



LITHIUM BATTERY PACK USER MANUAL

MODEL: SLPO48-200

- ※ Please read this manual before using the battery pack
- ※ Please keep this manual properly after reading

1. Product key parameters

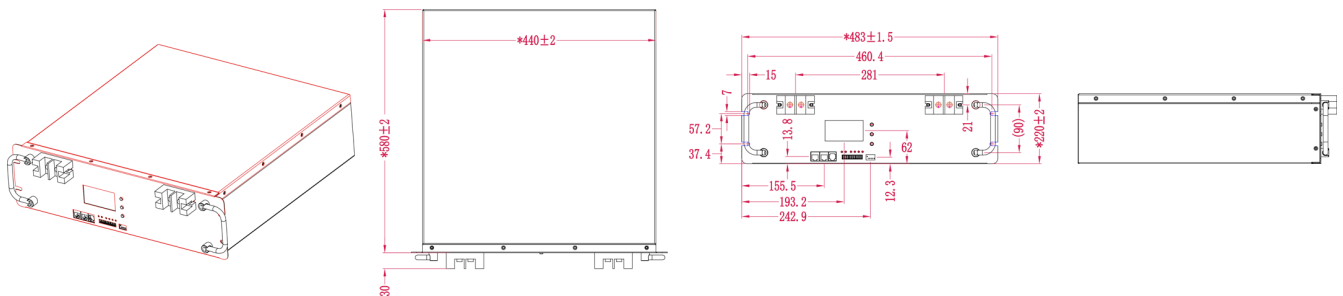
NO.	Item	Specification
1.1	Appearance	The battery pack surface is clean, free from scratches and mechanical damage.
1.2	Charging voltage	56.8V±0.2V
1.3	Nominal voltage	51.2V
1.4	Cut-off voltage	40V
1.5	Nominal capacity	200Ah (After standard charging, discharging at 50AH.)
1.6	Min. capacity	195Ah (After standard charging, discharging at 50AH.)
1.7	Standard charging current and voltage	Step 1: 50A constant current charge to 56.8V; Step 2: 56.8V constant voltage charge until the charging current reaches 5A. Temp.: 0~45°C
1.8	Charging time	5 hours (for reference)
1.9	Rated charging current	100A
1.10	Rated discharge current	100A
1.11	Working Temp.	Charging: 0~45°C; Discharging: -20~55°C
1.12	Storage Temp. and humidity range	1month: -20~45°C 3 months: -10~45°C 6 months: 0~25°C humidity: 45~90% RH The battery should be cycled every three months.
1.13	Cycle life	After 6000 cycles, at 25°C, 50A charge and discharge 80% DOD, recoverable capacity ≥ 80%
1.14	Initial battery internal resistance	≤ 100mΩ (50% capacity, AC impedance 1kHz measuring)
1.15	Battery weight	About 88kg
1.16	Ex-work voltage	52~53.5V
1.17	Dimension	483(L)*580(W)*220(H)
1.18	Function	Supports parallel connection of multiple battery pack (24units)
1.19	Communication	Communication (CAN, RS485, RS232), LCD, dry contacts
1.20	Color	Black

2. Structural characteristics and interface definition

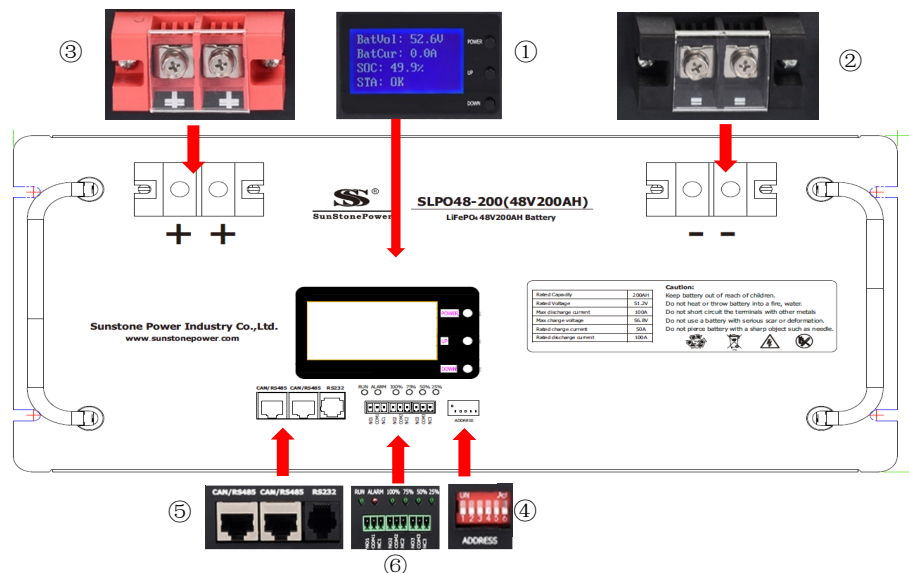
- A. Basic structure: 2mm sheet metal box structure and rack.
- B. Installation method: screw lock.
- C. Surface coating: add spray paint.

2.1 Overall structure

The battery assembly is mainly composed of the following parts: a 5U metal outer box, which contains a 16S module, and accessories include BMS, patch cords, and external terminals. The overall structure is simple, detachable, easy to maintain and protect, high reliability, light weight, and high energy density.



2.2 External interface function and introduction



2.2.1 Battery pack interface definitions

NO.	Interface	Function	Remark
1	Positive electrode	Charge and discharge positive terminal	Support continuous 100A single pin overcharge
2	Negative electrode	Charge and discharge negative terminal	Support continuous 100A single pin overcharge
3	LCD display and control	Battery pack information and status display	-
4	RS485/CAN/RS232 communication interface	The external communication of the battery pack is connected in parallel and connected to the communication interface of the upper computer	RS485/CAN is RJ45 interface RS232 is RJ11 interface
5	Dry contact and indicator light	Battery pack status indication, abnormal alarm	-
6	Address dial switch	Address setting when battery packs are connected in parallel	Invalid when all six bits are set to OFF

2.2.2 Battery pack interface functions

2.2.2.1 The positive and negative terminal blocks

The red terminal block is the positive pole of the battery, and the black terminal block is the negative pole of the battery. It is locked with M6 screws. When installing, the SC25-6 copper nose can be used for parallel connection of battery packs or external equipment for energy supply or charging.



2.2.2.2 LCD display and control

LCD display and control are divided into display part and control part.

(1) The control part is button control, as shown in the figure below, from top to bottom are POWER, UP, DOWN.



Power on:

- ① Long press the POWER switch until the red light turns on (first the green light turns on, but the switch shouldn't be released).
- ② The system self-checks when the red light is flashing (about 10S). After that, the battery will enter the power-on state.

Power off:

- ① Long press the switch (about 6S).
- ② The green light goes out briefly and then flashes to enter the self-test (about 10S). After that, the battery will be completely power-off.

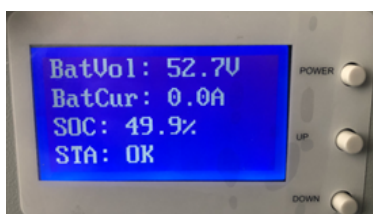
Item	Function	Remark
POWER	Battery pack operation power control 1. Power on 2. Power off 3. Wake up mode 4. Sleep mode	1. In wake/sleep mode, you need to stop pressing immediately after long pressing for 3~6 sec, otherwise the startup will fail. 2. Wake up again in 10S after wake up failure 3. After under-voltage dormancy, only charging wakeup is supported.
UP	LCD display content page up	-
DOWN	LCD display content page down	-

(2) LCD display: When the wake-up mode is activated, the user can view various status information of the battery through the LCD. This battery pack LCD display is divided into 6 pages.

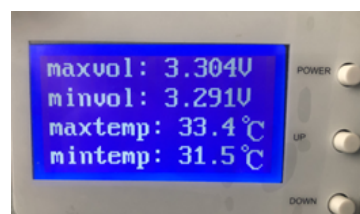
On the home page, you can view the battery voltage, current, capacity percentage, and battery pack status (OK or abnormal code).

On the next page, you can view the maximum and minimum voltage, maximum and minimum temperature of the battery.

User can view the voltage of each cell on pages 3~6.



First Page

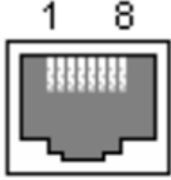
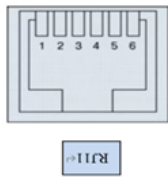


Second page

2.2.2.3 RS485/CAN/RS232 communication interface

The communication interface is divided into 2 RS485/CAN and 1 RS232 communication interface.

Item	Function	Remark
RS485/CAN	1. External communication, connect to the upper computer equipment. 2. The battery packs are connected in parallel.	1. The dual interface does not divide the A/B interface and can be connected as required. 2. RJ45 interface.
RS232	External communication, connect to the upper computer equipment.	RJ11 interface.

Item	Number	Signal	Schematic diagram
RS485/CAN	1	CAN-H	
	2	CAN-L	
	3	-	
	4	485-A	
	5	485-B	
	6	-	
	7	GND	
	8	GND	
RS232	1	232-RXD	
	2	232-TXD	
	3	GND	
	4	GND	
	5	-	
	6	-	

2.2.2.4 Dry contacts and indicator lights

This product contains 3 dry contacts and 3 groups of 6 LED indicators.

Item	Function	Remark
Dry contact	NO1: voltage protection NO2: current protection NO3: temperature protection	The dry contact can be normally open or normally closed.
Operating indicator	Normal operation of the battery pack is turned on, sleep/stop is turned off.	-
Alarm indicator	Fault/alarm: red light flashes.	E22: Module communication abnormal level 2 alarm E51: Module total voltage overvoltage level 1 alarm E52: Module total voltage overvoltage level 2 alarm E61: Module total pressure undervoltage level 1 alarm E62: Module total pressure undervoltage level 2 alarm E71: Module charging overcurrent level 1 alarm E72: Module charging overcurrent level 2 alarm E81: Module discharge overcurrent level 1 alarm E82: Module discharge overcurrent level 2 alarm E83: Module discharge load short circuit (serious) E92: Single cell overvoltage level 2 alarm E101: Single cell undervoltage level 1 alarm E102: Single cell undervoltage level 2 alarm E111: Module battery high temperature level 1 alarm E112: Module battery high temperature level 2 alarm E121: Module battery low temperature level 1 alarm E122: Module battery low temperature level 2 alarm

Item	Function	Remark
Power indicator	The 4 indicators respectively indicate 100%/75%/50%/25%.	-



2.2.2.5 Address dial switch

When battery packs are connected in parallel, the battery pack address can be set here, and it is invalid when all six bits are set to OFF.



3. BMS protection threshold

3.1 Temp. control threshold value

Item	Level	Tpmin / Tpmax(°C)	Temp. protection recovery value(°C); delay (5S)	Code	Dry contact output
Normal operation temp.	Running normal	10<Tpmin<35	-	-	-
Low temp. threshold value	Alarm	-20<Tpmin≤-15	≥-13	E121	-
	Protect	Tpmin≤-20	≥-15	E122	Dry contact 3 action
Radiator high temp. threshold value	Alarm	75≤Tpmax<85	≤65	E111	-
	Protect	Tpmax>85	≤75	E112	Dry contact 3 action
Battery cell high temp. threshold value	Alarm	60≤Tpmax<65	≤57	E111	-
	Protect	Tpmax>65	≤60	E112	Dry contact 3 action

Remark:

It cannot be charged or discharged when in the Protect state.

3.2 Voltage threshold value

Item	Cell voltage range (V); delay (3S)	Cell voltage recovery value (V); delay (5S)	Code	Dry contact output	Remark
Undervoltage alarm	$2.5 < V_{min} \leq 2.9$	≥ 3.1	E101	-	-
Undervoltage protection (Cannot discharge)	$V_{min} \leq 2.5$	≥ 2.8	E102	Dry contact 1 action	-
Normal	$2.9 < V < 3.65$	-	-	-	-
Full (Turn off charging)	$3.7 \leq V_{max} < 3.8$	≤ 3.45	-	-	No code displayed
Overvoltage protection (Turn off charging)	$V_{max} \geq 3.8$	≤ 3.5	E92	Dry contact 1 action	-

3.3 Current threshold value

Item	Current value (A); delay (3S)	Current recovery value (A); delay (5S)	Code	Dry contact output
Normal	< 120	-	-	-
Charge and discharge overcurrent alarm	$120 \leq I_{max} \leq 180$	$< 120A$	Charge E71 / Discharge E81	-
Charge and discharge overcurrent protection	$I_{max} > 180$	Recovery after 5S	Charge E72 / Discharge E82	Dry contact 2 action
Short circuit protection	$I_{max} > 220$ (within 1mS)	Recovery after 5S	E83	Dry contact 2 action

Remark:

Charge and discharge overcurrent protection: After charging protection, it cannot be charged but can be discharged; after discharge protection, it cannot be discharged but can be charged.

4. Daily use and maintenance of battery pack

4.1 Solution to the battery code

Code	Meaning	Solution	Remark
E22	Module communication abnormal level 2 alarm	Check whether the communication line is plugged in tightly, the connection is reliable, and restart after troubleshooting.	-
E51	Module overvoltage level 1 alarm	Stop charging and check whether the charging voltage is too high.	Charging voltage: 56.8V
E52	Module overvoltage level 2 alarm	Stop charging immediately and check whether the charging voltage is too high.	Charging voltage: 56.8V
E61	Module undervoltage level 1 alarm	The battery is undervoltage, it is recommended to charge it as soon as possible.	-

Code	Meaning	Solution	Remark
E62	Module undervoltage level 2 alarm	The battery is undervoltage, it is recommended to charge it as soon as possible.	-
E71	Module charging overcurrent level 1 alarm	Check whether the charging current of the charging device is too large.	Rated charging current: 50A
E72	Module charging overcurrent level 2 alarm	1. Check whether the charging current of the charging device is too large; 2. Use a current clamp to test whether the battery input current is consistent with the displayed current. If the difference is large, the BMS current may be inaccurate and needs to be replaced by a professional or authorized person.	Rated charging current: 50A
E81	Module discharge overcurrent level 1 alarm	Check whether the load of the battery is too heavy, and appropriately reduce the load.	Rated discharge current: 50A
E82	Module discharge overcurrent level 2 alarm	1. Check whether the load of the battery is too heavy, and appropriately reduce the load; 2. Use a current clamp to test whether the battery output current is consistent with the displayed current. If the difference is large, the BMS current may be inaccurate and needs to be replaced by a professional or authorized person.	Rated discharge current: 50A
E83	Module discharge load short circuit (serious)	1. Check whether the battery output is short-circuited; 2. Check whether the battery output load is seriously overloaded; 3. If E83 is still displayed after eliminating the above conditions, restart the BMS.	-
E92	Single cell overvoltage level 2 alarm	Check whether the voltage of a certain cell exceeds 3.8V on the display screen, but the other voltages are normal and basically the same. It is possible that the battery cell is faulty and needs to be repaired.	-
E101	Single cell undervoltage level 1 alarm	The battery is undervoltage, it is recommended to charge it as soon as possible.	-
E102	Single cell undervoltage level 2 alarm	The battery is supplied with undervoltage. Charge it as soon as possible, otherwise the battery may be damaged.	-
E111	Module high temperature level 1 alarm	It is recommended to appropriately reduce the charge and discharge current.	-
E112	Module high temperature level 2 alarm	1. At this time, the BMS has automatically cut off the charging and discharging current, and automatically resumes charging and discharging when the temperature drops, appropriately reducing the charging and discharging current to avoid over-temperature protection;	-

Code	Meaning	Solution	Remark
E112	Module high temperature level 2 alarm	2. If E112 is displayed without charging or discharging, please restart the BMS once. If the problem persists, it means that the BMS is damaged and needs to be replaced by a professional or authorized person.	-
E121	Module low temperature level 1 alarm	It is recommended to charge and discharge in a high temperature environment.	-
E122	Module low temperature level 2 alarm	1. It is recommended to charge and discharge under a higher temperature environment; 2. If the current ambient temperature is between -20°C and 55°C but E122 is displayed, please restart the BMS once. If the problem persists, please check whether the internal plug is loose; 3. If the internal wiring harness plug is not loose, it means that the BMS is damaged and needs to be replaced by a professional or authorized person.	-

4.2 Daily maintenance of battery pack

1. Check the voltage data on the BMS display and the actual battery voltage value to ensure the accuracy of the voltage collection of the BMS. If they are inconsistent, proofreading is required. The error between the collected voltage and the actual battery voltage does not exceed 10mV.
2. Check the temperature collection data and actual temperature value of the BMS, and the data error between the collected data and the actual temperature value is not allowed to exceed 3°C, to ensure that the battery will not be charged or discharged when the temperature is too high or too low.
3. Check the BMS current collected data and actual current value, the error is not allowed to exceed 1%, to ensure that the battery will not be charged or discharged by overcurrent.
4. Check the reliability of the charging equipment to ensure that the charging equipment performs charging according to the voltage and current regulations sent by the BMS, to ensure that the battery will not be overcharged.
5. Check the connection of the battery pack is good, the contact points are in normal contact, and there is no accumulation of dust, powder, metal chips.

4.3 Caution

1. Children are not allowed to use the batteries.
2. It is forbidden to disassemble the battery.
3. Keep batteries or battery packs away from dangerous items or materials, such as corrosive chemicals, dangerous machinery and equipment, and high-temperature environments.

4. Unreasonable use of this of products may cause smoke, such as external short circuit, overcharging, and high ambient temperature. If smoke occurs, please cut off the power in time, use carbon dioxide or dry powder fire extinguisher for treatment, and bury it with sand or mud. The crowd must be evacuated in time during the entire process.
5. Unreasonable use of this series of products may cause the single battery to swell. In severe cases, it may cause the casing to rupture or crack. In these conditions, the battery should be stopped immediately. Please contact our technical department or after-sales service department for further solution.
6. It is forbidden to short circuit the positive and negative terminal of the battery directly, and avoid any metal or other conductive objects contacting the positive and negative terminal of the battery. This operation may cause personal injury or property damage.
7. It is forbidden to immerse the battery in water or other conductive liquids. This operation may cause personal injury or property damage.
8. It is forbidden to use this product in series or parallel with other types of batteries. It is also forbidden to connect the whole system in series or parallel operation with other batteries. These operations may cause personal injury or property lose. If necessary, please contact the relevant technical department to obtain the correct technical support.
9. It is forbidden to get wet under the environment of more than 95%RH, even immerse in water. Otherwise, it may cause internal short circuit, loss of function or abnormal chemical reaction, and cause fire, smoke, explosion and other accidents.
10. It is forbidden to put the battery system into fire or to be exposed to a high temperature environment exceeding the temperature conditions specified in this specification for a long time. These environments above the safe temperature range will cause a significant decrease in the performance and life of this product, and even cause serious consequences such as combustion and explosion.
11. It is forbidden to store and use in an environment with high static electricity or high electromagnetic radiation. Otherwise, the electronic devices in this product will be damaged, which may cause potential safety hazards.
12. Connect the positive and negative terminal of the battery system strictly in accordance with the instructions, and reverse charging is prohibited.
13. When the electrolyte leaks, avoid contacting the electrolyte with skin and eyes. In case of contact, wash the area with plenty of water and seek medical assistance. It is forbidden for any person or animal to swallow any part of the battery system or the substance contained in the battery system.
14. Protect the battery system as much as possible to avoid mechanical vibration, collision and pressure shock, otherwise the battery system may short circuit, resulting in high temperature and fire.