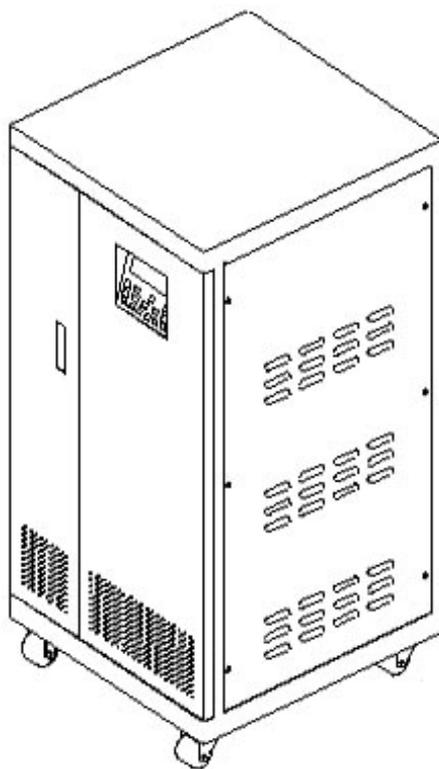


# Industrial Three Phase On Line UPS



**LTH - 3110 / 3115 / 3120 / 3130 / 3140**  
**User Manual**

## Save This Manual

Please read this manual carefully prior to storage, installation, wiring, operation and maintenance of the UPS.

This manual contains important instructions and warnings that you should follow during the storage, installation, wiring, operation and maintenance of the UPS. Failure to follow these instructions and warnings will void the warranty.

Please note that only qualified and trained technician can do installation, wiring, operation and maintenance of the UPS.

## Important Safety Instructions



If the UPS needs to be stored prior to installation, it should be placed in a dry area. The allowable storage temperature is between  $-10^{\circ}\text{C}$  -  $50^{\circ}\text{C}$ .



Install the UPS in a well-ventilated indoor area, away from excess moisture, heat, dust, flammable gas or explosives.



Leave adequate space around all sides of the UPS for proper ventilation. Please refer to **4-2 Installation Environment**.



The wiring must be performed by qualified and trained technician. If you want to wire by yourself, wiring must be under the supervision of qualified and trained technician.



Before wiring or making any electrical connection, make sure five N.F.B.s of the UPS are at off position. Please refer to **2-3 Front Door Opened**.



Before wiring or making any electrical connection, make sure the utility AC power voltage, frequency, phase and wire accord with your ordered UPS.



Before wiring or making any electrical connection, make sure the utility AC power supplied to the input of the UPS is completely cut off.



When connecting with the external battery cabinet, please confirm the polarity. Do not reverse the polarity.



If the UPS needs to be connected to a motor load, it must be confirmed by qualified and trained technician.



The external slits and openings of the UPS are provided for ventilation. To ensure reliable operation of the UPS and to protect the UPS from overheating, these slits and openings must not be blocked or covered. Do not insert any object into the slits and openings that may hinder ventilation.



In a low temperature environment (below  $0^{\circ}\text{C}$ ), you must allow the UPS to adjust to room temperature for at least one hour to avoid moisture condensing inside the UPS before usage.



Do not put beverage containers on the UPS, battery cabinet or any other accessory associated with the UPS.



The risk of dangerous high voltage is possible when the batteries are still connected to the UPS even though the UPS is disconnected from the utility AC power. Do not forget to pull out the battery cable to completely cut off the battery source.



Do not open or mutilate the battery. The released electrolyte is harmful to the skin and eyes and may be toxic.



Do not dispose of the battery in a fire. The battery may explode.



All maintenance services must be performed by qualified and trained technician. Forbid opening or removing the cover of the UPS to avoid high voltage electric shock.

# Contents

Section 1: Introduction -----	1
1-1 Product Introduction -----	1
1-2 Functions and Features -----	1
Section 2: Appearance and Mechanism -----	2
2-1 Appearance and Dimension -----	2
2-2 Front Panel -----	2
2-3 Front Door Opened -----	3
Section 3: System Description -----	5
3-1 UPS Block Diagram -----	5
3-2 Input Isolation Transformer Block Diagram -----	5
3-3 6 Pulse Rectifier Block Diagram -----	6
3-4 IGBT and PWM Block Diagram -----	6
3-5 3 Phase Inverter Block Diagram -----	6
3-6 STS Block Diagram -----	7
Section 4: Installation and Wiring -----	8
4-1 Prior to Installation -----	8
4-2 Installation Environment -----	8
4-3 Prior to Wiring -----	9
4-4 Cables Size -----	9
4-5 Wiring -----	10
4-6 External Battery Bank Wiring -----	10
Section 5: Communication Interface -----	12
5-1 RS232 -----	12
5-2 Dry Contact -----	12
5-3 RS485 -----	13
5-4 Remote Monitor Contacts -----	13
Section 6: Operation and Operation Modes -----	14
6-1 Turn ON the UPS -----	14
6-2 Turn OFF the UPS -----	15
6-3 Operation Modes -----	16
6-3-1 Online Mode -----	16
6-3-2 Battery Mode -----	16

6-3-3 Bypass Mode -----	17
6-3-4 Maintenance Bypass Mode -----	17
Section 7: LCD Display and Setting -----	18
7-1 UPS Status Screen -----	18
7-2 Event Record Screen -----	20
7-3 Date and Time Setting -----	20
7-4 Language Setting -----	21
Section 8: Abnormal Events LCD Display -----	22
8-1 Utility AC Power Source Outage Screen -----	22
8-2 Utility AC Power Voltage too High Screen -----	22
8-3 Output Short Circuit Screen -----	23
8-4 Overload Screen (100% - 124%) -----	23
8-5 Overload Screen (Above 125%) -----	24
8-6 Incorrect Phase Rotation Screen -----	24
8-7 Phase Angle Shift Screen -----	25
8-8 Battery Voltage too Low Screen -----	25
8-9 Output N.F.B. Turn Off Screen -----	26
8-10 Over Temperature Screen -----	26
8-11 Loads Unbalance Screen -----	27
Section 9: Trouble Shooting -----	28
Section 10: Maintenance -----	29
10-1 UPS -----	29
10-2 Battery -----	29
10-3 Fan -----	29
Section 11: Optional Accessories -----	30
11-1 RS485-RS232 Adapter -----	30
11-2 Remote Monitor Box -----	30
11-3 RS232-SNMP Adapter -----	30
Section 12: Specification -----	31
Section 13: Warranty -----	32

# Section 1: Introduction

## 1-1 Product Introduction

The LTH Series UPS is a 3 phase 4 wire industrial online uninterruptible power system which provides reliable and stable pure sine wave power to your critical loads. With advanced technology of Rectifier, IGBT, PWM and CPU control, the LTH Series UPS is extremely high reliable. Besides, the LTH Series UPS applied true galvanic isolation design to solve the problem of utility AC power such as noise, lighting, leakage current etc. Furthermore, the LTH Series UPS has individual inverter supports per phase which can endure 100% unbalance load. With its outstanding features, the LTH Series UPS provides safe, reliable and uninterrupted power to your sensitive electronic equipments at all times.

## 1-2 Functions and Features

- Industrial on line UPS (Low Frequency UPS) which can operate under harsh environment.
- Input true galvanic isolation transformer to solve the utility AC power problem such as noise, lighting, etc.
- Each phase with individual inverter to support 100% unbalance load.
- Intelligent battery test to prolong battery life.
- DC start-up function.
- No battery start-up: in case the battery is broken or external battery cabinet is not connected. The UPS can still start-up normally with AC.
- Intelligent boost and floating charging voltage control to protect battery.
- Wide AC input range:  $\pm 20\%$ .
- The operating conditions such as loads, input and output voltage, input and output frequency, battery voltage of the UPS can be seen on LCD.
- The CPU can record up to 400 entries of abnormal information of the UPS, which is helpful in fault diagnosis for the UPS and in the improvement of the maintenance efficiency.
- Built-in RS232, dry contact, RS485 and remote monitor contacts which allow you to monitor and manage the UPS.
- Overload, short circuit and over temperature protection: transfer to bypass.
- Incorrect phase rotation protection: the UPS will alarm.
- Phase angle shift protection: the UPS will alarm.

## Section 2: Appearance and Mechanism

### 2-1 Appearance and Dimension

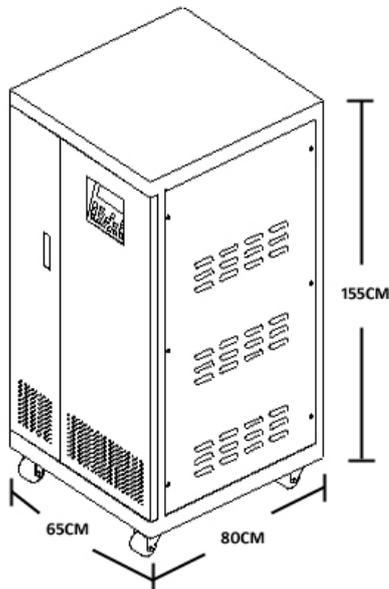


Figure 1 : 10KVA – 40KVA UPS Appearance

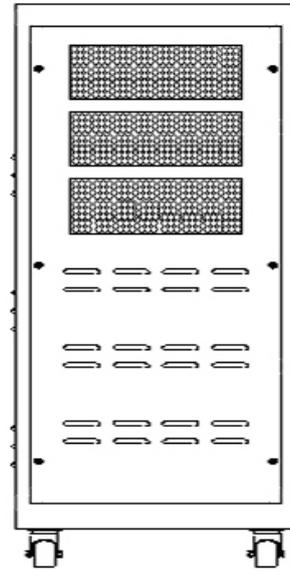


Figure 2 : 10KVA – 40KVA UPS Rear View

### 2-2 Front Panel

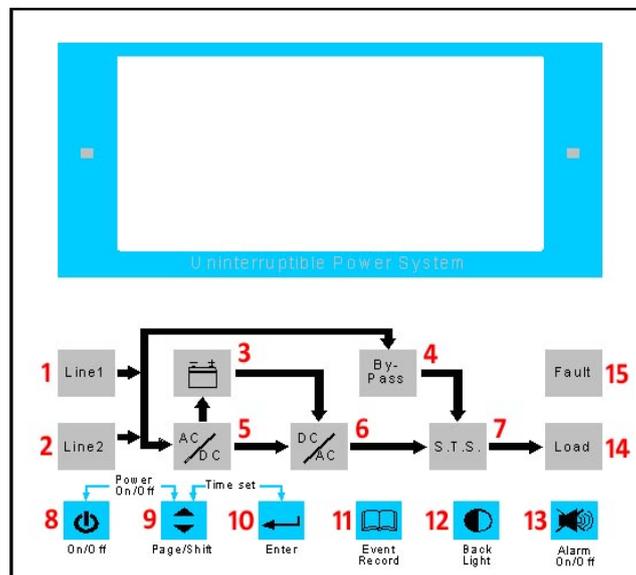


Figure 3 : Front Panel

No.	Light Color	Description
1.	Green	The indicator is on means the utility AC power is normal.
2.	Green	The indicator is on means the second input power source is standby.
3.	Green	The indicator is on means the battery is normal. The indicator is flashing means the UPS is in battery mode.
4.	Red	The indicator is on means the output power is supplied from bypass.

No.	Light Color	Description
5.	Green	The indicator is on means the rectifier and charger is operating normal.
6.	Green	The indicator is on means the IGBT and inverter is operating normal.
7.	Green	The indicator is on means the static transfer switch is operating normal.
8.	N/A	Press "8" and "9" buttons together to turn on / turn off the UPS.
9.	N/A	Press this button to change the UPS status pages. Press this button to change - <i>in setting page</i> .
10.	N/A	Press "9" and "10" buttons together to set date and time. Press this button to confirm the setting - <i>in setting page</i> .
11.	N/A	Press this button to see the event logs of the UPS. Press "11" and "12" buttons together to set language.
12.	N/A	Press this button to light the LCD backlight.
13.	N/A	Press this button to mute alarm.
14.	Green	The indicator is on means the load is in using.
15.	Red	The indicator is on means the UPS is abnormal.

### 2-3 Front Door Opened

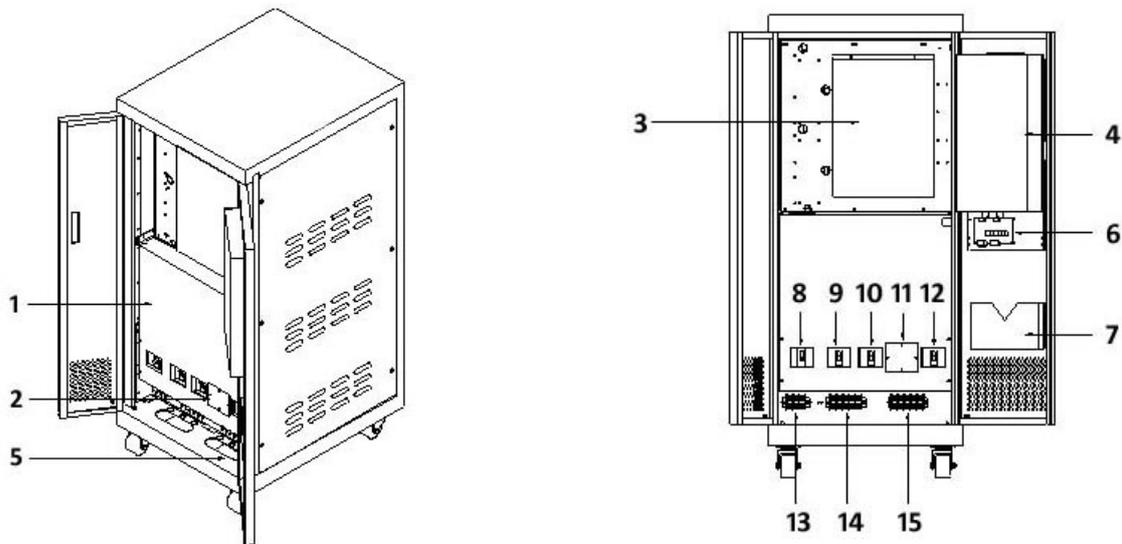


Figure 4 : Front Door Opened

No.	Description
1.	N.F.B.s protective cover.
2.	Maintenance bypass N.F.B. protective cover.
3.	Signal control PCB protective cover.
4.	LCM control PCB / LCD PCB / LED PCB protective cover.
5.	Cable through hole.
6.	Communication PCB.
7.	User manual leaving.
8.	Battery input N.F.B.
9.	Mains input N.F.B.
10.	Bypass (Reserve) input N.F.B.
11.	Maintenance bypass N.F.B. <b>For maintenance only! Only qualified and trained technician can open the cover plate of Maintenance bypass N.F.B. and operate it.</b>
12.	Output N.F.B.

No.	Description
13.	External battery bank input terminal block.
14.	Utility AC power Input terminal block.
15.	Output terminal block.

## Section 3: System Description

### 3-1 UPS Block Diagram

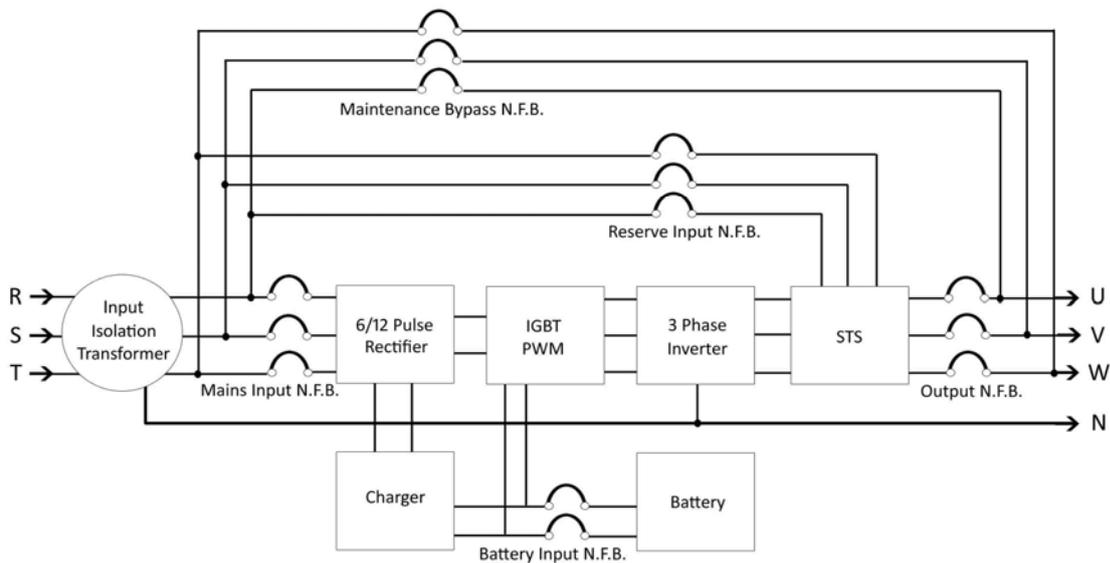


Figure 5 : UPS Block Diagram

*Figure 5: UPS Block Diagram* demonstrates the UPS working principle briefly. The utility AC power pass through the Input ISO Transformer to eliminate noise, leakage current, surge, etc, then the 6 Pulse Rectifier converts AC to DC to provide DC power for Charger to charge the battery and provide DC power for IGBT to trigger PWM to convert DC to AC. After PWM converts DC to AC, then AC will pass through the Inverter and provides reliable and stable pure sine wave power for the loads. In the event of overload or the UPS failure, the STS will work and allows the utility AC power provides power for loads directly.

### 3-2 Input Isolation Transformer Block Diagram

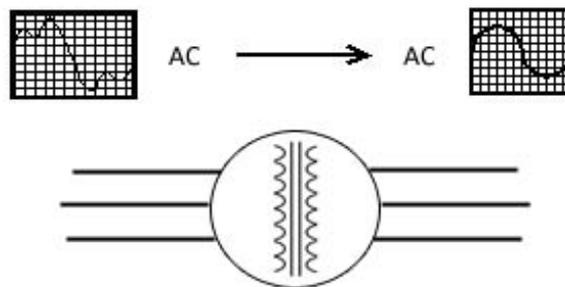


Figure 6 : Input Isolation Transformer Block Diagram

*Figure 6: Input Isolation Transformer Block Diagram* demonstrates the Input Isolation Transformer working principle briefly. The Input Isolation Transformer is designed to eliminate noise, surge, leakage current of the utility AC power to protect the components of the UPS and provide clean AC power for the 6 Pulse Rectifier.

### 3-3 6 Pulse Rectifier Block Diagram

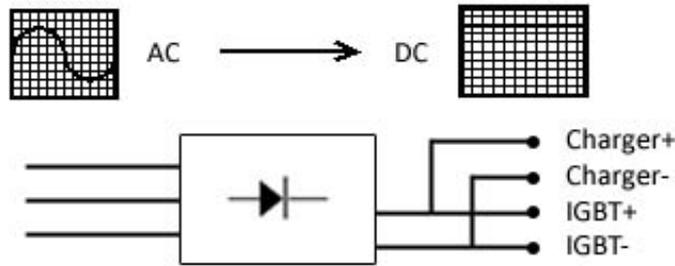


Figure 7 : Rectifier Block Diagram

Figure 7: Rectifier Block Diagram demonstrates the 6 Pulse Rectifier working principle briefly. The 6 Pulse Rectifier is designed to convert AC to DC to provide DC power for Charger to charge the battery and provide DC power for IGBT to trigger PWM to convert DC to AC.

### 3-4 IGBT and PWM Block Diagram

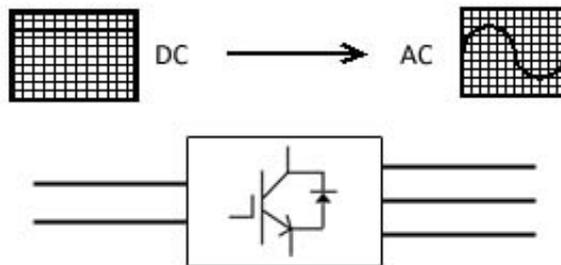


Figure 8 : IGBT and PWM Block Diagram

Figure 8: IGBT and PWM Block Diagram demonstrates the IGBT and PWM working principle briefly. The IGBT and PWM are designed to convert DC power to AC power. The DC power converted by Rectifier powers the IGBT to trigger the PWM to convert DC power to AC power.

### 3-5 3 Phase Inverter Block Diagram

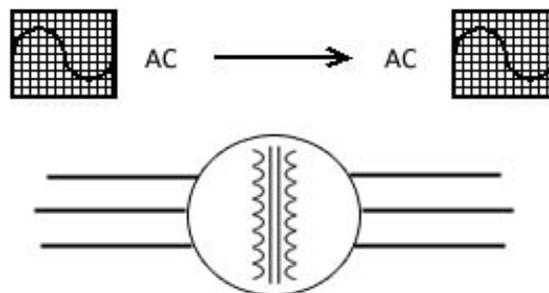


Figure 9 : Inverter Block Diagram

Figure 9: Inverter Block Diagram demonstrates the Inverter working principle briefly. The AC power converted by PWM passes through the Inverter then goes through the STS to the loads.

### 3-6 STS Block Diagram

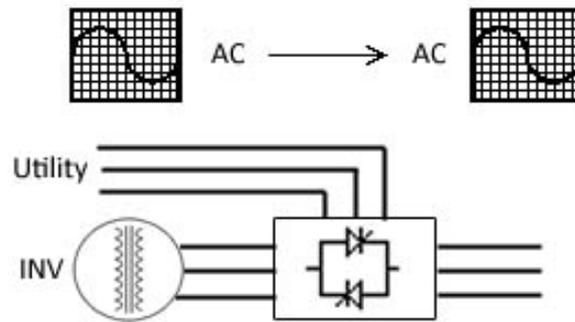


Figure 10 : STS Block Diagram

*Figure 10: STS Block Diagram* demonstrates the STS working principle briefly. The STS is designed to control the output AC power whether goes through the Inverter or directly from the utility AC power. If the UPS is normal, the output AC power will go through the Inverter and provide power for loads. If the UPS is failure or overload or over temperature, the loads will be provided by the utility AC power.

## Section 4: Installation and Wiring

### 4-1 Prior to Installation



Only a qualified and trained technician can do the installation. If you want to install by yourself, installation must be under the supervision of qualified and trained technician.



During the transportation, some unpredictable situations might occur. It is recommended that you inspect the UPS exterior packaging. If you notice any damage, please immediately contact the dealer from whom you purchased the UPS.



Open the front door to check the rating label on the UPS and make sure the model number, capacity and specification of the UPS match what you purchased.



During the transportation, some unpredictable situations might occur. It is recommended that you check the UPS can be turned on normally or not. Please follow below procedures:

1. Open front door and check five N.F.B.s (see Figure 4) are at 「OFF」 position.
2. Switch on 「8. Battery Input N.F.B.」 (see Figure 4).

**\* Note: If check 40KVA UPS, please connects external battery bank first. Please refer to 4-6 External Battery Bank Wiring.**

3. Then press 「8. On/Off」 and 「9. Page/Shift」 buttons (see Figure 3) together and release after you hear a beep to turn on the UPS.
4. If the UPS is fault, 「15. Fault」 indicator (see Figure 3) will light and alarm continuously. Please immediately contact the dealer from whom you purchased the UPS.
5. If the UPS is normal, then press 「8. On/Off」 and 「9. Page/Shift」 buttons (see Figure 3) together and release after you hear a beep to turn OFF the UPS.
6. Switch off 「8. Battery Input N.F.B.」 and check again five N.F.B.s (see Figure 4) are at 「OFF」 position then start to install the UPS.

### 4-2 Installation Environment



Install the UPS indoors. Do not place the UPS outdoors.



Make sure the installation area can accommodate and bear the weight of the UPS and external battery cabinets.



The installation place must be kept clean and tidy at all times.



Make sure the installation area is big enough for maintenance and ventilation. Since the fans of the UPS ventilate to rear and it is recommended that you place the external battery cabinet next the UPS. We suggest you:

- Keep a distance of 100cm from the front of the UPS and the external battery cabinet for maintenance and ventilation.

- Keep a distance of 50cm from the back of the UPS and the external battery cabinet for maintenance and ventilation.
- Keep a distance of 50cm from the both sides of the UPS and the external battery cabinet for maintenance and ventilation.



Keep the installation area temperature around 15 ° C - 25 ° C to prolong the battery life.

#### 4-3 Prior to Wiring



Only a qualified and trained technician can do the wiring. If you want to wire by yourself, wiring must be under the supervision of qualified and trained technician.



Please make sure the five N.F.B.s (see Figure 4) are at 「 OFF 」 position.



Please check whether the utility AC power voltage, frequency, phase and wire match the UPS that you purchased or not.



If the external battery bank needs to be connected to the UPS, please make sure the number of batteries of the external battery bank must meet UPS specification. Please refer to **4-6 External Battery Bank Wiring**.



A battery can present a risk of electric shock and high short circuit current. Servicing of batteries and external battery bank must be performed or supervised by qualified and trained technician knowledgeable in batteries and external battery bank. Keep unauthorized personnel away from batteries and the external battery bank.



Please make sure the power that will be supplied to the external battery terminal block and input terminal block (see Figure 4) of the UPS are completely cut off.



Please check whether the loads connected to the UPS exceed the capacity of the UPS or not.



If the UPS needs to be connected to a motor load, it must be confirmed by qualified and trained technician.

#### 4-4 Cables Size

Please check cables size that will be connected to the UPS. For the specifications of AC input cable, output cable and external battery input cable, please see below *Table 1: Suggested Cables Size*.

UPS Capacity	10KVA	15KVA	20KVA	30KVA	40KVA
AC Input Cable	12AWG	10AWG	8AWG	4AWG	2AWG
Output Cable	14AWG	12AWG	10AWG	8AWG	6AWG
External Battery Bank Input Cable	4AWG	2AWG	1/0:130A	3/0:200A	250:255A

Table 1 : Suggested Cables Size

**\* Note:**

- ***In accordance with National Electrical Codes (NEC), please install a suitable conduit and bushing.***
- ***Cables with PVC material and with temperature resistance up to 105 ° C are suggested.***

## 4-5 Wiring

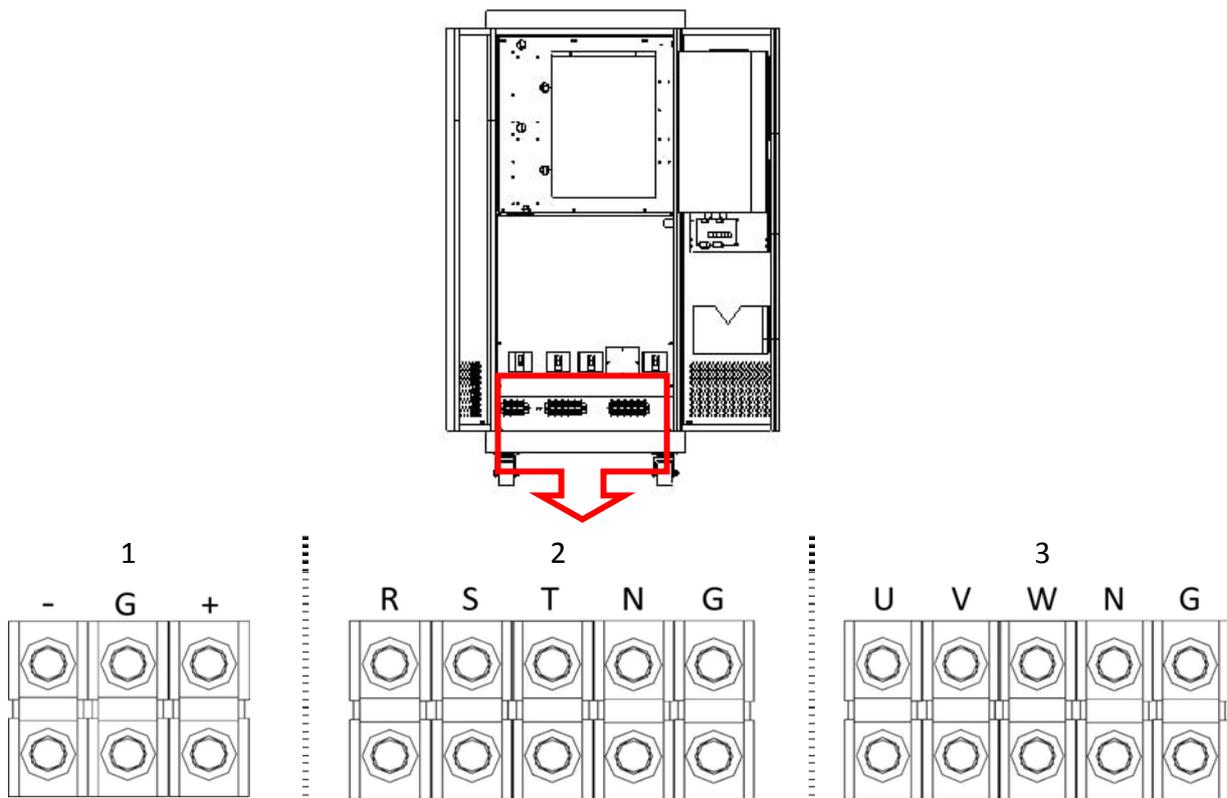


Figure 11 : Wiring Terminal Blocks

No.	Description	Function
1	External battery bank input terminal block.	Connects the mains AC source.
2	Utility AC power input terminal block.	Connects an external battery bank.
3	Output terminal block.	Connects the loads.

### \* Note:

- **Incorrect wiring will lead to severe electric shock and damage to the UPS.**
- **The utility AC power must be three phase (R/S/T) and meet the specification specified on the UPS rating label. When connecting the utility AC power to the UPS, make sure the phase sequence is correct.**
- **When connecting the external battery bank to the UPS, do not reverse the polarity.**
- **Make sure that all the cables are screwed tightly.**

## 4-6 External Battery Bank Wiring

Our standard 10KVA / 15KVA / 20KVA / 30KVA UPS can be installed 12VDC \* 16pcs batteries internal (Max. 12VDC 40Ah \* 16pcs can be placed). Our standard 40KVA UPS can not be installed 12VDC \* 16pcs batteries internal. The 40KVA UPS must have external battery bank. If you want to extend battery backup time for 10KVA / 15KVA / 20KVA / 30KVA UPS or connect external battery bank to 40KVA UPS, please make sure:

- The number of batteries of the external battery bank must be 12VDC \* 16pcs.
- Only use the same type of batteries from the same supplier. Never use old, new and different Ah batteries at the same time.

- Do not connect the batteries in reverse.
- Please contact the dealer from whom you purchased the UPS to confirm whether the charging current of the battery charger is sufficient or not.
- The external battery bank must have N.F.B.

# Section 5: Communication Interface

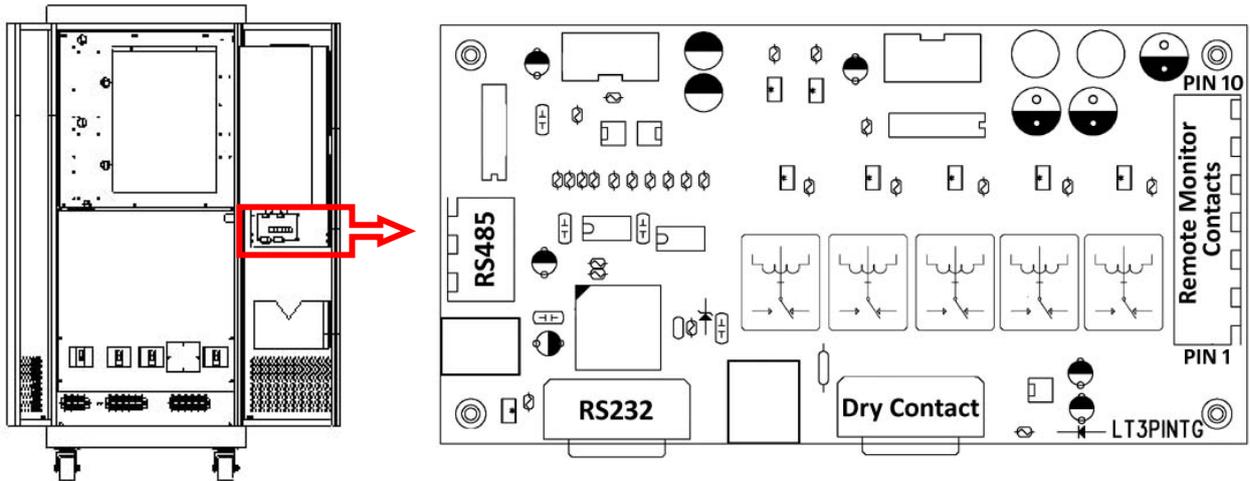
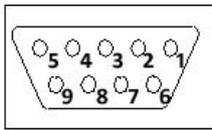


Figure 12 : Communication Interface

## 5-1 RS232



### Hardware

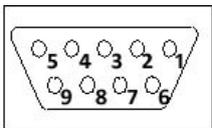
- ..... Baud Rate: 2400bps
- ..... Data Length: 8 bit
- ..... Stop Bit: 1 bit
- ..... Parity: None

### Pin Assignment

- ..... PIN 2: RXD (Receiving Data)
- ..... PIN 3: TXD (Transmitting Data)
- ..... PIN 5: GND (Ground)

RS232 port is to provide communication between the UPS and a computer. The UPS will provide information such as the UPS operation mode, battery capacity, battery voltage, UPS input/output voltage, UPS input/output frequency, etc... for you to check and monitor the UPS status via a computer. An option accessory: RS232-SNMP Adapter (Please refer to **11-3 RS232-SNMP Adapter**) is available as well for you to monitor the UPS via Internet.

## 5-2 Dry Contact

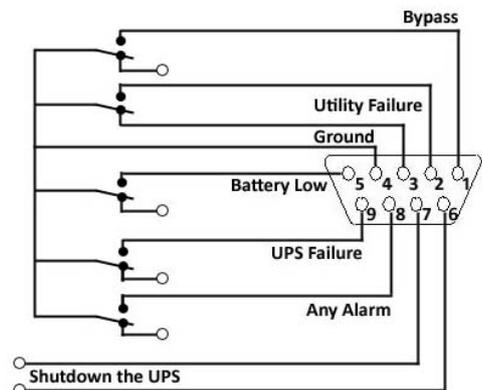


### Pin Assignment

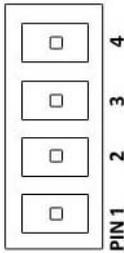
- ..... PIN 1: Bypass
- ..... PIN 2: Utility AC power Failure (N.O.)
- ..... PIN 3: Utility AC power Failure (N.C.)
- ..... PIN 4: Ground
- ..... PIN 5: Battery Low

- ..... PIN 6: Shutdown
- ..... PIN 7: Shutdown
- ..... PIN 8: Any Alarm
- ..... PIN 9: UPS Failure

Dry Contact is to provide UPS status such as bypass mode, battery mode, battery low voltage, any alarm and any fault of the UPS for you to know the UPS status immediately. The Dry Contact can also let you shutdown the UPS remotely. Right side figure demonstrates how you should make the connection for remote monitor.



### 5-3 RS485 (need optional accessory: RS485-RS232 adapter)

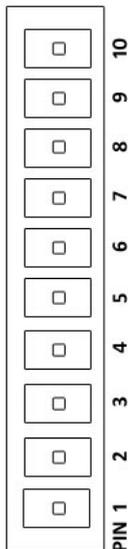


#### Pin Assignment

- PIN 1: TXD+ (Transmitting Data)
- PIN 2: TXD- (Transmitting Data)
- PIN 3: RXD+ (Receiving Data)
- PIN 4: RXD- (Receiving Data)

RS485 port needs optional accessory: RS485-RS232 adapter to work (Please refer to **11-1 RS485-RS232 Adapter**). RS485 port is to provide longer distance communication between the UPS and a computer. The UPS will provide information such as the UPS operation mode, battery capacity, battery voltage, UPS input/output voltage, UPS input/output frequency, etc... for you to check and monitor the UPS status via a computer.

### 5-4 Remote Monitor Contacts (need optional accessory: remote monitor box)



#### Pin Assignment

- PIN 1: Utility AC power Failure
- PIN 2: Bypass
- PIN 3: Battery Low
- PIN 4: Any Fault
- PIN 5: Any Alarm
- PIN 6: Load 5%
- PIN 7: UPS Normal
- PIN 8: N/A
- PIN 9: Ground
- PIN 10: +20VDC

Remote Monitor Contacts needs optional accessory: remote monitor box to work (Please refer to **11-2 Remote Monitor Box**). Remote Monitor Contacts provides UPS status such as online mode, battery mode, bypass mode, battery low voltage, loads connected, any alarm and any fault of the UPS for you to know the UPS status immediately.

## Section 6: Operation and Operation Modes

### 6-1 Turn ON the UPS

After you finished UPS installation and wiring, please see below procedures to turn ON the UPS:

1. Make sure the loads connected to the UPS are turn OFF.
2. Open front door and check five N.F.B.s (see Figure 4) are at 「OFF」 position.
3. Make sure the utility AC power N.F.B. and external battery bank N.F.B. (if you have external battery bank) are switch 「ON」 .
4. Switch ON 「8. Battery Input N.F.B.」 (see Figure 4) and you will hear a short beep. The indicators will light and LCD will show as Figure 13.

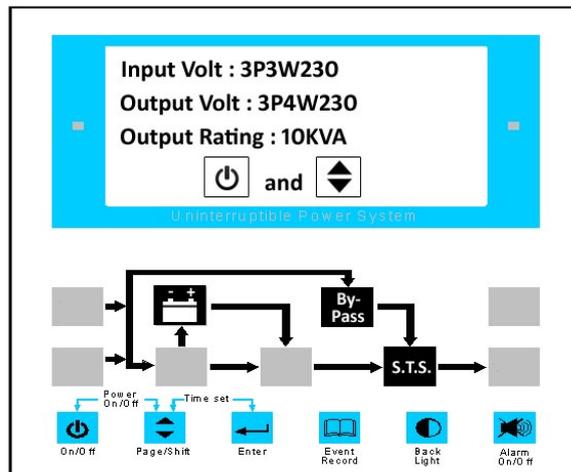


Figure 13 : LCD and Indicators - 1

5. Switch ON 「9. Mains Input N.F.B.」 (see Figure 4). The indicators will light and LCD will show as Figure 14.

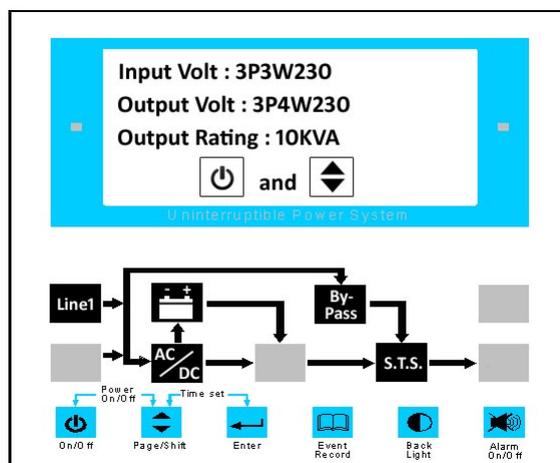


Figure 14 : LCD and Indicators - 2

6. Switch ON 「 10. Bypass (Reserve) Input N.F.B. 」 (see Figure 4). The indicators and LCD remain as Figure 14.
7. Switch ON 「 12. Output N.F.B. 」 (see Figure 4). **Be careful that the output has power from the utility AC power now.** The indicators and LCD remain as Figure 14.
8. Press 「 8. On/Off 」 and 「 9. Page/Shift 」 buttons (see Figure 3) together and release after you hear a beep to turn ON the UPS. The indicators will light and LCD will show as Figure 15.

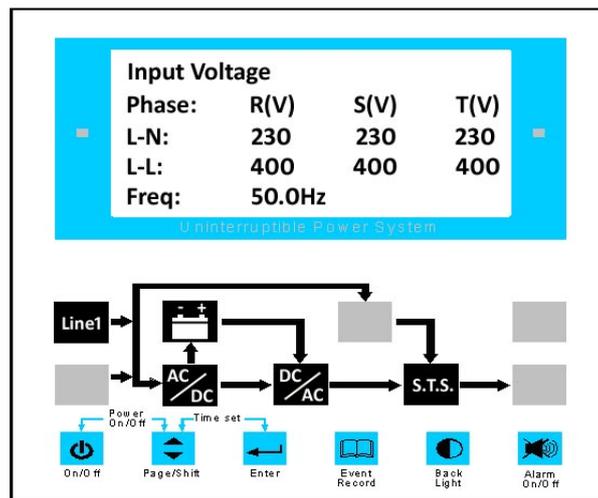


Figure 15 : LCD and Indicators - 3

**\* Note: If the UPS beep continuously and LCD show as Figure 31 or Figure 32, please check the utility AC power input wiring phase rotation or phase angle.**

9. The UPS is working now and you can turn ON your loads.

## 6-2 Turn OFF the UPS

If you want to turn OFF the UPS, please see below procedures to turn OFF the UPS:

1. Make sure the loads connected to the UPS are turn OFF.
2. Press 「 8. On/Off 」 and 「 9. Page/Shift 」 buttons (see Figure 3) together and release after you hear a beep to turn OFF the UPS. **Be careful that the output still has power from the utility AC power.**
3. Switch OFF 「 12. Output N.F.B. 」 (see Figure 4).
4. Switch OFF 「 10. Bypass (Reserve) Input N.F.B. 」 (see Figure 4).
5. Switch OFF 「 9. Mains Input N.F.B. 」 (see Figure 4).
6. Switch OFF 「 8. Battery Input N.F.B. 」 (see Figure 4).
7. The UPS is completely turn OFF now.

### 6-3 Operation Modes

There are four operation modes of the UPS. Please see below figures to demonstrate each mode.

#### 6-3-1 Online Mode

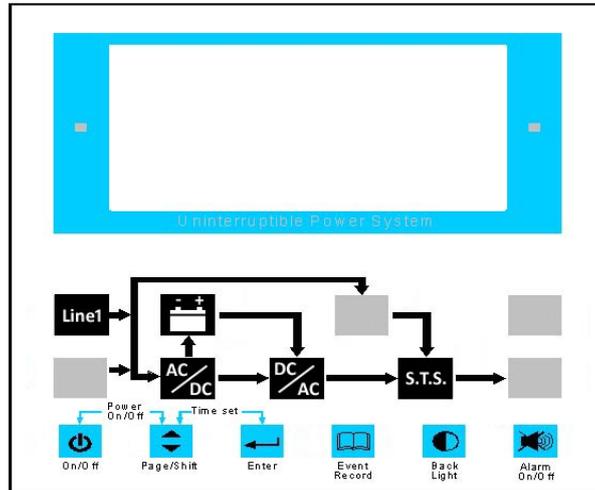


Figure 16 : Online Mode

**Condition: the utility AC power source is normal.**

Figure 16: Online Mode demonstrates that the load is supplied by the inverter which derives its power from the utility AC power and the UPS charges the batteries as needed and provides power protection to the equipment.

#### 6-3-2 Battery Mode

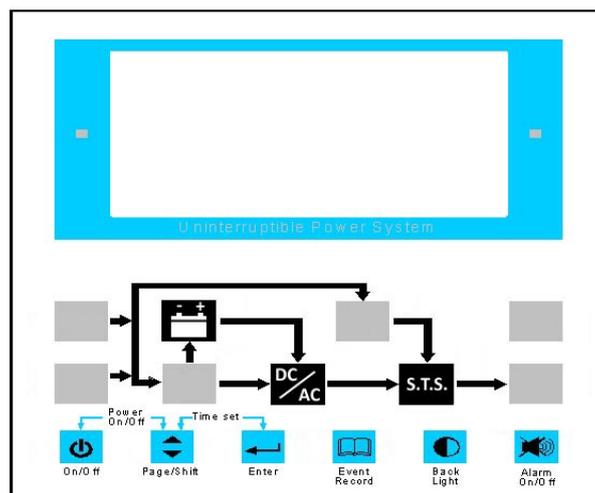


Figure 17 : Battery Mode

**Condition: the utility AC power source is outage.**

Figure 17: Battery Mode demonstrates that the load is supplied by the inverter which derives its power from the battery.

### 6-3-3 Bypass Mode

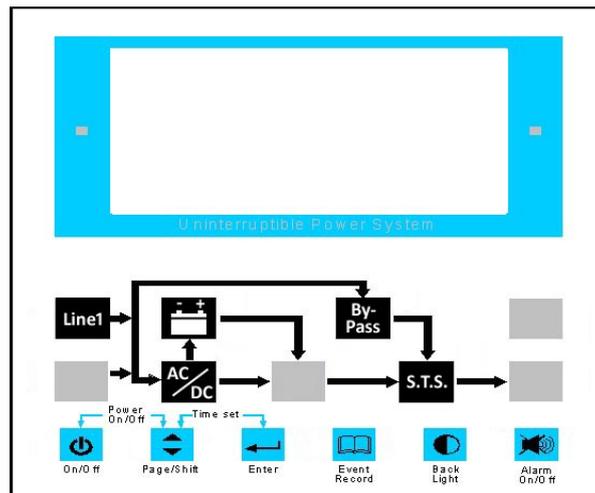


Figure 18 : Bypass Mode

**Condition: over temperature or overload or UPS shutdown or UPS failure.**

Figure 18: Bypass Mode demonstrates that the load is supplied by the utility AC power, not the inverter, and the batteries are charged.

### 6-3-4 Maintenance Bypass Mode

**Condition: the UPS needed to be repaired by a qualified and trained technician.**

Maintenance bypass is designed to supply the utility AC power to the loads directly when there is a fault condition on the UPS and maintenance work needs to be carried out. This operation must only be carried out by a qualified and trained technician who is familiar with the LTH series UPS. Incorrect use of the Maintenance Bypass N.F.B. can cause severe damage to the UPS.

# Section 7: LCD Display and Setting

## 7-1 UPS Status Screen

After you turn ON the UPS, the LCD will show status of the UPS. There are four pages and you can press 「9. Page/Shift」 button (see Figure 3) to change the page. Each page is as below figure:

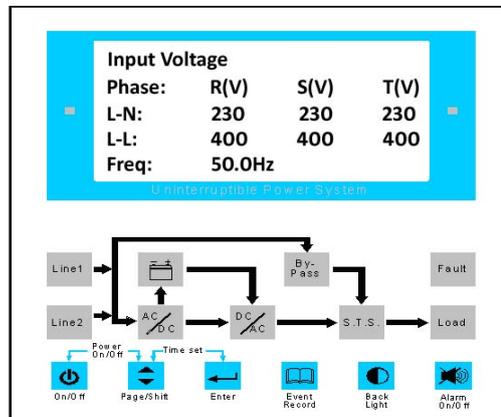


Figure 19 : Input Status Screen

Figure 19: Input Status Screen demonstrates the utility AC power R/S/T input voltage and frequency.

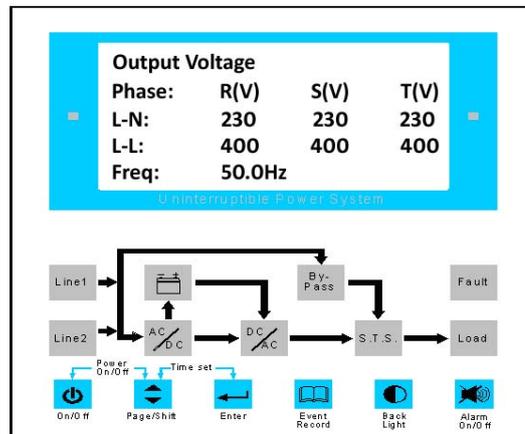


Figure 20 : Output Status Screen

Figure 20: Output Status Screen demonstrates the UPS R/S/T output voltage and frequency.

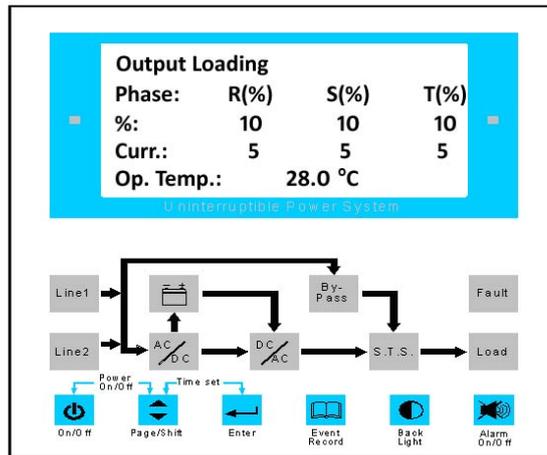


Figure 21 : Load Status Screen

Figure 21: Load Status Screen demonstrates the UPS R/S/T loads percentage, current and UPS interior temperature.

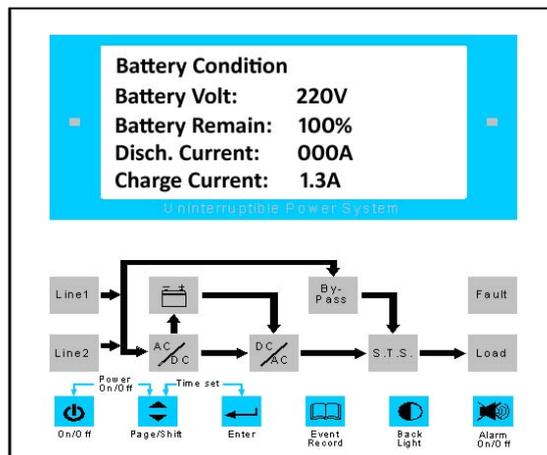


Figure 22 : Battery Status Screen

Figure 22: Battery Status Screen demonstrates the battery voltage, battery capacity, battery discharge current and charging current.

## 7-2 Event Record Screen

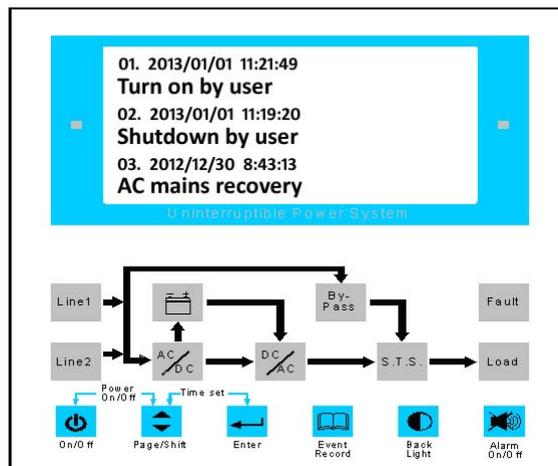


Figure 23 : Event Record Screen

Figure 23: Event Record Screen demonstrates the log of the UPS such as utility AC power failure, utility AC power recovery, UPS turn ON... The logs can be saved up to 400 entries of abnormal information of the UPS. You can press 「 11. Event Record 」 button (see Figure 3) to enter the Event Record page.

## 7-3 Date and Time Setting

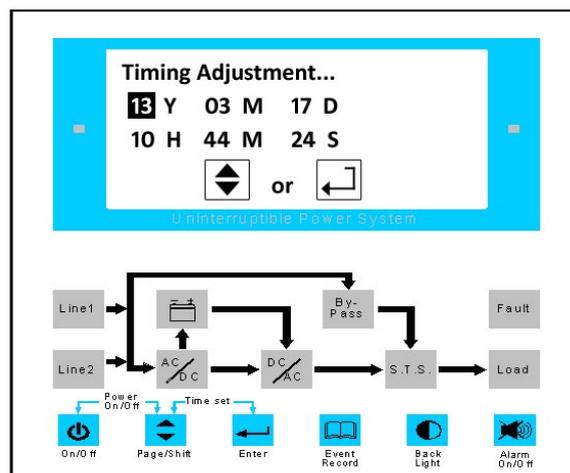


Figure 24 : Date and Time Setting Screen

Figure 24: Date and Time Setting Screen demonstrates the adjustment of date and time. If you want to set your local time and date, press 「 9. Page/Shift 」 and 「 10. Enter 」 buttons (see Figure 3) together for about 3 seconds then you will enter date and time setting page. Press 「 10. Enter 」 to change year / month / date / hour / minute / second and press 「 9. Page/Shift 」 to change the number.

## 7-4 Language Setting

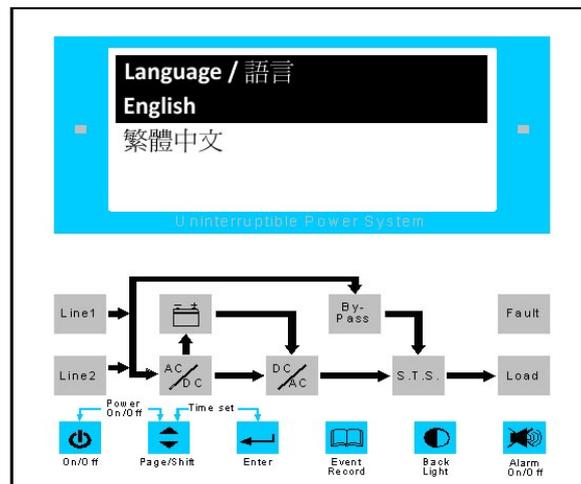


Figure 25 : Language Setting Screen

Figure 25: Language Setting Screen demonstrates the adjustment of language. Press 「11. Event Record」 and 「12. Back Light」 buttons (see Figure 3) together for about 3 seconds then you will enter language setting page. Press 「9. Page/Shift」 to select the language and press 「10. Enter」 to confirm.

# Section 8: Abnormal Events LCD Display

## 8-1 Utility AC Power Source Outage Screen

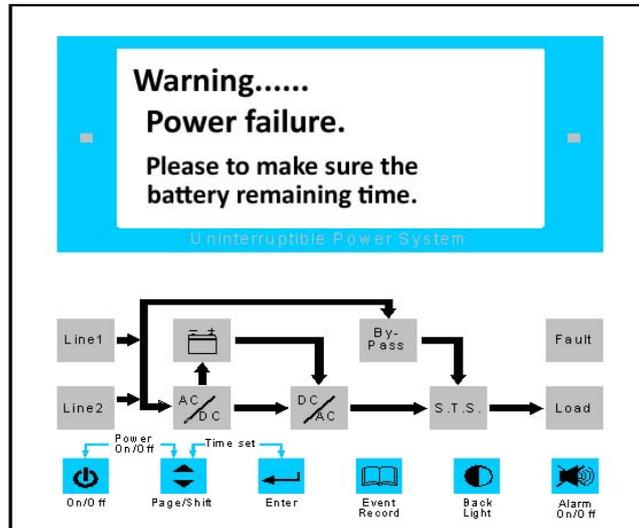


Figure 26 : Utility AC Power Source Outage Screen

If the utility AC power source is failure, the UPS will beep, the screen will flash and the screen will have warning message as Figure 26 shown.

## 8-2 Utility AC Power Voltage too High Screen

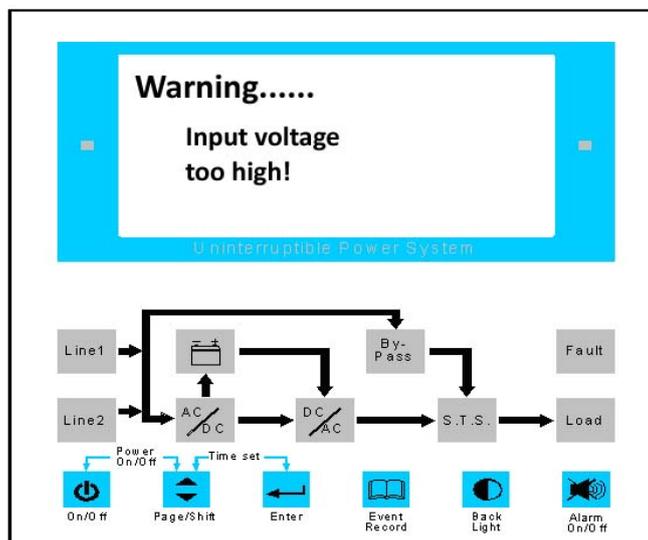


Figure 27 : Utility AC Power Voltage too High Screen

If the utility AC power source voltage is too high, the screen will flash and the screen will have warning message as Figure 27 shown.

### 8-3 Output Short Circuit Screen

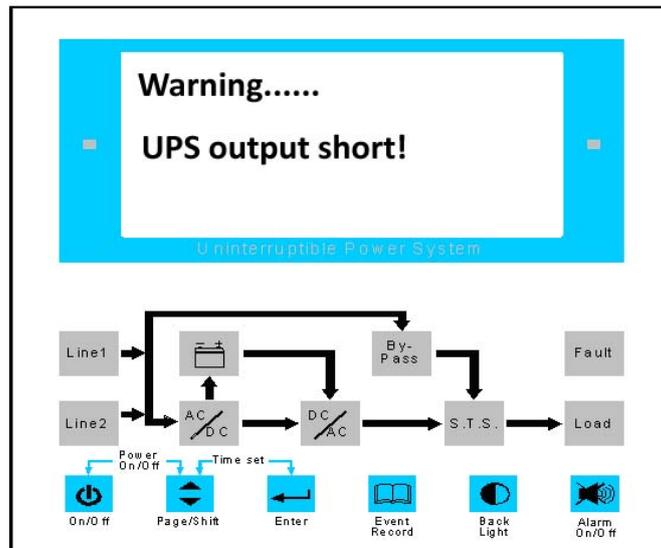


Figure 28 : Output Short Circuit Screen

If output short circuit, the UPS will beep continuously and the screen will have warning message as Figure 28 shown. Then the UPS will transfer to bypass mode.

### 8-4 Overload Screen (100% - 124%)

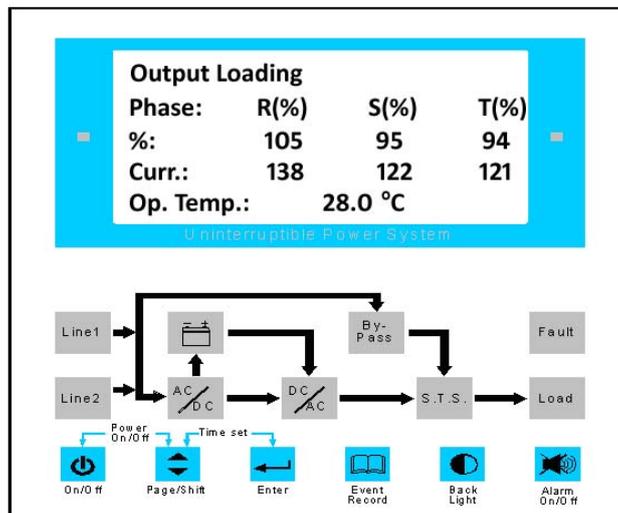


Figure 29 : Overload Screen (100% - 124%)

If overload 100% - 124% (any phase), the UPS will beep continuously, the screen will flash and the screen will show as Figure 29. After 10 minutes, the UPS will transfer to bypass mode.

### 8-5 Overload Screen (Above 125%)

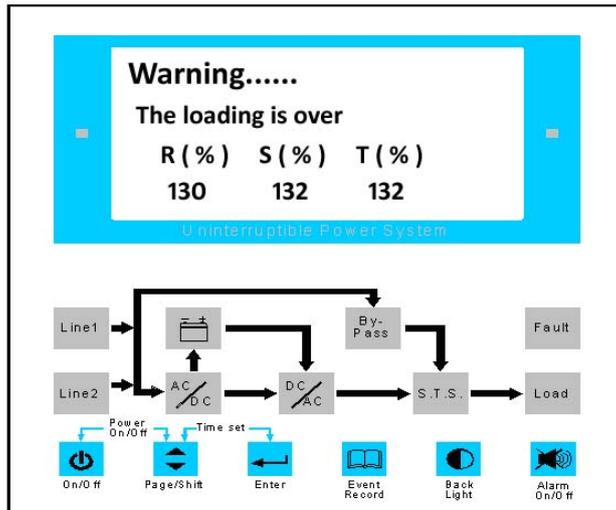


Figure 30 : Overload Screen (Above 125%)

If overload above 125% (any phase), the UPS will beep continuously, the screen will flash and the screen will have warning message as Figure 30 shown. After 1 minute, the UPS will transfer to bypass mode.

### 8-6 Incorrect Phase Rotation Screen

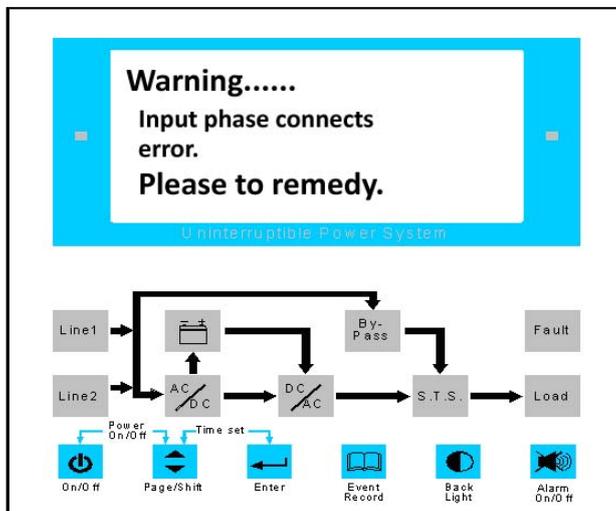


Figure 31 : Incorrect Phase Rotation Screen

If the utility AC power input wiring phase rotation is incorrect, the UPS will beep continuously, the screen will flash and the screen will have warning message as Figure 31 shown.

## 8-7 Phase Angle Shift Screen

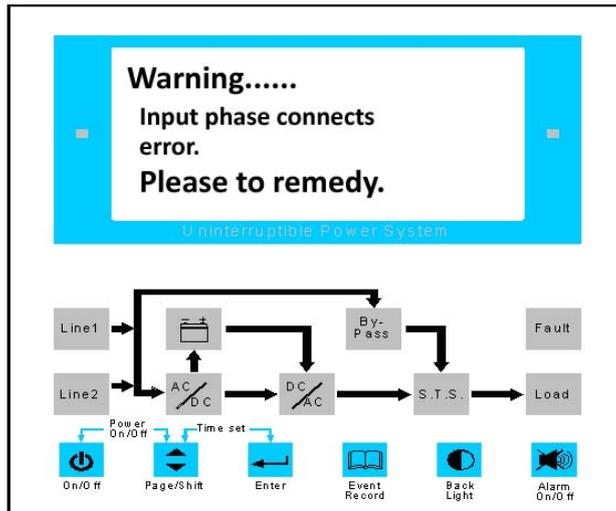


Figure 32 : Phase Angle Shift Screen

If the utility AC power input phase angle shift, the UPS will beep continuously, the screen will flash and the screen will have warning message as Figure 32 shown.

## 8-8 Battery Voltage too Low Screen

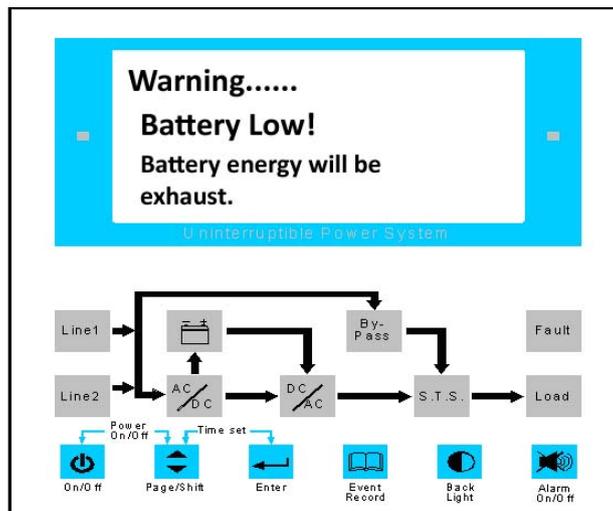


Figure 33 : Battery Voltage too Low Screen

In battery mode, if battery voltage is too low, the UPS will beep hurriedly, the screen will flash and the screen will have warning message as Figure 33 shown.

### 8-9 Output N.F.B. Turn Off Screen

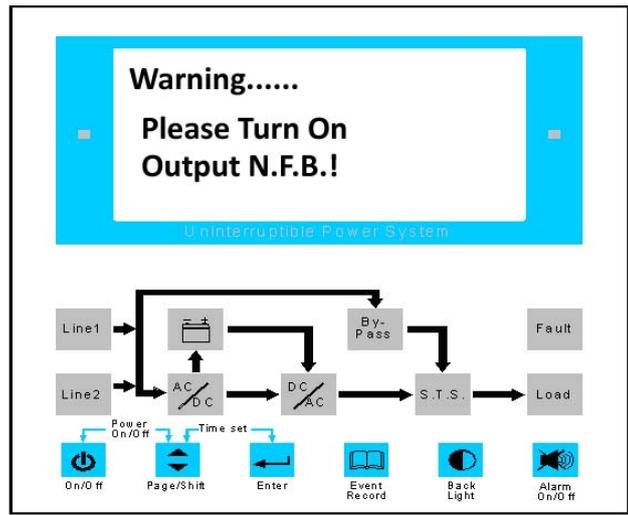


Figure 34 : Output N.F.B. Turn Off Screen

If the output N.F.B. is at OFF position, the screen will flash and the screen will have warning message as Figure 34 shown.

### 8-10 Over Temperature Screen

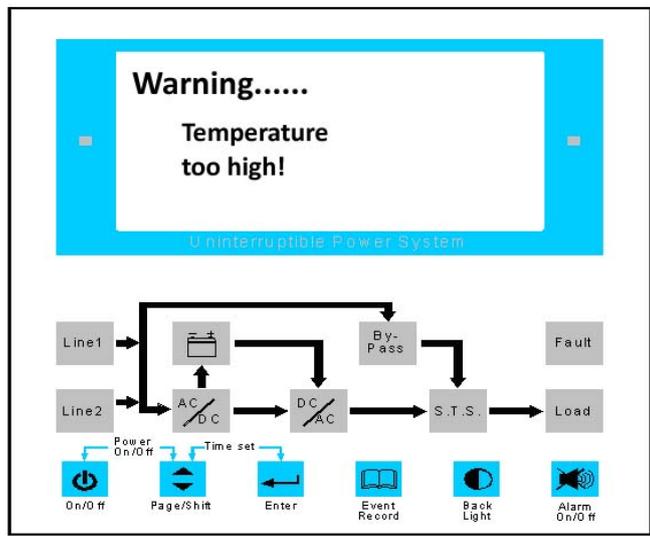


Figure 35 : Over Temperature Screen

If over temperature (over 72 ° C), the UPS will transfer to bypass mode and beep continuously. The screen will flash and the screen will have warning message as Figure 35 shown.

## 8-11 Loads Unbalance Screen

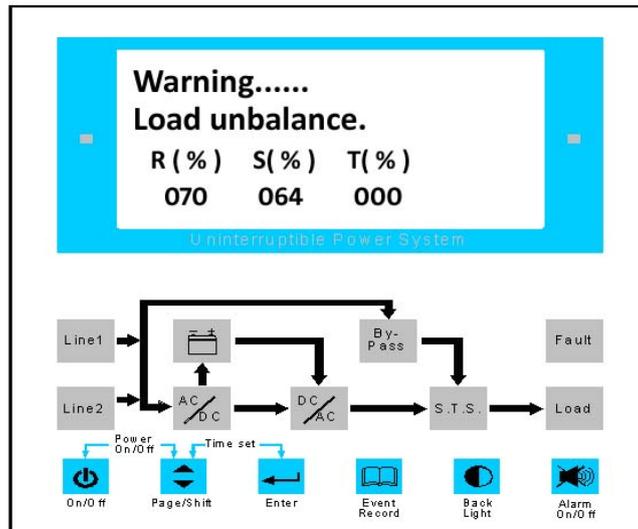


Figure 36 : Loads Unbalance Screen

If load is unbalance, the screen will flash and the screen will have warning message as Figure 36 shown.

## Section 9: Trouble Shooting

When you see the following problems on the LCD, please follow the solutions shown below.

No.	Warning Message	Possible Cause	Solution
1.	Input voltage too high	Utility AC power input voltage is too high	Contact service personnel
2.	UPS output short	Output has a short circuit issue	Contact service personnel
3.	The loading is over	The UPS is overload	Remove some loads
4.	Input phase connects error	1. Input wiring phase rotation is incorrect 2. Input phase angle shift	1. Cutoff the utility AC power N.F.B. first 2. Turn off the UPS 3. Check input R.S.T. sequence 4. Contact service personnel
5.	Battery low	Battery voltage is low	Charge the batteries
6.	Please turn on output N.F.B.	Output N.F.B. is at off position	Switch on output N.F.B.
7.	Temperature too high	The UPS temperature is too high	1. Choose a well-ventilated area 2. Decrease some loads 3. Check if fans run normally
8.	Load unbalance	1. The loads center on one or two phase 2. Output wiring does not connect well	1. Average loads of each phase 2. Check output wiring 3. Contact service personnel

## Section 10: Maintenance

### 10-1 UPS

Check the UPS quarterly and inspect:

- Whether the UPS, LCD, LED and alarm function are operating normally.
- Whether the UPS works in bypass mode (normally the UPS will work in online mode). If yes, check if any error, overload, internal fault, etc. occurs.
- Whether battery voltage is normal. If the battery voltage is too high or too low, find the root cause.

UPS Cleaning:

Regularly clean the UPS, especially the slits and openings, to ensure that the air freely flows into the UPS to avoid overheating. If necessary, use an air-gun to clean the slits and openings to prevent any object from blocking or covering these areas.

### 10-2 Battery

The LTH Series UPS uses sealed lead acid batteries. The battery life depends on the temperature, the usage, and the charging/discharging frequency. High temperature environments and high charging/discharging frequency will quickly shorten the battery life. Please follow the suggestions below to ensure a normal battery lifetime.

- Keep usage temperature between 15 ° C - 25 ° C
- When the UPS needs to be stored for an extended period of time, the batteries must be recharged once every three months and the charging time must be less than 24 hours each time.

### 10-3 Fan

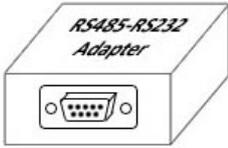
Higher temperatures shorten fan life. When the UPS is running, please check if all fans work normally and make sure if the ventilation air can move freely around and through the UPS. If not, replace the fans.

**\* Note:**

- ***Please ask your local dealer for more maintenance information. Do not perform maintenance if you are not trained for it.***

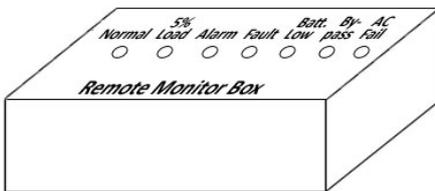
# Section 11: Optional Accessories

## 11-1 RS485-RS232 Adapter



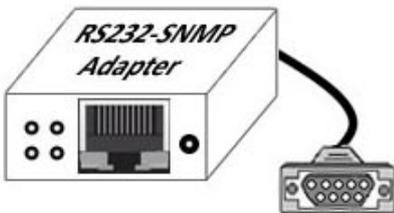
RS485-RS232 Adapter converts RS485 signal to RS232 signal and allows you to connect to a computer to monitor the UPS status, such as operation mode, battery capacity, battery voltage, UPS input/output voltage, UPS input/output frequency, etc.

## 11-2 Remote Monitor Box



Remote Monitor Box let you know the UPS status immediately. Through the indicators on the Remote Monitor Box, you can know the UPS status, such as in online mode or not, in battery mode or not, in bypass mode or not, battery voltage too low or not, loads connected, any alarm and any fault of the UPS.

## 11-3 RS232-SNMP Adapter



RS232-SNMP Adapter let you monitor the UPS status via Internet, such as operation mode, battery capacity, battery voltage, UPS input/output voltage, UPS input/output frequency, etc.

## Section 12: Specification

Model		LTH-3110	LTH-3115	LTH-3120	LTH-3130	LTH-3140
Capacity		10KVA	15KVA	20KVA	30KVA	40KVA
Input	Voltage	3 Phase 4 Wire + G 220/380VAC, 230/400VAC, 240/415VAC				
	Voltage Range	± 20% (option : >20%)				
	Frequency	50Hz or 60Hz				
	Frequency Range	± 5%				
Output	Voltage	3 Phase 4 Wire + G 220/380VAC, 230/400VAC, 240/415VAC				
	Frequency	50Hz or 60Hz ± 0.5%				
	Static Regulation	± 1% at linear load				
	Dynamic Regulation	<=2% at 50% unbalance load, <=5% at 100% unbalance load				
	THD Distortion	<=3% at linear load, <=5% at non-linear load				
	Transient Response	<5ms				
	Power Factor	0.8				
Battery	Voltage	192VDC (12VDC * 16pcs)				
	Charge Current	As customer demand				
	Float Charging Voltage	216VDC				
	Boost Charging Voltage	227VDC				
	Recharge Time	4 ~ 8 hours to 90% after fully discharge				
Static Switch	Main <-> Inverter	No break				
Indicator	LCD Display	Input / Output Voltage, Input / Output Frequency, Output Loading Status, Battery Status, Event Record				
	LED Display	Mimic display				
Protection	Overload	100% ~124% for 10 minutes, >125% for 1 minute, >150% to bypass				
	Over Temperature	Yes				
	Phase Rotation Incorrect	Yes				
	Phase Angle Shift	Yes				
	Lighting/EMI Filter	Yes				
Environment	Temperature	0 ° C ~ 40 ° C				
	Humidity	0% ~ 95%, non-condensing				
	Noise Level	<65dB at 1 meter				
Communication	Interface Port	RS232, Dry Contact, RS485, Remote Monitor Contacts RS485-RS232 Adapter (option), Remote Monitor Box (option), RS232-SNMP Adapter (option)				
Dimension (W * D * H)	UPS Only (cm)	65 * 80 * 155				
Net Weight	UPS Only (kgs)	250	300	350	400	450

## **Section 13: Warranty**

Seller warrants this product for a period of **1 YEAR** from the date of shipment, if used in accordance with all applicable instruction, to be free from original defects in material and workmanship within the warranty period. If the product has any failure problem within the warranty period, Seller will repair or replace the product as its sole discretion according to the failure situation.

This warranty does not apply to normal wear or to damage resulting from importer installation, operation, usage, maintenance or irresistible force (i.e. war, fire, natural disaster, etc.), and this warranty also expressly excludes all incidental and consequential damages.

Maintenance service for a fee is provided for any damage out of the warranty period. If any maintenance is required, please directly contact with the supplier or Seller.