Technical Specification of LiFePO4 Battery Pack (48V 100Ah)

SUNLIFE POWER

Contents

1. Scope

This document described Lithium Iron Phosphate Battery (48V 100Ah), including mechanical design, basic performance, test method and notes for use. The product applies to telecommunication back up power and storage system.

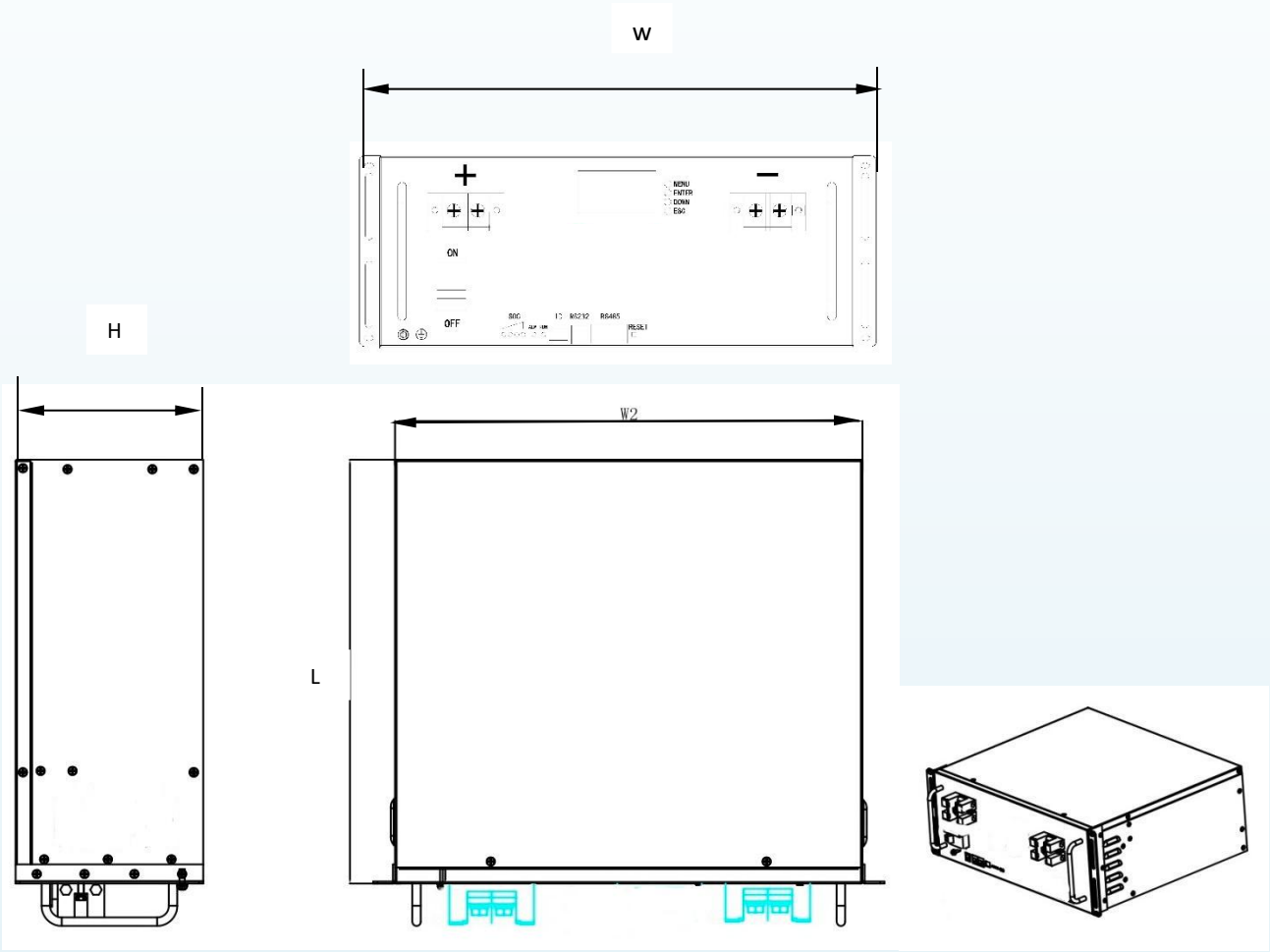
2. Mechanical Design

2.1 Battery specification：48V100Ah

2.2 Battery dimension：W×L×H= 482mm(W2=441)×480mm×177mm

2.3 Cell Model：3.2V5.5AH

2.4 Combination Method：16S18P



3. Battery Pack Basic Performance

#	Item	Parameter	Remark
1	Rated Capacity	100Ah	At 23℃±5℃, after standard charged, 0.2C constant current discharging, 37.5V cut off
2	Min. Capacity	95Ah	At 23℃±5℃, after standard charged, 0.2C constant current discharging, 37.5V cut off
3	Rated Voltage	48V	Battery module rated voltage
4	Standard Charge Current	20A（0.2C）	0℃~45℃，0.2C CC（Constant current）charge to 54.75V, then CV（constant voltage）charge，cut off when charging current≤ 0.02C.
5	Max Charge Current	50A（0.5C）	0℃~45℃，do not exceed 0.5C
6	Charge Cut Off Voltage	54.75V	
7	Standard Discharge Current	20A（0.2C）	-20℃~+60℃，0.2C CC（Constant Current）discharge, cut off @37.5V.
8	Max Continuous Discharge Current	100A	25℃±3℃，continuous 50A discharge
9	Discharge Cut Off Voltage	37.5V	
10	Max Pulse Discharge Current (5 seconds)	115A	25℃±3℃
11	Working Temperature (charge)	0℃~45℃	During charge, battery and ambient temperature should not exceed 45℃.
12	Working Temperature (discharge)	-20℃~55℃	Battery can work at specified temperature range with capacity loss in tolerance.
13	Storage temperature	-20℃～45℃	(short term) Within 1 month
		-10℃～35℃	(long term) Within 1 year
14	Battery Weight	43±0.5Kg	
15	Battery Impedance	≤65mΩ	AC 1KHz impedance with half electricity

4. Main Performance

4.1 Battery pack main performance parameter

#	Item		Standard	Test Method
1	Discharge Rate Character	0.2C	100%	Test Temperature：25℃±3℃； Charge：0.2C constant current charge to 54.75V， transfer to constant voltage, cut off when current ≤0.02C Discharge：0.2C/0.5C constant current discharge cut off @37.5V.
		0.5C	≥95%	
2	Capacity & Temperature Character	55℃	≥98%	Charge：0.2C constant current charge to 54.75V，transfer to constant voltage, cut off when current ≤0.02C； Discharge：0.2C constant current discharge cut off at 37.5V；2hours interval for the temperature.
		45℃	≥98%	
		25℃	100%	
		0℃	≥65%	
		-10℃	≥50%	
3	Life Cycle Character		≥2000times	After finish the standard charging, lay aside for 30 min, in 25±5℃，0.2C constant current discharge to 100%DOD, then go for next cycle.
4	Storage Character (Recoverable capacity)	25℃ 6months	≥98%	Charge battery with 60%~75% capacity for storage
		45℃ 3 months	≥95%	
		60℃ 1 month	≥95%	

4.2 Ambient Character for cell

#	Item	Standard	Test Method
1	Steady damp heat test	No fire, No explosion, No leakage. Discharge capacity cannot be lower than 60% of initial capacity	After standard charge，test as below： Temp：40℃±5℃；Relative Humidity：90％~95%； Standing time：48h；take out and place for 2h at room temperature. Then discharge with 1C till cut off voltage
2	Vibration	No fire, No explosion, No leakage.	After standard charge, fix to vibration machine and vibrate 30minuntes each at XYZ direction. Frequency Sweeping Rate：1oct/min； Vibration Frequency：10Hz~30Hz； Displacement amplitude（Single）：0.38mm； Vibration Frequency：30Hz~55Hz； Displacement amplitude（Single）:0.19mm.
3	Low Pressure	No fire, No explosion, No leakage.	Under 25±3℃ ambient temperature，put cell into vacuum cabinet, and reduce internal pressure gradually to not high than 11.6kPa（Simulated altitude 15240m), keep 6 Hours.
4	Drop Test	No fire, No explosion, No leakage.	Under the condition of shipment, the battery is free fall from a height of 1 m to a concrete floor of 5 cm thick, repeat 3 times from X, Y, Z axis direction.

4.3 Safety Performance for cell

#	Item	Standard	Test Method
1	Over Charge Test	No fire, No explosion	After standard charge, Under 25℃±3℃ ambient temperature for 1h. Then under the same temperature, 0.5C constant current charge to 5V(the simple cell).
2	Over Discharge Test	No fire, No explosion	After standard charge, Under 25℃±3℃ ambient temperature for 1h. Then under the same temperature, 0.3C constant current discharge to 0V(the simple cell).
3	Heat shock	No fire, No explosion	Put battery in hot cabinet, temperature is up with 5℃/min±2℃/min rate to 130℃±2℃and keep for 30mins
4	High Temperature Test	No fire, No explosion，Capacity recovery cannot less than 80%	After standard charge, place battery in 85℃ for 4h.
5	Short Circuit	No fire, No explosion	After standard charge, Under 25℃±3℃ ambient temperature for 1h. Then put the battery by external short circuit for 10 min, the outside line resistance should be less than 10 mΩ.

5. BMS (Battery Management System)

5.1 Protection Parameter

#	Item		Description	Value	Unit
1	Over Charge Parameter		Unit Overcharge Warning Voltage	3650	mV
			Unit Overcharge Protection Voltage	3700	mV
			Battery pack over charge warning voltage	54.75	V
			Battery Pack over charge protection voltage	55.5	V
2	Over Discharge Parameter		Unit Over discharge Warning Voltage	2800	mV
			Unit Over discharge Protection Voltage	2500	mV
			Battery pack over discharge warning voltage	42	V
			Battery Pack over discharge protection voltage	37.5	V
3	Charge Over Current Parameter		Charge Over Current Warning	50	A
			Charge 1st over current	55	A
			Charge 2nd over current	65	A
			Short circuit protection at charging port	YES	
4	Discharge Over Current Parameter		Discharge over current warning	110	A
			Discharge 1st over current	115	A
			Discharge 2nd over current	120	A
			Short circuit protection at discharging port	YES	
5	Temperature Protection	Charge	High temperature warning	50	℃
			Low temperature warning	0	℃
			High temperature protection	55	℃
			Low temperature protection	-5	℃
		Discharge	High temperature warning	55	℃
			Low temperature warning	-15	℃
			High temperature protection	60	℃
			Low temperature protection	-20	℃

5.2 Electrical Parameter

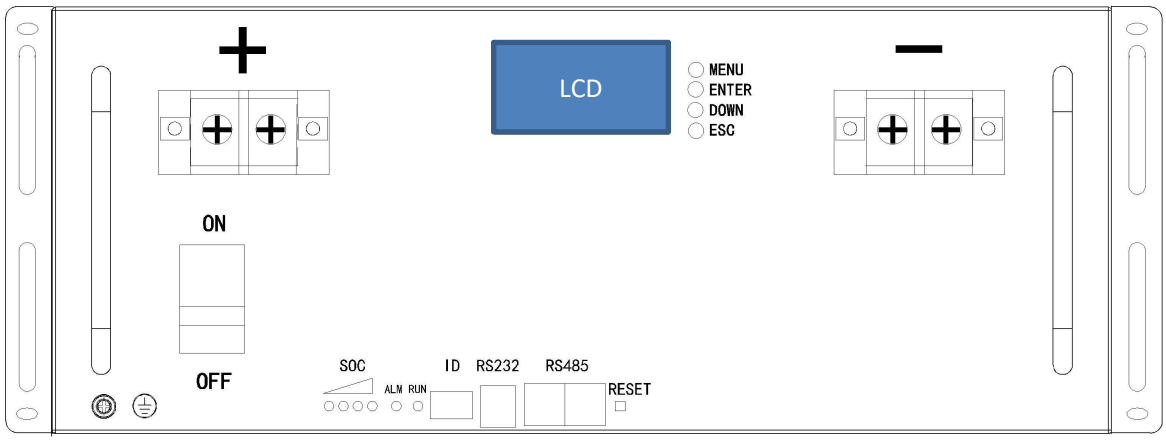
#	Item	Min	Typical	Max	Unit
1	Manage cell qty	—	15	15	Qty
2	Normal Working Voltage	—	48	54.75	V
3	Working temperature range	-20	25	60	℃
4	Continuous charge current	—	20	50	A
5	Continuous discharge current	—	20	100	A
6	1~16 Static current	—	—	2	mA
7	Total Operate Power Consumption	—		60	m A
8	Total dormant power consumption	—		200	u A

5.3 Function

#	Function	Description
1	Setup address	By dial switch, set up Main device or second devices, can set up 15 pcs address.
2	System Reset	By Reset button, reset system
3	Interface for Communicate	RS485 connector allows several devices connecting in parallel to enlarge battery capacity, can parallel 15 pcs RS232 interface communicates with upper computer.
4	SOC Evaluate and Display	Can dynamic evaluate SOC for each battery pack, and display the remaining power by 4 green LED.
5	Operation Status Display	Can display system operation status by 1 green LED
6	Failure Warning Display	Can display system failure by 1 red LED
7	Data Storage	Can record battery array’s voltage, temperature, each charge and discharge power
8	Low Consumption	Very slight static consumption deviation, and low operation& standby consumption
9	SOH Evaluation	Per sampling information, can do SOH evaluation for whole battery

10	Balance Management	300mAh balance current function during charging, improve cell voltage consistency.
11	Unit Voltage Inspection	Test cell unit's voltage, 15S Max can be inspected.
12	Temperature Inspection	Battery temperature protection function, battery high & low temperature protection and component high temperature protection.
13	Charge & discharge control	Disconnect failed module when at abnormal charge, over discharge, over-hot, over current, short circuit, separate each defective module timely and reduce defective scope
14	Short Circuit Protection	When battery has short circuit, system will be automatically protective within 100μS, disconnect load and recover.
15	"4 Remote" Communication	Through connection between upper computer and BMS, can remote signaling, remote control, remote adjust, telemetry.
16	Polarity Reverse Connection Protection	When polarity reverses connection, system will warn and protect.
17	Battery in Parallel Connection Management	Support multiple-unit battery connection in parallel, and set up address

6. Battery panel and connector interface



7. Storage and Transportation Requirement

Item		Requirement
Storage Temperature	Less than 1month	-20℃~+45℃
	Less than 6 month	-10℃~+35℃
Humidity		<70%RH
Storage SOC		60~75% SOC
Transportation	Battery should be in the condition of less than 30% charged by packaging boxes, should prevent violent vibration and impact during the transit or extrusion, prevent from rain and direct sunlight, suitable for cars, trains, ships, aircraft and other transportation vehicles.	

8. Notes for Battery Usage

8.1 Prohibition

For avoiding battery leakage, heat radiating, explosion, below prevent tips should be taken care of:

a) Prohibition of disassemble or re-assembly；

b) Prohibition of short circuited battery；

c) Prohibition to use near hot source；

d) Prohibition of dumping of battery into water, ocean or getting battery wet；

e) Prohibition of charging near fire or under sunlight；

f) Charge with specified charge according to charging requirement；

g) Prohibition of inserting nail into battery, hammering or stepping on by foot；

h) Prohibition of throwing；

i) Prohibition to use with damaged or deformed battery；

j) Prohibition of direct welding on battery pack；

k) Prohibition of charging opposite or over discharging；

l) Prohibition of charge opposite or opposite connection；

m) Prohibition to use to unspecified equipment；

n) Prohibition to direct touch with leaking battery.

8.2 Attentions

a) Prohibit of using battery in sunlight, otherwise will cause over hot, firing, or function failure, life reducing;

b) Prohibit use near static place which over 60V;

c) Prohibit charge at temperature below 0℃ or above 60℃;

d) When use at first time, if has corrosion, or bad smell, or any other abnormal, please do not use.

8.3 Delivery requirements

#	Item	Parameter	Remark
1	Capacity	≥95Ah	0.2C discharge
2	Rated Voltage	48V	
3	Battery Impedance	≤65mΩ	AC impedance
4	Battery Weight	43±0.5kg	
5	Insulation impedance	≥50MΩ /500V	Between the output terminals and case
6	Delivery capacity requirements	≦30% SOC	Voltage range 48V-54.75V