Howell Energy Co., Ltd

深圳市鸿伟高能科技有限公司

Specification

Model: LiFePO4 48V 30Ah

Customer：020189

Customer approval：

Date： 2020-07-07 .

Prepared By	Checked By	Approved By

Howell Energy Co., Ltd
Tel : +86-755 89335456
Fax: +86-755 89335457
Http:www.howellenergy.com
Office Address: B1010,Genzon Times Square, Longgang center, Shenzhen,China,
Factory Address: Howell industrial Estate No.30 Ruanchuan Road, Duruan Town, Pengjiang District, Jiangmen, Guangdong, China

1.Scope

This specification is applied to the LiFePO4 battery pack manufactured by Howell Energy Co., Ltd.

2.Specifications

No.	Item	General Parameter	Remark
1	Nominal Capacity	30Ah	Standard discharge(0.2 C)after standard charge (0.2 C)
2	Minimal Capacity	29.5Ah	
3	Nominal Voltage	48V	
4	Cycle Life	Higher than 80% of the Initial Capacity of the Cells	◆Charge:CC@0.2C to 54.75V, then CV till current to 0.02C ◆Rest: 30min. ◆Discharge: 0.2C to 37.5V ◆Temperature:23±3℃ ◆Carry out 1200cycles
5	Discharge cut-off voltage	37.5V	Overcharge protect moment (recommended value)
6	Charging cut-off voltage	54.75V	Charged by matched charger (recommended value)
7	Cell and assembly method	LF32135 3.2V/15.0Ah	15S2P
8	Housing material	Metal housing	
9	Standard charge	0.2C	0.2C constant current(CC) charge to 54.75V,then constant voltage (CV)54.75V charge till charge current decline to ≤0.02C
10	Maximum Charge Current	1.0C	
11	Standard discharge	0.2C	Constant current 0.2C Cut-off voltage 37.5V
12	Continuous Discharge Current	1.0C	
13	Operation Temperature Range	Charge: 0~45℃	60±25%R.H.
		Discharge: -20~60℃	
14	Storage Temperature Range	Less than 1 year : 10~25℃	60±25%R.H. at the shipment state
		Less than 3 months : -5~35℃	
15	Weight	Approx: 16Kg	
16	Internal Impedance	≤50mΩ	
17	Dimension	L(L1)482(442)xW(380)xH(88)mm	Iron box color：Black
18	Output Connector	DW22 4P terminal*1	
19	Communication interface	RS485*2、RS232*1	

3.Test Conditions, Methods and Electrical Performance

3-1 Test conditions

All tests shall be done under temperature: 15℃～35℃, relative humidity: (RH) 25%～85%, air pressure: 86kPa～106kPa except special appointment.

3-2 Measuring apparatus

a)Voltage is measured by D.C. voltmeter which precision is higher than 0.5 grade and self resistance is higher than 1kΩ/V;

b)Current is measured by D.C. meter which precision is higher than 0.5 grade;

c)Temperature is measured by thermometer which has proper measuring range and division value is lower than 0.5℃;

d)The timer used in measuring should be degreed in hour, minute and second,and should have degree of accuracy no more than ±1%;

3-3 Standard charge

Charge the battery with DC stabilized power supply 54.75V, constant-current 0.2C(A) until current reach to 0.02C（A）.

3-4 Standard discharge

After charged by (3-3）, discharge the battery with constant current 0.2C(A) until the battery reach to over discharge protection or total voltage reach to 36.8V;

3-5 Battery capacity

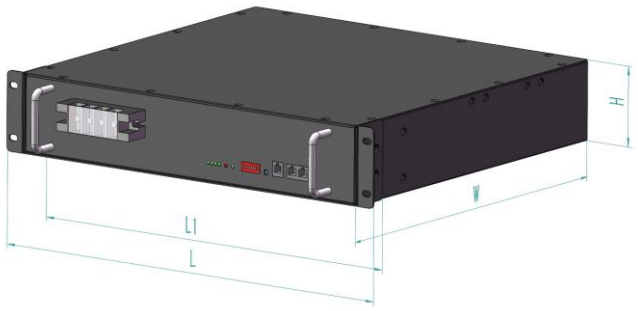
Discharge battery by（3-4）, and write down discharge time (hour), then capacity (Ah)=0.1C (A) * discharge time (hour);

3-6 Electrochemistry performance

Items	Test Method	Technical requirements
20℃ discharge capacity	Battery charge with standard methods, discharge at 0.2C（A）, write down discharge capacity	≥100% nominal capacity
55℃discharge capacity	Battery charge with standard methods, stored for 5h in 55℃±2℃, then discharge at 0.5C（A）to cut-off voltage, write down discharge capacity	≥95% nominal capacity
Charge retainability and recover capability	Battery charge with standard methods, stored for 28d in normal temperature 7d in 55℃	capacity retention rate≥80% capacity retention rate≥90%

4. Product Structural Characteristics

Product appearance(for reference only)



Item	Description	Dimension (mm)
H	Thickness	88.0(MAX)
W	Width	380.0(MAX)
L	Length	482.0(MAX)
L1	Length	442(MAX)
Output Connector	DW22 4P terminal *1	
Communication interface	RS485*2、RS232*1	
Iron box color：	Black	

5. Product storage and transportation

5-1 Storage

If the battery pack need to be stored for a long time, charge the battery for 50% electric quantity (after discharge, charge by charger for 2~3h every 3 months).

Battery pack and the charger should be stored in clean, dry and ventilating place, and should not be together with corrosive material, keep the battery away from fire and heat source.

5-2 Transportation

Battery pack and charger should be transported after packaging, and should avoid severe vibrating, impacting , extrusion, and direct light and rain. They can be transported with automobile, train, ship and plane, etc.

5-3 Maintainance

a）The battery pack should be stored in 40%～60% state-of-charge.

b）If the battery won’t be used for a long period, charge it every 3 months, and each time 1~2h

c）In the process of maintainance, don’t assemble and disassemble the battery without permission, other wise, the performance of battery will descend.

d）Don’t disassemble the battery without permission.

6.BMS Specification

NO.	Item		Standard
1	Voltages	Charge Method	CC/CV
		Single cell Charge Voltage	3.65V
		Single cell low voltage alarm and recovery	2800mV/3000mV
		Overvoltage protection and recovery of single cell	3750mV/3400mV
		Undervoltage protection and recovery voltage of single cell	2600mV/2900mV
		Battery pack low voltage alarm and recovery	42V/45V
		Battery overvoltage protection and recovery	54.75V/51.5V
		Battery undervoltage protection and recovery	39V/43.1V
2	Current	The charging current limiting	10A
		Charging overcurrent alarm and recovery	25A/23A
		Charging overcurrent protection	40A(0~150A)
		Overcurrent charge delay	10s
		Effective charging current	600mA~750mA
		Discharge over - current alarm and recovery	45A~43A
		Discharge overcurrent protection	50A(Automatic recovery after 60S)
		Discharge overcurrent delay	10s
		Transient overcurrent protection	100A~200A
		Transient overcurrent delay	30ms
3		Output short circuit protection	Not currently supported
4	Cell equalization function	Standby equilibrium	Open equalization without charge and discharge
		Standby equalization time	10h
		Equalizing opening voltage	3350mV
		Equalize opening and closing pressure differentials	30mV~20mV
5	Temperature	Charging temperature	-10℃~55℃
		The discharge temperature	-10℃~55℃

7.Basic mode of operation

7.1. Charging mode

When BMS detects that the charger is connected and the external charging voltage is greater than the internal battery voltage of 0.5V, it starts the charging MOSFET for charging.When the charging current reaches the effective charging current, it enters the charging mode.Charge and discharge MOSFET are closed in charging mode.

7.2. Floating charge mode

BMS enters the floating charging mode when it detects that the charger is connected and the effective charging

current cannot be generated due to abnormal charging protection such as charging current and charging temperature, or the external charging voltage is close to the internal battery voltage.In floating charge mode, the charging MOSFET is disconnected.

7.3. Discharge mode

The BMS enters the discharge mode when the load connection is detected and the discharge current reaches the effective discharge current.

7.4. Standby mode

If the above four modes are not satisfied, enter standby mode.

7.5. Shutdown mode

Normal standby for 24 hours, battery triggered undervoltage protection, reset button shutdown, BMS into shutdown mode.Wake conditions of shutdown mode: 1. Charging activation; 2.2. Button activation.

8. Indicator light

8.1. Capacity indication

State		Charge				Discharge			
Capacity indicator light		L4●	L3●	L2●	L1●	L4●	L3●	L2●	L1●
	0～25%	Destroy	Destroy	Destroy	Flicker	Destroy	Destroy	Destroy	Lighting Form
	25～50%	Destroy	Destroy	Flicker	Lighting Form	Destroy	Destroy	Lighting Form	Lighting Form
	50～75%	Destroy	Flicker	Lighting Form	Lighting Form	Destroy	Lighting Form	Lighting Form	Lighting Form
	⩾75%	Flicker	Lighting Form	Lighting Form	Lighting Form	Lighting Form	Lighting Form	Lighting Form	Lighting Form
Running indicator light●		Long bright				Flicker			

8.2. Flashing instructions

Flashing way	Bright	Destroy
Flicker 1	0.25s	3.75s
Flicker 2	0.5s	0.5s
Flicker 3	0.5s	1.5s

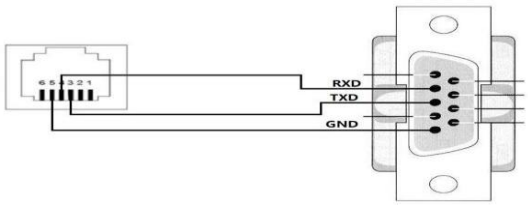
8.3. Status indicator

System state	Operating state	RUN	ALM	SOC				Explain
		●	●	●	●	●	●	
Power off	Dormancy	Destroy	Destroy	Destroy	Destroy	Destroy	Destroy	Destroy
Standby mode	Normal	Lighting Form	Destroy	According to electric quantity indication				Stand by
	Give an alarm	Lighting Form	Flicker 3					
Charge	Normal	Lighting Form	Destroy	According to electric quantity indication				The highest LED Flicker 2
	Over-current alarm	Lighting Form	Flicker 2	According to electric quantity indication				The highest LED Flicker 2

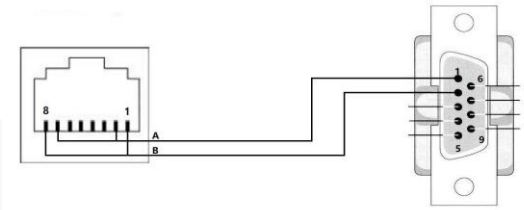
	Over-voltage protection	Lighting Form	Destroy	Lightin g Form	Lightin g Form	Lightin g Form	Lightin g Form	RUN lights: Often on the mains On, when the mains offline normal standby state
	Normal	Flicker 3	Destroy	According to electric quantity indication				According to the electric quantity normal light indication
Discharge	Give an alarm	Flicker 3	Flicker 3					
	Over-current, short Road, reverse connection and other protection	Destroy	Lighting Form	Destroy	Destroy	Destroy	Destroy	Stop the discharge. The mains are offline No action forced dormancy after 24h
	Low-voltage protection	Destroy	Destroy	Destroy	Destroy	Destroy	Destroy	Stop discharge
Temperature	Normal	According to normal status indication						---
	Charging the alarm	Lighting Form	Flicker 2	According to electric quantity indication				The highest LED Flicker 2
	Discharge the alarm	Flicker 3	Flicker 3	According to electric quantity indication				
	Protect	Destroy	Lighting Form	Destroy	Destroy	Destroy	Destroy	Stop charging and discharging, mains electricity Hibernate after no action for 24h when offline

9. Communication

9.1. RS232 interface

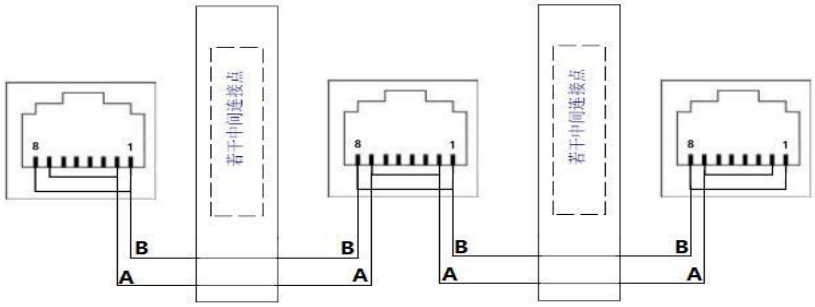


9.2. RS485 interface



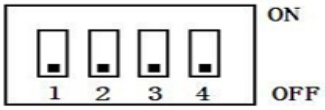
9.3. Parallel machine interface

When multiple machines are connected in parallel, RS485 interface is used as parallel communication interface.The terminal device can read the sum of the battery data of all parallel packs through interface 485.When multiple machines are connected in parallel, the RS485 interface is connected with the following figure:



9.4. Address dial code

Parallel dial code switch definition: when the battery is connected in parallel, the dial code switch is used to distinguish different Pack addresses. The hardware address can be set through the dial code switch on the board. Refer to the following table for the definition of dial code switch.



地址	拨码开关位置				说明
	#1	#2	#3	#4	
0	OFF	OFF	OFF	OFF	Pack0
1	ON	OFF	OFF	OFF	Pack1
2	OFF	ON	OFF	OFF	Pack2
3	ON	ON	OFF	OFF	Pack3
4	OFF	OFF	ON	OFF	Pack4
5	ON	OFF	ON	OFF	Pack5
6	OFF	ON	ON	OFF	Pack6
7	ON	ON	ON	OFF	Pack7
8	OFF	OFF	OFF	ON	Pack8
9	ON	OFF	OFF	ON	Pack9
10	OFF	ON	OFF	ON	Pack10
11	ON	ON	OFF	ON	Pack11
12	OFF	OFF	ON	ON	Pack12
13	ON	OFF	ON	ON	Pack13
14	OFF	ON	ON	ON	Pack14
15	ON	ON	ON	ON	Pack15

BMS can automatically recognize the corresponding dialed address after dialing the address (if the corresponding address cannot be read after dialing the address, please wait in BMS
), when conducting multi-machine parallel communication operation, it is necessary to configure the dialing address of each PACK first.When the code address is not dialed
For host mode, dial code address from dial 1 for slave mode, and BMS can only be used as slave when machine.

10. Warnings in using the battery

* Do not immerse the battery into water or seawater
* Do not use , leave or charge battery near a heat source such as fire or heater. If the battery leaks or smells, move it away from open fire. The battery should be used after fully charged in the first use.
* Do not inversely connect positive and negative polar
* do not put the battery in fire or heat the battery.

* Do not short-circuit the battery with wires or other metals.
* Do not pierce the shell with nails or other sharp objects. Do not hammer or tread the pack.
* Do not disassemble the pack and battery in any way.
* Do not put the battery pack in microwave oven or pressure vessels.
* If the battery pack smells, fevers, is out of shape, color changes or any other abnormal phenomena which the battery can't be used, if the battery is being charged or used, please take it out of the charger or electrical equipments.
* Do not use the battery in extremely thermal environment, such as direct light or cars in hot day. Other wise, the battery will overheats and the performance and life of battery will be influenced.
* If the battery leaks and the electrolyte get into the eye, do not rub eye. Instead, rinse eye with clean water, and seek medical attention immediately.
*Temperature will influence discharge capacity, if the temperature exceeds standard environment temperature（25±°5℃）, discharge capacity will reduce.

11. Especially attention

* If the battery pack smells or sounds unusual in the process of charging, stop charging immediately.
*If the battery pack smells or sounds unusual in the process of discharging, stop discharging immediately.
* If the above problems appear, please contact Howell Energy, do not disassemble without permission.

12. Product responsibility

* Howell Energy won't responsible for any accident caused by violating the specification.
* Howell Energy won't further notice if the specification changes for the reason of improving the quality of products or upgrade technical parameters. If you want to know latest product information, contact us to ask for it.