Shenzhen Polinovel Technology Co., Ltd

NOVEL Series LiFePO4 Battery Specification (12V 100Ah)

Model: NOVEL12100

Customer Name: ________________

Customer Confirmation: ________________

Date: 2017.12.22
Contents

1. General Information ........................................................................................................3

2. Product ..........................................................................................................................3

3. Product Specifications ..................................................................................................3

4. Battery Picture .............................................................................................................4

5. Dimensional Drawing .................................................................................................5

6. Test Conditions ............................................................................................................5

7. Product Performance ...................................................................................................6

8. Protective circuit specification .....................................................................................6

9. Transportation .............................................................................................................7

10. Storage .......................................................................................................................7

11. Battery Operation Instruction ....................................................................................7

12. Warning & Tips .........................................................................................................8
1. General Information
This specification defines the performance of rechargeable LiFePO4 battery pack NOVEL12100 manufactured by SHENZHEN POLINOVEL TECHNOLOGY CO., LTD, describes the type, performance, technical characteristics, warning and caution of the battery pack.

The battery pack supports Bluetooth communication function. Through Android and iOS APP, users can read the battery status and information. Due to the Android system’s openness, different smartphone manufacturers will have their own different Bluetooth hardware version and customized feature Android systems. So, the APP of this battery may not work well on some smartphones with Android system due to compatible issue. It is necessary for the customer to confirm whether the phone is compatible for our APP.

2. Product
2.1 Product Name: LiFePO4 Battery Pack
2.2 Description: 12V 100Ah LiFePo4 Battery Pack with Bluetooth Communication
2.3 Model: NOVEL12100

3. Product Specifications

<table>
<thead>
<tr>
<th>NO.</th>
<th>Items</th>
<th>Criteria</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Rated Capacity</td>
<td>100Ah</td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>Energy</td>
<td>1.28KWh</td>
<td></td>
</tr>
<tr>
<td>3.3</td>
<td>Nominal Voltage</td>
<td>12.8V</td>
<td></td>
</tr>
<tr>
<td>3.4</td>
<td>Outgoing Voltage</td>
<td>≥12.8V</td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td>Internal resistance</td>
<td>≤20mΩ</td>
<td></td>
</tr>
<tr>
<td>3.6</td>
<td>Series parallel application</td>
<td>up to 4 series or 4 parallel connected applications, please refer to the “Special Instruction in Series and Parallel Use of Polinovel 12V Lifepo4 batteries”</td>
<td></td>
</tr>
<tr>
<td>3.7</td>
<td>Limited charge voltage</td>
<td>14.6±0.2V</td>
<td></td>
</tr>
<tr>
<td>3.8</td>
<td>Floating charge voltage</td>
<td>13.8±0.2V</td>
<td></td>
</tr>
<tr>
<td>3.9</td>
<td>Charge Method</td>
<td>CC/CV</td>
<td></td>
</tr>
<tr>
<td>3.10</td>
<td>Standard charge current</td>
<td>60A</td>
<td></td>
</tr>
<tr>
<td>3.11</td>
<td>Maximum charge current</td>
<td>80A</td>
<td>(Continuous discharge)</td>
</tr>
<tr>
<td>3.12</td>
<td>Standard discharge current</td>
<td>80A</td>
<td>(Continuous discharge)</td>
</tr>
<tr>
<td>3.13</td>
<td>Maximum discharge current</td>
<td>100A</td>
<td>(Continuous discharge)</td>
</tr>
<tr>
<td>3.14</td>
<td>Pulse discharge current</td>
<td>400A(&lt;1s), 500A(&lt;30ms)</td>
<td></td>
</tr>
<tr>
<td>3.15</td>
<td>Discharge cut-off voltage</td>
<td>10.0V</td>
<td>Voltage at end of discharge</td>
</tr>
<tr>
<td>3.16</td>
<td>Cycle Life</td>
<td>&gt;2,000 cycles</td>
<td>@80% DOD</td>
</tr>
<tr>
<td>3.17</td>
<td>Dimension</td>
<td>L318 x W165 x H215 mm</td>
<td></td>
</tr>
<tr>
<td>3.18</td>
<td>Weight</td>
<td>Approx: 12.5 ±0.2 Kg</td>
<td></td>
</tr>
<tr>
<td>3.19</td>
<td>Operating Temperature</td>
<td>Charging: 0～45℃</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Discharging: -20～60℃</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recommended operating temperature: 15℃～35℃</td>
<td></td>
</tr>
<tr>
<td>3.20</td>
<td>Self-discharge rate</td>
<td>Residual capacity: ≤3%/month; ≤15%/years</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reversible capacity: ≤1.5%/month;≤8%/years</td>
<td></td>
</tr>
</tbody>
</table>
3.21 Storage Temperature & Humidity Range

| Less than 1 month: | -20°C ~ 35°C, 45%RH ~ 75%RH |
| Less than 3 months: | -10°C ~ 35°C, 45%RH ~ 75%RH |

Recommended storage environment: 15°C ~ 35°C, 45%RH ~ 75%RH

Long time storage:
If the battery need be stored for a long time, the voltage should be 13.2V (50%SOC), and stored in the condition as storage proposal. It need, at least one charge & discharge cycle every six months.

4. Battery Picture

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Length</td>
<td>318mm ±2mm</td>
</tr>
<tr>
<td>W</td>
<td>Width</td>
<td>165mm±2mm</td>
</tr>
<tr>
<td>H</td>
<td>Height</td>
<td>215mm±2mm</td>
</tr>
</tbody>
</table>
5. Dimensional Drawing

6. Test Conditions

6.1 Standard Test Conditions

6.1.1 Unless otherwise specified, all performance tests is required conducted at temperature 25°C±2°C, Humidity less than 45%~75%RH.

6.1.2 Unless otherwise specified, the tested product is required unused within two month after outgoing.

6.2 Measuring Instrument or Apparatus

All of the measuring instruments and facilities (include the equipment which monitor the test parameters) should be verified and calibrated qualified by relevant Chinese Calibration Regulation or certain standards within the valid date. All the test instruments and equipment should have the properties of adequate precision and stability, and the precision should be an order higher than the tested indicators or the tolerance should be less than one third of the tested parameters.

6.3 Standard Charging

Charging shall consist of charging at a 0.33C constant current rate until the battery reaches 14.6V. The battery shall then be charged at constant voltage of 14.6 volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to 0.02ItA. Charge time: Approx 5.5h, The battery shall demonstrate no permanent degradation when charged between 0 °C and 45 °C.
6.4 Standard Discharging

The battery should be discharged at a constant current of 0.33C to 10.0 volt @ 25°C ± 2°C

6.5 Others

If no otherwise specified, the rest time between Charge and Discharge amount to 30mins.

7. Product Performance

<table>
<thead>
<tr>
<th>NO.</th>
<th>Items</th>
<th>Criteria</th>
<th>Testing method</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Rated Capacity</td>
<td>100Ah</td>
<td>Rest for 1 hour after fully charged, then discharge with 0.33C current until the battery reaches the discharge cutoff voltage. Repeat above process for three times, if the discharge time is not less than 120 minutes, you can stop and define the Discharging current*time value (Ah) as battery capacity.</td>
</tr>
<tr>
<td>4.2</td>
<td>Minimum Capacity</td>
<td>95Ah</td>
<td></td>
</tr>
<tr>
<td>4.3</td>
<td>Internal resistance</td>
<td>≤20mΩ</td>
<td>50% battery SOC state frequency of 1 KHZ ac resistance tester</td>
</tr>
<tr>
<td>4.4</td>
<td>Cycle life (DOD100%)</td>
<td>≥2000cycle</td>
<td>Discharge with the current of 0.33C until it can’t discharge, and then rest it for 1h. Charge the battery following CC(0.33C)/CV(14.6V) mode to full capacity, and then rest it for 1h. Repeat above process until full charged capacity is no more than 80% of normal value. Accumulated times is defined as cycle life.</td>
</tr>
<tr>
<td>4.5</td>
<td>Discharge Temperature</td>
<td>-20°C</td>
<td>≥70%</td>
</tr>
<tr>
<td></td>
<td>Characteristics</td>
<td>-0°C</td>
<td>≥80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25°C</td>
<td>≥100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>55°C</td>
<td>≥95%</td>
</tr>
<tr>
<td>4.6</td>
<td>Discharge Retention</td>
<td>Residual</td>
<td>Charge the battery to full capacity and store it for 28days, and then discharge it with 0.33C to the cut-off voltage.</td>
</tr>
<tr>
<td></td>
<td>ability</td>
<td>capacity≥80%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recovery</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>capacity≥90%</td>
<td></td>
</tr>
<tr>
<td>4.7</td>
<td>Communication Function</td>
<td>Bluetooth</td>
<td>Through APP, user can read the battery system information such as voltage, current, SOC, temperature and so on.</td>
</tr>
</tbody>
</table>

8. Protective circuit specification

The batteries are supplied with a LiFePO4 Battery Management System (BMS) that can monitor and optimized each single prismatic cell during charge & discharge, to protect the battery pack overcharge, over discharge, short circuit. Overall, the BMS helps to ensure safe and accurate running.
### 5.1 Over charge
- **Over-charge protection for each cell**: 3.9±0.03V
- **Over-charge release for each cell**: 3.60±0.05V
- **Over-charge release method**: Under the release voltage

### 5.2 Over discharge
- **Over-discharge protection for each cell**: 2.0±0.05V
- **Over-discharge release for each cell**: 2.5±0.05V
- **Over-discharge release method**: Charge to recovery

### 5.3 Over current
- **Discharge over current protection**: 300~500A
- **Protection delay time**: 50-200ms
- **Over current release method**: Delay about 30S after recovery.

### 5.4 Short circuit
- **Do not short-circuit the electrodes**: Designed For 500A~700A /500us

### 5.5 Battery temperature
- **Charge over temperature**: Protection @65±5°C
- **Release @50±5°C**
- **Discharge over temperature**: Protection @65±5°C
- **Release @50±5°C**
- **Charge over temperature protection MOS**: Protection @103±10°C
- **Release @75±10°C**
- **Discharge over temperature protection MOS**: Protection @103±10°C
- **Release @75±10°C**

### 9. Transportation
- * Based on the character of cell, proper environment for transportation of LiFePO4 battery pack need to be created to protect the battery.
- * The battery should be packed in boxes for delivery, and be delivered under the state of half charged.
- * The battery should be prevented from vibration, shock, extrusion, sun-scorched and rain-drenched.
- * It could be delivered by car, train, boat, airplane, etc.
- * Keep the battery against dropping, turning over and serious stacking during loading.

### 10. Storage

Battery should be stayed in the warehouse 15℃~35℃ where it’s dry, clean, shade, and well-ventilated. Long time storage:

If the battery need be stored for a long time, the voltage should be 13.2V (50%SOC), and stored in the condition as storage proposal. It need, at least one charge & discharge cycle every six months.

### 11. Battery Operation Instruction

#### 11.1 Charge and discharge
- **Charging current**: Do not surpass the largest charging current that specification stipulated.
- **Charging voltage**: Do not surpass the highest limited voltage that specification stipulated.
- **Charging temperature**: within temperature scope that specification stipulated.
- **Charge with constant current, then with the constant voltage, no reverse charge, which is dangerous**
11.1.5 Special note:
Short time doesn't affect the use of the battery overcharge too, but for a long period of time over discharge or over charge can affect the function of the battery failure, or the battery can’t use permanently, appear serious safety hazards, need long time floating please use the recommended floating model specification. Battery when not in use for a long time, because of its own self-discharge characteristics can also cause discharge, to prevent the occurrence of a discharge, battery should maintain a certain capacity, maintain the voltage at 50% state of SOC.

12. Warning & Tips

- Please read and follow the specification and caution remarks on battery surface before use the battery. Improper use may cause heat, fire, rupture, damage or capacity deterioration of the battery. SHENZHEN POLINOVEL TECHNOLOGY CO., LTD. describes not responsible for any accidents caused by the usage without following our specification.
- The battery must be far away from heat source, high voltage, and avoid to be exposed in sunshine for long time.
- Never throw the battery into water.
- Do not put the battery in a charger or equipment with wrong terminals connected.
- Never connect the positive and negative of battery with metal.
- Avoid excessive physical shock or vibration. Don’t hit, fall, stamp on the battery.
- Without the permission of the manufacturer and guidance, don’t remove or assemble the battery.
- Do not use the battery mixed with other different manufacturers’, types, or models of batteries.
- Keep the battery against high temperature. Otherwise it will cause battery heat, get into fire or lose some function and reduce the life.
- When battery run out of power, please charge your battery timely (≤15day).
- Please use the matched or suggested charger for this battery.
- If battery emit peculiar smell, heating, distortion or appear any abnormity during working or storage, please stop using and take it out from device.
- If the battery leaks and get into the eyes or skin, do not wipe, instead, rinse it with clean water and see a doctor immediately.
- Please keep it far away from children or pets.
- Do not put disuse battery into a fire or water.
- The battery pack supports up to 4 series-connected applications
- Parallel connection of this battery pack is allowed under condition that voltage difference ≤0.2V, parallel numbers ≤4 groups, and operated by professionals.

Notes: Any other items which are not covered in this specification shall be agreed by both parties.

Shenzhen Polinovel Technology Co., Ltd
Xintun Building 804, Xintun Middle Road 50, Longcheng Street,
Longgang District, Shenzhen, 518172, China
Tel: +86 (0) 755 2890 6569
Fax: +86 (0) 755 2890 3442
E-Mail: sales@polinovel.com
Website: www.polinovel.com