圣阳电源
SACRED SUN

Deep Cycle Solar Energy Lithium Ion Battery

4860 Technical specification

Model	4860
Specification	48V 60Ah

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Contents

1. Scope

This document described Lithium Iron Phosphate Battery (48V/60Ah)， 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

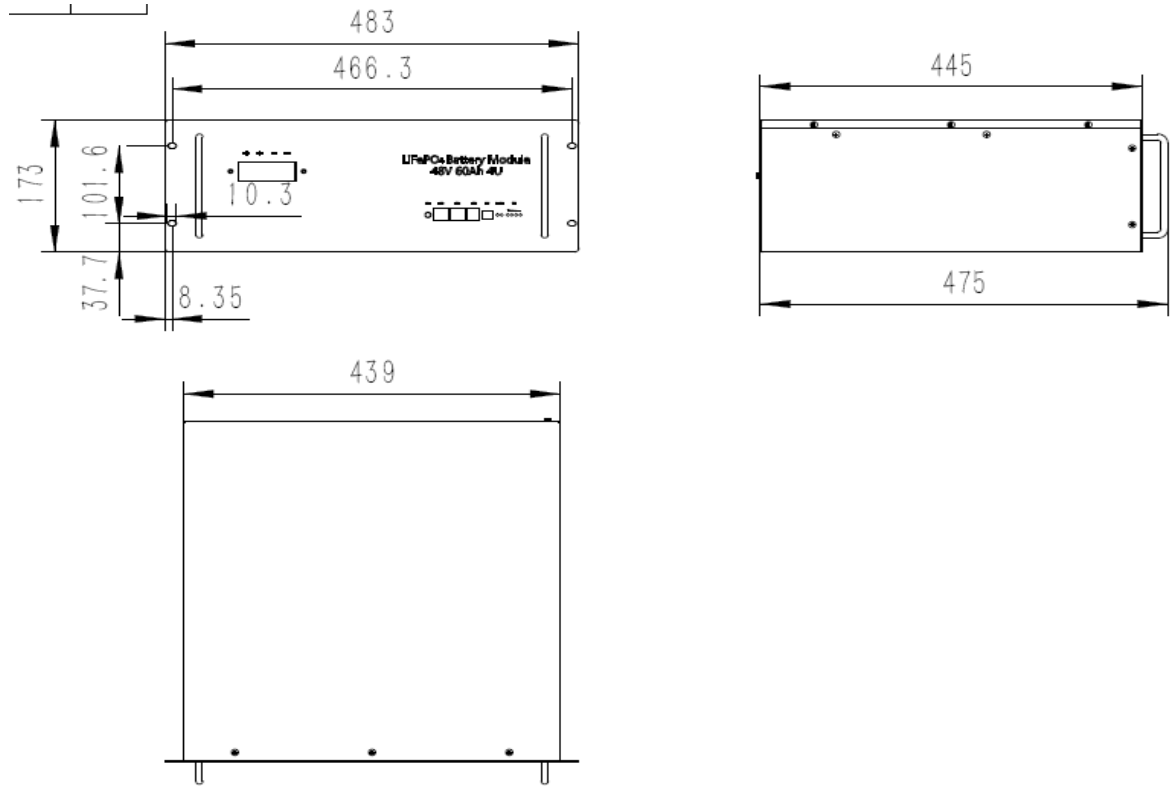
2.1 Battery specification：48V, 60Ah

2.2 Battery dimension：L×W×H= 483mm×445mm×173mm

2.3 Combination Method：15S1P

2.4 Weight：37kg

2.5 Dimensional drawing



3. Battery Pack Basic Performance

#	Item		Parameter	Remark
1	Rated Capacity		60Ah	23℃±5℃,0.5C constant current discharging,40.5V cut off
2	Rated Voltage		48V	Battery module rated voltage
3	Rated Energy		2.88kWh	
4	Standard Charge Current		10A	0℃~45℃，0.2C CC（Constant current）charge to 54.0V，then CV（constant voltage）charge，cut off when charging current≤0.05C.
5	Max Charge Current		50A	Constant Current
6	Standard Discharge Current		20A	-20℃~+60℃，0.5C CC（Constant Current）discharge, cut off @40.5V.
7	Max Discharge Current		50A	Constant Current
8	Charge Cut Off Voltage		54V	
9	Discharge Cut Off Voltage		40.5V	
10	Impendence		≤50mΩ	@AC 1KHz impendence with half electricity，50%SOC
11	Weight		About 37kg	
12	Working Temperature	charge	0℃~45℃	
		discharge	-20℃~60℃	
13	Storange Environment	＜1 month	-20℃~45℃	45～75%RH
		＜5 month	-10℃~35℃	
		Recommend	15℃~30℃	

Long storage:
When the battery needs to be stored for a long time, it should be charged to nearly 50% SOC state, Do at least one full charge and discharge cycle at least once every 6 months (first charge and then recharge 50%).

4. Main Performance

4.1 Battery pack main performance parameter

#	Item		Parameter	Remark
1	Discharge Rate Character	0.2C	100%	Test Temperature：25℃±3℃； Charge：0.2C constant current charge to 56V， transfer to constant voltage, cut off when current≤0.05C Discharge：0.2C or 0.5C constant current discharge cut off @40.5V.
		0.5C	≥95%	

#	Item		Parameter	Remark
2	Capacity & Temperature Character	55℃	≥95%	Charge：0.2C constant current charge to 54V，transfer to constant voltage, cut off when current≤0.05C； Discharge：0.5C constant current discharge cut off at 40.5V； 2hours interval for the temperature.
		45℃	≥95%	
		25℃	100%	
		0℃	≥65%	
		-10℃	≥50%	
3	Life Cycle Character @80%DOD, RT		≥2000	in 25±5℃, after finish the standard charging, lay aside for 30 min, 0.2C constant current discharge to 80%DOD, lay aside for 30 min, then go for next cycle. Repeat above process until discharge capacity reduce to 80% of initial value.
4	Storage Character (Recoverable capacity)	25℃ 6months	≥95%	Charge battery with 60%~75% capacity for storage
		45℃ 3months	≥90%	
		60℃ 1months	≥90%	

4.2 Ambient Character

#	Item	Parameter	Remark
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.

#	Item	Parameter	Remark
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 than11.6kPa（Simulated altitude 15240m）, keep 6Hours
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

#	Item	Parameter	Remark
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, 0.5 C 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 100 mΩ .

5. BMS (Battery Management System)

5.1 Protection Parameter

#	Item	Description	Value	Unit
1	Over Charge Parameter	Unit Overcharge Warning Voltage	3600	mV
		Unit Overcharge Protection Voltage	3700	mV
		Battery pack over charge warning voltage	54.5	V
		Battery Pack over charge protection voltage	55.5	V
2	Over Discharge Parameter	Unit Overdischarge Warning Voltage	2800	mV
		Unit Overcharge Protection Voltage	2700	mV
		Battery pack over discharge warning voltage	42	V
		Battery Pack over discharge protection voltage	40.5	V

#	Item		Description	Value	Unit
3	Charge Over Current Parameter		Charge Over Current Warning	50	A
			Charge 1st over current	55	A
			Charge 2nd over current	60	A
			Short circuit at charging port	Yes	
4	Discharge Over Current Parameter		Discharge over current warning	50	A
			Discharge 1st over current	55	A
			Discharge 2nd over current	60	A
			Short circuit at discharging port	Yes	
5	Temperature Protection	Charge	High temperature warning	50	℃
			Low temperature warning	0	℃
			High temperature protection	65	℃
			Low temperature protection	0	℃
		Discharge	High temperature warning	50	℃
			Low temperature warning	0	℃
			High temperature protection	65	℃
			Low temperature protection	-20	℃

5.2 Electrical Parameter

#	Item	Min	Typical	Max	Unit
1	Manage cell qty	—	15	16	Qty
2	Normal Working Voltage	40.5	48	54	V
3	Working temperature range	-20	25	60	℃
4	Continuous charge current	—	20	50	A
5	Continuous discharge current	—	20	50	A
6	Impendence	—	—	50	mΩ
7	1~16 Static current	—	—	2	mA
8	Total Operate Power Consumption	—	—	200	mA
9	Total dormant power consumption	—	—	200	uA

5.3 Function

#	Function	Description
1	Setup address	By dial switch, set up Main device or second devices
2	System Reset	By Reset button, reset system
3	Interface for Communicate	RS485 connector allows several devices connecting in parallel to enlarge battery capacity. 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	Can display system operation status by 1 green LED
6	Failure Warning	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	200mAh balance current function during charging, improve cell voltage consistency.
11	Unit Voltage Inspection	Test cell unit's voltage, 16S 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	"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 connecter interface

7. Storage and Transportation Requirement

Item		Requirement
Storage Temperature	Less than 1month	-20℃~+45℃
	Less than 6 month	-10℃~+35℃
Humidity		<75%RH
Storage SOC		50~60% SOC

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 disassembly 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 64V;

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	≥57Ah	0.5C discharg
2	Voltage Range	50V±2V	
3	Battery Impendence	≤50mΩ	AC impendence
4	Battery Weight	37Kg	
5	Insulation impedance	≥50MΩ /500V	Between the output terminals and carton
6	Delivery capacity requirements	50% SOC±10%	Voltage range 48.0V-52V