

规格书编号 File No.: Q/RD JS02-0001-2021

版本号 Ver.: A5.0

锂电池组

Lithium Battery Pack

规格书 SPECIFICATION

型号 Model	RD-12-09-SA
规格 Type	9Ah/12V
草拟 Prepared	
审核 Checked	
批准 Approved	

客户确认 Customer Confirmation	
审核 Checked/Date	批准 Approved/Date

深圳市玛维欧科技有限公司

Shenzhen Maweiou Technology CO.,LTD.

History of Version

版本变更履历表

版本号 Ver.	变更日期 Date	更改内容 Description	编制 Prepared By
A1.0	2021.06.29	新制定 First issue	林义游
A2.0	2021.07.05	增加电芯 K 值描述 Add the cells K value	林义游
A3.0	2021.07.22	<p>3.1 变更容量由 9Ah±5%为≥9Ah</p> <p>3.1 The change capacity is determined from 9Ah ± of 5% to ≥ 9Ah</p> <p>3.1 增加电池端子型号描述为 F2</p> <p>3.1 Add the battery terminal model as described as F2</p> <p>7.1 变更长期保存湿度由 45%-75%RH 变更为 10%-90%RH</p> <p>7.1 Change the long-term storage humidity from 45% -75%RH to 10% -90%RH</p> <p>7.1 增加要存储 14 个月，电池要在充满点后再进行搁置并与设备断开的要求</p> <p>7.1 Storage requirement for 14 months and the battery is shelved and disconnected from the device after a full point</p>	林义游
A4.0	2021.07.27	<p>3.1.3 Charge current - 10% -90%RH non condensing</p> <p>3.1.5 Discharge current - 10% -90%RH non condensing</p> <p>7.1 Change the long-term storage humidity 10% -90%RH non condensing and up to 45°C</p>	林义游
A5.0	2021.08.26	<p>Add the 15A Fuse in BMS,保护板增加 15A 保险丝</p> <p>Change the BMS Over Discharge current detection delay time。变更放电过流二级保护延时。</p>	林义游

1 前言 Preface

本标准规定了由福建华祥电源科技有限公司生产的可充电锂离子电池组的技术要求、测试方法和注意事项。

This Product Specification describes the technique requirements, test procedures and precaution notes of Lithium-ion Rechargeable cell by Fujian Huaxiang Power Technology CO.,LTD.

如果由于错误使用（规格书中没有规定）导致意外与损失，供应商免责。

It is claimed that we are free of any responsibility with the contingency and loss due to the cells' wrong usage (not preferred in the product specification)

2 产品描述 Description

2.1 产品：锂动力电池组及控制电路

Product: Lithium Battery Pack and its PCM

2.2 型号：HZF-12-09-SA

Model: HZF-12-09-SA

2.3 类别：磷酸铁锂 9Ah/12V 2P4S

Type: LiFePO₄ 9Ah/12V 2P4S

3 产品规格 Specification

3.1 电池主要参数 General

No	条目 Item	规格 Specifications	备注 Remark
1	标称容量 Nominal Capacity	≥9Ah	25℃放电 0.2C ₅ A discharge at 25℃ K 值低于 0.025mV/Hr 或 0.6 mV / D, @5%SOC/Ce l l s
2	标称电压 Nominal Voltage	12.8V	开路电压 OCV
3	充电电流 Charge Current	标准充电：1.8A，最大 4.5A Standard: 1.8A; Max: 4.5A	工作温度：0~45℃ Working temperature:0~45℃ 10 to 90%RH non condensing
4	充电截止电压 Charge cut-off Voltage	14.6V	恒压充电电压/CC/CV
5	放电电流 Discharge Current	标准：4.5A，最大 9A Standard: 4.5A ; Max: 9A	工作温度：-20~60℃ Working temperature:-20~60℃ 10 to 90%RH non condensing
6	放电截止电压 Discharge cut-off Voltage	10.0V	循环寿命，低温-10℃放电除外 Not including cycle life,-10℃ discharge
7	电池组电压 Pack Voltage	12.8V~13.2V	出货电压范围 Shipment status
8	电池组内阻 Pack Impedance	< 100mΩ	25℃时 50%荷电态 50% SOC at 25℃
9	电池组重量 Weight	约 1.0kg Approx:1.0kg	ABS Case

10	外形尺寸 Dimension	65×151×94mm (Not included Terminal)	大致数据 Approx
11	端子型号 Terminals type	F2	

3.2 电池主要性能 General Performance

标准充电方式 Standard charge:

电池组必须用专用充电器进行充电，1.8A 恒流恒压方式充电到 14.6V。

Charge battery pack with specific charger, 1.8A constant Current/constant voltage to 14.6V.

充电环境温度 Environment temperature: 23±2℃

相对湿度 Relative Humidity: 65±20%RH

大气压力 Pressure: 86kPa~106kPa。

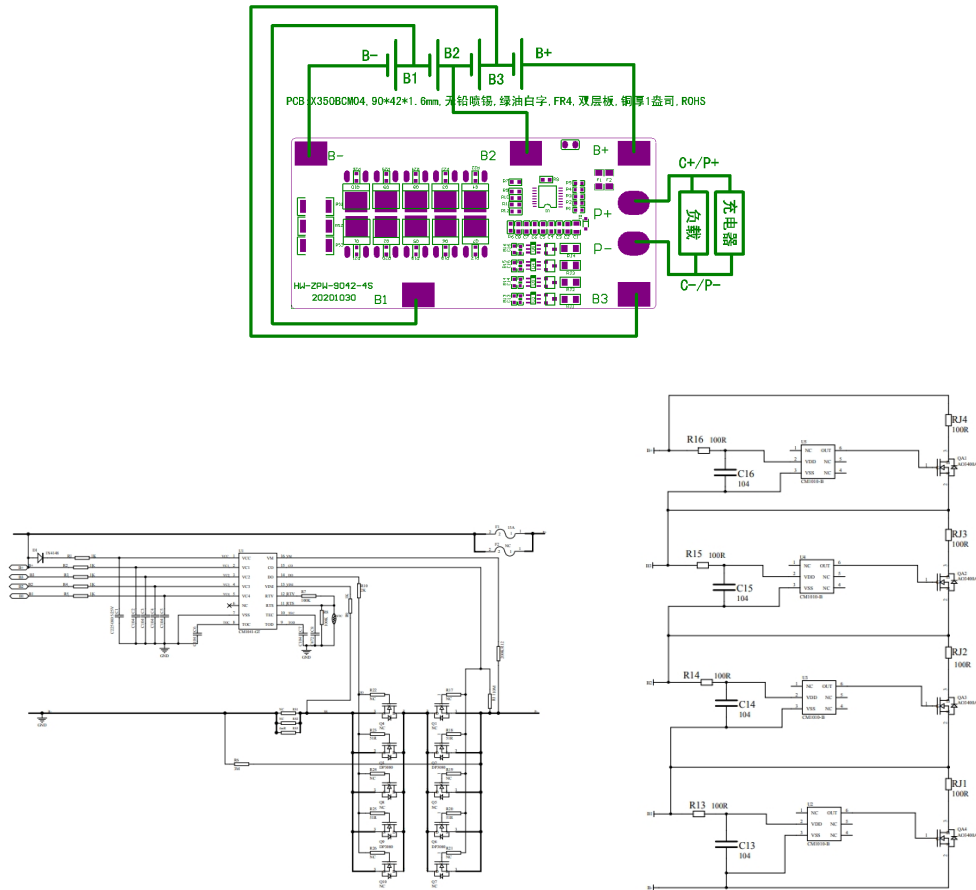
项目 Item		测试方法 Test Methods	指标 Performance
1	0.2C 容量 0.2C Capacity	标准充电后,静置0.5小时,然后以0.2 C ₅ A 放电到10.0V 的放电时间。 After standard charging, laying the battery 0.5h, then discharging at 0.2C ₅ A to voltage 10.0V, recording the discharging time.	≥300min
2	-10℃ 容量 -10℃ Capacity	标准充电后,在-10℃环境中静置4小时以上,然后以0.2 C ₅ A 放电到10.0V 的放电时间。 After standard charging, laying the battery in -10℃ more than 4h, then discharging at 0.2C ₅ A to voltage 10.0V recording the discharging time.	≥180min
3	循环寿命 Cycle Life	1.8A 恒流充电到14.6V,恒压截止电流为0.02C ₅ A;静置30分钟,用1.8A 放电到10.0V,静置30分钟后,再重复上述步骤,直至连续两次放电低于额定容量60%,记录电池充放电次数。 Constant current 1.8A charge to 14.6V, then constant voltage charge to current declines to 0.02C ₅ A, rest 30min, constant current 1.8A discharge to 10.0V, rest 30min. Repeat above steps till continuously discharging capacity less than 60% of the rated capacity.	≥2000times
4	荷电保持能力 Charged Storage Characteristics	After the full charging, storage the cells in a temperature of 25℃ for 28 days, then measure the capacity with discharge current of 0.2C till 10.0V. 满充电后在25℃下储存28天,检测0.2C 放电至10.0V 的容量。	Capacity ≥ 95% Initial capacity (cell 电芯)

4.1 保护板参数（单只电池控制） PCM Data for Single cell

测试项目 Test Item	最小值 Min	典型值 TYP	最大值 Max	单位 Unit	备注 Remark
输入电压（B+与 B-间） Input voltage(B+ to B-)		12.8		V	
过充保护电压 Over charge detection voltage	3.60	3.65	3.70	V	
过充保护恢复电压 Over charge release voltage	3.50	3.56	3.61	V	
过放保护电压 Over discharge detection voltage	2.22	2.32	2.42	V	
过放保护恢复电压 Over discharge release voltage	2.48	2.58	2.68	V	
放电过流 1 级保护电流 Level 1 Over current detection curren	20	25	30	A	
放电过流 1 级保护延迟时间 Level 1 Over Discharge current detection delay	25	47	70	ms	
放电过流 2 级保护电流 Level 2 Over current detection curren	20	25	30	A	
放电过流 2 级保护延迟时间 Level 2 Over Discharge current detection delay	2.5	4.7	7	ms	
充电过流保护 Overcharge current	20	25	30	A	
过充保护延迟时间 Over charge detecion delay	500	1000	1700	ms	
过放保护延迟时间 Over discharge release delay	500	1000	1500	ms	
充电过流保护延迟时间 Over charge current detection delay	6	12	24	ms	
短路保护延迟时间 Short delay	100	300	600	us	
正常状态下静态电流 Current consumption (Operation)	/	20	50	uA	
空载内阻 Load resistance	/	20	40	mΩ	
最大工作温度范围 Max operating temperature range	-40	/	85	℃	
建议最大持续充/放电电流 max continuous charge/discharge current	/	/	10	A	

均衡电压 Voltage Balance	3.55	3.60	3.65	V	
均衡电流 Voltage current	26	36	46	mA	
保险丝 Fuse	15A				

4.2 保护板原理图 Protection board principle diagram



5 安全性能测试 Safety Performance Testing

序号 No.	项目 Items	测试条件 Testing condition	标准 Criteria
1	过充电测试 Overcharge testing	标准充电后，恒流恒压源设定为 14.6V*1.5 以 4.5A 的电流持续充电 24h 或者当电池温度下降一峰值低约 20°C时,停止实验。 Battery charged at 5A current with a voltage limit of 14.6V.charging is continued for 24hours.or Stop test till cells temperature 20°C lower than max temperature.	不起火,不爆炸,不冒烟或漏液 No fire, no explode, no smoke or no leakage

2	过放电测试 Over discharge testing	<p>在 $25 \pm 3^{\circ}\text{C}$ 状态下, 按标准 0.2C 放电的要求放电至终止电压后, 外接 30Ω 负载放电 24 小时.</p> <p>At $25 \pm 3^{\circ}\text{C}$, According to the requirements of standard discharge 0.5C, the cells will be discharge to cut-off voltage, then connect with external load of 30 ohm for 24 hours.</p>	<p>不起火, 不爆炸, 不冒烟</p> <p>No fire, no explode, no smoke</p>
3	放电过流测试 Over discharge Current testing	<p>在 $25 \pm 3^{\circ}\text{C}$ 状态下, 按标准方式充电, 用 1.5 倍放电过流保护值, 放电至保护电路动作</p>	<p>不起火, 不爆炸, 不冒烟</p> <p>No fire, no explode, no smoke</p>

6 环境性能测试 Environment Performance Testing

序号 No.	项目 Items	测试条件 Testing condition	标准 Criteria
1	低温放电 Discharge at low temperature	<p>标准充电后, 在 $-10 \pm 2^{\circ}\text{C}$ 条件下贮存 16-24h, 然后用 0.2C 放电至 9.28V, 所记录放电时间. After standard charging, rest the cells for 16h at $-10 \pm 2^{\circ}\text{C}$, then discharging at 0.2C to voltage 10.0V, recording the discharging time.</p>	$\geq 180\text{min}$
2	高温放电 Discharge at high temperature	<p>标准充电后, 在 $55 \pm 2^{\circ}\text{C}$ 条件下贮存 4h, 然后用 0.2C 放电至 9.28V, 所记录放电时间. After standard charging, rest the cells 4h at $55 \pm 2^{\circ}\text{C}$, then discharging at 0.375C to voltage 10.0V, recording the discharging time.</p>	<p>$\geq 100\text{min}$</p> <p>电芯外观无变形, 无爆裂.</p> <p>No distortion, No rupture.</p>
3	振动测试 Vibration test	<p>电池在振幅为 0.8 mm (1.6mm) 的简谐振动, 振动频率为: 10~55 Hz, 扫频速率为: 1 Hz/min, X、Y、Z 三个方向各振动一次, 振动时间为 30min.</p> <p>Let the battery subjected simple harmonic motion with an amplitude of 0.8 mm (1.6mm) total maximum excursion]. The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz, The battery is to be tested for 30 min in each mutually perpendicular directions.</p>	<p>不爆炸、不起火</p> <p>No Explosion, No Fire</p>
4	温度循环测试 Temperature Cycling Test	<p>$70 \pm 3^{\circ}\text{C}$ 条件下搁置 4 小时; 在 $20 \pm 3^{\circ}\text{C}$ 条件下搁置 2 小时; 在 $-10 \pm 3^{\circ}\text{C}$ 条件下搁置 4 小时; 在 $20 \pm 3^{\circ}\text{C}$ 条件下搁置 2 小时; 按以上的步骤循环 10 次, 并且每次温度变换时间不得超过 30min。</p> <p>$70 \pm 3^{\circ}\text{C}$ maintaining for 4 hours. $20 \pm 3^{\circ}\text{C}$ maintaining for 2 hours. $-10 \pm 3^{\circ}\text{C}$ maintaining this temperature for 4 hours. $20 \pm 3^{\circ}\text{C}$ for 2 hours. Repeating the sequence for a further 9 cycles. And the temperature change should be finished within 30 min</p>	<p>不着火、不爆炸; 不漏气、不漏液</p> <p>No Explosion, No Fire and Not vent or leak</p>

5	Short test 短路测试	The fully charged battery is to be short-circuited by connecting the positive and negative terminals of the battery with resistance load not exceed 100mΩ. Tests are to be conducted at room temperature about 25±2℃. 在室温约为 25±5℃把充满电的电池的正负极用不超过 80mΩ 的负载连接起来, 连接起来使电池外部短路	No explosion, No fire 不爆炸, 不起火
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7. 贮存及其它事项 Storage and Others

7.1 长期贮存 Long Time Storage

长期贮存的电池 (超过 3 个月) 须置于干燥、凉爽处。贮存电压为 13.3V-14.6V。 储存温度 (-10 - 45℃) 和湿度 (10%-90%RH) 电池内部应不产生冷凝现象。

If stored for a long time (exceed three months), the cell should be stored in drying and cooling place.

The cell' s storage voltage should be between 13.3V-14.6V. Storage temperature (-10 - 45℃) and moisture (10%-90%RH) non condensing.

长期贮存的电池 (14 个月) 电池的贮存电压需保持在 13.3V-14.6V, 若要搁置 14 个月, 必须将电池充满电后立即与设备断开连接, 14 个月后, 电池充电后可以继续使用。

If stored for a long time (14 months), the initial condition of the voltage needs to be between 13.3V-14.6V.

If you want to storage it for 14 months, it is recommended the battery be disconnected from the device immediately after it is fully charged. After 14 months, the battery can continue to be used after it is charged.

7.2 其它事项 Others

任何本说明书中未提及的事项, 须经双方协商确定

Any matters that this specification does not cover should be conferred between the customer and Fujian Huazhen.

7.3 产品运输 Product Transportation

电池在运输中为半电状态, 应避免剧烈震动、挤压、日晒及浸湿。

During transportation the battery is approximately at a state of 50% charged, the battery should avoid from acute vibration, crushed, solarization, soaked.

7.4 保质期限 Warranty

保质期自出厂日期(喷码)开始起 2 年。如果证明电池的缺陷是在制造过程中形成的而不是由于用户滥用及错误使用造成，本公司负责退换电池。

The period of warranty is two year from the date of shipment. guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customers abuse and misuse.

附录 Appendix

锂离子充电电池操作指示及注意事项 Handling Precautions and Guideline

前言 Preface

为了使电池安全的使用及处理请在使用前认真的阅读操作说明

To ensure proper use of the battery please read the manual carefully before using it. Handling

声明一：客户若需要将电池用于超出文件规定以外的设备，或在文件规定以外的使用条件下使用电池，应事先联系华振公司，因为需要进行特定的实验测试以核实电池在该使用条件下的性能及安全性。

Note(1):If the battery is used to other equipment , or used condition is not accord to the condition in this Specification they should contact With Huazhen new energy technology in advance, Additional experimentation may be required to verify the performance and safety under the conditions.

声明二： 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华振公司概不负责

Note(2): Huazhen new energy technology will take no responsibility for any accident when the battery is used under other conditions beyond those described in this Document.

声明三： 如有必要，华振公司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。

Note(3): Huazhen new energy technology will inform the customer of improvements regarding proper use and handing of the battery in a written form, if it is necessary.

1.充电 Charging

1.1 充电电流 Charging current

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芯的充放电性能、机械性能和安全性能的问题，并可能会导致发热或泄漏。

Charging current should be less than maximum charge current specified in the Product Specification. Charging with higher current than recommended value may cause damage to cell electrical, mechanical, and safety performance and could lead to heat generation or leakage.

1.2 充电电压 Charging voltage

充电电压不得超过本规格书中规定的额定电压。充电器的设计应满足此条件。电池电压高于额定电压值时，将可能引起电芯的充放电性能、机械性能和安全性能的问题，可能会导致发热或泄漏。

Charging shall be done by voltage less than that specified in the Product Specification . which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with this condition. It is very dangerous that charging with higher voltage than maximum voltage may cause damage to the cell electrical, mechanical safety performance and could lead to heat generation or leakage.

1.3 充电温度 Charging temperature

电池必须在 0°C~45°C 的环境温度范围内进行充电。

The cell shall be charged within 0°C~45°C range in the Product Specification.

1.4 禁止反向充电 Prohibition of reverse charging

正确连接电池的正负极，严禁反向充电。若电池正负极接反，将无法对电芯进行充电。同时，反向充电会降低电芯的充放电性能、安全性，并会导致发热、泄漏。

Reverse charging is prohibited. The cell shall be connected correctly. The polarity has to be confirmed before wiring. In case of the cell is connected improperly, the cell cannot be charged. Simultaneously, the reverse charging may cause damaging to the cell which may lead to degradation of cell performance and damage the cell safety, and could cause heat generation or leakage.

2. 放电 Discharging

2.1 放电电流 Discharging current

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芯容量剧减并导致过热。

The cell 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.

2.2 放电温度 Discharging temperature

电池必须在-20°C~60°C的环境温度范围内进行放电。

The cell shall be discharged within -20°C~60°C range specified in the Product Specification.

2.3 过放电 Over-discharging

需要注意的是，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，电池应定期充电，将其电压维持在 12.8V 至 14.6V 之间。

It should be noted that the cell would be at an over-discharged state by its self-discharge characteristics in case the cell is not used for long time. In order to prevent over-discharging, the cell shall be charged periodically to maintain between 12.8V and 14.6V.

过放电会导致电芯性能、电池功能的丧失。

Over-discharging may causes loss of cell performance, characteristics, or battery functions.

3.电池的注意事项 Handling Instructions

认真阅读下面的注意事项，确保正确使用锂离子电池，福建华振新能源科技对违反下述注意事项而产生的任何问题不予负责。

Read and observe the following warnings and precautions to ensure correct and safe use of Li-ion batteries.

危险!

Danger!

安全警示及使用说明 Caution and Guideline

使用前应先阅读产品规格书以及安全警示，确保正确使用电池并确保电池使用过程中的安全。

Before using battery, please read specification and safety caution, insure proper application and safety.

安全警示 Caution

下面的操作可能导致电池泄漏，发热甚至燃烧：

Failing in following items can cause leakage, heat even fire:

禁止反向充电!

Prohibition of reverse charge of battery.

禁止过充电!

Prohibition of over charge of battery.

禁止过放电!

Prohibition of over discharge of battery.

禁止正负极短路!

Prohibition of short circuit of positive and negative of battery.

请使用指定的充电器充电!

Please charge by specified charger.

不要将电池直接连接在交流电源上!

Do not direct-connected the battery to alternating current power supply,

请不要撞击, 敲打, 钉刺或拆卸电池!

Don' t knock, beat, nail or disassemble battery.

请保持电芯远离热源, 禁止将电芯扔入火中!

Please keep away from fire or other heating sources and prohibition of dumping of battery into fire.

不要将电池放入微波炉,压力柜子和高温消毒柜里!

Do not put battery in microwave ovens or pressure cabinets、 High-temperature disinfectio cabinet.

不得将电池浸泡于液体中, 如淡水、海水、饮料等!

The battery should never be soaked in liquids such as freshwater, seawater and drinks.

禁止使用已损坏的电池!

Prohibit to use damaged battery

使用说明 Guideline

电池内有安全装置,为了保证其固有的安全功能,请不要将电池分解开或改变任何的部份。

As installed safety device in the battery, please do not resolve or change any other sections of the battery to protect the inherent safety functions;

请不要在规定的范围外使用或储存电池, 否则将削弱电池的性能, 缩短电池的寿命, 甚至导致电池发热, 起火或爆炸!

Don' t use or storage battery under the circumstance beyond specified, unless will weaken battery

performance and shorten battery life-span, even will cause heating, fire or explosion.

不要将电池与其它化学电池(像干电池)或不同容量、牌子的电池合用。

Do not use the battery with some chemical batteries (like dry battery) or different capacities and brands battery together,

若电发出气味、发热、变色、变形或者在使用充电、存储过程中,出现任何的不正常请立即从装置或充电器取出,停止使用。

If the battery emits the smell, heat , changes color, be out of shape or appears any other abnormal phenomena during the charging or stored procedures, please get out the battery from the device or charger and stop using;

使用前请确保电池在质量保证期内。

Please insure battery in quality guarantee duration before using.

请不要使电池的封口边缘与金属直接接触。

Please don't make the battery side edge of direct contact with the metal.

不要将电池放于高温处(如阳光直射或热天下汽车里)否则,会过热着火,性能降低和寿命缩短。

Do not put the battery under the high temperature places (like sunshine irradiation or car in the hot weather), or it will catch fire for the heat, reduce the performance and loss the life;

为确保安全,电池应安装安全装置,在静电强于制造时所要求的静电时请勿使用,否则,安全装置会失效,导致电池过热、破裂、爆炸及着火。

To insure the safety, the battery should install the safety device, please not use when the static electricity is more than we need when produce, or the safety device will lose efficacy and lead the overheating ,fracture, exploding and catching fire;

为了不装错或损耗电池,请认真阅读使用说明书进行安装与拆卸(从装置上)。

To insure not install the battery wrong or wastage of the battery, please read the instruction carefully

to install and dismounting;

若电池长时间不用时,请把电池从设备中拿出并存放于干燥阴凉的地方。

If the battery will not be used for a long time ,please take out of the battery from the device and store in dry and shady places.

若电池接触面有污迹,请在使用之前用干布擦干净,否则将导致与装置接触不良。

If there are splurge on the surface of the battery, please wipe up clean before using, or it will lead bad contact with the device.

若电池漏液,电解质粘于皮肤或衣服上,用水冲洗掉或用流水洗衣服。

If the batteries weep, the electrolytes stick on the skin or cloth, use the water to wash or running water to wash.

如果电解液接触到皮肤或眼睛,切勿揉眼睛,请立刻用清水冲洗接触的区域并寻求医生的建议!

If electrolyte comes into contact with the skin or eyes where shall flush the electrolyte immediately with fresh water and physicians' advice is to be sought.

电池放于小孩不能触摸的地方,若小孩咽下电池,请立即就医。

Put the battery to where the kids can not touch, if the kids swallow the battery, please Seeing the doctor soon;

其它化学反应 Other The Chemical Reaction

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, 这样也需要更换电池了。

备注 Remarks

若发现此规格书有任何问题，需经双方同意后方可修改。

If any matters concerning the specifications of the battery, it must be mutually agreed before any revision of the specifications are made.

本规格书未尽事宜应由双方协议确定。

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

产品外形/Product appearance

