

 <b>Lvwo</b>	<b>Specification</b>	Versions	A0
		Date	Jun. 21, 2024
		DOC No:	WBY-YJY-CN20240602101-01-CWH
Address: Economic Development Zone of Hangbu town, Shucheng County, Lu'an, China			
Tel:+86-0564-8030526	Post Code:231300	Web: www.lvwo-energy.com	

NO. : WBY-YJY-CN20240602101-01-CWH

# Product Development Agreement


## 12.8V 7Ah Battery System Specification

### A0 Version

Prepared By	Checked By	Approved By
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<b>Customer Approved</b>	<b>Signature:</b>
	<b>Date:</b>
	<b>Company Name: (Company Stamp)</b>



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## I. Battery System Design Reference Technical Document


- GB 2894 Safety signs (neq ISO 3864: 1984)
- GB 16179 Guidelines for the use of safety signs
- GB 8897.4-2008 Primary batteries (Part 4) Safety requirements for lithium batteries
- GB 21966-2008 Safety requirements for lithium primary cells and batteries in transportation
- GJB 4477-2002 General Specification for Lithium-ion Battery Packs

## II. Supply List

NO.	Version	Unit	Quantity	Notes
1	12.8V7Ah battery	pcs	1	


## III. Battery System Usage Requirements

1. Battery system operating external ambient temperature requirements: charge and discharge: charging  $-10^{\circ}\text{C}\sim 60^{\circ}\text{C}$ , discharging  $-20^{\circ}\text{C}\sim 60^{\circ}\text{C}$ ;
2. Battery system working external environment humidity requirements:  
 $10\%\leq\text{humidity}\leq 90\%\text{RH}$ ;
3. Battery system operation state try to maintain more than 20% SOC;
4. When the battery system is not in use for a short period of time, it is required to maintain more than 60% SOC and be stored in a dry, clean and well-ventilated warehouse at  $5^{\circ}\text{C}\sim 45^{\circ}\text{C}$ .
5. During the loading process of the battery pack, it is required to carry and put it gently, and strictly prevent it from falling, rolling and impacting;
6. The battery pack shall not be placed upside down or lying down in the storage state; it is strictly prohibited to expose the battery pack to sunlight, rain or water for a long time;
7. Ensure that the battery system in the operation or storage state away from flammable and

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explosive substances, high temperature environment;

8. It is strictly prohibited to force the battery system to operate under the state of short circuit, overcharge and high temperature alarm;
9. Strictly prohibit customers from disassembling the battery system without permission;

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## IV. Battery parameters

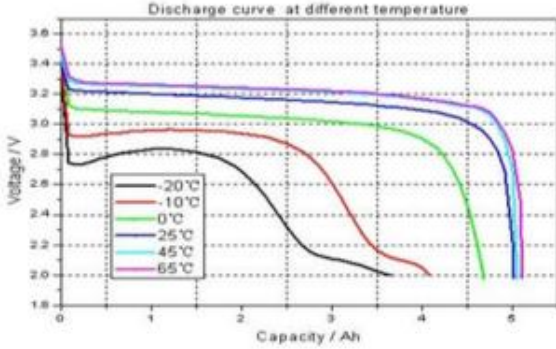
### 4.1. Testing conditions

If there is no special requirement, the experiment should be carried out in the environment of temperature:  $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ , relative humidity: 15~90 %RH, atmospheric pressure: 70kPa~106kPa.

### 4.2. Basic performance


<b>Cell parameters</b>			
<b>NO.</b>	<b>Item</b>	<b>Parameters</b>	<b>Notes</b>
1	Battery Type	Lithium Iron Phosphate Battery	
2	Rated voltage/capacity	3.2V/7Ah (IFR32800)	
3	Cell Voltage Range	2.0V-3.65V	
4	Cell Weight	147g	
5	Dimension	diameter: 32.3 mm, height: 81 mm	
6	Operating temperature	Charging : $0^{\circ}\text{C}$ - $60^{\circ}\text{C}$ Discharging: $-20^{\circ}\text{C}$ - $60^{\circ}\text{C}$	
7	Charging retention capability	97% ( $25^{\circ}\text{C}$ ,30days)	
8	Cycle times	More than 4000 times (0.2C), normal temperature, capacity retention rate: 80%)	

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9	Discharging curve of single body at -20 °C, -10°C, 0°C, 25°C, 45°C, 65°C	
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### Battery system parameters

1	Rated voltage	12.8V	4 series
2	Pack voltage range	9.2-14.8V	
3	Rated capacity	7Ah	No less than 7Ah
4	Total energy	89.6Wh	
5	SOC range	10%-100%	

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6	Charging and Discharging Capacity Efficiency	≥96%	
7	Standard charging current (A)	3A	
8	Standard discharging current (A)	7A	
9	Maximum continuous charging and discharging current	7A	
10	Total weight	1.4 kg	estimation
11	Ambient relative humidity	10%-90%	
12	Case material	PVC membrane	Horizontal and vertical bilayer encapsulation
13	Battery pack composition	4S1P in one pack	
14	Ambient temperature	Charging: -10°C~60°C Discharging: -20°C~60°C	
15	Product dimension (mm)	151*99*94 (±2) mm	L*W*H
16	Input/Output Method	Rubber Shell Terminals	
17	Bluetooth function	NO	

### 4.3. Environmental characteristics

(Charging as per the standards, after reaching full charge, allow 0.5h of rest before conducting the following tests)

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Ambient temperature	Discharging current	Battery Capacity Requirements
25°C	1.0I1A	The measured discharge capacity of the battery pack is not less than 100% of the nominal capacity, and the appearance is not deformed or burst
0°C	1.0I1A	The measured discharge capacity of the battery pack is not less than 90% of the nominal capacity, and the appearance is not deformed or burst
-10°C	1.0I1A	The measured discharge capacity of the battery pack is not less than 75% of the nominal capacity, and the appearance is not deformed or burst
55°C	1.0I1A	The measured discharge capacity of the battery pack is not less than 95% of the nominal capacity, and the appearance is not deformed or burst

#### 4.4. Safety Characteristics

Items	Specification parameter	Notes
Insulated electricity	$\geq 10$ M $\Omega$	With insulation resistance tester DC 500V test voltage, the battery positive and negative terminal interface (terminal) were tested on the battery pack metal shell, insulation resistance value $\geq 10M\Omega$ .
Electric strength	No breakdown, no flaring phenomenon	Battery positive and negative terminal interface respectively on the battery pack metal casing can withstand 50Hz, RMS 500V AC voltage (leakage current $\leq 10mA$ ) or 710V DC voltage for 1min, there should be no breakdown, no flaring phenomenon.

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Drop-resistant	<p>No obvious damage, no leakage, shell rupture, fire or explosion, and the battery pack and each position have no displacement when shaking up and down</p>	<p>When the battery pack is fully charged, choose any 6 angles, and drop to the cement floor once from the highest height set (0.8m ~ 1.8m).</p>
Constant humidity	<p>No significant deformation, rust, smoking, or explosion; its capacity should not be less than 90% of the measured benchmark capacity.</p>	<p>Once the battery pack is fully charged and equipped with a Battery Management System (BMS), it is placed in a constant temperature and humidity chamber at <math>60^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> with a relative humidity of 90% to 95% for 12 hours. Subsequently, it is removed and allowed to stand for 2 hours at an ambient temperature of <math>25^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> for visual inspection before discharging with a current of 1.0I1A to the cut-off voltage.</p>
Vibration measurement	<p>No explosion, no fire, no deformation, no parts falling off, no abnormal voltage, no sharp discharge current.</p>	<p>After fully charging the battery pack, it is securely fixed on a vibration table in the horizontal plane. The battery pack is then subjected to vibrations with an amplitude of 5mm and a maximum stroke of 10mm, with vibration frequencies ranging from 10Hz to 55Hz. Vibration tests are conducted in the x, y, and z directions of the battery pack, with each direction undergoing frequency-sweep testing between 10Hz and 55Hz for a duration of 90 minutes <math>\pm</math> 5 minutes. After the completion of the test, it is left idle for 1 hour.</p>

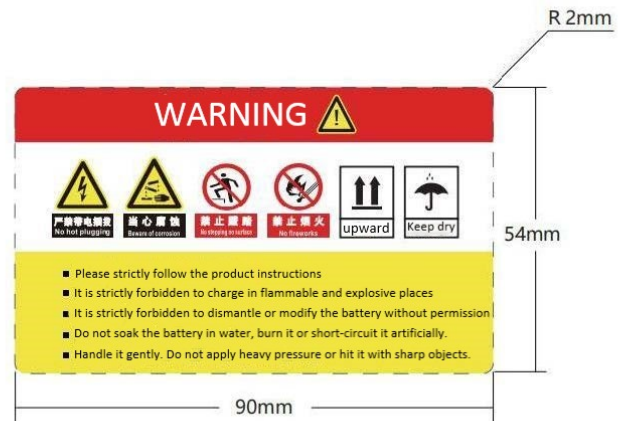
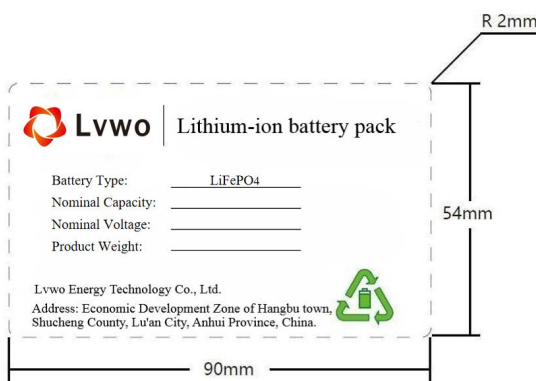
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## V. Schematic diagram of product external dimensions



The location of the label is shown above  
Overall dimension.

## VI. Certifications and nameplates

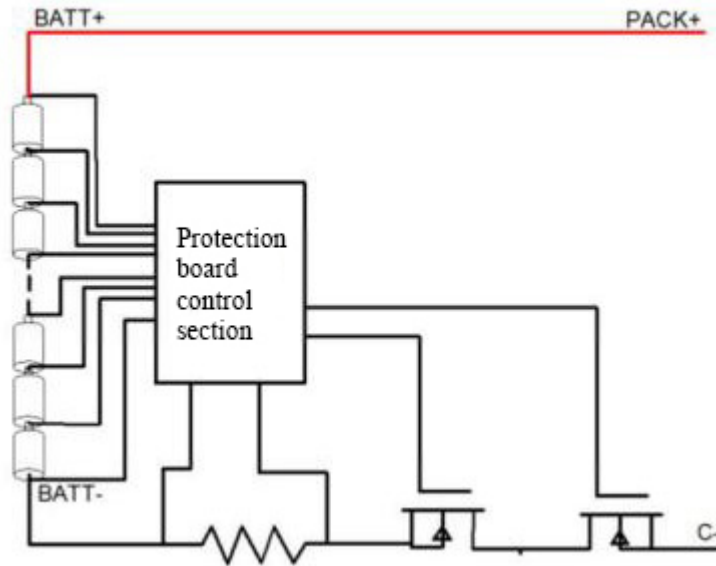


Labeling styles are shown in the attached drawings and weights are based on actual

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## VII. Battery Manager System specifications and parameters

### 7.1 Physical and wiring diagram of the BMS



### 7.2 Electrical parameter

Protection board model: To be determined

According to the protection board specification

## VIII. Charger

1. Lithium Iron Phosphate Battery Dedicated Charger
2. Maximum input voltage  $\leq 14.4$  (CC/CV)
3. Maximum continuous output current  $\leq 7A$

Notes: To prevent overcharging due to charger or protection board failure, the charger will stop first when charging is complete.

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## IX. Conditions of use

### 9.1. Packaging

9.1.1. Method:  Neutral carton (domestic)  UNcarton (export) Wood pallet

(bulk container export).

9.1.2. Each battery pack should have outer packaging and should be accompanied by a product manual and a certificate of conformity. The packaged product should be placed in a dry, dust-free, and moisture-proof packaging box. The outer packaging of dangerous goods should indicate the product name, model, voltage, capacity, quantity, gross/net weight, logo, battery serial number, etc. Neutral packaging does not include the above content. There should be necessary signs such as “Handle with care,” “Keep dry,” “This side up,” “Keep away from fire,” and so on.

9.1.3. Shipping documents: Shipping inspection report, product manual, host computer software, communication protocol (electronic file), etc.

9.1.4. Shock and pressure prevention measures: Fill shock-absorbing materials on both external sides (top and bottom) of the battery module.

9.1.5. Waterproofing, anti-scattering, handling: Battery module in nylon bag, tightened with strapping, pallet.

### 9.2. Transportation

Battery packs should be packaged in boxes for transportation, ensuring protection against severe vibrations, impacts, or compression. They should be shielded from exposure to sunlight and rain, and can be transported using vehicles such as cars, trains, ships, or airplanes.

### 9.3. Storage

9.3.1. Battery packs are typically stored at a state of charge of 20%-40% in a clean, dry, well-ventilated indoor area with an environment temperature of -5°C to 35°C and a relative humidity not exceeding 75%. The packs should be placed flat with a minimum distance of

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100mm from the ground.

9.3.2. Batteries should not be stored together with reactive chemicals or dusty items.


9.3.3. Batteries should not be subjected to any mechanical impact or heavy pressure.

9.3.4. Batteries should be kept away from direct sunlight, heat sources, with a distance from heat sources not less than 2 meters.

9.3.5. Every 3 months from the date of manufacture, a 0.2-0.5C current charge should be applied for 30-60 minutes, at a temperature range of  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ .

## **X. User Responsibility Letter**

The use of a letter of responsibility requires users to follow the instructions on the battery label or the specifications provided by Anhui Woo-power Technology Co., Ltd. If any loss is incurred due to the user's improper use leading to overheating of the power system, fire, explosion, or similar incidents, the company will not be held liable.

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## **XI. Dangerous matters**

Failure to read the following precautions carefully may result in battery leakage, explosion, or fire.

- (1) Do not submerge the battery in water or get it wet;
- (2) Do not use or store the battery near a heat source (such as fire or heater);
- (3) Do not reverse the positive and negative poles;
- (4) Do not directly connect the battery to a wall outlet or car cigarette lighter socket;
- (5) Do not throw the battery into fire or heat it;
- (6) Do not short-circuit the positive and negative poles of the battery with wires or other metal objects, and do not transport or store the battery with necklaces, hairpins, or other metal objects;
- (7) Do not strike, throw, or subject the battery to mechanical vibrations;
- (8) Do not pierce the battery casing with nails or other sharp objects, and do not hit or step on the battery;
- (9) Do not disassemble the battery in any way;
- (10) Do not charge the battery in a fire or under extreme heat conditions.

## **XII. Warnings and precautions**

- (1) No unqualified personnel are not allowed to dismantle or repair the battery system.
- (2) Only use the designated charger for charging the battery system.
- (3) Do not immerse the power system in water or saltwater. Store the battery in a cool, dry environment when not in use.
- (4) If the power system emits odors, heats up, changes color or shape during charging or discharging, or shows any abnormalities, stop operation immediately and seek professional assistance.
- (5) In case of a battery fire, use dry sand or a nitrogen fire extinguisher.
- (6) Do not dispose of the battery system in fire or heat sources.
- (7) When installing or using the battery, remove metal jewelry or other metal items, handle the battery carefully, especially when placing it in a metal container.