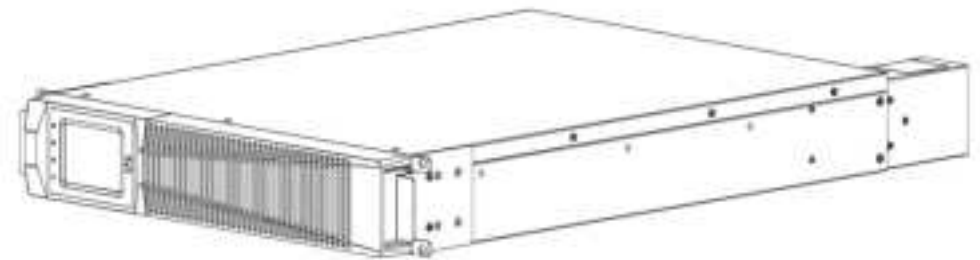




Uninterruptible Power Systems

5-10kVA



Operation Manual

4257-0995 C

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CONTACT

N1 Critical Technologies

www.n1critical.com

service@n1critical.com

sales@n1critical.com

877-226-3311

Publish statement

Thank you for purchasing this N1C LK-Series UPS.

The LK-Series UPS is an intelligent, single phase in/single phase out, high frequency online UPS designed by our experienced R&D team. It features excellent electrical performance, intelligent monitoring, control and network functions, modern design and interface, and compliance with EMC and safety standards. The UPS paired, with its Li-Ion battery, is a state-of-the-art, enterprise-grade component usable just about anywhere critical power protection is needed.

Read this manual carefully before installation

This manual provides technical support to the operator of the equipment.

Contact the nearest hazardous waste disposal station when the products or components are discarded.

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1. Safety

Important safety instructions - Save these instructions

Dangerous voltage and high temperatures exist inside the UPS. During the installation, operation and maintenance, please abide the local safety instructions and relative laws, otherwise it may result in personnel injury or equipment damage. Safety instructions in this manual act as a supplement for local safety regulations. Our company will not assume liability caused by disobeying safety instructions.

1.1 Safety notes

1. Even with no connection with utility power, 208/220/230/240VAC voltage may still exist at UPS terminals!
2. To reduce the risk of hazardous electric shock, please ensure the UPS is properly grounded before turning on the utility breaker.
3. Don't open or damage the battery. Doing so will expose the cell terminals and pose an energy hazard. Chemicals inside the battery are harmful to the skin and eyes and may be toxic.
4. Please avoid short circuit between anode and cathode of the Li-ion battery pack, otherwise, it may spark and cause a fire.
5. Don't open UPS as there is risk of electric shock. Opening the UPS will void the warranty.
6. Check if high voltage exists and that the battery is off before attaching the battery to the UPS.
7. Working environment and storage way will affect the lifetime and reliability of the UPS. Avoid having the UPS working in the following conditions for extended periods of time:
 - ◆ Areas where the humidity and temperature are out of the specified range (temperature 0 to 40°C, relative humidity 5%-95%).
 - ◆ Direct sunlight or location near sources of heat.
 - ◆ High vibration areas.
 - ◆ Areas with explosive or flammable gas, corrosive chemicals, excessive dust, etc.
8. Keep UPS vents and fans in good, clean condition, otherwise the components inside the UPS may become overheated, reducing the life of the UPS and voiding the warranty.

1.2 Symbols used in this guide



WARNING!

Risk of electric shock



CAUTION!

Read this information to avoid equipment damage

2. Main Features

2.1 Summarization

The LK-Series UPS is a single-in/single-out, high frequency, unity power factor, online UPS. The UPS can solve most of the power supply problems, such as blackout, over-voltage, under-voltage, high voltage pulse, voltage fluctuation, surge, inrush current, harmonic distortion (THD), noise interference, frequency variation, etc.

This UPS can be used in many applications where critical power protection and battery backup are vital: computer and network devices, automatic equipment, communication systems, industrial equipment, refrigeration systems, etc.

2.2 Functions and Features

- ◆ Integrated solution for data centers

UPS with its Li-ion battery cabinet and optional PDU external maintenance bypass, offer excellent choices for data center and networking equipment (MDF/IDF, security, etc.)

- ◆ Digital Control

The LK-Series UPS uses a Digital Signal Processor (DSP) to enhance and increase reliability, performance, self-protection, and self-diagnostics.

- ◆ Battery Configurable

Li-ion battery: 192Vdc 12Ah, up to 8 battery packs (EBM) can be connected in parallel.

- ◆ Configurable Charging Current

Via ups menu, the user may set the capacity of the batteries as well as reasonable charging current. Constant voltage mode, constant current mode and floating mode are switched automatically for ease of use and maximum battery reliability.

- ◆ Intelligent Charging Method

The series UPS adopts advanced three-stage charging method—

1st stage: high current constant current charging
to guarantee to charge back to 90%;

2nd-stage: Constant Voltage

In order to vitalize battery and make sure batteries are fully charged

3rd stage: floating mode to maintain battery for long periods between discharges.

With this 3-stage charging method, it extends the life of the batteries and guarantees fast charging.

- ◆ LCD Display

With LCD plus LED displays, the user may easily get UPS status and its operational parameters, such as input/output voltage, frequency & load%, battery % and ambient temperature, etc.

- ◆ Intelligent Monitoring Function

Via optional SNMP Card, you may remotely control and monitor the UPS.

- ◆ EPO Function

Energy saving ECO mode turns off the UPS inverter and runs in "bypass" mode until power is lost.

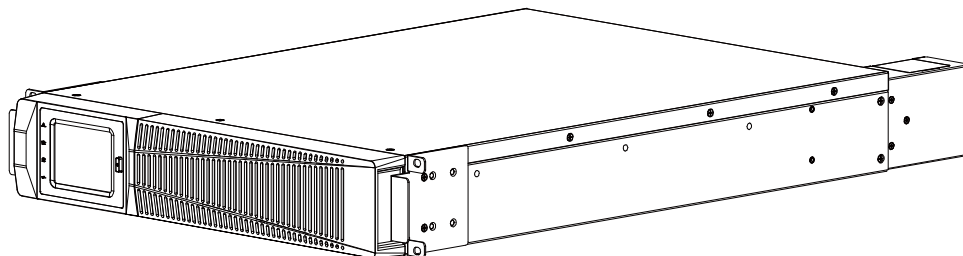
- ◆ Parallel Connection

Connect up to 4x 6kva or 10kva modules together for added power capacity or redundancy.

3. Installation

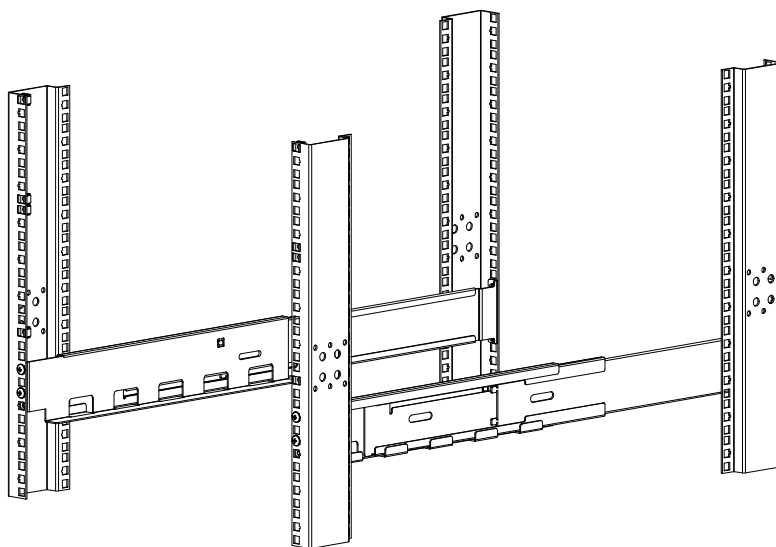
3.1 Rack UPS

3.1.1 Appearance of UPS

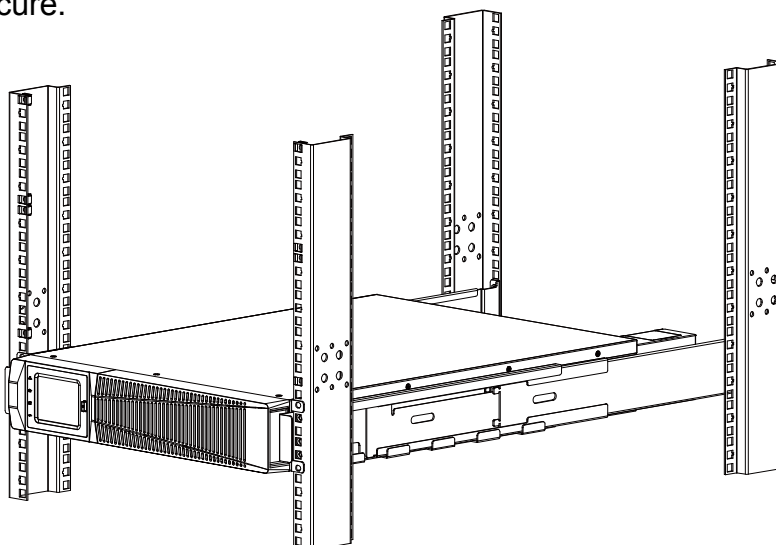


3.1.2 Installation

Fix the rails to the cabinet.



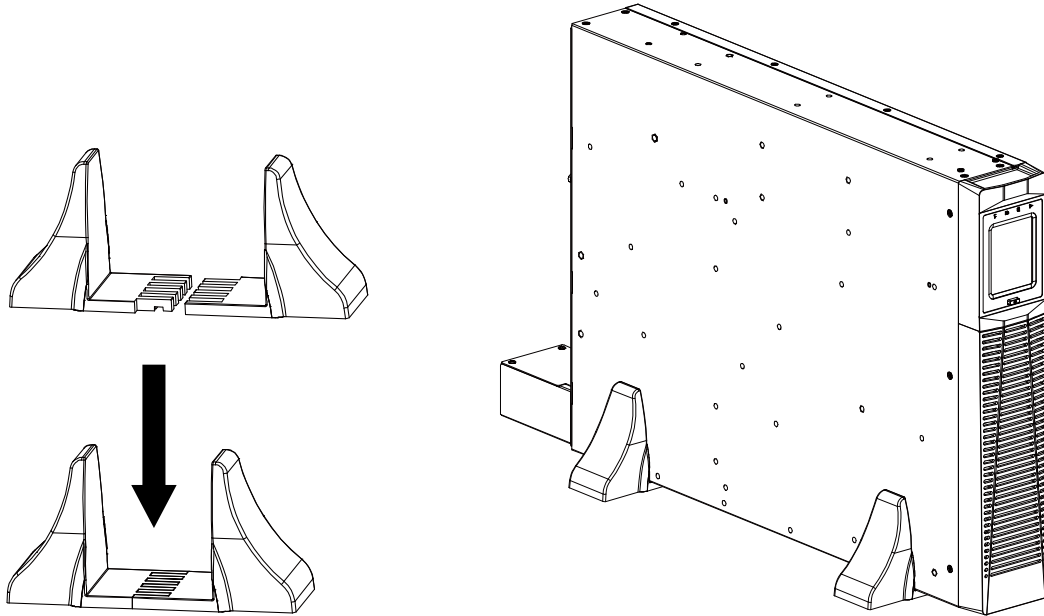
After installing the rails, install the mounting brackets to the front sides of the UPS, then insert the UPS into the cabinet on the rails and fix the screws to the rack posts to secure.



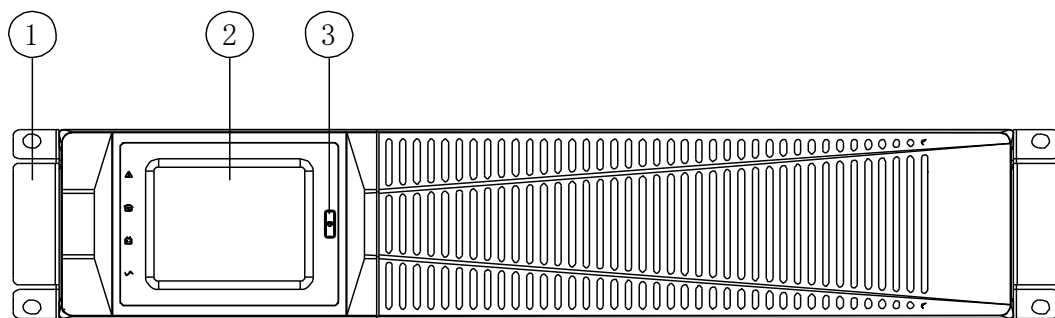
3.2 Tower UPS

3.2.1 Installation

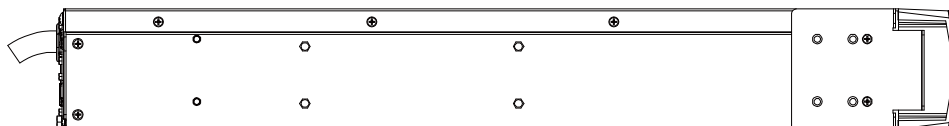
Assemble the bracket, according to the size of the UPS, and then the UPS can be directly placed on the bracket.



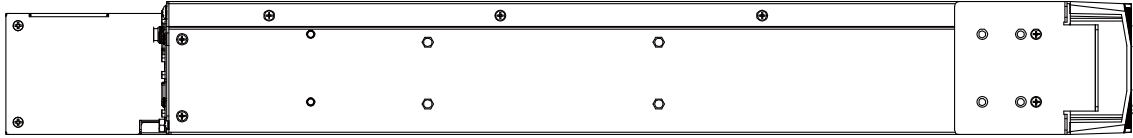
3.3 Cabinet Outlook



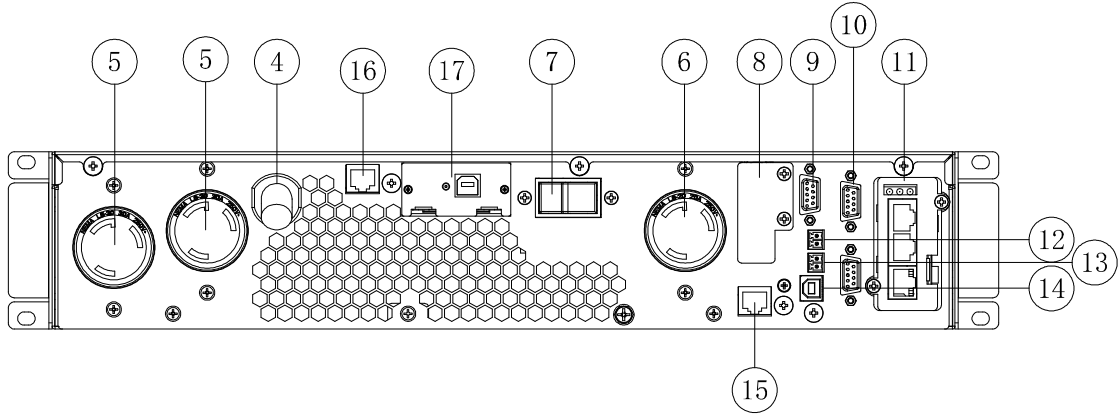
Front View



5kVA Side View

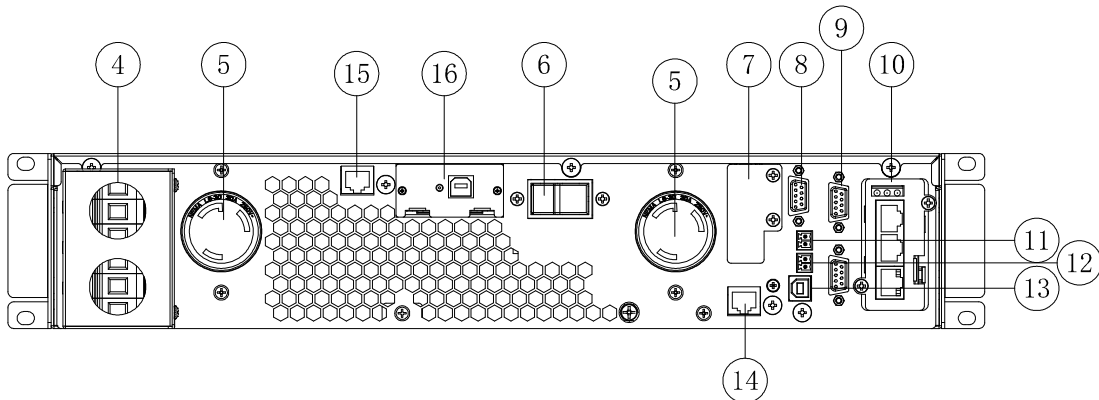


6kVA & 10kVA Side View



5kVA Rear View

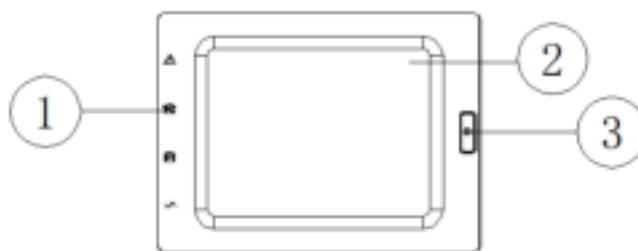
(1) Mounting bracket	(2) LCD
(3) Cold-Start Button	(4) Input Cord
(5) Output1 Socket L6-30	(6) Output2 Socket L6-20
(7) Output2 Breaker	(8) Battery Terminal
(9) RS232 port	(10) Parallel port
(11) Intelligent Slot 1	(12) MAINTAIN-AUXSWS port
(13) EPO port	(14) USB port
(15) RS485 port	(16) COM port
(17) Intelligent Slot 2	



6kVA & 10kVA Rear View

(1) Mounting Bracket	(2) LCD
(3) Cold-Start Button	(4) Input & Output1 Terminal
(5) Output2 Socket L6-30	(6) Output2 Breaker
(7) Battery Terminal	(8) RS232 port
(9) Parallel port	(10) Intelligent Slot 1
(11) MAINTAIN-AUXSWS port	(12) EPO port
(13) USB port	(14) RS485 port
(15) COM port	(16) Intelligent Slot 2

3.4 LCD control panel



LCD control panel introduction

- (1) LED (from top to bottom: “alarm”, “bypass”, “battery”, “inverter”) (2) LCD display
(3) Cold-Start button

3.5 Installation notes

Note: For optimal operation and maintenance, the space in front and back of the cabinet should be left at least 100cm and 80cm, respectively, when installing the cabinet.

- ◆ Please place the UPS in a clean, stable environment, free from vibration, dust, humidity, flammable gas and liquid, corrosive chemicals, etc. To avoid from high room temperature, a system of room ventilation fans are recommended.
- ◆ The environment temperature around UPS should keep in a range of 0°C ~ 40°C. If the environment temperature exceeds 40°C, the rated load capacity should be reduced by 10% per every 4°C. The max temperature cannot be higher than 50°C.
- ◆ If the UPS is assembled in a low temperature, condensation may exist. The UPS cannot be installed unless the internal and external of the equipment is fully dry. Otherwise, there will be a risk of electric shock. Installing in such conditions will void the warranty.
- ◆ Batteries should be mounted in an environment where the temperature is within the required specs. Temperature is a major factor in determining battery life and capacity. In a normal installation, the battery temperature is maintained between 15°C and 25°C. Keep batteries away from heat sources. Do not use the battery in temperatures higher than 50°C.



WARNING!

Maximum battery performance data is achieved between 20°C and 25°C. Operating it above this range may reduce the battery life while operation below this range will reduce the battery capacity.

◆ Should the equipment not be installed immediately it must be stored in a room so as to protect it against excessive humidity and or heat sources.



CAUTION!

An unused battery must be recharged every 6 months. Temporarily connecting the UPS to a suitable AC supply and activating it for the time required for recharging the batteries.

◆ The highest altitude that UPS may work normally with full load is 1000 meters. The load capacity should be reduced when this UPS is installed in place whose altitude is higher than 1000 meters, shown as the following table:

(Load coefficient equals max load in high altitude place divided by nominal power of the UPS)

Altitude (m)	1000	2000	2500	3000
Load coefficient	100%	90%	85%	80%

◆ The UPS cooling depends on the internal fans, Keep the UPS in a well ventilated area and keep the fans and vents free of dust, dirt and debris. Excessive dust/dirt/debris on the UPS may cause it to overheat and it may void the warranty.

3.6 External Protective Devices

The UPS must connect to an external circuit breaker at the input A.C. supply and the battery. This chapter provides guidelines for qualified installers that must have the knowledge of local wiring practices for the equipment to be installed.

◆ External Battery

The UPS and its associated batteries are protected against the effect of over-current through a DC compatible thermo-magnetic circuit-breaker (or a set of fuses) located close to the battery.

◆ UPS Output

Any external distribution board used for load distribution shall be fitted with protective circuit breaker devices that may avoid the risk of UPS overloaded.

◆ Over-current

Circuit breakers shall be installed at the distribution panel of the incoming main supply. It may identify the power cables current capacity as well as the overload capacity of the system.

3.7 Power Cables

The cable design shall comply with the voltages and currents provided in this section. Follow local building wiring codes and take into consideration the environmental conditions (temperature and physical support media) when installing.



WARNING!

Upon starting. Please ensure that you are aware of the location and operation of the external isolators which are connected to the UPS input supply of the mains distribution panel. Check to see if these supplies are electrically isolated. And post and necessary warning signs to prevent any inadvertent operation.

3.7.1 Recommended cross-sectional areas for power cables

UPS cabinet	Cable Dimension			
	AC Input (AWG)	AC Output (AWG)	DC Input (AWG)	Grounding (AWG)
5/6kVA	10	10	10	10
10kVA	8	8	8	8

- ◆ When selecting, connecting, and routing power cables, follow local safety regulations and rules.
- ◆ If external conditions such as cable layout or ambient temperatures change, perform verification in accordance with the local regulations.
- ◆ The nominal battery discharge current refers to the current of twenty 12 V batteries at 240V in standard configuration.
- ◆ The battery cable specifications are selected based on 16 batteries by default and compatible with application scenarios with 16–20 batteries.

3.7.2 Power cable connector requirements

Model	Connector	Connection Mode	Bolt Type	Bolt Hole Diameter	Torque
5/6/10kVA	Input connector	Crimped IT terminals	M4	4.5mm	3N•m
	Output connector	Crimped IT terminals	M4	4.5mm	3N•m
	Grounding connector	Crimped IT terminals	M4	4.5mm	3N•m

3.7.3 Recommended input front-end and output back-end circuit breakers

Model	Input circuit breaker	Maintenance circuit breaker	Output circuit breaker	Battery circuit breaker
5kVA	30A 2P	30A 2P	30A 2P	40A 2P
6kVA	50A 2P	50A 2P	50A 2P	50A 2P
10kVA	65A 2P	65A 2P	65A 2P	65A 2P



CAUTION!

Protective ground cable: Connect each cabinet to the main facility ground point. For Grounding connection, follow the shortest route possible.



WARNING!

Failure to follow adequate grounding procedures may result in electromagnetic interference or in hazards involving electric shock and fire.

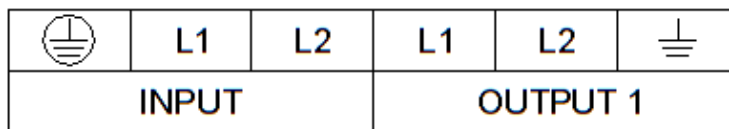
3.8 Power cable connect


Once the equipment has been finally positioned and secured, connect the power cables as described using the following procedure.

Verify the UPS is totally isolated from its external power source and also all circuit breakers on the bypass PDU device (if used) are open. Check to see if they are electrically isolated, and post any necessary warning signs to prevent their inadvertent operation.

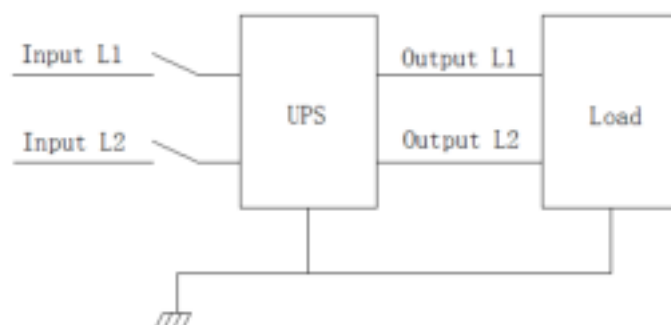
The 5kVA model has a molded input power cable with L6-30P input. Plug into L6-30R outlet. For 6kVA & 10kVA, open the UPS rear panel. Remove the wire terminal cover for access to terminal screws.

3.8.1 Input connection



INPUT-L1: Primary input Phase L1	INPUT -L2: Primary input Phase L2
OUTPUT1-L1: Output Phase L1	OUTPUT1-L2: Output Phase L2
 : Grounding	BAT+: Positive terminal of the batteries string
BAT-: Negative terminal of the batteries string	

Choose appropriate A.C. power cable (refer to the table above) and connect to the UPS input terminals (Black to L1, Red/White to L2, Green to Ground). Ensure cables are tight and there is no short circuit or loose/frayed wires strands between terminals causing a short circuit. Tighten the cable gland and replace terminal block cover.



WARNING!

If the load equipment is not ready to accept power on the arrival of the commissioning engineer then ensure that the system output cables are safely isolated at their ends.

Connect the safety ground and any necessary bonding cables to the facility ground. All UPS, battery and PDU cabinets must be grounded.



CAUTION!

The grounding and any neutral bonding must be in accordance with local and national electrical codes.

3.9 Battery connection

3.9.1 Li-ion battery pack connection

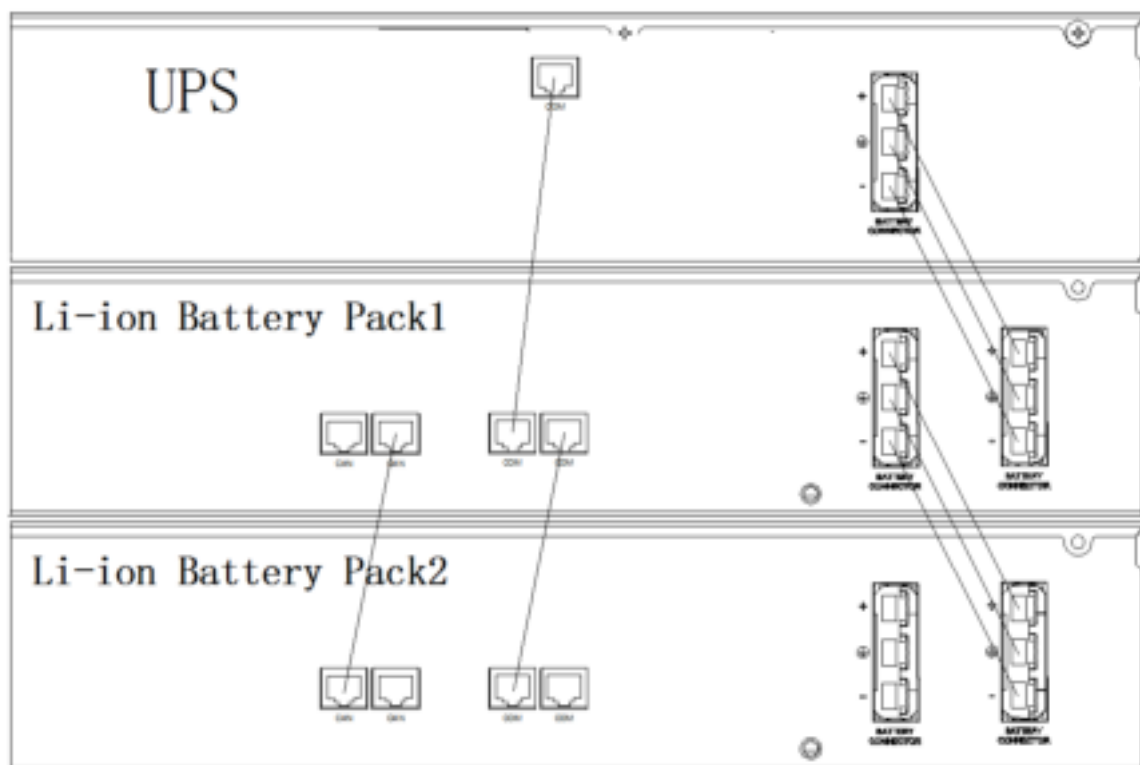


Image shows optional second battery. Minimum one battery is required per UPS.

Note:

The BAT+ of the UPS battery connector is connected to the BAT+ of the Li-ion battery pack connector. The BAT- of the UPS battery connector is connected to the BAT- of the Li-ion battery pack connector. And the Ground of the UPS battery connector is connected to Ground of the Li-ion battery pack connector.

Use RJ45 communication cable connect the COM port of the UPS to the COM port of the Li-ion battery pack. Use RJ45 communication cable connect the CAN port of the Li-ion battery pack to the CAN port of another Li-ion battery pack if 1+ battery are used. Do not connect the CAN port on the battery to the UPS. Refer to battery manual for additional battery setup and connection information.



WARNING!

Only the LK-Series battery specifically designed for this LK-Series UPS can be used. Do not use with a UPS from other brands.

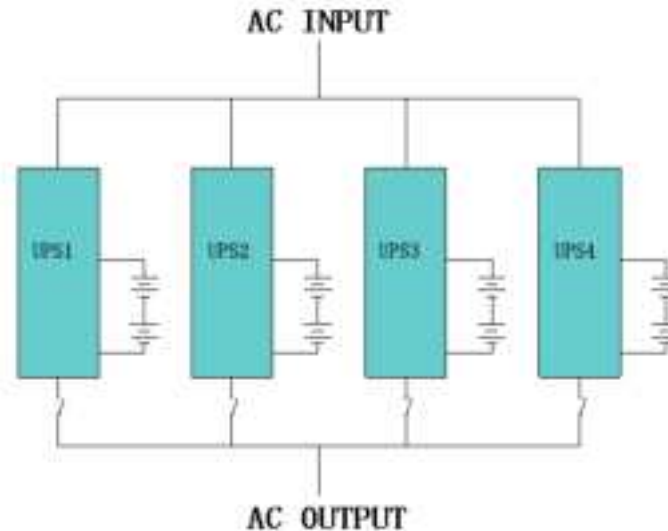
Doing so will void the warranty. When using multiple battery packs in parallel, ensure that their positive and negative terminals of connectors are connected correctly. Use only the included battery connection cable for this series of Li-ion battery pack.

3.10 UPS parallel Installation

The following sections introduce the installation procedures for more than one UPS system connected in parallel.

3.10.1 Cabinet installation

Connect all the UPS needed to be put into parallel system as below picture.



Make sure each UPS input breaker is in “off” position and there is no any output from each UPS connected.

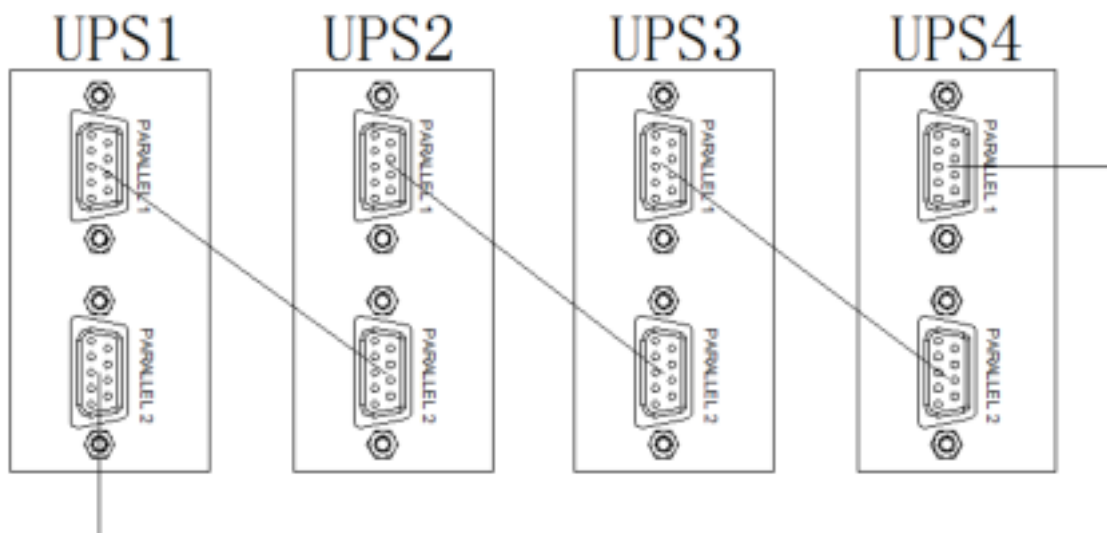


WARNING!

Make sure the L1, L2 lines are correct (in phase), and grounding is well connected. Each battery groups of UPS only be connected separately.

3.10.2 Parallel cable installation

Shielded and double insulated control cables must be interconnected in a ring configuration between UPS units as shown below. The ring configuration ensures proper communication between the head UPS unit and the supplementing UPS units.



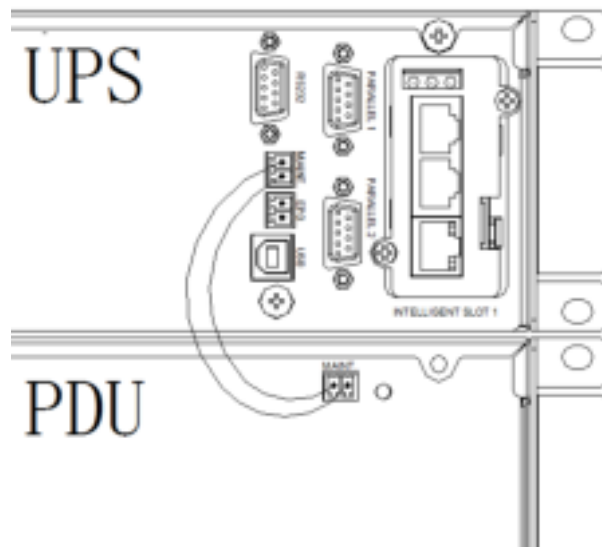
3.10.3 Requirement for the parallel system

A group of paralleled UPS behaves as one large UPS system but with the advantage of presenting higher reliability. In order to assure that all UPS are equally utilized and comply with relevant wiring rules, please follow the requirements below:

- 1) All UPS must be of the same rating and be connected to the same bypass source.
- 2) The outputs of all the UPS must be connected to a common output bus.
- 3) The length and specification of power cables including the bypass input cables and the UPS output cables should be the same. This facilitates proper load sharing when operating in bypass mode.

3.11 Maintenance breaker auxiliary signal cable connection

- ◆ Connect the auxiliary contact interface of the bypass PDU and the dry contact interface of the UPS output dry port. The dry contact of the UPS is normally closed logic and can be enabled when the PDU maintenance bypass switch cover is opened, automatically switching the UPS to static bypass mode.
- ◆ The UPS must be in static bypass mode whenever the maintenance breaker on the bypass PDU is switched. The UPS will be damaged (and warranty voided) if the maintenance breaker is activated with the UPS in online mode.



3.12 Computer access

- ◆ Download and install Netility from the N1Critical.com website to scan your local area network (LAN) for connected UPS SNMP network cards.
- ◆ Ensure the UPS network card is connected to the same network as the PC using the Netility software. Run the software scanning tool to list connected UPS and adjust network settings (IP is set via DHCP by default).
- ◆ Highlight the desired UPS from the list and press the "Launch Web User Interface" to open the GUI page in the PC's default browser program.
- ◆ Configure the UPS settings in the GUI as desired. Refer to NetAgent manual in software downloads for additional information.



◆ Above: Image of Netility network scanning tool used to find and configure UPS IP address settings.



◆ Above: Image of NetAgent graphical user interface (GUI) available via default web browser by navigating to the IP address of the UPS's SNMP network card.

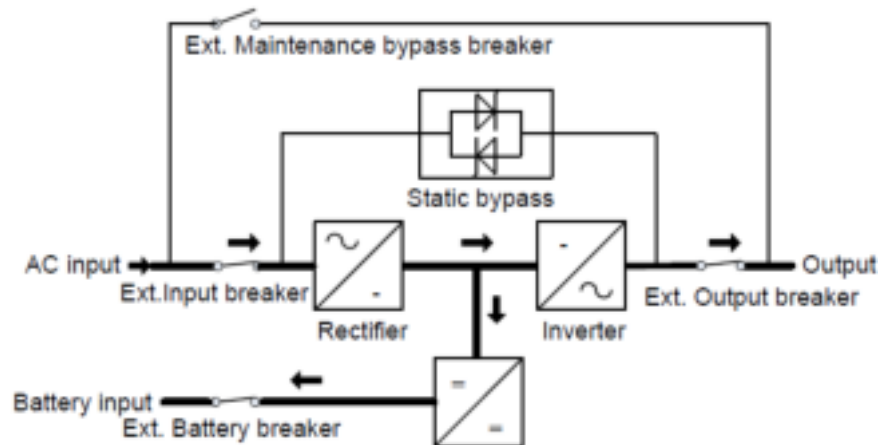
4. Operation

4.1 Operation Modes

The UPS is a double-conversion on-line UPS that may operate in the following alternative modes:

◆Normal mode

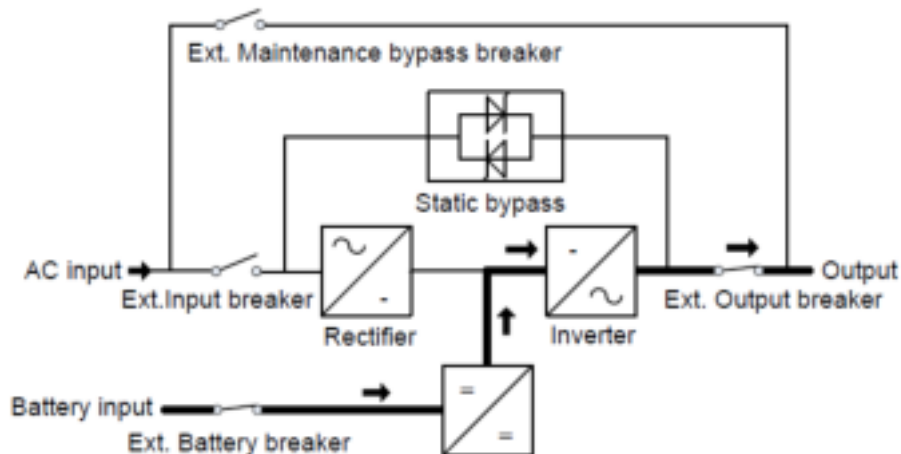
The rectifier/charger derives power from the AC Mains and supplies DC power to the inverter while floating and boosting charge the battery simultaneously. Then, the inverter converts the DC power to AC and supplies to the load.



Single input

◆Battery mode (Stored Energy Mode)

If the AC mains input power fails, the inverter, which obtains power from the battery, supplies the critical AC load. There is no power interruption to the critical load. The UPS will automatically return to Normal Mode when AC recovers.

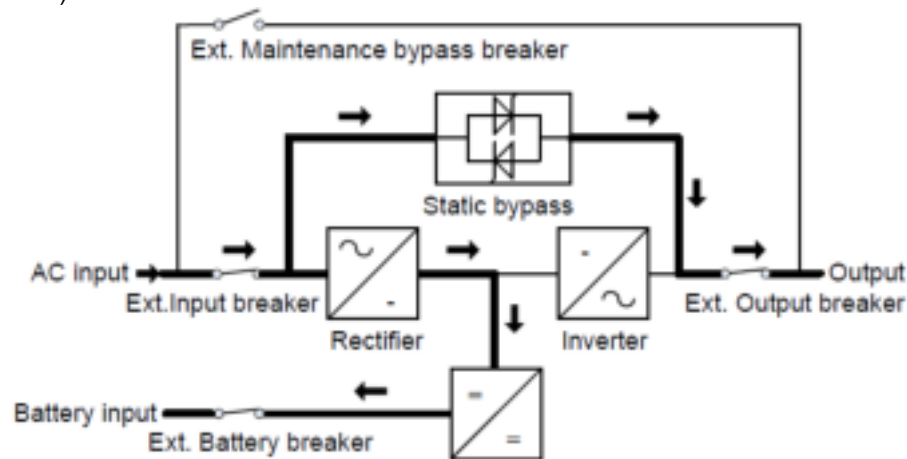


Single input

◆Bypass mode

If the inverter is out of order, or if overload occurs, the static transfer switch will be activated to transfer the load from the inverter supply to bypass supply without interruption to the critical load. In the event that the inverter output is not synchronized with the bypass AC source, the static switch will perform a transfer of the load from the inverter to the bypass with power interruption to the

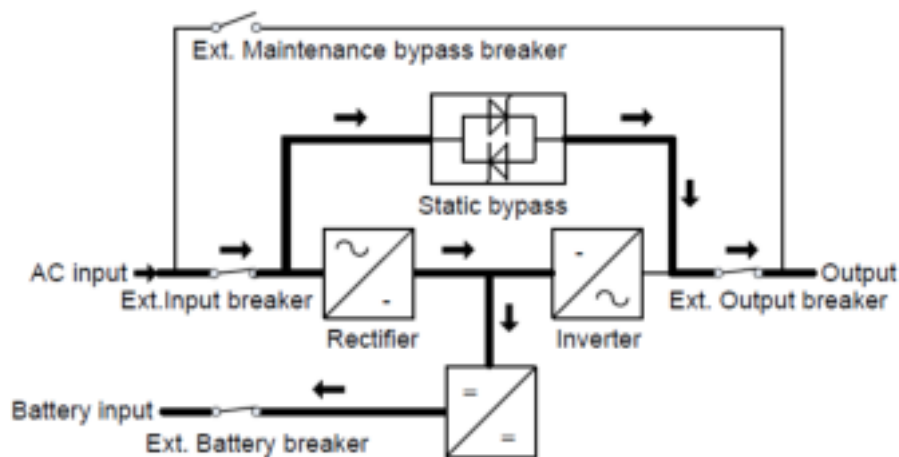
critical AC load. This is to avoid paralleling of unsynchronized AC sources. This interruption is programmable but typically set to be less than an electrical cycle e.g. less than 15ms (50Hz) or less than 13.33ms (60Hz).



Single input

◆ECO Mode

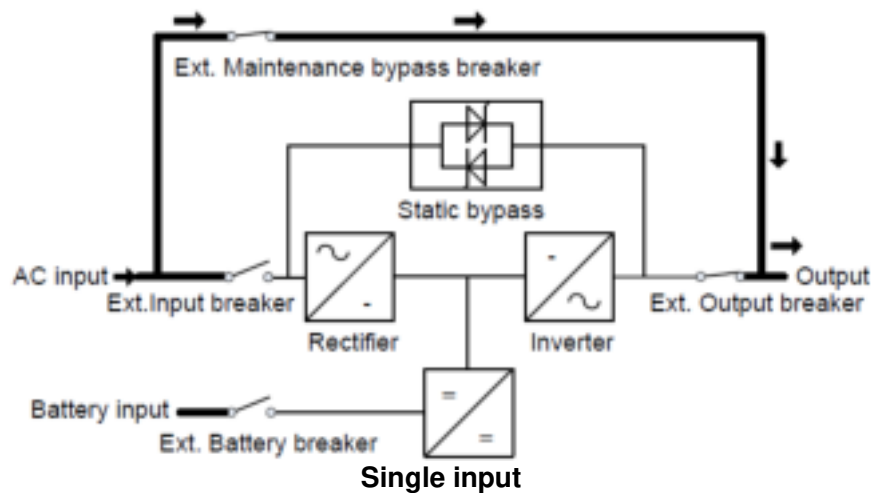
When the UPS is at AC Mode and the requirement to the load is not critical, the UPS can be set at ECO mode in order to increase the efficiency of the power supplied. At ECO mode, the UPS works at Line-interactive mode, so the UPS will transfer to bypass supply. When the AC is out of set window, the UPS will transfer from bypass to Inverter and supplies power from the battery, and then the LCD shows all related information on the screen.



Single input

◆Maintenance mode (Manual Bypass)

A manual bypass switch is available to ensure continuity of supply to the critical load when the UPS is out of order or in repair and this manual bypass switch bears for equivalent rated load.



4.2 Turn on/off UPS

4.2.1 Restart procedure



CAUTION!

MAKE SURE GROUNDING IS PROPERLY DONE!

- ◆ Set the Battery Breaker to the “ON” position according to the user’s manual.

CAUTION!



Check to see if the load is safely connected with the output of the UPS. If the load is not ready to receive power from the UPS, make sure that it is safely isolated from the UPS output terminals

- ◆ Turn ON OUTPUT breaker of the PDU.
- ◆ Turn ON INPUT breaker of the PDU.

If the Rectifier input is within voltage range, the rectifier will start up in 30 seconds then the inverter will start up after then.

If the rectifier fails at startup, the bypass LED will light up. When the inverter starts up, the UPS will transfer from bypass mode to inverter mode, then the bypass LED extinguishes and the inverter LED lights up.

No matter whether the UPS can work normally or not, all the status will be shown on the LCD display.

4.2.2 Test procedure



CAUTION!

The UPS is operating normally. It may take 60 seconds to boost up the system and perform self-test completely.

- ◆ Switch OFF INPUT breaker of the PDU to simulate utility failure, the rectifier will turn off and the battery should feed the inverter without interruption. At this time, the LEDs of battery should be turned on.
- ◆ Turn ON INPUT breaker of the PDU to simulate utility recovery, the rectifier will restart

automatically after 20 seconds and the inverter will supply to the load. It is suggested to use Dummy loads for testing. The UPS can be loaded up to its maximum capacity during load test.

4.2.3 MAINTENANCE BYPASS

To supply the load via Mains, you may simply active the internal mechanical bypass switch.



CAUTION!

The load is not protected by the UPS when the internal mechanical bypass system is active and the power is not conditioned.

Switch to mechanical bypass



CAUTION!

If the UPS is running normally and can be controlled through the display, carry out steps 1 to 6; otherwise, jump to Step 5.

- ◆ Open the cover of MAINTENANCE breaker of the PDU, the UPS turns to bypass mode automatically.
- ◆ Turn ON MAINTENANCE breaker of the PDU;
- ◆ Switch OFF BATTERY breaker;
- ◆ Switch OFF INPUT breaker of the PDU;
- ◆ Switch OFF OUTPUT breaker of the PDU;

At this time the input source will supply to the load through the MAINTENANCE breaker.

Switch to normal operation (from mechanical bypass)



CAUTION!

Never attempt to switch the UPS back to normal operation until you have verified that there are no internal UPS faults.

- ◆ Turn ON OUTPUT breaker of the PDU.
- ◆ Turn ON INPUT breaker of the PDU.
- ◆ Turn ON BATTERY breaker.

The UPS powers from the static bypass instead of the maintenance bypass, then the bypass LED will light up.

- ◆ Switch OFF the MAINTENANCE breaker of the PDU, then the output is supplied by the static bypass of the UPS.
- ◆ Put on the cover of MAINTENANCE breaker of the PDU.

The rectifier will operate normally after 30 seconds. If the inverter works normally, the system will be transferred from bypass mode to normal mode.

4.2.5 Shut down procedure

CAUTION!



This procedure should be followed to completely shut down the UPS and the LOAD. After all power switches, isolators and circuit breakers are opened, there will be no output.

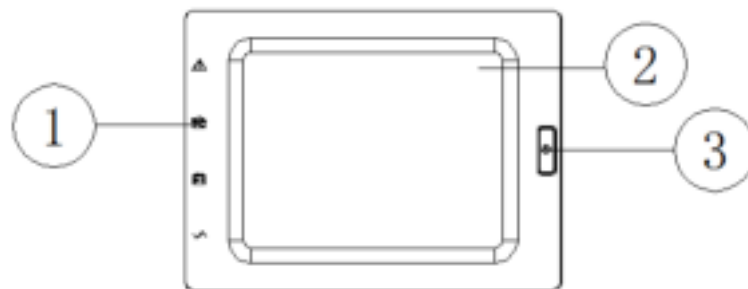
- ◆ Switch OFF the BATTERY breaker;
- ◆ Switch OFF the INPUT breaker of the PDU.
- ◆ Switch OFF the OUTPUT breaker of the PDU. The UPS shuts down;
- ◆ To completely isolate the UPS from AC input, all input switches of Utility shall be completely off, which includes the ones for rectifier and bypass.
- ◆ The primary input distribution panel, which is often located far away from the UPS area, so a label should be posted to advise service personnel that the UPS circuit is under maintenance.

WARNING!



Wait for about 5 minutes for the internal D.C. bus bar capacitors to be completely discharged.

4.3 The LCD Display



Overview of the operating panel of the UPS

- (1) LED (from top to bottom: “alarm”, “bypass”, “battery”, “inverter”)
- (2) LCD display
- (3) Cold start button

LED indicator light

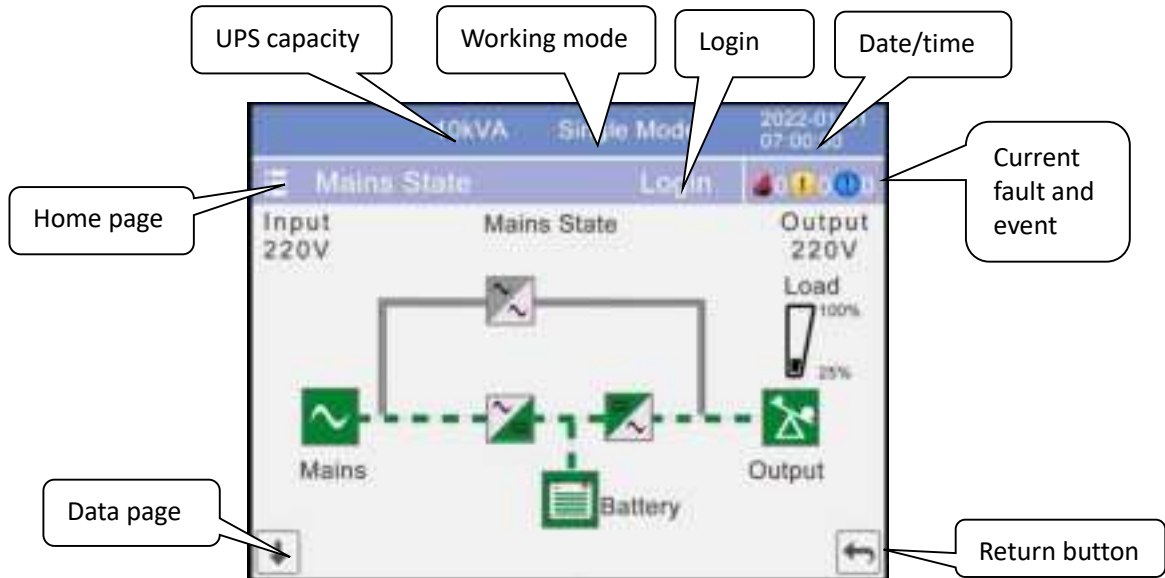
Button	Function
	Yellow: UPS alarm information Red: UPS fault information
	Blue:UPS in bypass mode
	Yellow:UPS in battery mode
	Green:UPS works normally
Attention:These lights will display different indications in different operating modes.	

Introduction

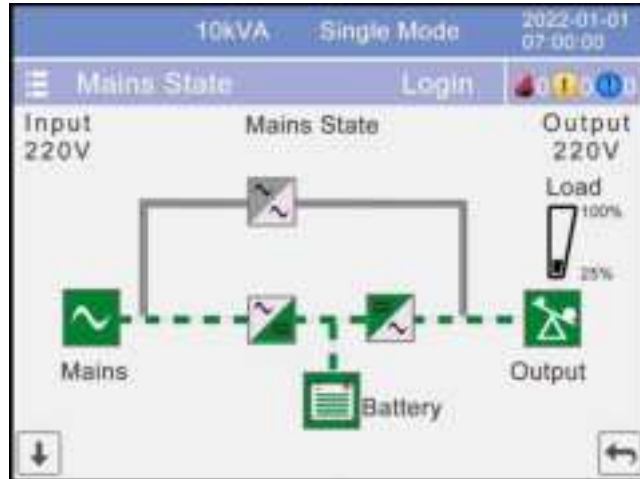


CAUTION!

The display provides more functions than those described in this manual.



4.3.1 Datas: Displays the flow state of UPS work, and quickly enters real-time data by clicking on the block.



4.3.2 Status: View the voltage and current of the main, output, battery (can also be entered through by real-time data block), Temperature, BUS Voltage, through clicking on the block, enter the corresponding data window.



4.3.2.1 Input: Click the Input block to enter the Input data display window, click return to return to the previous window, click home page to return to the main page.



4.3.2.2 Output: Click the output block to enter the output data display window, click return to return to the previous window, click home page to return to the main page.





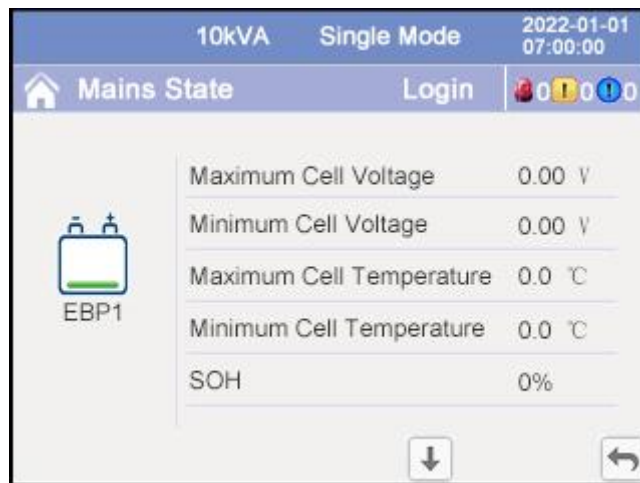
4.3.2.3 Battery: Click the battery block to enter the battery data display window, click return to return to the previous window, click home page to return to the main page.



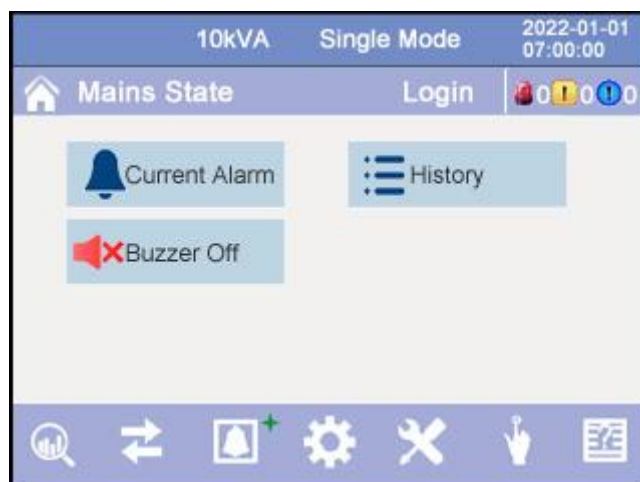
4.3.2.4 Status: Click the status block to enter the status data display window, click return to return to the previous window, click home page to return to the main page.



4.3.2.5 BMS: Click the status block to enter the BMS data display window, click return to return to the previous window, click home page to return to the main page. Data content including EBP 1 to EBP8.



4.3.3 Alarm: View the alarm and history of the UPS, and open or close the buzzer.



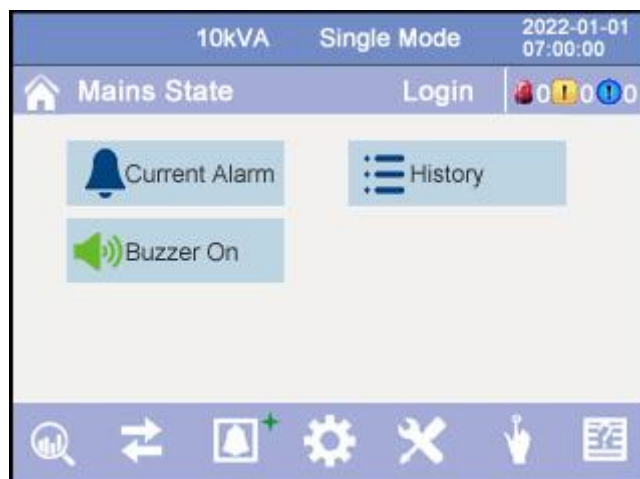
4.3.3.1 Current Alarm: Click the current alarm to enter the current alarm display window, click return to return to the previous window, click home page to return to the main page.

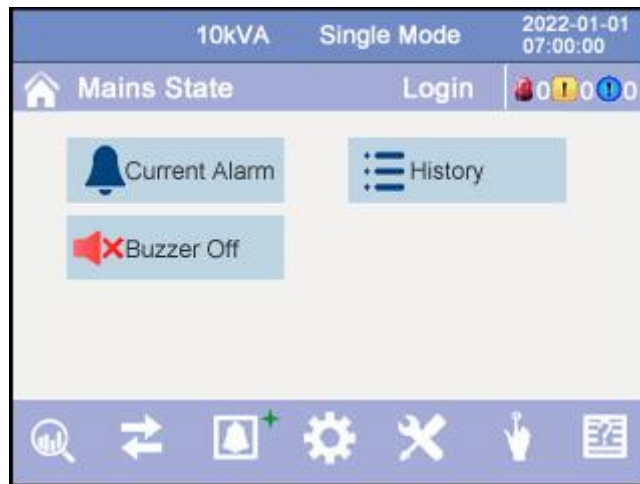


4.3.3.2 History: Click the history to enter the history recode display window, click return to return to the previous window, click home page to return to the main page.

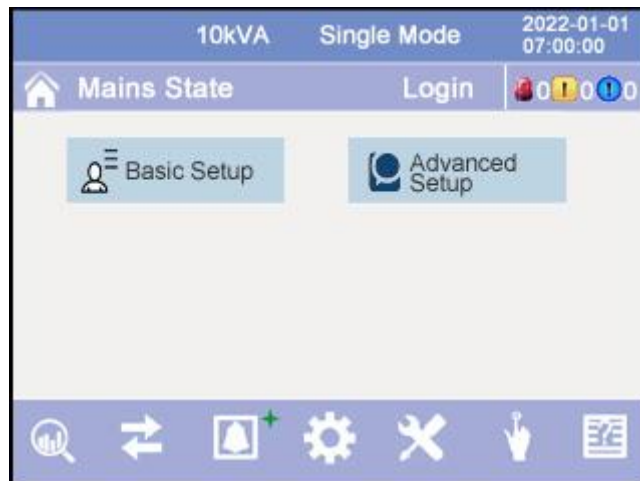


4.3.3.3 Buzzer: Click the buzzer mute then the buzzer will mute and the block will change to red. If the buzzer need on, then click the block buzzer will on and the block will change to green. click return to return to the previous window, click home page to return to the main page.

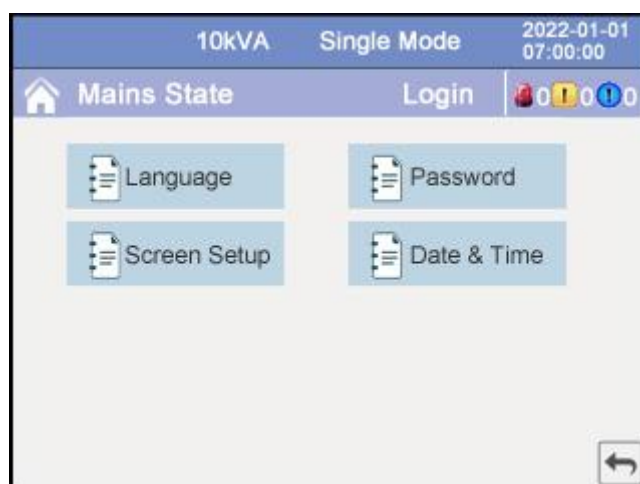




4.3.4 Setting: There are two levels, the basic setting for user settings, advanced setting for technical personnel, please contact the relevant technical personnel to enter advanced settings.



4.3.4.1 Basic Setting: Click basic setting, you can set the language, brightness, screen orientation, password, date and time.



4.3.4.1.1 Language: Click the language block which you want and click the save config block to save. click return to return to the previous window, click home page to return to the main page.



4.3.4.1.2 Password: Click password block enter user password setting page, input old password and new password, then click save confirm to save the change. Password format is six numbers. click return to return to the previous window, click home page to return to the main page.

Password lock time: When LCD is not touched, it needs to re login when the setting value is set, click left or right block to change the value.



4.3.4.1.3 Screen Setup: Click the block to change value. click return to return to the previous window, click home page to return to the main page.

Brightness: Click the text to input new value and click the save config block to save. Value range is 10~63, default value is 63. Click return to return to the previous window, click home page to return to the main page.

Backlight time: LCD backlight delay time, click the text to input new value and click save config block to save. Value range is 1~255, default value is 255. Click return to return to the previous window, click home page to return to the main page.

Screen Orientation: LCD screen orientation, click left or right block to change the screen orientation to horizontal and vertical, and click save. Click return to return to the previous window, click home page to return to the main page.



4.3.4.1.4 Date &Time: Click the text to select other value or input new value and click save config block to save. Click return to return to the previous window, click home page to return to the main page.

Date: current date

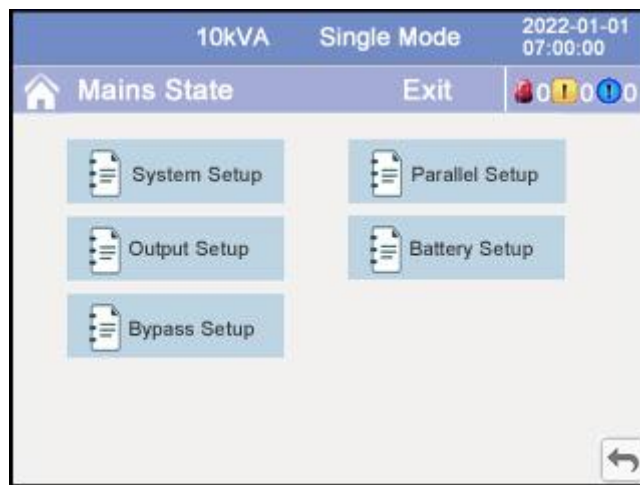
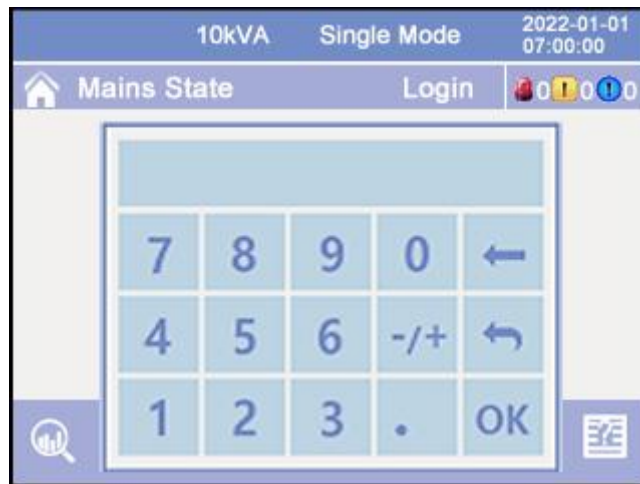
Time: current time



4.3.4.2 Advanced Setting: Click advanced setting, enter by input the correct password. The user password is "123456".

Note: This operation is recommended to be operated by professionals, or under the guidance of professionals.





4.3.4.2.1 System setting: Click the text to select other value or input new value and click save config block to save. Click return to return to the previous window, click home page to return to the main page.

Working Mode: Select the work mode of UPS, work mode: Normal mode, ECO mode, CF mode, GEN mode



System Configuration: Select the configuration of system, system configuration: Single mode, Parallel mode.

4.3.4.2.2 Output setting

Output Frequency: Output frequency, The value can be 50Hz or 60Hz.

Output Voltage Level: Output voltage level, The value can be 208,220,230,and 240.

Inverter Voltage Adjust: Inverter Voltage Adjust, The value can be -5 to 5, 0.5 value apart.

A screenshot of a control panel interface. At the top, it shows '10kVA', 'Single Mode', and the date/time '2022-01-01 07:00:00'. Below this is a header bar with a home icon, 'Mains State', 'Exit', and a status indicator '0000'. The main area contains three settings: 'Output Frequency (Hz)' with a value of 50, 'Output Voltage Level (V)' with a value of 220, and 'Inverter Voltage Adjust (%)' with a value of 0.0. Each setting has left and right arrow buttons for adjustment. At the bottom, there is a 'Save Config' button and a back arrow.

4.3.4.2.3 Battery setting

Battery Type: The UPS supports VRLA and Li-ion batteries, default value is Li-ion.



CAUTION!

It is necessary to start the UPS to activate the lithium battery. Because the Li-ion battery pack do not support cold start.

Battery Group: Must modify the number to actual configuration, The value can be 1~8, default value is 1.

No Battery Warning: can be no warning when no batter after set disable, and is enable by default.

A screenshot of a control panel interface. At the top, it shows '10kVA', 'Single Mode', and the date/time '2022-01-01 07:00:00'. Below this is a header bar with a home icon, 'Mains State', 'Exit', and a status indicator '0000'. The main area contains three settings: 'Battery Type' with a value of 'Li-ion', 'Battery Group' with a value of '1', and 'No Battery Warning' with a value of 'Disable'. Each setting has left and right arrow buttons for adjustment. At the bottom, there is a 'Save Config' button, a downward arrow, and a back arrow.

OUTPUT2 EOD (SOC): The battery SOC of OUTPUT2 socket EOD can be 0%/25%/50%, and is 0% by default.



4.3.4.2.4 Bypass settings

Bypass Volt Prot Lower Limit: When the difference between the bypass voltage and the rated voltage exceeds the lower threshold for the bypass voltage, the system determines that the bypass voltage is abnormal and that the bypass is unavailable. The value can be -10%,-20%,-30%,-45%.

Bypass Volt Prot Upper Limit: When the difference between the bypass voltage and the rated voltage exceeds the upper threshold for the bypass voltage, the system determines that the bypass voltage is abnormal and that the bypass is unavailable. The value can be 10%,15%,20%,25%.

Bypass Freq Tracking Rate: When the difference between the bypass input frequency and the rated frequency is greater than this value, the system determines that the bypass frequency is not normal, and that the bypass is unavailable. The value range is $\pm 1\%$, $\pm 2\%$, $\pm 4\%$, $\pm 5\%$, $\pm 10\%$ (default).



4.3.4.2.5 Parallel settings

Parallel ID:Set the host and slave,the value can be 1~4.

Parallel Basic Units:Set up several UPS parallel, the value can be 2~4.

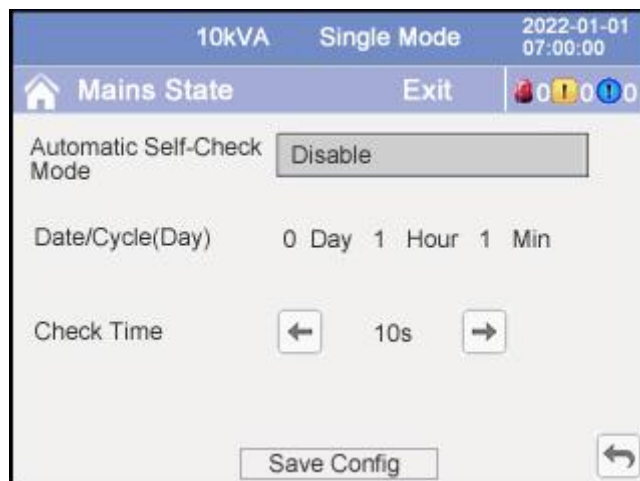
Parallel Redund Units:Set to reduce the total load, the value can be 0~3.



4.3.5 Maint: Screen Touch Correction and Battery Cycle Self-Check.



4.3.5.1 Battery Cycle Self-Check: can select check by Disable, Monthly, Weekly and Interval. The default value is Disable.



4.3.6 Common: INV ON/OFF, Output Socket Control, Battery test.



4.3.6.1 INV ON/OFF

OFF: Turn off the UPS inverter

ON: Turn on the UPS inverter



4.3.6.2 Output Socket Control

OUTPUT2: Control OUTPUT2 socket on or off.



4.3.6.3 Battery Test

Start Manual Self-Check: Start battery self-check immediately

Stop Manual Self-Check: Stop battery self-check immediately



4.3.7 About: check the software version

4.3.7.1 LCD Monitor and Control Firmware Version



4.3.7.2 BMS Firmware Version



4.4 Parallel parameters setting

Parallel system should be commissioning when the stand-alone are all intact.

Take 4 units in parallel for example.

- 1) Confirm the input/output wires connection and input phase sequence are correct; switch off the battery breaker of each UPS, and measure the battery voltage of all battery group are normal.
- 2) Connect the parallel cable, it should be formed loop connection.
- 3) Switch on the input breaker of unit 1, and access LCD setting interface to setting the System Configuration, Parallel ID, Parallel Basic Units, Parallel Redundant Units. The setting interface is showed as below, require setting the in series number and capacity of battery. The output voltage level and Bypass protection range are default setting.



- 4) Turn off the input breaker of Unit 1, and make sure the UPS is off. Turn on the input breaker of Unit 2, access the LCD setting interface, setting the parallel working mode, ID (NO.2), parallel 4 units, redundant number. The other setting are the same as UPS 1 operation.



- 5) For Unit 3 and Unit 4 UPS, the operation setting are all the same as Unit 1 and 2.
- 6) Turn on Input/output breaker of all the paralleled UPS, then confirm all the setting are correct. Each UPS has their owed different ID.

- 7) There are only one master in parallel system .The UPS has the smallest ID or the first to inverter is the master. You can turn on all the UPS after confirm all the setting are correct.



- 8) Turn on all the battery breaker and confirm the parameter (V/I) are normal.
 9) Connected the Load, and check whether the output current are balance.

Switch on and off the utility breaker to test all the UPS converters system from Utility to battery and restored function are working find.

4.5 Display Messages/Troubleshooting

This section lists the event and alarm messages that the UPS might display. The messages are listed in alphabetical order. This section is listed with each alarm message to help you troubleshoot problems.

Display messages

Operational Status and Mode(s)

No.	Information stand for	LED			
		Fault	Bypass	Battery	Inverter
1	Initialized	EXTINGUISH	EXTINGUISH	EXTINGUISH	EXTINGUISH
2	Standby Mode	EXTINGUISH	EXTINGUISH	X	EXTINGUISH
3	No Output	EXTINGUISH	EXTINGUISH	X	EXTINGUISH
4	Bypass Mode	EXTINGUISH	LIGHT	X	EXTINGUISH
5	Utility Mode	EXTINGUISH	EXTINGUISH	X	LIGHT
6	Battery Mode	EXTINGUISH	EXTINGUISH	LIGHT	EXTINGUISH
7	Battery Self-diagnostics	EXTINGUISH	EXTINGUISH	LIGHT	EXTINGUISH
8	Inverter is starting up	EXTINGUISH	X	X	EXTINGUISH
9	ECO Mode	EXTINGUISH	X	X	X
10	EPO Mode	LIGHT	EXTINGUISH	X	EXTINGUISH
11	Maintenance Bypass Mode	EXTINGUISH	EXTINGUISH	EXTINGUISH	EXTINGUISH
12	Fault Mode	LIGHT	X	X	X

CAUTION: "X" means it is determined by other conditions

Fault Information

No	Fault Cord	UPS Alarm Warning	Buzzer	LED
1	002	Radiator Over Temperature	Twice per second	Fault LED lit
2	004	REC Over Current	Beep continuously	Fault LED lit
3	005	REC Power Fault	Beep continuously	Fault LED lit
4	00E	Fan Fault	Beep continuously	Fault LED lit
5	013	Soft Start Failed	Beep continuously	Fault LED lit
6	014	BAT Charger Fault	Beep continuously	Fault LED lit
7	016	REC Comm. Fault	Once per 2 seconds	Fault LED blinking
8	019	REC Initializes Fault	Beep continuously	Fault LED lit
9	01E	Rectifier Fault	Beep continuously	Fault LED lit
10	041	Inverter Fault	Beep continuously	Fault LED lit
11	044	INV IGBT SHORT	Beep continuously	Fault LED lit
12	047	Inverter relay Short	Beep continuously	Fault LED lit
13	04A	Inverter relay Broken	Beep continuously	Fault LED lit
14	04D	INV par. cable comm Fault	Twice per second	Fault LED lit
15	051	Output Short Circuit	Once per second	Fault LED blinking
16	054	INV Comm. Fault	Once per 2 seconds	Fault LED blinking
17	057	INV Initializes Fault	Beep continuously	Fault LED lit
18	05A	INV self-test Fault	Beep continuously	Fault LED lit
19	05E	DC Component Fault	Once per 2 seconds	Fault LED lit
20	061	DC bus abnormal	Beep continuously	Fault LED lit
21	064	INV Power Fault	Beep continuously	Fault LED lit
22	067	ENV Over Temperature	Twice per second	Fault LED lit

No	Fault Cord	UPS Alarm Warning	Buzzer	LED
23	068	Load Sharing Fault	Twice per second	Fault LED lit
24	069	Par. cable Fault	Twice per second	Fault LED lit
25	071	Bypass SCR Short	Beep continuously	Fault LED lit
26	074	Bypass SCR Broken	Beep continuously	Fault LED lit
27	077	Bypass Feedback Fault	Beep continuously	Fault LED lit

Alarm Information

No	Alarm Cord	UPS Alarm Warning	Buzzer	LED
1	103	Battery Over Voltage	Once per second	BATTERY LED blinking
2	104	BAT Low Pre-warning	Once per second	BATTERY LED blinking
3	105	Battery Reverse	Twice per second	BATTERY LED blinking
4	106	Battery EOD	Once per second	BATTERY LED blinking
5	107	Battery Voltage low	Once per second	BATTERY LED blinking
6	108	No Battery	Once per second	BATTERY LED blinking
7	10B	Mains Freq. Abnormal	Once per 2 seconds	INVERTER LED blinking
8	10C	Mains Volt. Abnormal	Once per 2 seconds	INVERTER LED blinking
9	10D	REC Comm. Error	Once per 2 seconds	INVERTER LED blinking
10	10E	Mains input lost	Once per 2 seconds	
11	10F	REC Set Data Err.	Once per 2 seconds	FAULT LED blinking
12	121	INV Par. cable abnormal	Once per 2 seconds	FAULT LED blinking
13	125	INV Overload	Once per 2 seconds	INVERTER LED blinking
14	126	INV not synchronized	Beep continuously	INVERTER LED blinking
15	12A	INV Set Data Err	Once per 2 seconds	FAULT LED blinking
16	129	INV Comm. Error	Once per 2 seconds	FAULT LED blinking
17	133	Bypass switch too frequent	Once per 2 seconds	BYPASS LED blinking
18	143	Parallel Overload	Once per 2 seconds	INVERTER LED blinking
19	128	Bypass Overload	Once per 2 seconds	BYPASS LED blinking
20	131	BPS Unable To Trace	Once per 2 seconds	BYPASS LED blinking
21	132	BPS Unavailable	Once per second	BYPASS LED blinking

4.6 Options

SNMP card: SNMP / mini SNMP optional

- ◆ Loosen the 2 torque screws (on each side of the card).
- ◆ Carefully pull out the card. Reverse the procedure for re-installation

The slot called SNMP supports the MEGAtec protocol. SNMP card port is also a tool to remotely monitor and manage any UPS system

SNMP card supports the Modem Dial-in (PPP) function to enable the remote control via the internet when the network is unavailable.

In addition to the features of a standard SNMP card, SNMP card has the option to add NetFeeler Lite to detect temperature, humidity, smoke and security sensors. Thus, making SNMP card a versatile management tool. SNMP card also supports multiple languages and is setup for web-based auto language detection.



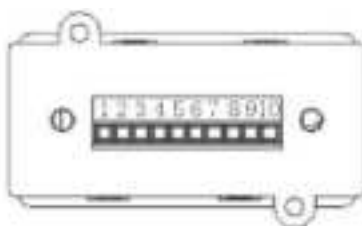
Typical topology of the UPS Network Management

Relay card

A 10-pin terminal is supported to offer the signals of Bypass, Utility Failure, Inverter On, Battery Low, UPS fault, UPS Alarm, and UPS Shutdown.

The relay communication card contains six dry contact outputs and one dry input. The inputs and outputs are factory programmed according to functions listed in the table

Table: Relay Contacts (communication card)



Pin	Function Description	Input or Output
1	Utility Failure	Output
2	Battery Low	
3		
4	Bypass On	
5	UPS Fault	
6	Inverter On	
7	Summary Alarm	
8	common	
9	Remote Shutdown +	Input (5~12V)



Appendix 1 Specifications

GENERAL			
Model Name	N1C.LK5000	N1C.LK6000	N1C.LK10000
Capacity	5kVA / 5kW	6kVA / 6kW	10kVA / 10kW
Topology	Double Conversion On-Line		
Cooling	Fan cooled		
Dimension W x D x H	440 * 621.5 * 86.5 mm(2U) / 17.3*24.5*3.4 inch		
Net Weight	16.5 kg / 36.4 lbs	15.5 kg / 34.2 lbs	17 kg / 37.5 lbs
Installation Type	Rack/Tower		
INPUT			
Nominal voltage	208(Default)/220/230/240Vac		
Input Voltage Range	110-300Vac(110-176Vac @ 50% load / 176-300Vac @ 100% load)		
Frequency Range	40-70Hz		
Harmonic distortion(THDi)	< 3%		
Power Factor	>0.99		
Input Connection	Power core connection input (L6-30P)	Terminal(L+L+G)	
OUTPUT			
Output Power	5kW	6kW	10kW
Power factor	1.0		
Output Waveform	Pure Sinewave		
Online Efficiency (up to)	95.0%	95.5%	
Economy mode efficiency	97.5%	98%	
Output voltage	208(Default)/220/230/240Vac		
Voltage Regulation	±1%		
Output Voltage Regulation (Dynamic)	±5%		
Harmonic distortion(THDv)	< 1% (Full Linear load)		
	< 3% (Full nonlinear load)		
Output Frequency	50/60Hz ± 10%(Line mode); 50/60Hz(default) ±0.1%(Battery mode)		
Over Load Capability (Online mode)	105%~110%: UPS transfer to bypass after 60 minutes when the utility is normal 110%~125%: UPS transfer to bypass after 10 minutes when the utility is normal 125%~150%: UPS transfer to bypass after 1 minute when the utility is normal >150%: UPS transfer to bypass after 0.5 second when the utility is normal		
Over Load Capability (Battery mode)	105%~110%: UPS after 10 minute shut down 110%~125%: UPS after 1 minute shut down 125%~150%: UPS after 10 second shut down >150%: UPS after 0.5 second shut down		

Over Load Capability (Bypass mode)		105%~130%: Only Overload alarm 130%~150%: UPS after 10 minute shut down 150%~200%: UPS after 1 minute shut down >200%: after 0.5 second shut down	
Current Crest Ratio		3:1	
Outlets - Total	Non- Programmable Receptacles	L6-30R*2	Terminal (L+L+G)
	Programmable Receptacles	L6-20R*1	L6-30R*2
BYPASS			
Voltage range		208/220Vac Max.voltage: +25% (optional +10%,+15%,+20%) 230Vac Max.voltage: +20% (optional +10%,+15%) 240Vac Max.voltage: +15% (optional +10%) Min. voltage: -45% (optional -10%,-20%,-30%)	
Frequency range		Frequency Protection Range: ±10%	
ECO Range		Rated Voltage ± 10%	
BATTERY			
Nominal DC Voltage (Li-ion)		192Vdc	
Charge Current (max.)		12A	15A
Communication Section and User Interface			
Control panel LCD (English-Language)+LED		3.5 inch Color touch screen	
Communication Interface		USB,RS232,RS485,COM port, Parallel port, Intelligent slot, SNMP card (optional), Relay card (optional)	
Emergency Power Off (EPO)		Yes	
ENVIRONMENT			
Operating temperature		0℃~40℃	
Storage temperature		-25℃~55℃ (without batteries)	
Humidity range		0~95%RH (Non -condensing)	
Operating altitude		0~1000 meters Normally operate; 1000~3000 meters Derating	
Protection Class		IP20	
Noise level (1m, Online mode, full load, float charging)		≤45dB	≤50dB
STANDARDS			
Safety		cTUVus: UL 1778: 2014 R4.23, CSA C22.2 NO. 107.3-14 + GI1	
EMC		FCC 47 CFR Part 15 Subpart B, Class A	
OTHERS			
Generator Compatible		Yes	
Short Circuit		Hold Whole System	
Overheat		Line Mode: Switch to Bypass; Backup Mode: Shut down UPS immediately	
Low battery voltage		Alarm and Switch off	

EPO	Shut down UPS immediately
Audible & Visual alarms	Line Failure, Battery Low, Overload, System Fault

Appendix 2 Problems and Solution

In case the UPS cannot work normally, it might be wrong in installation, wiring or operation. Please check these aspects first. If all these aspects are checked without any problem, please consult with local agent right away and provide below information.

(1) Product model name and serial number.

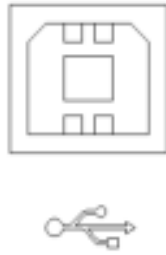
(2) Try to describe the fault with more details, such as LCD display info, LED lights status, etc.

Read the user manual carefully, it can help a lot for using this UPS in the right way. Some FAQ (frequently asked questions) may help you to troubleshoot your problem easily.

No.	Problem	Possible reason	Solution
1	Utility is connected but the UPS cannot be powered ON.	Input power supply is not connected; Input voltage low; The input switch of the UPS is not switched on.	Measure if the UPS input voltage/frequency is within the window. Check if UPS input is switched on
2	Utility normal but Utility LED does not light on, and the UPS operates at battery mode	The input breakers of the UPS are not switched on; input cable is not well connected	Switch on the input breaker; Make sure the input cable is well connected.
3	The UPS does not indicate any failure, but output do not have voltage	Output cable does not well connected; Output breaker do not switch on	Make sure the output cable is well connected; Switch on the output breaker.
4	Utility LED is flashing	Utility voltage exceeds UPS input range.	If the UPS operates at battery mode, please pay attention to the remaining backup time needed for your system.
5	Battery LED is flashing but no charge voltage and current	Battery breaker does not switch on, or batteries are damaged, or battery is reversely connected. Battery number and capacity are not set correctly.	Switch on the battery breaker. If batteries are damaged, need to replace whole group batteries, Connect the battery cables correctly; Go to LCD setting of the battery number and capacity, set the correct data.
6	Buzzer beeps every 0.5 seconds and LCD display "output overload"	Overload	Remove some load
7	The UPS only works on bypass mode	The UPS is set to ECO mode, or the transfer times to bypass mode are limited.	Set the UPS working mode to UPS type(non-parallel) or to reset the times of transferring to bypass or re-start the UPS
8	Cannot Cold-start	Battery switch is not properly closed: Battery fuse is blown Or Battery low: Battery quantity set wrong;	Close the battery switch: Replace the fuse: Recharge the battery: Power ON the UPS with AC to set the battery quantity & quantity;

Appendix 3 USB communication port definition

Definition of port:



Connection between PC USB port and UPS USB port.

PC USB port	UPS USB port	Description
Pin 1	Pin 1	PC : +5V
Pin 2	Pin 2	PC : DPLUS signal
Pin 3	Pin 3	PC : DMINUS signal
Pin 4	Pin 4	Signal ground

Available function of USB

- ◆ Monitor UPS power status.
- ◆ Monitor UPS alarm info.
- ◆ Monitor UPS running parameters.
- ◆ Timing off/on setting.

Communication data format

Baud rate ----- 9600bps

Byte length ----- 8bit

End bit ----- 1bit

Parity check -----none



CAUTION!

USB, RS232 and RS485 interface cannot be used at the same time, you can only use one of them at one time.

Appendix 4 RS232 communication port definition

Definition of Male port:



Connection between PC RS232 port and UPS RS232 port

PC RS232 port	UPS RS232 port	
Pin 2	Pin 2	UPS send,PC receive
Pin 3	Pin 3	PC send,UPS receive
Pin 5	Pin 5	ground

Available function of RS232

- ◆ Monitor UPS power status.
- ◆ Monitor UPS alarm info.
- ◆ Monitor UPS running parameters.
- ◆ Timing off/on setting.

RS-232 communication data format

Baud rate ----- 9600bps

Byte length ----- 8bit

End bit ----- 1bit

Parity check -----none

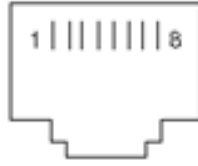


CAUTION!

USB, RS232 and RS485 interface cannot be used at the same time, you can only use one of them at one time.

Appendix 5 RS485 communication port definition

Definition of port:



Connection between the Device's RS485 port and UPS RS485 port.

device(RJ45)	UPS(RJ45)	Description
Pin 1/5	Pin 1/5	485+ "A"
Pin 2/4	Pin 2/4	485 -"B"
Pin 7	Pin 7	12V
Pin 8	Pin 8	GND

Available function of RS485

- ◆ Monitor UPS power status.
- ◆ Monitor UPS alarm info.
- ◆ Monitor UPS running parameters.
- ◆ Timing off/on setting.

Communication data format

Baud rate ----- 9600bps

Byte length ----- 8bit

End bit ----- 1bit

Parity check -----none



CAUTION!

USB, RS232 and RS485 interface cannot be used at the same time, you can only use one of them at one time.

RS485 port pin7 is 12Vdc!

Appendix 6 COM communication port definition

Definition of port:



Connection between the Device's RS485 port and UPS COM port.

device(RJ45)	UPS(RJ45)	Description
Pin 1/5	Pin 1/5	485+ "A"
Pin 2/4	Pin 2/4	485 -"B"
Pin 7	Pin 7	12V
Pin 8	Pin 8	GND

Available function of COM

◆ BMS communication for Li-ion battery pack

Communication data format

Baud rate ----- 9600bps

Byte length ----- 8bit

End bit ----- 1bit

Parity check -----none

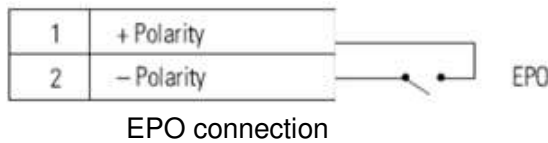


CAUTION!

COM port pin7 is 12Vdc!

Appendix 7 EPO instruction

EPO is emergency power off of UPS. This function can be used to turn off the load and UPS thermal protection. For example, when the indoor temperature is too high. When EPO is activated, the UPS immediately turns off all outputs and power converter, and the UPS remains in the fault alarm state.



EPO function test:

- (1) Confirm that the machine is turned off and disconnected from the power grid;
- (2) The two pins of the EPO terminal are connected to a normally closed passive switch (e.g.: the connection terminal of the green female pin);
- (3) Connect to UPS and restart;
- (4) Turn on the EPO external switch. Test whether the UPS is turned off (e.g.: unplug the terminal);
- (5) UPS turns off when the switch is turned on, indicating that the EPO setting is valid;
- (6) To resume normal operation, close the external switch and restart the UPS.

Note: Please make sure that the EPO function is normal before using the UPS with critical equipment load to avoid unexpected power failure of the load.

Appendix 8 Optional port definition

The load segment set can control the power supply of the socket through the power management software or through the display and provide an orderly shutdown and startup of your equipment. For example, during a power outage, you can keep critical equipment running and shut down other equipment. This feature allows you to effectively manage battery usage and save battery power.

For example:

The EOD of output2 socket can be set to 1.92V/cell (or 1.84 V/cell). When the battery voltage drops to 1.92V/cell, output2 socket will automatically disconnect the load output, which can extend the battery mode operation time of output1 load.

Finally, when the battery voltage drops to the EOD voltage (1.75V/cell), the UPS shuts down the all of output.

