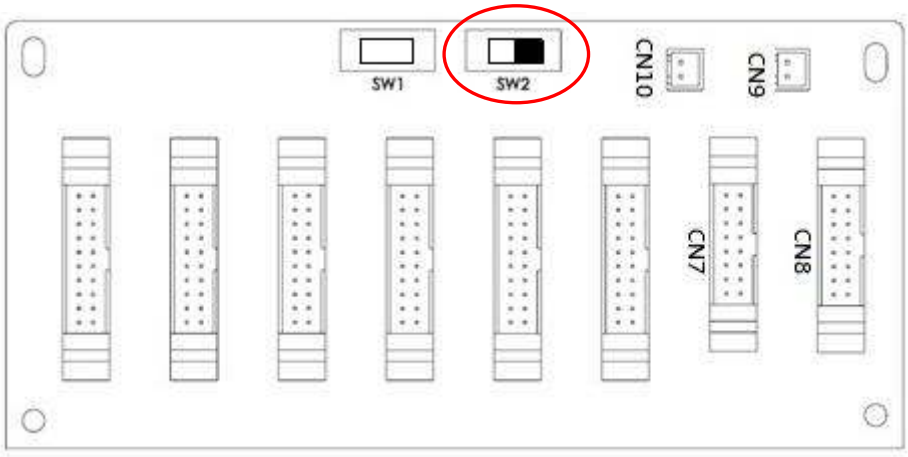


Figure 2-7 SW2 switch position on the UPS 1

2-6-2-2. Install Parallel Board of UPS2

1. Please set SW2 on the parallel board of the UPS 2 to the left side as shown in the Figure 2-8.

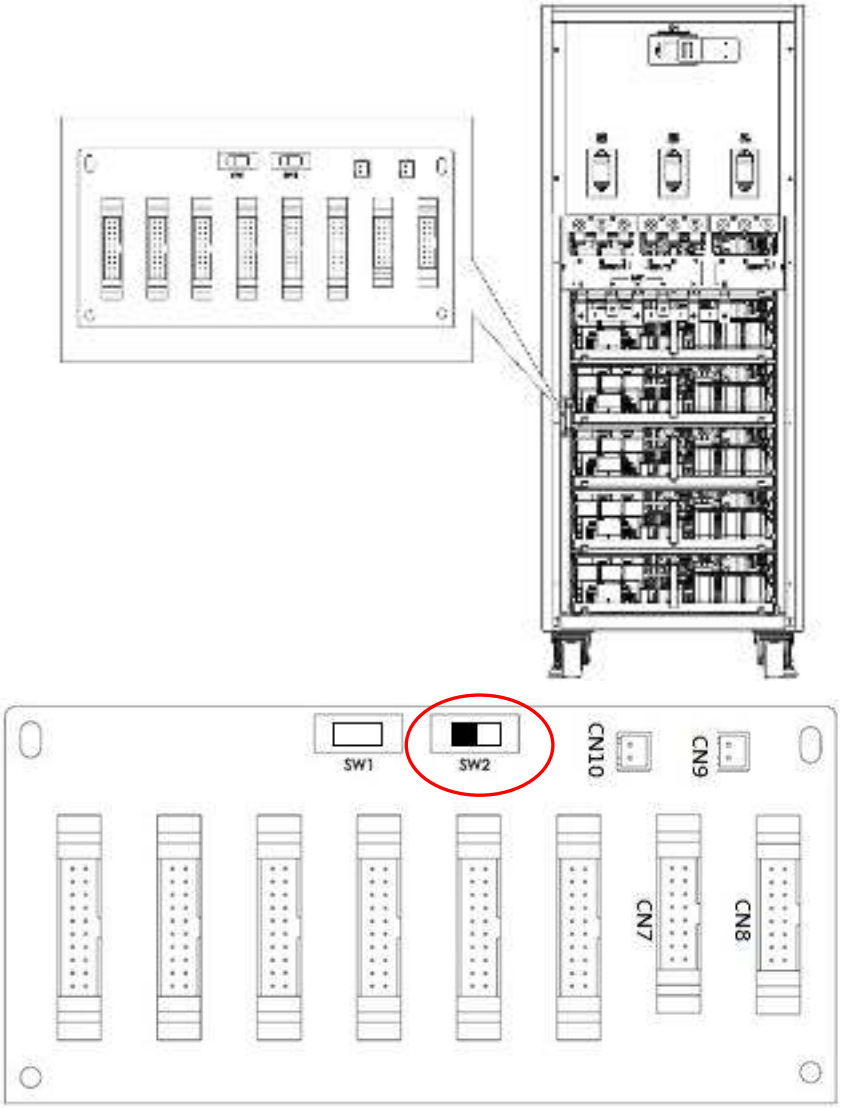


Figure 2-8 SW2 switch position on the UPS 2

2-6-3. Parallel Function Setting

1. For the input and output wiring, please be sure to follow section 2-6-1. Input and Output Wiring.
2. For the parallel board setting, please be sure to follow section 2-6-2. Parallel Board Setting process.

Please confirm if the two steps above have been completed correctly, and then set parallel function and battery configuration. Please follow the steps below:

1. **Do not connect Parallel Cable until informed.**
2. Place the input breakers (Q1) of two UPSs in the "ON" position. But keep the output breakers (Q3) of two UPSs in the "OFF" position.
3. Turn on the battery breaker.
4. Turn on the external AC source breaker to apply AC input source to two UPSs.
5. Wait for the wake-up of UPSs. Then, start to set UPS 1.
6. Set up the parallel function through the LCD panel of the UPS 1. Enter the "PARALLEL" item in "SETUP" page. (Refer to User Manual 3-2-5-5. Setup-Parallel screen operation method)
7. Enable the "UPS Parallel" function of UPS 1. (**Ignore the warning of "Parallel UPS Cable Loosen"**)
8. Set up the battery configuration as "independent" or "common" battery, depending on the real application.
9. After setting these two parameters, use the "Save Setting" item in "General" screen of "SETUP" page to save settings.
10. Continue setting the UPS 2.
11. Setup the parallel function through the LCD panel of the UPS 2. Enter the "PARALLEL" item in "SETUP" page. (Refer to User Manual 3-2-5-5. Setup-Parallel Screen operation method)
12. Enable the "UPS Parallel" function of UPS 2. (**Ignore the warning of "Parallel UPS Cable Loosen"**)
13. Set up the battery configure as "independent" or "common" battery, depending on the real application.
14. After setting these two parameters, use the "Save Setting" item in "General" screen of "SETUP" page to save settings.
15. Turn off the external AC source breaker and wait for complete shutdown of two UPSs.
16. Turn off battery breaker.

2-6-4. Parallel Cable Connection

There are two connectors at the end of parallel cable. One is 16-pin connector and the other is 2-pin connector. Insert the 16-pin connector into the CN7 of the parallel board and 2-pin connector into the CN10 of the parallel board. Please use the same way to connect the parallel cable on these two UPSs. Please refer to connector position as shown in Figure 2-9 & 2-10 on next page.
For the UPS with two parallel boards, please insert the connectors into any one of two boards.

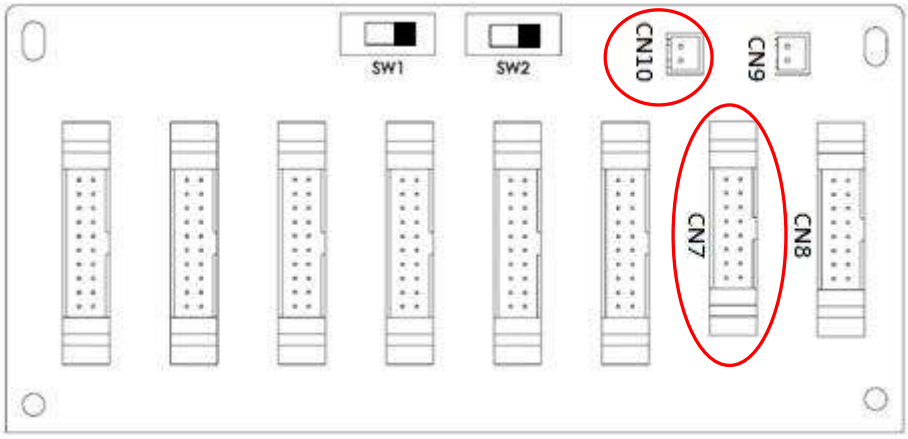


Figure 2-9 UPS 1 Parallel Board

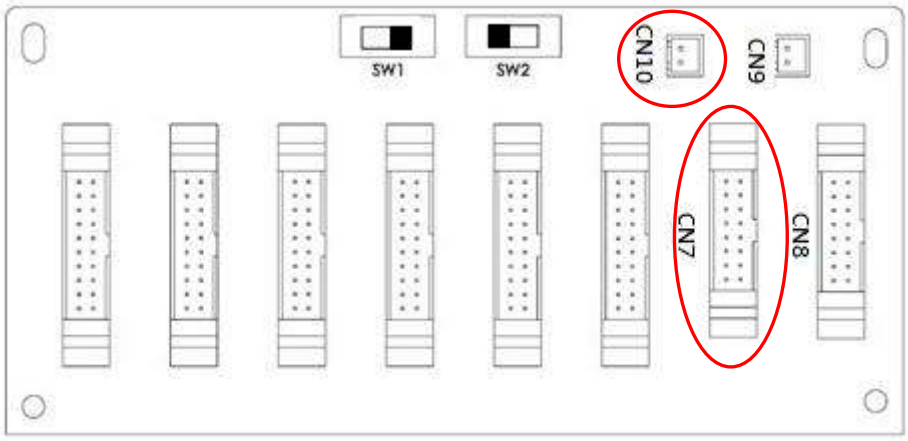


Figure 2-10 UPS 2 Parallel Board

Warning:
The parallel cable of each UPS must to be connected correctly. Any wrong connection will cause the UPS system to operate abnormally.

2-6-5. Parallel System Turn On Procedure

1 Please make sure the sections from 2-6-1. to 2-6-4. are fully followed.
2 Please confirm the input breaker and output breakers of each UPS have already been turned "ON".
3 Turn on the battery breaker.
4 Turn on the external AC source breaker to apply AC input source to two UPSs.
5 Please confirm the whole system without any abnormal event through the panel display. (Refer to User Manual 3-2-7. EVENTS Screen)
6 Turn on the UPS by pressing the power switch on the front panel of the UPS or through control page in LCD panel. (Refer to User Manual 3-2-3. Control Screen)

2-7. Software Installation

For optimal computer system protection, install UPS monitoring software to fully configure UPS shutdown.

3. Control Panel and LCD Operation

3-1. Introduction

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

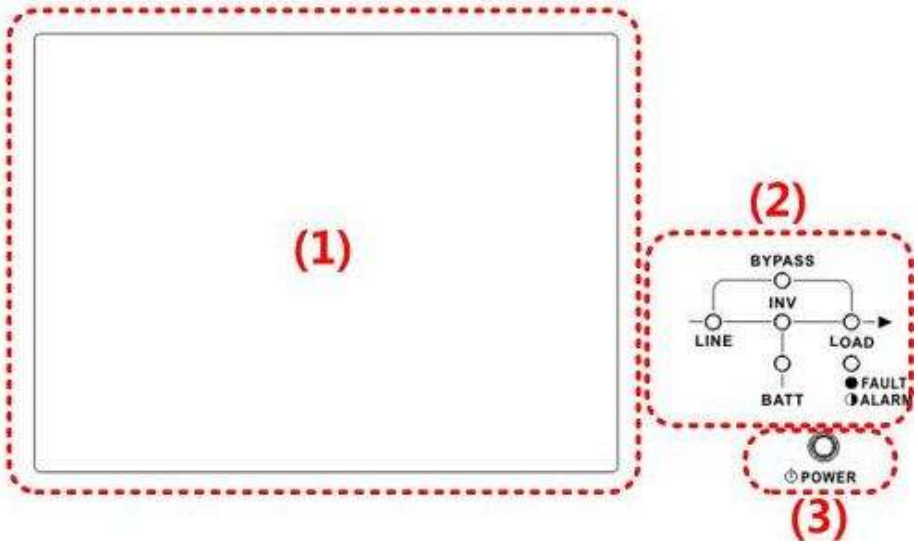


Figure 3-1 Control panel

(1) LCD display: Graphic display and all measured parameters.
(2) LED indications. Refer to Table 3-1.
(3) Control keys. Refer to Table 3-2.
(4) Audible Alarm. Refer to Table 3-3.

Table 3-1: LED indications

LED	Color	Status	Definition
LINE	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.
LOAD	Green	On	There is power output for the load.
		Off	There is no power output for the load.
INV	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.
FAULT/ ALARM	Red	On	UPS fault.
		Flashing	UPS alarm.
		Off	Normal.

Table 3-2: Control key table

Control Key	Description
Power On/Off	Turn on UPS or Turn off UPS. (hold 2-Sec)

Table 3-3: Audible Alarm

UPS condition	Description
Power on/off	Buzzer sounds two seconds.
Battery mode	Buzzer sounds every 2 seconds.
Low battery	Buzzer sounds every half seconds.
UPS alarm	Buzzer sounds every 1 second.
UPS fault	Buzzer continuously sounds.

3-2. Screen Description

3-2-1. Initial Screen

Upon turning on, the UPS will execute self-test first. The initial screen will remain approximately 5 seconds as shown below.

Figure 3-2 Initial screen

3-2-2. Main Screen

After initialization, the main screen will display as shown in Figure 3-3. Main screen is divided into six parts.

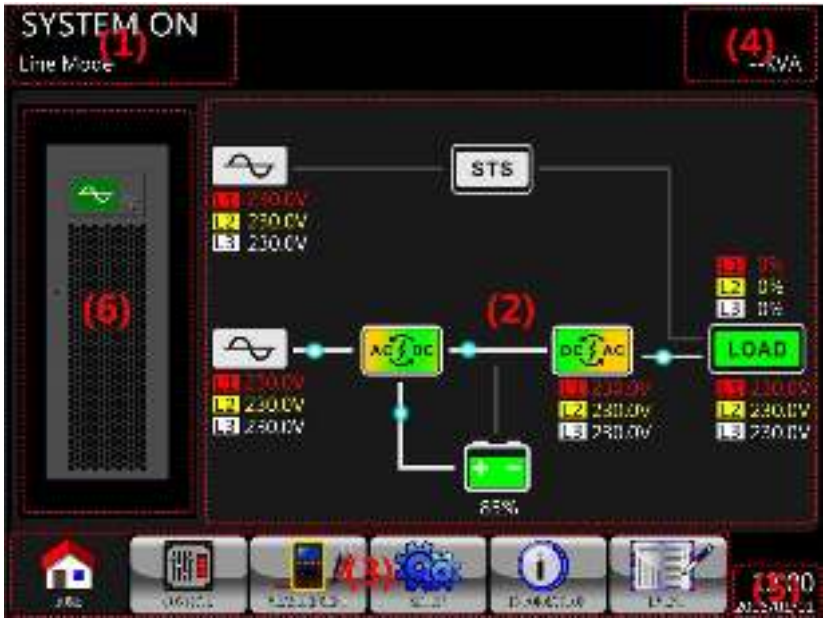


Figure 3-3 Main screen

(1) UPS operation mode: It shows UPS current operation mode and status.

(2) UPS flow chart: It shows current flow chart and measurement data.

(3) Main menu: Touch each icon to enter submenu. Refer to Figure 3-4 for menu tree.

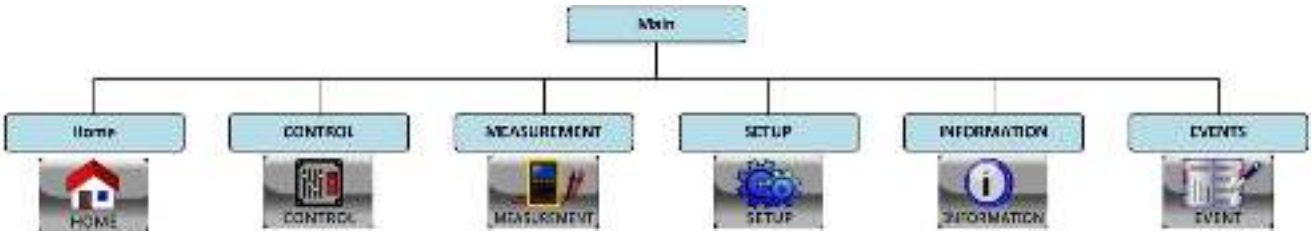


Figure 3-4 Menu tree

(4) UPS power rating: It show UPS power rating.

(5) Date and time: It shows current date and time.

(6) UPS status: The meanings of each icon are listed as below.

Icon	UPS status
	UPS operates in Standby mode or Shutdown Mode.
	UPS operates in Line mode or Converter Mode.
	UPS operates in Bypass mode or ECO Mode.
	UPS operates in Battery mode or Battery Test Mode.
	UPS operates in Fault mode.

3-2-3. Control Screen

Touch

icon to enter into the submenu as shown in Figure 3-5 and Figure 3-6.

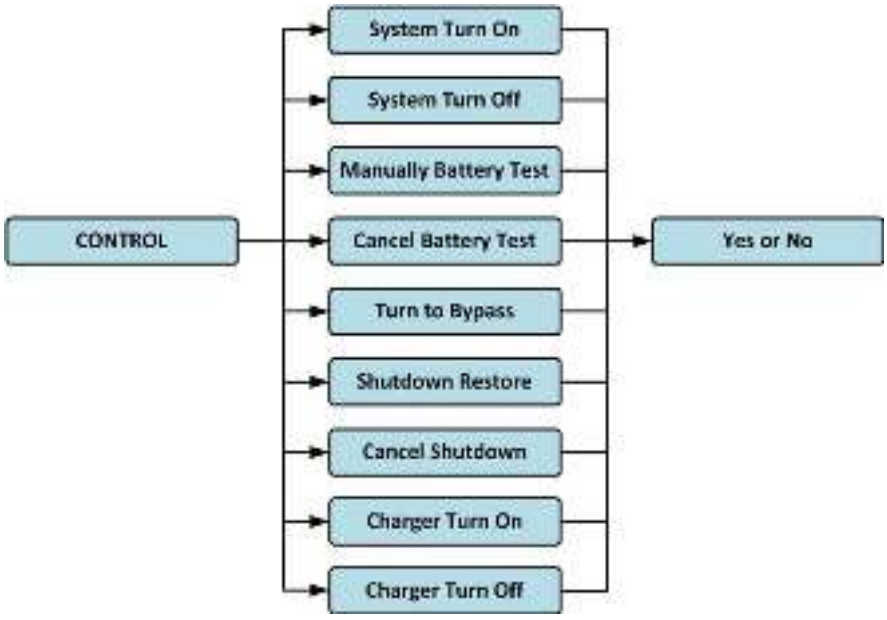


Figure 3-5 Control menu tree

Figure 3-6 Control screen page

Touch any control option directly. Then, confirmation screen will pop up. Touch

icon to confirm command or touch

icon to cancel command as shown below.

Figure 3-7 Confirmation screen

3-2-4. Measurement Screen

Touch icon to enter into the sub-menu. You may choose input, output, bypass, load or battery to monitor detailed status. Please refer all screens in Figure 3-8 and 3-9. All detailed measurement items are listed in Table 3-4.

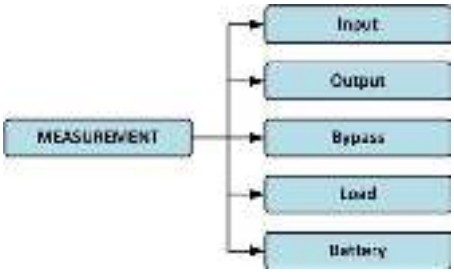


Figure 3-8 Measurement menu

Figure 3-9 System Measurement Screens

Table 3-4: Measurement items

Submenu	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 connected 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 remaining runtime. Units 1sec.

	Capacity (%)	The percentage of the battery capacity. Units 1%.
	Test Result	Battery test result
	Charging Status	Battery charging status
	Temperature 01(℃)	Temperature of external battery pack. Units 0.1℃.
	Temperature 02(℃)	Temperature of external battery pack through extra communication card T1. Units 0.1℃.
	Temperature 03(℃)	Temperature of external battery pack through extra communication card T2. Units 0.1℃.
	Temperature 04(℃)	Temperature of external battery pack through extra communication card T3. Units 0.1℃.
	Temperature 05(℃)	Temperature of external battery pack through extra communication card T4. Units 0.1℃.

3-2-5. Setup Screen

Touch the icon to enter into the submenu. It's required to enter password to access General, SYSTEM, BATTERY and PRE-ALARM sub-menus as shown in Figure 3-10 and 3-11. The default password for user is "0000".

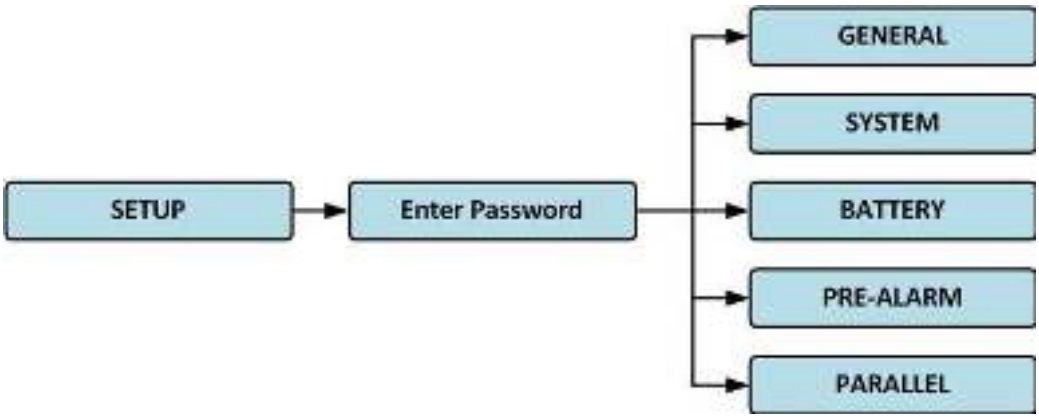


Figure 3-10 Setup menu

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

Figure 3-11 Enter password screen

There are two levels of password protection, user password and maintainer password.
The default password for user is "0000". It could be changed by users.
The manitainer password is owned by service personnel.
Entering different level of password can access to differnet settings. The setting can be changed in different operation mode. The Table 3-5 lists the relevant information.

Table 3-5: All setting items in Setup Menu

Setting item \ UPS operation Mode		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
	EPO Function	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					Y		Y
	Bypass Mode	Y	Y								Y
	Auto-Restart	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Cold Start	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
	Charger Test	Y	Y	Y				Y	Y		Y

Battery	Nominal Battery Voltage	Y	Y								Y
	Battery Capacity in Ah	Y	Y	Y			Y	Y	Y		Y
	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
	Auto-Restart Battery Voltage	Y	Y	Y	Y	Y	Y	Y	Y		Y
	Pre-Alarm	Y	Y	Y	Y	Y	Y	Y	Y		Y
Parallel	UPS Parallel	Y	Y								Y
	Independent Battery	Y	Y								Y

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

Setting Procedure

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

Step 2: Select modified item and it will show current value and setting in the screen. Simply click current setting and it will list all alternatives in the end. Please choose one.

Step 3: Choose icon to confirm the change or choose icon to cancel the modification.

Figure 3-12 setting procedure

3-2-5-1. Setup-General Screen

The Setup-General screen and setting list are shown in Figure 3-13 and Table 3-6. General setting can be set in any operating mode.

Figure 3-13 Setup-General screen

Table 3-6: 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 Time	Set current date and time. (yyyy / mm / dd hour : min : sec) **MUST be set after UPS installation**
	System Installed Date	Set system installed date (yyyy / mm / dd) 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**
	Battery Installed Date	Set battery installed 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**
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 Refer to Table 2-8
EEPROM Reset	--	Restore EEPROM to default setting Refer to Table 2-8
EPO Function	--	Set EPO active status ● Normal Close Active ● Normal Open Active (Default)
Password	--	Set New Password. 0000 (Default)
Save Setting	--	Save all settings to EEPROM. **Use this feature to save the setting(s) you have done.**
Startup Screen		Set up initial screen. (xxxxxxxxxxxx). The max. length is 12 characters.

Table 3-7: 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	--	--
	Startup Screen		
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
	Cold Start		Y
	Battery Mode Delay Time	Y	Y
	System Shutdown Time	Y	Y
	System Restore Time	Y	Y
	Charger Test	--	--
Battery	Nominal Battery Voltage	Y	Y
	Battery Capacity in Ah	Y	Y
	Maximum Charging Current	Y	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

3-2-5-2. Setup-System Screen

The Setup-System screen and setting list are shown in Figure 3-14 and Table 3-8. System setting can be set only when UPS is operated in certain mode. Please check setting item availability in Table 3-5 for the details. If it's not allowed to set up under specific mode, the warning screen will appear. Refer to Figure 3-15.

Figure 3-14 Setup-System screen

Figure 3-15 Warning screen

Setup-System setting list is shown in Table 3-8.

Table 3-8: Setup-System setting list

Setting Item	Sub Item	Explanation
Output Voltage	--	Set output voltage ● 220Vac (Default) ● 230Vac ● 240Vac **MUST be reviewed after UPS installation**
BYPASS SETTING	Bypass Voltage Range	Set bypass voltage range: Upper limit ● +10% ● +15% (Default) ● +20% Lower limit ● -10% ● -20% (Default)

		● -30%
	Bypass Frequency Range	Set bypass Frequency range: Upper/ Lower limit ● +/- 1Hz ● +/- 2Hz ● +/- 4Hz (Default)
Converter Mode	--	Set converter mode ● Disable (Default) ● Enable
ECO Mode	--	Set ECO mode ● Disable (Default) ● Enable
Bypass Mode	--	Set bypass mode ● Disable (Default) ● Enable **MUST be reviewed after UPS installation.** If you need the Bypass power when UPS is OFF, please enable it.
Auto-Restart	--	Set auto-restart ● Disable ● Enable (Default) After "Enable" is set, once UPS shutdown occurs due to low battery and then utility restores, the UPS will return to line mode.
Cold Start	--	Set cold start ● Disable ● Enable (Default) After "Enable" is set, the UPS can be turned on without connecting to utility by pressing Battery Start Button. Refer to cold start operation for the details.
Battery Mode Delay Time	--	Set system shutdown delay time in battery mode (0~9990sec). ● 0: Disable (Default) ● Not 0: Enable When this feature is enabled, UPS will shut off output after UPS operates in Battery mode for certain seconds.
Shutdown/ Restore	System Shutdown Time	Set system shutdown time (0.2~99min) ● 0.2 min (Default) This delay time will start counting when the CONTROL-Shutdown Restore command is executed.
	System Restore Time	Set system restore time (0~9999min) ● 1 min (Default) This delay time will start counting after shutdown time is elapsed when the CONTROL-Shutdown Restore command is executed.
Charger Test	--	Set charger test ● Disable (Default) ● Enable

3-2-5-3. Setup-Battery Screen

The Setup-Battery screen and setting list are shown in Figure 3-16 and Table 3-9. 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 3-15.

Figure 3-16 Setup-Battery Screen

Table 3-9: 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 Battery capacity is changed.**
Maximum Charging Current	--	Set battery maximum charging current (1~24A 100KVA/1~32A 120KVA/1~40A 160KVA/1~48A 200KVA) ● 2A (Default) **MUST be set after UPS installation or Battery capacity is changed.**
Battery Low/ Shutdown Setting	Low Voltage	Set battery low voltage (10.5~11.5V)x(battery Number) ● 11V x Battery Number (Default)
	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) ● 10V x Battery Number (Default)
Battery Test	Periodic Battery Test	Set periodic battery test disable or enable ● Disable (Default) ● Enable
	Battery Test Interval	Set battery test interval (7~99 Days) ● 30 Days (Default)
	Stop by Time	Set testing time for battery test (10~1000sec) ● 10 sec (Default)
	Stop by Battery Voltage	Set stop battery voltage in battery test (11~12V) x (battery Number) ● 11V x Battery Number (Default)
	Stop by Battery Capacity	Set battery capacity to stop battery-testing. (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 over this period, there is a warning "Battery Age Alert" to indicate it.

Temperature Compensation	--	Set battery temperature compensation. (0~-5 (mV/C/cl)) ● 0(mV/C/cl) (Default)
Charging Voltage	--	Set battery charging voltage. (2.30~2.35V) ● 2.35V (Default) Set battery float voltage. (2.23~2.35V) ● 2.29V (Default)
Auto-Restart Battery Voltage	--	Set auto-restart battery voltage. (0 or 12.0V~13.0V) ● 0V (Default)

3-2-5-4. Pre-Alarm Screen

The Setup-Pre-Alarm screen and setting list are shown in Figure 3-17 and Table 3-10. Pre-Alarm setting can be set in any operation mode.

Figure 3-17 Setup-Pre-Alarm screen

Table 3-10: 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)

3-2-5-5. Setup-Parallel Screen

Simply touch "PARALLEL" tab to show parallel function page as shown below.

Figure 3-18 Setup-Parallel screen

Refer to Table 3-11 for Setup-Parallel setting list.

Table 3-11: Setup-Parallel setting list

Setting Item	Sub Item	Explanation
UPS Parallel	--	Set UPS parallel ● Disable (Default) ● Enable
Independent Battery	--	Set Independent Battery ● Disable (Default) ● Enable

3-2-6. Information Screen

Touch icon to enter into the sub-menu. In this Information screen, you can check the UPS configuration. There are three sub-menus, Identification, System and Battery.

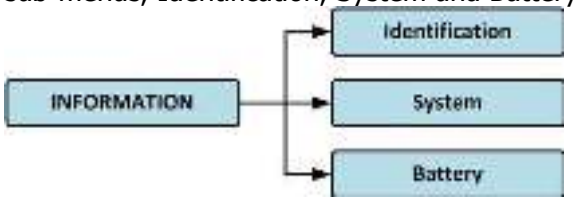


Figure 3-19 Information menu

3-2-6-1. INFORMATION - Identification Screen

When Identification tab is touched, the Model Name, Serial No. and Firmware Version will be displayed as shown below.

Figure 3-20 Identification screen page

3-2-6-2. INFORMATION - System Screen

When System submenu tab is touched, information such as the system power, nominal voltage, nominal frequency … etc. will be displayed as shown in Figure 3-21 and Figure 3-22. Touch UP and DOWN arrows to switch different pages.

Figure 3-21 INFORMATION System screen page 1

Figure 3-22 INFORMATION System screen page 2

3-2-6-3. INFORMATION - Battery Screen

When Battery tab is touched, the information such as battery nominal voltage, capacity, charging current … etc. will be displayed as shown below.

Figure 3-23 INFORMATION Battery screen page

3-2-7. Event Screen

When an event occurs, you will see icon flashing in the main screen as shown in Figure 3-24. You also can touch

icon to check the latest event lists, history events and reset all events. Refer to Figure 3-25 for menu tree.

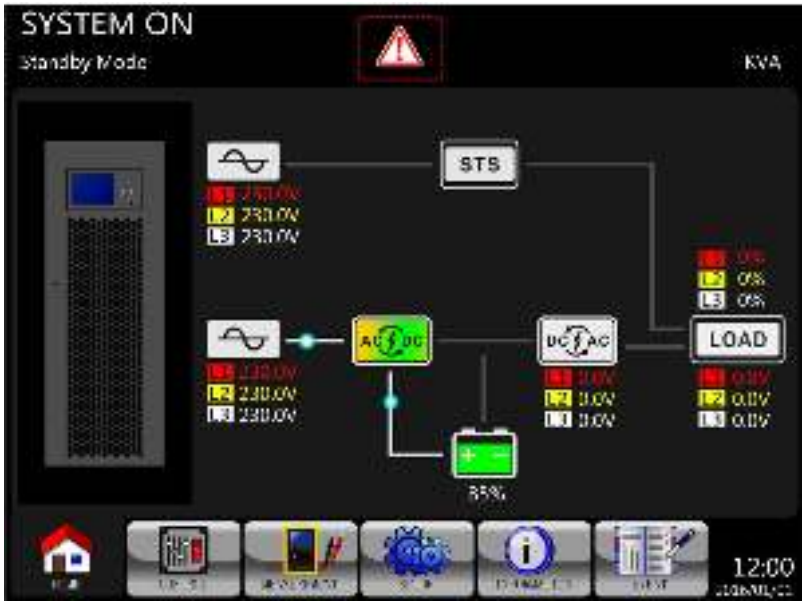


Figure 3-24 Alarm warning screen

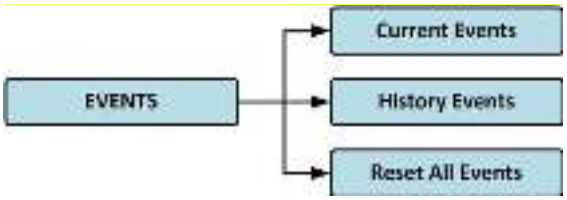


Figure 3-25 Events menu

3-2-7-1. Current Events

When an event occurs, it will display power stage ID* and alarm code in Current Events screen. It can save up to 50 events in current list. Only 10 events can be listed in one page. Therefore, if it exceeds more than 10, you have to touch

icon to read other event as shown below.

NOTE: Please refer to section 2-2 Front Door Open View to identify power stage ID.

Figure 3-26 Current Events screen

3-2-7-2. History Events

The detailed event information is saved in history events. It can save up to 500 events in history events. When warning occurs, it will display alarm code, alarm time and power stage ID*. When fault event occurs, it will display alarm description, alarm time and power stage ID. (Refer to Table 3-12 Alarm List) In order to record more historical information about the UPS system, the important changes in setting (refer to Table 3-13 Warning list for changing important settings), UPS operation mode changes (refer to Table 3-14 UPS mode changes) and control action execution (refer to Table 3-15 Control execution) will be saved in History Events. Refer to Figure 3-27 for display screen.

NOTE: Please refer to section 2-2 Front Door Open View to identify power stage ID.

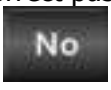
Figure 3-27 History Events screen

3-2-7-3. Reset All Events

It's necessary to enter maintainer password before accessing Reset All Events screen as shown below.

Figure 3-28 Reset All Events screen

After entering correct password, it will pop up reconfirmed screen. Then, touch

icon to reset all events or touch 

icon to cancel this action shown as below.

Figure 3-29 Reset All Events Confirmation screen

3-3. Alarm List

In Table 3-12, it provides the complete list of UPS alarm messages.

Table 3-12: Alarm List

Messages in the 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 is not balanced
Fault! Bus Short	DC bus is short
Fault! Bus Soft Start Time Out	The rectifiers can't 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 short-circuited.
Fault! S Inverter Voltage Short	S phase inverter Output is short-circuited.
Fault! T Inverter Voltage Short	T phase inverter Output is short-circuited.
Fault! RS Inverter Voltage Short	R-S inverter Output is short-circuited.
Fault! ST Inverter Voltage Short	S-T inverter Output is short-circuited.
Fault! TR Inverter Voltage Short	T-R inverter Output is short-circuited.
Fault! Inverter R Negative Power	R phase inverter Output Negative Power over range
Fault! Inverter S Negative Power	S phase inverter Output Negative Power over range
Fault! Inverter T Negative Power	T phase inverter Output Negative Power over range
Fault! Over Load Fault	Heavy overload causes UPS fault.
Fault! Battery Fault	Batteries reversed
Fault! Over Temperature	Make sure adequate space is allowed for air ventilation and the fan is working
Fault! CAN Fault	CAN communication fault
Fault! TRIG0 Fault	Synchronized trigger signal fault
Fault! Relay Fault	Inverter relay fault
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 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 the UPS can supply.
Warning! Battery Open	Battery not connected
Warning! Battery voltage High	Battery voltage is too High
Warning! Turn On Abnormal	As stated.
Warning! Charge Fail	As stated.
Warning! EEPROM Fail	EEPROM operation error
Warning! Fan Lock	As stated.
Warning! Line Phase Error	As stated.
Warning! Bypass Phase Error	As stated.
Warning! N Loss	Neutral loss
Warning! Internal Initial Fail	As stated.
Warning! Comm Syn Signal Fail	Communicate Synchronization Signal Fail
Warning! Comm. TRIG0 Fail	Communicate Trigger signal fault
Warning! Power Stage loss	Power stage is not detected.
Warning! Parallel Sys Config. Wrong	Parallel System Configure error
Warning! Maintenance Bypass	Enter maintenance
Warning! Battery Age Alert	Battery Life expiration
Warning! Parallel UPS Cable Loosen	As stated.
Warning! Parallel UPS Config. Wrong	Parallel UPS Configure error
Warning! Battery Voltage Low	Battery voltage is too low.
Warning! ID Conflict	Power stage ID in conflict
Pre-Alarm! Line Voltage Fail	Line voltage over range
Pre-Alarm! Line Voltage Normal	Line voltage recovered to normal
Pre-Alarm! Line Frequency Unstable	Line frequency over range
Pre-Alarm! Line Frequency Normal	Line frequency recovered to normal
Pre-Alarm! Over Load	Output Load over range
Pre-Alarm! Load Normal	Output Load recovered to normal
Pre-Alarm! Load Unbalance	Output Load unbalance

3-4 History Record

Table 3-13**:** Warning list for changing important settings

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! Cold Start
23	Setup! EEPROM Reset	24	Setup! Battery Mode Delay Time
25	Setup! EPO Function	26	Setup! Shutdown Restore Time
27	Setup! Save Setting	28	Setup! Redundancy
29	Setup! Power Rating Setting	30	Setup! Charger Test
31	Setup! Nominal Battery Voltage	32	Setup! Battery Capacity in Ah

33	Setup! Maximum Charging Current	34	Setup! Battery Low Voltage
35	Setup! Battery Low Capacity	36	Setup! Battery Shutdown Voltage
37	Setup! Periodic Battery Test	38	Setup! Stop By Time
39	Setup! BATTERY Age Alert	40	Setup! Temperature Compensation
41	Setup! Charging Voltage	42	Setup! PRE-ALARM
43	Setup! UPS Parallel	44	Setup! Independent Battery
45	Setup! Auto-Restart Battery Voltage		

Table 3-14**:** 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 3-15**:** Control execution

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

4. Interface and Communication

As shown in Figure 4-1, there are dry contact port (X1~X2), communication port (RS232/USB), SNMP Card slot and extra Comm. card slot on the front panel.

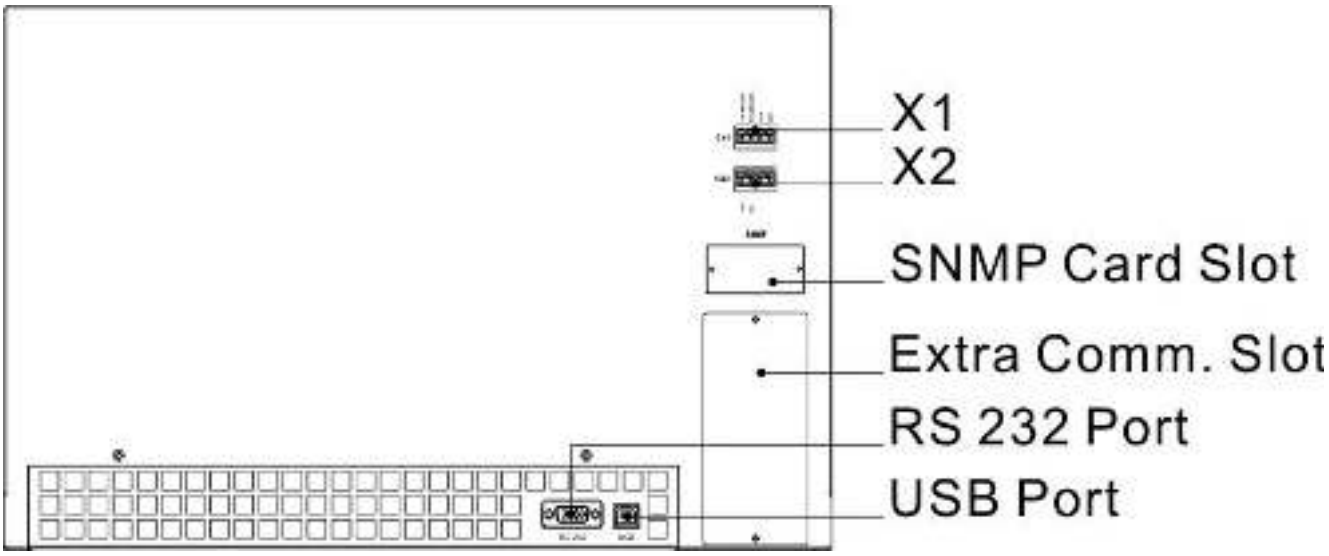


Figure 4-1 Dry contact ports and communication ports

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

4-1. X1- Temperature Detection Port for External Battery Pack

The UPS is equipped with battery temperature detection function. UPS can receive battery temperature signal through the temperature detection board. Communication between the UPS and battery temperature detection board is via I2C communication protocol. X1 is the battery temperature detection port. The port is shown in Figure 4-2 and described in Table 4-1.

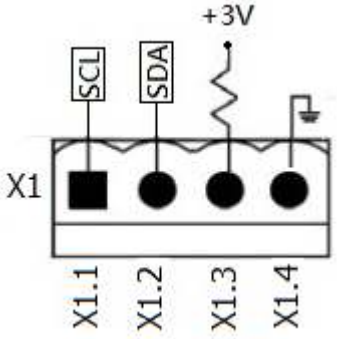


Figure 4-2 Battery Temperature Detection Port

Table 4-1 Description of Battery Temperature Detection Port

Name	Position	Description
SCL	X1.1	I²C communication SCL Signal
SDA	X1.2	I²C communication SDA Signal
+3.0V	X1.3	3V
Power GND	X1.4	GND

4-2. X2 - Remote EPO Input Port

The UPS is equipped with Emergency Power off (EPO) Function that can be operated by a remote contact assigned by the users. Users can set the logic (N.C or N.O) of this EPO Function through LCD panel.

X2 is the remote EPO input port. This port is shown in Figure 4-3 and described in Table 4-2.

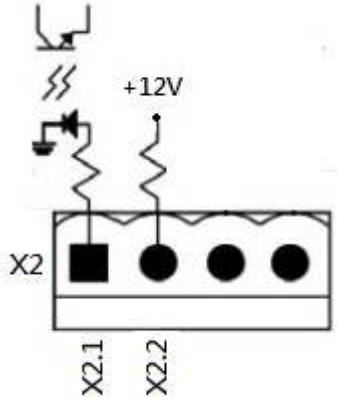


Figure 4-3 Remote EPO input port

Table 4-2 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 Normal Closed (N.C), EPO is triggered when pins 1 and pin 2 of X1 are opened. Otherwise, EPO Logic setting is Normal Opened (N.O). EPO is triggered when pins 1 and pin 2 of X2 are closed.

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 Normal Opened (N.O).

4-3. Other Communication Interface

4-3-1. Extra Comm. Slot

There is an optional slot to allow **Extra Comm. Card** inserted. This option can enhance the communication capability of the UPS. It provides an additional SNMP slot, dry contact I/P & O/P signals and temperature sensor ports.

4-3-2. Local Communication Ports – RS232 & USB

This UPS is equipped with one RS-232 port and one USB port.

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

4-3-3. SNMP Slot

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

5. Operation Principles

5-1. Block diagram of UPS

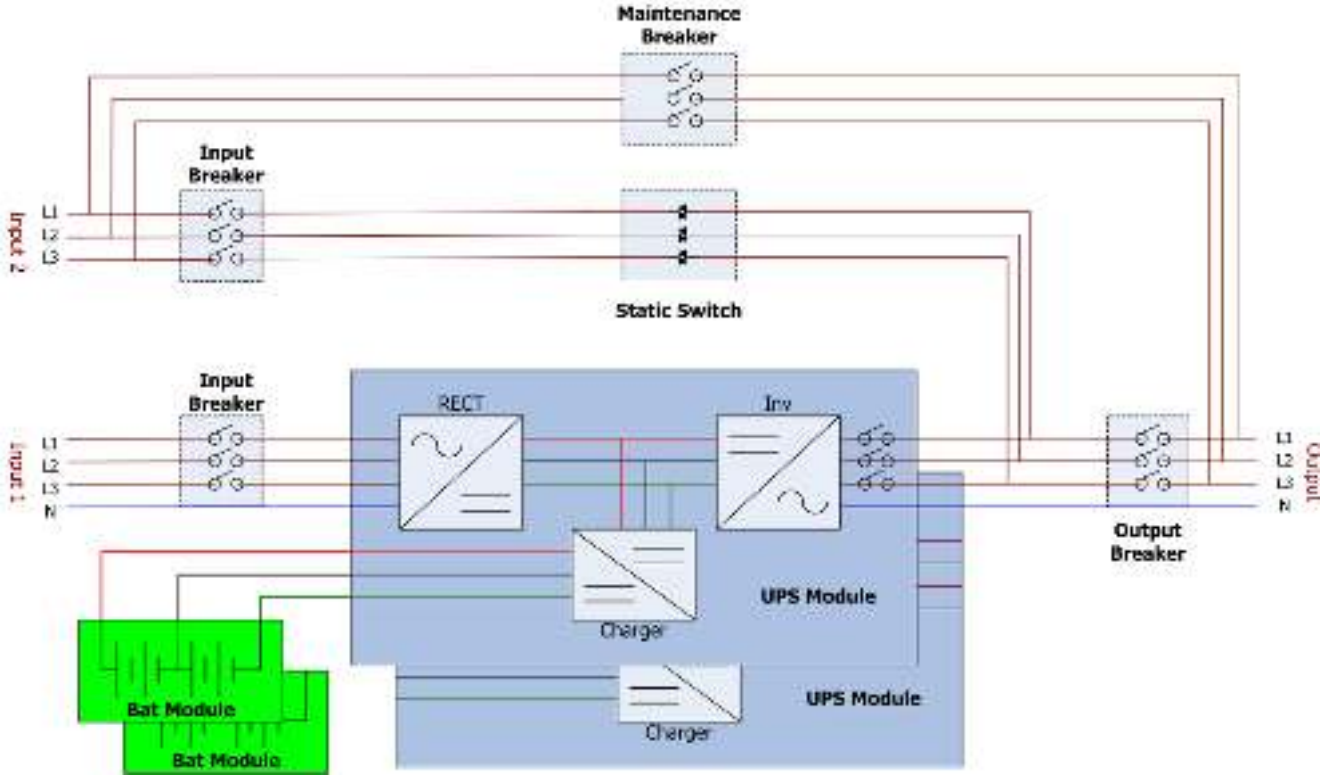


Figure 5-1 Wiring diagram for dual inputs

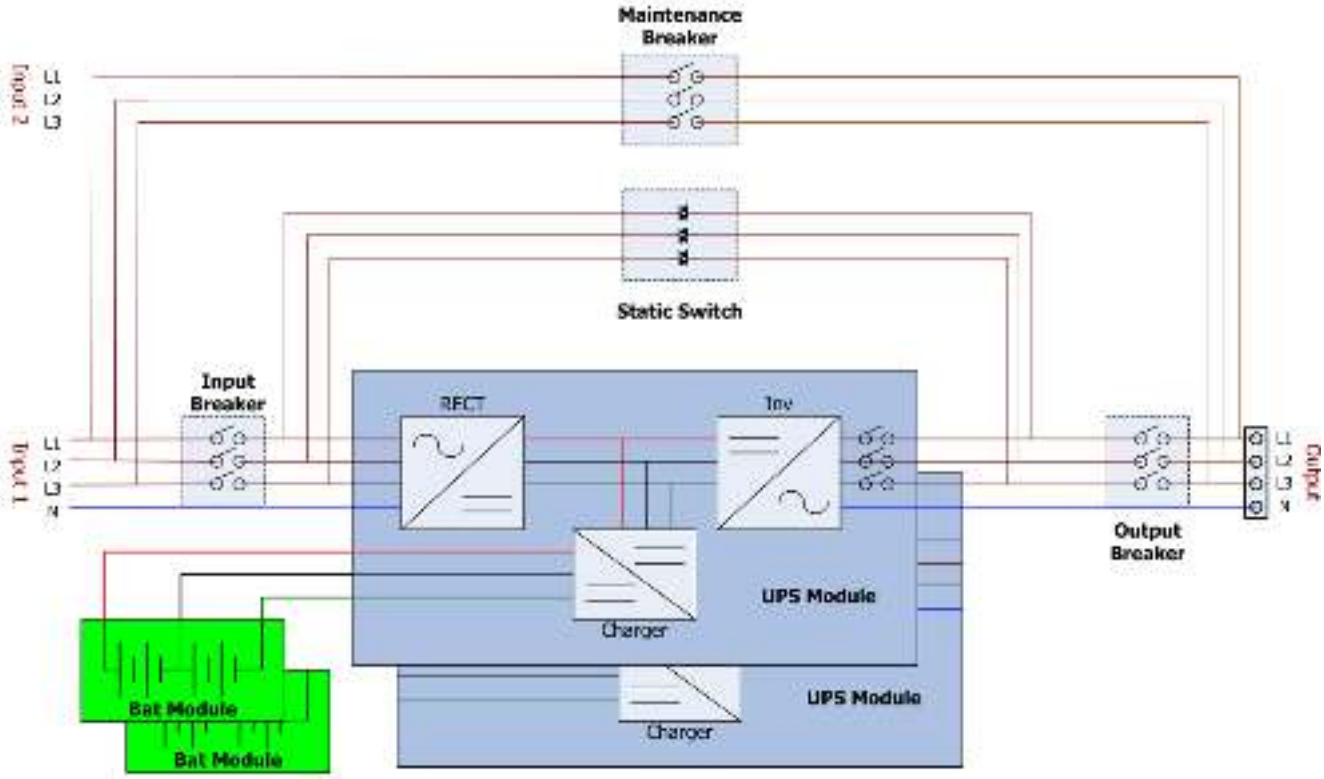


Figure 5-2 Wiring diagram for single input

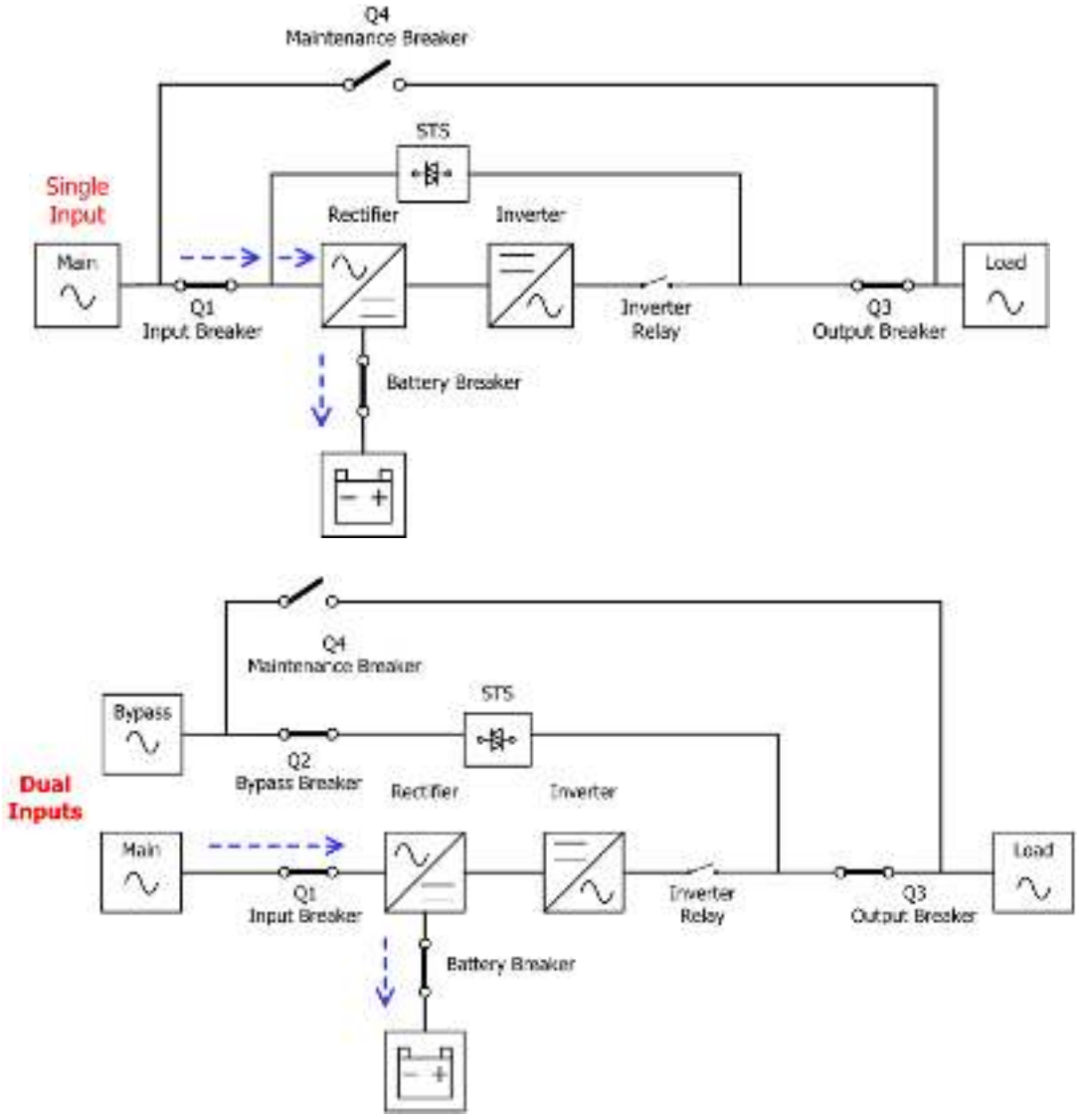
5-2. Operation Mode

This 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)

5-2-1. 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 under this mode.

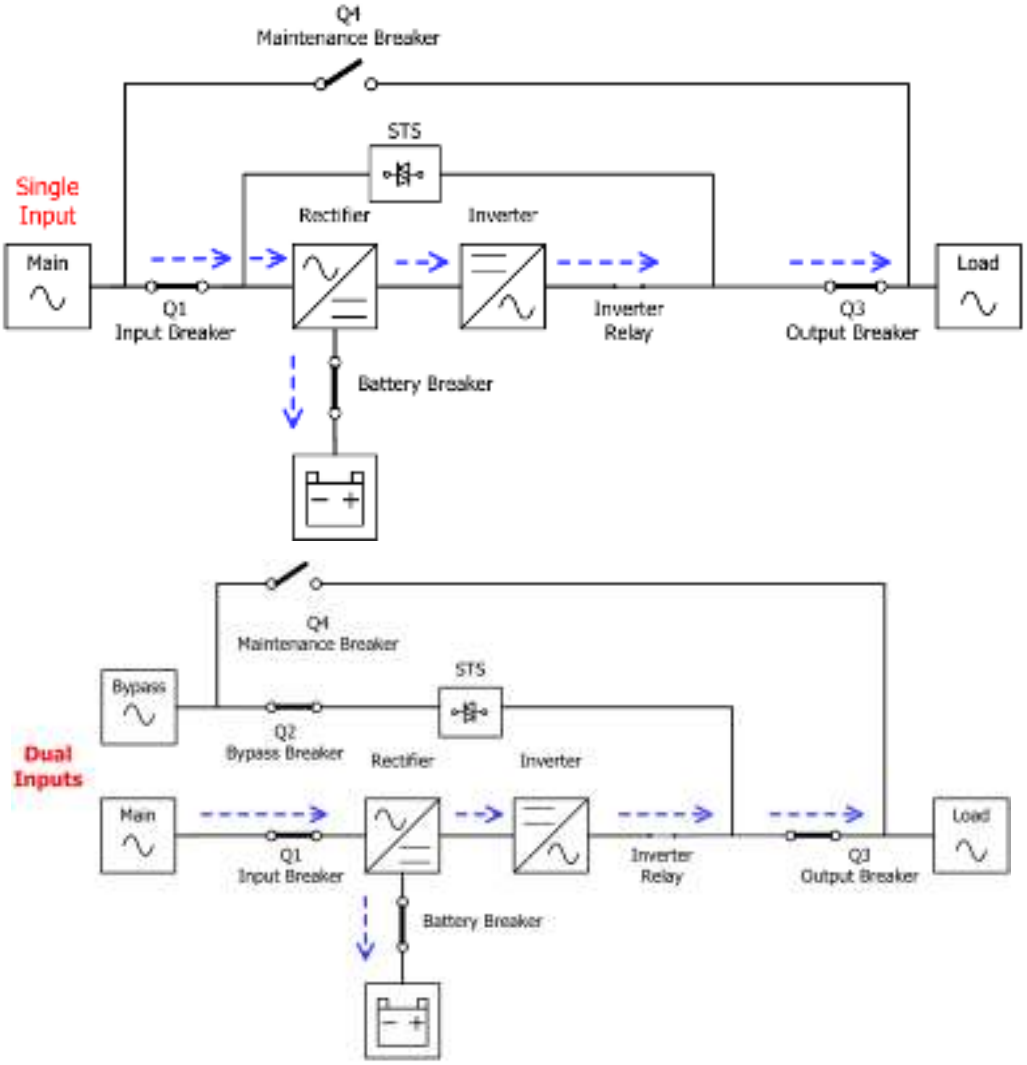


Standby Mode Diagram

5-2-2. Line Mode

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

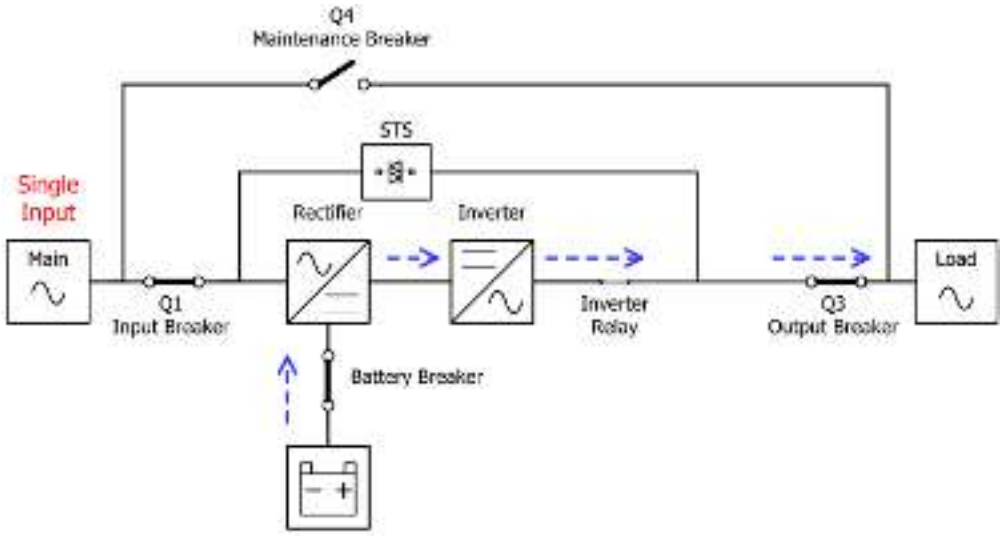
power to the load.

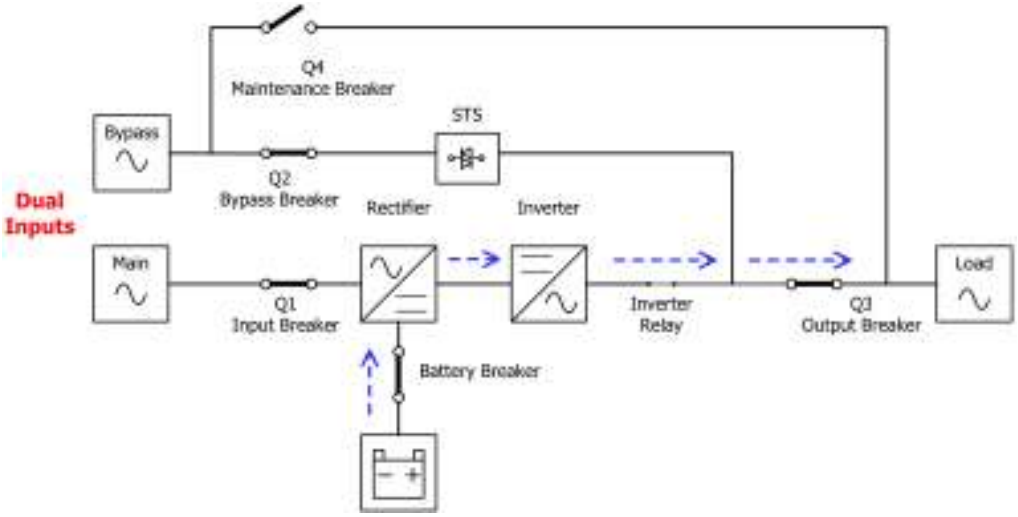


Line Mode Diagram

5-2-3. Battery Mode

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



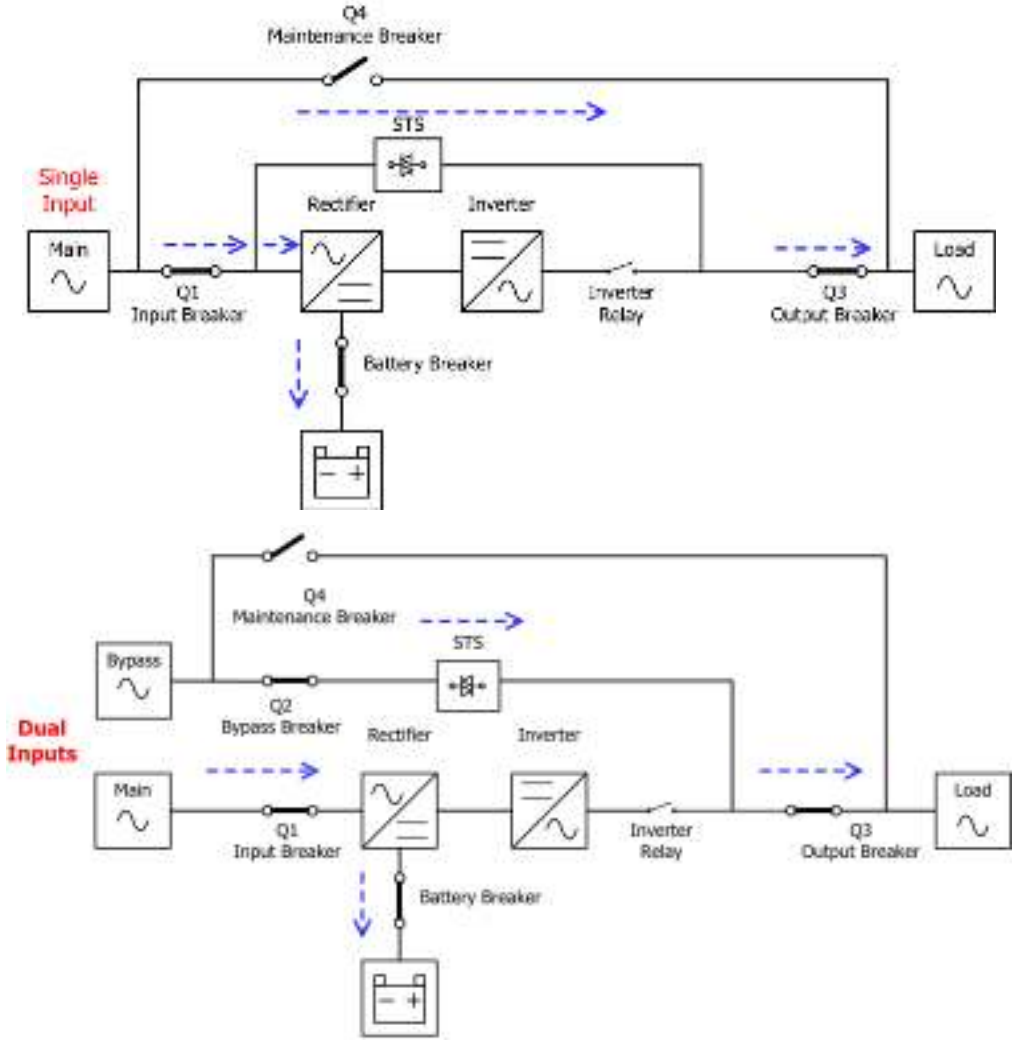


Battery Mode Diagram

5-2-4. Bypass Mode

Upon connecting to utility input power, the UPS is in Bypass mode before UPS is turned on (if BYPASS enable setting is Enabled), and charger function will be active when battery is present.

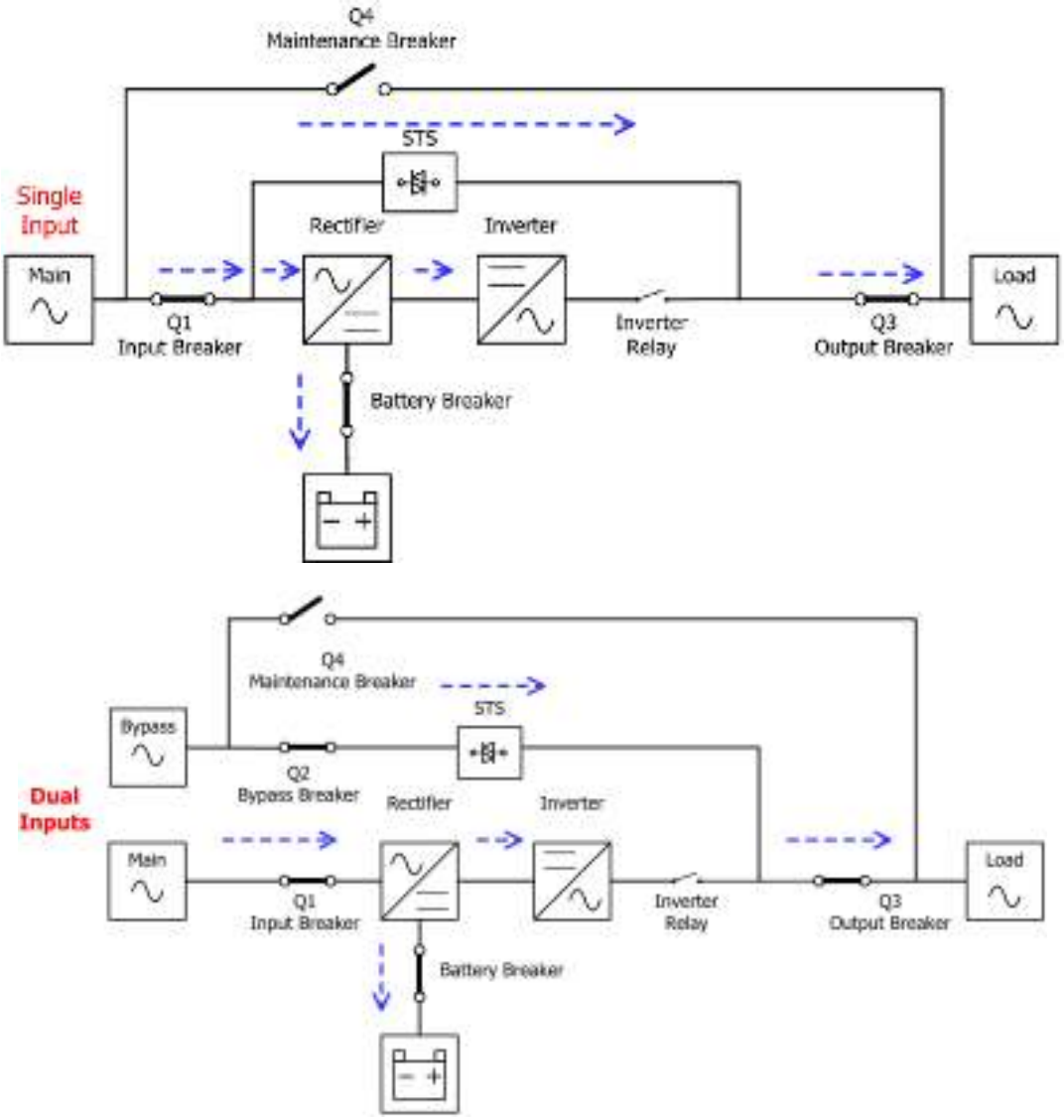
After UPS has been turned on, if the UPS encounters abnormal situations (over-temperature, overload …, etc.), the static transfer switch will perform as a transference of the load from the inverter to the bypass source with no interruption. If the transference is caused by a recoverable reason, the UPS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



Bypass Mode Diagram

5-2-5. ECO Mode

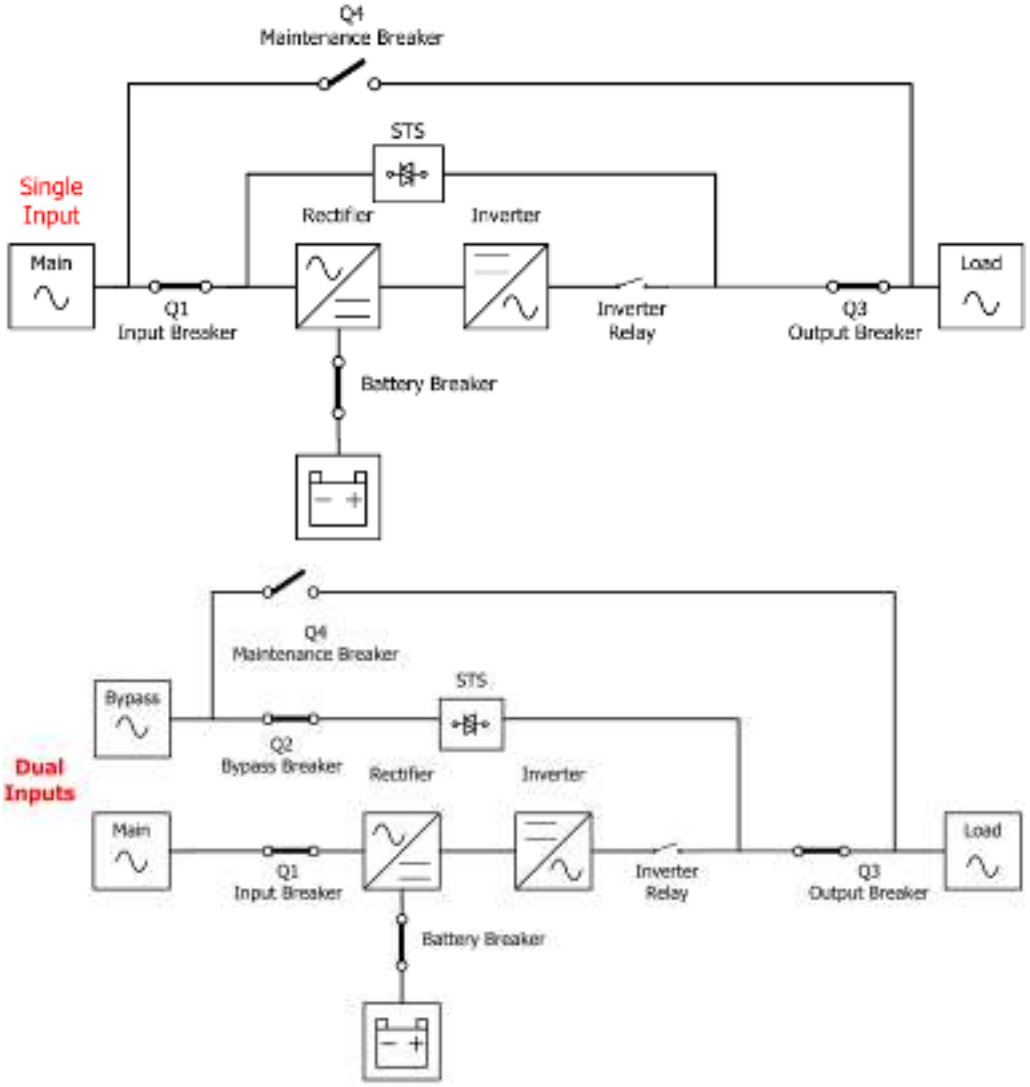
The ECO Mode is enabled through the setting menu of LCD panel. In ECO mode, the load is powered by bypass when the bypass voltage and frequency are within the acceptable ranges. If the bypass is out of range, the UPS will transfer the power source of load from bypass to inverter. In order to shorten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



ECO Mode Diagram

5-2-6. Shutdown Mode

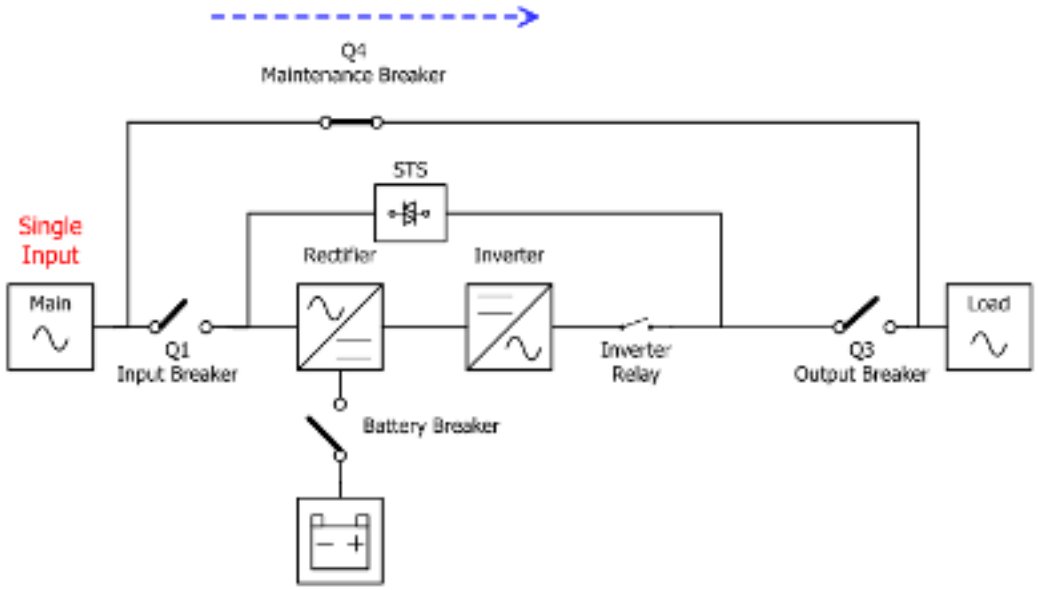
When the UPS is in the off state and the utility power source is absent, the UPS will enter into shutdown mode. Or when the UPS has discharged the battery to the cut-off level, the UPS will enter into shutdown mode as well. When the UPS enters this mode, it is going to shut off the control power of UPS.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

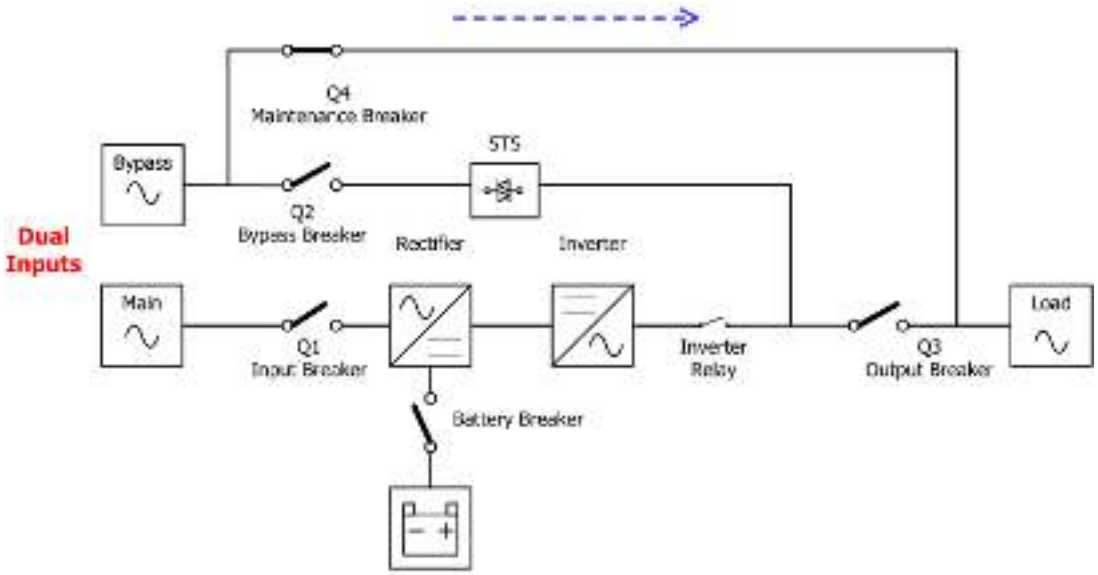


Shutdown Mode Diagram

5-2-7. Maintenance bypass Mode

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





Maintenance Bypass Mode Diagram

6. 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 Stage s' address have been configured. Refer to section 2-2 Power Stage for the details. ● Make sure all the breakers are switch **OFF**.

6-1. AC Startup

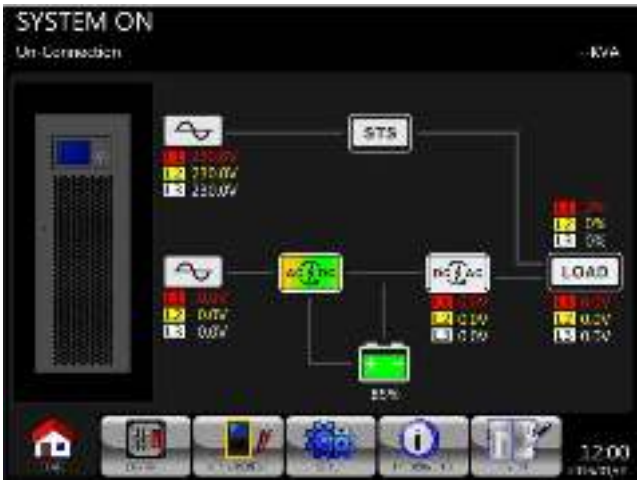
Ensure to follow this procedure when turning on the UPS from a fully powered-down condition.

The operating procedures are as follows:

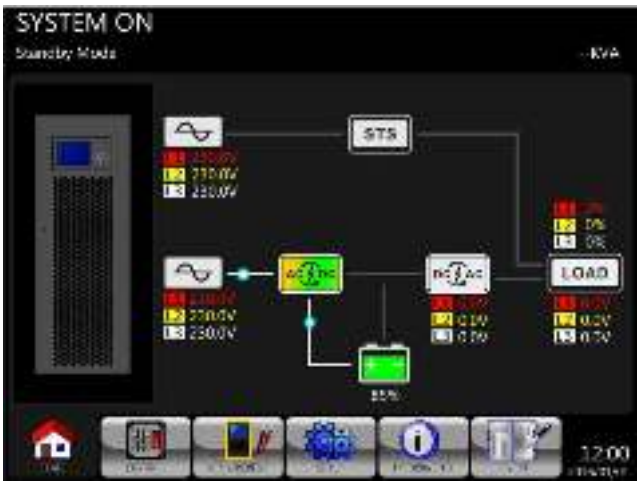
Step 1: Refer to "2-4. Wiring Terminal View" to connect the power cables and the battery required for the UPS system.

Step 2: Switch ON the battery breaker.

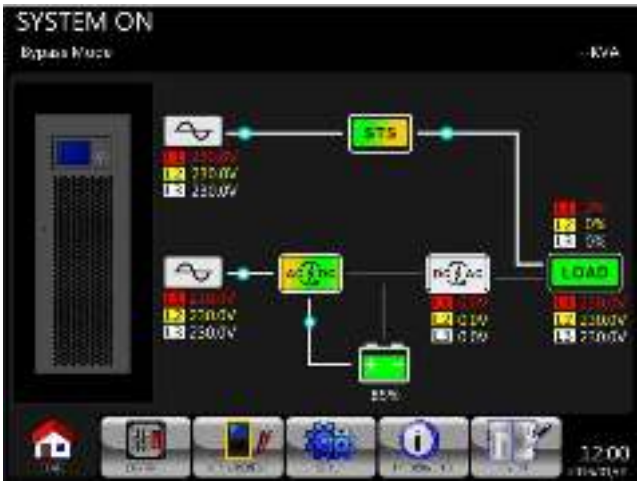
Step 3: Switch ON the external power switch to power the UPS. Then, LCD panel is displayed as shown below.



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



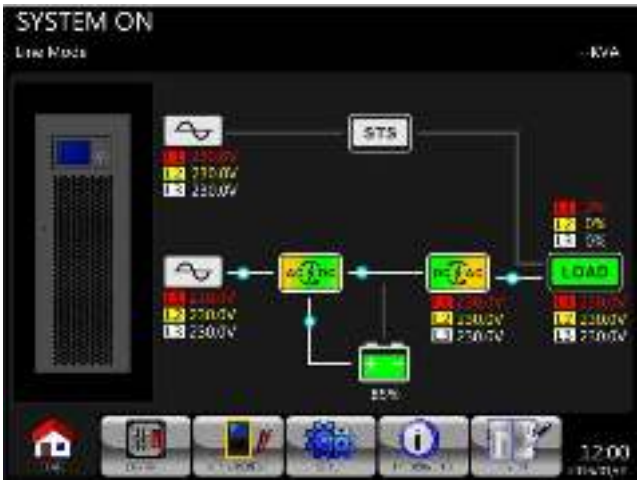
Or the UPS will enter into Bypass Mode, if the setting of Bypass mode is enabled



Step 5: Make sure there is no warning or fault event happening. If yes, please refer to Chapter 7 Troubleshooting to solve it.

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

After turning on, UPS will do self-test and start up inverter. After few seconds, UPS will be transferred to Line mode.

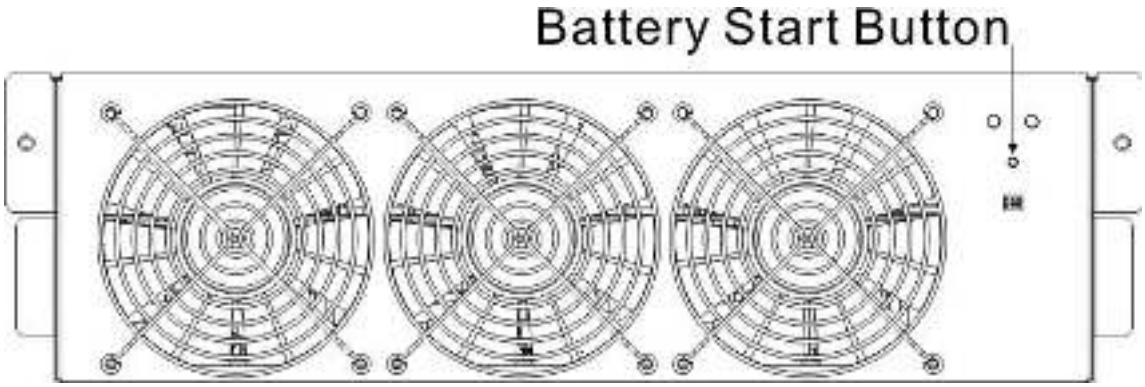


Step 7: Switch ON the output breaker (Q3). AC startup procedure is complete.

6-2. Cold Start Startup

Step 1: Switch ON the battery Breaker.

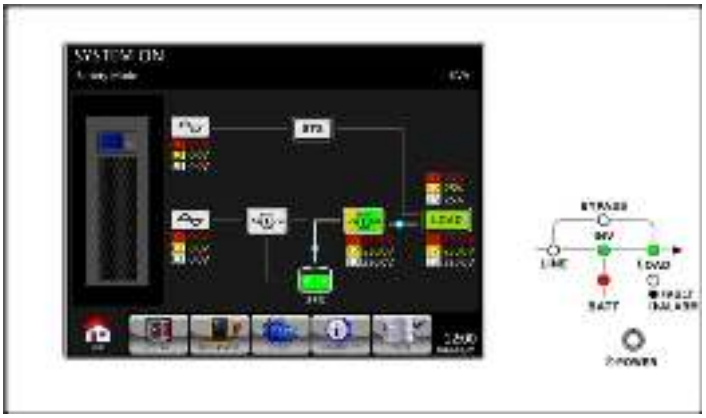
Step 2: Press the "Battery Start" button on any one of power stages to start up the control power.



Step 3: After pressing the "Battery Start" button, UPS will enter into Standby mode. Refer to the diagram below for LCD display.

Step 4: Before UPS enters into shutdown mode, please press "Power On/Off" button for 2 second immediately as shown in the diagram below.

Step 5: Then, UPS will enter Battery Mode as shown in the diagram below.

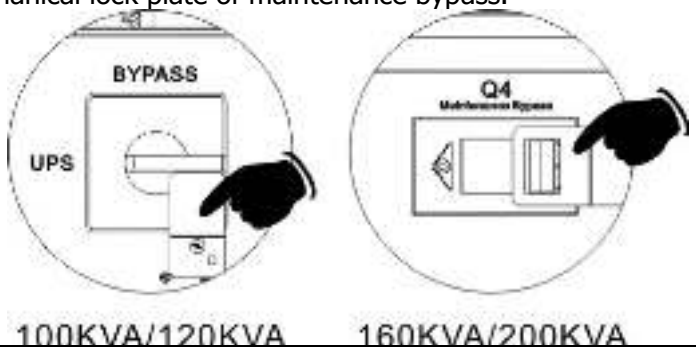
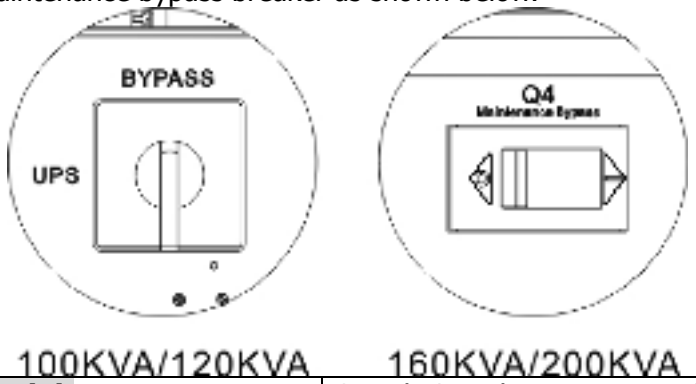


Step 6: Switch ON the output breaker (Q3). Cold start startup procedure is complete.

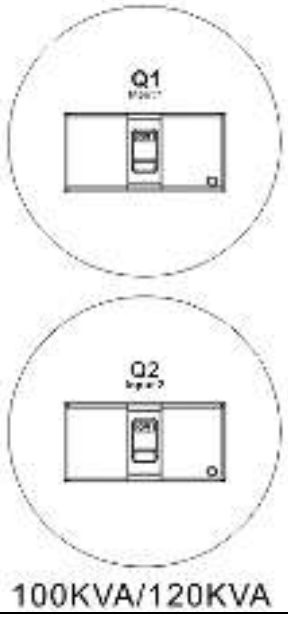
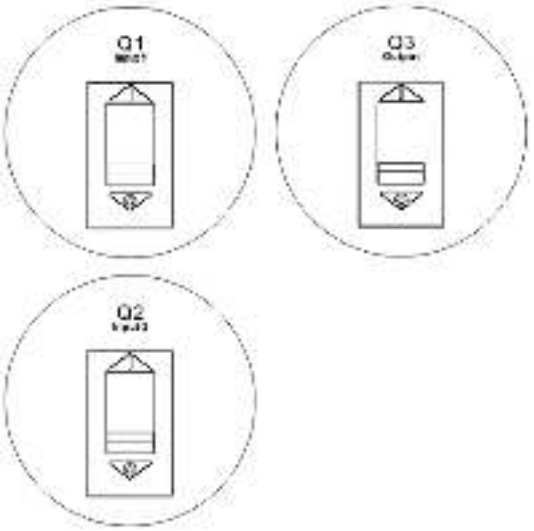
6-3. Maintenance Bypass Operation

If any fault occurs on any one of power stages, please follow below steps to transfer to maintenance bypass for power stage maintenance and UPS protection as below.

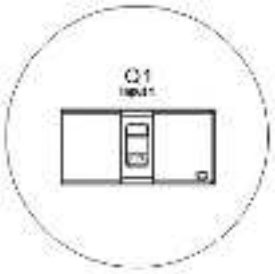
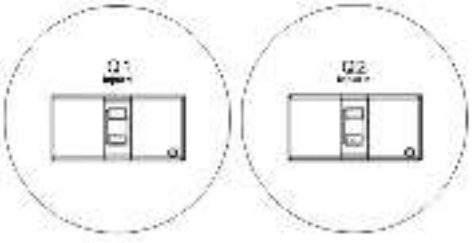
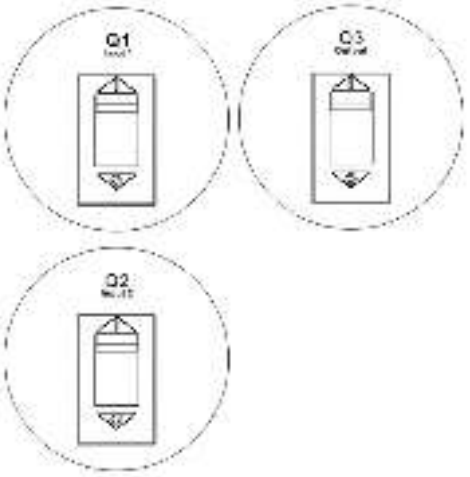
6-3-1. Transfer to maintenance bypass

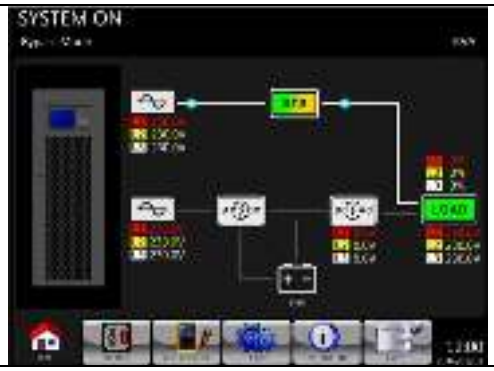
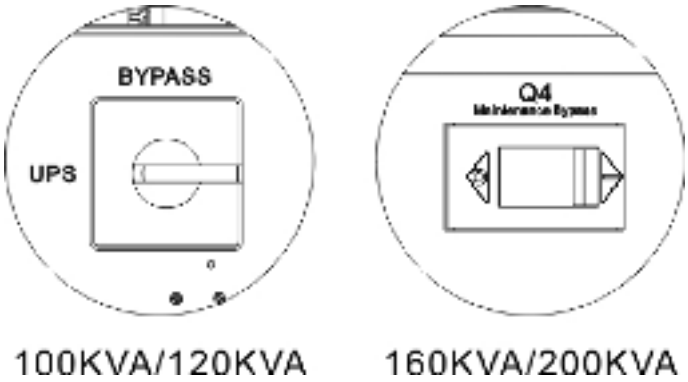
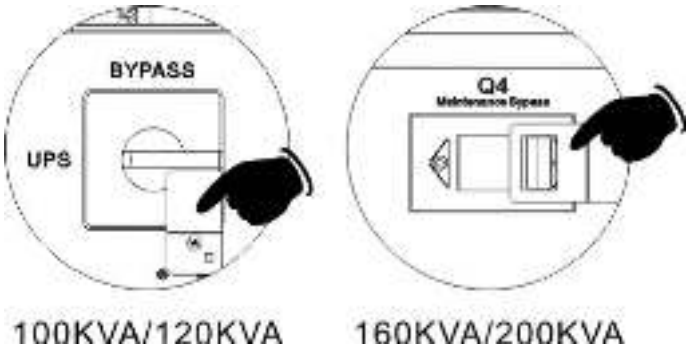
<table>
<tr><td>Step 1:</td><td colspan="2">Remove the mechanical lock plate of maintenance bypass.
 
</td></tr>
<tr><td>Step 2</td><td colspan="2">Make sure the UPS operates in Bypass mode as shown below.
</td></tr>
<tr><td>Step 3</td><td colspan="2">Switch ON the maintenance bypass breaker as shown below.
 
</td></tr>
<tr><td>Step 4</td><td>Single input model:
Switch OFF the Input1 Breaker (Q1) as shown below.

Dual input model:
Switch OFF the Input1 Breaker (Q1) and Input2 Breaker (Q2) as shown below.</td><td>Switch OFF the Input1 Breaker (Q1), Input2 Breaker (Q2) and Output Breaker (Q3) as shown below.</td></tr>
</table>

	 100KVA/120KVA	 160KVA/200KVA
Step 5	It is possible to change the power stage now.	

6-3-2. Transfer to UPS Protection

Step 1	Make sure the maintenance is complete. All power stages have been installed well.	
Step 2	**Single input model:** Switch ON the Input1 Breaker (Q1) as shown below.  100KVA/120KVA **Dual input model:** Switch ON the Input1 Breaker (Q1) and Input2 Breaker (Q2) as shown below.  100KVA/120KVA	Switch ON the Input1 Breaker (Q1), Input2 Breaker (Q2) and Output Breaker (Q3) as shown below  160KVA/200KVA
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 set it "enabled". Then, exit the SETUP menu and check if the UPS operates in bypass mode.	

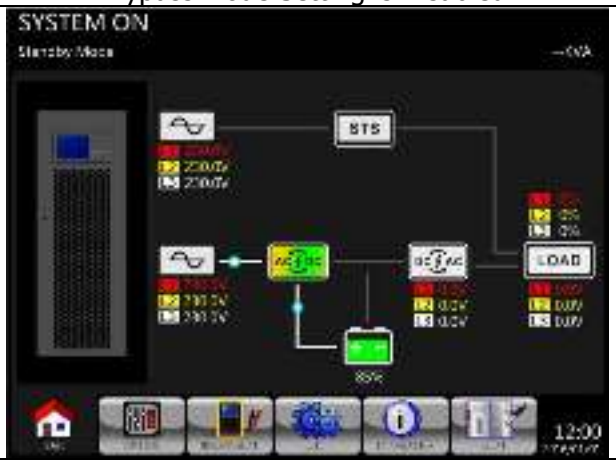
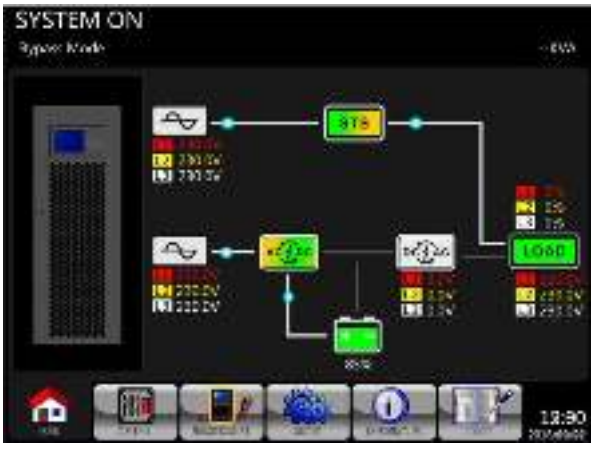
	
Step 4	Turn off maintenance bypass breaker as shown below. 
Step 5	Lock back the mechanical lock plate as shown below. 

6-4. Turn off Operation

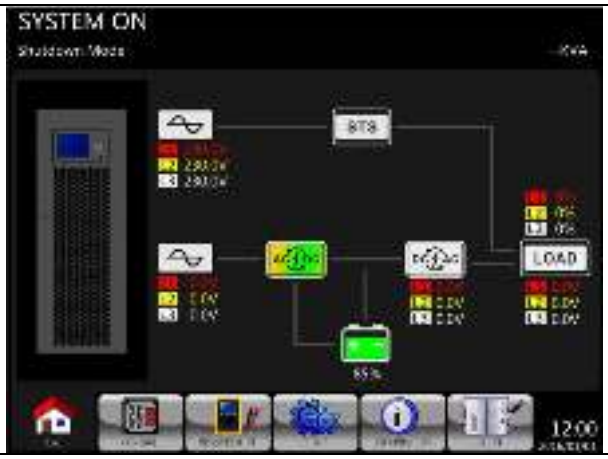
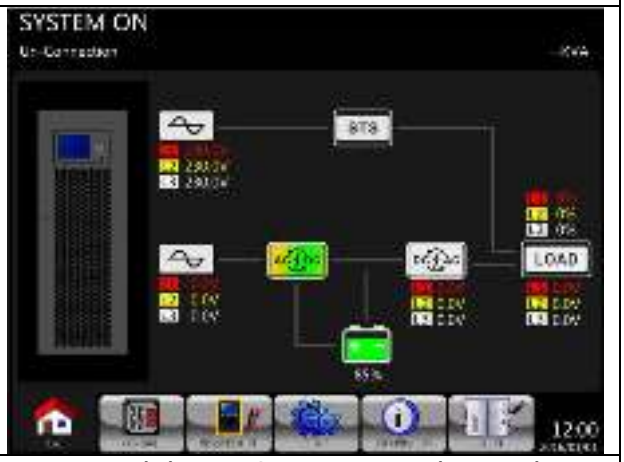
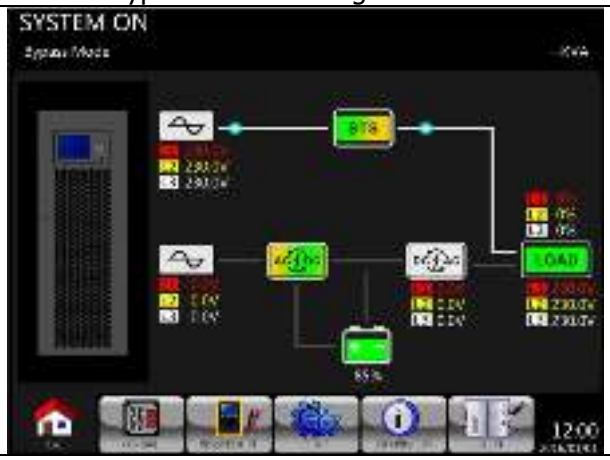
6-4-1. Turn Off Operation in Bypass Mode/ Standby Mode

When the UPS neither is turned on nor turned off, the UPS operates in the Standby Mode or Bypass Mode, depending on the "Bypass Mode" Setting.

The LCD diagrams are shown below.

Bypass Mode Setting is Disabled	Bypass Mode Setting is Enabled
	

Step 1: Switch OFF the Q1 Breaker. The LCD diagrams are shown below.

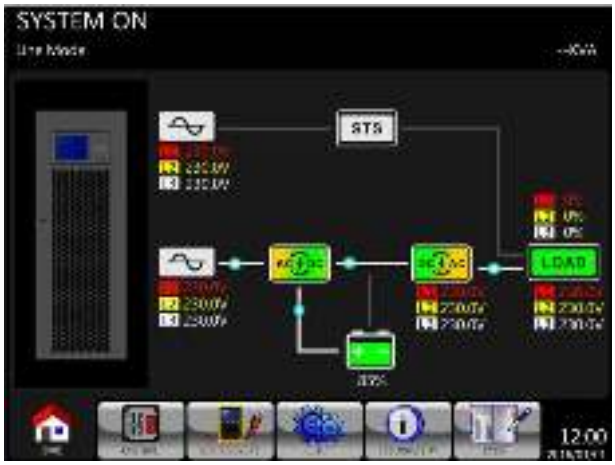
<table>
<tr><td colspan="2">Bypass Mode Setting is Disabled</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>UPS enters Shutdown Mode.</td><td>It is normal the Un-Connection is shown when power stages have shut off their control power.</td></tr>
<tr><td colspan="2">Bypass Mode Setting is Enabled</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td colspan="2">UPS stay in Bypass mode and No AC input is indicated.</td></tr>
</table>

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 disconnect from the AC power for a long time.

6-4-2. Turn Off Operation in Line Mode

The LCD diagrams are shown below when the UPS operates in the Line Mode.



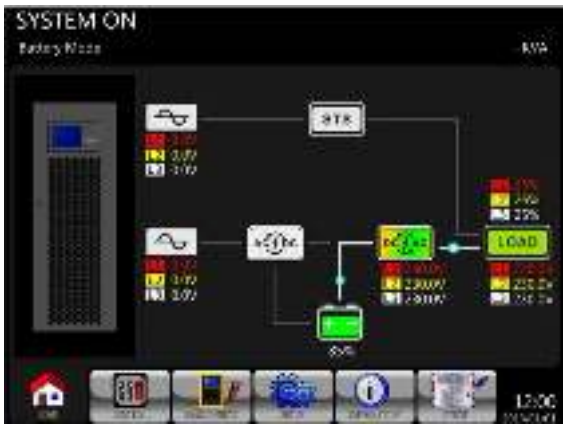
Step 1: Press "Power On/Off" button for 2 second to turn off the UPS. Or use the Menu-Control-System

Turn Off to turn off the UPS.

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

6-4-3. Turn Off Operation in Battery Mode

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



Step 1: Press "Power On/Off" button for 2 second to turn off the UPS. Or use the Menu-Control-System Turn Off to turn off the UPS.

After turning off, the UPS will tranfer to Standby Mode.

7. Trouble Shooting

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

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	DC bus voltage is not balanced	Contact service personnel.
Fault! Bus Short	DC bus is short	Contact service personnel.
Fault! Bus Soft Start Time Out	The rectifiers could not start due to low DC bus voltage within specified duration	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 desired voltage with in specified duration	Turn off UPS and then restart the UPS. If it fails again, contact service personnel.
Fault! Inverter Voltage Over	Inverter Voltage over (Peak Value)	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 over range	Contact service personnel.
Fault! Inverter S Negative Power	S phase inverter Output Negative Power over range	Contact service personnel.
Fault! Inverter T Negative Power	T phase inverter Output Negative Power over range	Contact service personnel.
Fault! Over Load Fault	Heavy overload causes UPS fault.	Reduce some load.
Fault! Battery Fault	Battery reverse	Check the polarity of battery connection and contact service personnel.
Fault! Over Temperature	Make sure adequate space is allowed for air vents and the fan is working	Check if the ambient temperature is over specification. Or contact service personnel.
Fault! CAN Fault	CAN communication fault	Contact service personnel.
Fault! TRIG0 Fault	Synchronized trigger signal fault	Contact service personnel.
Fault! Relay Fault	Inverter relay fault	Contact service personnel.

Fault! Line SCR Fail	Line SCR short circuit fault	Contact service personnel.
Fault! EEPROM Fault	EEPROM operation error	Contact service personnel.
Fault! Parallel Cable Loosen Fault	As stated.	Check if the parallel cable is loose and contact service personnel.
Fault! DSP MCU Stop Communicate	As stated.	Contact service personnel.
Fault! Bypass Temperature Fault	As stated	Check if the ambient temperature is over specification. Or contact service personnel.
Fault! Bypass SCR Fault	As stated.	Contact service personnel.
Warning! EPO Active	Check the EPO connector	Check if the connector is loose when EPO acts abnormally.
Warning! Over Load Fail	The load devices are demanding more power than the UPS can supply. Line mode will transfer to Bypass mode.	Reduce some load and check output Load-Capacity and specification
Warning! Communicate CAN Fail	CAN communication error	Contact service personnel.
Warning! Over Load	In Line mode, the load devices are demanding more power than the UPS can supply.	Reduce some load and check output Load-Capacity and specification
Warning! Battery Open	Battery not connected	1. Check battery breaker. 2. Check if the battery connection 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! Turn On Abnormal	As stated.	Check if the input voltage or frequency is out of range.
Warning! Charge Fail	As stated.	Contact service personnel.
Warning! EEPROM Fail	EEPROM operation error	Contact service personnel.
Warning! Fan Lock	As stated.	Check if the fan is blocked or contact service personnel.
Warning! Line Phase Error	As stated.	Check if the Mains phase sequence is correct and contact service personnel.
Warning! Bypass Phase Error	As stated.	Check if the Bypass phase sequence is correct and contact service personnel.
Warning! N Loss	Neutral loss	Check if the Neutral connection is well and contact service personnel.
Warning! Internal Initial Fail	As stated.	Contact service personnel.
Warning! Comm. Syn. Signal Fail	Communicate Synchronization Signal Fail	Contact service personnel.
Warning! Comm. TRIG0 Fail	Communicate Trigger signal fault	Contact service personnel.
Warning! Redundancy Set Fail	As stated.	Check the redundancy setting is correct and contact service personnel.

Warning! Parallel Sys Config. Wrong	Parallel System Configure error	Contact service personnel.
Warning! Maintenance Bypass	Enter maintenance	Check if the connector is loose when it acts abnormally.
Warning! Battery Age Alert	Battery Life expiration	Check if the battery has been used over its service age. Or contact service personnel.
Warning! Parallel UPS Cable Loosen	As stated.	Check if the Parallel UPS Cable is loose and contact service personnel.
Warning! Parallel UPS Config. Wrong	Parallel UPS Configure error	Check the Parallel UPS Setting is correct and contact service personnel.
Warning! Parallel Firmware Error	Power Stage parallel firmware error	The firmware version does not support UPS Parallel feature. Contact service personnel.
Warning! ID Conflict	Power Stage ID conflict.	There are two Power Stages with the same ID numbers. Change the repeated ID to release it. Or contact service personnel.

8. Storage and Maintenance

8-1. Storage

Before storing, charge the UPS at least 7 hours. Store the UPS covered and upright in a cool, dry location. During storage, recharge the battery in accordance with the following table:

Storage Temperature	Recharge Frequency	Charging Duration
-25°C - 40°C	Every 3 months	1-2 hours
40°C - 45°C	Every 2 months	1-2 hours

8-2. Maintenance

The UPS system operates with hazardous voltages. Repairs may be carried out only by qualified maintenance personnel.

Before carrying out any kind of service and/or maintenance, disconnect the batteries and verify that no current is present and no hazardous voltage exists in the terminals of high capability capacitor such as BUS-capacitors.

Only persons are adequately familiar with batteries and with the required precautionary measures may replace batteries and supervise operations. Unauthorized persons must be kept well away from the batteries.

Verify that no voltage between the battery terminals and the ground is present before maintenance or repair. In this product, the battery circuit is not isolated from the input voltage. Hazardous voltages may occur between the battery terminals and the ground.

Batteries may cause electric shock and have a high short-circuit current. Please remove all wristwatches, rings and other metal personal objects before maintenance or repair, and only use tools with insulated grips and handles for maintaining or repairing.

When replace the batteries, install the same number and same type of batteries.

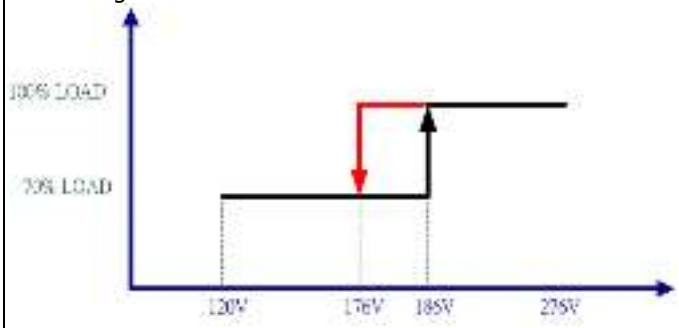
Do not attempt to dispose of batteries by burning them. This could cause battery explosion. The batteries must be rightly deposed according to local regulation.

Do not open or destroy batteries. Escaping electrolyte can cause injury to the skin and eyes. It may be toxic.

Please replace the fuse only with the same type and amperage in order to avoid fire hazards.

Do not disassemble the UPS system.

9. Specifications

MODEL		100K	120K	160KL	200KL
CAPACITY		100KVA / 90KW	120KVA / 108KW	160KVA / 144KW	200KVA / 180KW
INPUT					
Voltage Range	Nominal Voltage	380V/400V/415V (220V/230V/240V)			
	Voltage Range (Full Load)	305V ~ 478V 100% load; (176V ~ 276V)			
	Voltage Range (De-rating)	208V ~ 304V 70% Load Max(120V ~ 175V*)			
	Voltage Comeback	Low Loss Voltage +10V, High Loss Voltage -10V			
Nominal Frequency		50Hz/60Hz(Auto-selectable)			
Frequency Range		40Hz ~ 70Hz			
Phase		3 Phase with Neutral(Three Phase, Neutral + Ground)			
Synchronized Range		+/- 1Hz, +/- 2Hz, +/- 4Hz (default: 4Hz) User Programmable			
Power Factor		≧ 0.99 at 100% Load			
THD i (100% load)		< 3%@Full Load(@Linear Load)			
* De-rating 					
Mains Input (Bypass)					
Voltage Range	Nominal Voltage	380V/400V/415V			
	Voltage Range	Upper limit: +10, +15 or +20, default: +15% Lower limit: -10, -20, -30 default:-20%			
Nominal Frequency		50Hz/60Hz(Auto-selectable)			
Frequency Range		40Hz ~ 70Hz			
Phase		3 Phase with Neutral(Three Phase, Neutral + Ground)			
Synchronized Range		+/- 1Hz, +/- 2Hz, +/- 4Hz (default: 4Hz) User Programmable			
OUTPUT					
Phase		3 Phase with Neutral(Three Phase, Neutral + Ground)			
Output voltage		380/400/415VAC (Ph-Ph)			
		220/230/240VAC (Ph-N)			
AC Voltage Regulation		< 1% Typical (balanced load) < 2% Typical (unbalanced load)			
Frequency Range (Synchronized Range)		40Hz ~ 70Hz			
Frequency Range (Batt. Mode)		50 Hz ± 0.1 Hz or 60Hz ± 0.1 Hz			
Overload	AC mode	1 hour for 105 ~110%, 10 mins for 111~125%, 1 min for 126~150%, 200ms for >150%			
	Battery mode	1 hour for 105 ~110%, 10 mins for 111~125%, 1 min for 126~150%, 200ms for >150%			
Current Crest Ratio		3:1 max			
Harmonic Distortion		100% linear load: <2% 100% nonlinear load: <4%			
Transfer Time	Line ⟷ Battery	0 ms			
	Inverter ⟷ Bypass	Synchronous transfer: <= 0ms Asynchronous transfer: < 1 cycle			
	Inverter ⟷ ECO	<20 ms			
EFFICIENCY					
AC mode		94%, Line mode @ 100% R Load 93.5%, Line mode @ 50% R Load			
ECO Mode		98%, ECO Mode @ 100% R Load 97%, ECO Mode @ 50% R Load			
Battery Mode		93 %, Battery mode @ 100% R Load 92.5%, Battery mode @ 50% R Load			

MODEL		100K	120K	160KL	200KL
BATTERY					
Type		Depending on applications			
Numbers		32 36 40 (adjustable)			
Maximum charging current Note1		24A	32A	40A	48A Note2
Floating Voltage		2.3V/cell			
Boost Charging		2.35V/cell			
Charger Voltage Regulation		< 1%			
Ripple Voltage		< 1%			
Ripple Current (% C10)		< 5			
NOTE1:AC Input >200Vac NOTE2:Scale=1A					
PHYSICAL					
Dimension D X W X H mm		940 x 567 x 1015		1040 x 567 x 1452	
Single input Model	Net Weight(kg)	199	234	306	340
Dual Input Model	Net Weight(kg)	142	237	314	348
ENVIRONMENT					
Operation Temperature		0 ~ 40°C (the battery life will down when > 25°C)			
Operation Humidity		<95 % and non-condensing			
Operation Altitude**		<1000m**			
Acoustic Noise Level		Less than 70dB @ 1 Meter		Less than 73dB @ 1 Meter	
MANAGEMENT					
Smart RS-232 or USB		Supports Windows® 2000/2003/XP/Vista/2008/7/8/10, Linux, Unix, and MAC			
Optional SNMP		Power management from SNMP manager and web browser			

**If the UPS is installed or used in a place where the altitude is above than 1000m, the output power must be de-rated 1% per 100m.
***Product specifications are subject to change without further notice.