

Multi-application - LiFePO4 Power

CE **UE-48Li20**

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## LITHIUM IRON PHOSPHATE BATTERY



NO IMAGE AVAILABLE

### 1. Battery Pack Brief Introduction

This specification applies to the **UE-48Li20** battery manufactured by MASTER BATTERY, S.L., describes the type and size, performance, technical characteristics, warning and caution of the rechargeable cell.

#### 1.1 Battery Type

LiFePO4 (LFP)

#### 1.2 Reference Standard

GB/T 18287-2013

#### 1.3 Product SPEC

48V/20Ah 16S1P

#### 1.4 Cell Brand and Model

UE-027070180C-Fe-20Ah

#### 1.5 Period of Warranty

24 Months from the date of shipment

#### 1.6 Battery Specification Amendment

If the raw materials, production processing, production system or battery usage environments & other conditions need to be change, the amendment side needs provide the written advice to the other side, only the both sides come to an end, the amendment will be effective



## 2. Battery Pack Basic Features

NO.	Items		Characteristics	Testing Methods
1	Nominal Voltage		48V	Follow (GB/T18287-2013)
2	Nominal Capacity		20Ah	Follow (GB/T18287-2013)
3	Minimum Capacity		19Ah	Follow (GB/T18287-2013)
4	Battery Internal Impedance		Internal Impedance $\leq 60\text{m}\Omega$	Internal Impedance Testing Machine (HIOKI 3555,1kHz)
5	Shipment Voltage		51V~56V	Multi-meter
6	Dimension	Length	As external dimension drawing	Vernier caliper
		Width		
		Height		
7	Working Temperature	Charge	0~50°C, 45~85% RH	Temperature & Humidity Instruments
		Discharge	-20~60°C, 45~85% RH	
8	Storage Temperature & Humidity Range	Short: above one month	-20~+55°C, 45~85% RH	Temperature & Humidity Instruments
		Medium: above three months	0~+45°C, 45~85% RH	
		Long: above one year	+5~+30°C, 45~85% RH	
9	Allowed maximum continuous charge current		30A	Multi-meter
10	Allowed maximum continuous discharge current		30A	Multi-meter
11	Allowed maximum reverse charge voltage		NO Allowed	/
12	Allowed maximum charge voltage		58.4±0.2V	Multi-meter
13	Discharge cut-off voltage		40±1V	Multi-meter
14	Weight		About:12 Kg	Electronic scale
15	Balanced function		/	/
16	Display voltage		(1%)	/
17	Display current		(2%)	/
18	Display capacity		(10%)	/
19	Communication		RS232 / RS485	/



### 3. Battery Pack Electrical Characteristics

#### 3.1 Testing Conditions (Unless Specially Requirements)

Temperature: 20±5°C      Related Humidity: 45~75%      Atmosphere Pressure: 86~106 kPa

The testing items under the Shipment Voltage.

#### 3.2 Battery Pack Electrical Characteristics

NO.	Items	Standards	Testing Method
1	Internal Impedance	Impedance $\leq 60\text{m}\Omega$	Under 20±5°C Environment Temperature, the Usage Frequency of Fully Charge( 1KHz), Use AC Internal Impedance test machine to test (HIOKI3555).
2	Nominal Capacity	20Ah	Rest for 0.5~1 hour after fully charge, Using electrical loader to connect with the battery output port, and discharge with constant current 0.2C till it can't discharge. Do the cycle three times, if there is one time that the discharge time is equal or more than 285 minute, you can stop.
3	Short circuit protection	No load ability after short-circuit. Comeback capability of loading after remove the lead away	Short the pack with the lead (<50mΩ). If remove the lead away, connect the electronic loader with P+, P- of protection board again, so load ability comes back.
4	Allowed Maximum continuous charge Current	30A	Charging with 30A for more than 0.5h and the added temperature of battery pack less than 15°C.
5	Allowed Maximum continuous discharge Current	30A	Discharging with 30A for more than 0.5h and the added temperature of battery pack less than 15°C.
6	Over Current Protection	120A~150A	Using electron load connect with output side, discharge with 120A for about 2 sec Discharge with 150A for less than 20 millisecond.



NO.	Items	Standards	Testing Method						
7	Cycle life	Discharge Capacity $\geq 80\%$	Discharge it with the current of 1C to the cut-off voltage, and store it for 15 min. Charge a battery with the current of 1C, then keep the voltage and current constant and continue to charge it until completed. After storing the battery for 15 min. The test is to be conducted as per the above cycles. The cycle should be 2500 times. At the 2001 times discharge capacity should not be less than $\geq 80\%$ with 0.2C.						
8	Discharge Temperature Characteristics	The ratio between discharge capacity and charge capacity should be not less than the following value	At $20 \pm 5^\circ\text{C}$ discharge the battery with the current of 0.2C to the cut-off voltage and record charge capacity. Store the battery at the following temperature for 2h and discharge the battery with 0.2C to the cut-off voltage.						
		Discharge Current	Discharge Temperature						
		0.2C	<table> <tr> <td>-20°C</td><td>0°C</td><td>25°C</td><td>55°C</td></tr> <tr> <td>60%</td><td>80%</td><td>100%</td><td>95%</td></tr> </table>	-20°C	0°C	25°C	55°C	60%	80%
-20°C	0°C	25°C	55°C						
60%	80%	100%	95%						
9	Charge Retention	Remain capacity $\geq 90\%$	At $20 \pm 5^\circ\text{C}$ completely charge and store it for 28 days, and then discharge it with 0.2C to the cut-off voltage. (We suggest charge the battery every three months)						
10	Over Discharge Protection furbish	Charging with 0.2C	Charge the battery with 0.2C for 5 min and measure the output voltage ( $\geq 40\text{V}$ ) of the battery pack. The battery should have load.						



## 4. Battery Pack Reliability Test

### 4.1 Testing condition (Unless Special Requirements)

Temperature:  $20 \pm 5^\circ\text{C}$       Related Humidity: 45~75%      Atmosphere Pressure: 86~106 kPa

All testing under full capacity.

### 4.2 Reliability Test

NO.	Items	Standards	Testing Method
1	Vibration Testing	The appearance of battery should not leakage, break or explosion	Fix a charged battery on a vibrating table, vibrate it for 90 minutes in three mutually perpendicular directions at the 0.8mm resonance. The frequency is to be varied at the rate of 1hz/min between 10 and 55 hertz.
2	High Temperature Discharge Testing	The battery should be no remarkable breakage, distortion. Discharge time should not less than 255 mins	Place a full charged battery under the environments of $55^\circ\text{C}$ for 2 hours. Discharge it at the current of 0.2C to the cut-off voltage. Then keep it at $20^\circ\text{C} \pm 5^\circ\text{C}$ for 2 hours.
3	Low Temperature Discharge Testing	The battery should be no remarkable breakage, distortion. Discharge time should not less than 180 minute	Place a full charged battery under the environments of $-20^\circ\text{C}$ for 15-24 hours. Discharge it at the current of 0.2C to the cut-off voltage. Then keep it at $20^\circ\text{C} \pm 5^\circ\text{C}$ for 2 hours.
4	Constant Humidity & Temperature Testing	The battery should be no remarkable breakage, distortion. Discharge time should not less than 180 mins	Place a full charged battery under the environments of $40^\circ\text{C}$ and 90%~95% RH for 48 hours. And keep it in the room temperature for 2 hours. Then discharge it at the current of 200mA to the cut-off voltage.
5	High & Low Temperature Storage	The battery should be no remarkable breakage, distortion. And charge/discharge normally	Place a full charged battery in a oven with $55 \pm 2^\circ\text{C}$ for 2 hours, then keep it under $20 \pm 5^\circ\text{C}$ for 4hrs, then place it in a oven with $-20 \pm 2^\circ\text{C}$ for 2 hours, then keep for 4 hours under $20 \pm 5^\circ\text{C}$ , cycle as high temperature-normal temperature-low temperature-normal temperature-high temperature for 10 times.



## 5. Battery Pack Safety Test

### 5.1 Testing Conditions (Unless Specially Requirements)

Temperature: 20±5°C

Related Humidity: 45~75%

Atmosphere Pressure: 86~106 kPa

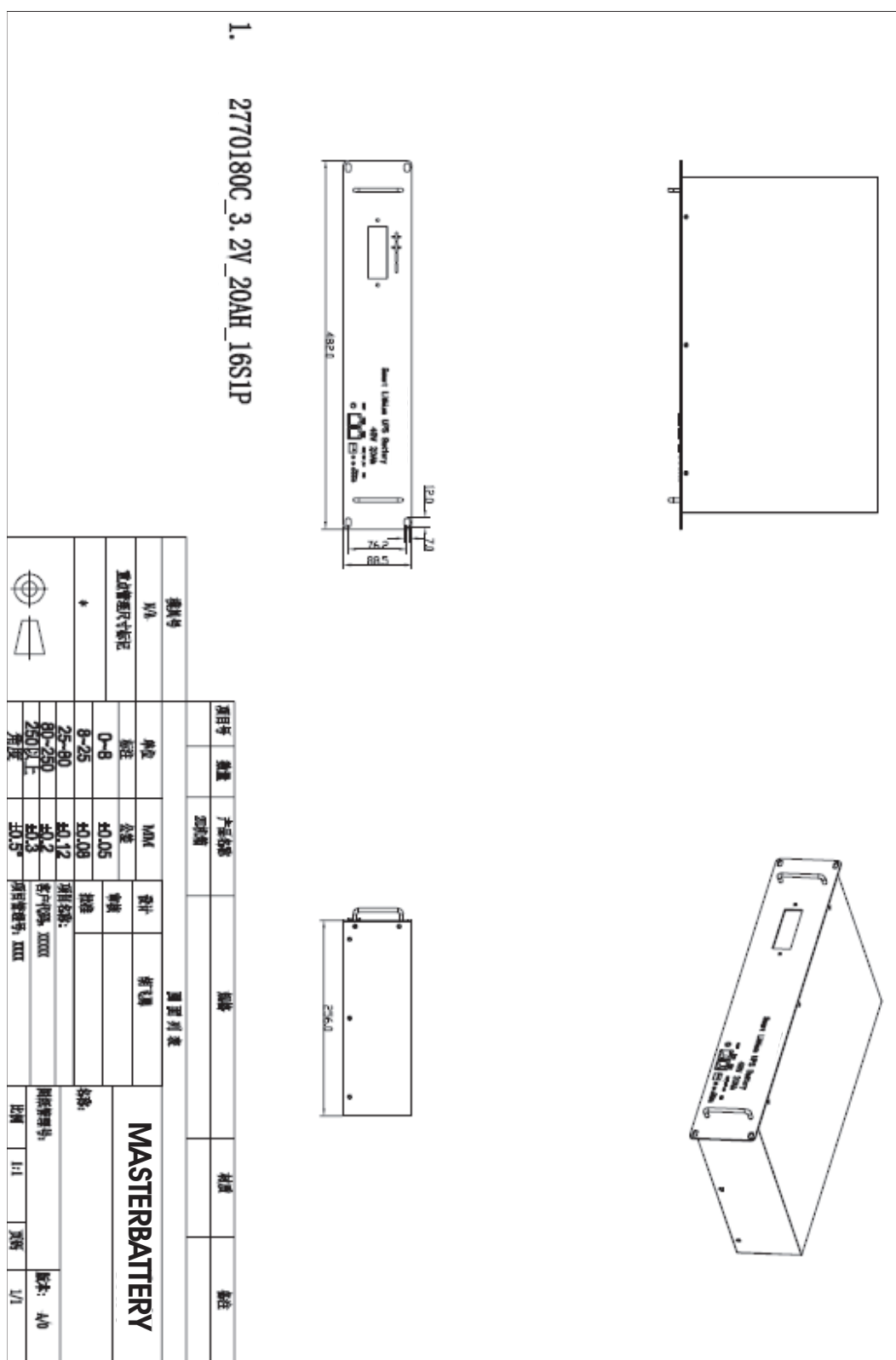
All testing under full capacity.

### 5.2 Battery Pack Safety Test

NO.	Items	Standards	Testing Method
1	Short-Circuit	The battery should be no remarkable breakage, distortion. And charge normally	Use a resistor with less than 0.05Ω to make the battery short circuit for 1 hour. The appearance and characteristics are normal.
2	Over Discharge Protection Test	The battery should be no remarkable breakage, distortion. Appearance and charge are normal	Discharge the battery at the rate of 1C with the load of 30Ω for 24h. Charging for 10 sec with specified adapter, and check the voltage (≥32V).
3	Impact Test	The battery should be no explosion or catch fire	Place a full charged battery on a flat and put a stainless steel stick (Diamond 7.9 mm) in the middle of the battery upright. Beat the steel stick with 9.1Kg.



## 6. Pack diagram



## 7. Packing & Transportation

### 7.1 Battery Packing

### 7.2 Transportation

Batteries should be packed. During transportation they should be protected from vibration, shock, impact, rain and direct sunshine. The prompt vehicles are lorry, train, steamships or planes, etc.

## 8. Battery Usage Notice

Please read and follow the handling instructions for the battery before use. Improper use of the battery may cause heat, fire, rupture, damage or capacity deterioration of the battery. MASTER BATTERY, S.L., describes is not responsible for any accidents caused by the usage without following our handling instructions.

8.1 Before use, please carefully read the handling instructions and the marks on the battery.

8.2 Please use the battery under natural, room environments.

Temperature: -20~35°C ,

Relative Humidity: 65±20%.

8.3 During use, please far away from heat source, high voltage and avoid children to use. Don't beat battery.

8.4 Please use the special charger to charge the battery, and don't put the battery in the charger more than 24 hours.

8.5 Do not make the positive (+) and negative (-) terminals short circuit. And do not wet the battery , or will have dangers.

8.6 Please store the battery well if don't use in a long time. Please keep the battery in half charge , that is to say don't charge fully and don't discharge completely. Please avoid to touch with metal to damage the battery. Please store the battery in shade, cool and dry place.

8.7 Do not put the battery into a fire or water, and please safely deal with the disuse battery.





## 9. Danger & Warning & Caution

### Danger

- When Charge the battery, please use special charger and following the handling instructions.
- Only use the battery on the appointed device.
- Don't heat the battery or put into the fire.
- Don't use the battery near to fire sources and don't use or leave it in the car which temperature is over 60°C, and don't charge the battery in these environments.
- Don't throw the battery into water and don't wet it.
- Don't place the battery in the pockets and bags together with your necklace, hairpins, coins , nails or metal products. Also don't store the battery together with these products.
- Don't use metal conductors avoiding not to make the two electrodes short circuit.
- Don't reverse the two electrodes when use the battery.
- Don't penetrate the battery with sharp things
- Do not disassemble the battery.
- Don't weld the battery directly .
- Don't use the battery with seriously scratch and distortion.
- Please carefully read the handling instruction before use.

### Warning

- Don't put the battery into heater, washing machine or high voltage container.
- Don't use the chargers without appointment and UL certificate.
- If the battery is not fully charged in the stated time ,please stop charging.
- Please stop using if you find the battery heat, smell odor, change color, distort or other abnormal states.
- Please far away from the battery if you find leakage or terrible smell.
- Please wash with clean water if the electrolyte leak on your skin or clothes.
- If the battery leaks, and the electrolyte get into the eyes. Do not wipe eyes, instead, rinse the eyes with clean water and immediately see a doctor.

### Caution

- Place the battery far away from children in order not to swallow by them.
- Children's guardians should guide the children when they use the batter.
- Please have a profound understanding of the battery handling instruction before use.
- Please study the operating guide before Charging the battery.
- Please carefully read the operating guide of the device before put into or take out the battery from it.
- Battery has usage cycle life, if its using time is quite little than usual, please change your battery.
- If the battery cycle life is over, please take it out of the device quickly.
- If don't use the battery for a long time, please take it out of your device and store it under a low temperature & low humidity environment.
- Charge, use and store the battery should be far away from electrostatic place.
- **It is strictly prohibited any series or parallel between the battery pack.**

