惠州市赛能电池有限公司

Fullymax Battery Co.,Ltd.

锂离子蓄电池规格书

Specification for Lithium-ion Battery

客户型号(Customer Model No.)：_____

产品料号(Part No.)：FBC7543129

型号规格(Description) 3700mAh 11.1V 3S1P 41.07Wh

制定 Prepared by		审核 Checked by		批准 Approved by
		CELL	PACK	
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客户确认（Customer Confirmation）：

客户名称(Customer)：_____

盖章(Seal)：_____

签名/日期(Sign/Date)：_____

备注：贵司收到成品规格书后，请及时确认回复。产品定型后的规格书，一定要经过双方手工签字并加盖"骑缝章"方可有效；由于规格书中的图纸为示意图纸，因此可能与实物有一定的差异；此份规格书惠州市赛能电池有限公司保留最终解释权。

Note： After the receipt of the finished product specification data sheet, please kindly confirm in time. The specification of the product after the product finalized is effective only after both of the two parties, the manufacturer and the customer, sign and stamp with a across-page seal on. As the specification of the drawings is only the schematic drawings, there may be some difference with the physical objects. Fullymax Battery Co.,Ltd. reserves the final interpretation of it.

Please return this sheet after your approvals.

产品履历表
Product Modification Record

版本 Revision	变更时间 Date	变更内容 Modified content
A0	2024-5-24	首次发行 Original Release

目　录 Content

1、范围 Scope

本规格书描述了由惠州市赛能电池有限公司生产的锂离子蓄电池有关参考技术指标及测试方法、使用要求。

This specification describes the technical parameter, testing method and using requirement of Lithium-ion Battery manufactured by Fullymax Battery Co.,Ltd.

2、主要技术参数 Main Technical Parameter

2.1 成品规格参数 Battery specifications

项目 Item		参数 Parameter	备注 Remark
1. 容量 Capacity	典型容量（$C_{typ.}$）	3860mAh	在室温 23±2℃下标准充电后，0.2C 放电至截止电压 9.0V 0.2C Discharge cut-off Voltage 9.0V after standard charge at 23±2℃
	最小容量（$C_{min.}$）	3700mAh	
2. 标称容量 Nominal capacity		3700mAh	
3. 标称电压 Nominal voltage		11.1V	
4. 出货开路电压 Shipments of Open-circuit voltage		11.1~11.46V	自发货之日起一个月内，在室温 23±2℃下测量电池电压 Test the battery voltage within 1month since the delivery day at 23±2℃
5. 组合方式 Configuration		3S1P	电芯组合方式 Cell Configuration
6. 电池内阻 Internal resistance		≤18mΩ	室温23±2℃下，AC1kHz测试电池内阻 AC 1kHz at 23±2℃
7. 充电截止电压 Charge cut-off voltage		12.6V	4.2V/Cell
8. 标准充电电流 Standard charge current		3.7A	1C
9. 最大充电电流 Maximum charge current		7.4A	2C（Ref.Temperature:10~45℃）
10. 标准放电电流 Standard discharge current		3.7A	1C
11. 最大持续放电电流 Max. constant discharge current		85.1A	23C（Ref.Temperature:10~45℃）
12. 最大瞬间放电电流 Max.burst discharge current		166.5A	45C(≤3S)
13. 放电截止电压 Discharge cut-off voltage		9.0V	
14. 尺寸 Dimension		Max: 厚 24*宽 45*长 138mm	
15. 重量 weight		295g	Approx.
16. 工作环境温度范围 Working Temperature Range		10~45℃	充电 Charge
		-20~+60℃	放电 Discharge

3、测试方法及条件 Testing method and conditions

3.1 标准测试条件 Standard test conditions

被测试电池须为本公司出厂时间不超过一个月的新电池，且电池未进行过五次以上充放电循环。除其它特殊要求外，本产品规格书规定的测试条件为：温度 23±2℃，相对湿度 45%~65%RH,大气压 86kPa~106kPa。

The battery for test must be new produced no more than 1 month and charge-discharged less than 5 cycles. Unless otherwise specified, all tests stated in this Specification shall be proceeded in the following conditions: temperature of 23±2℃, the relative humidity of 45%~65%RH, atmospheric pressure is 86kPa~106kPa.

3.2 测试设备要求 Measuring Equipment requirements

- 测量尺寸的仪器精度应大于等于 0.01mm。
- 万用表测量电压及电流的准确度应不低于 0.2 级，测量电压时内阻不应小于 10kΩ/V。
- 内阻测试仪测量原理应为交流阻抗法（AC 1kHz LCR）。
- 电池测试系统的电流精度应为±0.1%以上，恒压精度±0.2%，计时精度不低于±0.1%。
- 测量温度的仪表准确度应不低于±0.2℃。

（1） Slide caliper should have an accuracy of the grade 0.01mm or higher.
（2） The multimeter should have an accuracy of the grade 0.2 or higher. The impedance when testing voltage should be more than 10KΩ/V.
（3） The impedance meter with AC 1 kHz should be used.
（4） For the battery testing system, the accuracy of current should be more than ±0.1%, the accuracy of voltage should be more than ±0.2% and the accuracy of time should be more than ±0.1%.
（5） The thermometer should be have an accuracy of the grade 0.2℃ or higher.

3.3 标准充电 Standard Charge

1C 恒流恒压充电至 12.6V，截止电流为 0.02C。
1C CC-CV 12.6V,Cut-off current is 0.02C.

备注：上述充电方式必须采用专用锂电池充电设备，进行充电。
Note: Charging equipment special for Lithium-ion battery must be used only for the above charging.

3.4 标准放电 Standard Discharge

1C 恒流放电至放电截止电压。
1C constant current discharge to Discharge cut-off voltage.

3.5 搁置时间 Rest Time

如无特殊要求,电池充放电间隔 30min 以上。
Unless otherwise specified, between battery charging and discharging, there is a 30min interval or more.

4、产品性能
Performance

4.1、电性能测试 Electricity Characteristics

项目 Item	测试方法 Testing method	要求 Requirement	
1、开路电压 Open-circuit voltage	标准充电后，24 小时内测量开路电压。 Measure the open-circuit voltage of the battery within 24 hours after the Standard Charge.	≥12.3V	
2、AC 内阻 AC Internal Impedance	充半电后，在 23±2℃采用交流法测量内阻（通过放电端测试）。 After half charge, measure the resistance through the discharge wires at AC 1KHz ,23±2℃.	成品组合内阻≤18mΩ AC Internal Resistance of Battery Pack≤18mΩ	
3、容量 Capacity	标准充电后，搁置 30min，0.2C 放电至 9.0V。 Discharge the battery with a constant current of 0.2C to 9.0V after Standard Charge and rest 30min.	放电容量≥100% C_{min} Discharge Capacity≥ 100%C_{min}	
4、倍率放电特性 C-rate Discharge Characteristics	标准充电后，搁置 30min，用最大持续放电电流进行恒流放电到 9.0V 截止。 Discharge the battery to 9.0V with maximum continuous discharge current after Standard Charge and rest 30min.	放电容量≥85%C_{min} Discharge Capacity≥85%C_{min}	
5、放电温度特性 Temperature Dependence of the Discharge Characteristics	电池在 23±2℃标准充电后，在 30 分钟内冷却或加热到测试温度。放电前电池在此温度下保持 2 小时，然后 1C 放电至 9.0V 截止，做完一个温度实验后，电池在室温 23±2℃下放置 2h 然后进行充电。 Heat or cool the battery to the testing temperature within 30min and rest for 2 hours after standard charge at 23±2 ℃ , then discharge at 1C to 9.0V cut-off. When a test finished, charge the battery after rested 2 hours at room temperature（23±2℃）.	-20℃	≥60% C_{min}
		25℃	≥100% C_{min}
		60℃	≥95% C_{min}
6、循环性能 Cycle Life Performance	电池在 23±2℃标准充电后，搁置 30min，1C 放电至 9V，搁置 30min，重复上述步骤进行循环，直到连续 3 次放电容量≤80%时循环寿命终止。 Measure the capacity under the following cycle conditions until the cycle life ends when the three discharge capacity ≤80%, Cycle conditions: Standard Charge， rest for 30min;Discharge at 1C to 9V cut-off， Testing temperature is 23±2℃.	循环次数≥300 次 Cycle Life≥300 cycles 放电容量≥80% Discharge Capacity≥80%	

4.2 储存特性 Storage Characteristics

项目 Item		测试方法 Testing method	要求 Requirement
常温贮存 General Temperature Storage Characteristics	1	标准充电后电池在 23±2℃的环境中贮存 28 天，测试 1C 放电容量（保持容量）。 Store the battery, which is charged at standard charge condition, for 28 days at 23±2 ℃ .Measure the remaining capacity of the battery at 1C discharge.	容量保持≥85% C_{min} Remaining Capacity≥85% C_{min}
	2	1C 循环 3 次，测试恢复容量（3 周循环的最大放电容量）。 Charge and discharge at 1C for 3 cycles. Measure the recovery capacity (the max. discharge capacity for three cycles).	容量恢复≥90% C_{min} Recovery Capacity≥90% C_{min}
长期贮存性能 Long-term Storage Characteristics		贮存前给电池充入 50%的容量，然后开路搁置 365 天，在 23±2℃ 的环境条件下 1C 循环 3 次，测试恢复容量（3 周循环的最大放电容量）。 Store the battery at 23±2 ℃ for 365 days after charging the battery with 50% capacity, then charge and discharge the battery with 1C , under 23±2℃ for 3 cycles. Measure the recovery capacity (The Max. discharge capacity for three cycles).	容量恢复≥85% C_{min} Recovery Capacity≥85% C_{min}

4.3 安全性能 Safety Performance

项目 Item	测试方法 Testing method	要求 Requirement
恒定湿热性能 Constant humidity and temperature test	标准充电后，将电池放入 40±2℃，相对湿度为 90%~95%的恒温恒湿箱中搁置 48h，取出电池在环境温度 23±2℃条件下，搁置 2h，若外观无明显变化则以 1C 放电至 9.0V。 Put the battery into an oven of constant humidity(90%~95%) and constant temperature(40±2℃), rest for 48 hours, take it out and rest for 2 hours at 23±2℃, then discharge at 1C to 9.0V cutting off.	放电容量≥80% C_{min} Discharge Capacity≥80% C_{min}
振动 Vibration test	标准充电后，电池在以下条件下测试： 振幅：0.8mm （双振幅：1.6mm）； 振动频率：10~55Hz(扫频:1Hz/min) ； 方向：X、Y、Z 三个互相垂直方向往复振动 90~100min。 After standard charging, the battery is to be tested as following conditions: Amplitude:0.8mm （Double amplitude：1.6mm）; Frequency:10~55Hz(sweep:1Hz/min) ; Direction: X/Y/Z axis for 90~100min. The battery is to be tested in three mutually perpendicular to each axis.	不漏液，不起火,不爆炸 No leak,No fire, no explosion

强制放电 Forced-Discharge Test	电芯标准放电后，以1C电流反向充电90min After standard discharge of the cell, reverse charge with 1C current for 90min	不起火,不爆炸, No fire, no explosion

5、储存及运输要求
Storage and Shipment Requirement

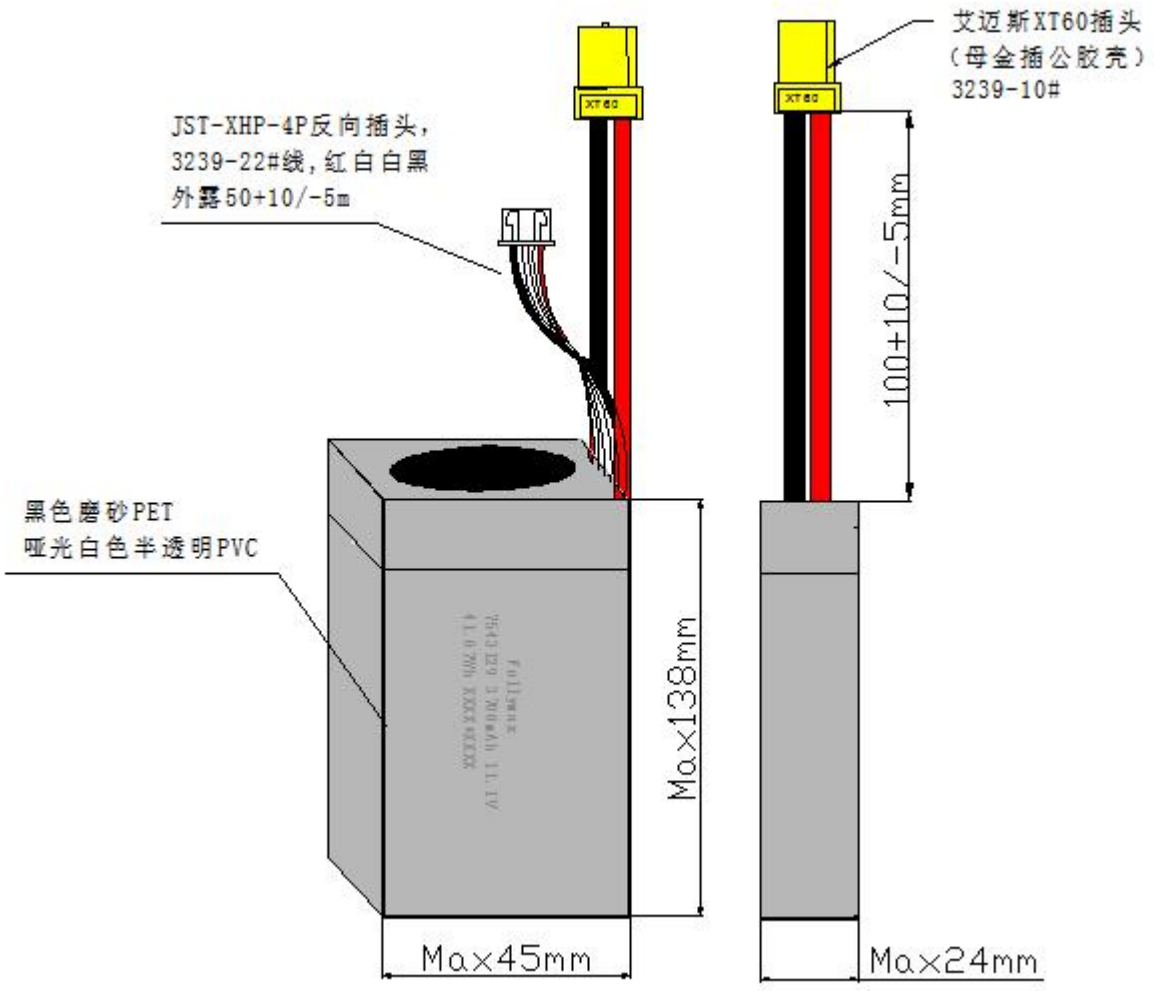
项目 Item	要求 Requirement	备注 Remarks
1、贮存温度 Storage temperature	≤ 1month：-20℃~+45℃ ≤ 3 month：-20~30℃ ≤ 1 Year：25±3℃	运输时推荐贮存温度为 23±2℃ The best temperature for shipment is 23±2℃
2、湿度 Humidity	45%~85%RH	/
3、荷电量 State of Charge (SOC)	30~50%	Pack 电压 11.1-11.46V Pack Voltage 11.1-11.46V

6. 装配结构 Mounting structure

6.1 电池主要物料 Battery materials

序号 NO.	物料名称 Title	规格型号 Specifications	单位 Unit	数量 Qty	备注 Remark
1	电芯	FBC7543129	PCS	3	
2	艾迈斯 XT60 插头	母金插公胶壳 3239 / 10#	PCS	1	
3	JST-XHP-4 反	3239 / 22#红白白黑	PCS	1	
4	PET	黑色磨砂	PCS	1	
5	PVC	哑光白色半透明	PCS	1	

6.2 电池尺寸结构 （单位 mm） Battery Dimension (Unit: mm) and Structure



6.3PVC 喷码：

Fullymax

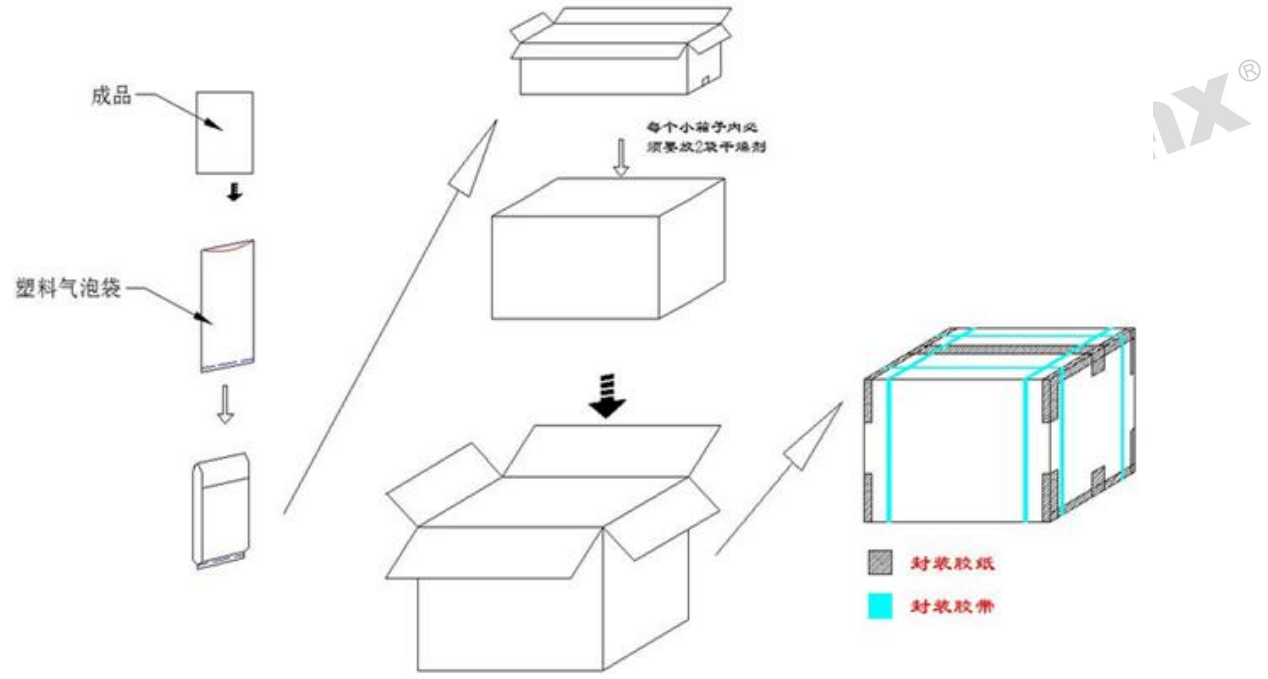
7543129 3700mAh 11.1V

41.07Wh XXXX*XXXX(出货日期流水码）

7、包装说明(白盒包装) Packing Instruction (Plastic tray packaging)

标志的图形、尺寸、颜色应符合 GB/T 191-2000 的要求

The photo, size and color of the mark are all comply with the requirement of GB/T 191-2000.



8、电池保质期与品质担保 Warranty period of battery and Quality guarantee

8.1，电池保质期：从工厂发货起半年期限，在保质期内，因我司电池的原因造成的不良，由我司给予退换处理。

The warranty period of a battery is half part of a year from the delivery date of shipment. The detective product caused by Fullymax Battery Co.,Ltd. will be returned within the warranty period.

8.2，请客户仔细阅读下面的注意事项并遵守，确保正确使用锂离子电池，以便于获得最佳的使用性能和最可靠的安全性；对于客户的使用超出规格说明书外的情况，惠州市赛能电池有限公司不承担有关事故的责任。

For the use of the battery exactly, in order to obtain optimum performance and safety, the Customer shall strictly observe this item described below. The defects other than those caused by user overstep this Specification shall be excluded from the warranty of Fullymax Battery Co.,Ltd.

8.3，未尽事宜由供需双方协商而定。

Any matters which are not covered in this specification should be negotiated between the customer and Fullymax Battery Co.,Ltd.

9、注意事项 Notice

9.1 产品警示声明 Product Cautionary Statement and Disclosure

对超出说明书外的误操作导致的问题，惠州市赛能电池有限公司不承担任何责任。

Fullymax Battery Co.,Ltd. will not take any responsibility for the problems caused by incorrect operation beyond the specification.

声明一：在电池长期未使用期间，它可能会用其自放电特性而处于某种过放电状态。为防止过放电的发生，应定期对电池充电（至少每三个月一次），使其电压保持在（3.7V 至 3.9V）*N 之间（N 代表电池组的个数），请每隔 3 个月按下面方法激活电池一次：0.2C 充电至 4.2V/每节电芯， 休息 10 分钟， 然后用 0.2C 放电到 3.0V/每节电芯，休息 10 分钟，再用 0.2C 充电到 3.85V/每节电芯。过放电会导致电池功能的丧失，并破坏电池的内部结构。当电池因未使用自放电至单节电压低于 3V 时，这样的电池需报废不能再进行充电使用，如继续使用会有胀气及起火的风险。当电池组间电芯的静态压差（指断开负载 24 小时以后的电芯压差）>500Mv 时，这样的电池需报废不能再进行充电使用，如继续使用会有胀气及起火的风险。

Note(1)： The battery might be at an over-discharged state because of its self-discharge characteristics if the battery is not used for long time. In order to prevent over-discharging, the battery should be charged (at least once every three months) periodically to maintain the voltage between (3.7V and 3.9V)*N ((n represents the number of series of cell)) ， Please activate the battery once every 3 months according to the following method: Charge at 1.0C to 4.2V/Cell, rest 10 min, then discharge with 1.0C to 3.0V/Cell, rest 10 min, then charge at 1.0C to 3.85V. Overdischarge will lead to the loss of the battery function and damage the internal structure of the battery.When the battery with a single cell voltage less than 3V by self-discharge due to unused , the battery must be scrapped and can not be used anymore, continued use will have risk of gassing and fire.When the static voltage difference between the cells (refers to the cell voltage difference after 24 hours of disconnecting the load) >500Mv, such batteries need to be scrapped and cannot be used for charging. If they continue to be used, there will be risks of gassing and fire..

声明二：如因保护电路、电池组、使用设备和充电器的匹配使用不当导致的问题，惠州市赛能电池有限公司不承担任何责任。

Note(2)：Fullymax Battery Co., Ltd. will not take any responsibility for the problems caused by improper use of PCM, battery pack, Use equipment and charger.

声明三：若成品电池无保护线路装置，则需使用带保护均衡功能的充电器进行充电。

Note(3): It is necessary to use the charger with protection balanced function to charge if the finished battery without PCM.

声明四：对超出保质期的产品，惠州市赛能电池有限公司不承担任何责任。

Note(4): Fullymax Battery Co.,Ltd. will not take any responsibility for products beyond the warranty period.

声明五：充电电流不得超过本规格书中规定的最大充电电流；使用高于推荐值电流充电将可能引起电池的充放电性能、机械性能和安全性能的问题，并可能会导致发热或泄漏。充电电压不得超过本规格书规定的充电截止电压。

Note(5): The charging current can't exceed the maximum charging current in this specification; The charging with higher current than recommended value may caused the problems of performance of charge & discharge, mechanical and safety, and may lead to fever or leakage. The charging voltage shall not exceed the charging cut-off voltage specified in this specification.

声明六：放电电流不得超过本规格书规定的最大放电电流；大电流放电会导致电池容量剧减并导致过热。

Note(6)： The battery shall be discharged at less than the maximum discharge current specified in the Product Specification； High discharging current may reduce the

discharging capacity significantly or cause over-heat.

声明七：产品已经验收合格，在客户端装配过程导致的电池损坏，惠州市赛能电池有限公司不承担任何责任。

Note(7)： Fullymax Battery Co.,Ltd. will not take any responsibility for battery damaged resulting from the client assembly after the products were accepted.

9.2 产品使用指南 User manual

9.2.1 用户在使用电池前，如果发现电池组有任何异常，如变形，气涨，漏液等就应立即停止使用。

Stop using the battery immediately whenever it deforms, swells, leaks.

9.2.2 若外观无任何异常时，则需检查电池组总输出是否正常，在上述规定的时间内，其电池组总输出标准是否在规格书标准范围内，若在此范围，则初步判定 OK；

Check the total output of the battery pack if the appearance is normal. Within the time specified above, the total output is within the standard as specification sheet shows, confirmed it is OK if in this range；

9.2.3 总电压输出 OK 后，再检测单体电芯电压是否正常，在上述规定的时间内，单电芯输出的标准在 3.70~3.96V 范围内，若在此范围，则再次判定 OK；

Once the total voltage output is confirmed OK, test each cell voltage. Within the time specified above, the standard of the single cell output is in the range of 3.70~3.96V, and it is OK again if it is in this range；

9.2.4 当总电压与分电压均 OK 后，再检测放电线端的总内阻，其总内阻标准是否在规格书标准范围内；若在此范围内，则判定 OK；

Once the total voltage and cell voltage are confirmed OK, test the total internal resistance through the discharge wire, if its total internal resistance standard is within the standard range as specification sheet shows, it is OK for normal using.

9.2.5 电池长期贮存的环境温度为 0℃~30℃之间，对于贮存期超过 3 个月的电池组，在使用前需进行活化处理一次，活化处理是指用平衡充电器对电池组进行充电，充电至电量显示 100%SOC 时，再以 0.2C 的电流进行放电至电压保护，再用平衡充电器对电池组进行充电至 50%SOC 左右；

Battery long-term storage temperature is 0℃ ~ 30 ℃, for the storage period of more than 3 months, battery pack needs to be activated before use. Activation means that charge the battery pack with a balanced charger, charging until the electricity is displayed at 100% SOC, then discharged at a current of 0.2C to the voltage protection, and then charge the battery to about 50% SOC with the balance charger;

9.2.6 禁止对低于 3.2V*N (N 指电芯串联的个数)的电池组进行放电，否则会导致电池组性能的下降和缩短电池组的循环使用寿命；

Do not discharge battery pack with less than 3.2V * N (N refers to the number of batteries in series) otherwise it will lead to the battery pack performance degradation and shorten its cycle life;

9.2.7 建议使用结束后电池组的电量不低于 20%的电量；

Recommend to remain no less than 20% of the battery electricity after the end of using.

9.3 警告 Warnings

不仔细阅读下述事项可能导致电池泄露、爆炸或起火

The battery will fire, explode or leak if not strictly observing this item described below.

- 不能把电池进入水中，长时间不用时把电池放在阴凉和干燥的地方保存。
- Do not immerse the battery in water or seawater, and keep the battery in a cool dry environment during stands by period.
- 禁止与一次电池（如干电池）或不同容量、型号、品种电池组合使用。
- Do not mix using the battery with one-off battery (such as dry battery) or different performance together.
- 电池应放在小孩接触不到的地方，如果小孩不小心吞咽电池应立即寻求医疗救济助。
- Keep all batteries out of the reach of little children. Consult a doctor immediately if a battery is swallowed.
- 不能在产热源的附近使用或存放电池，比如火源或加热炉。
- Do not use or leave the battery near a heat source such as fire or heater.
- 充电时必需使用符合规格的充电器。
- Use the battery charger specifically for that purpose when recharging.
- 请勿将正负板接反。
- Do not reverse the positive (+) and negative (-) terminals.
- 请勿将电池直接连接到墙上插座或车载点烟式插座上。
- Do not connect the battery to an electrical outlet.
- 请勿将电池投入火中或给电池加热。
- Do not dispose the battery in fire or heat.
- 禁止用导线或其它金属物体将电池正负极短路。
- Do not short-circuit the battery by directly connecting the positive (+) and negative (-) terminals with metal objects such as wire.
- 禁止将电池与项链、发夹或其它金属物体一起运输或贮存。
- Do not transport or store the battery together with metal objects such as necklaces, hairpins etc.
- 禁止撞击、投掷电池，使电池受到硬物撞击。
- Do not strike or throw the battery against hard surface.
- 禁止直接焊接电池端子。
- Do not directly solder the battery.
- 禁止用钉子或其它尖锐物体刺穿电池壳体，禁止锤击或脚踏电池。
- Do not unpack the battery with a nail or other sharp object.
- 禁止以任何方式分解电池。
- Never disassembling the battery in any way.

9.4 注意 Cautions

- 不要在极热环境中使用或者储存电池，如阳光直射或热天的车内。否则，电池会过热，可能着火（点燃），这样就会影响电池的性能、缩短电池的使用寿命。
  Do not use or leave the battery at very high temperature (for example, at strong direct sunlight or in a vehicle in extremely hot weather). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be shortened.
- 不要在强静电场所使用电池，否则电子保护装置可能会受到损坏导致危险事故。
  Do not use it in a location where static electricity is rich, otherwise, the safety devices may be damaged, causing a harmful situation.

- 如果电池漏液后电解液进入眼睛，不要擦，应用水冲洗，立即寻求医疗救助。如不及时处理，眼睛将会受到伤害。
  In case the electrolyte getting into the eyes due to the leakage of battery, do not rub the eyes! Rinse the eyes with clean running water, and seek medical attention immediately. Otherwise, it may injure eyes or cause a loss of sight.
- 如果电池发出异味、发热、变形、变色或出现其它任何异常现象时不得使用；如果电池正在使用或充电，应立即从用电器中或充电器上取出并停止使用。
  If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charger and place it in a contained vessel such as a metal box
- 如果电池的端子变脏，使用前用干布擦干净。否则电池会接触不良，从而引起能量损耗或无法充电。
  In case the battery terminals are contaminated, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection between the battery and the electronic circuitry of the instrument
- 随意丢弃电池可能会导致火灾，处理电池前需要把电池 100%放电并用绝缘胶带把电池的输出端进行绝缘。
  Be aware discarded batteries may cause fire, 100%discharged the battery and tape the battery terminals to insulate them before disposal.
- 电池报废处理的方法：报废的电池或电池组应移交给专业回收电池公司进行报废处理。
  Battery disposal: The scrapped cells or packs should be handed over to professional recycling battery companies or institution for disposal.