

Specification Of Lithium-ion Battery

Model: 48V/100Ah

Lithium iron phosphate (LiFePO₄) battery pack

Drafter	
Proofreader	
Auditor	
Standard	

Customer Approve

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1 Scope

This specification describes the basic performance, technical requirements, testing method, and precautions of the Lithium iron phosphate (LiFePO₄) battery pack. This specification only applies to 48V/100Ah lithium iron phosphate (LiFePO₄) battery pack manufactured by Sichuan Changhong Battery Co., Ltd.

2 Product type and model

2.1 Product type: Lithium iron phosphate (LiFePO₄) battery pack

2.2 Model: 48V/100Ah

3 Specification

Items		Specifications
Rated Capacity		100Ah
Nominal Voltage		48V
Discharge Cut-off Voltage		40.5V
Internal Resistance		≤30mΩ
Charging Method		CC/CV
Max. Charging Voltage		54V
Max. Charging Current		100A
Max. Discharging Current		100A
Charging Current Limiting		20A
Operating Temperature	Charge	0℃～55℃
	Discharge	-20℃～60℃
Storage Temperature	< 1 month	-20℃～45℃, RH45%～85%
	< 3 month	-20℃～40℃, RH45%～85%
	< 1 year	-20℃～25℃, RH45%～85%
Dimension(W×H×D)		442×177.5×431.2 mm(see figure 1)
Weight		Approx. 47kg

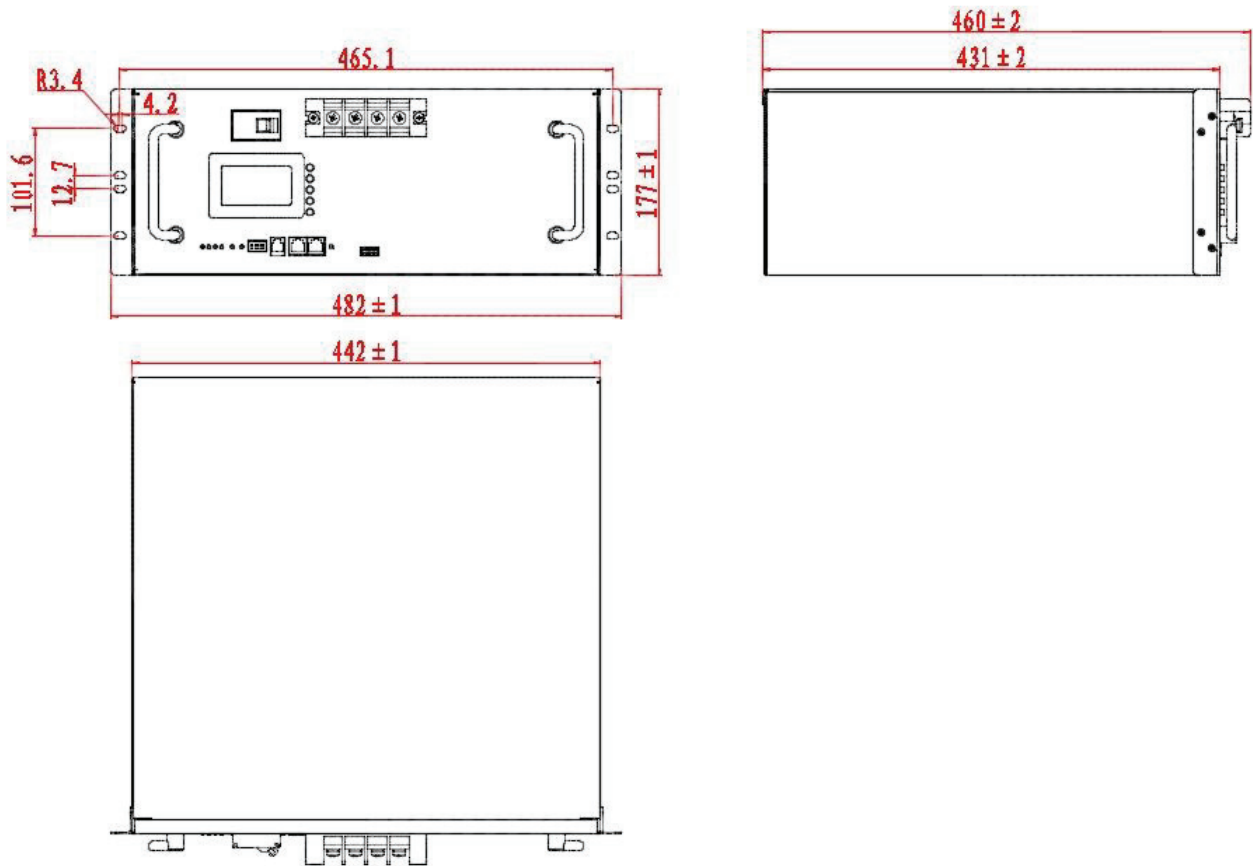


Figure 1 Battery Size

4 Appearance

The surface of the battery pack should be clean, no apparent deformation, no mechanical damage; no corrosion of the interface contact, and it should have obvious and clear product identification. Positive, negative terminal and polarity should be clearly marked so as to be easy to connect the power interface. Communication(or alarm) interface should be clearly identified, and conduct trace layout design to make the design of the battery line and control line artistic and tidy.

5 Electrical Characteristics

5.1 General Characteristics

Items	Criteria	Test Method
Standard Charge	CC/CV	At 25°C±2°C, the battery shall be charged at a constant current of 0.2I _t A, up to a voltage of 54V, then be charged at a constant voltage of 54V up to a current of ≤0.05I _t A.
Discharging at 25°C 0.2I _t A	Discharge capacity ≥rated capacity	At 25°C, After fully charging in accordance with standard charge and storing for 0.5h, test the discharge capacity with the current of 0.2I _t A to the end voltage 40.5V(or 2.5V/cell).
Discharging at -10°C 0.2I _t A	Discharge capacity ≥rated capacity*60%; The battery has no deform and no explosion.	After fully charging in accordance with standard charge, and storing for 6h at -10°C ±2°C, test the discharge capacity with the current of 0.2I _t A to the end voltage 40.5V(or 2.5V/cell).
Discharging at 55°C 0.2I _t A	Discharge capacity ≥rated capacity*95%; The battery has no deform and no explosion.	After fully charging in accordance with standard charge, and storing for 4h at 55°C ±2°C, test the discharge capacity with the current of 0.2I _t A to the end voltage 40.5V(or 2.5V/cell).
Cycle Life	≥1000 cycles	At 25°C±5°C, charging the battery in accordance with standard charge, then discharging the battery with the current of 0.2I _t A to the end voltage 40.5V(or 2.5V/cell), repeat the test until the discharge capacity is less than rated capacity*80%
Storage Characteristics	Retention capacity ≥rated capacity*95%; Recovery capacity ≥rated capacity*90%	After fully charging in accordance with standard charge, and storing for 30 days at 25°C±5°C, test the discharge capacity with the current of 0.2I _t A to the end voltage 40.5V(or 2.5V/cell); Then charging the battery in accordance with standard charge and test the discharge capacity with the current of 0.2I _t A to the end voltage 40.5V(or 2.5V/cell) again.

5.2 Safety Characteristics

Items	Criteria	Test Method
Over Charging Test	The battery has no fire and no explosion.	After fully charged in accordance with standard charge, charging the single cell with current 1C to voltage 5V.
Over Discharging Test	The battery has no fire and no explosion.	After fully charged in accordance with standard charge, discharging the single cell with current 0.3C to voltage 0V.
Short Circuit	The battery has no fire and no explosion. The maximum temperature <130°C.	After fully charged in accordance with standard charge, the battery is to be short-circuited by connected with copper wire which maximum internal resistance is less than 5mΩ for 10min.
Puncture	The battery has no fire and no explosion.	After fully charged in accordance with standard charge, the single cell will be put into fume hood and be punctured with a high temperature resistant nail (the diameter of 3.0mm ~ 8.0mm) till it is completely discharged.
Thermal Shock	The battery has no fire and no explosion.	After fully charged in accordance with standard charge, the battery will be put into the high temperature chamber at 85°C for 120min.

6 BMS

Battery management system provides overcharge protection, over-discharge protection, over-current protection, over-temperature protection and short circuit protection, and it can keep the battery voltage balance etc.

No.	Items	Specifications	
1	Single battery over-charge protection	Over-charge alarm voltage	3.60±0.02V
		Over-charge protection voltage	3.65±0.02V
		Over-charge detection delay time	1.0±0.5S
		Over-charge release voltage	3.38±0.02V
		Over-charge release conditions	Single battery voltage<3.38V or discharge
2	Single battery over discharge	Over-discharge alarm voltage	2.80±0.02V
		Over-discharge protection voltage	2.50±0.02V
		Over-discharge detection delay time	1.0±0.5S
		Over-discharge release voltage	2.90±0.02V

		Over-discharge release conditions	Detecting the effective charging current or the voltage>2.9V.
		Over-discharge protection shutdown	Shutdown immediately after Under-voltage protection, and maintain communicate for 5min.
		Over-discharge shutdown activation	Connect the charger.
3	Battery pack over-charge protection	Over-charge alarm voltage	54.0±0.3V
		Over-charge protection voltage	54.8±0.3V
		Overcharge detection delay time	1.0±0.5S
		Overcharge release voltage	50.2±0.3V
		Overcharge release conditions	Battery pack voltage<50.625V or discharge
4	Battery pack over-discharge protection	Over-discharge alarm voltage	42.0±0.3V
		Over-discharge protection voltage	37.5±0.3V
		Over-discharge detection delay time	1.0±0.5S
		Over-discharge release voltage	43.5±0.3V,
		Under-voltage release conditions	Detecting the effective charging current or the voltage>42V.
		Under-voltage protection shutdown	Shutdown immediately after Under-voltage protection, and maintain communicate for 5min.
		Under-voltage shutdown activation	Connect the charger.
5	Current limit	Charging current limit	10A or 20A
6	Short circuit protection	Short-circuit protection current	≥300A
		detection delay time	300μs
		Protection release conditions	Disconnect the load
7	Overcurrent protection	Charge/Discharge overcurrent alarm	125±2A
		Charge/Discharge overcurrent protection (No.1)	130±2A
		Charge/Discharging overcurrent detection delay time (No.1)	1.0±0.5S

7 Operation Guide

7.1 Starting、Shutdown and Reset

7.1.1 Starting

- Press the RESET button
- Connect the charger and charge

7.1.2 Shutdown

- Press the RESET button for 3s
- Automatic shutdown after 24 hours of normal standby time
- Battery undervoltage (battery pack or cell voltage) protection
- The shutdown command through the PC software

7.1.3 Reset

- Press the RESET button for 10s

7.2 Safety instruction

Please read the following precautions carefully, making sure the Lithium Ion Battery Pack is used correctly.

- It is forbidden to use cables or other metal stuff to connect the positive and the negative directly, or conduct objects into the battery pack, which will lead to short circuit.
- It is forbidden to put the battery pack into water or make them wet.
- It is forbidden to put the battery pack into fire or heat it. The battery pack in the extreme hot environment can't be used, as it will affect the performance and shorten the life cycle due to the heat.
- It is forbidden to strike or throw the battery pack. It should be handled with care, avoiding strenuous vibration.
- It is forbidden to impale the battery pack with nails or other sharp objects, or slapping with hammer, or step on the battery pack with feet.
- It is forbidden to put the battery pack into microwave oven or pressure vessels.
- It is forbidden to disassemble the battery pack without manufacturer's authorization.
- It is forbidden to use it when the battery pack emits odor, heats, deforms, sounds abnormally, turns color or any other abnormal phenomenon occur. If the battery pack is in operation or charging, take it out immediately from the electrical equipment or charger and stop using. Send it back to the manufacturer's authorized unit or relative unit for proper disposition.
- It should be moved away from naked fire if the battery pack leaks or smells abnormally.
- It is forbidden to clean the container of battery pack with organic solvent.
- It is forbidden to put out the fire with carbon dioxide when accident occurs, but with fire fighting appliance with carbon tetrachloride or sandy soil.

- It is forbidden to smoke or light fire in the charging place to avoid explosion.
- It is forbidden to disassemble the battery pack. If disassembled, it is probably to cause short circuit, leading internal substance to resolve, break out fire, explore etc. as well as the leakage of the electrolyte. Do not scrubs, strip with water and go to a doctor immediately if the leaked electrolyte sparks into eyes, or the eyes will be injured. The leaked electrolyte should be far away from fire to avoid explosion.
- Do not connect the positive pole and the negative one inversely.
- It is forbidden to replace the single battery personally, but replace and install it by supplier.
- Before the initial discharge, the battery pack should be fully charged.
- The storage room should be kept clean, dry, light and ventilated.
- The battery pack should be charged in time to extend the life when the battery is low. If not, the battery pack is in power shortage status for long time, which will affect its life cycle. If the battery pack is to be shelved for long time, it's better to keep it half-charged, and charge it by constant voltage of 50.7V for one hour every three months.
- When charging, the battery pack should be far away from fire, inflammables and disconnect the load (Close the power equipment.)
- The working environment of the battery pack is 5°C~40°C (the best working environment: 15°C~35°C). The performance will be affected if the working temperature is beyond the range, as the capacity changes, or the operation time of the equipment changes, but it's normal.
- The battery pack belongs to consumables, and its life is limited. Replace the battery when the capacity is lower than 70% of the rated capacity.
- Keep the battery pack in the room where is cool and dry if it's not used in a long time, or the performance becomes weak. Scrubs it with dry cloth if the terminal stud is dirty, or the battery pack will in bad-contact, leading to capacity loss or no ability to charge.

7.3 Status before ex-work

The battery pack is in 50% charged status. The voltage $\geq 48V$.

8 Transportation

Transport the battery after it is packed into carton. During the transportation, the battery pack

shall not be gone through severe mechanical collision, sun, rain. The battery pack shall not be placed inverted. During unloading, handle it with care, avoid throwing, rolling, pressing.

9 Storage period

The battery (battery pack) should be stored in the dry, ventilated and clean room, far away from corrosive substances, fire and heat source. It should be kept in 5°C ~ 40°C ambient temperature environment with the relative humidity of less than 75%. During storage, the battery is in 50%~60% charged status to avoid over-discharging. The battery should be charged by constant voltage of 50.7V for 1 hour every 3 months.

10 Product responsibility

10.1 Read the specification carefully before and operate it strictly with specification. Our company is free of responsibility for the accidents caused by not obliging to the tips in the specification.

10.2 The specification is served as the arbitration if the supplier and the demander have conflicts over the technology