12.8V 314AH
LiFePO4 Battery
User Manual

JK ENERGY
SOLAR STORAGE

Content

1. Technical Specifications

NO.	Item	Parameters
1	Version	12.8V 314AH
2	Nominal Voltage	12.8V
3	Nominal Capacity	314Ah
4	Cell & Method	4S1P
5	Weight	Ca 31.5KG
6	Working Voltage	10-14.6V
7	Standard Charge Voltage	13.8-14.4V
8	Maximum Charge Voltage	14.5±0.1V
9	Standard Charge Current	≤ 150A
10	Maximum Charge Current	150A
11	Standard Discharge Current	≤ 150A
12	Maximum Discharge Current	150A
13	Charge Temperature Range	0~60 °C
14	Discharge Temperature Range	-20~60°C
15	Optimal Temperature Range	23±2°C
16	Cycle Life	≥6000 Cycles at 80% depth of discharge (100-20%)
17	Lithium Battery Type	LiFePO4（LFP）Lithium lron Phosphate
18	Working Environment	Charge Temperature: 0°C~60°C Discharge Temperature: -20°C~60°C Relative Humidity : ≤ 90 %

2. Overview of Safety and Performance Testing on LFP Cells and Battery Pack

The following sections summarize a comprehensive set of safety and performance tests conducted on lithium iron phosphate (LFP / $LiFePO_4$) battery cells and battery packs. These evaluations are designed to assess the behavior of the cells and packs under various stress conditions, including electrical, thermal, and mechanical scenarios. All tests were performed on fully charged units under controlled laboratory conditions.

Where noted, tests were conducted without a Protection Circuit Module (PCM) to evaluate the intrinsic safety of the cell design.

2.1. Cell-level Safety Tests

No.	Item	Specification	Test Method and Condition
1	Short Circuit Test	No explosion, No fire and the Temperature of the surface of battery is lower than 150℃	After standard charging and put the battery into a fume hood, and connect the Negative terminal and Positive terminal directly with a Cu wire (the wire's resistance should be lower than 50mΩ). Record the surface temperature of battery during the test and stop the test when the temperature decreases to about 10℃ lower than the peak temperature during whole test. Note： this test is performed without PCM
2	Heating Test	No explosion， No fire	After standard charging and put the battery into oven convection or circulating air oven. The temperature of oven is to be raised with a rate of 5±2℃/min to a temperature of 130±2℃ and last for 10 minutes.
3	Impact Test	No explosion， No fire	The fully charged battery is secured to the testing machine by means of a rigid mount which will support all mounting surfaces of the battery. The battery is subjected to a total of three shocks of equal magnitude. The shocks are applied in each of three mutually perpendicular directions. At least one of them shall be perpendicular to a flat face. For each shock the battery is accelerated in such a manner that during the initial milliseconds the minimum average acceleration is 75 gn. The peak acceleration shall be between 125 gn and 175 gn. Batteries are tested in an ambient temperature of 25℃±3℃.

4	Over Charge Test	No explosion， No fire	After a standard charge, the cell is placed in a fume hood. A constant voltage of 3.9 V and current of 1C are applied until the voltage reaches 3.9 V and current drops to nearly 0 A. The surface temperature is recorded, and the test ends when the temperature drops to about 10 °C below the peak. Note: Test conducted without a Protection Circuit Module (PCM).

Summary

These cell-level tests are designed to simulate extreme conditions and verify the safety and stability of LFP cells. By evaluating thermal behavior, mechanical resilience, and electrical limits, the results demonstrate that the cells maintain integrity and safety even when exposed to demanding scenarios. The absence of fire, leakage, or explosion across all tests confirms the robustness of the cell design.

2.2. Mechanical Testing of Battery Pack

To ensure the safe handling, transport, and operation of LFP battery packs, mechanical stress tests are performed under controlled conditions. These include drop and vibration tests that simulate real-world impacts and movement. The battery packs are fully charged before testing, and each procedure confirms that no explosion, leakage, or fire occurs—even under harsh physical conditions. These results demonstrate the pack’s structural integrity and resilience, reinforcing the overall safety of the battery system.

No.	Item	Specification	Test Method and Condition
1	Drop Test	No explosion, No leakage and No fire.	After a standard charge, the battery pack is dropped from a height of 1 meter onto concrete ground. The drop is performed twice.
2	Vibration Test	No explosion, No leakage and No fire.	Fully charged battery packs are subjected to vibration under the following conditions: • Simple harmonic motion with amplitude of 0.76 mm (total excursion 1.52 mm) • Frequency varied at 1 Hz/min between 10 Hz and 55 Hz • Full sweep (10 Hz → 55 Hz → 10 Hz) completed in 90 ± 5 minutes per mounting position • Vibration applied in three mutually perpendicular directions Procedure: Step 1: Verify voltage is typical of a charged pack Steps 2–4: Apply vibration as specified Step 5: Remove battery from mount and perform visual inspection

3. BMS/PCM Specifications

No.	Item	Specification	Parameter
1	Cell over-discharge protection	Over-discharge detection voltage	2.50V
		Over-discharge detection delay time	Typical:1.0s
		Over-discharge release voltage	2.90V or charge
2	Pack overcharge alarm	Pack Overcharge alarm voltage	14.5V
		Pack alarm release voltage	14.5V
3	Pack overcharge protection	Pack Overcharge detection voltage	14.6V
		Overcharge detection delay time	Typical:1.0s
		Overcharge release voltage	14.2V
4	Pack over-discharge alarm	Pack Over-discharge alarm voltage	10.2V
		Pack alarm release voltage	10.4V
5	Pack over-discharge protection	Pack Over-discharge detection voltage	10V
		Over-discharge detection delay time	Typical:1.0s
		Over-discharge release voltage	10.2V or charge
7	Short circuit protection	Short protection current	560A
		Protection condition	Load short
		Detection delay time	≤300us
		Protection release condition	Charging release
8	Balance	Balance threshold voltage	3.45V
9	Alarm	It has over-temperature, over charge, under-voltage, over-current, short circuit alarm function	

3.1. Over charge protection and recovery

3.1.1. Cell level over charge protection and recovery

When the voltage of any one cell is higher than the set value of the cell overcharge voltage, and the duration reaches the cell overcharge delay, the system enters the overcharge protection state, the charging MOSFET will turn off, and the battery cannot be charged. After the cell over charge protection, when the voltage of all cells drops below the cell overcharge recovery value, the overcharge protection state is released. It can also be released by discharge.

3.1.2. Pack level over charge protection and recovery

When the battery voltage is higher than the entire over-voltage set value, and the duration reaches the entire overcharge delay, the system enters the overcharge protection state, turns off the charging MOSFET, and cannot charge the battery. When the entire voltage drops below the recovery value of the entire voltage over-voltage protection, the over charge protection state is released, and it can also be released by discharge.

3.2. Over-discharge protection and recovery

3.2.1. Cell level over-discharge protection and recovery

When the minimum cell voltage of any one cell is lower than the set value of the over-discharge voltage of the cell, and the duration reaches the over-discharge delay of the cell, the system enters the over-discharge protection state, turns off the discharge MOSFET, and cannot discharge the battery. After the cell over-discharge protection occurs, charging the battery pack can release the over-discharge protection state.

3.2.2. Pack level over-discharge protection and recovery

When the battery voltage is lower than the over-discharge voltage set value, and the duration reaches the entire over-discharge delay, the system enters the over-discharge protection state, turns off the discharge MOSFET, and cannot discharge the battery. After the pack level over-discharge protection occurs, charging the battery pack can release the over-discharge protection state.

3.3. Over-current protection and recovery in charging mode

When the charging current exceeds the charging protection current and the duration reaches the over-current detection delay time, the system enters the charging over-current protection state and cannot charge the battery. After the charging over-current protection occurs, it will automatically recover after a delay. The charging over-current state can also be released by discharging.

3.4. Over-current protection and recovery in discharging mode

When the discharge current exceeds the discharge over-current protection current and the duration reaches the over-current detection delay time, the system enters the discharge over-current protection state and turns off the discharge MOSFET. Delayed automatic recovery after discharge over-current occurs, and the corresponding release time can be set longer if automatic recovery is required. Charging can also release the discharge over-current protect condition. Discharge has two-level over-current protection function, which has different response speeds for different current values, and protects the battery more reliably.

3.5. Temperature Protection and Recovery

3.5.1. High temperature protection and recovery in charging and discharging modes

When the NTC detects that the temperature of the battery cell surface is higher than the setting of high temperature protection value during charging and discharging, the management system enters the high temperature protection state, the charging or discharging MOSFET is turned off, and the battery pack cannot be charged or discharged in this state. When the temperature of the surface of the cell drops to the high temperature recovery set value, the management system recovers from the high temperature state and turns on the charge and discharge MOSFET again.

3.5.2. Low temperature protection and recovery in charging and discharging modes

When the NTC detects that the temperature of the cell surface is lower than the setting of low temperature protection value during charging and discharging, the management system enters the low temperature protection state, the charging or discharging MOSFET is turned off, and the battery pack cannot be charged or discharged in this state. When the temperature of the cell surface rises to the low temperature recovery set value, the management system recovers from the low temperature state and turns on the charge and discharge MOSFETs again.

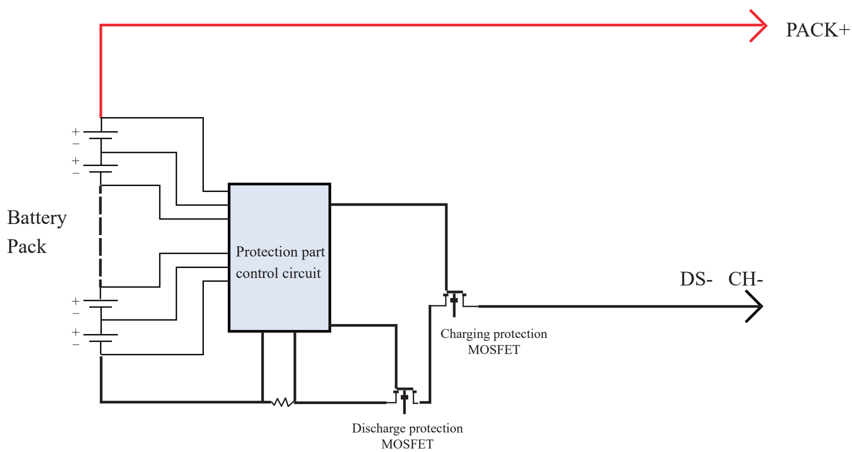
3.6. Balance function

The management system uses the resistance bypass method to balance the cells. During the charging process, the voltage of the highest single cell of the battery pack reaches the set equilibrium starting voltage value, and the voltage difference between the minimum voltage and the maximum voltage of the single cell of the battery pack is greater than the set value. When the value is set, the equalization function of the cells that meet the conditions is enabled, and the two adjacent equalizers cannot be enabled at the same time. The equalization stops when the cell voltage difference is less than the set value or the cell voltage is less than the equalization turn-on voltage.
NOTE: When the battery is new it is recommended to fully charge the battery for a extended periode of time so the cell balance process has time to complete.

3.7. Capacity calculation

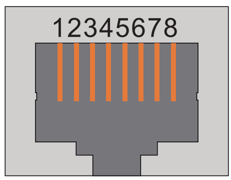
The SOC (state-of-charge) calculation of the battery pack can be accurately performed by integrating current and time. The full capacity is automatically updated after a complete charge and discharge cycle. It has the function of calculating the number of charge and discharge cycles. When the cumulative discharge capacity of the battery pack reaches the set cycle capacity, the number of cycles increases by one.
NOTE: Capacity learning operation: first fully charge to over-voltage protection, then discharge to under-voltage protection, and then charge it again for the capacity learning process to complete

3.8. BMS/PCM Functions Brief Diagram



Note: The above circuit shows a typical protection circuit module design.
The actual design may vary depending on the excact model.

3.9. RJ45 Interface Description



Interface	Defined Declaration	Interface	Defined Declaration
PIN1	RS485-B	PIN5	RS485-B(Inverter Use)
PIN2	RS485-A	PIN6	CAN-L
PIN3	CAN-H	PIN7	RS485-A
PIN4	RS485-A(Inverter Use)	PIN8	RS485-B

3.10. Heating Pad Technical Specifications

NO.	Item	Parameters
1	Rated Voltage	13V
2	Resistance	3.762Ω ±5%
3	Power Cable	Silicone wire 0.5mm^2
4	Rated Power	Each 45W, Total 90W

3.11. Working logic of heating function

The battery includes an integrated heating function that heats the cells so that normal charging can take place at temperatures below 0 °C. Heating occurs only when the battery is cold **and** an appropriate power source is available.

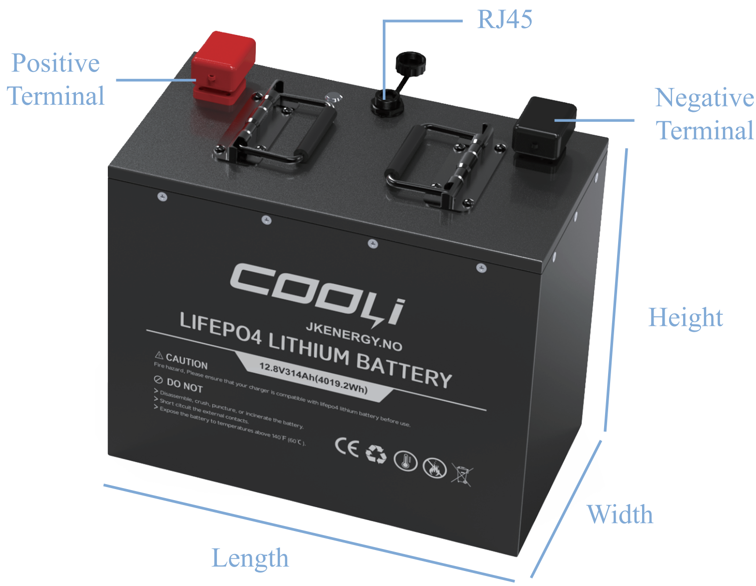
The heating function starts when the battery temperature is lower than the defined heating start temperature **and** at least one of the following conditions is met:

- **Heating is enabled in the app and sufficient discharge current is present**
  The battery uses a controlled amount of its own energy to produce heat.
- **A charger is connected**
  The charger's output voltage is higher than the battery voltage.
- **An external 12 V auxiliary power supply is available**
  Heating can be powered without using the battery's stored energy.
- **The battery is receiving charging current (>0 A)**
  Heating activates when energy is actually being supplied to the battery.
- **Forced heating is activated**
  Available only on models that support this function.

How the Heating Process Works

- The system detects that the battery temperature is below the heating start threshold.
- Available power is directed to the internal heating elements.
- The battery warms up to a safe charging temperature (typically around 0–5 °C).
- Once the required temperature is reached, the heating function shuts off automatically.

4. Product Scheme and Characteristics



NO.	Item	Parameters
1	Version	12.8V 314AH
2	Length	355mm
3	Width	190mm
4	Height	288mm
5	Connection Bolt Size	M8
6	Product Weight	≈31.5Kg
7	Terminal Type	Copper terminal block
8	Initial State of Charge	The battery is delivered with an initial SOC of 50-60% (approx.)

5. Storage Conditions

◆ For long time storage, the battery should be charged to Approx 60% SOC, this corresponds to the initial state of charge.Voltage is about 1.05 times the nominal voltage when resting in this state.
The battery should be kept in storage in a dry and ventilated place.
◆ The battery pack and charger should be stored in clean, dry and ventilated place, avoid contacting with corrosive materials and be away from fire and heat.

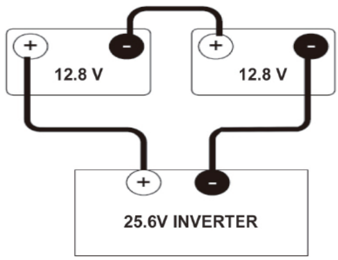
6. Product Responsibility

◆ We assume no responsibility for the accident of not operating in accordance with the specification.
◆ If the specifications, raw materials, production process or production control systems is changed, the change will vary depending on the quality and reliability of data written notice to the customer.

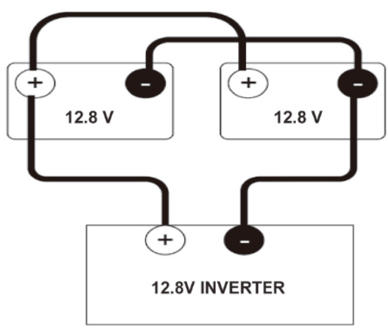
7 . Battery Handling Precautions

◆ Don't immerse battery in water or allow it to get wet!
◆ Don't charge, use and store battery near a heat source such as fire heater! If the battery leaks or releases strange odor, please remove it from place near fire place immediately. Fully charge the battery before first-time using.
◆ Don't reverse the positive and negative pole of battery!
◆ Don't throw the battery into fire or heat it!
◆ Don't short-circuit battery with wire or other metal objects !
◆ Don't nail, knock or trample the battery!
◆ Don't disassemble the battery in any way!
◆ Don't put the battery into microwave oven or pressure vessel!
◆ If the battery gives off odor, gets heat, deformation, discoloration or appears and abnormal behaviors, stop using it. Please remove the battery from electrical appliances and stop using it if the battery is being used or charged!
◆ Don't use battery in a very hot environment, such as under direct sunlight or in car on hot day. Otherwise, the battery will overheat which will affect battery performance and shorten battery life !
◆ If the battery leaks and electrolyte leakage enters into the eyes, don't rub, rinse with water immediately and seek immediate medical assistance. If not in time, eyes will be hurt!
◆ Ambient temperature will affect the discharge capacity of battery, if the ambient temperature is beyond the standard environment (23±2°C), the discharge capacity will be changed.

◆**Do not connect batteries in series or parallel at the same time.**
When connected in series, the number of batteries is ≤ 4.
Use only same battery model and with the same capacity when connecting batteries in series.



(Battery Wiring In Series Configuration)



(Battery Wiring In Parallel Configuration)

8. Special Considerations

◆ During charging process, if there has odor or unusual noise, please stop charging immediately.
◆ During discharging process, if there has odor or unusual noise, please stop discharging immediately.
◆ If there have above behavior during your using process, please contact us, do not disassemble by yourself.

For the above contents of the specification, we has the final interpretation right. If there is any change, we will notify the user in advance.