LiFePO₄ Battery Specification

Model	UE-48Li100-3U
Issued Date	2020-12-10
Issued Version	V1

1. Scope

This specification is applicable to the LFP rechargeable battery 15S1P battery. This specification outlines key requirements of the battery supplied by Upower, Ltd.

2. Model

48V 100AH -15S1P

3. Specification Description

3.1 Cell Specification

No.	Items	Specification Description
3.1.1	Model	LFP56160118
3.1.2	Material System	Lithium iron phosphate
3.1.3	Nominal Capacity	100Ah (at 1.0C rate discharge after standard charge)
3.1.4	Nominal Voltage	3.2V
3.1.5	Cut-off Voltage	2.5V
3.1.6	Charge Voltage	3.65V
3.1.7	Standard Charging Method	1.0C constant current, 3.65V constant voltage charge to 3.65V, continue charging till current deadline to ≤ 0.05C
3.1.8	Standard Discharging Method	1.0C constant current discharge to 2.5V
3.1.9	Internal Impedance	≤ 0.7mΩ (50% SOC, Measure the AC impedance at 1kHz)
3.1.10	Weight	1.93 ± 0.03kg
3.1.11	Cycle Life	≥ 6000 cycles, more than 80% at 0.5C charge and 0.5C discharge at 25°C (Charge method: 0.5C CC charge to 3.65V, then CV 3.65V charge till charge current decline to ≤ 0.05C; Discharge: Constant current 0.5C 2.5V Cut-off)

3.2 Battery Pack Specification

No.	Items	Specification Description
3.2.1	Appearance	The surface is clear and is free of scratch, mechanical cuts and match well with the host
3.2.2	Combination Mode	15S1P
3.2.3	Charge Voltage	54.6V ± 0.2V
3.2.4	Nominal Voltage	48V
3.2.5	Cut-off Voltage	40V
3.2.6	Nominal Capacity	100Ah (at 0.5C rate discharge after standard charge)

No.	Items	Specification Description	
3.2.7	Standard Charge Current & Voltage	1: 0.5 CC charge to 54.6V; 2: CV (constant voltage 54.6V) charge till charge current decline to 0.05C.	Temperature: 0°C ~ 45°C
3.2.8	Charging Time	3 hours (Ref.)	
3.2.9	Max. Charge Current	1C	
3.2.10	Max. Discharge Current	1C	
3.2.11	Operating Temperature	Charging: 0°C ~ 45°C - Discharging: -20°C ~ 55°C	
3.2.12	Storage Temperature and Humidity Range	1 month: -20 ~ 45°C 3 months: -10 ~ 45°C 6 months: 0 ~ 25°C Humidity: 45% ~ 90% RH	The battery should cycle once in three month. Recommended storage temperature is 25 ± 5°C of SOC 50% ~ 60%.
3.2.13	Pack Initial Internal Impedance	≤ 30mΩ (50% SOC, Measure the AC impedance at 1kHz)	
3.2.14	Pack Weight	Approx. 45kg	
3.2.15	Cycle Life	≥ 4500 cycles, more than 80% at 0.5C charge and 0.5C discharge at 25°C (Charge method :0.5C CC charge to 54.6V, then CV 54.6V charge till charge current decline to ≤ 0.05C; Discharge: Constant current 0.5C 40.0V Cut-off)	
3.2.16	Delivery Voltage	48 ~ 52V (30% ~ 60%)	
3.2.17	Battery Dimension	400 (L)* 483 (W)* 132 (H) mm	
3.2.18	Function	LED display, Red/Black terminal (2 Pin), Communication (RS485/CAN)	
3.2.19	Matching Inverter Brand	Battery can communicate with the following brands of inverters:	

Battery can communicate with the following brands of inverters:

	Brand	Protocol Version
1	Master Power	Inverter and BMS 485 communication
2	Voltronic	Protocol-2020/07/09
3	Schneider	Version2 SE BMS Communication Protocol
4	Growatt	Growatt BMS RS485 Protocol 1xSxxP ESS Rev2.01 Growatt BMS CAN-Bus-protocol-low-voltage-V1.04
5	SRNE	Technical specification Studer BMS Protocol V1.02_EN
6	GOODWE	
7	KSTAR	
8	EAST	
9	SMA	

Note: if the battery is abnormal with the inverter, please confirm whether the protocol version is consistent

4. Caution

In order to prevent the battery possibly occurs leaks, over heat, swollen, please note the preventive measure.
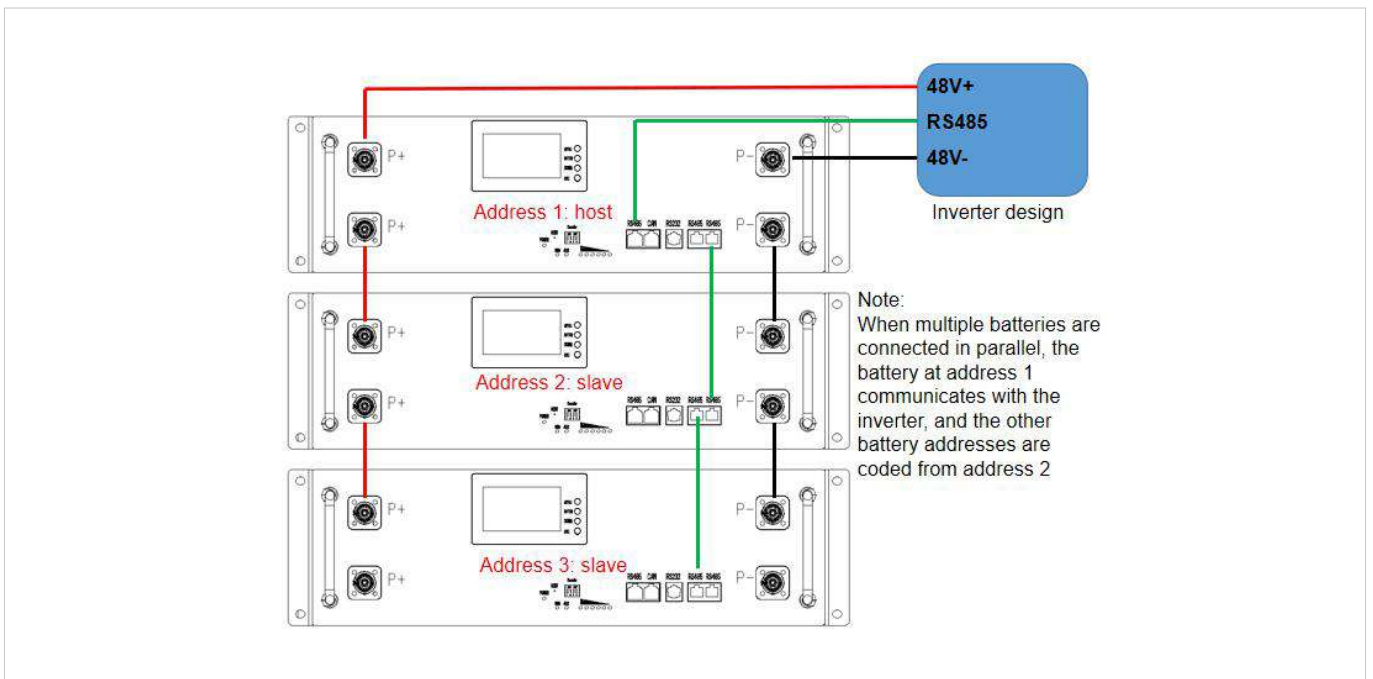
Handling Precautions and Guideline

4.1   Strictly prohibits inverting the cathode use battery.

4.2   Strictly prohibits directly connect battery to power source plug.

4.3   Please do not throw the battery to water or put into heater.

4.4   Strictly prohibits plunging the battery in sea water or water, when battery do not use, please store battery in the cool-dry environment.

4.5   The prohibition in strong static electricity and strong magnetic field place use, otherwise is easy to destroy the battery PCBA.

4.6   The prohibition puts the battery nearby the hot high temperature source, like the fire, the heater and so on use and leaves alone.

4.7   The prohibition directly connects the battery cathode with the metal to short-circuit.

4.8   The prohibition rap or throws, steps on the battery and so on.

4.9   Forbids directly to weld the battery and pierces the battery with the nail or other sharp weapons.

4.10 If the battery sends out the unusual smell, gives off heat, the distortion or appears any exceptionally, immediately moves the battery from the installment or the battery charger to and stops using.

4.11 If the battery occurs leaks, the electrolyte enters eye, please do not have to rub scratches, the application clear water flushing eye, and delivers the medical treatment otherwise to be able immediately to injure the eye.

4.12 When battery long-term storage, or assembly in the host, suggest customer should take every 3 months carry on one time charge and discharge and recharge it to half-charge state.

4.13 Abandon the battery to wrap up the electrode using the insulating paper, prevented the battery short-circuits.

4.14 Abandon battery processing to be supposed to follow the local government the laws and regulations.

4.15 Do not decompose the battery.

zeroCO₂

5. Outline Drawing

Battery dimension: 400 (L) *483 (W) *132 (H) ±1mm

6. Battery Parallel Wiring Diagram

Note:
When multiple batteries are connected in parallel, the battery at address 1 communicates with the inverter, and the other battery addresses are coded from address 2

7. Package

Individually packed in wooden boxes + padding (TBD)

8. PCM Specification

8.1 Scope

The specification is applied to the protection of 15S LFP cell from overcharge, over discharge, over current and short-circuit.

8.2 Electricity parameter (Environment temperature 25°C)

Protection Parameter		
Items	Content	Standard
Over Charge Protection	Over Charge Protection Voltage (V)	3.70V ± 50mV
	Over Charge Protection Delay Time (ms)	2000ms ± 500ms
	Over Charge Release Voltage (V)	3.40V ± 50mV
Over Discharge Protection	Over Discharge Protection Voltage (V)	2.65V ± 50mV
	Over Discharge Protection Delay Time (ms)	2000ms ± 500ms
	Over Discharge Release Voltage (V)	3.00V ± 50mV
Discharge Overcurrent Protection	Discharge Overcurrent 1 (A)	120A ± 5A
	Protection Delay Time 1	1000ms ± 500ms
	Discharge Overcurrent 1 (A)	130A ±5A
	Protection Delay Time 2	200ms ± 50ms
	Conditions for Relieving Protection	Delayed release for 1min
Charge Overcurrent Protection	Charge Overcurrent Protection	110A ± 5A
	Charging Overcurrent Delay	1000ms ± 500ms
	Conditions for Relieving Protection	Delayed release for 1min
Short Circuit Protection	Conditions of Protection	External load short circuit
	Detection Delay Time	≤ 600us
	Conditions for Relieving Protection	Disconnect load
PCM Internal Resistance	Main Circuit Conduction Internal Resistance	<10mΩ

Items	Content	Standard
Temperature Protection	Charging High Temperature Protection	50°C ± 5°C
	Charging High Temperature Protection Recovery	45°C ± 5°C
	Charging Low Temperature Protection	0°C ± 2°C
	Charging Low Temperature Protection Recovery	5°C ± 2°C
	Discharge High Temperature Protection	65°C ± 2°C
	High Temperature Protection Recovery of Discharge	60°C ± 2°C
	Discharge Low Temperature Protection	-20°C ± 2°C
	Discharge Low Temperature Protection Recovery	-15°C ± 2°C
	MOS Tube High Temperature Protection	100°C ± 5°C
	MOS Tube High Temperature Protection Recovery	90°C ± 5°C
Total Voltage Protection	Total Voltage Over-High Protection	54.6V ± 0.3V
	Total Voltage Overhigh Protection Recovery	51.8V ± 0.3V
	Total Voltage Too Low Protection	40V ± 0.3V
	Total Voltage Too Low Protection Recovery	44.0V ± 0.3V
SOC Protection	SOC Too Low Protection	< 15% SOC Stop discharging
	SOC Too Low Protection Delay	2000ms ± 500ms
Voltage Difference Protection	Voltage Difference Protection Voltage	450mV ± 50mV
	Voltage Difference Protection Recovery	350mV ± 50mV