

# LiFePO4 Battery Specification

## 51.2V-100AH



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# Product Specification

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The specification shall be applied to Li-ion rechargeable battery pack Of 51.2V 100Ah which is manufactured by Our company.

## 2 . Specification

NO	Items	Criteria	Remarks
2.1	Typical Capacity	5120Wh	0.5 C charge discharge for voltage
2.2	Combination Method	16S1P	
2.3	Nominal Voltage	51.2V	
2.4	Internal Impedance	Battery: $\leq 0.7m\Omega$	AC 1 KHz after standard charge
2.5	Charge Voltage(V)	58.4V	
2.6	Standard Charge Current	50A	
2.7	Max. Charge Current	100A	
2.8	Continuous discharge current	100A	
2.9	Pulse current	200A	
2.10	Shipping Voltage Requirements	$\geq 51.2V$	
2.11	Operating Temperature	0°C ~ +55°C	Charging
		-20°C ~ +55°C	Discharging
2.12	Storage Temperature	-20°C ~ +45°C	Less than 1 month
		-20°C ~ +35°C	Less than 6 months

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## 3 . Battery Configuration

NO	Items	Criteria	Remarks
3.1	EVE-manufactured Cell	50160116-100Ah	LiFePO4
3.2	BMS	16S100A	
3.3	Connector		

## 4 . Battery Performance Criteria

### 4.1 Appearance

There shall be no such defect as scratch, bur and other mechanical scratch, and the connector should be no rust dirt. The structure and dimensions see attached drawing of the battery. It's required that the battery must match well with the mobile phone of 51.2V100Ah.

### 4.2 Measurement Apparatus

( 1) Dimension Measuring Instrument

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01 mm.

(2) Voltmeter

Standard class specified in the national standard or more sensitive class having inner impedance not less than 10 K $\Omega$ /V.

(3) Ammeter

Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01 $\Omega$  .

(4) Impedance Meter

Impedance shall be measured by a sinusoidal alternating current method(AC 1kHz LCR meter) .

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## 4.3 Standard Test Condition

Test should be conducted with new batteries within one month after shipment from our factory and the cells shall not be cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under temperature of  $23\pm 2^{\circ}\text{C}$  and relative humidity of less 75% , air 86Kpa~ 106Kpa.

## 4.4 Standard Charge

Full charge condition: Constant current 0.1C, Constant voltage 58.4V for 16 hours in all at  $23\pm 2^{\circ}\text{C}$  .

## 4.5 Common Performance

NO	Items	Testing method and determinant standard
1	Charge Performance	The battery can be charged when using the original charger. The standard charge mode :under the temperature of $23\pm 2^{\circ}\text{C}$ , charge the battery with the current of 0.1C until the voltage reaches up to 58.4V, then charge with constant voltage until the charge current $\leq 0.02\text{C}$ , then stop charging.
2	Discharge Performance	When connecting with load, the battery can supply power. Charge the battery with standard charge mode, then rest for 0.5h, then discharge with 0.1C until the voltage is 40V, and the discharge time is required $\geq 5\text{h}$ . The cycle life is required 5 times.
3	Cycle Performance	Under the temperature of $23\pm 2^{\circ}\text{C}$ , charge the battery with 0.1C, when the voltage reaches up to 58.4V charge with constant voltage until the charge current $\leq 0.02\text{C}$ , then stop charging, then rest for 0.5h, then discharge with 0.1C to 40V. Cycle with the above mode, when the continuous discharge time $< 3\text{H}$ stop cycling. The cycle life is required $\geq 6000$ times.

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NO	Items	Testing method and determinant standard
4	Charged Storage Characteristics	Charge the battery with 0.1C, then shift to charge with constant voltage until the voltage reaches up to 58.4V, when the charge current $\leq 0.02C$ stop charging; rest under the temperature of $23 \pm 2^\circ\text{C}$ for 28 d then discharge with 0.1C to 40V. The discharge time is required $\geq 4.25\text{h}$ .
5	Storage Characteristics	Charge the battery, which is new manufactured shorter than 3 months, with 0.1C until the capacity reaches to 40~50%, after resting for 12 months under the temperature of $20 \pm 5^\circ\text{C}$ and the humidity of 45 ~ 75% , then charge with 0.1C to 58.4V then shift to charge with constant voltage , under the temperature of $23 \pm 2^\circ\text{C}$ , after full-charge rest for 0.5 h, then discharge with 0.1C to 40V. The discharge time is required $\geq 4\text{h}$ . The cycle life is required 5 times.

## 4.6 Safety Performance

NO	Items	Testing method and determinant standard
1	High Temperature Characteristics	Under the temperature of $23 \pm 2^\circ\text{C}$ , after charging the battery with 0.1C, then put the battery into the constant temperature and humidity oven with $65 \pm 2^\circ\text{C}$ for 2h, then discharge with 0.1C to 40V. The discharge time is required $\geq 4\text{h}$ and the battery should no deformation and smoking.
2	Low Temperature Characteristics	Under the temperature of $-20^\circ\text{C}$ , after charging the battery with 0.1C, then put the battery into the constant temperature and humidity oven with $-40 \pm 2^\circ\text{C}$ for 4h, then discharge with 0.1C to 40V. The discharge time is required $\geq 0.1\text{h}$ and the battery should no deformation and smoking.
3	Overcharge Protection Characteristics	After full-charging the battery with 0.1C and set the constant current and voltage supplier with 2 times of the nominal voltage and current, then load it to the battery for 7h. It is required the battery should be no leakage, deformation, smoking and explosion during the test processes.

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NO	Items	Testing method and determinant standard
4	Over- discharge Protection Characteristics	Under the temperature of $23\pm 2^{\circ}\text{C}$ ,after discharging the battery with 0.1C to 40V, then connect the load with $n \times 30\Omega$ then discharge for 7h. It is required the battery should be no leakage, in fire, smoking and explosion during the test processes.
5	Short- circuit Protection Characteristics	Under the temperature of $23\pm 2^{\circ}\text{C}$ , after full-charging the battery with 0.1C, then make the battery's anode and cathode short-circuit for 1h (the connecting resistance is smaller than $80\pm 20\text{m}\Omega$ ), and there should be no leakage, deformation, smoking and explosion during the test processes.
6	Constant Humidity and Temperature Characteristics	Under the temperature of $23\pm 2^{\circ}\text{C}$ , after charging the battery with 0.1C, then put the battery into the constant temperature and humidity oven with $40\pm 2^{\circ}\text{C}$ and 90 ~ 95% for 48 h, the battery should be no obvious deformation, leakage, rust, smoking and explosion. After testing take out the battery then rest for 2h under the temperature of $23\pm 2^{\circ}\text{C}$ , discharge with 0.1C to 40V. The discharge time is required $\geq 3\text{H}$ .
7	Drop Test	After charging the battery, put it aside for 1H ~ 4H for testing. 1. Drop the battery onto the concrete with a free fall height of 1m. Drop one on each side of the battery Times, a total of six tests. After the test, measure the voltage and visually inspect the appearance of the battery. 2. Drop the battery pack onto the concrete with a free fall height of 1.5m. Each side of the battery falls Once, a total of six tests were conducted. After the test, measure the voltage and visually inspect the battery appearance. There should be no leakage, fire or explosion.

## 4.7 Rest Period

Unless otherwise defined, 30 min, rest period after charge, 30 min, rest period after discharge.

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## 5 . Storage and Others

### 5.1 Long Time Storage

If stored for a long time(exceed three months) , the cell should be stored in drying and cooling place. The cell' s storage voltage should be 51.2 ~ 55.7V

and the cell is to be stored in a condition that the temperature of  $23 \pm 2$  °C and the humidity Of 45%- 75% .

### 5.2 Others

Any matters that this specification does not cover should be conferred between the customer and ours .

## 6 . Protection Circuit

Item	Content	Criterion
Voltage	Charging voltage	DC:58.4V CC/CV
	Balance voltage for single cell	3.525±0.025V
Current	Balance current for single cell	35± 10mA
	Current consumption	≤70uA
	Max charge current	≤ 100A
	Max continues discharge current	≤ 100A
	Pulse current(time)	200A (5S)
Over Charge Protection	Over charge detection voltage	3.65±0.025V
	Over charge detection delay time	0.5~ 1.5S
	Over charge release voltage	3.55±0.05V



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Item	Content	Criterion
Over Discharge Protection	Over discharge detection voltage	2.50±0.05V
	Over discharge detection delay time	500~ 1500mS
	Over discharge release voltage	2.7±0.10V
Over Current Protection	Over discharge current detection	115±5A
	Detection delay time 1	50~ 150mS
	Detection delay time 2	5~ 15mS
	Over charge current detection current	115±5A
	Detection delay time	300~800mS
Short Protection	Short Circuit Protection Current	About 1260A
	Detection delay time	450~800uS
	Detection condition	Exterior short circuit
	Release condition	Cut load, Auto Recovery
Temperature	Detect the temperature of the Mosfet	90±5°C
	Charging high temperature protection	65±5°C
	Charging low temperature protection	0±5°C
	Discharge high temperature protection	70±5°C
	Discharge low temperature protection	-20±5°C
	Temperature protection release condition	Drop to 45°C , charge
	Operating temperature range	-20~+80°C
	Storage temperature range	0~60°C
Internal Resistance	Main loop electrify resistance	≤5mQ

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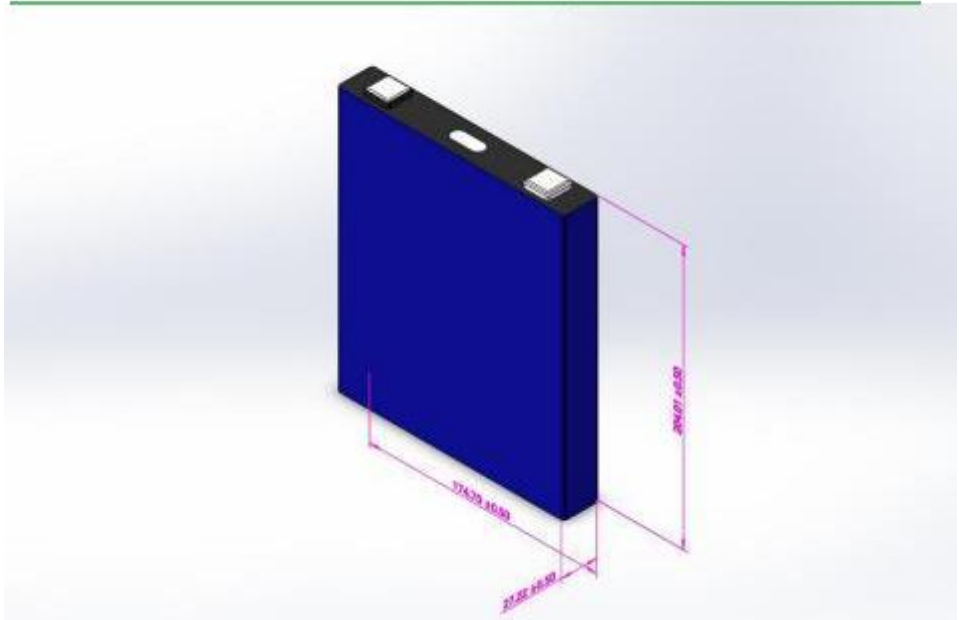
## 7 . Assembly Drawing

### 7.1 Pack Battery



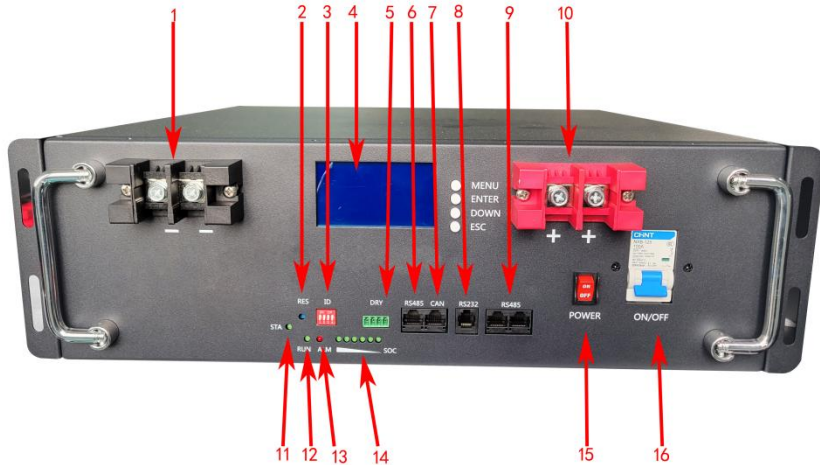
Length	Width	Height
483mm±2mm	460mm±2mm	140mm±2mm

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Length	Width	Height
160mm±0.5mm	50mm±0.5mm	116mm±0.5mm

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ON	Item	Bewrite
1	negative	battery box negative interface
2	reset button	reset system status
3	address code	the code switch is used for setting the address of each BMS protection board, supports multi-module expansion using
4	Display screen	Data display
5	dry contacts	provides multi-channel dry contacts signal, the dry contacts signal is passive switch, does not divide the polarity

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6	external RS485 communication	independent RS485 communication for communication with external inverter, inverter protocol to upload the corresponding summary battery information, the default baud rate of 9600bps.
7	external CAN communication	independent CAN communication for communication with external inverter, inverter protocol to upload the corresponding summary battery information, CAN communication default baud rate of 500 kbps
8	RS232 communication	with RS232 communication function for BMS internal testing and debugging, the default baud rate is 9600bps
9	RS485 communication	with parallel dual RS485 function for the battery pack parallel machine, address compatibility automatic and manual settings, the default baud rate of 9600bps
10	positive	battery box positive interface
11	status indicator	display BMS switch status
12	Operation	Indicator display battery current status
13	Warning indication	display battery current status
14	power indicator	display battery current
15	Switch	Control the battery output, turn on the switch, and the battery will work
16	Air switch	Protect the battery to prevent battery damage caused by high current impact and short circuit

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## Appendix

### Handling Precautions and Guideline For Li-ion Rechargeable Batteries

#### Preface

This document of 'Handling Precautions and Guideline Li-ion Rechargeable Batteries' shall be applied to the battery cells manufactured by Our company.

#### Note 1 :

The customer is requested to contact Our company. in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

#### Note 2 :

Our company. will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

#### Note 3:

Our company.will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the cell, if it is deemed necessary.

### Caution!

Do not use or store the battery where is exposed to extremely hot, such as under window of a car in direct sunlight in a hot day. Otherwise, the battery may be overheated. This can also reduce battery performance and/or shorten service life.

If the battery leaks and electrolyte gets in your eyes, do not rub them. Instead, rinse them with clean running water and immediately seek medical attention. If left as is, electrolyte can cause eye injury.

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## Danger!

- Do not immerse the battery in water or allow it to get wet.
- Do not use or store the battery near sources of heat such as a fire or heater. — Do not use any chargers other than those recommended by JHY.
- Do not reverse the positive(+) and negative(-) terminals.
- Do not connect the battery directly to wall outlets or car cigarette- lighter sockets.
- Do not put the battery into a fire or apply direct heat to it.
- Do not short-circuit the battery by connecting wires or other metal objects to the positive(+) and negative(-) terminals.
- Do not pierce the battery casing with a nail or other sharp object, break it open with a hammer, or step on it.
- Do not strike, throw or subject the battery to sever physical shock.
- Do not directly solder the battery terminals.
- Do not attempt to disassemble or modify the battery in any way.
- Do not place the battery in a microwave oven or pressurized container.
- Do not use the battery in combination with primary batteries( such as dry- cell batteries) or batteries of different capacity, type or brand.
- Do not use the battery if it gives off an odor, generates heat, becomes discol- ored or deformed, or appears abnormal in any way. If the battery is in use or being recharged, remove it from the device or charger immediately and discontin- ue use.