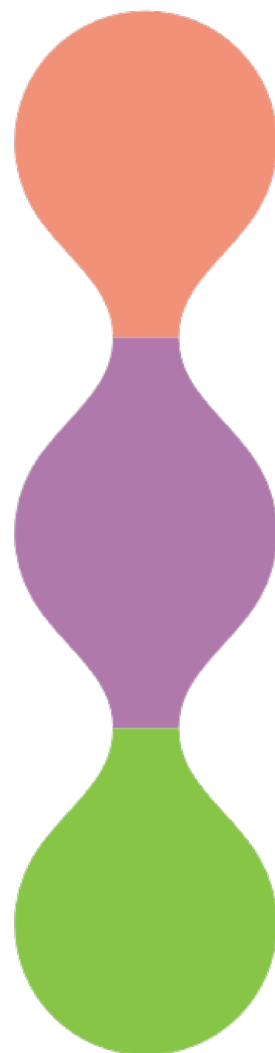




# User Guide

Giant II Series (3P/3P)  
Tower Type  
PRO63300-EL  
10-160KVA

Version 1.00  
(English )



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# 1. INTRODUCTION

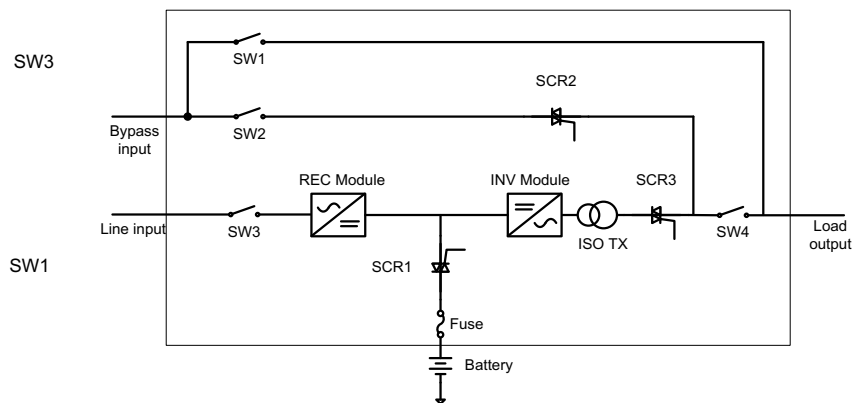
## 1-1. Overview

This UPS series is a double conversion system with sinewave output. It supplies continuous, stable, clean power for commercial and industrial environments. When the utility is lost accidentally, the UPS system will use the power from battery to output without interruption.

This system is applied an advanced digital controller to control the double conversion system, and with an isolated transformer at the output to protect the load and the UPS itself. The UPS is also built-in user-friendly LCD interface and multiple communications including Modbus, RS-232 and intelligent slot. With free download software, this UPS provides complete power solution of monitoring and controlling remotely.

## 1-2. Basic structure

The whole system consists of REC module, INV module, static bypass, maintain bypass and battery controller. The output of the UPS are switched over to either line input or bypass input with two SCRs operated in parallel. The basic structure is shown as below:

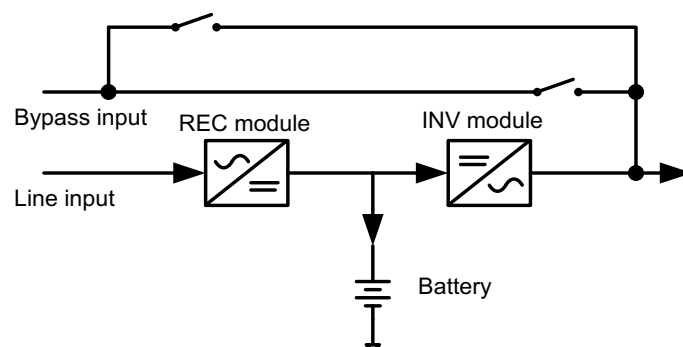


## 1-3. Working mode

This part will introduce the working mode of the UPS system.

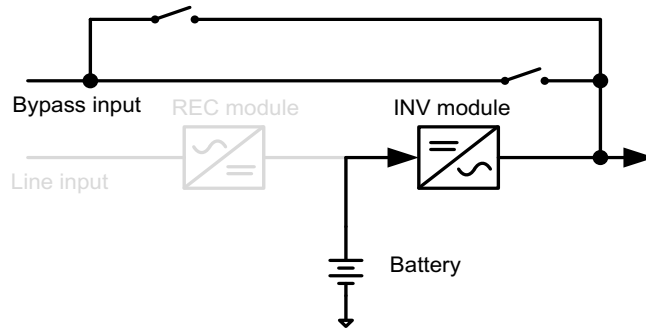
### 1-3-1. Line mode

When the UPS is working in line mode, the AC input will be rectified by REC module, and then be converted to the output via INV module. Meanwhile, the battery is being charged. At this time, static bypass is in standby.



### 1-3-2. Battery mode

When the utility fails, the UPS will transfer to battery mode without interruption. The UPS converts the power from battery to output. At this time, static bypass is still in standby. If the utility is recovered, the UPS will transfer back to line mode again.

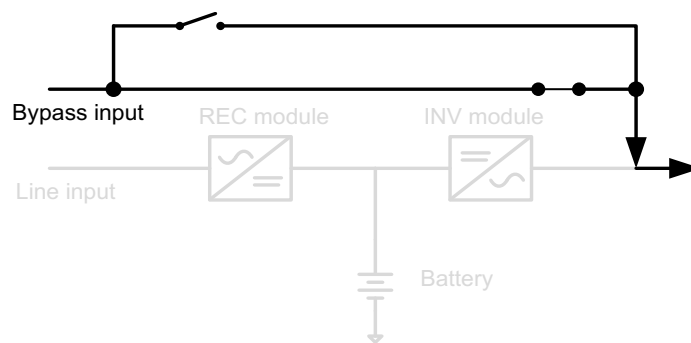


### 1-3-3. Static bypass mode

Bypass mode can be enabled or disabled by user setting. The default setting is enabled. The UPS system will work in bypass mode when the following conditions occur.

- The UPS system doesn't turn on.
- The UPS is overload in line mode.
- The rectifier or inverter module is abnormal.
- The utility fails and the battery is discharged to low level.

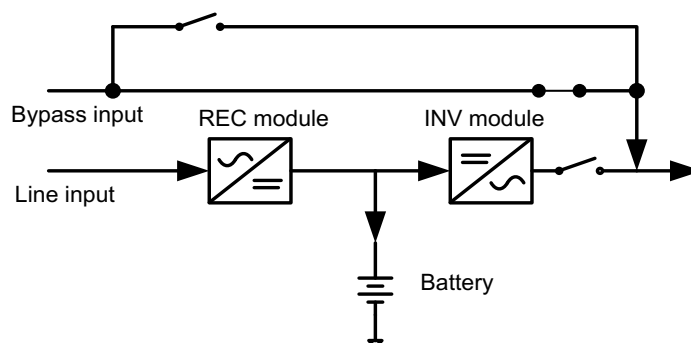
When above mentioned situation is eliminated, the UPS will transfer back to line mode or battery mode.



### 1-3-4. Eco mode

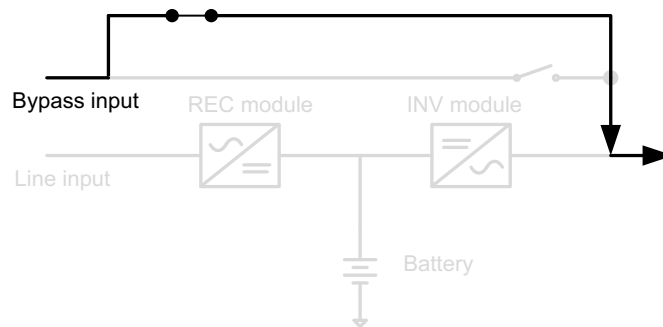
ECO mode can be enabled or disabled by user setting. The default setting is disabled. If it's required to have high efficiency performance instead of the high power quality, it's better to enable "ECO mode".

In this mode, load will be supported via Bypass input when utility quality is OK. And the Line input will still be operated to charge battery and INV module is in standby status with switch opened. When Bypass input is lost, the system will transfer to line mode or battery mode and the transfer time is less than 10ms. When Bypass input is restored, the system transfers back to bypass mode again. This ECO mode operation greatly improves system efficiency.



### 1-3-5. Maintain bypass mode

When the UPS needs maintenance and load needs uninterruptible power, the users can firstly transfer the inverter to bypass mode, and then switch on maintain bypass breaker. After that, switch off all other breakers and switches. In this condition, the utility can still power the load and users can maintain the UPS.



### 1-3-6. Other modes

Except mentioned modes above, there are standby mode, power-off mode and fault mode.

There is no output in standby mode, but the utility will charge battery. If the UPS stays in standby mode for a while without utility and load connection, the UPS will transfer to power-off mode. At this time, the UPS can't be turned on by pressing ON button. Please kindly wait for 5 minutes to allow UPS completely off itself. After 5 minutes, UPS can be restarted by pressing ON button.

The UPS will transfer to fault mode if a fault occurs in the UPS. When some minor faults occur, the UPS still can transfer to bypass mode if bypass input is available. When some severe faults occur, it won't be eliminated until the users restart the UPS. Now, it's not necessary to turn off and restart the UPS to clear fault code. Simply follow section "6.3.3" to exit fault mode through LCD operation.

### 1-3-7. Dual input source

The line input and bypass input are separated routes in this UPS. Users can apply different power sources into these two input routes and set up a dual-input system. Users also can connect the same power source to these two inputs. Once the utility fails, no Line input and bypass input is available at the same time. Then, it will transfer to battery mode.

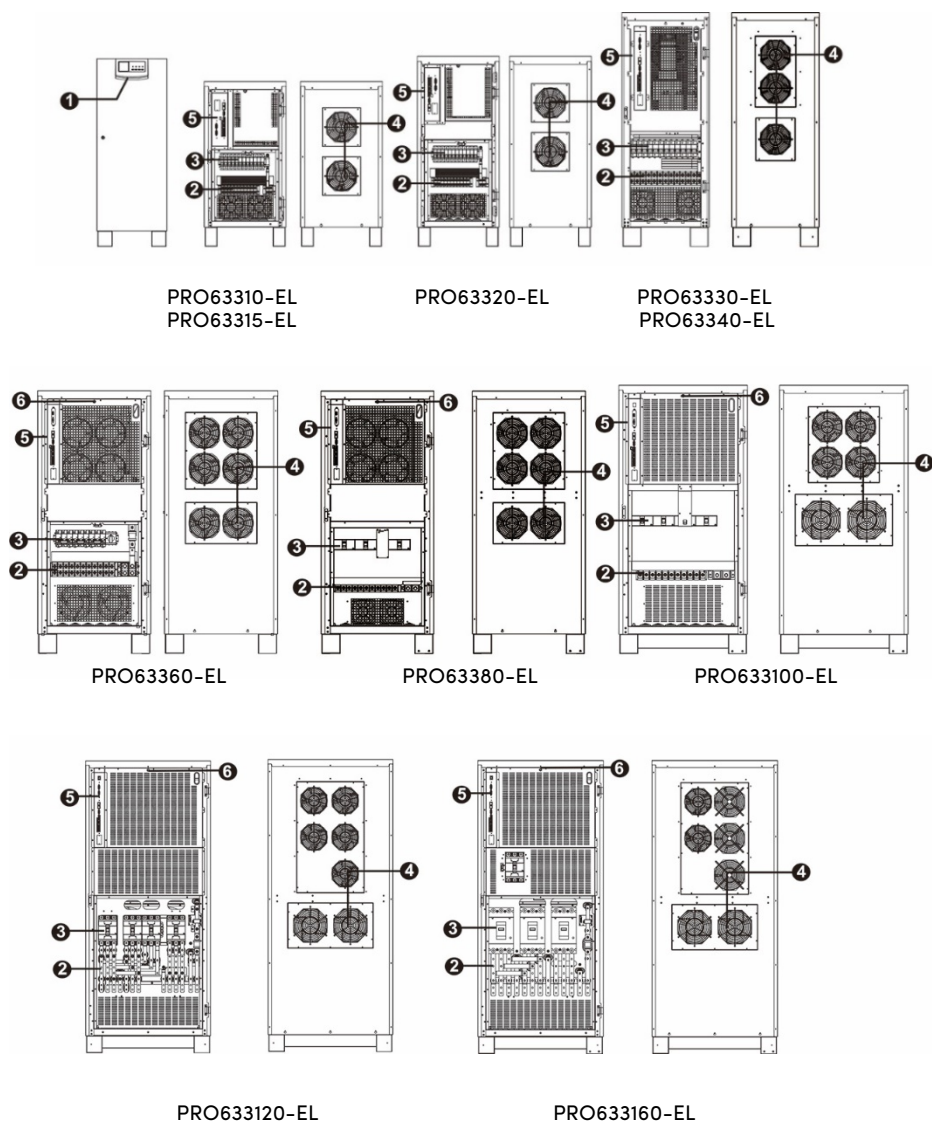
### 1-3-8. Reverse phase sequence operation

When the phase sequence of the line input is reversed, the UPS can still work in the line mode with "Line phase error" warning. If the bypass input connects to the line input with the same AC source, it will alarm with "Bps.phase error" warning and can't turn into bypass mode.

### 1-3-9. No neutral operation

When the line input disconnects from the neutral, the UPS can still work in the line mode.

## 1-4. Overview



- |                       |                                                                              |
|-----------------------|------------------------------------------------------------------------------|
| 1) Interface          | 4) Fans                                                                      |
| 2) Terminals          | 5) Communications                                                            |
| 3) Breaker and switch | 6) Cold start button. This button is located same position for whole series. |

## 2. IMPORTANT SAFETY WARNING

### 2-1. Conventions and used symbols

Conventions used:

**WARNING!** Warnings identify conditions or practices that could result in personal injury;

**CAUTION!** Caution identify conditions or practices that could result in damaged to the unit or other equipment connected.

|                                                                                     |                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Warning, risk of electric shock                                                                                                                                                                                        |
|    | Warning, risk of danger                                                                                                                                                                                                |
|    | Warning, risk of electric shock, energy storage timed discharge                                                                                                                                                        |
|    | Refer to the operating instructions                                                                                                                                                                                    |
|    | Warning, danger of the possible fall down of the equipment                                                                                                                                                             |
|    | Warning, Danger of fan's rotation.                                                                                                                                                                                     |
|    | Warning, hot surface                                                                                                                                                                                                   |
|    | Protective conductor terminal                                                                                                                                                                                          |
|    | Earth (ground) terminal                                                                                                                                                                                                |
|  | Direct current                                                                                                                                                                                                         |
|  | Alternating current                                                                                                                                                                                                    |
|  | Both direct and alternating current                                                                                                                                                                                    |
|  | Three-phase alternating current                                                                                                                                                                                        |
|  | Three-phase alternating current with neutral conductor                                                                                                                                                                 |
|  | Preservation of the environment: the users can contact with their provider or with the pertinent local authorities to be informed on how and where they can take the product to be recycled and/or disposed correctly. |

### 2-2. Safety instructions



**WARNING!** Before installing and using this equipment, read all instructions and cautionary markings on the UPS and this manual. Store the manual where it can be accessed easily.



**WARNING!** This manual is for qualified personnel. The tasks described in this manual may be performed by qualified personnel only.



**WARNING!** This equipment must be installed by qualified person.



**WARNING!** Make sure the UPS is isolated and protective earth correctly connected at installing and before operating the UPS.



**WARNING!** Pay attention to the slope of the ground and surface to avoid fall down when moving the equipment.



**WARNING!** This equipment is heavy. Do not lift too heavy without help.



**CAUTION!** The UPS can only working on dry condition. Shut down the UPS if any liquid flows into the UPS and dry it with absorbent cloth. Please use dry cloth when clean the UPS.



**CAUTION!** Please charge the battery first if using the UPS for first time or no using the UPS for a long period of time (6 months maximum).



**WARNING!** Never manipulate the equipment with wet hands.



**CAUTION!** To avoid a risk of fire and electric shock, make sure that existing wiring is in good condition and that the wire is not undersized. Do not operate the Inverter with damaged or substandard wiring.



**WARNING!** When the UPS shut down the power supply to the load because of EPO signal trigger, the equipment has power supply yet. To shut down the equipment's power, please turn off all the input power.



**WARNING!** Authorized service personnel should reduce the risk of electrical shock by disconnecting both the AC and DC power from the UPS before attempting any maintenance or cleaning or working on any circuits connected to the inverter. Turning off controls will not reduce this risk. Internal capacitors can remain charged after disconnecting all sources of power. Please wait at least 5 minutes to service the unit.



**CAUTION!** Do not open, disassemble or modify the equipment yourself. It contains no user-serviceable parts. Attempt to service this equipment yourself may cause a risk of electrical shock or fire and will void the warranty from the manufacturer.



**CAUTION!** Shut down the UPS if any smoke or gas exhausts from the UPS.



**WARNING!** Battery circuit is not isolated; it is dangerous to touch any part of the batteries.



**CAUTION!** When batteries are replaced, the complete battery set has to be replaced and do not reuse faulty batteries.



**CAUTION!** Do not expose the batteries in a fire or to high temperatures. Batteries may explode.



**CAUTION!** Batteries involve a serious risk for health and environment. Their disposal should be done in accordance with the existing regulations.



**WARNING!** Under high temperature environment, the case of this equipment could be hot enough to cause skin burns if accidentally touched. Ensure that this inverter is away from normal traffic areas.



**CAUTION!** To reduce risk of fire hazard, do not cover or obstruct the equipment.

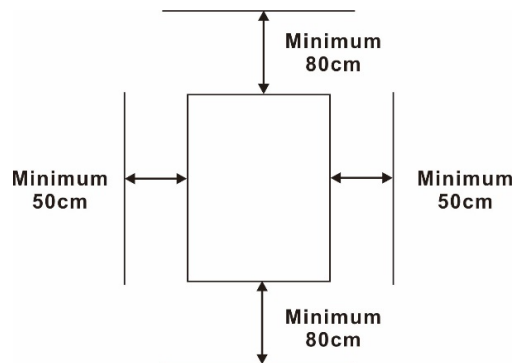
### 3. INSTALLATION

#### 3-1. Basic requirement

- Ambient temperature: 0°C ~ +55°C
- Storage temperature: -15°C ~ 60°C
- Relative humidity: 5% ~ 95%
- Altitude: If the UPS is installed within 1000m, the UPS power will not be derated. When the height is over 1000m, the output power will be derated by following the table

| Altitude(m) | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 |
|-------------|------|------|------|------|------|------|------|------|------|
| Coefficient | 100% | 95%  | 91%  | 86%  | 82%  | 78%  | 74%  | 70%  | 67%  |

- Vertical: No vibration and the degree of deviation from vertical shouldn't be more than 5°.
- Space: It's requested to have a clearance of approx. 80 cm to the front and back of the unit and approx. 50 cm to the side.



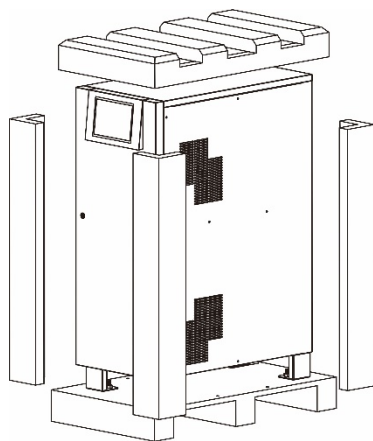
The UPS should be installed in the environment with free ventilation, less dust, optimum ambient temperature and humidity.

The recommended ambient temperature is 20°C~25°C with 50% humidity.

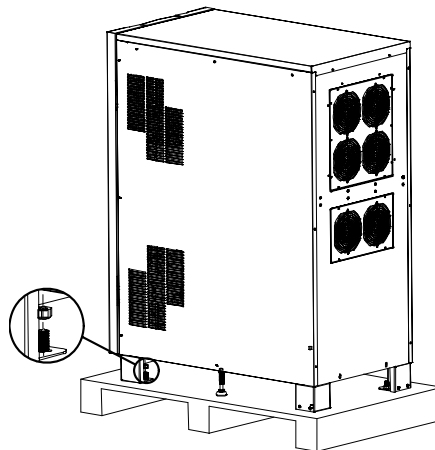
**Caution!** It's NOT allow to have flammable, explosive or corrosive gas or liquid in installation environment. It is forbidden to install in a metal conductive dust environment.

#### 3-2. Disassembling and moving

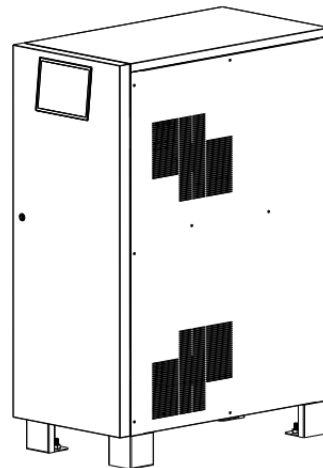
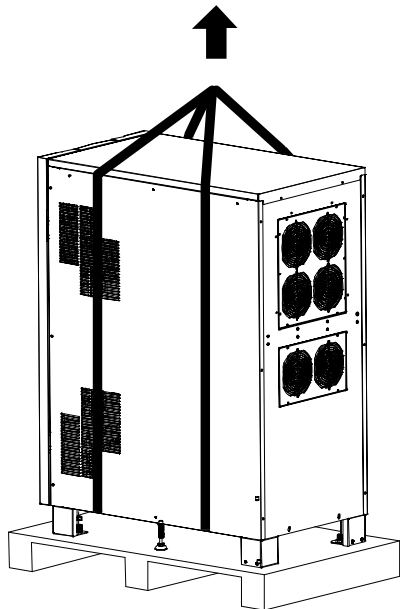
- Please check if any damage on the carton before open.
- Then follow below steps to remove UPS from the carton and the pallet.



Remove the cartons and foam.



Remove the nuts showed in the figure.



Preparing two cables. The length of two cables is about 3 meters and the bearing should be at least 1.5 tons. Fix the UPS with cables. Use the hoist to lift up the UPS and place it on the ground.

➤ After the UPS is removed from pallet, please inspect the unit and package contents. Be sure that nothing inside the package is damaged. You should have received the following items inside of package:



CD



User manual



USB cable

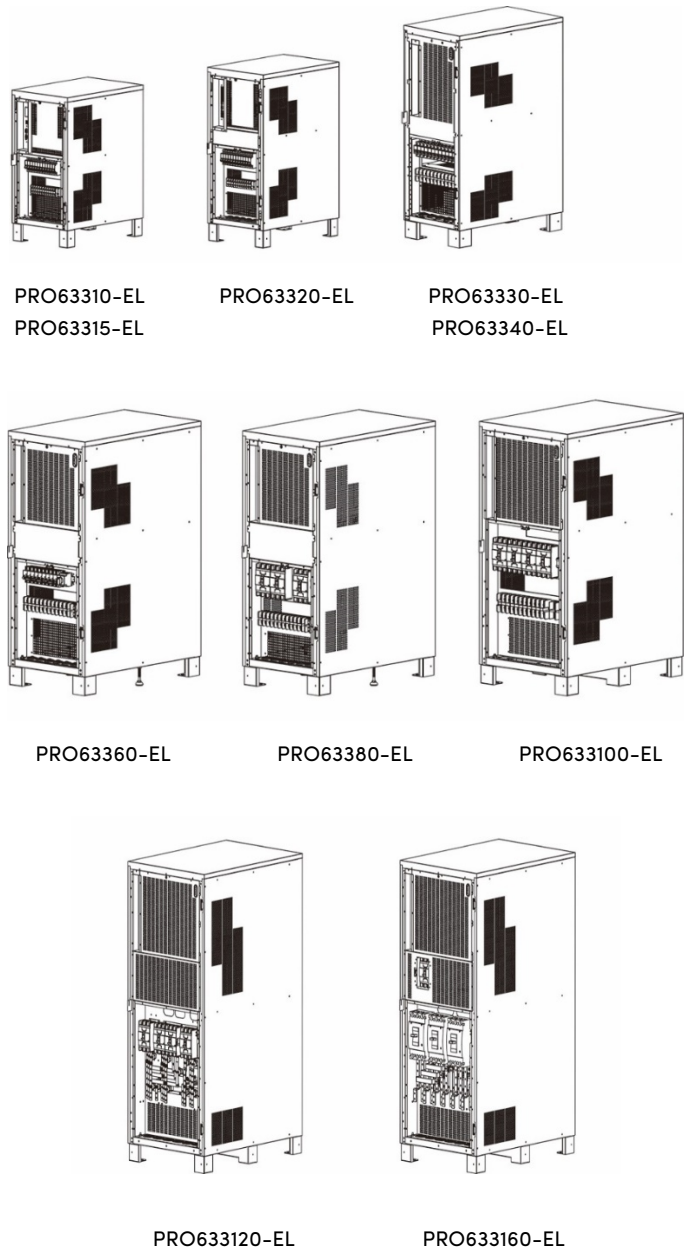


RS-232 cable

4. ELECTRICAL CONNECTION

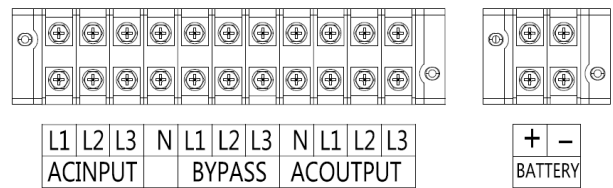
4-1. Power connection

All the connectors are accessible by front panel of the UPS. Simply open the front door for wire connection. Refer below diagrams for inside panel for whole series.

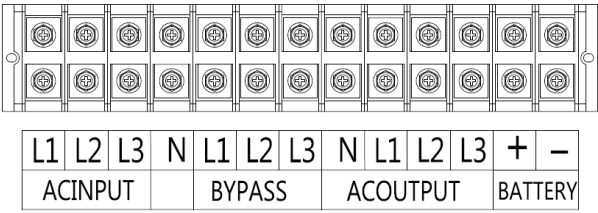


The wire terminals of each model are shown as below:

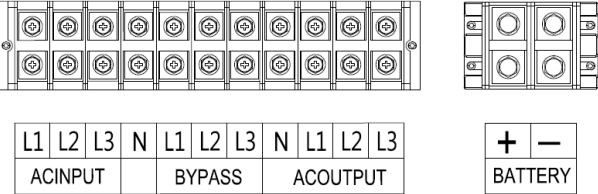
➤ PRO63310-EL/PRO63315-EL/PRO63320-EL



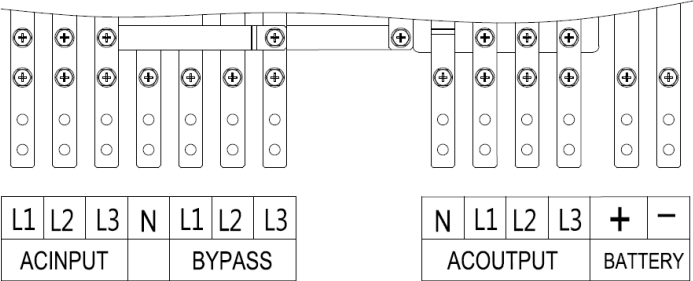
➤ PRO63330-EL/PRO63340-EL



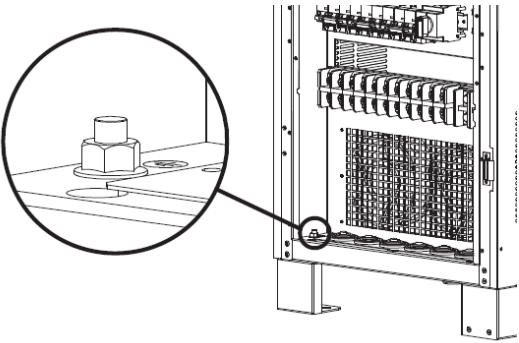
➤ PRO63360-EL/PRO63380-EL



➤ PRO633100-EL~PRO633160-EL



The ground terminal is shown as below:



The specifications of internal breaker, fuse and switch are shown as below:

| UPS Model    | Input Breaker |         |          | Battery Fuse | Output  |         |
|--------------|---------------|---------|----------|--------------|---------|---------|
|              | LINE INPUT    | BYPASS  | M-BYPASS |              | Breaker | Switch  |
| PRO63310-EL  | 50A/3P        | 32A/3P  | 32A/3P   | 100A         | 32A/3P  | N/A     |
| PRO63315-EL  | 50A/3P        | 50A/3P  | 50A/3P   | 100A         | 50A/3P  | N/A     |
| PRO63320-EL  | 63A/3P        | 63A/3P  | 63A/3P   | 200A         | 63A/3P  | N/A     |
| PRO63330-EL  | 100A/3P       | 100A/3P | 100A/3P  | 200A         | N/A     | 125A/3P |
| PRO63340-EL  | 100A/3P       | 100A/3P | 100A/3P  | 315A         | N/A     | 125A/3P |
| PRO63360-EL  | 125A/3P       | 125A/3P | 125A/3P  | 315A         | N/A     | 125A/3P |
| PRO63380-EL  | 225A/3P       | 225A/3P | 225A/3P  | 350A         | 225A/3P | N/A     |
| PRO633100-EL | 225A/3P       | 225A/3P | 225A/3P  | 350A         | 225A/3P | N/A     |
| PRO633120-EL | 350A/3P       | 250A/3P | 250A/3P  | 350A*2       | 250A/3P | N/A     |
| PRO633160-EL | 350A/3P       | 350A/3P | 250A/3P  | 350A*2       | 350A/3P | N/A     |

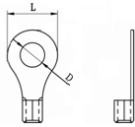
**NOTICE:**

- 1) Before installing the UPS, be sure that all breakers and switches are OFF.
- 2) The bypass input of the UPS is default connected to AC input wire from factory. Therefore, if this UPS is used as dual-inputs, please remove this connection.
- 3) If there is no neutral connection in bypass, the load with neutral connection may be out of power when UPS is in bypass mode.

The recommended sizes of the cables are listed as below:

| UPS Model    | Line Input and Ground |                                  | BYPASS/OUTPUT |                                  | BATTERY    |                                  |
|--------------|-----------------------|----------------------------------|---------------|----------------------------------|------------|----------------------------------|
|              | Size (AWG)            | Cross section (mm <sup>2</sup> ) | Size (AWG)    | Cross section (mm <sup>2</sup> ) | Size (AWG) | Cross section (mm <sup>2</sup> ) |
| PRO63310-EL  | ≤ 8                   | ≥ 8                              | ≤ 8           | ≥ 8                              | ≤ 6        | ≥ 10                             |
| PRO63315-EL  | ≤ 8                   | ≥ 8                              | ≤ 8           | ≥ 8                              | ≤ 6        | ≥ 10                             |
| PRO63320-EL  | ≤ 6                   | ≥ 10                             | ≤ 6           | ≥ 10                             | ≤ 4        | ≥ 20                             |
| PRO63330-EL  | ≤ 4                   | ≥ 16                             | ≤ 4           | ≥ 16                             | ≤ 2        | ≥ 30                             |
| PRO63340-EL  | ≤ 2                   | ≥ 25                             | ≤ 2           | ≥ 25                             | ≤ 1/0      | ≥ 50                             |
| PRO63360-EL  | ≤ 1/0                 | ≥ 40                             | ≤ 1/0         | ≥ 40                             | ≤ 3/0      | ≥ 80                             |
| PRO63380-EL  | ≤ 1/0                 | ≥ 40                             | ≤ 1/0         | ≥ 40                             | ≤ 4/0      | ≥ 100                            |
| PRO633100-EL | ≤ 3/0                 | ≥ 80                             | ≤ 3/0         | ≥ 80                             | ≤ 4/0      | ≥ 100                            |
| PRO633120-EL | ≤ 3/0                 | ≥ 80                             | ≤ 3/0         | ≥ 80                             | ≤ 4/0      | ≥ 100                            |
| PRO633160-EL | ≤ 4/0                 | ≥ 100                            | ≤ 4/0         | ≥ 100                            | ≤ 4/0      | ≥ 100                            |

The recommended sizes of the ring terminals are listed as below:



| Items       | PRO63310-EL<br>PRO63315-EL<br>PRO63320-EL | PRO63330-EL<br>PRO63340-EL           | PRO63360-EL<br>PRO63380-EL<br>PRO633100-EL |         | PRO633120-EL<br>PRO633160-EL            |
|-------------|-------------------------------------------|--------------------------------------|--------------------------------------------|---------|-----------------------------------------|
|             | AC INPUT/ BYPASS/<br>OUTPUT/ BATTERY      | AC INPUT/ BYPASS/<br>OUTPUT/ BATTERY | AC INPUT/<br>BYPASS/<br>OUTPUT             | BATTERY | AC INPUT/<br>BYPASS/ OUTPUT/<br>BATTERY |
| D (mm)      | 5.3                                       | 8.4                                  | 8.4                                        | 10.5    | 8.4                                     |
| L (mm)      | 12                                        | 22                                   | 22                                         | 27      | 22                                      |
| Torque (Nm) | 2                                         | 5.5                                  | 5.5                                        | 10      | 5.5                                     |

#### Recommended max. battery pack capacity:

| Model            | PRO63310-EL<br>PRO63315-EL<br>PRO63320-EL | PRO63330-EL<br>PRO63340-EL | PRO63360-EL<br>PRO63380-EL<br>PRO633100-EL | PRO633120-EL<br>PRO633160-EL |
|------------------|-------------------------------------------|----------------------------|--------------------------------------------|------------------------------|
| Battery capacity | 100 Ah                                    | 200 Ah                     | 400 Ah                                     | 600 Ah                       |

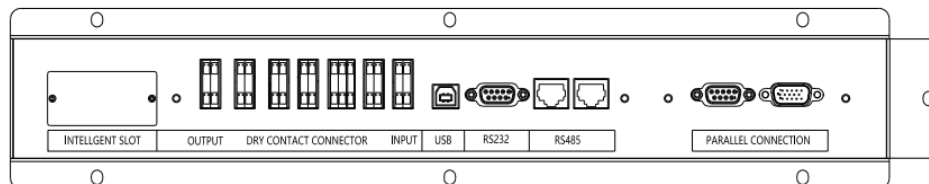
**Note 1:** Please set up suitable charging current and battery numbers based on specifications. Wrong configuration will shorten lifecycle of battery.

After connecting all the cables, please double check the issues as below:

- Check the phase sequence of LINE INPUT, BYPASS and OUTPUT.
- Check the polarity of the battery cables.
- Make sure all the connected cables are screwed tightly.

## 4-2. Communication

The UPS provides a variety of communications. The details are listed as below:

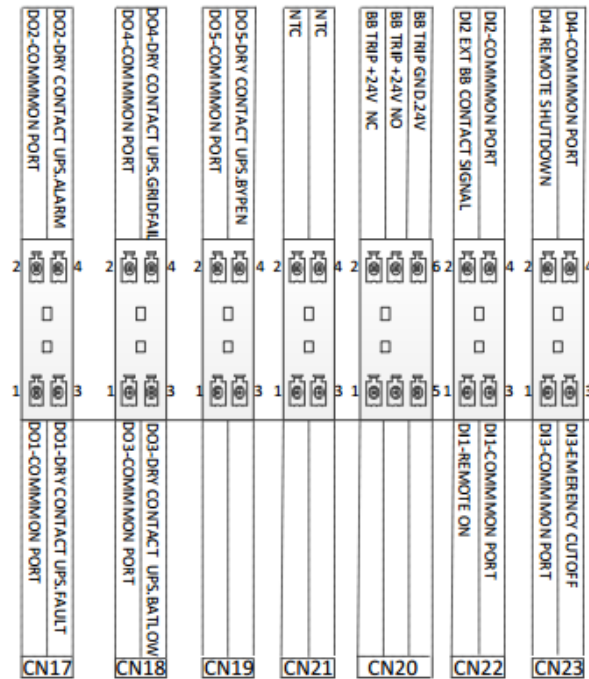


### 4-2-1. Intelligent slot

The intelligent slot can provide SNMP solution for remote monitor. Please request the supplier for detail information.

### 4-2-2 Dry contact

There are 5 output, 4 input dry contacts and one battery switch trip. The detailed functions are listed as below.



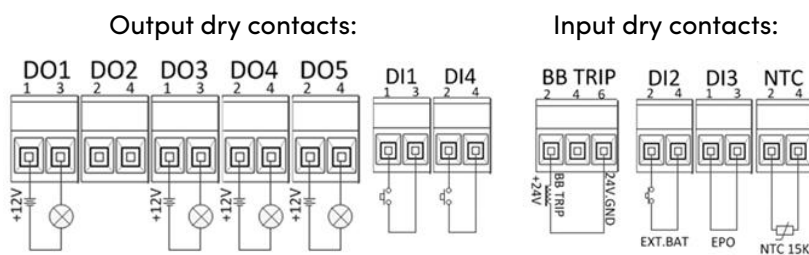
The output dry contacts only provide two passive statuses: short and open. It's necessary to connect external power source to trigger this function.

The input dry contacts provide active signals and it's not necessary to connect external power to trigger it. Users can simply short or open the ports to ground.

The detailed electrical parameters of contacts are listed as below:

| Contacts | Parameters   | Recommended | Maximum |
|----------|--------------|-------------|---------|
| Output   | Voltage (V)  | 24VDC       | 230VAC  |
|          | Current (mA) | 0.5         | 1       |
| Input    | Voltage (V)  | N/A         | 5       |
|          | Current (mA) | N/A         | 15      |

#### Application:



#### Function descriptions of output contacts:

| Output contacts | Function Description                                                        | Default value |
|-----------------|-----------------------------------------------------------------------------|---------------|
| DO1             | 0: Normally open 1: Normally close<br>0: Normally close<br>1: General alarm | 0             |
| DO2             | 2: Normal Mode<br>3: Battery mode<br>4: Static bypass                       | 0             |

|     |                                                                                                                                                                                                                                                                                                                            |   |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| DO3 | 5: Output overload<br>6: Fan fault<br>7: Battery fault<br>8: Battery open<br>9: Low battery<br>10: Input beyond the limitation<br>11: Bypass beyond the limitation<br>12: EPO is enabled<br>13: Maintenance bypass mode<br>14: Backfeed protection is activated in input<br>15: Backfeed protection is activated in bypass | 0 |
| DO4 |                                                                                                                                                                                                                                                                                                                            | 0 |
| DO5 |                                                                                                                                                                                                                                                                                                                            | 0 |

#### Function descriptions of input contacts:

| Input contacts | Function Description                                                                                                                                                                                      | Default value |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| DI1            | 0: Normally open 1: Normally close                                                                                                                                                                        | 0             |
| DI4            | 0: Normally close<br>1: UPS on<br>2: UPS off<br>3: Battery fault<br>4: Generator is activated<br>5: Self-define alarm 1<br>6: Self-define alarm 2<br>7: ECO is disabled<br>8: Forcibly close the inverter | 0             |
| DI2            | Signal port for external battery connection                                                                                                                                                               | Constant      |
| DI3            | EPO is activated                                                                                                                                                                                          | Constant      |
| NTC            | External battery temperature                                                                                                                                                                              | Constant      |
| BB TRIP        | Battery switch tripped                                                                                                                                                                                    | Constant      |

#### 4-2-3. EPO

Emergency Power Off (EPO) is the capability to shut down a system. It contains two pins of terminal strip. When it's in open circuit, it will activate shutdown of the system and cut off output. When it's in close status for UPS normal operation.

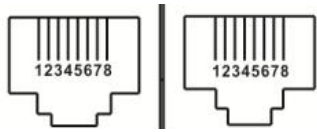
#### 4-2-4. USB/RS232

To allow for unattended UPS shutdown/start-up and status monitoring, connect the bundled USB communication cable one end to the USB port and the other to the communication port of your PC. If using RS-232 communication, please use RS-232 cable to connect UPS and your PC. With the monitoring software installed, you can schedule UPS shutdown/start-up and monitor UPS status through PC.

| Chart                                                                               | Pin    | Definition |
|-------------------------------------------------------------------------------------|--------|------------|
|  | USB    | PIN1:VDD   |
|                                                                                     |        | PIN2:D-    |
|                                                                                     |        | PIN3:D+    |
|                                                                                     |        | PIN4:GNDT  |
|                                                                                     | RS-232 | PIN2:RXD   |
|                                                                                     |        | PIN3:TXD   |
|                                                                                     |        | PIN5:GNDT  |

4-2-5. RS485

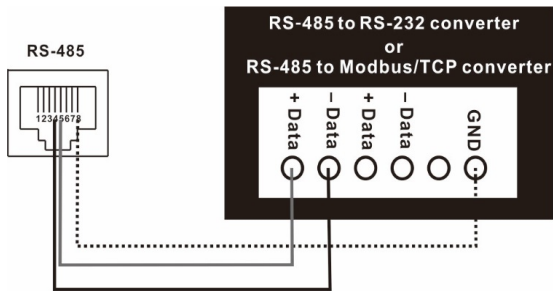
➤ Definition of RS485 pins :



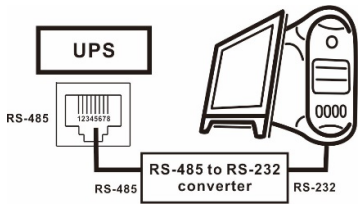
| Pin     | Definition | Pin     | Definition |
|---------|------------|---------|------------|
| RS485-1 | PIN1:485-A | RS485-2 | PIN1:485-A |
|         | PIN2:485-B |         | PIN2:485-B |
|         | PIN4:485-B |         | PIN4:485-B |
|         | PIN5:485-A |         | PIN5:485-A |

➤ Single unit application :

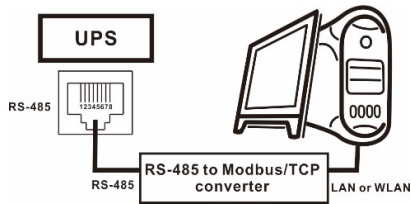
First, please use one RS485 to RS 232 converter or RS-485 to Modbus/TCP converter as media converter between RS485 and computer. Please follow below chart for wiring connection between RS485 and media converter:



Then, follow below diagram to connect personal computer:



Using RS-485 to RS-232 converter

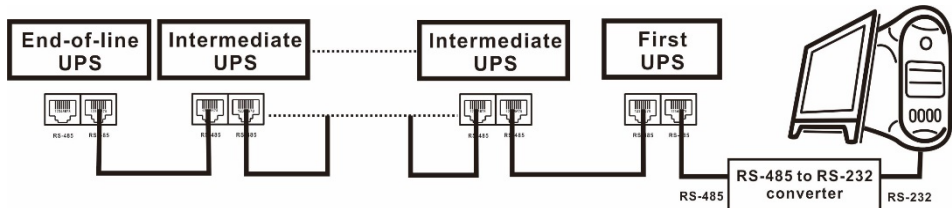


Use RS-485 to Modbus/TCP converter

The maximum communication distance can be up to 1200m.

➤ Multiple monitoring application:

The RS-485 can support 31 units in maximum for centralized monitoring.

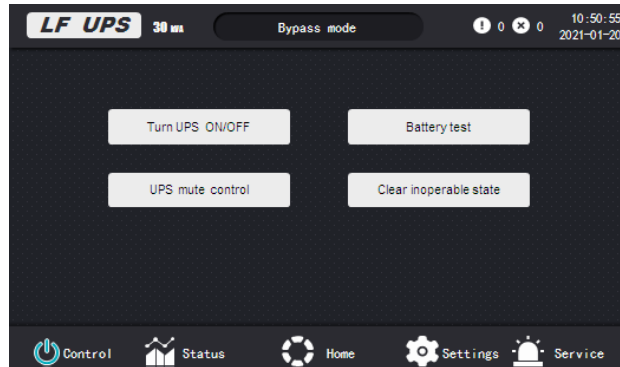


Please set the address of each unit in the LCD. Each unit should have unique address. Otherwise, it will cause conflicts in the line.

## 5. COMMISSIONING

### 5-1. Start up procedure

Although this UPS supports battery start function, we still recommend to follow the steps below to turn on the UPS.



- Before turning on the UPS, please be sure input and output wiring connection is complete. Please refer to section 4.1 for wiring connection.

**Caution!** This UPS can only be turned on while connecting to battery and utility input.

- Switch on line input, bypass input and battery switch. Touch LCD will light up automatically.
- After UPS self-checking is complete, it will enter the main screen.
- Then, touch the icon  to enter control menu.
- Touch the icon "Turn UPS ON/OFF". It will show "Turn UPS ON".
- Turn on the UPS by selecting the icon .
- When UPS turns on successfully, the status bar on the top of the screen shows the icon . At this time, switch on output switch.

Cold start procedure:

When line input is lost, users can follow the steps below to start up the UPS:

- Switch on battery breaker and press cold start button located on the top of front panel for a while.
- Wait until UPS self-checking is complete and LCD lights up, then, follow startup procedure to turn on the UPS.

**Caution!** When bypass mode is enabled, the UPS will transfer to bypass mode automatically if bypass input is OK. The UPS won't transfer to line mode until you enter LCD main menu to turn on the UPS.

### 5-2. Shutdown procedure

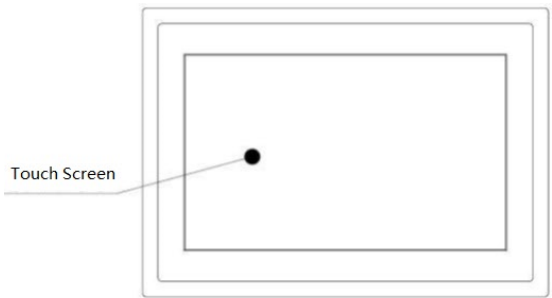
- Touch the icon  to enter main menu.
- Touch the icon "Turn UPS ON/OFF". It will show "Turn UPS OFF" and select the icon  to turn off the UPS.
- If bypass mode is enabled and bypass input is OK, the UPS will transfer to bypass mode. Otherwise, the UPS will stay in standby mode. When line input is lost, the UPS will transfer to power off mode and shut down after a while.
- After the UPS shuts down completely, switch off line input breaker and battery switch.
- Switch off bypass input breaker and load switch.

### 5-3 Maintenance bypass operation

- Turn off the UPS and keep the UPS working in bypass mode.
- Remove the metal cover of maintenance bypass breaker and then switch on maintenance bypass breaker.
- Switch off line input breaker, battery switch and bypass input breaker. Now, the UPS works in maintenance bypass mode and the load is still working without interruption.
- After the maintenance is completed, switch on battery switch, AC input breaker and bypass input breaker in order. And then switch off maintenance bypass breaker. Don't forget to put the cover back.

6. INTERFACE

6-1. Control panel

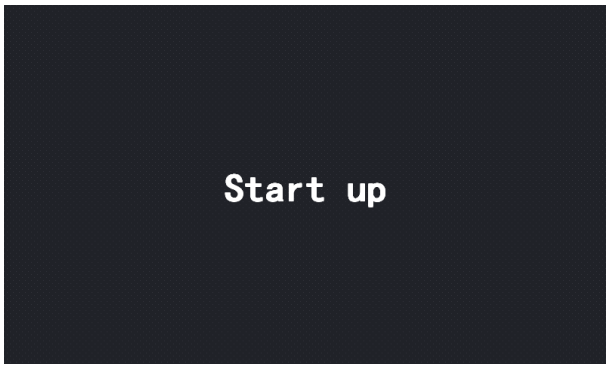


6-1-1. Buzzer

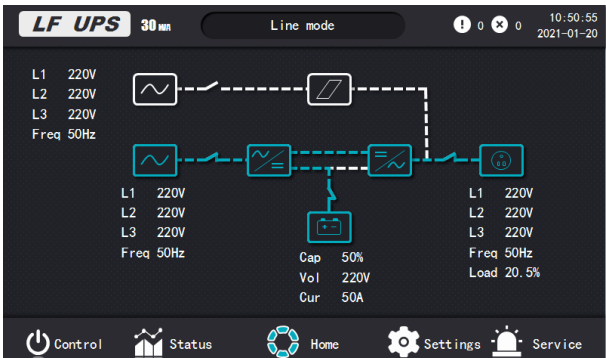
| UPS state                                            | Buzzer status                | Muted |
|------------------------------------------------------|------------------------------|-------|
| Bypass/Standby                                       | Beeping once every 2 minutes | Yes   |
| Battery / Battery-test mode (normal battery voltage) | Beeping once every 4 seconds | Yes   |
| Battery / Battery-test mode (low battery voltage)    | Beeping once every second    | Yes   |
| Fault                                                | Beeping continuously         | Yes   |
| Warnings (except overload)                           | Beeping once every second    | No    |
| Overload                                             | Beeping twice every second   | No    |

6-2. LCD information

6-2-1. Basic



Star up screen



Main Page

After the UPS is powered on, LCD will start up first and then display main page.

#### ➤ Start Up

When first starting up the UPS, it will take few seconds to start up the LCD. Please kindly wait.

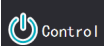
#### ➤ Main page

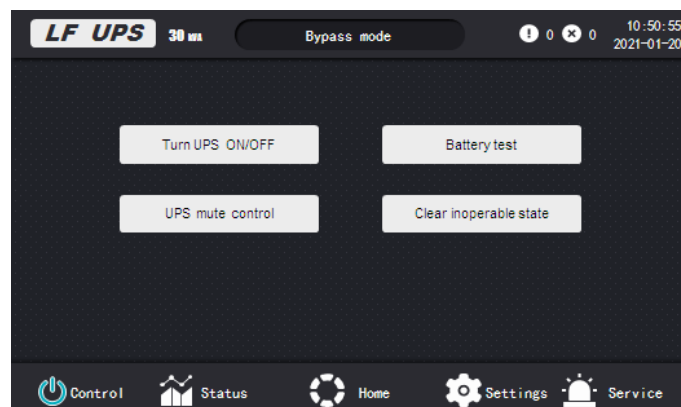
This page is used to display basic information. It will show 5 short-cut buttons on the bottom. They are Control, Status, Home, Settings and Service.

- Control: including Turn UPS ON/OFF, UPS mute control, Battery test and Clear inoperable state.
- Status: It will show current status of the UPS, including Line input voltage/current, bypass input voltage/current, battery status, output voltage/current, load level, temperature and input voltage range under different modes.
- Settings: It's for UPS parameter settings.
- Service: It will show alarm event, fault event, data log, serial no. of the UPS, firmware version and export datalog.

### 6-3. Sub-menus

#### 6-3-1. Control sub-menu

Touch the icon  to enter control menu.

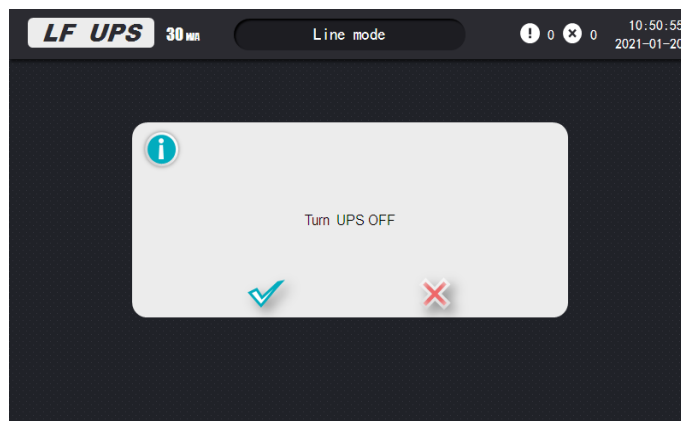


Control Menu

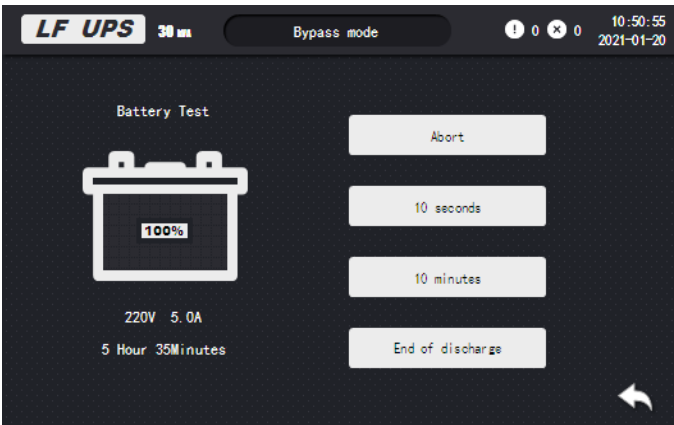
#### ➤ Turn On/Off UPS

If the UPS is turned on already, the screen will show "Turn UPS OFF".

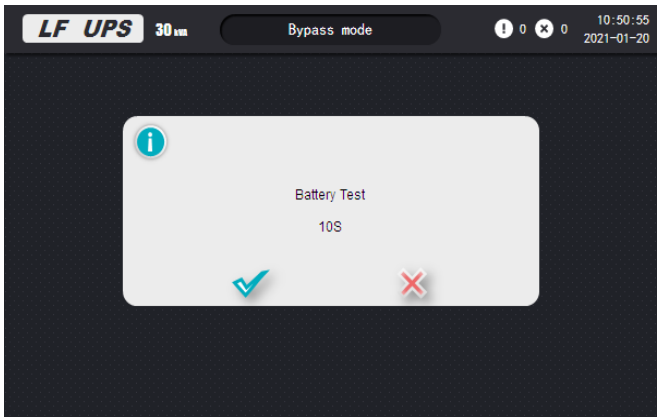
If the UPS is turned off, the screen will show "Turn UPS ON".



➤ Battery Test

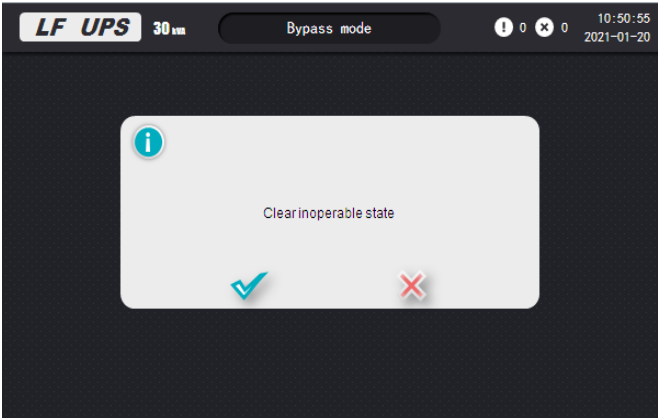


Battery Test List



Battery Test Confirmation screen

➤ Clear inoperable state

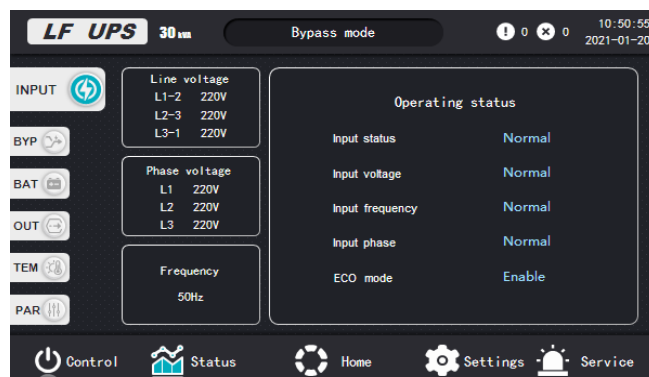


## 6-3-2. Status sub-menu

Touch the icon  to enter Status page. There are five selections: Input, Bypass, Output, BAT., Temp., and PAR.

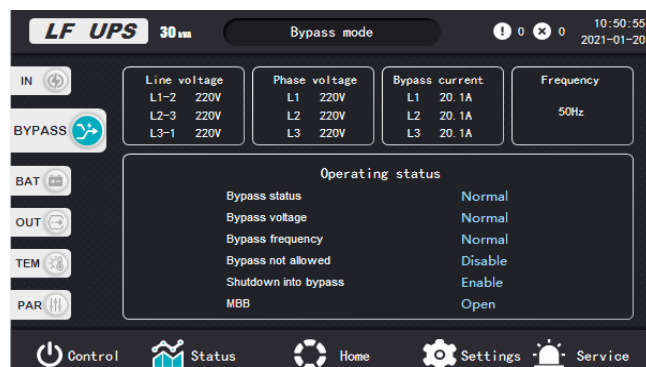
| Item   | Description                                                                                                                             |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Input  | Display real-time input line voltage, input phase voltage and input frequency.                                                          |
| Bypass | Display real-time bypass line voltage, bypass phase voltage, bypass frequency and bypass current.                                       |
| BAT.   | Display battery status, DC bus voltage, real-time battery voltage and backup time.                                                      |
| Output | Display real-time output line voltage, output phase voltage, output frequency, output current, load percentage and output power factor. |
| Temp.  | Display all kinds of component temperature.                                                                                             |
| PAR    | Display input voltage range, voltage range for bypass mode and voltage range for ECO mode.                                              |

### ● INPUT



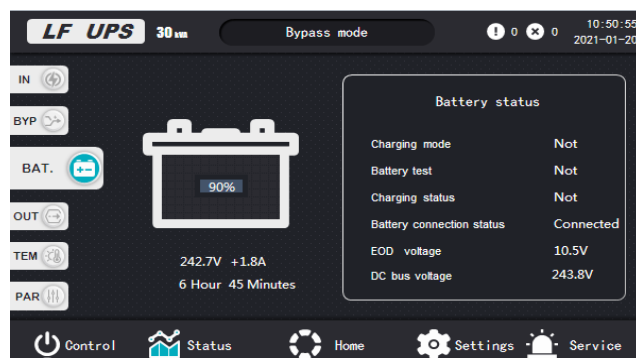
Input status

### ● BYPASS



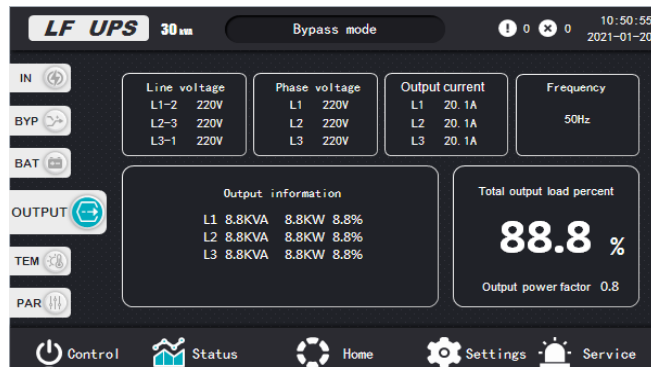
Bypass status

### ● BAT.



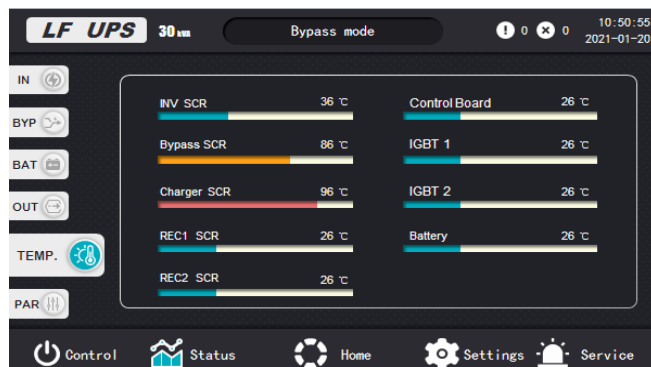
Battery status

- OUTPUT

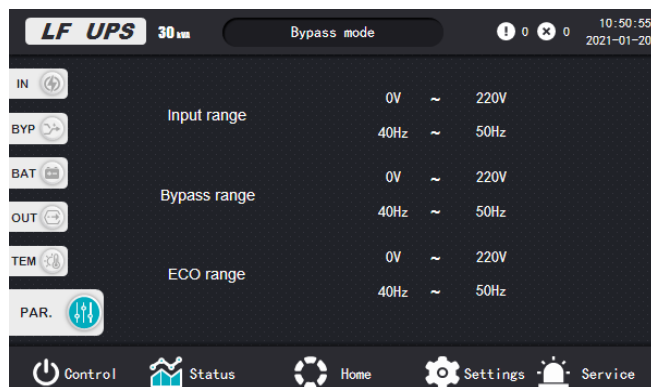


Output status

- TEMP.

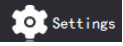


- PAR.



Voltage range for different modes

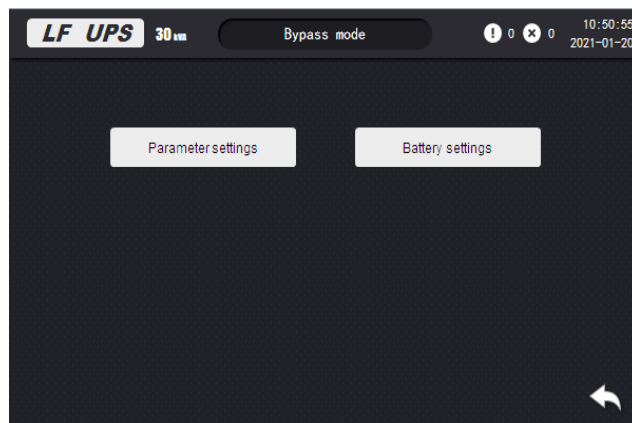
### 6-3-3 Setting sub-menu

This sub-menu is used to set the parameters of UPS. There are 3 options: UPS settings, General settings and Advanced settings. Touch the icon  to enter setting menu page.

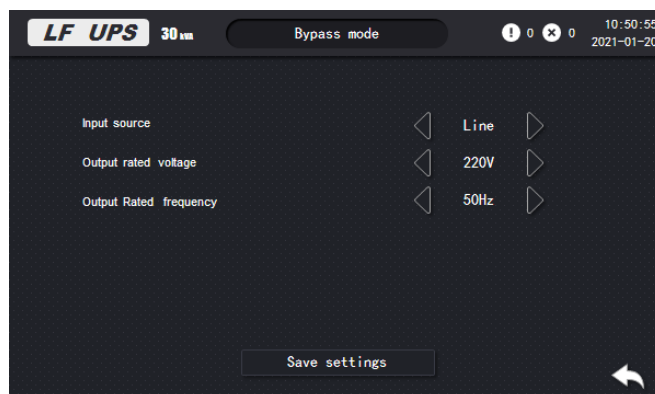
**NOTE:** Not all settings are available in every operation mode. If the setting is not available in present mode, the LCD will keep its original setting parameter showed instead of changing the parameters.

| Items             | Description                                                                     |
|-------------------|---------------------------------------------------------------------------------|
| UPS settings      | It's to set up power source, output voltage and battery related parameters.     |
| General settings  | It's to set up UPS basic information, not related to any function operation.    |
| Advanced settings | It's to set up function parameters. It's required to enter password for access. |

## UPS Settings

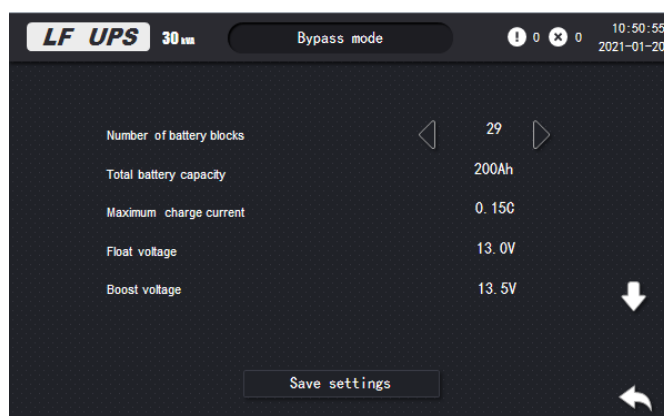


- Parameter settings



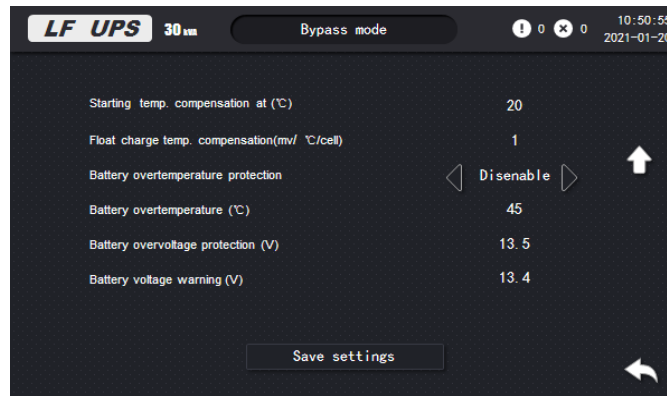
- Input source: It's to set up AC input. There are two selections: Line and generator. The default setting is "Line". This parameter setting will display in the main screen. If "generator" is selected, the output frequency will be fixed within 40~75 Hz and output voltage within 165~280V.
- Output rated voltage: There are three selections, 220V, 230V and 240V. The default setting is 220V.
- Output rated frequency: There are two selections, 50 Hz and 60 Hz. The default setting is 50 Hz.

## Battery Settings



Battery settings screen 1

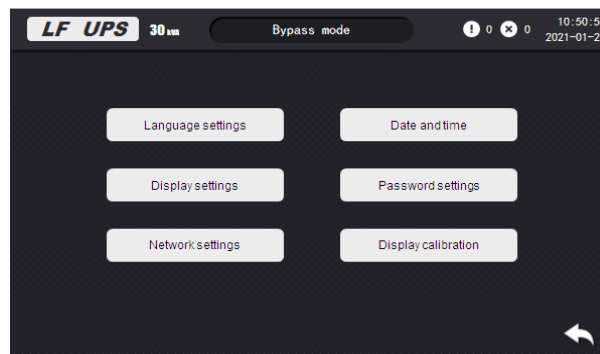
- Number of battery blocks: It's to set up battery number per string. The default setting is 32.
- Total battery capacity: It's to set up battery capacity. The default setting is 100Ah.
- Maximum charger current: It's to set up maximum charger current. The default setting is 0.2C.
- Float voltage: It's to set up float charging voltage. The default setting is 13.5V.
- Boost voltage: It's to set up boost charging voltage. The default setting is 14V.



Battery settings screen 2

- Starting temp. compensation at (°C): The setting range is from 20°C to 25°C.
- Float charge temp. compensation (mV/cell): The setting range is from 0 to 7.
- Battery overtemperature protection: Enable / Disable this function.
- Battery overtemperature(°C) : It's to set up battery overtemperature point.
- Battery overvoltage protection (V): It's to set up battery overvoltage point.
- Battery voltage warning (V): It's to set up battery voltage warning point. The setting range is from 12V to 14V.

## General Settings



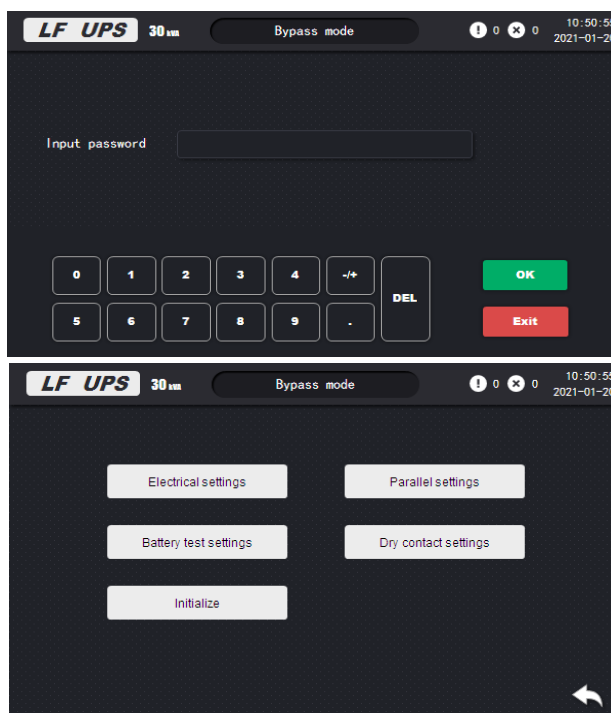
| Setting items       | Description                                                                                     |
|---------------------|-------------------------------------------------------------------------------------------------|
| Language settings   | LCD display language setting. There are three languages to select: English, Chinese and French. |
| Date and time       | Date and time setting.                                                                          |
| Display settings    | Set up LCD display brightness.                                                                  |
| Password settings   | Set up password for advanced settings.                                                          |
| Network settings    | Set up Modbus IP address, Modbus baud rate and enable/disable access authority for RS-485 data. |
| Display calibration | Calibrate LCD screen.                                                                           |

## Advance Settings

There are two permissions for Advanced Setting: User and Factory.

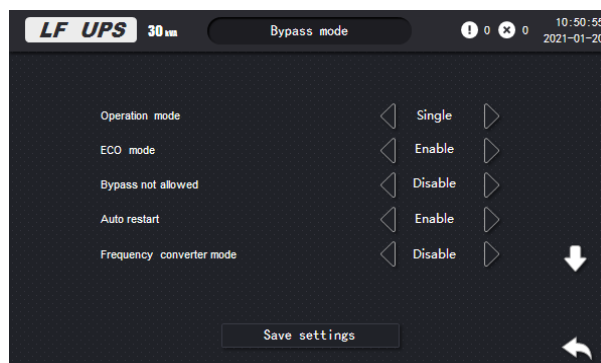
### Advanced Setting → User

It's required to enter password to access to the "Advanced setting" page. After entering password, click "OK" button to enter.

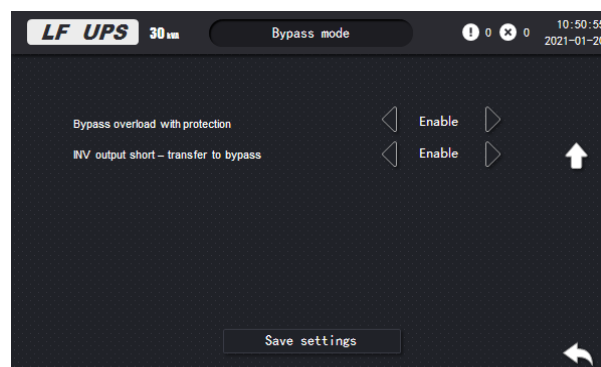


Advanced setting menu

- Electrical settings

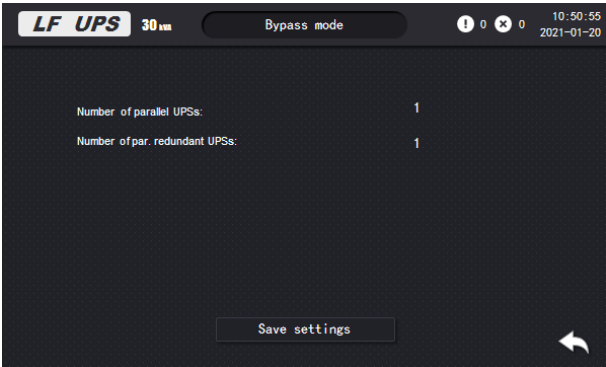


Electrical setting screen 1



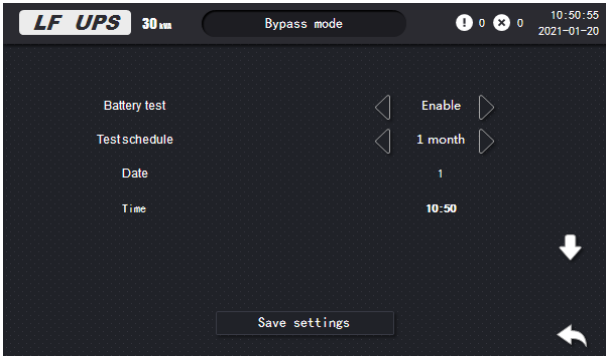
Electrical setting screen 2

- Parallel settings

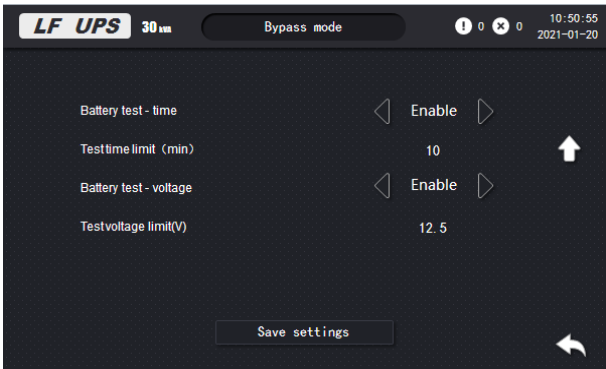


Parallel setting screen

- Battery test setting

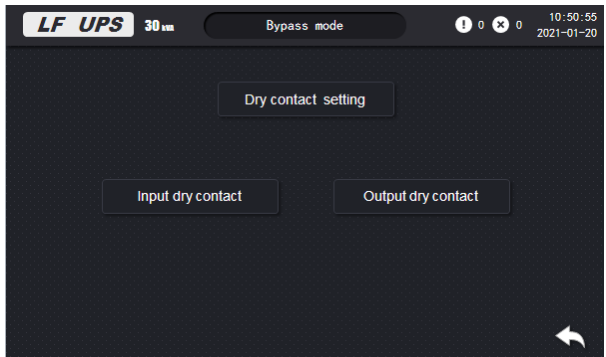


Battery test setting screen 1



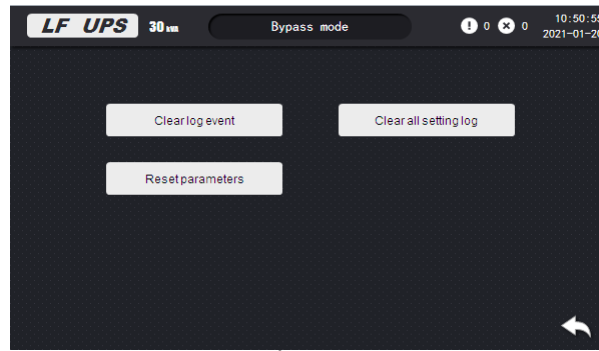
Battery test setting screen 2

- Dry contact settings



Dry contact setting screen

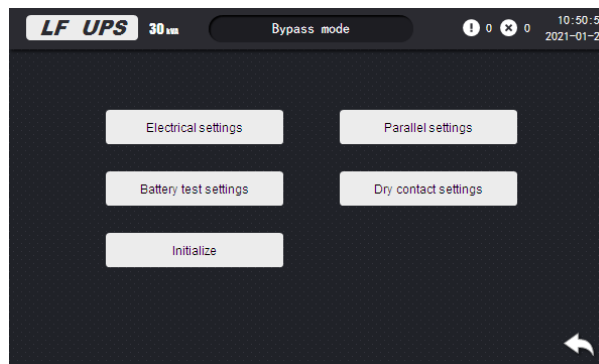
- Initialize



Initialize screen

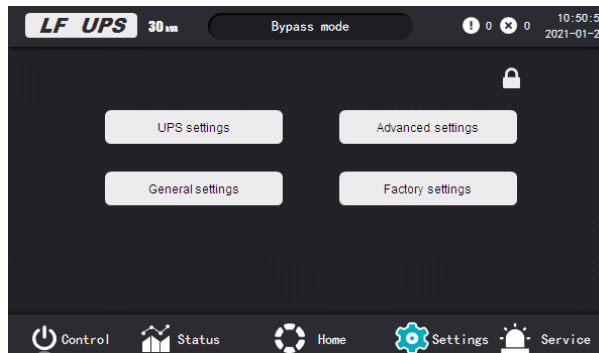
### Advanced Settings → Hidden Factory Settings

Factory setting is hidden to avoid mis-operation. It's required to enter password to access to the "Advanced setting" page first. After entering password, click "OK" button to enter.

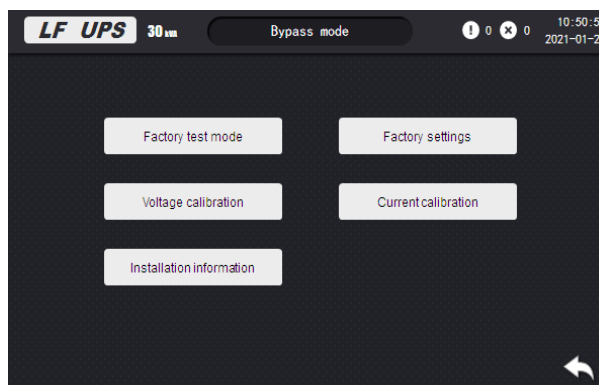


Advanced setting menu

After accessing Advanced setting menu, click "Return arrow" and it will show Factory Setting icon in the screen.



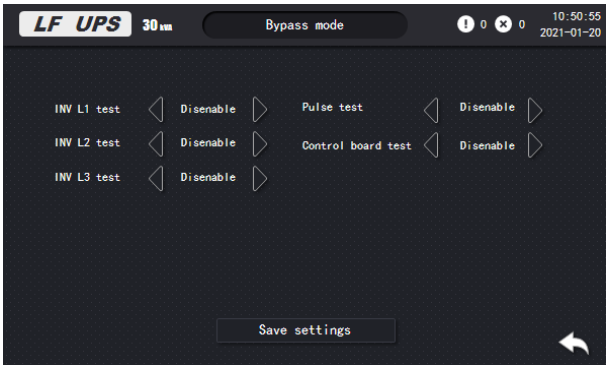
Displayed hidden Factory settings



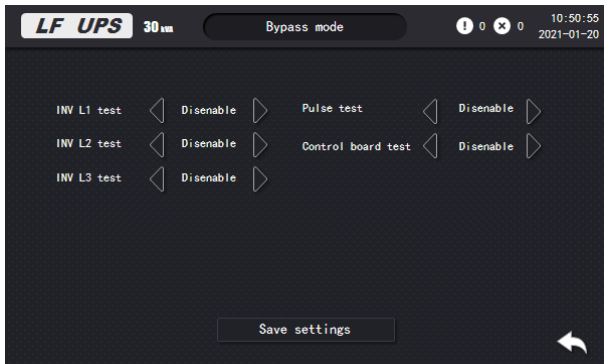
Factory settings menu

After clicking “Factory settings” icon, it will show five selections: Factory test mode, Factory settings, Voltage calibration, Current calibration and Installation Information.

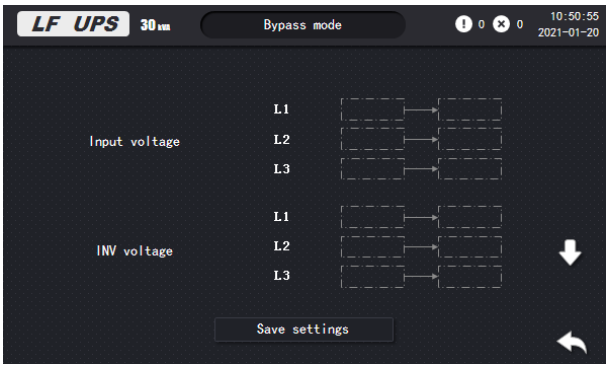
- Factory test mode



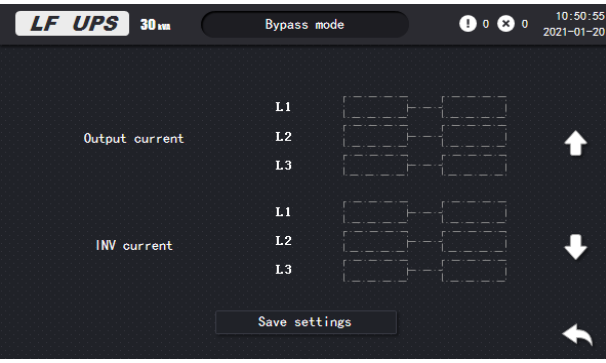
- Factory settings: It will show default setting from factory.



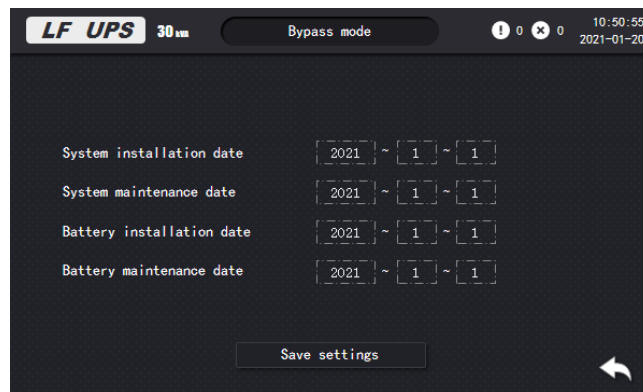
- Voltage calibration: It can calibrate input voltage, inverter voltage, bypass voltage, output voltage, battery voltage and BUS voltage.



- Current calibration: It can calibrate output current, inverter current and output current.

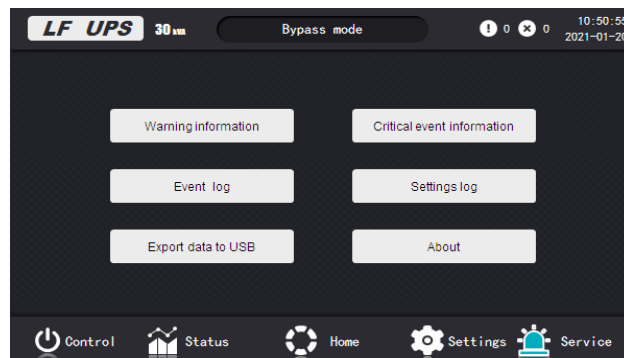


- Installation Information: It can set up system installation date, system maintenance date, battery installation date and battery maintenance date.



#### 6-3-4. Service sub-menu

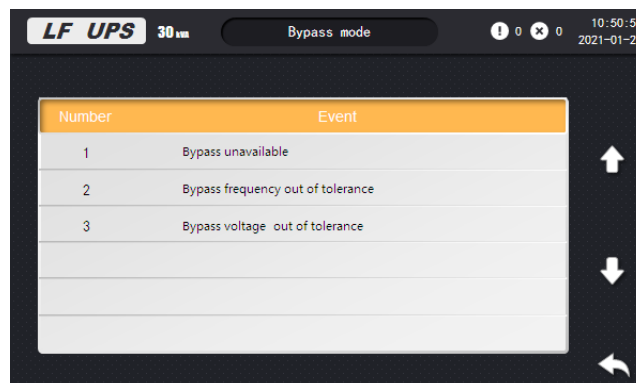
Touch the icon  Service to enter Service page. There are six items to select: Warning information, Critical event information, Event log, Setting log, Export data to USB and About.



Service Page

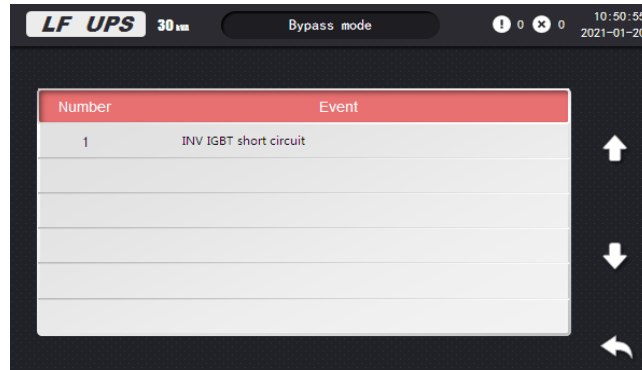
| Items                      | Description                                                                                 |
|----------------------------|---------------------------------------------------------------------------------------------|
| Warning information        | It's to record UPS current alarm information.                                               |
| Critical event information | It's to record UPS current fault.                                                           |
| Event log                  | It's to record date and time and corresponding codes when any event, alarm or fault occurs. |
| Setting log                | It's to setting log for dry contact.                                                        |
| Export data to USB         | It's to export event log and setting log to USB.                                            |
| About                      | It's to check serial number and all firmware versions.                                      |

- Warning information



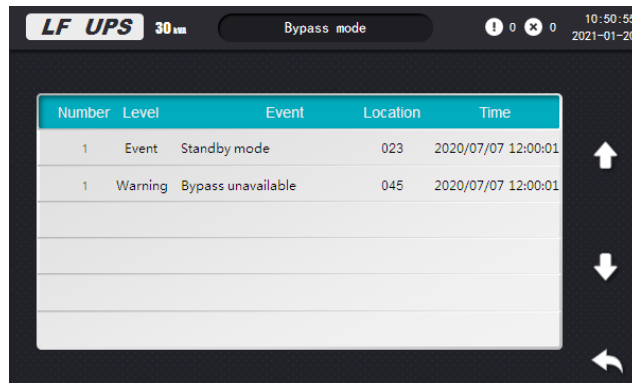
Warning information screen

- Critical event information



Critical event information screen

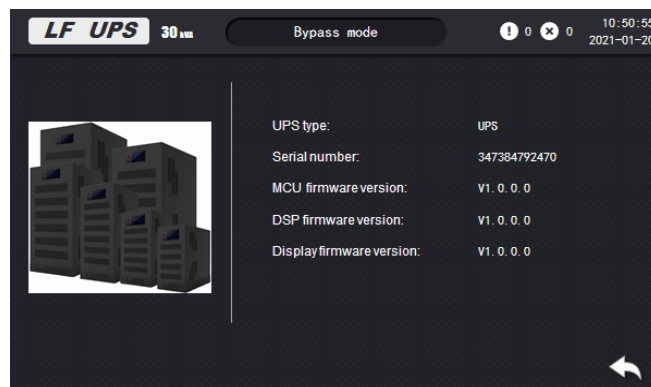
- Event log



Event log screen

- 1) It's to record all events on the UPS. Information is including times, code, description, date and time of occurrence. If more than 5 events are listed in the screen, click down arrow to see next page.
- 2) Check Chapter 8 for detailed warning and fault codes.

- About



- 1) UPS serial number
- 2) MCU firmware version
- 3) DSP firmware version
- 4) Display firmware version

## 7. MAINTENANCE

**Caution!** Inside maintenance is only available for the engineer with qualified electrical knowledge.



There is still possible high voltage inside of the unit even disconnect all connections.

### 7-1. System maintenance

- Check if touched LCD functions well.
- Make sure there is no abnormal noise inside of the unit.
- Make sure nothing blocks the ventilation of the unit.
- Please use dry towel to clean the surface of the unit when it is not working.
- Please check the outlook condition of all wires and connection situation periodically after disconnecting all power. The checking interval should be less than 2 years.

### 7-2. Battery maintenance

In order to prolong the lifecycle of the battery, please do the maintenance periodically.

- The lifecycle of the battery is based on ambient temperature and recharge cycles. Please make the battery working under the ambient temperature between 15°C ~25°C.
- Check the voltage of the battery pack weekly. Check the voltage of each battery monthly.
- Keep the environment of battery clean and tidy.
- Check the terminals of the batteries termly, make sure they are tightened.
- Please charge the battery once a month if the battery hasn't been used for a long time.
- If the discharging time is much less than normal situation, please check if it's time to replace them.

## 8. TROUBLE SHOOTING

### 8-1. Warning code

| Code | Event                                          | How to do                                                                                                                                                                                        |
|------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Battery open                                   | Please check if battery wires are connected correctly and battery switch is on.                                                                                                                  |
| 3    | Line phase error                               | Please check the phase sequence of line input.                                                                                                                                                   |
| 4    | Bypass phase error                             | Please check the phase sequence of bypass                                                                                                                                                        |
| 5    | Battery over charge                            | Check the battery voltage and then restart the unit.                                                                                                                                             |
| 6    | Low battery                                    | Remove all connected loads and charge the battery from utility.                                                                                                                                  |
| 14   | Maintain switch is open.                       | Don't switch on maintenance bypass breaker if it's not in repair.                                                                                                                                |
| 17   | The end of battery backup setting time         | Please restart the UPS.                                                                                                                                                                          |
| 18   | Battery breaker is disconnected.               | Check battery breaker.                                                                                                                                                                           |
| 19   | Battery test fails                             | Please restart the UPS.                                                                                                                                                                          |
| 21   | Inverter is not synchronized.                  | Check the bypass power source.                                                                                                                                                                   |
| 22   | Parallel line lost                             | Check if sharing cables are connected well and restart the UPS.                                                                                                                                  |
| 23   | Bypass wiring difference                       | Check if the Bypass phase sequence and voltage is correct or not.<br><b>WARNING:</b> If bypass wiring is different and when fault occurs on all parallel UPSs, it will cause power interruption. |
| 24   | N+1 redundancy lost                            | It's to remind users that connected loads are beyond single and N+1 redundancy is not working. UPS capacity. Pay attention to UPS status while working in Expansion mode.                        |
| 29   | Bypass frequency unstable                      | Please check the bypass frequency.                                                                                                                                                               |
| 30   | RTC crystal error                              | Please restart the UPS.                                                                                                                                                                          |
| 31   | Need to maintain                               | Please call for maintenance service.                                                                                                                                                             |
| 34   | Warranty is about to expire.                   | Please contact service center.                                                                                                                                                                   |
| 35   | Warranty has expired.                          | Please contact service center.                                                                                                                                                                   |
| 36   | AC capacitor warning.                          | Please contact service center.                                                                                                                                                                   |
| 37   | AUX PSU warning.                               | Please contact service center.                                                                                                                                                                   |
| 38   | Filter warning.                                | Please contact service center.                                                                                                                                                                   |
| 39   | Battery warning.                               | Please contact service center.                                                                                                                                                                   |
| 40   | DC capacitor warning.                          | Please contact service center.                                                                                                                                                                   |
| 41   | Fan warning.                                   | Please contact service center.                                                                                                                                                                   |
| 52   | Output overload warning                        | Please check the output load.                                                                                                                                                                    |
| 53   | Bypass overload warning                        | Please check the output load.                                                                                                                                                                    |
| 54   | Maintain switch not function                   | Please check the maintenance bypass switch.                                                                                                                                                      |
| 55   | Input frequency is beyond the acceptable range | Check if input frequency is within acceptable range.                                                                                                                                             |
| 56   | Input voltage is beyond the acceptable range   | Check if input voltage is within acceptable range.                                                                                                                                               |
| 57   | Bypass is not synchronized.                    | Check the bypass power source.                                                                                                                                                                   |
| 59   | Over-temperature warning on charger SCR.       | Reduce the connected loads or cooler the environment temperature.                                                                                                                                |
| 60   | Over-temperature warning on REC1 SCR.          | Reduce the connected loads or cooler the environment temperature.                                                                                                                                |
| 61   | Over-temperature warning on Inverter SCR.      | Reduce the connected loads or cooler the environment temperature.                                                                                                                                |
| 62   | Over-temperature warning on bypass SCR.        | Reduce the connected loads or cooler the environment temperature.                                                                                                                                |
| 63   | Over-temperature warning on control board.     | Reduce the connected loads or cooler the environment temperature.                                                                                                                                |
| 64   | Over-temperature warning on IGBT1.             | Reduce the connected loads or cooler the environment temperature.                                                                                                                                |
| 65   | Over-temperature warning on IGBT2.             | Reduce the connected loads or cooler the environment temperature.                                                                                                                                |

|     |                                                                            |                                                                   |
|-----|----------------------------------------------------------------------------|-------------------------------------------------------------------|
| 66  | Battery over-temperature warning                                           | Check battery.                                                    |
| 67  | Over-temperature warning on REC2 SCR.                                      | Reduce the connected loads or cooler the environment temperature. |
| 69  | Bypass abnormal                                                            | Please check bypass power source.                                 |
| 70  | No input                                                                   | Please check mains input.                                         |
| 71  | EEPROM fault                                                               | Restart the UPS. If problem remains, please call for service.     |
| 72  | Bypass is not allowed.                                                     | Please check UPS bypass setting.                                  |
| 73  | Bypass frequency is beyond the acceptable range.                           | Check bypass power source.                                        |
| 74  | Bypass voltage is beyond the acceptable range.                             | Check bypass power source.                                        |
| 75  | Fan fault                                                                  | Check if fan is not working.                                      |
| 76  | Backfeed protection is activated when there is power input on mains input. | Check inverter SCR.                                               |
| 77  | On bypass mode, backfeed protection is activated.                          | Check bypass SCR.                                                 |
| 79  | Parallel number setting is not correct.                                    | Please check parallel setting.                                    |
| 80  | UPS automatically turns into Fault mode in three times.                    | Check event log.                                                  |
| 81  | Output breaker is off.                                                     | Check output breaker.                                             |
| 82  | SPS abnormal.                                                              | Check power supply board.                                         |
| 97  | Over-temperature on charger SCR.                                           | Reduce the connected loads or cooler the environment temperature. |
| 98  | Over-temperature on REC1 SCR.                                              | Reduce the connected loads or cooler the environment temperature. |
| 99  | Over-temperature on Inverter SCR.                                          | Reduce the connected loads or cooler the environment temperature. |
| 101 | Over-temperature on control board.                                         | Reduce the connected loads or cooler the environment temperature. |
| 102 | Over-temperature on IGBT1.                                                 | Reduce the connected loads or cooler the environment temperature. |
| 103 | Over-temperature on IGBT2.                                                 | Reduce the connected loads or cooler the environment temperature. |
| 104 | Over-temperature on REC2 SCR.                                              | Reduce the connected loads or cooler the environment temperature. |
| 105 | Over-temperature on input inductance/ transformer.                         | Reduce the connected loads or cooler the environment temperature. |
| 106 | Over-temperature on inverter transformer.                                  | Reduce the connected loads or cooler the environment temperature. |

## 8-2. Fault code

| Code | Event                           | How to do                                                                                       |
|------|---------------------------------|-------------------------------------------------------------------------------------------------|
| 1    | BUS start fail                  | Restarts the unit. If the problem remains, please call for service.                             |
| 2    | BUS voltage is high             |                                                                                                 |
| 3    | BUS voltage is low              |                                                                                                 |
| 17   | INV soft start fails            |                                                                                                 |
| 18   | INV voltage high                |                                                                                                 |
| 19   | INV voltage low                 |                                                                                                 |
| 20   | L1 phase INV is short circuited | Disconnect the load first. Then restart the unit. If the unit is normal, please check the load. |
| 21   | L2 phase INV is short circuited |                                                                                                 |
| 22   | L3 phase INV is short circuited |                                                                                                 |
| 23   | L1-2 INV is short circuited     |                                                                                                 |
| 24   | L2-3 INV is short circuited     |                                                                                                 |
| 25   | L3-1 INV is short circuited     |                                                                                                 |
| 37   | Wiring fault.                   | Recheck if input and output wiring is correct.                                                  |

|     |                                                                    |                                                                                                                                                   |
|-----|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 38  | Switch line fault                                                  | Restarts the unit. If the problem remains, please call for service.                                                                               |
| 39  | Parallel line loss                                                 | Recheck if parallel cable is firmly connected.                                                                                                    |
| 40  | CAN comm. fault                                                    | Restart the unit. If problem remains, please call for service.                                                                                    |
| 41  | Host line loss                                                     | Recheck if parallel cable is firmly connected to the master UPS.                                                                                  |
| 42  | Output voltage of master UPS is not consistent in parallel system. | Recheck all UPS output voltage settings in parallel system.                                                                                       |
| 44  | The transfer time from inverter to bypass is time out.             | Check bypass power source.                                                                                                                        |
| 45  | The transfer time from bypass to inverter is time out.             | Check bypass power source.                                                                                                                        |
| 46  | Parallel version difference                                        | Restart the unit. If problem remains, please call for service.                                                                                    |
| 47  | SYNC line Loss                                                     | Restart the unit. If problem remains, please call for service.                                                                                    |
| 66  | CPU communication fault                                            | Restarts the unit. If the problem remains, please call for service.                                                                               |
| 67  | Overload fault                                                     | Remove some excessive loads based on UPS capacity.                                                                                                |
| 72  | DSP firmware version incompatible                                  | DSP software version is incompatible with the model. Restart the unit. If the problem remains, please call for service.                           |
| 82  | Battery voltage too high                                           | Disconnect the load first. Then, restart the unit. If the unit is normal, please check the load. If the problem remains, please call for service. |
| 83  | L1 phase INV over current                                          |                                                                                                                                                   |
| 84  | L2 phase INV over current                                          |                                                                                                                                                   |
| 85  | L3 phase INV over current                                          |                                                                                                                                                   |
| 86  | L1 phase output over current                                       |                                                                                                                                                   |
| 87  | L2 phase output over current                                       |                                                                                                                                                   |
| 88  | L3 phase output over current                                       |                                                                                                                                                   |
| 89  | L1 phase INV SCR fault                                             |                                                                                                                                                   |
| 90  | L2 phase INV SCR fault                                             |                                                                                                                                                   |
| 91  | L3 phase INV SCR fault                                             |                                                                                                                                                   |
| 92  | L1 phase bypass SCR fault                                          |                                                                                                                                                   |
| 93  | L2 phase bypass SCR fault                                          |                                                                                                                                                   |
| 94  | L3 phase bypass SCR fault                                          |                                                                                                                                                   |
| 107 | Parallel number setting is not compatible in parallel system.      | Check parallel number setting in parallel UPSs.                                                                                                   |
| 108 | Output frequency setting is not compatible in parallel system.     | Check output frequency setting in parallel UPSs.                                                                                                  |

## 9. SPECIFICATION

**Table1: Line input**

| Model                           | 10K                                  | 15K    | 20K   | 30K   | 40K   | 60K   | 80K   | 100K   | 120K   | 160K  |
|---------------------------------|--------------------------------------|--------|-------|-------|-------|-------|-------|--------|--------|-------|
| Capacity                        | 10KVA                                | 15KVA  | 20KVA | 30KVA | 40KVA | 60KVA | 80KVA | 100KVA | 120KVA | 160K  |
|                                 | 9KW                                  | 13.5KW | 18KW  | 27KW  | 36KW  | 54KW  | 72KW  | 90KW   | 108KW  | 144KW |
| Rated voltage                   | 3 x 380/400V (3Ph + N)               |        |       |       |       |       |       |        |        |       |
| Rated frequency                 | 50Hz/60Hz                            |        |       |       |       |       |       |        |        |       |
| Voltage range                   | 165V~280V (Ph-N) / 285V~485V (Ph-Ph) |        |       |       |       |       |       |        |        |       |
| Frequency range                 | 46Hz~54Hz @50Hz; 56Hz~64Hz @60Hz     |        |       |       |       |       |       |        |        |       |
| Rated input current / per phase | 20A                                  | 30A    | 38A   | 55A   | 72A   | 108A  | 140A  | 175A   | 210A   | 278A  |

**Table 2: Battery**

| Model              | 10K                                                                                                                           | 15K | 20K | 30K | 40K | 60K | 80K | 100K | 120K | 160K |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|------|------|------|
| Battery numbers    | 29/30/31/32 PCS (12V in series)                                                                                               |     |     |     |     |     |     |      |      |      |
| Rated voltage      | 384VDC                                                                                                                        |     |     |     |     |     |     |      |      |      |
| Charging current   | Up to 25A (for 10kVA) and 40A (for 20kVA)<br>Up to 50A (30~160kVA)<br>*Note : Available charging current is subject to load % |     |     |     |     |     |     |      |      |      |
| Floating voltage   | 13.5VDC /per unit (12V)                                                                                                       |     |     |     |     |     |     |      |      |      |
| High cut off point | 14.5VDC / per unit (12V)                                                                                                      |     |     |     |     |     |     |      |      |      |

**Table 3: Inverter output**

| Model             | 10K                                            | 15K | 20K | 30K | 40K | 60K | 80K | 100K | 120K | 160K |
|-------------------|------------------------------------------------|-----|-----|-----|-----|-----|-----|------|------|------|
| Waveform          | Sinusoidal wave                                |     |     |     |     |     |     |      |      |      |
| Rated voltage     | 3 x 380/400V (3Ph + N)                         |     |     |     |     |     |     |      |      |      |
| Tolerance         | ±1% (Balanced)                                 |     |     |     |     |     |     |      |      |      |
| Rated frequency   | 50/60 Hz ±1 %                                  |     |     |     |     |     |     |      |      |      |
| THDV              | R load<2%; RCD load<5%                         |     |     |     |     |     |     |      |      |      |
| Overload capacity | 110%~125%: 10min, 125%~150%: 60s, >150%: 200ms |     |     |     |     |     |     |      |      |      |
| Efficiency        | >90%                                           |     |     |     |     |     |     |      |      |      |

**Table 4: Bypass**

| Model             | 10K                                            | 15K | 20K | 30K | 40K | 60K | 80K | 100K | 120K | 160K |
|-------------------|------------------------------------------------|-----|-----|-----|-----|-----|-----|------|------|------|
| Rated voltage     | 3 x 380/400V (3Ph + N)                         |     |     |     |     |     |     |      |      |      |
| Rated frequency   | 50Hz/60Hz                                      |     |     |     |     |     |     |      |      |      |
| Voltage range     | 176V~264V (Ph-N) / 304V~456V (Ph-Ph)           |     |     |     |     |     |     |      |      |      |
| Frequency range   | 46Hz~54Hz @50Hz; 56Hz~64Hz @60Hz               |     |     |     |     |     |     |      |      |      |
| Transfer time     | Synchronization: 0ms                           |     |     |     |     |     |     |      |      |      |
| Overload capacity | 110%~125%: 10min, 125%~150%: 60s, >150%: 200ms |     |     |     |     |     |     |      |      |      |

**Table 5: ECO Bypass (Default disable)**

| Model           | 10K                                  | 15K | 20K | 30K | 40K | 60K | 80K | 100K | 120K | 160K |
|-----------------|--------------------------------------|-----|-----|-----|-----|-----|-----|------|------|------|
| Rated voltage   | 3 x 380/400V (3Ph + N)               |     |     |     |     |     |     |      |      |      |
| Rated frequency | 50Hz/60Hz                            |     |     |     |     |     |     |      |      |      |
| Voltage range   | 176V~264V (Ph-N) / 304V~456V (Ph-Ph) |     |     |     |     |     |     |      |      |      |
| Frequency range | 46Hz~54Hz @50Hz; 56Hz~64Hz @60Hz     |     |     |     |     |     |     |      |      |      |
| Transfer time   | <10ms                                |     |     |     |     |     |     |      |      |      |

**Table 6: Environment**

| Model                     | 10K                                                     | 15K | 20K | 30K | 40K | 60K | 80K | 100K | 120K | 160K |
|---------------------------|---------------------------------------------------------|-----|-----|-----|-----|-----|-----|------|------|------|
| Working temperature range | 0°C ~ 50°C                                              |     |     |     |     |     |     |      |      |      |
| Storage temperature range | -15°C ~ 60°C                                            |     |     |     |     |     |     |      |      |      |
| Altitude                  | 0 ~ 1000m<br>(Please refer to part 3.1 when over 1000m) |     |     |     |     |     |     |      |      |      |
| Humidity                  | 5% ~ 95% no condensing                                  |     |     |     |     |     |     |      |      |      |
| IP degree                 | IP31, optional: IP41                                    |     |     |     |     |     |     |      |      |      |
| Cooling                   | Forced air cooling                                      |     |     |     |     |     |     |      |      |      |
| Communi-cation            | RS232, USB, RS485, intelligent slot                     |     |     |     |     |     |     |      |      |      |

**Table 7: Mechanics**

| Model       | 10K | 15K | 20K | 30K  | 40K | 60K  | 80K | 100K | 120K | 160K |
|-------------|-----|-----|-----|------|-----|------|-----|------|------|------|
| Depth (mm)  | 656 |     | 656 | 821  |     | 975  |     | 975  | 1051 | 1051 |
| Width (mm)  | 405 |     | 405 | 432  |     | 554  |     | 635  | 705  | 705  |
| Height (mm) | 817 |     | 941 | 1159 |     | 1286 |     | 1326 | 1646 | 1646 |
| Weight (kg) | 120 | 145 | 193 | 278  | 365 | 471  | 573 | 650  | 735  | 790  |

## 10. PARALLEL INSTALLATION GUIDE

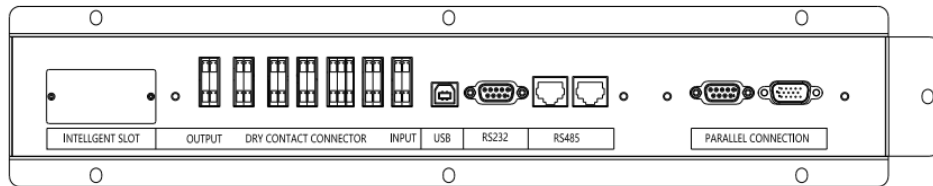
### 10.1. Introduction

- The UPS can be paralleled in 3+1 redundancy or 4 units as an expansion.
- **N+1 redundancy** is a form of resilience that ensures system availability in the event of one UPS failure. During normal operations, the load is shared equally across all UPSs, which behaves as if they were a single UPS device. If a single UPS fails or needs to be taken offline for service, the system will continue running without interruption. The UPS modules should be sized so that the total anticipated load can be carried by N units. If the total power of system is more than N units, the system will continue running but with warning coming out.
- **Expansion** is activated when the total power of system is more than N units. In this case, the system continues running but with warning ringing out. Under this situation, if a single UPS fails or needs to be taken offline for service, the system will shut down for overload.
- **Host and slaves** are generated randomly. Usually the first one who starts up will be the host. If one slave device fails or needs to be taken offline, the host and other slaves keep running. If the host fails or needs to be taken offline, the new host will come out from slaves by competing with each other.

### 10.2. Parallel Kit Overview

#### 10-2-1. Overview

If you purchase a parallel UPS, you should find the following items.



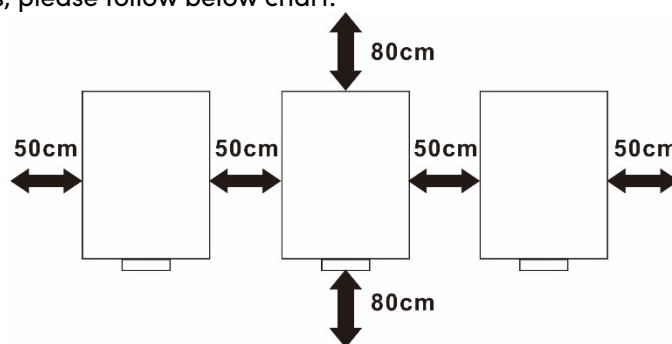
Please make sure parallel communication port is already installed in the UPS as shown in the chart.



Parallel communication cable

#### 10-2-2. Installation

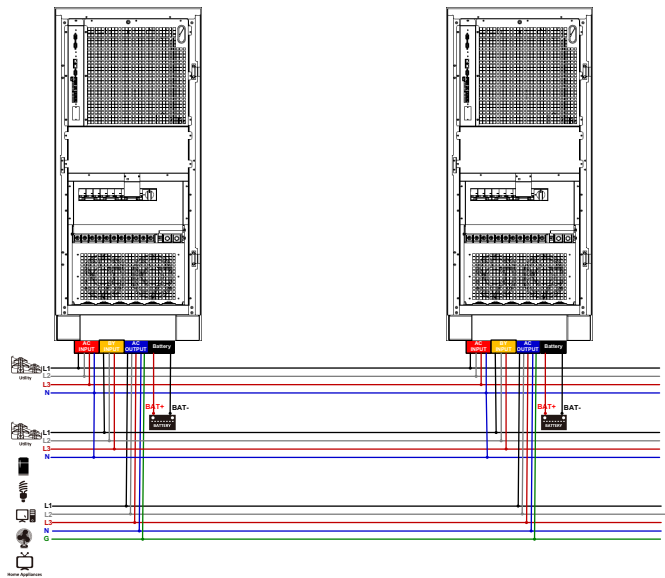
When installing multiple units, please follow below chart.



**NOTE:** For proper air circulation to dissipate heat, allow a clearance of approx. 20 cm to the side and approx. 80 cm front and back the unit.

10-2-3. Wiring Connection

Two UPSs in parallel:

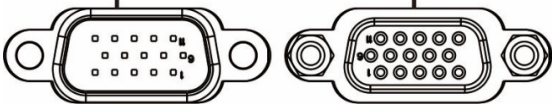


Communication Connection

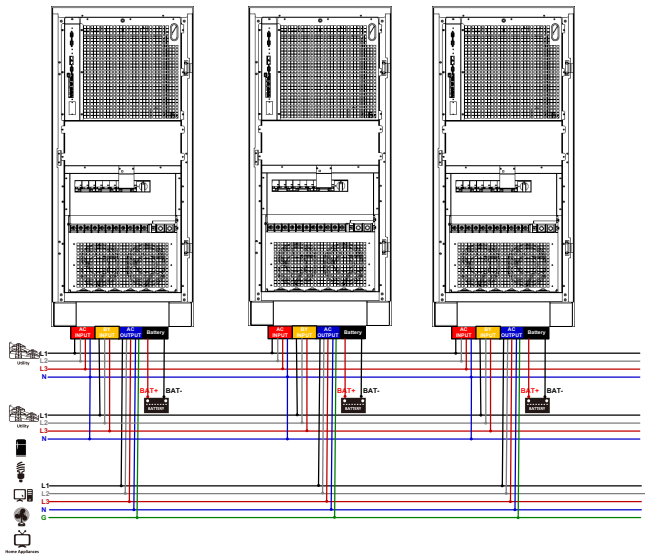
UPS 1



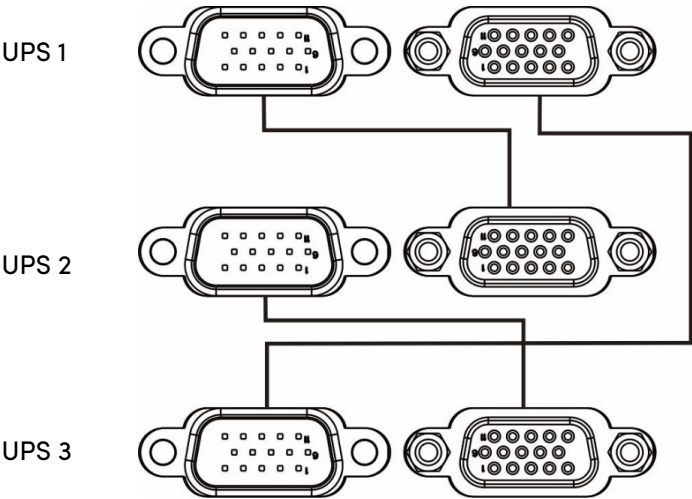
UPS 2



Three UPSs in parallel:



Communication Connection



Please apply the same above wiring connection to finish four UPSs in parallel.

Recommended specification of battery breaker for each UPS:

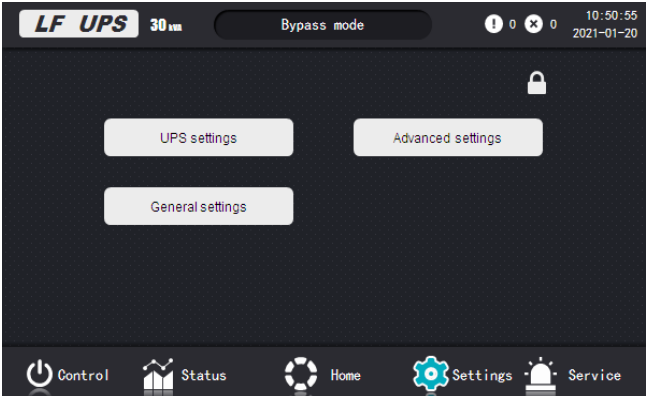
| Model                                     | One unit |
|-------------------------------------------|----------|
| PRO63310-EL<br>PRO63315-EL<br>PRO63320-EL | 63~80A   |
| PRO63330-EL                               | 100A     |
| PRO63340-EL                               | 125~160A |
| PRO63360-EL                               | 160~200A |
| PRO63380-EL                               | 200~250A |
| PRO633100-EL                              | 300~350A |
| PRO633120-EL                              | 350~400A |
| PRO633160-EL                              | 400A     |

**Note 1:** Please be sure **NOT** to share the same battery pack in parallel system.

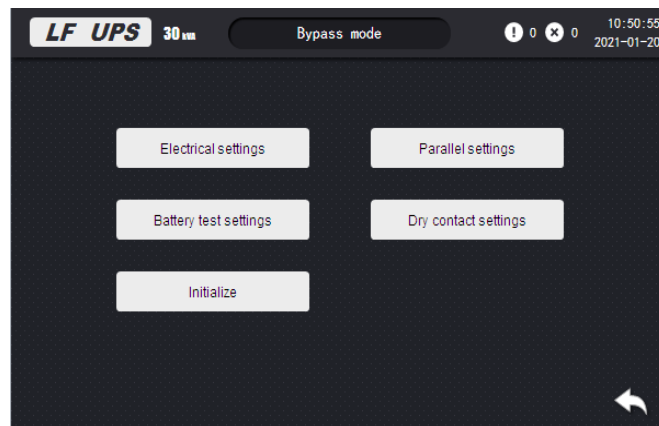
**Note 2:** It's recommended to use the same specification for all connected batteries.

10.3. Setting and LCD display

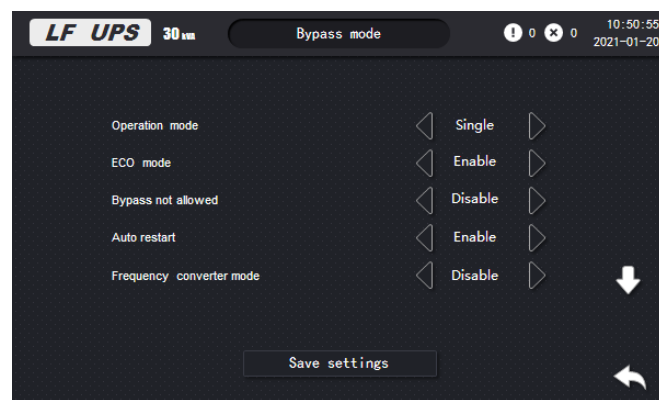
This UPS with single function will already be set up well from factory. If the default setting is "Single", it's able to modify to "parallel" model by configuring LCD setting. Click "Settings" button and then "Advanced settings" button. It's required to enter service password to access parallel setting. Please contact service center to get service password and technical support.



After entering menu of advanced settings, click “Electrical settings” and change “Single” to “Parallel” in Operation mode. Be sure to click “Save settings” before exit.



Advanced Setting menu



Electrical settings screen

#### 10.4. Specification

| Model                             | 10K             | 15K             | 20K           | 30K           | 40K           | 60K           | 80K           | 100K           | 120K            | 160K            |
|-----------------------------------|-----------------|-----------------|---------------|---------------|---------------|---------------|---------------|----------------|-----------------|-----------------|
| Power range                       | 10KVA<br>9KW    | 15KVA<br>13.5KW | 20KVA<br>18KW | 30KVA<br>27KW | 40KVA<br>36KW | 60KVA<br>54KW | 80KVA<br>72KW | 100KVA<br>90KW | 120KVA<br>108KW | 160KVA<br>144KW |
| Max parallel number               | 4               |                 |               |               |               |               |               |                |                 |                 |
| Output Power for Parallel System  |                 |                 |               |               |               |               |               |                |                 |                 |
| VA                                | 40K             | 60K             | 80K           | 120K          | 160K          | 240K          | 320K          | 400K           | 480K            | 640K            |
| W                                 | 36K             | 54K             | 72K           | 108K          | 144K          | 216K          | 288K          | 360K           | 432K            | 576K            |
| Circulation Current under No Load | <3A             |                 |               |               | <5A           |               |               |                |                 |                 |
| Power Unbalance Ratio             | <5% @ 100% Load |                 |               |               |               |               |               |                |                 |                 |
| Parallel communication            | CAN             |                 |               |               |               |               |               |                |                 |                 |
| Transfer time in parallel mode    | 0ms             |                 |               |               |               |               |               |                |                 |                 |

## 10.5. Trouble shooting

### 10-5-1. Warning code

| Code | Event                    | How to do                                                                                                                                                                                        |
|------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 22   | Parallel line lost       | Check if sharing cables are connected well and restart the UPS.                                                                                                                                  |
| 23   | Bypass wiring difference | Check if the Bypass phase sequence and voltage is correct or not.<br><b>WARNING:</b> If bypass wiring is different and when fault occurs on all parallel UPSs, it will cause power interruption. |
| 24   | N+1 redundancy lost      | It's to remind users that connected loads are beyond single and N+1 redundancy is not working. UPS capacity. Pay attention to UPS status while working in Expansion mode.                        |

### 10-5-2. Fault code

| Code | Event                       | How to do                                                                                                                                |
|------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 38   | Switch line fault           | 1. Update all UPS firmware to the same version.<br>2. After updating, if the problem still remains, please contact your local dealer.    |
| 39   | Parallel line loss          |                                                                                                                                          |
| 40   | CAN comm. fault             |                                                                                                                                          |
| 41   | Host line loss              |                                                                                                                                          |
| 42   | Output voltage difference   | Restart the UPS. If the problem still remains, please contact your local dealer.                                                         |
| 46   | Parallel version difference | 1. Update all UPS firmware to the same version.<br>2. After updating, if the problem still remains, please contact your local dealer.    |
| 47   | SYNC line Loss              | 1. Check if communication cables are connected well and restart the UPS.<br>2. If the problem remains, please contact your local dealer. |
| 49   | Parallel setting difference | Check if the parameter setting of all UPSs are the same. If not, please update them with same settings.                                  |

### Disclaimer

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