



# LiFePO4 Battery Pack 51.2V96Ah Product Manual

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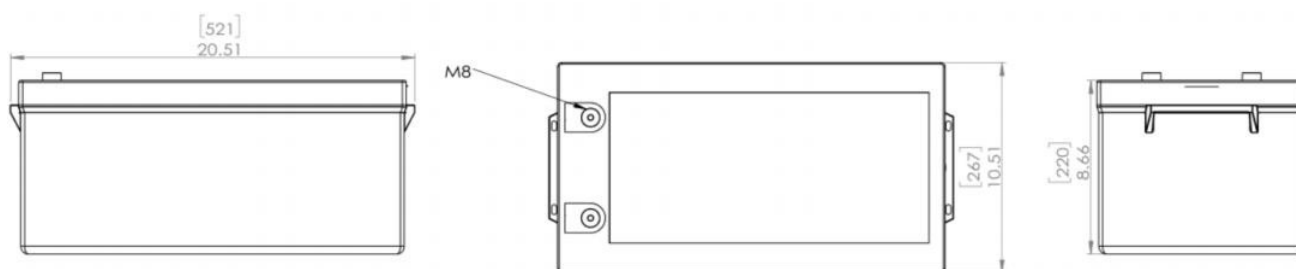
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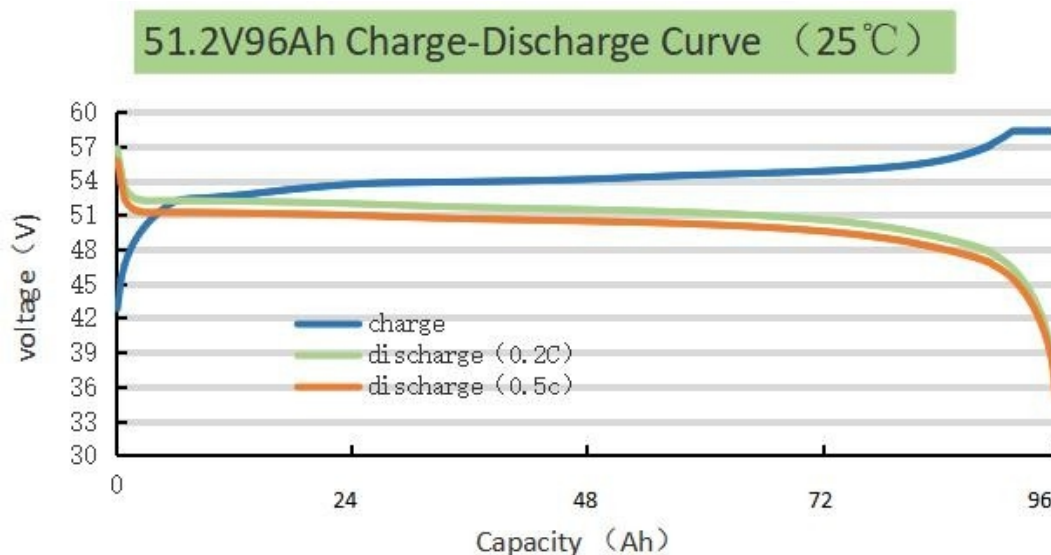
### 1 Product Specification

No.	Items	Specification
1	Product Model	HC51.2V96Ah (26650-4600mAh-3.2V-16S21P)
2	Normal Voltage	51.2V
3	Rated Capacity	96Ah(C <sub>5</sub> )
4	Energy	4.92KWh
5	Weight	About 36kg ± 2kg
6	Size	(520±2) mm * (267±2) mm* (220±2) mm
7	Internal Resistance(AC)	≤40m Ω
8	Charge Voltage	57.6±0.2V
9	Standard Cu toff Voltage	About 40V
10	Charge Current	≅ 50A
11	Standard Discharge Current	≅ 80A
12	Max Discharge Current	≤100A
13	Passive Protection Function	Over charge protection, Over discharge protection, Temperature protection, Balanced function
14	Charging Terminal	M8
15	Discharge Terminal	
16	Cycle Life	≥2,000@0.5C/1C (100%DOD)
		≥4,000@0.5C/1C (80%DOD)
		≥6,000@0.5C/1C (50%DOD)

### Drawing



## 2 Characteristics Curve



## 3 User's Manual

### 3.1 Charge

Charging terminal of battery pack is connected to charger appropriate with it, and then charge. Charge voltage is  $57.6 \pm 0.2V$ . Do not reverse.

### 3.2 Discharge

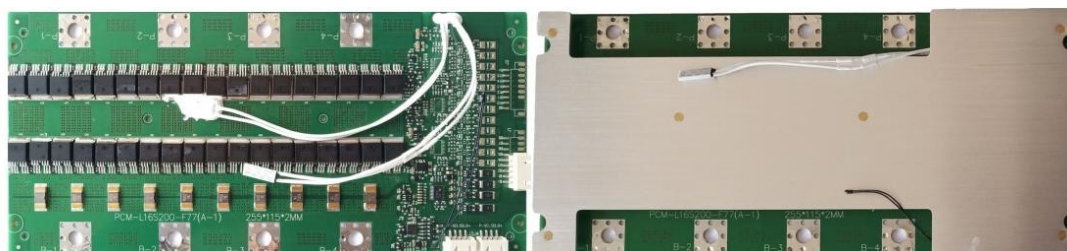
Discharge terminal of battery pack is connected to load with connectors, and then discharge. Do not reverse.

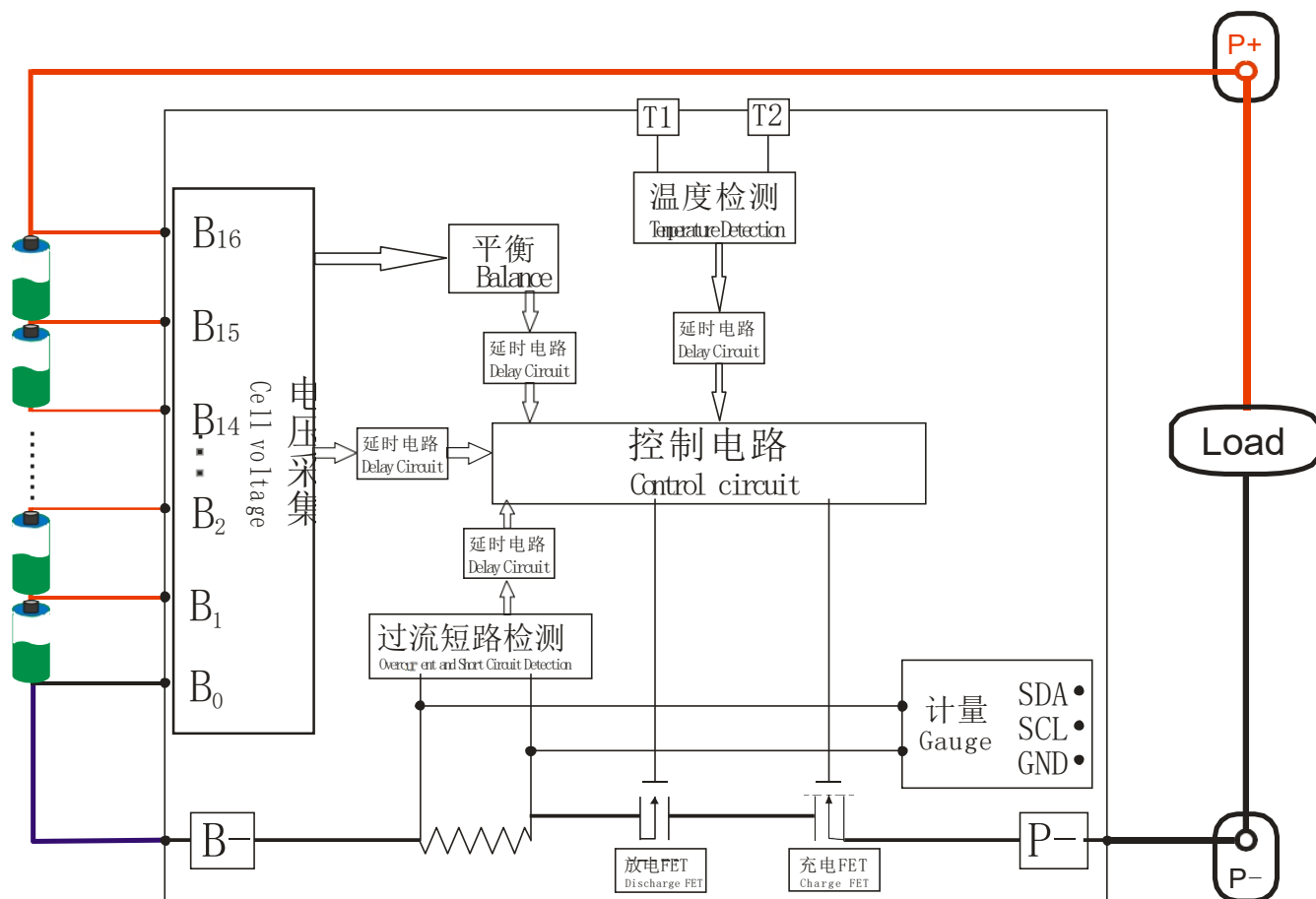
## 4 BMS function

This battery pack has a battery management system (BMS), providing over discharge, over charge, over current, short circuit, over temperature and low temperature protection.

	<p style="text-align: center;"><b>Shandong Haicen Power CO.,LTD</b></p> <p style="text-align: center;"><b>Product Manual</b></p>	<p>NO. : <u>HC20-PKLI20026</u></p> <p>REV : <u>R1.1</u></p>
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N o.	Test item		Criterion
1	Voltage	Charging voltage	DC:57.6V 3.6V/Cell
		Balance voltage for single cell	3.60±0.05V
2	Current	Balance current for single cell	36±5mA
		Current consumption	≤200 μ A
		Maximal continuous charging current	100A
		Maximal continuous Discharging current	100A
3	Over charge Protection	Over charge detection voltage	3.75±0.03V
		Over charge detection delay time	0.8S—2S
		Over charge release voltage	3.5±0.05V
4	Over discharge protection	Over discharge detection voltage	2.20±0.08V
		Over discharge detection delay time	50mS—150mS
		Over discharge release voltage	2.50±0.1V
5	Over current protection	Over current detection current	450±50A
		Detection delay time	250ms—350ms
		Release condition	charger release
6	Short protection	Detection condition	Exterior short circuit 1200A
		Detection delay time	200-800us
		Release condition	Cut load
7	Resistance	Protection circuitry	≤30mΩ
8	Temperature	Operating Temperature Range	-20~+90℃
		Storage Temperature Range	-40~+125℃





## 5 Extra Tips

You encounter difficulties, please contact us, we will try our best to provide you with service and help.

- Please do not be machined on the circuit board, any damage may cause functional failure of the internal circuit;
- Please do not make the force and deformation to the product, any damage to electronic components or lines may make the product unstable.
- Please do not disassemble the shell, lest you cause unnecessary damage to you;
- The charging terminal polarity is reversed, and it burn internal circuit board, please pay attention to the port when connect.

## 6 Tests

Single cell and Protection Circuit Specification are only results of standard test, this is for your reference only.

### 6.1 Standard Test Requirements

Battery test must be within 1 month after production. All tests in this specification should

be at standard atmospheric conditions. (Temperature:  $25 \pm 2^{\circ}\text{C}$ , relative humidity:  $65 \pm 20\%$ ). Charge voltage is  $57.6 \pm 0.05\text{V}$ , Standard cutoff voltage is about  $40\text{ V}$ ; Standard current is  $I_5\text{ (A)}$ .

## 6.2 Standard Charge

Charge the battery with Lithium ion battery special test cabinet, supply standard voltage, standard current until current down to  $0.05I_5\text{(A)}$ .

## 6.3 Standard Discharge

Discharge the battery at standard current with special detection device, constant discharging to standard discharge cutoff voltage or until the battery stop.

## 6.4 Capacity Retention Rate

Test Methods	Test Standards
Standard charge, in standard test conditions on hold for 28 days, standard discharge.	capacity retention rate $\geq 80\%$

## 6.5 Cycle Life

Cycles Life  $\geq 2,000$  cycles, capacity retention rate  $\geq 80\%$ ). (Standard charge at  $0.5\text{C}$ , rest  $0.5 \sim 1\text{h}$ ; discharge at  $1\text{C}$  to cut off voltage, rest  $0.5 \sim 1\text{h}$ , repeat the above steps until  $2,000$  cycles.)

## 7 Cautions

Please pay attention to followings in case of battery will have leakage, heat etc.

- Do not immerse the battery in water or seawater, and keep the battery in a cool dry surrounding if it stands by.
- Do not use or leave the battery at high temperature as fire or heater. Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.
- Do not reverse the positive and negative terminals.
- Do not reverse polarity charging.
- Do not connect the battery electrodes to an electrical outlet.
- Do not short circuit. Otherwise it will cause serious damage of the battery.
- Do not transport or store the battery together with metal objects such as hairpins, necklaces, etc.
- Do not strike, trample, throw, fall and shock the battery.
- Do not directly solder the battery and pierce the battery with a nail or other sharp objects.
- Do not use the battery in the location where static electricity and magnetic field is great, otherwise, the safety devices may be damaged, causing hidden trouble of

safety.

- Do not combine the battery pack in series.
- Do not overload with battery
- Please use special charger for charging.
- Please charge the battery within 24 hours after fully discharged.
- If the battery leaks and the electrolyte gets into the eyes, do not rub the eyes, instead, rinse the eyes with clean water, and immediately seek medical attention. Otherwise, it may injure eyes.
- If the battery gives off strange odor, generates heat, becomes discolored or deformed, or in any way appears abnormal during use, recharging or storage, immediately stop charging, using, and remove it from the device.
- In case the battery terminals are dirty or oxidation, clean the terminals with a dry cloth before use. Otherwise poor performance may occur due to the poor connection with the instrument.
- Tape the discarded battery terminals to insulate them.



## 7.1 Battery Checking

- After receiving the battery, you should first check the packing carefully. During the handling process, please ensure there's no shock on the battery.
- Please check the battery case and accessories if there's any damage or leakage, if so, please contact us immediately.
- Please check the output connector is correct or not, measuring the voltage between positive and negative, if it's within the normal standard.

## 7.2 Installation and Precautions

- No smoking or fire during installation to avoid short-circuit of battery and prevent equipment damage or personal injury.
- The battery should be installed under the condition with well-ventilated and no sunlight. Don't put it under place with possible flooding.
- When fastening battery terminals, please don't use excessive force, or the terminals could be damaged.
- Clean the surface of battery with dry cloth, please don't use oil or other volatile organic solvents to clean, or it may damage it.
- Please make sure that the positive (+) & negative (-) polarity is correct connected, or it may fire or damage the battery and load.

- Start testing the equipment if it could be well working with battery.
- Using and maintenance

### 7.3 Battery Using and Maintenance

- Charging current should be less than maximum charge current specified in the Product Specification, charging current bigger than recommended current may damage the battery.
- Discharging current should be less than maximum discharge current specified in the Product Specification; discharging current bigger than recommended current may damage the battery.
- Discharge temperature:  $-20^{\circ}\text{C} \sim +60^{\circ}\text{C}$ . Humidity:  $\text{RH} \leq 85\%$ . When the temperature is higher than  $45^{\circ}\text{C}$ , please note ventilation. When the environment humidity is higher than 85%, please pay attention to protection. Charging temperature:  $0^{\circ}\text{C} \sim +45^{\circ}\text{C}$ . Humidity:  $\text{RH} \leq 85\%$ , When the environment humidity is higher than 85%, please pay attention to protection; storage temperature:  $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$  (Best temperature is  $15^{\circ}\text{C} \sim 25^{\circ}\text{C}$  in dry environment). Temperature affects the capacity of battery obviously, it's normal.
- When the battery power is low, please charge it in time. This could ensure longer cycle life. If the battery can't be charged in time and let it under power shortage condition, it may affect the cycle life.
- The lithium-ion battery charge discharge shallow is beneficial to improve the cycle life, proposal user each discharge is put to the nominal capacity of 80%.
- It should be noted that the cell would be possible to be at the over-discharged state by its self-discharge characteristics in case the cell is not used for long time. In order to prevent over-discharging, the cell shall be charged periodically to maintain a certain voltage range 52.8V~54.4V, 2months one cycle, Over-discharging may causes loss of cell performance, characteristics, or battery functions. But for battery packs with communication fuction, please maintain it once in 1 month.
- Don't use organic solvents to clean the battery case. If for battery fire accident, please use dry powder fire extinguisher or sand.
- Battery is a consumable product with limited cycle life. Please charge it in time when the capacity can't reach the requirement to avoid any loss of the user.

### 7.4 Battery Common Troubles and Solutions

- ◆ Battery voltage is too low after fully charged.
- Battery was in long-term storage with no usage, not in accordance with the provisions for maintenance either.  
Solution: charge the battery can be solved.
- Battery disconnected  
Solution: remove the battery to check whether the line is broken or not, the solder joints come off or not, nickel belt breaks or not, and then repair according to the

damage situation.

➤ Protection circuit does not work

Solution: first, make sure the cable is contact with the protection circuit well, then, observe solder is off or not. If the above conditions are normal, please test voltage between B+/B- and P+/ P- voltage, then the board would be failed if the voltage difference is very high. Then please do testing in detail on protection circuit, if not pass, please change another new protection circuit.

➤ Battery suffered fierce collision, with character-external battery case damaged or with electrolyte odor.

Solution: It's not in the scope of maintenance generally. If needing maintenance, we need the confirmation of the problem whether on the output line or the battery itself.

First, open the battery case, check the battery P + / C + and P- / C- lines or joints damaged or not. If damaged, it needs to be replaced. Then, instigating smell odors method to determine the battery, if there is irritation electrolyte odor, indicating that the battery has been leaking. You need to test the voltage of each series. If the voltage of one series is very different with much lower voltage, then this series needs to be replaced.

◆ Insufficient capacity

Solution: To charge and discharge the battery with 3~5 cycles generally.

◆ Battery voltage instability or cannot charge or discharge normally.

➤ Faulty soldering

Solution: To test the resistance with the internal resistance tester, and confirm the internal resistance of the battery exceeding a predetermined value or not. If not, the battery would be in faulty soldering condition, the battery needs to be unpacked to be welded again.

➤ Protection circuit abnormal

Solution: replace the protection circuit.

➤ Connector or terminals in poor contact condition

Solution: replace the terminals or connectors

◆ Battery works properly in charging but could not discharge or discharging well but could not charge.

Solution: The protection circuit is damaged; you need to replace the protection circuit.

## 8Other Technical Indicators

If you need battery protection parameters and other related parameters, please contact our sales or technical staff, we will provide you as soon as possible.

## 9Products Liability

Shandong Haicen Power Co., Ltd. is not responsible for the incident caused by not



# Shandong Haicen Power CO.,LTD

## Product Manual

NO. : HC20-PKLI20026

REV : R1.1

obeying the Manual. Before using the battery, you should read the specifications, usage instruction and some attentions carefully to learn its application method and areas. If the phenomenon such as incorrect using method or wrong circuit connection, or input power data, working index are inconsistent with the Manual, cause damage to product, load and its accessories, we are not responsible for it.