



锂离子电池安装使用说明书
**User Manual for Lithium-ion Battery
Installation**

中聚电池有限公司

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衷心感谢您对中聚电池的信任！我们将以负责的态度为您提供满意的服务。本公司生产的锂离子蓄电池可广泛应用于交通、通讯、储能及备用电源等领域。

为使您安全合理的使用本产品，请在安装或使用前详细阅读本说明书，阅读后请妥善保管。

另外，本产品的性能、特性等指引请参考《锂离子电池规格书》。

Thanks sincerely for your trust to Sinopoly Battery Co., Ltd. We will take the responsibility to provide you with satisfactory service. Sinopoly battery has been widely used in vehicles, transportation, communication systems, energy storage and backup systems etc.

In order to make you safely and reasonably use of this product, please read this manual before installing or using our production and take care of this manual after reading it.

In addition, you can refer to the 《PRODUCT SPECIFICATION》 to understand the performance and features of the batteries .

一、 电池结构 Structure of The Cell

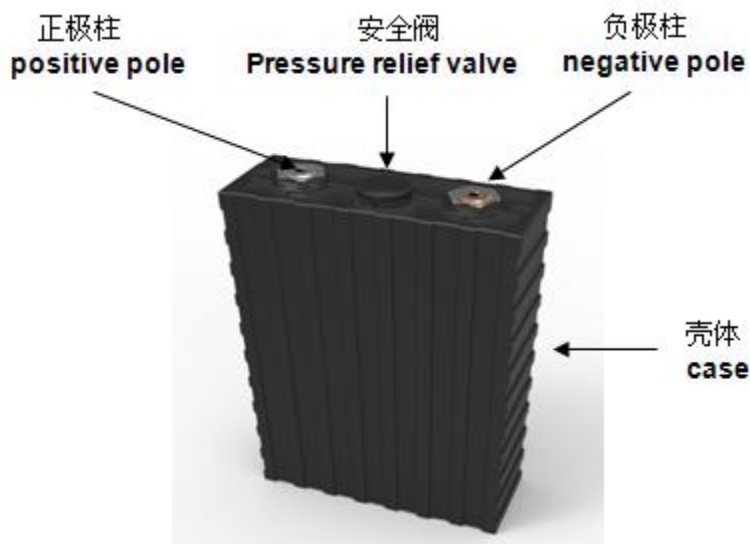


图 1 电池结构简图

Fig 1 A brief diagram of the structure

二、 单体电池的技术参数 Technical Parameters of The Cell

标称电压 Nominal Voltage	3.2V	工作电压 Operating Voltage	2.5 V ~3.65V		
标准充电 Standard Charge	电流 Current	参照产品规格书 Refer to the product specifications	最佳放电 Recommended Discharge	电流 Current	0.33C
	电压 Voltage	≤3.65V		电压 Voltage	≥2.5V
循环寿命 Service Life	参照产品规格书 Refer to the product specifications		电池内阻 Internal Resistance	≤0.8mΩ	
使用环境 Ambient Temperature Range	充电 Charge	0℃~45℃	自放电率 Self-Discharge Rate	≤5%/Month	
	放电 Discharge	-20℃~55℃			

三、 安装要求 Installation Requirements

1、 电池管理系统 The Battery Management System (BMS)

为了实时监控电池组内单体电池的电压、电流和温度，有效防止电池过充、过放、过热的现象，电池组必须配置功能完善、性能可靠、数据采集准确的电池管理系统（BMS）及保护板。使用过程中为保持电池组内单体性能的一致性，电池管理系统（BMS）及保护板需要有均衡功能。

The batteries must be installed with the BMS and protection plate which have the perfect functions and reliable performance and accurate data acquisition. Then they can assure the real-time monitoring of the cell's voltage, current and temperature, and effectively prevent the batteries from overcharging and overdischarging and overheating. The BMS and protection plate need to have a balanced function in use process to keep the consistency of performance within the batteries.

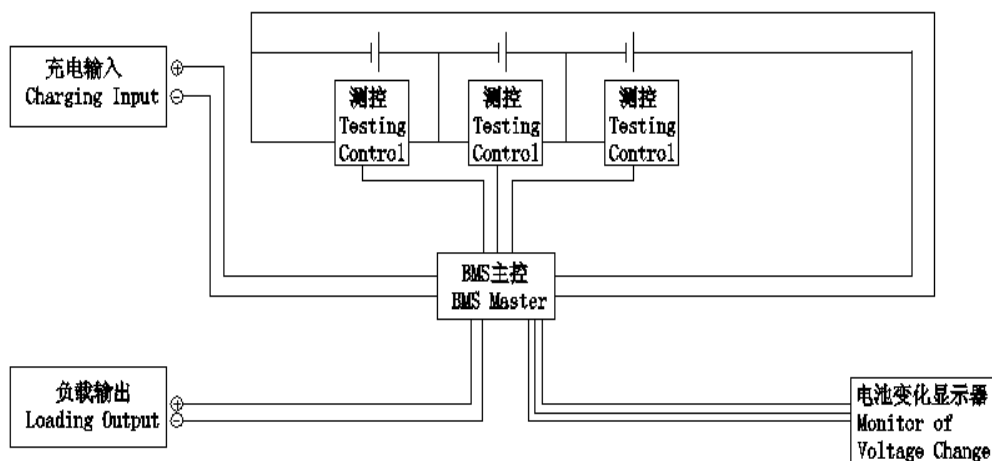


图 2 电池组充放电及与电池管理系统（BMS）连接示意图

Fig 2 schematic diagram of charging and discharging of the batteries pack and connection with the BMS

2、 连接片 The Copper Bus Bar

我司电池在组装时的选用的连接片是采用纯铜 T2 材质多层叠加的方式，在连接片中部套热塑管绝缘；根据电流大小选择相应的连接片面积，原则上电池连接片的电流密度为 $4A/mm^2$ ，最大能通过 $7A/mm^2$ 。

The copper bus bar selected by our celles during pack is made of pure copper T2 material with

multi-layer superposition, and insulated with a thermoplastic tube in the middle of the copper bus bar. You can determine the copper bus bar size according to the current. In principle, the current density of the copper bus bar is $4A/mm^2$, maximum $7A/mm^2$.

3、安装方式 The Installation Method

客户可以从实际出发，选择架式、柜式、箱式安装。电池组安装应根据实际情况预留安装、维护和检测的空间。

You can choose the installation method of Rack-type or Cabinet-type or Box-type according to your actual needs. The batteries pack should be installed according to the actual situation to reserve the space of maintenance and testing.

注意：所有电池出厂前已经荷电，所有金属安装工具使用过程中，禁止与电池正负极接触，防止电池短路。

Note: All batteries are charged before shipment. it is forbidden to contact with the positive and negative poles of the battery during usage of all metal installation tools to prevent short circuit.

4、安装流程 The Installation Procedure

请严格按照电池出厂时的电池编号顺序进行组装，不允许拆散原 Pack 组，进行混装。Please pack the batteries according with the battery number strictly. The original Pack group is not allowed to be disassembled and mixed.

注意：请先进行单体电池之间的连接，再进行电池组与充电器或负载的连接。安装连接条前请保证电池极柱上的污渍已清理干净，如果电池极柱有氧化现象请用砂纸打磨处理。

Note: You should connect the cell first and then connect the batteries and the charger or load. Please make sure to clean up the surface stains on the poles and use the sandpaper grinding if the poles have the oxidation phenomenon before connecting.

电池组安装后要指定专人使用用力矩扳手检查确保所有螺栓处于拧紧状态。建议所需的螺栓力矩如下表所示。

After installing, you should check all bolts to ensure that they are in tightening state with torque wrench by a special person. Recommended Bolt torque requirement are shown below.

螺栓规格 Bolting Specification	螺栓力矩 Bolt torque
M6	10Nm~13Nm
M8	15Nm~17Nm
M14	17Nm~19Nm

如下为电池的串联方式和混联方式。

The following examples are the battery series mode and the mixed connection mode.



图 3 电池组串联示意图

Fig 3 the batteries series mode



图 4 电池组 2 并 4 串联示意图

Fig 4 the batteries mixed connection mode

按所选用产品的相关规定进行 BMS 和保护板的安装。安装结束后，测量并记录每块电池的开路电压和电池组的总电压，检查无误后，方可通电。

Please install the BMS and protection plate according to the relevant regulations of your selected product. Please measure and record the open voltage of each cell and the total voltages of the batteries at the end of installation.No electricity can be turned on until there is no mistake.

四、 电池的充电和放电 The Charging and Discharging of The Battery

1、电池的充电 Charging

标准充电：0.33C恒流充电至3.65V，再以3.65V恒压充电至电流衰减为0.02C。

充电环境温度： 0℃~45℃。

Standard Charging: Charging at a 0.33C constant current rate until the cell voltage reaches 3.65V.

The cell shall then be charged at constant voltage of 3.65 volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to 0.02C.

Ambient temperature of Charging: 0℃ ~45℃.

注意：电池过充，会导致电池寿命会缩短。同时会产生一定的危险性。充电终止电压越高，充电电流越大，充电时间越长，对电池损害越大。

Note: It will shorten the batteries life when they were overcharged. At the same time, there will be certain danger. It will greatly damage to the batteries at the higher termination voltage, the greater charging current and the longer charging time.

2、电池放电 Discharging

标准放电: 0.33C恒流放电至2.5V。

放电深度： 100%DOD； 优化寿命： 50~60%DOD；

放电环境温度： -20℃~60℃。

Standard discharging: Cells shall be discharged at a constant current of 0.33C to 2.5volts.

Discharging depth :100% DOD; Optimized life: 50-60% DOD;

Ambient temperature of disharging: -20℃ ~60℃.

注意：当单体电压低于放电终止电压极限值时，电池处于过放状态，长时间过放会缩短电池使用寿命。避免电池过放。

Note: When the monomer voltage was lower than the discharge end voltage limited, the batteries were in the overdischarging state. It will greatly damage to the batteries at the longer overdischarging time. Please avoid the overdischarging state.

电池充放电的标准电流并不是必须使用的电流，如果能采用更小的电流进行充放电，可以大大延长电池寿命。如果采用更大的电流进行充放电，则大大缩短电池寿命。

The standard charging and discharging current is not required to use the current, if you can use the smaller charging and discharging current, it will greatly extend the life of the batteries.

Otherwise, it will greatly shorten the batteries life at the larger current.

3、贮存中电池的补充充电 **Recharging in Storage**

对长期储存未使用的电池，应定期检查单体电池的端电压。当发现单体电池的端电压下降至 2.5V 以下时，应及时给电池补充电。请至少半年对电池进行一次补充充电。如电池长期放置导致电池在使用前发现电池电压下降为 0V 或 2V 以下，请尝试对电池采用 0.1C 恒流充电至 3.65V 后恒电压充电至 0.02C。如果电池电压逐步回升，电池壳体又不发热，电池可恢复正常；否则，电池已损坏，禁止使用。

For the long-term storage of unused cells, you should check the terminal voltage of the cell. When you find the terminal voltage dropped below 2.5V, you should recharge the cells timely. Please recharge the battery at least half a year. If the cell was placed for a long time, and resulted in the voltage drops 0V or below 2.5V before using, please try to charge the cell with 0.1c constant current. If the cell's voltage rise again and the cell's case without fever, it can be returned to normal; Otherwise, the cell has been damaged and is not allowed to be used.

五、 电池使用 **The Operation**

1、环境温度 **The Operation Temperature**

电池的放电温度范围是-20℃~60℃。优化使用最佳环境温度为 10℃~45℃。当温度超过 90℃时，电池有可能喷液。为了避免因电池使用过程中温度过高发生危险，电池组应配置电池热管理系统可实时监测电池的温度。

The discharging temperature range is -20℃~ 60℃. You can optimize the best temperature for the environment to 10℃ ~ 45℃. When the temperature is more than 90℃, the cell might spray. You should configure the thermal management system with batteries which can real-time monitor the temperatures of the individual cells in order to avoid danger because of the higher temperature in using process.

2、能量衰减 **The Efficiency Loss**

电池能量随充放电次数的增加而减少，当电池的放电容量下降到 60%时，请考虑更换电池。

The energy of the cell will be decreased with the increased of charging and discharging times.

When the discharging capacity of the cell drops to 60%, please consider replacing the cell.

3、电池安全 The Battery Safety

当电池在受到外界强烈挤压、针刺或短路时电池内部聚集的能量能够瞬间释放，不会发生爆炸等安全事故。我司电池的塑料外壳可以提高电池的安全性。但是塑料电池壳易受到外界环境温度的变化而发生轻微形变，因此要求客户在使用过程中一定要将电池组夹紧。

When the cell is crushed, needle punctured or shorted, the internal energy of the cell will instantaneous release but not an explosion accidents. The plastic case can improve the safety of the cell. However, plastic case is easier to be deformed due to change of external environmental temperature. So the batteries must be bonded tightly during operation.

六、注意事项 Announcements

1 、禁止短路。Don't Shorted Connection.

电池在运输、贮存、使用过程中，禁止将电池直接短路，或使用正负短路搭接的方法测试电池的荷电状态。

During transportation, storage and using, it's prohibited to short-circuit the cell directly or test the charged state of the cell by using positive and negative short-circuit lap.



图 5 禁止短路

Fig5 Don't shorted connection



图 6 禁止正负极短接

Fig 6 Don't short-circuit the cell directly

2 、禁止过充电、过放电。Don't Over-Charge or Over-Discharge The Batteries.

充电时严格控制充电电压不超过允许的最高充电电压，如果超出，电池会造成不可逆的损伤甚至无法使用。放电时应严格控制允许的最低放电电压，如果低于允许的放电压，电池会受到损伤。当电池放电电压为 0V 时，这个电池就会彻底损坏并报废。如果电池组中有电压为 0V 的电池而继续放电时，有可能会发生喷液等，造成电池（组）损坏。

The charging voltage should be strictly controlled to not exceed the maximum allowable charging voltage. Otherwise, the cell will cause irreversible damage or even cannot be used. The discharging voltage should be strictly controlled to not lower than the minimum allowable discharging voltage. Otherwise, the cell will cause damage. The cell will be damaged completely

if the cell's voltage below 0 v. If there is a cell's voltage under 0V in the batteries pack and the batteries continue to discharge, there may be liquid injection and cause damage to the batteries.

3、严格控制电池的充放电温度。Strictly Control The Cell's Charging and Discharging Temperature.

电池的充放电温度较宽，但电池内部最佳充放电温度为 0℃~45℃。在高温环境下使用时注意强制通风散热。在低温环境下使用时，电池放电电流会偏小，电压下降快。为了使电池在低温环境下正常工作，应对电池和电池组进行保温加热。

The charging and discharging temperature is wide, but the cell's inside temperature should be controlled at 0°C~ 45°C. You should pay attention to force ventilation and heat dissipation under the environment of high temperature. When used in lower temperature environment, the cell's discharging current should be small, and the voltage will drop quickly. In order to enable the batteries to operate normally at low temperature, the batteries and batteries pack should be heated by heat preservation.

4、严格保持电池组中单体电池的一致性。Strictly Maintain The Consistency of Monomer Batteries.

电池在使用中不得随意变动电池的配组顺序。禁止将不同型号、不同规格的电池混合使用。Don't change the cell's number randomly arranged in any way during the use of the batteries. Don't mix the different types or different specifications in use.

5、禁止打开电池的安全阀或拧松正负极柱螺母。Don't Open The Pressure Release Valve or Loosen The Positive and Negative End Nut of The Cell.

电池在出厂时安全阀的开启压力已设置好。任何情况下拧开安全阀或松动正负极柱紧固螺母直接导致电池报废。

The opening pressure has been set up of the release valve before shipment. It will lead to scrap if you open the relief valve or loosen the positive and negative end nut.



图 7：禁止打开安全阀

Fig7 Don't open the pressure release valve



图 8：禁止松动极柱螺母

Fig 8 Don't loosen the end nut

七、电池的维护 Maintenance

1、电池的定期检查 Daily Check

检查电池是否有破裂、变形现象，如有应马上停止使用并更换。

检查单体电池的电压，电池正常电压为 2.5V~3.65V。如发现电池的电压偏低 ($\leq 2.5V$)，应将该电池进行单个充电，如仍不能恢复到正常，应更换电池。如在使用中发现单体电池电压为零，应及时更换，不允许继续充电和放电。

Check the cell if there was broken or deformation. You should stop using and replace it immediately if it has been severe deformation.

You should check monomer cell's voltage. It's normal range of the voltage from 2.5V to 3.65V. If you find the cell's voltage is low ($< 2.5V$), you can charge it individually. If it still cannot return to normal, you should replace it. If you find the cell's voltage is 0V, you should stop using and replace it immediately. No charge or discharge is allowed.

2、电池的定期保养 Regular Maintenance

定期对电池进行一次补充电。每半年最少进行一次。

定期清除电池表面上的灰尘和污物。每半年最少进行一次。

定期检查拧紧电池连接条上的螺栓。每半年最少进行一次。

定期校准电池监控系统的检测精度。每半年最少进行一次。

Please recharge the cell at least half a year.

Please clear the dust and dirt on the cell surface at least half a year.

Please check the tighten bolts on the copper bus bar at least half a year.

Please calibrate the detection accuracy of the batteries monitoring system at least half a year.

3、电池的更换 The Battery Replacement

请挑选相同规格、相同荷电量的电池，进行单体电池的更换使用。替换的电池容量、内阻应与电池组内的其他电池保持基本一致。

Please choose the same specification and the same SOC to replace a single cell if it needs to displace. The capacity and resistance should be consistent with other celles in the batteries.

八、电池的贮存 Storage

电池贮存在干燥、清洁、通风的仓库，存储温度为 10°C~45°C。

Please storage the cells in a dry, clean and ventilated warehouse. The temperature should be at

10°C ~ 45°C.

远离热辐射源、光线辐射源、化学污染源。电池不受阳光直射，离热源不得少于 2 米。
Keep away from heat sources; Keep away from chemical pollution sources ;Keep away from light sources. Don't expose cells to sunlight. You should keep cells away from the heat source not less than 2 meters.

严禁将电池倒置。电池补充充电时间间隔不能超过 6 个月。

Don't put the cell upside down. The recharging interval of the cell should not exceed 6 months.

九、电池的运输 Transportation

电池在运输过程中，避免受到剧烈的机械冲撞、曝晒、雨淋。

Keep cells from away violent mechanical impact, solarization and drenching during transportation.

电池在装卸过程中，应轻搬、轻放、严防摔掷、翻滚。

In loading, unloading or transshipment operations, it shall be lifted gently to prevent tumbling and rolling.

十、电池的废弃 Scrap

当电池经多次充放电使用后，放电容量低于 60% 时应予以更换。可将电池送往电池回收商处理，切勿随处丢放，避免造成环境污染或导致危险发生。

When the batteries have been charged and discharged many times, it should be replaced if the discharging capacity is less than 60%. The cells can be sent to the recycling company for treatment. Don't leave cells everywhere and avoid causing pollution and danger.

十一、灭火措施 The Fire Extinguishing Measures

我司电池不会出现爆炸情况，请放心使用。电池只有在错误使用的情况下才有可能泄露或冒烟。在电池冒烟或者起火的情况下，首先疏散危险区人员并使房间通风，然后立即使用黄沙、二氧化碳灭火器、干粉灭火器扑灭大火。也可将电池浸泡在大量的水中，但切忌用少量水喷淋。

Please ensure using, it will never happen explosion. It may leak or smoking only in the case of incorrect using. Under the condition of smoking or fire, first you should evacuate people in danger areas and then air the room, then immediately use sand, carbon dioxide fire extinguisher or dry powder fire extinguishers to extinguish fire. You can also soak the burning cell in large amounts of water, but don't spray it with a small amount of water.

十二、地址及联系方式 Address and Contact

公司地址：香港灣仔港灣道 26 號華潤大廈 30 樓 3001-3005 室

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