



LN Energy Technology Co., Ltd.

雷能能源科技有限公司

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电池规格书

SPECIFICATION OF BATTERY

Customer No. 客户编号	A139
Product Name 产品名称	Li-ion battery pack 锂离子电池组
Model 型号	YC110
Specification 规格	60V20AH
Draw 拟制	梁光宁
Check 审核	
Approve 批准	
客户承认 Customer approval	

雷能能源科技有限公司

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2. scope of application 适用范围

This product specification applies on the battery of LN Energy Technology Co.,Ltd, the battery is suitable for Electric motorcycle products.

本产品规格书适用于雷能能源科技有限公司的电池，该电池适用于电动摩托车产品。

3.Product specification 产品规格

3.1 product description 产品描述

3.1.1 Name: Rechargeable Li-ion battery pack 名称: 锂离子电池组

3.1.2 Model: =YC110 型号: YC110

3.1.3 Rechargeable Li-ion cell and control circuit: 可电充锂离子电芯和控制电路

3.2 Relevant explanation 相关说明

3.2.1 Standard temperature: Unless otherwise specified, the standard temperature stipulated in the Document is $23^{\circ}\text{C}\pm 2^{\circ}\text{C}$

标准温度: 除非特殊说明, 本文件测试所用标准温度为 $23^{\circ}\text{C}\pm 2^{\circ}\text{C}$

3.2.2 Standard charging: Under standard temperature, Charge with constant current of 2A (but not higher than the maximum allowable charging current designed for the product) until the maximum voltage reaches the charging cut-off voltage, and then charge the battery at the constant voltage until the charging current is lower than or equal to 0.02C

标准充电: 标准温度下以 20A 电流恒流 (但不高于产品设计最大允许充电电流) 充电至最高电压达到充电截止电压, 维持该充电电压, 恒压充电至充电电流 $\leq 0.02\text{C}$ 为止

3.2.3 Standard discharging: Under the standard temperature, discharge at a constant current of 0.2C until the voltage reaches the discharging cut-off protection voltage.

标准放电: 标准温度下以 0.2C 电流恒流放电至放电截止电压

3.2.4 Overcharging protection: When charging, the single cell voltage reaches the set value, the control circuit will cut off the circuit to stop charging (can discharge)

过充保护: 充电时, 当单节电芯电压达到设定值时, 控制电路将切断电路停止充电 (可以放电)

3.2.5 Overdischarging protection: When discharging, the single cell voltage reaches the set value, the control circuit will cut off the circuit to stop discharging

过放保护: 放电时, 当单节电芯电压达到设定值时, 控制电路将切断电路停止放电

3.2.6 Charging/ Discharging overcurrent protection: When the Charging/ Discharging current reaches the set value, the control circuit will cut off to stop the Charging/ Discharging

充/放电过流保护: 当充/放电电流达到设定值时, 控制电路将切断以停止充/放电

3.2.7 Short circuit protection: When the Charging/ Discharging circuit is abnormal, the control circuit will be cut off to stop the Charging/ Discharging

短路保护: 当充放电回路异常时, 控制电路将切断已停止充放电

3.2.8 Temperature protection: When the temperature of the battery or MOS reaches the set value, the control circuit will be cut off to stop charging/discharging

温度保护: 当电池或 MOS 管温度达到设定值时, 控制电路将切断以停止充放电

3.2.9 Balancing: When there is a certain difference in the series cell voltage, the equalization circuit in the control circuit will make the series cell voltage as consistent as possible during charging

均衡: 当串联电芯电压有一定差异时, 充电时控制电路中的均衡电路会让串联电芯电压尽量保持一致



3.3 Cell Main Characteristics 电芯主要特性

Cell Supplier 电芯供应商	Cell Model 电芯型号	Nominal Voltage 标称电压	Nominal Capacity 标称容量	Min. Capacity 最小容量
SAMSUNG	EV INR21700-50G	3.63V	5000mAH	4900mAH

3.4 Battery Pack parameter 电池包参数

No.	Item 项目	Parameter 要求参数	Remark 注释	
3.4.1	capacity 容量	Nominal Capacity 典型容量	20Ah	
		Min. Capacity 最小容量	19.6Ah	
3.4.2	Nominal Voltage 标称电压	58.08V		
3.4.3	Max. Charge Voltage 最大充电电压	67.2V	Adapter charger 适配充电器	
	Charge mode 充电方式	CC/CV 恒流恒压模式	The charger have no voltage detection function 充电器不能有电压检测功能	
	Standard Charge Current 标准充电电流	0.2A	CC/CV mode 0.02C cut-off	
	Max. Charge Current 最大充电电流	10A	恒流恒压模式 截止电流 0.02C	
3.4.4	Standard Discharge Current 标准放电电流	0.2C		
	Max. Continuous Discharge Current 最大持续放电电流	45A		
	Discharge Cut-off voltage 放电终止电压	46.4V		
3.4.5	Operating voltage Range 工作电压范围	46.4-67.2V	Recommended usable Voltage 推荐的可用电压范围	
3.4.6	Internal Impedance 内阻	≤120mΩ	AC impedance 1KHz	
3.4.7	Weight 重量	≈KG		
3.4.8	Operating environments temperature 工作环境温度	Charging 充电	0 ~ 45°C ± 5°C	Recommended temperature Range 推荐温度范围
		Discharging 放电	-20~60°C ± 5°C	
3.4.9	Storage temperature	≤1 month	-20°C ~ 45°C	Storage Humidity 0~60%RH 储存湿度 0~60%RH
		≤3 months	-10°C ~ 35°C	



储存温度	≤12 months	0°C ~ 25°C
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3.5.The basic function and parameters 基本功能及参数

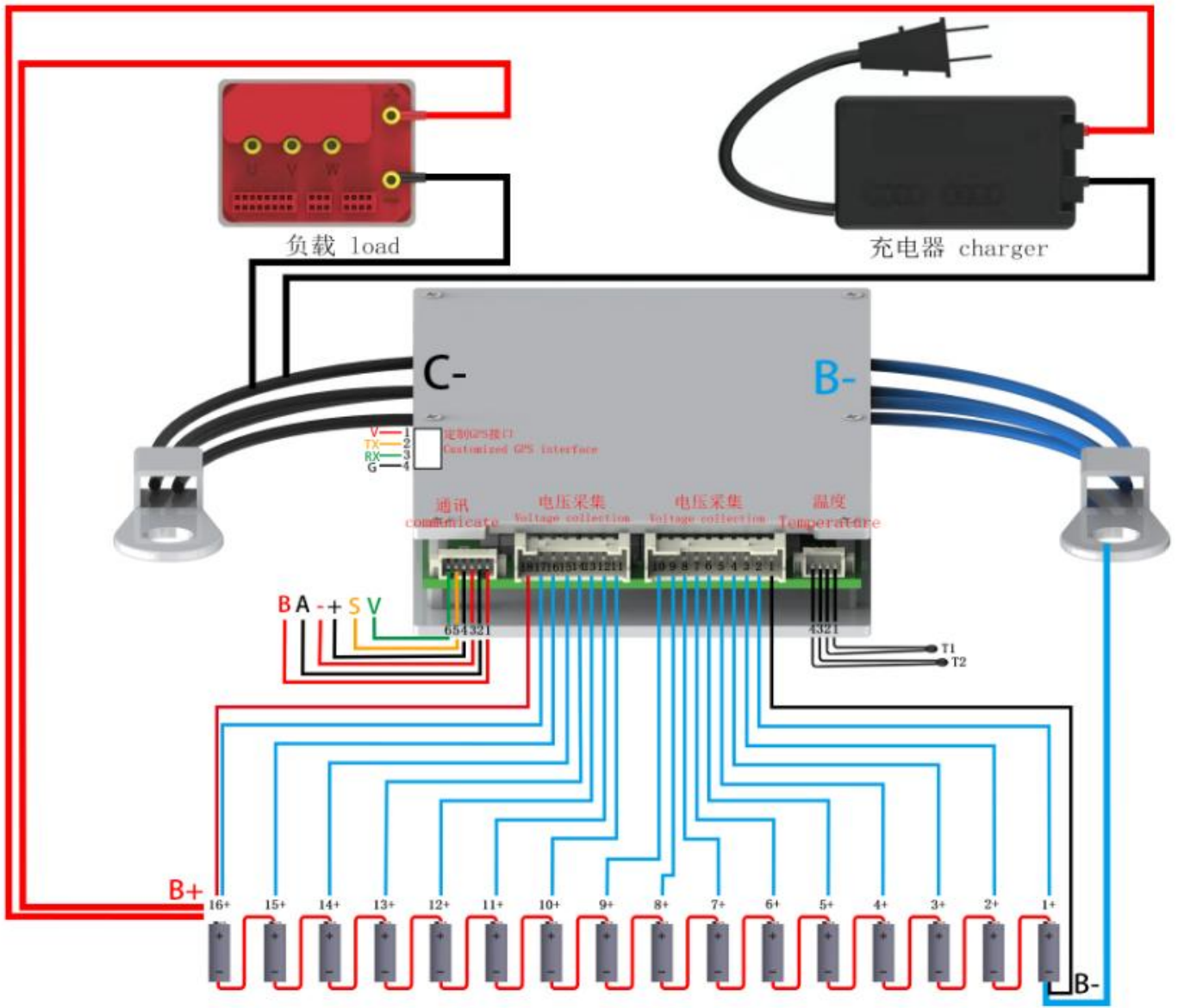
Item 项目	Unit 单位	Min. 最小值	Nominal 标 称值	Max. 最大值
Overcharging protection voltage/Cell (Primary) 过充保护电压/节 (一级)	V	4.20	4.25	4.3
Overcharging protection voltage/Cell (Secondary) 过充保护电压/节 (二级)	V	4.25	4.30	4.35
Overdischarging protection voltage/Cell (Primary) 过放保护电压/节 (一级)	V	2.85	2.9	2.95
Overdischarging protection voltage/Cell (Secondary) 过放保护电压/节 (二级)	V	1.95	2.0	2.05
Charge reverse/short circuit protection function 充电反接/短路保护功能	/	/		
Charging overcurrent protection 充电过流保护	/	Yes 有		
Discharging overcurrent protection (Primary) 放电过流保护电流 (一级)	A	75	80	85
Discharging overcurrent protection (Secondary) 放电过流保护电流 (二级)	A	195	200	205
Short circuit protection function 短路保护功能	/	Yes 有		
Short circuit protection recovery method 短路保护恢复方式	/	Automatically recovers after the load is disconnected 断开负载自动恢复		
Charging high temperature protection (Primary) 充电高温保护温度 (一级)	°C	60	65	66
Charging high temperature protection recovery temperature(Primary) 充电高温保护恢复温度 (一级)	°C	55	60	61
Charging high temperature protection (Secondary) 充电高温保护温度 (二级)	°C	60	65	66
Charging high temperature protection recovery temperature(Secondary) 充电高温保护恢复温度 (二级)	°C	55	60	61
Charging low temperature protection (Primary) 充电低温保护温度 (一级)	°C	-5	0	5
Charging low temperature protection recovery temperature(Primary) 充电低温保护恢复温度 (一级)	°C	-10	5	0
Charging low temperature protection (Secondary) 充电低温保护温度 (二级)	°C	-5	0	5
Charging low temperature protection recovery temperature(Secondary) 充电低温保护恢复温度 (二级)	°C	-10	5	0



temperature(Secondary) 充电低温保护恢复温度 (二级)				
Discharging high temperature protection (Primary) 放电高温保护温度 (一级)	°C	60	65	66
Discharging high temperature protection recovery temperature(Primary) 放电高温保护恢复温度 (一级)	°C	55	60	61
Discharging high temperature protection (Secondary) 放电高温保护温度 (二级)	°C	60	65	66
Discharging high temperature protection recovery temperature(Secondary) 放电高温保护恢复温度 (二级)	°C	55	60	61
Discharging low temperature protection (Primary) 放电低温保护温度 (一级)	°C	-25	-20	-15
Discharging low temperature protection recovery temperature(Primary) 放电低温保护恢复温度 (一级)	°C	-15	-10	-5
Discharging low temperature protection (Secondary) 放电低温保护温度 (二级)	°C	-25	-20	-15
Discharging low temperature protection recovery temperature(Secondary) 放电低温保护恢复温度 (二级)	°C	-15	-10	-5
MOS high temperature protection MOS 高温保护温度	°C	80	85	90
Balancing current 均衡电流	mA	/	/	/
Other funtions 其他功能				
Switching function 开关功能		Yes 有		
Charging port has no voltage 充电口无电压		/		
Voltage reading 电压读取		Yes 有		
Communication Interface 通讯方式		/		
Communication baud rate 通讯波特率		/		

3.6. Protection circuit 保护电路

3.6.1 Protection circuit block diagram 保护电路框图



3.7.The size and appearance 尺寸及外观

3.7.1 Size 尺寸:

The appearance of the product should have no obvious damage, such as abrasion, damage, cracks, stains, leakage, deformation, etc., the surface should be uniform, no color difference
电池产品外观无明显损伤, 如擦伤, 破损, 裂缝, 污点, 渗漏, 变形等, 电池表面应均匀一致, 无色差。

3.8.The interface definition 接口定义

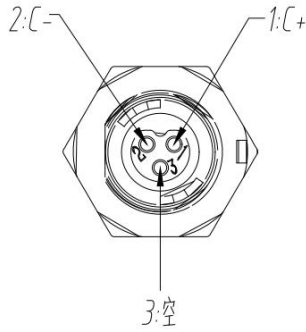
Nam 定义	Description 描述	Remark 注释
C+	Positive port of charge (充电端口正极)	
P+	Positive port of discharge (放电端口正极)	
C-	Negative port of charge (充电端口负极)	
P-	Negative port of discharge (放电端口负极)	

input terminal diagram 输入端口图:

output terminal diagram 输出端口图:

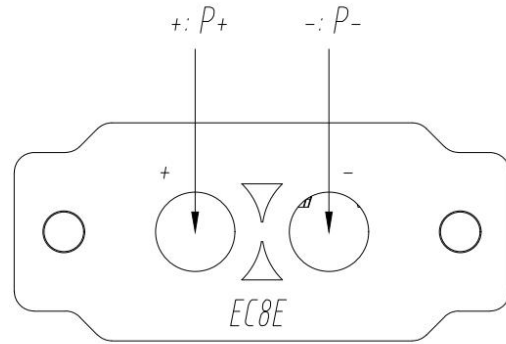


充电口定义



充电口: 捷联通 M12自锁3芯

放电口定义



放电口: EC8香蕉插头

4 Performance test methods and conditions 性能测试方法及条件

4.1 Test conditions 测试条件

4.1.1 The produced date of the test sample is within one month, and the number of cycles before the test is less than 3 times 测试样品的生产日期在一个月之内, 测试前的循环次数不超过 3 次。

4.1.2 Except for special provisions, the test should be carried out under standard atmospheric conditions, the ambient temperature of the test is generally $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, and the ambient humidity is 45% to 85%. If this environment is not achieved, it can also be carried out at $15 \sim 35^{\circ}\text{C}$ and the ambient humidity is 25% ~ 85%.

除特殊规定外, 测试应在标准大气条件下进行, 测试的环境温度一般为 $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 环境湿度为 45% ~ 85%。如果达不到这个环境, 也可在 $15 \sim 35^{\circ}\text{C}$, 环境湿度为 25% ~ 85% 中进行。

4.2 Requirements for measuring instruments and equipment 测量仪器与设备要求

4.2.1 The accuracy of the instrument measuring the voltage should not be less than 0.5, and the internal resistance should not be less than $10\text{K}\Omega/\text{V}$.

测量电压的仪表精度应不低于 0.5 级, 内阻应不低于 $10\text{K}\Omega/\text{V}$ 。

4.2.2 The accuracy of the instrument measured the current/internal resistance should not be less than 0.5 测量电流的仪表精度应不低于 0.5 级。

4.2.3 The accuracy of the instrument measuring the internal resistance should not be less than 0.5. 测量内阻的仪表精度应不低于 0.5 级。

4.2.4 The relative error of the instrument measuring time is $\pm 0.1\%$.

测量时间的仪表相对误差为 $\pm 0.1\%$ 。

4.2.5 The current of constant current load is constant and adjustable, and the relative error of current is $\pm 0.1\%$ 恒流负载的电流恒定可调, 其电流相对误差为 $\pm 0.1\%$ 。

4.2.6 The charging power supply (or charger) can be changed to constant voltage charging after the battery voltage reaches the constant voltage value of the charging voltage.

充电电源(或充电器)在电池电压达到充电电压恒压值后应能改为恒压充电。

**4.2 Electrical performance and test methods 电气性能及测试方法**

No.	Item 项目	Criteria 标准	Test method 测试方法
4.2.1	Rated Capacity 额定容量	≥95%	Rest 30min after standard charging, and then standard discharge to discharge cut-off voltage. 标准充电后搁置 30min, 然后标准放电至放电截止电压。
4.2.2	Internal resistance 内阻	Refer to 3.4.6 参考 3.4.6	Using a AC 1KHZ meter whose precision is not less than 0.5%, detect the resistance between the battery' s positive and negativeterminals. The result value can not include any external conductor' s resistance. The maximum and the minimum need to be recorded 使用 AC 1KHz 检测方法及其准确度不低于 0.5 级的仪表, 测量电池接口处正负极之间的内阻值, 若检测仪表在检测过程中使用附加的电池固定夹具和引线, 可以视情况减去固定引线的电阻值, 且记录最大与最小之差值
4.2.3	cycle life 循环寿命	> 1000times	Rest 30min after standard charge, then discharged at 0.5C ₆ A constant current to termination voltage, rest 30min, so until two consecutive discharge time is less than 36 min (about 80% of the C ₅). 标准充电后搁置 30min, 以 0.5C ₆ A 恒流放电至终止电压, 搁置 30min, 如此循环至连续两次放电时间小于 36min (约 80%C ₅)。
4.2.4	Storage characteristics 存储特性	≥80%	After standard charging, it is left open for 28 days at 20 ° C ± 5 ° C, and then the standard discharge capacity is tested 标准充电后在 20±5°C条件下开路搁置 28 天, 然后测试标准放电容量。

4.3 Safety performance and test methods 安全性能及测试方法

No.	Items 项目	Criteria 标准	Test Method 测试方法
4.3.1	Overcharge protection 过充电保护性能	The charging protection is acting, and No fire, no explosion 充电保护动作, 且不起火, 不爆炸	Apply voltage to the battery pack at 1.2 times of the designed normal charging voltage, and charge the battery pack at the maximum allowable charging current, until the battery management system comes into operation (and observe for 2H), or stop the test in case of fire or explosion conditions. 以设计之正常充电电压的 1.2 倍给电池包施加电压, 并以允许最大充电电流对电池组充电, 直至电池管理系统起作用(并观察 2 小时), 或起火、爆炸条件时停止试验



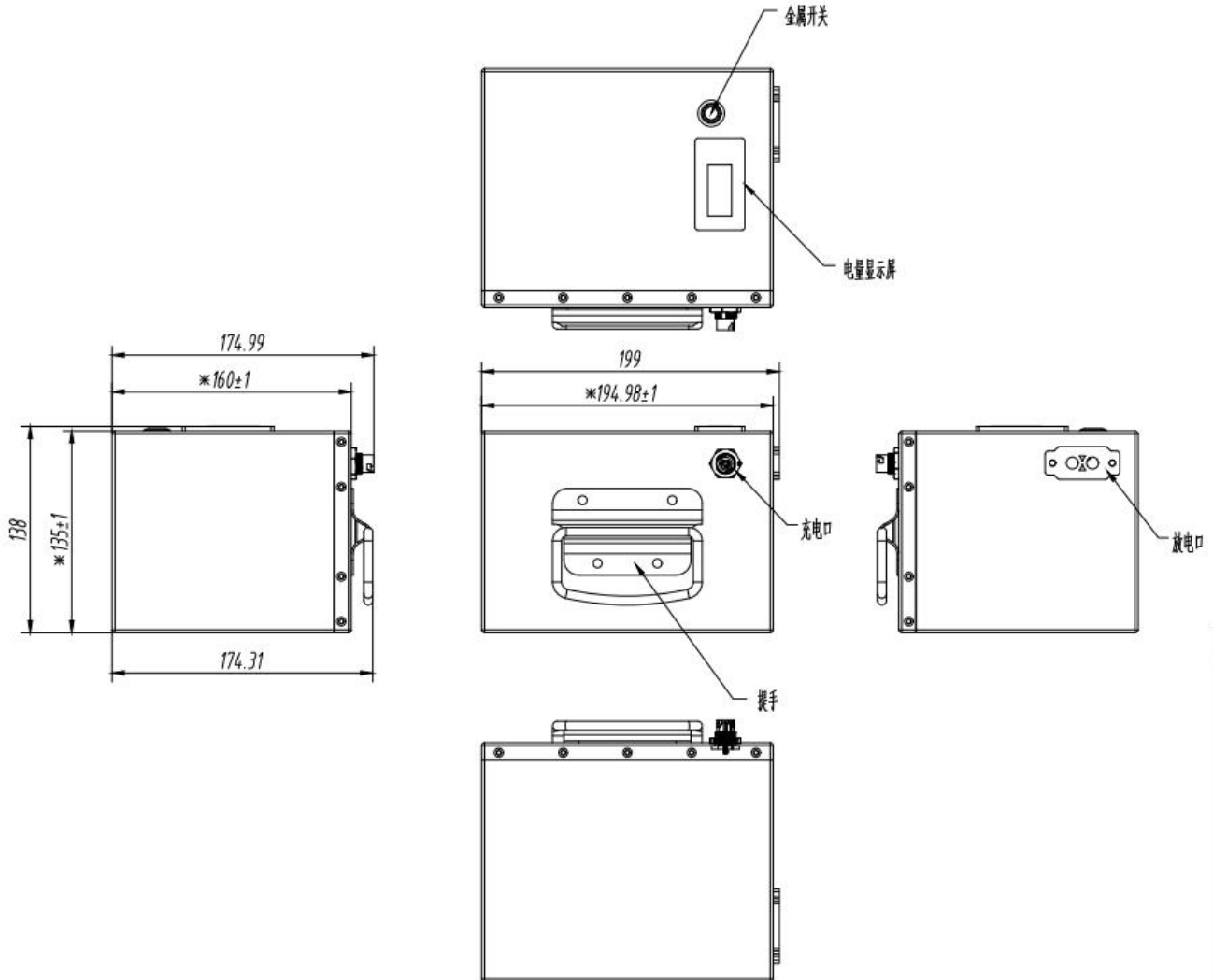
4.3.2	Overdischarge Protection 过放电保护性能	Discharging protection is acting, and No fire,no explosion 充电保护动作,且不起火,不爆炸	Set the discharge process with the maximum allowable discharge current and the protective voltage below the discharge cutoff until the discharge is terminated, the battery management system is in operation (and observe for 2 hours), or the test is stopped under fire or explosion conditions 以最大允许放电电流, 并以低于放电截止保护电压设置放电过程,直至放电终止, 电池管理系统起作用(并观察 2 小时), 或起火、爆炸条件时停止试验。
4.3.3	Short protection 短路保护	Short circuit protection is acting, and No fire,no explosion 短路保护动作, 且不起火,不爆炸	After standard charging , short-circuit the positive and negative terminals of the battery outputs directly , the battery management system is in operation (and observe for 1 hours), or the test is stopped under fire or explosion conditions 标准充电后, 直接短路电池输出端正负极, 电池管理系统起作用(并观察 1 小时), 或起火、爆炸条件时停止试验。

4.4 Mechanical property 机械性能

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5. Description Of Mechanical Characteristics 机械特性描述

5.1 Battery Final Dimension 电池成品尺寸



5.2 Label Figure 标签图

6. Transportation And Storage 运输和储存

6.1 Transportation 运输

6.1.1 The product must be packaged by ship, and should be prevented by vibration, shocking or crushing, even more can't be stored under the sun and rain; Shipped with the stuff of flammable, combustible and easy corrosion is inhibited. This product can be shipped by cars, trains, air and sea.

电池应包装成箱进行运输，在运输过程中应防止剧烈振动、冲击或挤压，防止日晒雨淋，严禁与易燃、易爆、易腐蚀的物品同车装运，可使用汽车、火车、轮船、飞机等交通工具进行运输。

6.1.2 Do not mix the battery products with other cargos.

请勿与其他货物混合。

6.1.3 The load capacity of battery shipment it is advisable to remain at about 70%.

电池运输前的荷电量保持在大约 70%为宜。



6.2 Storage 储存

6.2.1 The ambient temperature and humidity of the stored products shall meet the conditions specified in 3.4.9, and shall be placed in a clean, dry, ventilated room with moisture-proof, dust-proof, shock-proof and anticorrosive measures. Avoid contact with corrosive substances and keep away from fire and heat sources.

储存产品的环境温度及湿度符合 3.4.9 规定的条件，并置于清洁、干燥、通风并设有防潮、防尘、防震、防腐蚀措施的室内。避免与腐蚀性物质接触，应远离火源及热源。

6.2.2 The batteries should be stored at room temperature, charged to about 30% to 60% of capacity. In case of over-discharge, batteries should be charged to suitable range with standard charge method for one time every 3 months while storing and batteries should be charge-discharged with standard method for one time after being stored more than one year in order to activate it and restore energy.

电池应在室温下存放，应充电到 30%~60% 的电量。为防止电池过放，建议每 3 个月按标准充电方式进行补电。如储存时间超过一年，建议每年按标准充放电方式进行一次充、放电循环以激活电池。

6.2.3 When a battery works, it uses the energy released by an electrochemical reaction to provide electricity, which is actually a chemical product. Because of this, if the battery is stored for a long time without use, the performance of the battery will decay slowly, so pay attention to the battery re-charge and discharge activation after a period of storage to restore battery energy

电池工作时是利用电化学反应释放的能量提供电能，它实际上是一种化学产品。正因为如此，若电池贮存很长时间而没有使用，电池的性能会缓慢衰减，因此要注意在一段时间的存储后对电池重新充放电激活以恢复电池能量。

7. Safety and Caution 安全规定与注意事项

7.1 Danger 危险

To prevent possible battery leakage, heat, fire, please pay attention to the following precautions.

为防止电池可能发生泄漏、发热、起火，请注意以下预防措施

- It is forbidden to use in an environment beyond the waterproof grade of the shell. The waterproof inside the battery may fail under the change of environmental conditions and service conditions.

禁止在超出外壳防水等级环境下使用，电池内部防水可能在环境条件变化和使用条件变化下失效。

- Do not immerse the battery in liquid such as water, beverages, or other fluids. (Except for special products designed for this use scenario)

禁止将电池浸入如水、饮料或其它液体中。(除为此使用场景设计之特殊产品)

- Do not use or place the battery near an fire, heater or high temperature environment (above 60°C)

禁止将电池在热高温源旁，如火、加热器等使用和留置

- Do not use unauthorized chargers.

禁止使用未经授权的充电器。



- Do not charge or discharge with a current greater than the designed maximum allowable charge or discharge current
禁止使用大于产品设计的最大允许充放电电流进行充放电
- Do not attach or insert battery with polarity reversed.
禁止将电池极性反转连接。
- Do not connect the battery to an AC outlet or DC automotive plug.
禁止将电池连接到 AC 插座或 DC 的汽车充电插座。
- Do not use the battery in equipment for which it was not intended.
禁止将电池使用在其它装置或设备中。
- Do not short-circuit the battery by directly connecting the positive and negative terminal with metal object such as wire.
禁止使用导线等金属物体直接连接电池正负极短路电池。
- Do not transport or storage the battery together with metal, such as hairpins, necklaces.
禁止将电池与金属，如发夹、项链等一起运输或贮存
- Do not excessive impact to the battery such as striking, throwing, trampling, etc.
禁止对电池的过度机械冲击,如撞击、 抛掷、 践踏等。
- Do not penetrate the battery with a nail or other sharp object.
禁止使用钉子或其它尖锐物体刺穿电池。
- Do not disassemble the battery.
禁止拆解电池。

7.2 Warnings 警告

- Keep the battery away from small children. If the battery or any of its component parts is swallowed, seek medical attention immediately.
将电池放在小孩够不到的地方。 如果电池或者电池任意部件被小孩吞食， 必需立刻就医
- Do not place the battery in or near a microwave or other cooking appliances. If subjected to heat or strong electromagnetic radiation, the battery may leak, generate heat, smoke, catch fire, or explode.
禁止将电池放在靠近微波设备或其它烹饪装置附近， 如果电池被加热或受到强电磁辐射， 可能发生漏液、 发热、 冒烟、 着火等。
- Do not mix with other batteries. The battery should not be used with other batteries having a different capacity, chemistry, or manufacturer. Doing so could cause the battery to generate heat, smoke, catch fire, or explode.
禁止与其它电池混用。 因与其它电池有不同的容量、 化学成分、 制造工艺等， 相互混用可能会发热、 冒烟、 着火等。
- Immediately remove it from the device or charger, and stop using it, if there are noticeable abnormalities, such as smell, heat, discoloration, or deformity. The battery may be defective and could generate heat, smoke, catch fire, or explode with continued use.
如果电池在使用或贮存中有明显异常， 如发出异味、 发热、 变色、 变形， 或者是在充电过程中出现任何异常现象， 立即将电池从使用装置或充电器中移开， 并停止使用。 电池可能有缺陷， 继续使用可能导致发热、 冒烟、 着火等。



- Stop charging if the charge process cannot be finished within the specified time.
如果充电不能在规定的时间内完成， 停止充电。
- Do not use a battery near open flame.
禁止将电池靠近火源。
- Do not use the battery after water.
电池进水后禁止使用。
- Do not touch a leaking battery. If liquid leaking from the battery gets into your eyes, immediately flush your eyes with clean water and seek medical attention. If left untreated, it will cause significant eye damage.
禁止触摸漏液电池。 如果电解液不小心进入眼睛， 请不要揉擦， 应马上用清水冲洗眼睛， 并立即送医院治疗， 否则会伤害眼睛。
- To prevent short-circuit or damage during transport or store, securely pack the battery in a case or carton. Do not transport and store the battery together with metal objects such as necklaces, hairpins, etc.
防止在运输和存放过程中短路或损坏电池， 必需将电池安全包装在盒子或纸箱中。 不要与金属物体如项链、 发夹等一起运输和存储。
- Do not insert the battery onto the charger for a long time. If charging beyond the normal time, the battery is still in the charger, please stop charging. The abnormal charging will cause battery over-heated, distort, smoke or burning.
不可长期置放充电器上如果超过正常充电时间很长时间充电器仍在充电应停止充电， 不正常的充电有可能会使电池发热、 冒烟变形或燃烧。

7.3 Caution 注意

- Read the specification before use. Keep for future reference.
电池使用前注意阅读此规格书， 并保存以便后续查阅。
- Do not use or leave the battery at very high temperature ($>60^{\circ}\text{C}$, for example, at strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.
禁止在高温下($>60^{\circ}\text{C}$ ， 如直射的阳光下或很热的汽车中)使用或搁置电池， 否则可能会引起电池过热、 起火或功能失效， 或者导致电池寿命减短或损坏电池。
- Do not place the battery in an environment exceeding 60°C for a long time
不要把电池长期放置在超过 60°C 的环境中
- Do not use the battery in places with strong static electricity and strong magnetic, otherwise it may damage the safety protection circuit, and cause hidden trouble of safety.
不要在强静电和强磁场的地方使用， 否则易破坏电池安全保护电路， 带来不安全的隐患
- Read the charger' s manual before use for proper charge method.
在充电前仔细阅读充电器使用说明， 使用正确的充电方法。
- Please contact the supplier if the battery gives off an unusual odor, generates heat, or shows signs of rust prior to its initial use.
在首次使用前， 如果电池发出明显的异味、 发热或锈蚀迹象， 请联系电池供应商。
- Parents must explain how to use the system and the battery. Please check back periodically to



ensure children are using the system and the battery correctly.

给小孩使用前大人必须讲解清楚如何使用设备和电池，并定期跟踪确认，以确保小孩正确使用。

- Do not charge or discharge near flammable materials. Doing so could result in fire.
请不要靠近易燃材料充放电电池，否则可能产生起火隐患。
- If electrolyte leaks from the battery and comes into contact with skin or clothing, immediately flush with water. Otherwise, it may cause skin irritation.
如果电解液从电池漏出并接触到皮肤或衣服，立即用水冲洗，否则导致刺激皮肤。
- If the battery pack have a system interface consisting of stripped lead wires or exposed contact plates, Temporarily insulate exposed contacts and conductors with an insulator such as polypropylene tape or polyvinylchloride tape. Failure to do so could result in an electrical shock, a short circuit causing the battery to generate heat, smoke, catch fire, or the combustion of other materials.
如果电池组有由剥离导线或暴露的接触板组成的系统接口，可暂时用聚丙烯胶带或聚氯乙烯胶带隔离暴露接触导体与绝缘体。不这样做可能会导致触电，短路造成电池发热、冒烟、着火，或其它材料的燃烧。
- When disposing of the battery, be aware discharged battery may cause fire, tape the terminals to insulate them. Recycle it according to local rules and regulations.
处理电池时，注意带电的电池可能会造成火灾，应该用胶带将电路端子隔离。根据当地法规回收。
- In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.
如果电池电路端子弄脏，使用前应用干布抹净，否则可能会因接触不良而影响性能失效。
- If the battery voltage is lower than the overdischarge protection voltage, precharge the battery at a current lower than 0.03C, and do not use the battery until the battery capacity is restored
如果电池的电压低于过放电保护电压，请以低于 0.03C 的电流对电池进行预充电，电池容量没恢复之前不要使用该电池

8. Battery operation instruction 电池操作说明

8.1 charging 充电

8.1.1 Charging current: Cannot surpass the biggest charging current which in this specification book stipulated

充电电流：不能超过规格书规定的最大的充电电流

8.1.2 Charging voltage: Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

充电电压：不能超过规格书规定的最高的限制电压

8.1.3 Charge temperature: The battery must carry on the charge in the ambient temperature scope which this specification book stipulated.

充电温度：电池充电温度必须按照规格书的温度范围执行

8.1.4 Uses the constant electric current and the constant voltage way charge, the prohibition reverse charges. If the battery positive electrode and the cathode meet instead, can damage the battery.

先恒流后恒压方式充电，禁止颠倒的方式充电。如果电池正负极颠倒充电会带来危险

8.2 Discharging 放电



8.2.1 The discharging current does not have to surpass this specification book stipulation the biggest discharging current, the oversized electric current electric discharge can cause the battery capacity play to reduce and to cause the battery heat.

电池放电电流不能超过规格书规定的最大放电电流，过大的电流放电会造成电池发热和容量衰减

8.2.2 discharge temperature 放电温度

The battery discharge must carry on in the ambient temperature scope which this specification book stipulated

电池放电温度必须按照规格书的温度范围执行

8.2.3 Over-discharges 过放电

After the short time excessively discharges charges immediately cannot affect the use, but the long time excessively discharges can cause the battery the performance, battery function losing. The battery long-term has not used, has the possibility to be able to be at because of its automatic flashover characteristic certain excessively discharges the condition, for prevented excessively discharges the occurrence, the battery should maintain the certain electric quantity.

短时间的的过充过放不影响电池的使用，但是长时间的过放电会影响到电池的功能失效，电池永久性不能适用，电池可能过放还有一个原因是自动能量的消失。预防电池过放的出现方法是电池应保持一定的电量

9. Quality Guarantee Period 保质期

The warranty period is 500 times or 24 months from the date of delivery. If the damage caused by improper use is not caused by product quality problems, the manufacturer will not provide free services even within the warrantyperiod.

保修期自出厂之日起使用寿命 500 次或 24 个月。如因使用不当造成损坏，不是由产品质量问题造成的，即使在保修期内，生产厂家也不提供免费服务。

10. Other The Chemical Reaction 其它化学反应

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.

由于电池是利用化学反应的原理，所以随时间的增加电池的性能会降低，即使是存放很长一段时间而不使用。如果使用条件如充电、放电及周围环境温度等情形不在指定的使用范围内，也会缩短电池的使用寿命，或者产生漏液导致设备损坏。如果电池长周期不能充电，即使充电方法正确，这样需要更换电池了

11 . Others 其它事项

11.1 The customer is requested to contact LN advance, if the customer needs other applications oroperating conditions out of those described in this document. Additional experimentation may be required toverify performance and safety under such conditions.

客户若需要将电池应用于本文件规定以外的使用条件下，应事先联系雷能，因为需要进行特定的实验测试以验证电池在该使用条件下的性能及安全性。



11.2 LN will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

对于在超出文件规定以外的条件下使用电池而造成的任何意外事故，雷能概不负责。

11.3 LN will inform the customer in a written form regarding proper use and handing of the cell, if it is necessary.

如有必要，雷能会以书面形式告之客户有关正确操作使用电池的改进措施。

11.4 Use of the information described herein for other purposes and/or reproduction or copying without the express permission of LN is strictly prohibited.

本文件内容未经本公司许可，严禁以其它目的的转载或复制等。

11.5 Any matters not mentioned in this specification shall be determined by the the customer and LN
任何本说明书中未提及的事项，须经双方协商确定。

12. Note 备注

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

其他项目不包括在本规范应经双方同意。