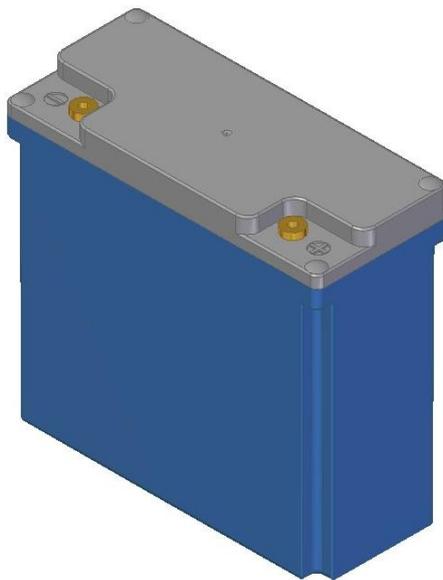


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# 产品说明书

## Product Manual



产品名称 Product Name	12.8V32Ah 磷酸铁锂电池组 12.8V32Ah LiFePO4 Battery Pack				
编制 Made By	刘洋	审核 Checked By	陈果	批准 Approved By	任士界
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## 质量声明 Quality Statement

正确的使用和维护保养才能确保您的电池（或电池系统）长期可靠稳定地运行。

Proper use and maintenance will ensure that the battery (or battery system) will operate reliably and consistently for long periods of time.

◆收到产品后，请检查包装是否完好，若包装破损，可能导致产品损坏。若有损坏，请于五个工作日内联系我司售后或销售人员。

After receiving the product, please check if the packaging is in good condition. If the packing is broken, it may cause damage to the product. If there is any damage, please contact our after-sales or sales staff within five working days.

◆凡不按本说明书规定进行使用或维护保养者，视同放弃保修权利，山东精工电源科技有限公司及其服务站有权不再予以保修，对由此而产生的一切损失也不予以赔偿，但可以根据情况提供相应的有偿服务。

Anyone who does not use or maintain the battery according to the manual shall be deemed to give up the warranty right. Shandong Goldencell Power Technology Co., Ltd. and its service station have the right to no longer guarantee the warranty, and will not compensate for any losses arising from it. However, the corresponding paid service can be provided according to the situation.

◆贵司在收到产品及产品说明书后，请于七个工作日内回复。七个工作日内未回复，我司将视客户承认此产品及产品说明书符合贵司要求。

Please reply and confirm us within seven working days after receiving your product and specification. We will regard that you agree with the product and the specification meets your requirements if you do not reply within seven working days.

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## 1. 适用范围 Application Scope

本产品说明书描述了山东精工电源科技有限公司生产的锂离子电池产品指标、使用方法、产品测试、日常维护及特别注意事项等。

This product manual describes the product specifications, usage methods, product testing, routine maintenance and special attentions of the lithium batteries manufactured by Shandong Goldencell Power Technology Co., Ltd.

## 2. 产品指标 Product Specification

### 2.1 产品参数 Product Parameter

NO.	项目 Items	参数 Parameter	
1.	标称电压 Normal Voltage	12.8V	
2.	额定容量 Rated Capacity	32Ah(C <sub>5</sub> )	
3.	最小容量 Minimum Capacity	31Ah(C <sub>5</sub> )	
4.	能量 Energy	约 409.6Wh About 409.6Wh	
5.	交流内阻 Alternating Internal Resistance	≤40mΩ	
6.	产品尺寸 Product Size	(181±2) mm * (77±1) mm * (168±2) mm	
7.	产品重量 Product Weight	3.5±0.1kg	
8.	封装方式 Packing method	塑料壳 Plastic Case	
9.	充电 Charge	充电电压 Charge Voltage	14.4±0.15V
		最大充电电流 Maximum Charge Current	15A
		充电截止电流 Cut-off Charge Current	320mA~640mA
10.	放电 Discharge	放电电流 Discharge Current	≤15A
		最大持续放电电流 Maximum Continual Discharging Current	15A~30A
		放电终止电压 End of Discharge Voltage	约 10.0V About 10.0V
11.	保护电路 Protection circuit	过充保护、过放保护、温度保护、均衡功能 Over charge protection, Over discharge protection, Temperature protection, Balanced function	
12.	正极 Positive	M5 螺纹孔 M5 screwed hole	
13.	负极 Negative	M5 螺纹孔 M5 screwed hole	
14.	工作温度 Working Temperature	充电温度 Charge temperature	0°C~45°C
		放电温度 Discharge temperature	-20°C~60°C
15.	荷电保持能力 Charge Retention	按照 4.3.1 标准充电进行充电结束后, 在标准测试条件下搁置 28 天, 再以 4.3.2 标准放电进行放电, 荷电保持率≥90%。 After charging according to standard 4.3.1, placing the battery for 28 days under the standard test conditions, then discharge it under standard 4.3.2, and the charge retention rate is ≥90%.	

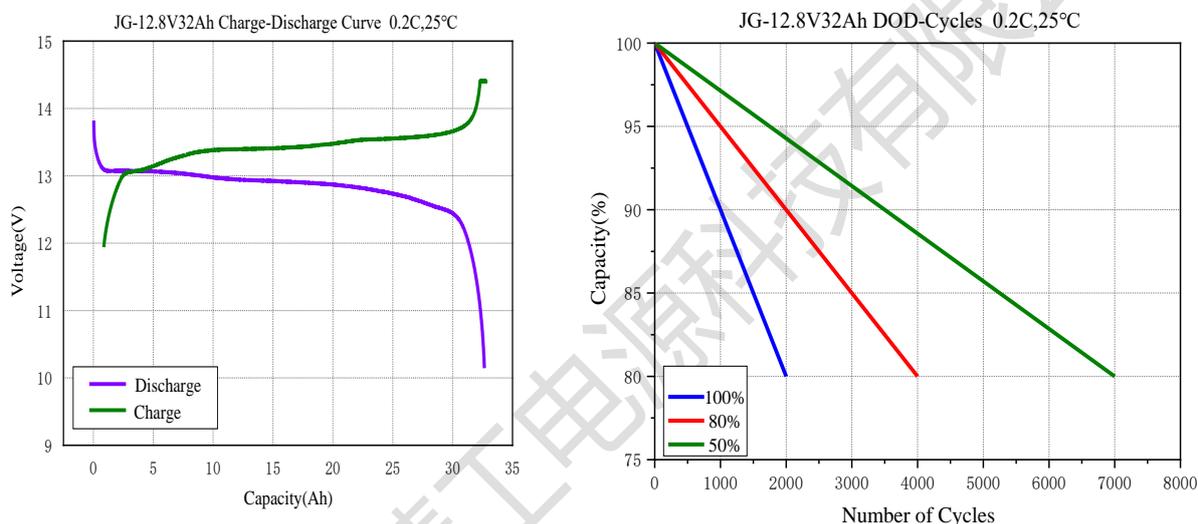
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16.	循环次数 Cycle time	<p>循环寿命不小于 2000 次，容量保持率<math>\geq 80\%</math>。（按照 4.3.1 标准充电进行充电，搁置 0.5~1h 后；按照 4.3.2 标准放电进行放电，搁置 0.5~1h，计 1 次循环）。</p> <p>The cycle life is not less than 2000, the capacity retention rate is <math>\geq 80\%</math>. (Charging according to 4.3.1 standard, leaving 0.5~1h; discharging according to 4.3.2 standard, leaving 0.5~1h, counting 1 cycle time).</p>
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※ 产品尺寸不包含出线位置及各类接插件（例如电量显示板、把手、轮子、散热口等各类零部件）。

The product size does not include the outlet position and various connectors (such as power display board, handles, wheels, heat dissipation ports and other parts).

## 2.2 产品充放电曲线图 Product Charge and discharge diagram



## 3. 产品使用方法 Product Usage Method

### 3.1 充电 Charge

充电时请选用符合本说明书充电要求的锂离子电池组专用充电设备，进行充电。请注意电池组正负极，切勿反接。

When charging, please select the special charging equipment for lithium-ion battery pack that meets the charging requirements of this manual for charging. Please pay attention to the positive and negative battery pack. Do not reverse.

充电时请先将充电器输出端与电池组充电口连接后，再将充电器输入端与插座连接。锂离子电池充电器不可作为充电桩使用，充电完成后请及时断开充电器输入端、输出端插头。

Please connect the output end of the charger to the battery pack charging port firstly, and then connect the input end of the charger to the socket for charging. The lithium battery charger cannot be used as a charging pile. Please disconnect the input and output plugs of the charger immediately after charging.

### 3.2 放电 Discharge

放电时请正确将锂离子电池组正负极与匹配的负载连接，切勿反接。

When discharging, correctly connect the positive and negative terminals of the lithium-ion battery pack to the matching load. Do not reverse.

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## 4. 产品测试 Product Testing

### 4.1 测试要求 Test Requirements

测试的电池组出厂时间不超过一个月，若由于运输等其他原因超时未测试，可将电池组进行充放电循环后测试。

Battery tested must be done within 1 month after production. If the battery is not tested on time due to transportation or other reasons, the battery can be recharged and discharged for testing.

除非特别说明，本说明书中所有测试均在以下环境条件下进行：温度为  $25\pm 2^{\circ}\text{C}$ ，湿度为  $\leq 85\% \text{RH}$ ，大气压力为  $86\text{kPa}\sim 106\text{kPa}$ ；本说明书中所提的常温是指  $25\pm 2^{\circ}\text{C}$ 。

Unless otherwise specified, all tests in this specification should be done under the following environmental conditions: temperature  $25\pm 2^{\circ}\text{C}$ , humidity  $\leq 85\% \text{RH}$ , atmospheric pressure  $86\text{kPa}\sim 106\text{kPa}$ ; The normal temperature mentioned in this specification refers to  $25\pm 2^{\circ}\text{C}$ .

### 4.2 测试仪器要求 Requirements of the testing equipment

仪器名称 Name of equipment	仪器要求 Requirements for equipment
电压测试仪 Voltage tester	分辨率 Resolution: 1mV
电流测试仪 Current tester	分辨率 Resolution: 1mA
交流阻抗仪 AC impedance meter	分辨率 Resolution: 0.1m $\Omega$
游标卡尺 Vernier caliper	精度 Precision: 0.01 mm (适用于小于 300mm 尺寸测量 Suitable for less than 300mm measurement)
刻度尺 Scale	精度 Precision: 1mm (适用于大于 300mm 尺寸测量 Suitable for larger than 300mm measurement)

### 4.3 测试方法 Test methods

#### 4.3.1 标准充电 Standard Charge

常温下，使用锂离子电池组专用测试柜，以标准充电电压 14.4V、标准充电电流  $I_5$ （当  $I_5$  大于最大充电电流时，按照最大充电电流测试），恒流恒压充电至电流降至  $0.05 I_5$ 。

At normal temperature, the special test cabinet for lithium-ion battery pack is used, the standard charging voltage is 14.4V, the standard charging current is  $I_5$  (when  $I_5$  is greater than the maximum charging current, the maximum charging current is tested), and the constant current and constant voltage are charged until the current drops to  $0.05 I_5$ .

#### 4.3.2 标准放电 Standard Discharge

常温下，使用锂离子电池组专用测试柜，充满电后，搁置 10min；以标准放电电流  $I_5$ （当  $I_5$  大于放电电流时，按照放电电流测试），恒流放电到标准放电终止电压（约为 10.0V）或电池组截止为止。允许重复 5 次，当连续 3 次实验结果的极差小于额定容量的 3%，可提前结束实验，取试验结果的最高值。

At normal temperature, use the special test cabinet for lithium-ion battery pack, fully charged, set aside for 10min; At the standard discharge current  $I_5$  (when  $I_5$  is greater than the discharge current, according to the discharge current test), the constant discharge to the standard discharge termination voltage (about 10.0V) or the battery cutoff. It is allowed to repeat for 5 times. When the range of the experimental results for 3 consecutive times is less than 3% of the rated capacity, the experiment can be ended in advance and the highest value of the test results can be taken.

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## 5. 特别注意 Special Attentions

为了充分利用锂离子电池组的能效，防止电池组发生泄漏、发热等意外，请禁止以下注意事项：

In order to make full use of the energy efficiency of the battery and prevent accidents such as leakage or heat generation, please prohibit the followings:

- 电池组在使用或搁置过程中注意远离火、加热器、腐蚀性物品等，否则可能会引起电池组过热、起火或功能失效、寿命减短，甚至发生危险。

The battery pack should be kept away from fire, heaters, corrosive materials, etc. during use or shelving, otherwise it may cause the battery pack to overheat, fire, function failure, life reduction, and even danger.

- 严禁将电池组置于 0°C 以下或 45°C 以上环境下充电；严禁将电池组在超过 60°C 高温下放电或搁置。

Do not charge the battery pack below 0°C or above 45°C; Do not discharge or suspend the battery pack at a temperature higher than 60°C.

- 若电池组在大于 45°C 环境下使用，请注意通风散热。

If the battery pack is used in an environment above 45°C, please pay attention to ventilation and heat dissipation.

- 电池组使用环境湿度 RH ≤ 85%，若环境湿度大于 85% 时，请注意防水。

The ambient humidity RH of the battery pack is ≤ 85%. If the ambient humidity is greater than 85%, please pay attention to waterproofing.

- 避免电池组在使用或贮存过程中因温度变化产生的冷凝现象，否则会导致电池或金属零部件的生锈。

Avoid condensation caused by temperature change during use or storage of battery pack, otherwise it will lead to rust of battery or metal parts.

- 严禁将电池组浸入水中，一旦进入水中或水进入电池中，立即隔离处理，并请专业人员处理。

Do not immerse the battery in the water. Once it is in the water or water enters the battery, isolate it immediately and ask a professional to deal with it.

- 严禁电池组过充、过放、过载使用电池组。

Do not overcharge, over discharge or overload the battery.

- 严禁在强静电和强磁场的环境下使用，否则可能损坏电池组保护电路。

Do not use the battery in the location where static electricity and magnetic field is strong. Otherwise the battery protection circuit may be damaged.

- 严禁颠倒正负极使用电池组，严禁短路电池组正负极。

Do not reverse the positive and negative terminals. Do not short the positive and negative of the battery.

- 严禁电池组进行串联或并联使用。

Do not combine the battery in series or in parallel.

- 严禁对电池组反充电，严禁将电池组正负极端子直接插入电源插座。

Do not reverse polarity charging. Do not connect the battery electrodes to an electrical outlet.

- 充电端口正负极接反会烧毁内部电路板，连线时请注意端口正负极。

Reversing the Positive and negative charging terminal will burn the internal circuit board, so pay attention to it.

- 充电时请选用符合本说明书充电要求的锂离子电池组专用充电设备。

When charging, please select the special charging equipment for lithium-ion battery pack that meets the charging requirements in this manual.

- 电池组使用后，请于 12 小时内进行充电。电池组使用后超过 12 小时未充电，充电前请测试电池组电压。若电池组电压值 < 8.0V，不可充电，并隔离放置，同时咨询山东精工电源科技有限公司技术人员。

Please charge the battery within 12 hours after using. If the battery is not charged for more than 12 hours after using,

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please test the battery voltage before charging. If the voltage of the battery is <8.0V, do not charge, need to place in isolation. Meanwhile please contact our technical staffs in Shandong Goldencell Power Technology Co., Ltd.

- 严禁对电路板进行机械加工，可能会损伤内部电路造成功能失效。  
Do not machine the circuit board, which may damage the internal circuit and cause function failure.
- 严禁让产品受力变形，可能会导致电子元件或线路部分损坏，使产品不稳定。  
Do not deform the product under pressure, which may cause electronic components or part of the circuit damage, and make the product unstable.
- 严禁敲击、抛掷、踩踏、坠落、拆解、冲击电池组等。  
Do not strike, trample, throw, fall and shock the battery.
- 严禁直接焊接电池组和用钉子或其它利器刺穿电池组。  
Do not directly weld the battery and pierce the battery with a nail or other sharp objects.
- 严禁拆装外壳，以免给您带来不必要的损害。  
Do not remove the case, in case of unnecessary damage.
- 严禁将电池组与导电物体（如发夹、项链等）一起运输或贮存。  
Do not transport or store the battery together with metal objects such as hairpins, necklaces, etc.
- 若电池组发生泄露，有液体溅入眼睛或皮肤，请不要揉擦，应用清水冲洗，并立即就医治疗。  
If the battery leaks and liquid splashes into the eyes or skin, do not rub, wash it with clean water, and immediately seek medical attention.
- 若电池组发出异味、发热、变色、变形或使用、贮存、充电过程中出现任何异常，立即停止充电、停止使用，在保证安全的情况下将其从装置中移出并隔离。  
If the battery gives off strange odor, generates heat, becomes discolored or deformed, or any abnormality appears during use, storage, or charging, stop charging and using immediately, remove and isolate it from the device in the safe way.
- 电池组意外发生火灾时应使用锂离子电池专用灭火器或沙土灭火。  
In case of accidental fire, Lithium battery special fire extinguisher or sand should be used.
- 报废的电池组端子处应用绝缘纸包住电极，以减少后期搁置时的安全隐患。  
The electrode of the discarded battery terminal should be covered with insulating paper to reduce the safety hazard when laying aside.
- 寿命终结的锂离子电池或没有使用价值的锂离子电池要依照当地的法律进行相应的回收和处理。请务必将废旧的锂离子电池以及包装材料送到专门的回收点处理。  
Lithium-ion batteries with end-of-life or useless lithium-ion batteries should be recycled and disposed of according to local laws. Please be sure to send the waste lithium-ion batteries and packaging materials to a special recycling point for treatment.

## 6. 电池组的日常使用和维护 Battery Using and Maintenance

### 6.1 电池组储存 Battery Storage

项目 Item	环境 Environment	存储时间 Storage time
储存温度 Storage Temperature	45°C~50°C, 无凝露环境下 45°C~50°C, non-condensing	<1 个月 < 1 month
	25°C~45°C, 无凝露环境下 25°C~45°C, non-condensing	<3 个月 < 3 months

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	-20°C~25°C, 无凝露环境下 -20°C~25°C, non-condensing	<12 个月 < 12 months
	15°C~25°C, 无凝露环境下 15°C~25°C, non-condensing	长期 Long term

锂离子电池应贮存在清洁、干燥、通风的环境中，应避免与腐蚀性物质接触，应远离火源及热源。存储时，锂离子电池不得倒置及卧放，并避免机械冲击或重压，SOC 应保持在 20%~85%范围内。

Lithium-ion batteries should be stored in a clean, dry and ventilated environment, avoid contact with corrosive substances, and stay away from fire and heat sources. During storage, lithium-ion batteries should not be placed upside down and horizontally, and mechanical impact or heavy pressure should be avoided. SOC should be kept within the range of 20%~85%.

## 6.2 电池组使用前检查 Battery Checking Before Using

- 收到电池组后，首先应仔细检查包装有无异常，并在搬运过程中避免撞击。  
After receiving the battery, first check the packing carefully, please ensure there's no shock on the battery during the handling process.
- 检查电池组外壳及配件有无破损、漏液、缺失等不良现象，如有破损、缺失请联系我司。  
Please check the battery case and accessories if there's any damage or leakage, if so, please contact us immediately.
- 检查电池组充放电端子是否正确，测量正负极有无反接，电压是否在设备的正常工作电压范围内。如果端子处有污物或锈迹，使用前应用干布抹净，否则可能会导致电极端子接触不良。  
Please check the output connector is correct or not, measure whether the positive and negative is reversed and whether the voltage is within the normal standard. In case the battery terminals are dirty or rust, clean the terminals with a dry cloth before use. Otherwise poor performance may occur due to the poor connection with the instrument.

## 6.3 电池组安装注意事项 Battery Installation Notes

- 清理电池组安装位置，确保无灰尘、金属异物或其它异物，安装过程中严禁烟火，避免电池组短路，防止造成设备损坏或人员伤害。  
Please clean up the installation position of the battery to ensure no dust, metal or other foreign materials. No smoking or fire during installation to avoid short-circuit of battery and prevent equipment damage or personal injury.
- 电池组就位，电池组放置在安装位置，电池组应安装在通风条件良好、干燥、清洁的环境中，不得把电池组安装在有可能浸水的地方，电池组使用和存储时应避免接近易燃易爆物品。  
The battery should be installed under the condition with well-ventilated and no sunlight. Don't put it under place with possible flooding. The using and storage of the battery should be kept away from inflammable and explosive materials.
- 电池组与仓体间需做减震与固定，避免电池组机械损伤。  
Shock absorption and fixation should be done between the battery pack and its housing, so as to avoid mechanical damage to the battery pack.
- 将用电器导线端子紧固在电池组端子上，紧固时不要用力过大或超过规定的扭矩，否则可能会造成端子损坏。  
When fastening battery terminals, please don't use excessive force, or the terminals could be damaged.
- 安装完成检查端子紧固是否到位，电池组表面是否有杂物，使用干布清理电池组外包装，不得使用易产生静电的工具清理电池组外包装，不得使用挥发机油等有机溶剂，否则会损坏电池组外包装甚至使电池组外包装

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开裂。

After installation, please check whether the terminal fastening is in place and whether there are sundries on the surface of the battery. Clean the surface of battery with dry cloth, please don't use oil or other volatile organic solvents to clean, or it may damage it.

- 注意确保端子的正 (+) 负 (-) 极性连接正确。否则，可能会引起火灾或者造成电池组、用电器损坏。  
Please make sure that the positive (+) & negative (-) polarity is correctly connected, or it may fire or damage the battery and electrical appliances.
- 设备试运行，观察设备及电池组有无异常情况。  
Test to run the equipment, observe whether the equipment and battery are abnormal.

#### 6.4 电池组工作要求 Battery Working Requirements

- 充电电流不得超过规定的最大充电电流，使用高于规定电流充电将可能影响电池组的使用寿命或内部电路损坏，甚至发生危险。

The charging current shall not exceed the specified maximum charging current. Charging with higher than the specified current may affect the service life of the battery pack or damage the internal circuit, or even cause danger.

- 放电电流不得超过规定的最大持续放电电流，使用高于规定电流放电将可能影响电池组的使用寿命或内部电路损坏，甚至发生危险。

The discharge current shall not exceed the specified maximum continuous discharge current. If the discharge current is higher than the specified current, the service life of the battery pack may be affected or the internal circuit may be damaged or even dangerous.

- 当电池组电量不足时，应及时充电，这样有益于延长电池组寿命。如果不及时充电，电池组长时间处于缺电状态，会影响电池组的使用寿命。

When the battery is short of power, it should be charged in time, which is beneficial to extend the battery life. If the battery is not charged in time, battery is in the state of power shortage for a long time, battery life will be affected.

- 浅充浅放有益于提高锂离子电池组的循环寿命，建议每次放电放至额定容量的 10%；充电充至额定容量的 95%。

Shallow charge and shallow discharge are beneficial to improve the cycle life of lithium-ion battery pack, and it is recommended to discharge to 10% of the rated capacity every time; Charge to 95% of rated capacity.

#### 6.5 电池组日常维护 Battery Using and Maintenance

- 电池长期未使用可能会因其自放电特性而使其处于过放电状态。为防止过放电的发生，电池应定期充放电，将其电压维持在一定范围内（13.32~13.6V）。电池组 2 个月内至少充放电一次（带有通讯功能的电池组 1 个月内至少充放电一次，其中 SOC/容量校准需校准，校准方法是用充电器将电池组充满，放电至电池组保护）。

The battery would be possible to be at the over-discharged state by its self-discharge characteristics in case the battery is not used for long time. In order to prevent over-discharging, the battery shall be charged periodically to maintain a certain voltage range: 13.32~13.6V, 2 months one cycle. (for battery with communication function, please maintain it once in 1 month) What's more, the SOC / Capacity calibration shall be performed. The calibration method is to charge fully with charger, then discharge to over-discharged protection state.

- 首次使用电池或电池长时间搁置后，可能会进入休眠状态，可以使用带有空载电压的锂离子充电器或直流电源（按照充电要求设置电压值、电流值）激活。若无法激活，需隔离放置，同时咨询我司技术人员。

After using the battery for the first time or leaving it idle for a long time, it may enter a dormant state and can be activated by using a lithium-ion charger with no-load voltage or a DC power supply (set voltage and current according to charging requirements). If it cannot be activated, place it in isolation and consult our technicians.

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- 不能使用有机溶剂清洗电池组外壳。  
Don't use organic solvents to clean the battery case.
- 电池组是消耗品，寿命是有限的。当电池组容量低于使用要求时，请及时更换电池组，避免因容量不足造成损失。  
Battery is a consumable product with limited cycle life. Please change it in time when the capacity can't reach the requirement to avoid any loss of the user.
- 为防止保护板过充保护功能失效造成的安全问题，也不要长时间的充电，电池充满后即取出，另外充电时必须使用原装或电池所附带的充电器，并按说明进行操作和使用，否则可能损坏电池甚至发生危险。  
In order to prevent the safety problem caused by the failure of the protection board overcharge protection function, do not charge for a long time. After the battery is fully charged, remove it. In addition, use the original charger or the one attached to the battery and operate it according to the instructions. Otherwise, the battery may be damaged or cause danger.
- 浅充浅放可保证电池组经济地使用，过充过放可能会引起电池组过热、起火或功能失效、寿命减短，甚至发生危险。  
The shallow charge and discharge of the battery ensures that the battery can be used economically. Overcharge and over discharge may cause the battery overheat, fire or function failure, shorten life, or other dangerous.
- 如长时间存储而不使用，电池组的性能会下降。此外，如果没有维持在规定的使用条件下（如充电、放电、环境温度等），电池的预期寿命可能会缩短。如果电池长时间存储不进行定期维护，即使后续使用正常，电池性能也有可能下降。  
If the battery pack is not used for a long time, the performance of the battery pack will be degraded. In addition, if the battery is not maintained under the specified conditions of use (such as charging, discharging, ambient temperature, etc.), the life expectancy of the battery may be shortened. If the battery is stored for a long time without regular maintenance, the battery performance may deteriorate even if it is used normally later.
- 电池组的开关、电量显示板、USB 为损耗部件，可提供有偿售后服务。  
The battery switch, battery display board and USB are consumed components, we could offer valuable after sales service.
- 到了寿命终结的锂电池要依照当地的法律进行相应的回收和处理。  
Waste lithium batteries should be recycled and disposed in accordance with local laws.

## 6.6 电池组的常见故障及解决方法 Battery Common Troubles and Solutions

- ◆ 电池组充满后搁置一段时间电压过低或为零 Battery voltage is too low after fully charged.
- 若电池组长时间存放不使用，且没有按照规定进行保养。  
Battery is in long-term storage with no usage, and not maintenance in accordance with the provisions.  
解决方法：请测试电池组电压，若电池组电压值 $<8.0V$ ，不可充电，并隔离放置，同时咨询山东精工电源科技有限公司技术人员。若电压 $\geq 8.0V$ 正常，可隔离充电，定时查看是否可以正常充电。  
Solution: Please test the battery voltage. If the battery voltage is  $<8.0V$ , it can't be charged and need to be isolated. Please consult the technicians in Shandong Goldencell Power Technology Co., Ltd. If the voltage is  $\geq 8.0V$ , the battery can be isolated to charge, and periodically check to see if it can be charged normally.
- 电池组断路 Battery Disconnection  
解决方法：拆开电池组，查看线路是否断掉，检查焊点是否有脱落、镍带是否有断裂，根据情况把损伤的地方进行修复。  
Solution: remove the battery to check whether the line is broken or not, the welding joints come off or not, nickel belt breaks or not, and then repair according to the damage situation.

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- 保护板不工作 Protection Board not work  
解决方法：首先确认保护板的排线与保护板接触是否良好，观察焊点是否脱落，若以上情况均无异常，进行测试 B+、B-间电压与 P+、P-间电压，如这两个电压相差较大，则说明保护板已坏。需要对保护板进行详细测试，测试不通过需更换保护板。  
Solution: first, make sure the cable line is contact with the protection board well, then, observe welding is off or not. If the above conditions are normal, please check the voltage between B+/B- and P+/ P-, the protection board has been broken if the voltage difference is very high. Then please do testing in details on protection board, if not pass, please change another new protection board.
- 电池组受过激烈碰撞，特征是电池壳外部有损伤或电池组有电解液的气味。  
Battery suffered fierce collision, with character-external battery case damaged or with electrolyte odor.  
解决方法：这类情况一般不在维修范围内，若维修需确定是输出线路出现了问题，还是电池组本身出现了问题。首先将电池壳拆开，查看电池组 P+/C+和 P-/C-线或焊点有无破损，若有损伤，需更换。然后用煽闻的方法对电池组进行气味确定，若有刺激的电解液气味，说明电池组已经漏液，需要对电池组的每串电池进行电压测试，如若有一串电压与其他几组电压相差太大且非常低则需要更换这一串的电池。  
Solution: It's not in the scope of maintenance generally. If needing maintenance, we need the confirmation of the problem whether on the output line or the battery itself. First, open the battery case, check whether the battery P + / C + and P - / C - lines or joints damaged or not. If damaged, it needs to be replaced. Then, instigating smell odors method to determine the battery, if there is irritation electrolyte odor, indicate that the battery has been leaking, and need to test the battery voltage of each series. If the voltage of one series is quite different from others or much lower than others, then this series needs to be replaced.
- ◆ 容量不足 Insufficient capacity  
解决方法：对电池组进行充放电循环，一般进行 3-5 次循环。  
Solution: To charge and discharge the battery with 3~5 cycles generally.
- ◆ 电池组电压不稳定或充放电异常 Battery voltage instability or cannot charge or discharge normally.
- 虚焊 Faulty welding  
解决方法：用内阻测试仪测试电池组内阻，如超过规定数值，则电池组内部可能有虚焊，需要拆开电池组重新焊接。  
Solution: To test the resistance with the internal resistance tester, and confirm the internal resistance of the battery exceeding a predetermined value or not. If not, the battery would be in faulty welding condition, the battery needs to be unpacked and be welded again
- 保护板异常 Protection board abnormal  
解决方法：更换保护板。 Solution: replace the protection board.
- 端子或接插件接触不良 Connector or terminals in poor connecting condition  
解决方法：更换端子或接插件。 Solution: replace the terminal or connector.

## 7. 其它技术指标 Other Technical Indicators

本说明书未尽事宜及其它相关参数如客户有需要，请与我司销售人员或技术人员联系。我们将尽可能为您提供，感谢你的理解。欢迎您随时访问本公司网站或拨打客户服务热线，了解更多产品信息。

If battery protection parameters and other related parameters are needed, please contact our sales or technical staff, we will provide the information as soon as possible. Your understanding is highly appreciated. Welcome to visit our company's website or dial the service hotline any time to learn more information.

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## 8. 免责声明 Products Disclaimer

质保不包括正常损耗、维护、搬运、储存不当造成的问题，山东精工电源科技有限公司对未遵守本产品说明书规定的使用和安装而导致的意外不负责任，包括但不限于以下情况：

The warranty does not cover problems caused by normal wear and tear, maintenance, handling and storage. Goldencell is not responsible for accidents caused by non-compliance with the use and installation of this product, including but not limited to the following circumstances:

- 运输或储存过程中的损坏。  
Damage during transportation or storage.
- 产品使用方法错误、电路连接不对或采用的输入电源、负载功能参数与产品说明书所标性能参数不符。  
The use method of the product is wrong, the circuit connection is wrong, or the input power supply and load function parameters used do not match the performance parameters specified in the product manual.
- 不正确的电池安装或维护。  
Incorrect battery installation or maintenance.
- 在不适当的环境下使用。  
Use battery in inappropriate environments.
- 除本产品说明书规定外，不适当的或不正确的充放电方式使用。  
Used improper or incorrect charging and discharging methods which is not included in this specification
- 在不可抗力的情况下，如雷电、风暴、洪水、火灾、地震等。  
In case of force majeure, such as lightning, storm, flood, fire, earthquake, etc.

产品使用前，请客户仔细阅读本产品说明书，不按照本产品说明书的规定进行使用，山东精工电源科技有限公司不再承担产品质量保证责任及由此引起的损失赔偿等一切相关责任。因前述行为，对山东精工电源科技有限公司的声誉造成负面影响的，山东精工电源科技有限公司保留追究其法律责任的权利。在不影响产品使用的情况下，产品如有升级，恕不另行通知。

Before using the battery, please read the specifications, usage instruction and some attentions carefully. Shandong Goldencell Power Technology Co., Ltd. is not responsible for the incident caused by not obeying the Manual. The phenomenon such as incorrect using method or wrong circuit connection, or input power data, working index are inconsistent with the Manual, cause damage to product, over load and its accessories, we are not responsible for it. Without affecting the use of the product, the product is subject to upgrade without prior notice.

### ◆ 风险警告 Risk Warnings

#### ➤ 警示声明 Warning Statement:

- 电池组属于危险品，存在潜在的危险，在使用和维护时必须采取适当的防护措施！  
Battery pack belongs to dangerous goods, there are potential dangers, in the use and maintenance must take appropriate protective measures!
- 必须使用正确的工具和防护装备操作电池组。  
The battery pack must be operated with the correct tools and protective equipment.
- 电池组的维护必须由具有电池专业知识并经安全培训的人士执行。  
The maintenance of the battery pack must be carried out by personnel with professional battery knowledge and safety training.
- 若拆解电池组，需经山东精工电源科技有限公司授权许可。  
If disassembling the battery pack, authorization and permission from Shandong Goldencell Power Technology Co., Ltd. are required.
- 不遵守上述警告可能造成多种灾难。

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Failure to observe the above warnings could result in a variety of disasters.

➤ 危险类型 Danger Types:

- 客户知悉在电池组使用和操作过程中存在以下潜在的危险

Customers are aware of the following potential dangers during the use and operation of the battery pack.

- 存在受到电击或者电弧伤害的风险。

There is a risk of electric shock or arc injury.

- 存在受到电解液或者其他化学品危害的风险。

There is a risk of being harmed by electrolyte or other chemicals.

- 为防止发生意外短路，造成电弧、爆炸或者热失控，需选择合适的操作方法及防护装备。

To prevent accidental short circuits, resulting in arcs, explosions or thermal runaway, appropriate operating methods and protective equipment should be selected.

◆ 保密责任 Confidentiality responsibility

客户应对合作内容高度保密，未经山东精工电源科技有限公司许可，不得向第三方透露产品说明书的任何内容，否则，将依照相关法律追究责任。

Customers should keep the contents of the cooperation highly confidential, and should not disclose any contents of the product manual to a third party without the permission of Shandong Goldencell Power Technology Co., Ltd., otherwise, the customer will be prosecuted in accordance with relevant laws.

本产品说明书为中、英双语，如中英文约定存在冲突时，以中文版本为准，本文件的最终解释权归本公司所有。

This product manual is in Chinese and English versions. In case of any conflict between the Chinese and English versions, the Chinese version shall prevail. Goldencell reserves the right of final interpretation of this document.

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## 9. 关于我们 About JGNE

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