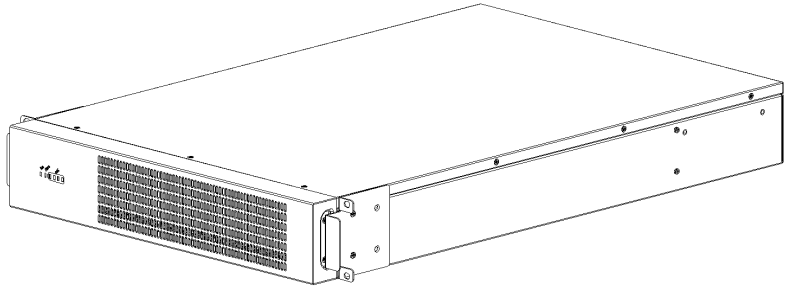
4257-1638 A

Li-ion Battery Pack

192V/12Ah



Operation Manual

CONTACT
N1 Critical Technologies
www.n1critical.com
service@n1critical.com
sales@n1critical.com
877-226-3311

Publish statement

Thank you for purchasing this LK-Series Li-ion external battery module (EBM).
Read this manual carefully before installation. It is used only in conjunction with LK-Series UPS battery backup systems.
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.

Contents

1. Safety

Important safety instructions - Save these instructions

Dangerous voltage and high temperatures exist inside the Li-ion battery pack (EBM). 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 to local safety regulations. Our company will not assume liability caused by disobeying safety instructions.

1.1 Safety notes

1. Even if the Li-ion battery pack circuit breaker is not turned on, battery voltage may still exist at battery pack terminal!

2. To reduce the risk of hazardous electric shock, please ensure the EBM is properly grounded before turning on the 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 use a dropped, damaged or deformed Li-ion battery pack.

6. Working environment and storage way will affect the lifetime and reliability of the Li-ion battery pack. Avoid having the Li-ion battery pack 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℃, 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 EBM vents and fans in good conditions otherwise the components inside the Li-ion battery pack may become overheated, reducing the life of the EBM 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

This LK-Series Li-ion battery pack is designed for high frequency online UPS (5-10kVA), featuring excellent electrical performance, faster charging speed, lighter weight, more environmentally friendly, and compliance with EMC and safety standards. The Li-ion battery is a state-of-the-art backup battery solution that has an on-board battery management system (BMS). The UPS and battery pack can be applied to different applications from computer devices, automatic equipment and communication system to industry equipment.

2.2 Functions and Features

◆Integrated solution for data center

This series Li-ion battery pack is integrated with the LK-Series UPS in system cabinet, offering an excellent choice for data centers.

◆Intelligent battery management system(BMS)

This LK-Series Li-ion battery pack includes a comprehensive battery management system, increasing reliability, performance, self-protection, and self-diagnostics.

◆High performance Li-ion battery cells

Each battery pack contains 60 cells in series with 4 parallel-connected Li-ion battery sets with powerful charging and discharging capabilities

◆Intelligent charging/discharging control

Via BMS, the Li-ion battery pack can automatically control the UPS to provide the required charging voltage and charging current to achieve a high-speed and safe charging environment. When the BMS detects an internal fault, the Li-ion battery pack and UPS can also be controlled by the BMS to turn off charging/discharging of the UPS to protect the Li-ion battery.

◆LED Display

With LED displays, the user may easily get Li-ion battery pack status and its operational parameters, such as battery capacity, battery alarm, charging status, etc.

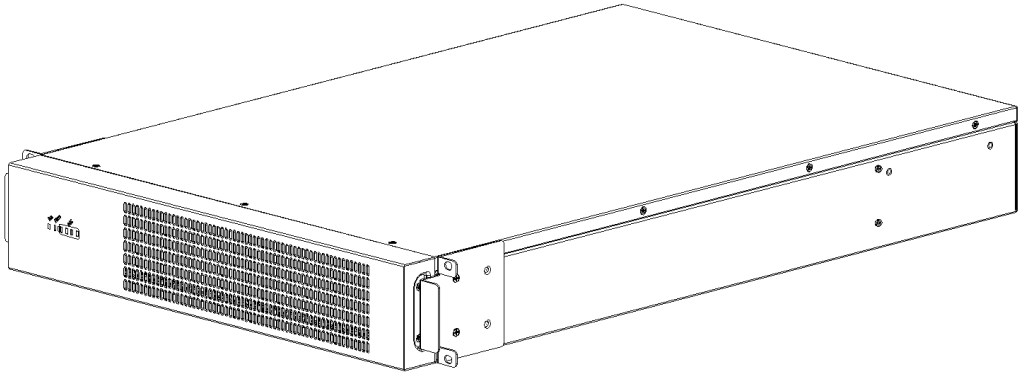
◆Intelligent Monitoring Function

With communication between Li-ion battery pack and UPS, users can get more detailed information about Li-ion battery, such as cell voltage, cell temperature, pack runtime, etc.

3. Installation

3.1 Sub Rack UPS

3.1.1 Appearance of EBM



3.1.2 Installation

CAUTION!

Due to the weight of the Li-ion battery pack, the following precautions should be taken during installation.

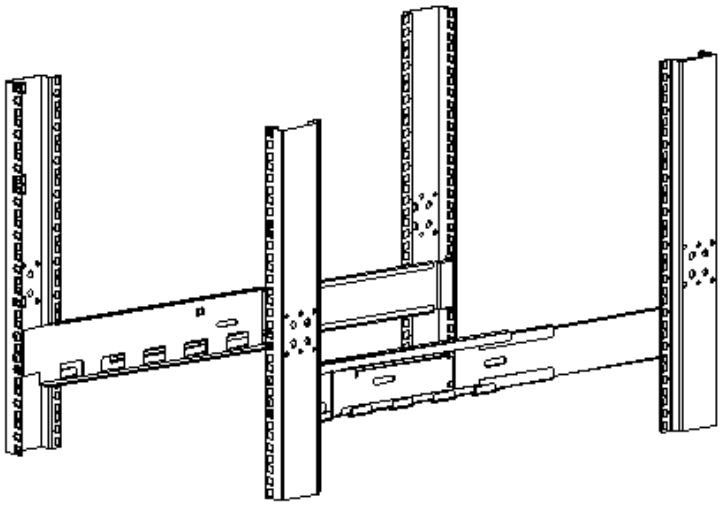
◆The battery pack must be installed first, starting from the bottom of the cabinet and placing the UPS above it.

◆Prohibit handling Li-ion battery boxes solely through the mounting brackets.

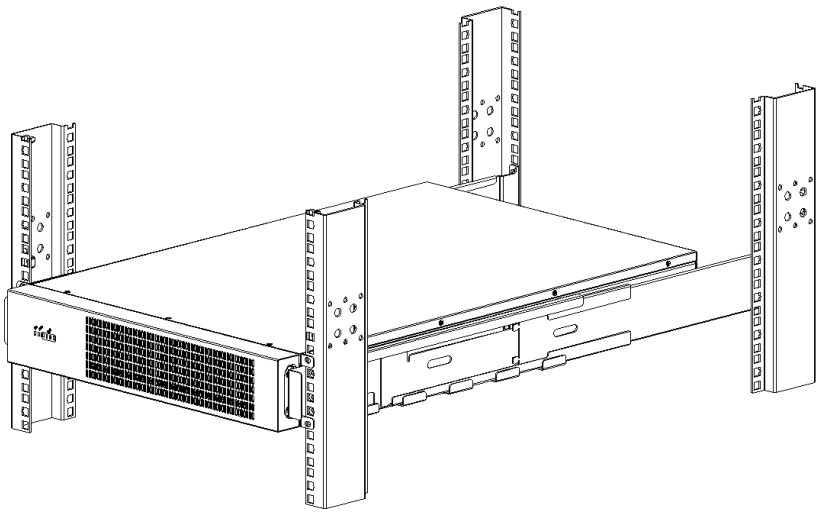
◆Two or more people are required for installation operations.

Installation steps:

Fix the rails to the cabinet.



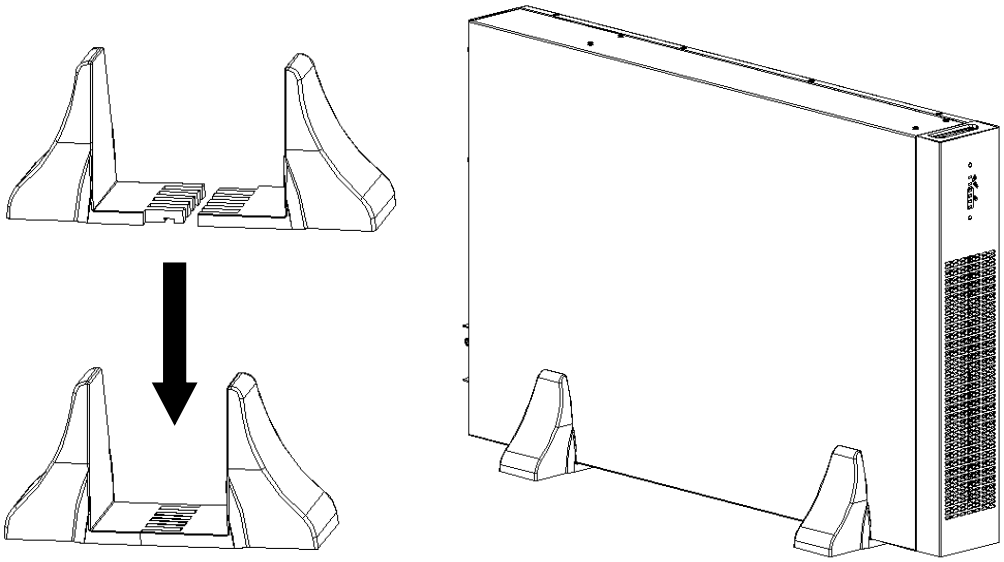
After installing the rails, install the mounting brackets to the front panel of the Li-ion battery pack, then insert the Li-ion battery pack into the cabinet on the rails and fix the screws to the rack posts.



3.2 Tower EBM

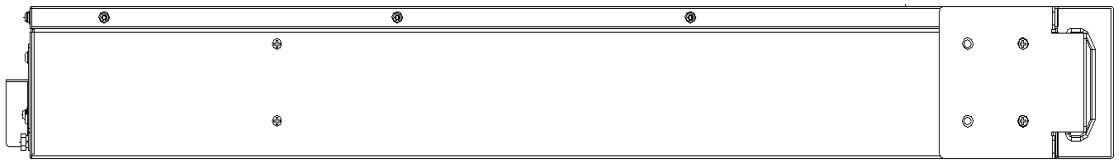
3.2.1 Installation

Assemb the bracket, according to the size of the Li-ion battery pack, and then the Li-ion battery pack can be directly placed on the bracket.

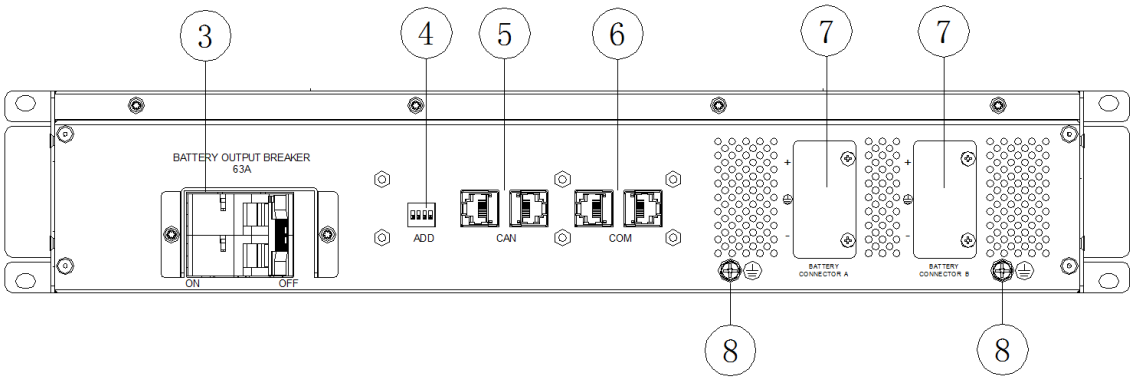


3.3 Cabinet Outlook

Front View



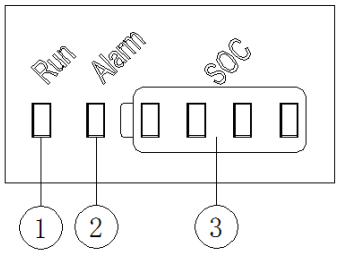
Side View



Rear View

(1) Rack mounting bracket	(2) LED panel
(3) Battery Breaker	(4) DIP switch
(5) CAN ports	(6) COM ports
(7) Battery Connector	(8) Grounding screw

3.4 LED panel



LED panel introduction

（1）Running LED （2）Alarm LED （3）State of Charge LED

3.5 Installation notes

Note: Consider for the convenience of 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 Li-ion battery pack in a clean, stable environment. Avoid the vibration, dust, humidity, flammable gas and liquid, corrosive chemicals, etc. To avoid high room temperatures, room air extractor fans are recommended.

◆The Li-ion battery pack should be mounted in an environment where the temperature is within 0ºC-40ºC. Temperature is a major factor in determining battery life and capacity. The battery will have its highest performance in temperatures within 20-25ºC. Do not use the battery in temperatures higher than 50ºC.

◆ Keep Li-ion battery pack away from water, heat sources and hazardous materials such as flammable, combustible and explosive materials, etc.

◆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. Under the following conditions, the maximum storage time shall not exceed 12 months, as shown in the table below.

Storage Environment	Specifications	
Storage Temperature	-10ºC to *25ºC < 12month -20ºC to -10ºC & *25 to 45ºC < 3month Below -20ºC & 45ºC to 60ºC < 1month	SOC: 25%~50%
Relative Humidity	< 90%RH	
Altitude	3000m without derating	

CAUTION!

Maintain storage temperature of Li-ion battery pack between -10ºC~ +25ºC and humidity below 90% RH for optimal performance.

CAUTION!

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

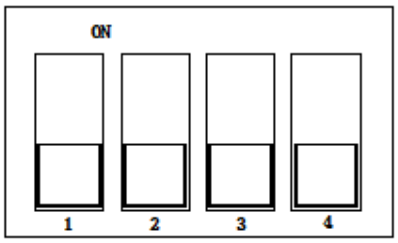
WARNING!

Typical battery performance data are quoted for an operating temperature between 20°C and 25°C. Operating it above this range will reduce the battery life while operation below this range will reduce the battery capacity.

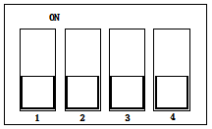
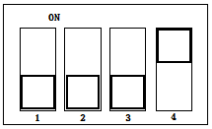
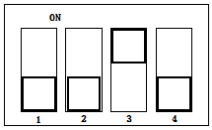
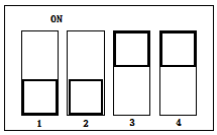
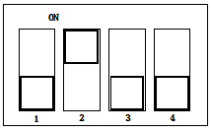
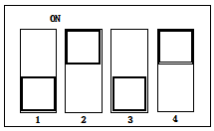
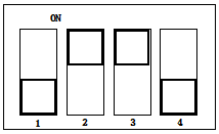
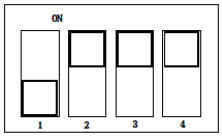
3.6 Battery connection

3.6.1 Set communication ID for Li-ion battery pack

The LK-Series Li-ion battery pack supports parallel use, with a maximum of 8 EBM units in parallel. When Li-ion battery packs are used in parallel (more than 1x battery), each battery pack needs to have the proper ID set to allow normal parallel use. The dip switches are located on the back panel of each EBM, as shown in the following figure:



DIP Switch Setting:

EBM ID	DIP switch settings				Diagram
	1	2	3	4	
1	OFF	OFF	OFF	OFF	 *default
2	OFF	OFF	OFF	ON	
3	OFF	OFF	ON	OFF	
4	OFF	OFF	ON	ON	
5	OFF	ON	OFF	OFF	
6	OFF	ON	OFF	ON	
7	OFF	ON	ON	OFF	
8	OFF	ON	ON	ON	

3.6.2 Li-ion battery pack cable connection

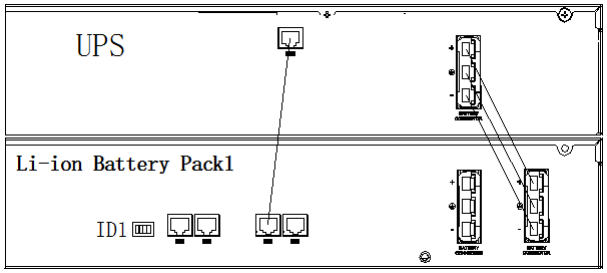
CAUTION!

To avoid any issues with the use of the battery pack and UPS, please make sure to connect the cables according to the following requirements.

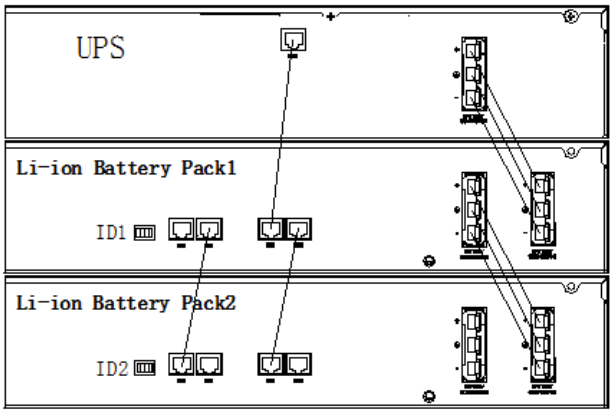
The BAT+ (positive) of the UPS battery connector is connected to the BAT+ of the Li-ion battery pack connector. The BAT- (negative) of the UPS battery connector is connected to the BAT- of the Li-ion battery pack connector. The PE (ground) of the UPS battery connector is connected to the PE of the Li-ion 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 COM port of the Li-ion battery pack to the COM port of another 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. (*NOTE: Do note connect battery to the RS485 port on the UPS. Connect to the COM port - #16 in the UPS manual. There is no CAN port connection between UPS and battery. CAN is or battery-to-battery only.) It is recommended to connect the battery ground screw(s) to a grounded terminal on UPS or mounting rack, etc.

Note that the ID of the DIP switch for each battery pack needs to be set according to the DIP Switch Setting table.

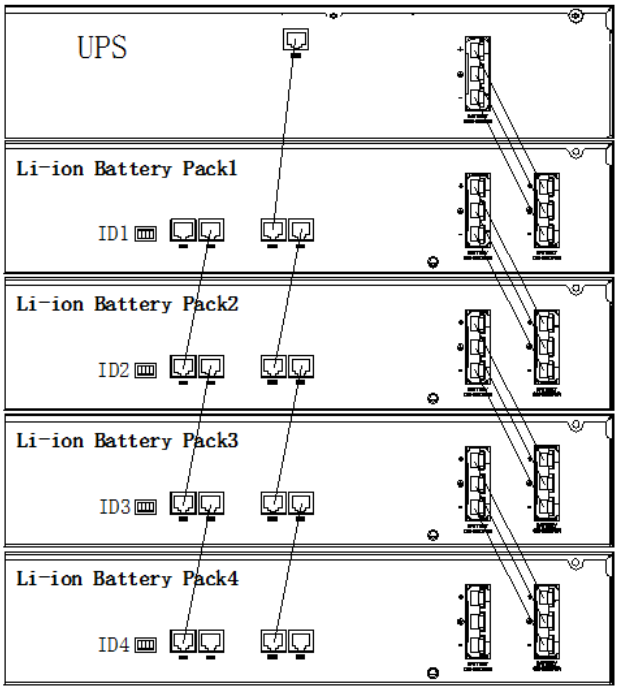
UPS connected to 1 Li-ion battery pack: (ID1)



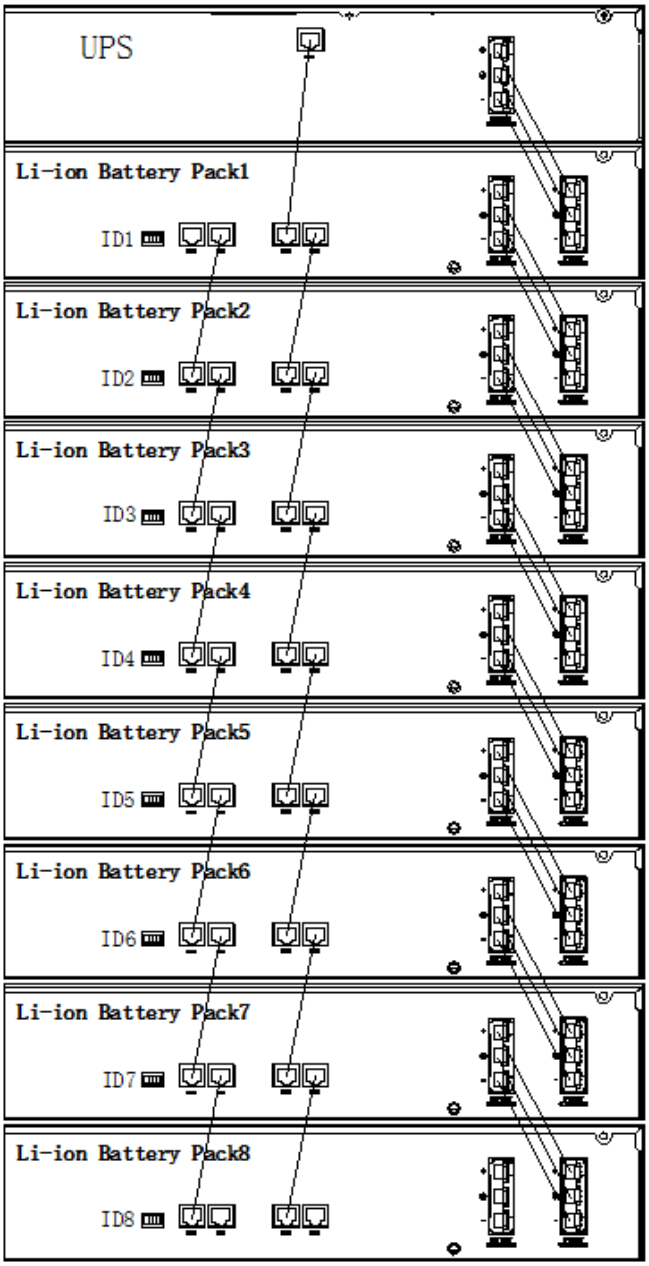
UPS connected to 2 Li-ion battery packs: (ID1, ID2)



UPS connected to 4 Li-ion battery packs: (ID1, ID2, ID3, ID4)



UPS connected to 8 Li-ion battery packs: (ID1, ID2, ID3, ID4, ID5, ID6, ID7, ID8)



WARNING!

Only the LK-Series UPS specifically designed for this LK-Series Li-ion battery pack 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.

CAUTION!

Protective ground cable: Connect each battery cabinet to the main facility ground system. For grounding connection, follow the shortest route possible.

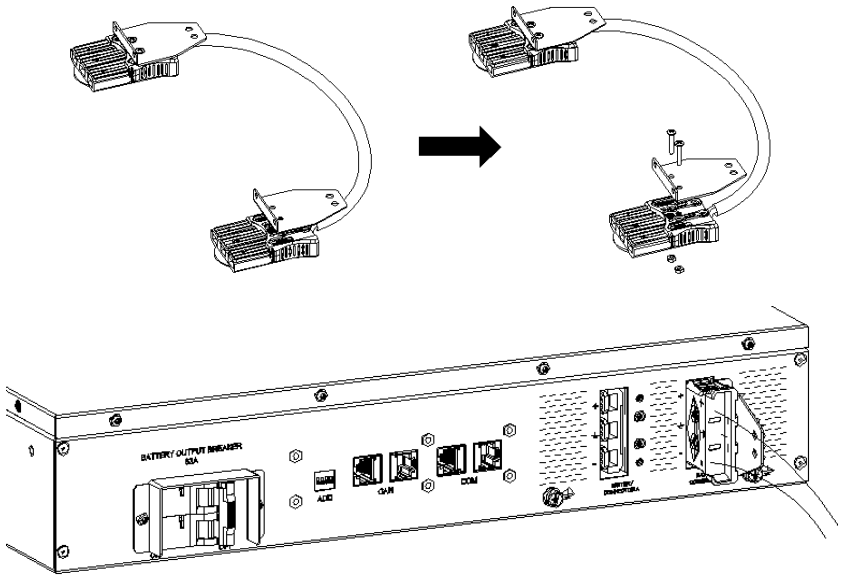
WARNING!

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

3.6.3 Battery cable terminal fixing

The battery cable does not support hot swapping, after installing the battery cable, the terminal fixing parts need to be locked on the battery terminal and rear panel to prevent the battery cable from loosening.

Use two screws and nuts to secure the terminals to the fixing bracket, then insert the battery cable into the battery pack, and finally use screws to secure the fixing bracket to the rear panel of the battery pack.



4. Operation

4.1 Li-ion battery pack activation

CAUTION!

MAKE SURE GROUNDING IS PROPERLY DONE!

◆Turn ON the BATTERY breaker of Li-ion battery pack.

◆Turn ON the INPUT utility breaker or PDU(If the system uses PDU) to energize the UPS. After about 50 seconds, the LED of the Li-ion battery pack will light up. This indicates that the Li-ion battery pack has been successfully activated and can be used normally.

◆Check the LCD of the UPS to ensure battery is charging. When the Li-ion battery pack is charging, the SOC indicator light of the Li-ion battery pack will display green and flash normally.

CAUTION!

If the Li-ion battery pack fails to activate after performing the above operation. Please check if the battery cable is securely connected. Reactivate the operation.

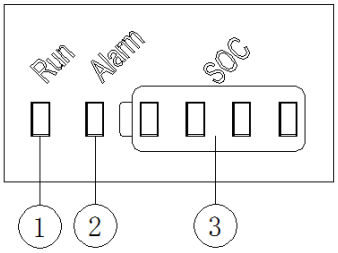
CAUTION!

After activating the Li-ion battery pack, if a red light is found on the battery pack, please check if the communication cable is securely connected and if the battery pack communication ID is set correctly.

CAUTION!

The Li-ion battery pack does not support cold start function.

4.2 The LED indicator light



LED panel

(1) Running LED

(2) Alarm LED

(3) State of Charge LED

LED	Function
Running	When the LED is green, that means BMS is running.
Alarm	When the LED is blinking, that means there is alarm in BMS.
	When the LED is constantly on, that means there is fault in BMS.
SOC	Indicate the current remaining power a) When SOC is 0%, LED1, LED2, LED3, LED4 are off. b) When SOC is 1%~25%, LED1 is on. c) When SOC is 26%~50%, LED1 and LED2 are on. d) When SOC is 51%~75%, LED1, LED2 and LED3 are on. e) When SOC is 76%~100%, LED1, LED2, LED3 and LED4 are on.

4.3 The LCD information of Li-ion battery

When the UPS is configured in Li-ion battery mode, a relevant parameter page about the Li-ion battery pack will appear on the LCD, which is used to display the status information of each battery pack, as shown in the following figure below.

4.4 Display Messages/Troubleshooting

This section lists the alarm messages of BMS that the UPS might display. This section is listed with each alarm message to help you troubleshoot problems.

Alarm Information

No	UPS Alarm Warning	Buzzer	LED
1	Cell Low V Fault	Beep continuously	Fault LED lit
2	Cell Over V Fault	Beep continuously	Fault LED lit
3	End of life	Beep continuously	Fault LED lit
4	Safe Low V Protec	Beep continuously	Fault LED lit
5	RelayOvertemp Flt	Beep continuously	Fault LED lit
6	DSCH LowTemp Flt	Beep continuously	Fault LED lit
7	DSCH OverTemp Flt	Beep continuously	Fault LED lit
8	DSCH OverCur Flt	Beep continuously	Fault LED lit
9	CH LowTemp Flt	Beep continuously	Fault LED lit
10	CH OverTemp Flt	Beep continuously	Fault LED lit
11	CH OverCur Flt	Beep continuously	Fault LED lit
12	Bat Reverse Conn	Beep continuously	Fault LED lit
13	Bat address Err	Beep continuously	Fault LED lit
14	Hardware Protect	Twice per second	Fault LED lit
15	Analog Protect	Beep continuously	Fault LED lit
16	Relay Failure	Beep continuously	Fault LED lit
17	Int Comm Fault	Once per 1 seconds	Fault LED blinking
18	Int Comm Err	Beep continuously	Fault LED lit
19	UPS&BMS Comm Abnormal	Once per 1 seconds	Fault LED blinking
20	UPS&BMS No Comm	Once per 1 seconds	Fault LED blinking
21	Num of BAT Fault	Once per 1 seconds	Fault LED blinking

Appendix 1 Specifications

Li-ion Battery Pack	
Model Name	N1C.LK192EBM2U
Battery type	LiFePO4
Nominal voltage	192Vdc
Nominal Capacity	12Ah
Nominal Energy	2304Wh
Charging Current	6A
Discharging Current	63A
Operating temperature	0℃~40℃
Storage temperature	-20℃~+60℃
Humidity range	0~95%RH (Non -condensing)
Operating altitude	0~3000 meters (Non -condensing)
Protection Class	IP20
Dimension W x D x H	440*684*86.5 mm(2U) / 17.3*27*3.4 inch
Net Weight	34 kg / 75 lbs
Certificate (Safety)	Li-ion battery cell: UL1642 Li-ion battery pack: IEC 62619:2022, UL1973:2022
Certificate (EMC)	FCC 47 CFR Part 15 Subpart B, ANSI C63.4-2014
	EN IEC 61000-6-1: 2019, EN IEC 61000-6-3: 2021
Certificate (Transport)	UN38.3, ISTA 2B

Appendix 2 Problems and Solution

In case the Li-ion battery pack 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 N1C 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 for using this Li-ion battery pack in the right way. Some FAQ (frequently asked questions) may help you to troubleshoot your problem easily. If the following table still cannot solve the problem, please contact N1C customer service.

No.	Alram	Possible reason / Solution
1	UPS&BMS Comm Abnormal	The COM communication cable between Li-ion battery packs is not connected or is not secured, or the circuit breaker of the Li-ion battery pack is not closed.
2	UPS&BMS No Comm	The COM communication cable between UPS and Li-ion battery pack is not connected, or the connection is not secured, or the circuit breaker of the Li-ion battery pack is not closed.
3	Num of BAT Fault	The number of battery packs set on the LCD does not match the actual number of batteries used, or the circuit breaker of the Li-ion battery pack is not closed.
4	Cell Low V Fault	The voltage of the Li-ion battery cell is low. provide UPS main power input to charge the Li-Ion battery pack for 30+ minutes. If the fault still exists, contact customer service.
5	Cell Over V Fault	The voltage of the Li-ion battery cell is high. Please turn off the circuit breaker of the Li-Ion battery pack for 2 hours. Then, turn on battery pack. If the fault still exists, contact customer service.
6	End of life	The Li-ion battery has aged (below 60% state of health). Please contact customer service to replace it with a new Li-ion battery.
7	Safe Low V Protec	The voltage of the Li-ion battery cell is too low and the battery is damaged. Please contact customer service.
8	RelayOvertemp Flt	When Li-ion batteries are connected in parallel, the battery temperature is too high. Please confirm whether the temperature environment where the Li-ion battery pack is located meets the specified allowable ambient temperature.
9	DSCH LowTemp Flt	When Li-ion batteries are discharged, the battery temperature is too low. Please confirm whether the temperature environment where the Li-ion battery pack is located meets the specified allowable ambient temperature.
10	DSCH OverTemp Flt	When Li-ion batteries are discharged, the battery temperature is too high. Please confirm whether the temperature environment where the Li-ion battery pack is located meets the specified allowable ambient temperature.
11	DSCH OverCur Flt	When Li-ion batteries are discharged, the battery discharge current is too high. Please check if the UPS shows a rectifier fault. If not, please contact customer service.
12	CH LowTemp Flt	When Li-ion batteries are charged, the battery temperature is too low. Please confirm whether the temperature environment where the Li-ion battery pack is located meets the specified allowable ambient temperature.
13	CH OverTemp Flt	When Li-ion batteries are charged, the battery temperature is too high. Please confirm whether the temperature environment where the Li-ion battery pack is located meets the specified allowable ambient temperature.
14	CH OverCur Flt	When Li-ion batteries are charged, the battery charge current is too high. Please check if the UPS shows a BAT charger fault. If not, please contact customer service.

15	Bat Reverse Conn	The positive and negative connections of the Li-ion battery connection wires are reversed. Please check if the battery connection wires are reversed.
16	Bat address Err	The communication address of the DIP switch for the Li-ion battery pack is not set correctly. Please check the settings.
17	Hardware Protect	Hardware circuit failure of Li-ion battery pack. Please contact customer service.
18	Analog Protect	Hardware circuit failure of Li-ion battery pack. Please contact customer service.
19	Relay Failure	The BMS relay is Invalid. Please contact customer service.
20	Int Comm Fault	Serious communication failure inside the Li-ion battery. Please contact customer service.
21	Int Comm Err	Communication failure inside the Li-ion battery. Turn off the Li-ion battery pack circuit breaker and restart the Li-ion battery pack. If the fault still exists, please contact customer service.