

Rosen Solar Energy Tech. Co., Ltd.

Specification For Approval

48V 200AH Powerwall LiFePo4 Battery

Model : RS-15S4P-48V-200Ah

Draft	Checked	Approval
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Date: 2020-02-10

1. Scope

The specification shall be applied to Li-ion rechargeable battery pack of LFP24140160-15S4P which is manufactured by Rosen Solar Energy Tech. Co., Ltd.

2. Specification

	No.	Item	General Parameter		Remark
	Cell	1	Rated Capacity	Typical	55Ah
Minimum				51Ah	
2		Nominal Voltage	3.2V		Mean Operation Voltage
3		Internal Impedance	≤0.65 mΩ		Internal resistance measured at AC 1KHz after 50% charge The measure must uses the new batteries that within one week after shipment and cycles less than 5 times
4		Dimension	Thickness: Max 24.5mm		Initial Dimension
			Width: Max 140.5mm		
			Height: Max 160.5mm		
5		Weight	1.15kg		APPROX
6		Standard charge	Constant Current 0.33C ₅ A Constant Voltage 3.65V 0.02C ₅ A cut-off		Charge time : Approx3.5h
7		Rapid Charge	Constant Current 1C ₅ A Constant Voltage 3.65V 0.01C ₅ A cut-off		Charge time : Approx1.5h@ ≥ 10°C
8		Standard discharge	Constant current 0.33C ₅ A end voltage 2.5 V		16.5A
9	Maximum discharge current	Constant current: 2C ₅ A end voltage: 2.5 V		100A@ ≥ 0°C	
10	Volumetric specific energy	295 WH/L		APPROX	
11	Gravimetric specific energy	139WH/KG		APPROX	

Battery Pack	No.	Item	General Parameter		Remark
	1	Combination method	15S4P		
	2	Rated Capacity	Typical	205Ah	Standard discharge after Standard charge (package)
			Minimum	200Ah	
	3	Factory Voltage	48.0V		Mean Operation Voltage
	4	Voltage at end of Discharge	42.0V		Discharge Cut-off Voltage
	5	Charging Voltage	54.0V		
	6	Internal Impedance	≤22mΩ		Internal resistance measured at AC 1KHz after 50% charge The measure must uses the new batteries that within one week after shipment and cycles less than 5 times
	7	Standard charge	Constant Current 20A Constant Voltage see No.5 0.02CA cut-off		Charge time : Approx 6 h
		Limiting current	20A		
	8	Standard discharge	Constant current: 20A end voltage see NO.4		
	9	Maximum Continuous Charge Current	100A		
	10	Maximum Continuous Discharge Current	100A		100A when 0°C > T ≥ -10°C 50A when -10°C > T ≥ -20°C
	11	Operation Temperature Range	Charge: 0~45°C Discharge (: -20~55°C		60±25%R.H. Bare Cell
	12	Storage Temperature Range	Less than 12 months : -10~35°C less than 3 months: -10~45°C Less than 7 day : -20~65°C		60±25%R.H. at the shipment state
13	Dimensions	680*485*180 mm		Include case	
14	Weight	Around 97.50 kg		Include case	
15	BMS SUPPORTS	14 PCS CONNECT IN PARALLEL		MAX 134.4 KWH	

3. Battery Testing Equipment and Conditions

3.1 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.

3.2 Measurement Apparatus

(1) Dimension Measuring Instrument

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

(2) Voltmeter

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

(4) Impedance Meter

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

3.3 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 $^{\circ}$ C and relative humidity of less 75%.,air 86Kpa~106Kpa.

3.4 Rest Period

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

4. Storage and Others

4.1 Long Time Storage

If stored for a long time(don't used,exceed three months), the cell should be stored in drying and cooling place. The cell's storage voltage should be 48.0V-49.0V and the cell is to be stored in a condition that the temperature of 23 \pm 2 $^{\circ}$ C and the humidity Of 45%- 75%. Long-term use of unused batteries to recharge every 3 months。 Ensure that the battery voltage is within the above range。

4.2 Others

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

5.Battery Management System

5.1 BMS Specification

1) : The BMS is designed for 15 series lithium battery.

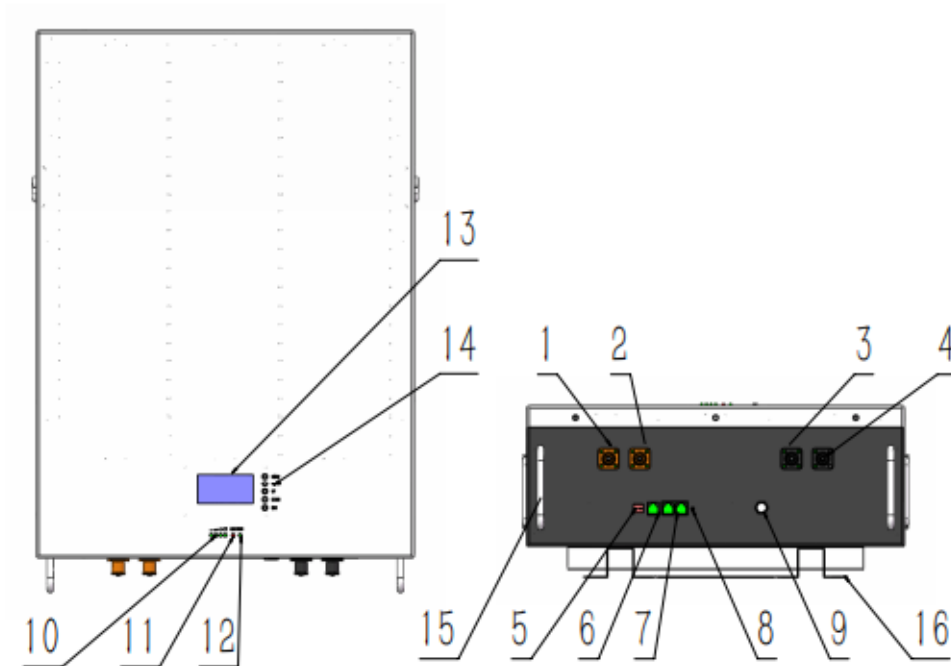
2) : The BMS have all functions which are :overcharge detection function; over discharge detection function; over current detection function; short detection function; Temperature detection function ; balance function; communicate function ; Alarm function ; Total capacity function : Storage history function

5.2 BMS Protect parameter

48V 15S Typical value specifications

Items	Details	Standard
Cell overcharge protection	Overcharge detection voltage	3.65±0.025V
	Overcharge detection delay time	Typical:1.0s
	Overcharge release voltage	3.38±0.02V
Cell over-discharge protection	Over-discharge detection voltage	2.7±0.02V
	Over-discharge detection delay time	Typical:1.0s
	Over-discharge release voltage	2.9±0.02V or charge
Over-current protection	Discharge Over-current protection current1	130±10A
	Discharge Over-current detection delay time 1	1S
	Discharge Over-current protection current2	150±10A
	Discharge Over-current detection delay time2	≤100m±50ms
	Charge OC protection current	130±10A
Short protection	Short protection current	350±10A
	Protection condition	Load short
	Detection delay time	≤300us
	Protection release condition	Charging release
Temperature(T) protection	Charge high T protection	55±3℃
	Charge high T recover	50±5℃
	Discharge high T protection	65±5℃
	Discharge high T recover	60±5℃
	Charge low T protection	-5±5℃
	Charge low T recover	0±5℃
	Discharge low T protection	-20±5℃
	Discharge low T recover	-15±5℃
Balance	Balance threshold voltage	3.45V
Communication	It has RS232 and RS485 standard communication interface, it can real-time monitoring the capacity of battery bank, the voltage, current, environment temperature, and charging/discharging current.	
Alarm	It has over-temperature, over charge, under-voltage, over-current, short circuit alarm function.	

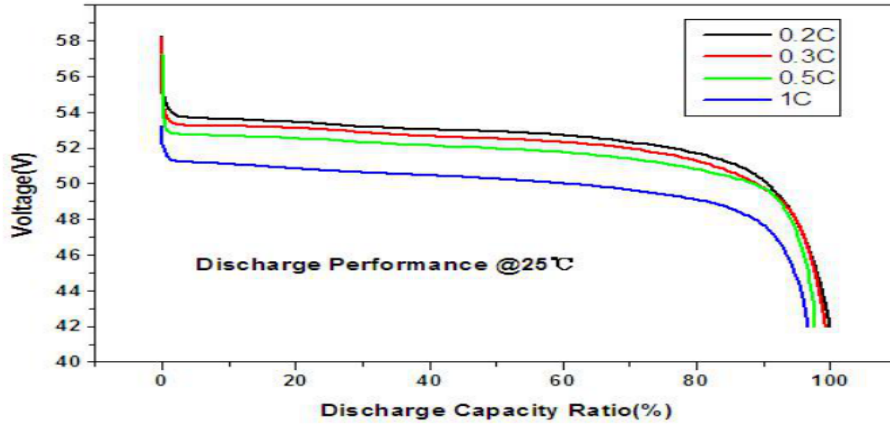
6. Case Structure of Battery Pack



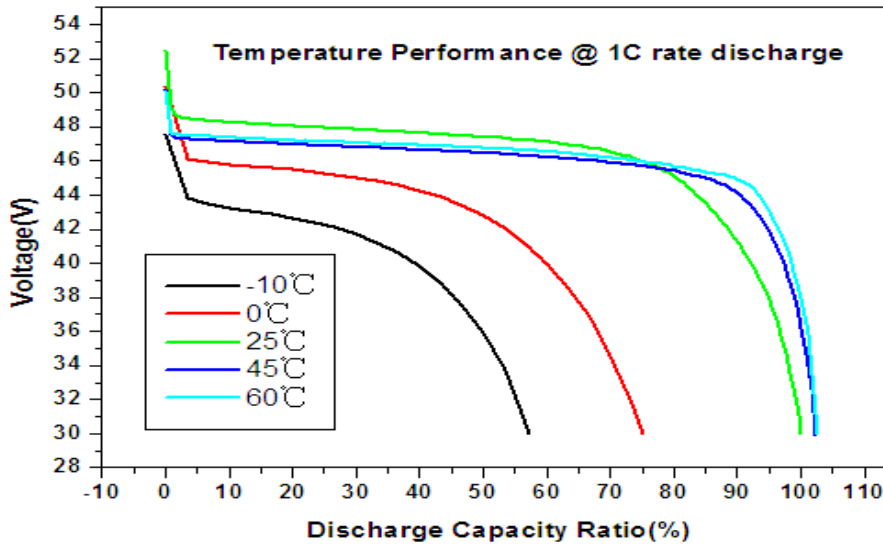
No.	Description	Silk-screen	Remark
1-2	UES0600	P+ P+	Output terminal
3-4	UES0600	P- P-	Output terminal
5	Dial switch	ADS	Set the address
6	RS232	RS232	RS232 communication port
7	RS485 port	RS485	RS485 communication port
8	Port Reset button	RST	For reset the batter
9	Dial switch	ADS	Set the address
10	LED	CAPACITY	Capacity indicator
11	LED	ALM	Alarm indicator
12	LED	RUN	Operation indicator
13	LCD		
14	LCD Key		
15	Handle		
16	Bracket		

7. Testing Report Curve

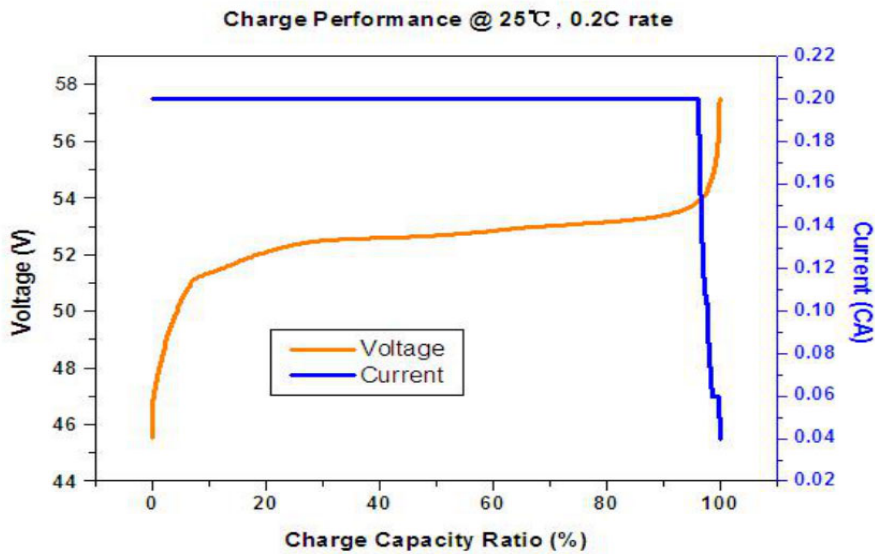
7.1 Discharge Curve-C rate



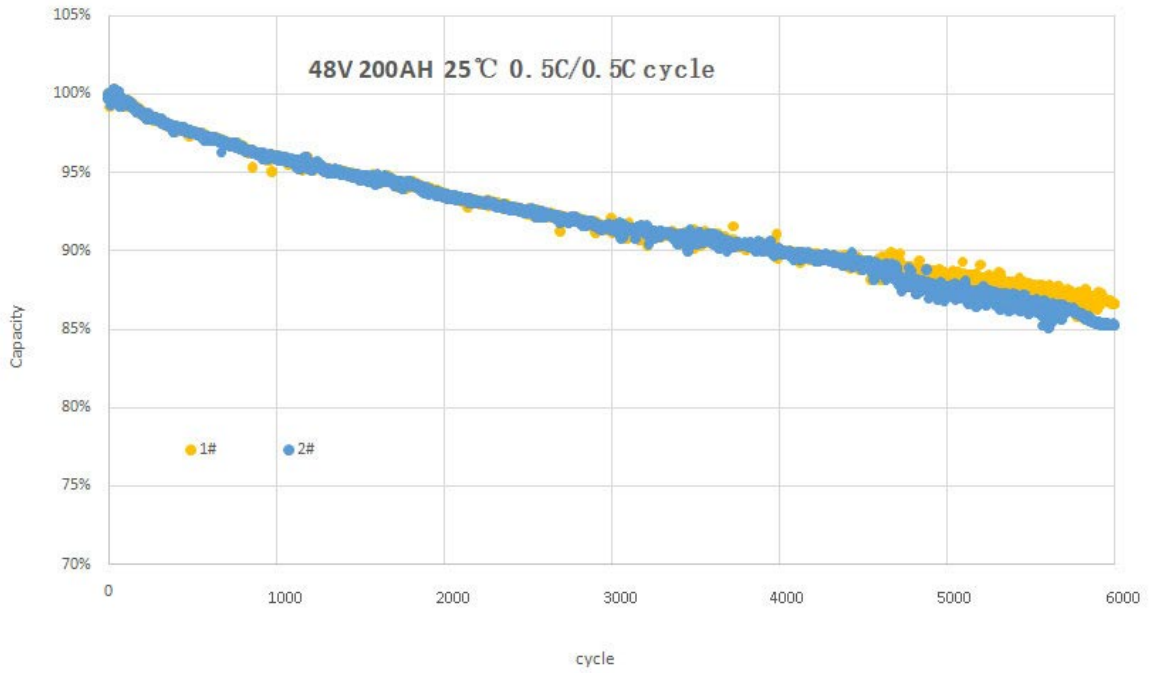
7.2 Discharge Curve-1C



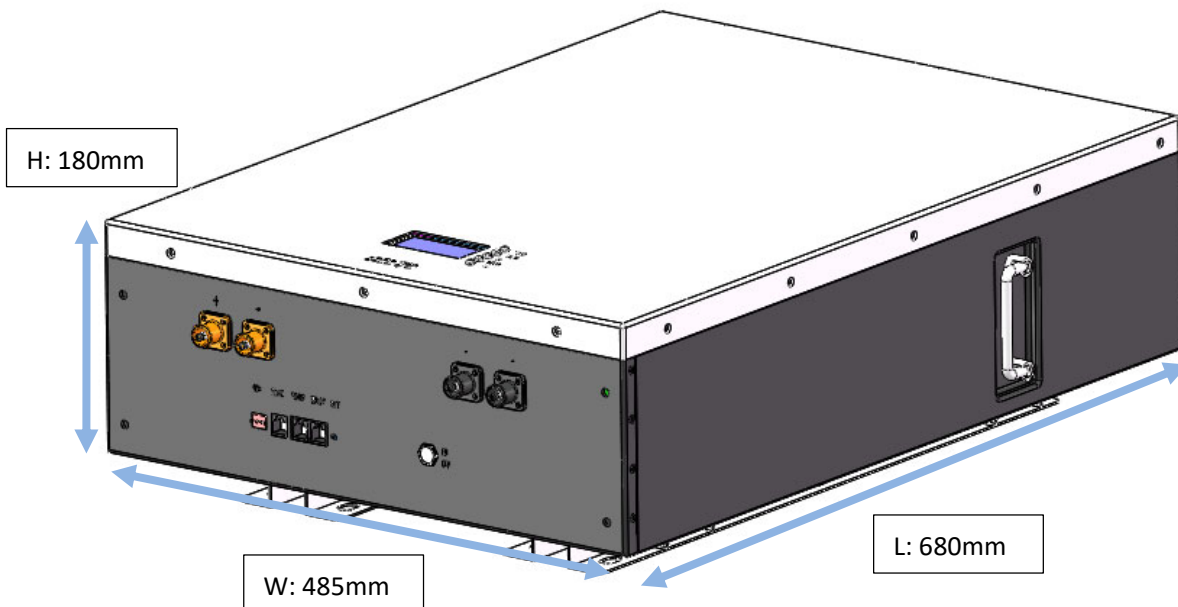
7.3 Charge Curve-0.2 C



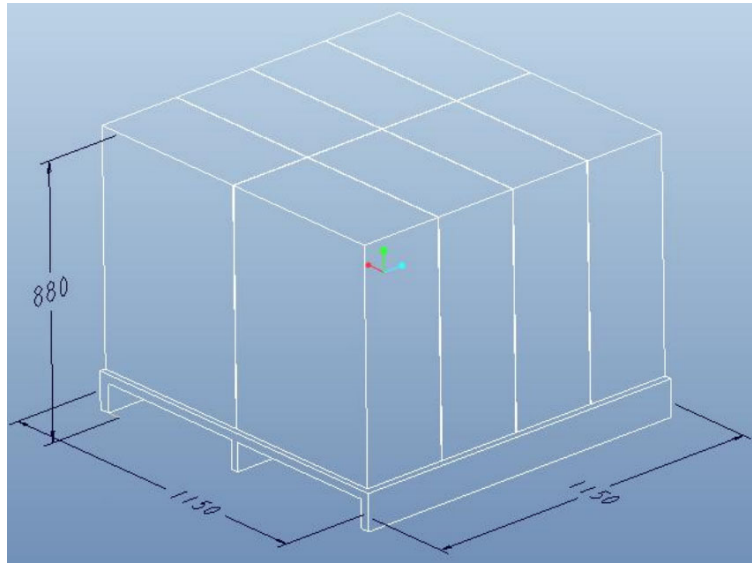
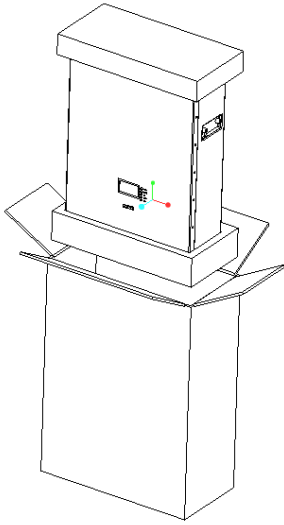
7.4 Cycle life over 6000 times –0.5 C standard



8. Pack and Packaging of Battery Pack



Shipping Package



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 **INVERTER CHARGER** other than those recommended by Rosen Solar.
- 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 discolored 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 discontinue use.

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.