Technical Specification of LiFePO4 Battery Pack (12.8V 100Ah)

File#： Version A

Effective Date：Dec 9 , 2019

Model	R-LFP12.8V100Ah
Specification	12.8V 100Ah

Contents

1. Scope

This document described Lithium Iron Phosphate Battery (12.8V 100Ah)， including mechanical design， basic performance, test method and notes for use. The product applies to storage system.

2. Mechanical Design

2.1 Battery specification：12.8V100Ah

2.2 Battery dimension：L×W×H= 328 mm×172mm×234mm

2.3 Cell Model： 3.2V 50Ah

2.4 Combination Method：4S2P

3. Battery Pack Basic **Performance**

#	Item	Parameter	Remark
1	Rated Capacity	100Ah	23℃±5℃,0.33C constant current discharging,8.4V cut off
2	Rated Voltage	12.8V	Battery module rated voltage
3	Standard Charge Current	20A（0.2C）	0℃~45℃，0.2C CC（Constant current）charge to 14.6V，then CV（constant voltage） charge，cut off when charging current≤0.05C.
4	Max Charge Current	100A	0℃~55℃，do not exceed 1C
5	Charge Cut Off Voltage	14.6V	
6	Standard Discharge Current	20A（0.2C）	-20℃~+60℃，0.2C CC（Constant Current） discharge, cut off @8.4V.
7	Max Continuous Discharge Current	100A	25℃±3℃，continuous 100A discharge
8	Discharge Cut Off Voltage	8.4V	
9	Max Pulse Discharge Current	120A	25℃±3℃；≤30 minutes
		150A	25℃±3℃；≤5 seconds
10	Working Temperature (charge)	0℃~55℃	During charge, battery and ambient temperature should not exceed 45℃.
11	Working Temperature (discharge)	-20℃~55℃	Battery can work at specified temperature range with capacity loss in tolerance.
12	Storage temperature	-20℃～45℃	(short term) Within 1 month
		-10℃～35℃	(long term) Within 1 year
13	Battery Weight	10.5±0.5Kg	
14	Battery Impedance	≤35mΩ	AC 1KHz impedance with half electricity

4. Main Performance

4.1 Battery pack main performance parameter

#	Item		Standard	Test Method
1	Discharge Rate Character	0.33C	100%	Test Temperature：25℃±3℃； Charge：0.2C constant current charge to 14.6V，transfer to constant voltage, cut off when current ≤0.05C Discharge：0.33C/0.5C constant current discharge cut off @8.4V.
		0.5C	≥95%	
2	Capacity & Temperature Character	55℃	≥95%	Charge：0.2C constant current charge to 14.6V，transfer to constant voltage, cut off when current ≤0.05C； Discharge：0.5C constant current discharge cut off at 8.4V；2hours interval for the temperature.
		45℃	≥95%	
		25℃	100%	
		0℃	≥65%	
		-10℃	≥50%	
3	Life Cycle Character		≥2000times	100% Depth of Discharge; at 25℃
			≥3000times	80% Depth of Discharge; at 25℃
			≥4500times	30% Depth of Discharge; at 25℃
4	Storage Character (Recoverable capacity)	25℃ 6months	≥95%	Charge battery with 60%~75% capacity for storage
		45℃ 3 months	≥90%	
		60℃ 1 month	≥90%	

4.2 Ambient Character

#	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 than11.6kPa（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

#	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,0.3 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. PCM (Protection Circuit Management)

5.1 Protection Parameter

#	Item		Description	Value	Unit
1	Over Charge Parameter		Cell Over charge Detection Voltage	3700±30	mV
			Cell Over charge Release Voltage	3550±50	mV
			Battery pack Over charge Detection Voltage	14.8±0.05	V
			Battery Pack Over charge Release Voltage	14.2±0.1	V
			Over Charge Voltage Protection Delay Time	1±0.5	S
2	Over Discharge Parameter		Cell Over discharge Detection Voltage	2350±30	mV
			Cell Over discharge Release Voltage	2500±50	mV
			Battery pack over discharge Detection voltage	9.4±0.05	V
			Battery Pack over discharge release voltage	10±0.1	V
			Over discharge Voltage Protection Delay Time	1±0.5	S
3	Balance		Balance Voltage	/	V
			Balance Current	/	mA
4	Charge Over Current Parameter		Charge Over Current Protection	100±1	A
			Short circuit at protection charging port	/	
5	Discharge Over Current Parameter		Discharge over current Protection	200	A
			Discharge over current Protection Delay Time	20~80	mS
			Short circuit protection at discharging port	/	
6	Short circuit protection release			/	
7	Temperature Protection	Charge	High temperature protection	55	℃
			Low temperature protection	-5	℃
		Discharge	High temperature protection	75	℃
			Low temperature protection	-20	℃
8	Consumption		Sleep mode	500	uA

6. 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	

7. Notes for Battery Usage

7.1 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.

7.2 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 15.2V;

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

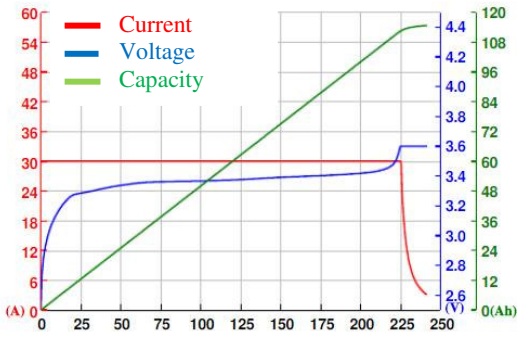
d) When use at first time, if has corrosion, or bad smell, or any other abnormal, please do not use.

7.3 Delivery requirements

#	Item	Parameter	Remark
1	Capacity	≥100Ah	0.33C discharge
2	Rated Voltage	12.8V	
3	Battery Impedance	≤35mΩ	AC impedance
4	Insulation impedance	≥50MΩ /500V	Between the output terminals and case
5	Delivery capacity requirements	≦30% SOC	Voltage range 12.8V-14.6V

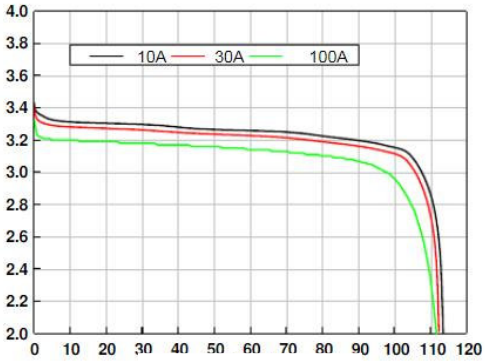
8.Attachment :Charge and discharge curve of cell

Charge curve



Time (min.)

Discharge curve



Capacity (Ah)