

文件编号:

版本: A0

锂离子圆柱电池规格书**Li-ion Rechargeable Cylindrical battery specification**

型号规格 Model SPEC	INR14500AA1000
标称容量 Nominal Capacity	1000mAh
客户 Customer	

编制 Registered	审核 Checked	质量确认 QA	批准 Approved

客户确认 Customer Approved
公司全称: Company Name:
签名: Signature:
部门: Department:
公司印章: Company Stamp:

变更履历表

Modified List

版本 Revision	日期 Date	变更内容 Modified content	批准 Approve
A/0	2024-05-06	新版发行 New Release	曹汉标

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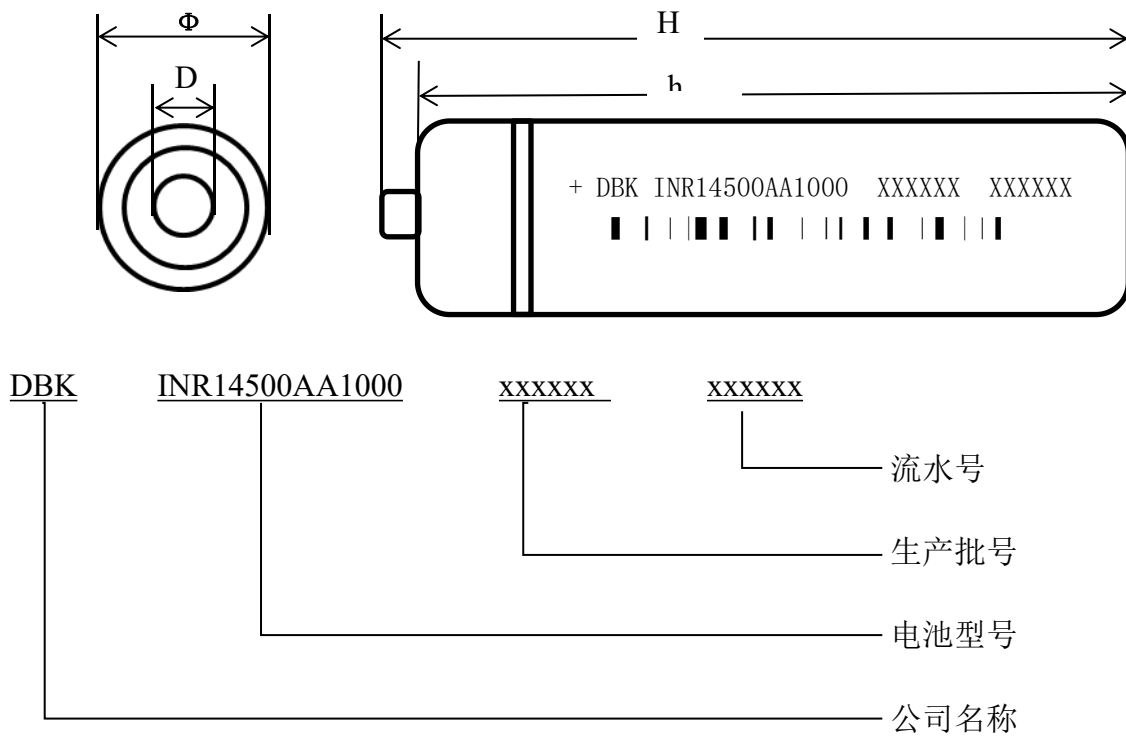
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1. 适用范围 Scope

本标准描述了圆柱锂离子电池的基本性能、技术要求、测试方法及注意事项。本标准只适用于江西迪比科股份有限公司所生产的圆柱电池。参照 GB31241-2022,GB/T18287-2013。

This specification describes the basic performance, technical requirement, testing method, warning and caution of the Li-ion rechargeable cylindrical battery. The specification only applies to JIANGXI DBK CO., LTD. Reference GB31241-2022,GB/T18287-2013.

2. 电芯尺寸图 Drawing of Cell



项目 Item	描述 Description	规格要求 Specification requirements
Φ	电芯直径 Diameter of Cell	$14.0 \pm 0.2\text{mm}$
D	正极柱直径 Diameter of Positive column	$3.9 \pm 0.1\text{mm}$
H	电池高度 Height of Cell	$50.0 \pm 0.3\text{mm}$
h	主体高度 Body Height	$48.5 \pm 0.3\text{mm}$
喷码内容 Identification Code		+ DBK INR14500AA1000 XXXXXX XXXXXX -

3. 电池主要技术规格 Technical Specification

序号 NO.	项目 Item	规格 Specifications	
3.1	标称容量 Nominal Capacity	3600mWh	4.8V恒压充电至截止电流 48mA, 480mA 放电至 1.0V
3.2	最小容量 Minimum Capacity	3060mWh	CV at 4.8V ,end current 40mA and 480mA discharge to 1.0V cut-off
3.3	充电 Charge	输入电压 Input voltage	5.0±0.3V (正极 V+, 负极 B-)
		充电电流 Input current	350±20mA
3.4	放电 Discharge	输出电压 Output voltage	1.48-1.65 V (正极 V+, 负极 B-)
		输出电流 Output current	2A (MAX)
3.5	欠压保护 Under-Voltage protection	2.7-2.8V	

4. 电芯主要技术参数 Technical Specification

序号 NO.	项目 Item	规格 Specifications	
4.1	标称容量 Nominal Capacity	1000.0mAh	0.5C 充电, 0.2C 放电至终止电压 2.75V
4.2	最小容量 Minimum Capacity	970mAh	0.5C charge and 0.5C discharge to 2.75V cut-off
4.3	标称电压 Nominal Voltage	3.60V	
	出货电压 Shipment Voltage	3.70-3.90V	
4.4	标准充电方式 Standard Charging Method	23±2℃ 0.5C 恒流恒压充电至 4.20V, 截止电流 0.02C 23±2℃ 0.5C CC/CV to 4.20V ,end current 0.02C	
4.5	充电电流 Charge Current	标准充电:0.5C Standard charge: 0.5C	
		快速充电:1C Rapid charge:1C	
4.6	充电时间 Charge Time	标准充电: 180min Standard Charge: 180min	
		快速充电: 120min Rapid Charge:120min	
4.7	充电截止电压 Charge Cut off Voltage	4.20V	
4.8	放电截止电压 Discharge Cut off Voltage	2.75V	
4.9	标准放电 Standard Discharge	0.2C 恒流放电至 2.75V 0.2C Constant Current Discharge to 2.75V	
4.10	最大连续放电电流 Max. Discharge Current	3.0C	

序号 NO.	项目 Item	规格 Specifications	
4.11	最大瞬间放电电流 Max. Pulse Discharge	5.0C (≤4S)	
4.12	内阻 Internal Impedance	≤75 mΩ	标准充电后 AC 1KHz 测试 AC 1KHz after standard charge
4.13	体积能量密度 Volume Energy Density	480wh/L	

5. 安全规格 Safety Specification

序号 NO.	项目 Item	规格 Specifications	
5.1	工作温度 Operating Temperature	充电 Charge	0~45℃
		放电 Discharge	-20℃~55℃
5.2	运输贮存条件 Storage & Transportation Condition	-20℃~50℃	小于一个月 Less than 1 month
		-20℃~40℃	小于三个月 Less than 3 months
		-20℃~25℃	小于一年 Less than 1 year
		湿度 Humidity	MAX.90%RH
		推荐存储: 20℃±10℃, 50%电量, 电池每六个月循环充放电一次。 Recommended Storage Condition: 20℃±10℃, 50%SOC, cells should cycle once in six months.	

6. 电池外观及测试 Appearance And Measurement

6.1 外观 Appearance

电池外表面清洁, 无电解液泄漏, 无明显的划痕及机械损伤, 无锈蚀, 无影响电池价值的其它外观缺陷。
 There shall be no such defect as leakage, deep scratch, crack, rust, which may adversely affect commercial value of the cell.

6.2 测试设备要求 Test Equipment Requirements

(1) 尺寸测量设备 Dimension Measuring Instrument

测量仪器, 仪表准确度应满足以下要求

The accuracy of measuring instruments and instruments should meet the following requirements

电压测量装置: ±0.5% Voltage measuring device: ±0.5%

电流测量装置: ±0.5% Current measuring device: ±0.5%

温度测量装置: ±0.5℃ Temperature measuring device: ±0.5℃

时间测量装置: ±0.1% Time measuring device: ±0.1%

容量测量装置: ±1% Capacity measuring device: ±1%

尺寸测量装置: ±0.1% Size measuring device: ±0.1%

质量测量装置: ±0.1% Quality measurement device: ±0.1%

(2) 内阻测试仪 Impedance Meter

内阻测试仪测试方法为交流阻抗法 (AC 1kHz LCR) .

The internal resistance tester is AC impedance method (AC 1kHz LCR)

6.3 标准测试条件 Standard Test Condition

测试电池必须是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，除非其它特殊要求。本产品规格书规定的测试环境条件为：温度 $23\pm 2^{\circ}\text{C}$ ，相对湿度 $45\%\sim 85\%$ ，大气压： $86\sim 106\text{KPa}$ 。

Test should be conducted with new batteries within one month after shipment from our factory and the cells shall not be cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under temperature of $23\pm 2^{\circ}\text{C}$ and relative humidity of $45\%\sim 85\%$, Atmospheric pressure: $86\sim 106\text{KPa}$.

7. 电性能 Electrochemical Performance

序号 NO.	项目 Item	测试方法和条件 Test Method and Condition	标准 Criteria
7.1	0.2C 容量 0.2C Capacity	电芯标准充电后,搁置 30 分钟,用 0.2C 电流放电至 2.75V,记录放电容量。 After standard charging, rest cell for 30min, then discharge at 0.2C to 2.75V, record the discharge capacity.	放电容量 $\geq 970\text{mAh}$ Discharge Capacity $\geq 970\text{mAh}$
7.2	循环寿命 Cycle Life	电芯先用 0.5C 恒流充电至 4.20V, 再恒压 4.20V 充电,直至充电电流 $\leq 0.02\text{C}$, 搁置 10 分钟,再用 0.5C 电流放电至 2.75V; 再搁置 10 分钟, 重复以上步骤。 Constant current 0.5C charge to 4.20V, then constant voltage charge to cutoff current of 0.02C, rest for 30min, constant current 0.5C discharge to 2.75V, rest for 30min. Repeat the above steps.	400times (次) 容量保持率 $\geq 60\%$ Remaining Capacity $\geq 60\%$
7.3	高低温放电 Discharge at high and low temperature	标准充电后, 电池分别在 $-10\pm 2^{\circ}\text{C}$ 、 $0\pm 2^{\circ}\text{C}$ 、 $55\pm 2^{\circ}\text{C}$ 条件下搁置 4h 且在此温度下以 0.5C 电流放电至 2.75V,记录放电容量 After standard charging, battery storage under the condition of $-10\pm 2^{\circ}\text{C}$ 、 $0\pm 2^{\circ}\text{C}$ 、 $55\pm 2^{\circ}\text{C}$ for 4h and discharge the battery at 0.5C to 2.75V, recording the discharge capacity.	-10°C 容量保持 $\geq 60\%$ Remaining Capacity $\geq 60\%$ 0°C 容量保持 $\geq 80\%$ Remaining Capacity $\geq 80\%$ 55°C 容量保持 $\geq 95\%$ Remaining Capacity $\geq 95\%$

8. 贮存性能 Storage Performance

序号 NO.	项目 Item	测试方法和条件 Test Method and Condition	标准 Criteria
8.1	常温贮存 RT Storage Performance	标准充电后电池在 $20 \pm 5^{\circ}\text{C}$ 的环境中贮存 28 天, 测试 0.5C 放电容量 (保持容量)。 Standard charge and storage the cell at $20 \pm 5^{\circ}\text{C}$ for 28 days, after which measure the 0.5 C discharge capacity (remaining).	容量保持 $\geq 85\%$ Remaining Capacity $\geq 85\%$
		0.5C 循环 3 次, 测试恢复容量 (3 周循环的最大放电容量)。 0.5C cycle 3 times, measure the recovery capacity (the maximum discharge capacity of 3 cycles).	容量恢复 $\geq 90\%$ Remaining Capacity $\geq 90\%$
8.2	高温贮存 HT Storage Performance	标准充电后电池在 $55 \pm 2^{\circ}\text{C}$ 的环境中贮存 7 天, 测试 0.5C 放电容量 (保持容量)。 Standard charge and storage the cell at $55 \pm 2^{\circ}\text{C}$ for 7 days, after which measure the 0.5 C discharge capacity (remaining).	容量保持 $\geq 85\%$ Remaining Capacity $\geq 85\%$
		0.5C 循环 3 次, 测试恢复容量 (3 周循环的最大放电容量)。 0.5C cycle 3 times, measure the recovery capacity (the maximum discharge capacity of 3 cycles).	容量恢复 $\geq 90\%$ Recovery Capacity $\geq 90\%$

9. 环境适应性 Environmental Performance

序号 NO.	项目 Item	测试方法和条件 Test Method and Condition	标准 Criteria
9.1	恒定湿热 Constant temperature and humidity test	电芯标准充电后, 测试条件如下: 温度: $40 \pm 2^{\circ}\text{C}$ 相对湿度: 90~95%RH 放置时间: 48 小时 电芯取出在室温下放置 2 小时, 然后以 0.2C 电流放电至终止电压。 Standard charge the cell, put it under the test condition: Temperature: $40 \pm 2^{\circ}\text{C}$ Relative Humidity: 90~95%RH Storage Time: 48 hours, After which cool under room temperature for 2 hours, Then 0.2C discharged to cutoff voltage.	无变形、无锈蚀、无起火、无爆炸。 放电容量不低于初始容量的 60%。 No Distortion、No Rust、No Fire、No Explosion. Discharging capacity is not less than 60% initial capacity.

序号 NO.	Item 项目	测试方法和条件 Test methods and condition	标准 Criteria																													
9.2	低气压 Vacuum	电芯标准充电后，将其搁置在真空箱中。真空箱密闭后，逐渐减少其内部压力至不高于 11.6kPa 并保持 6h。 Standard charge the cell, after which store it in vacuum chamber below 11.6kPa for 6 hours.	不泄漏、不破裂、不起火、不爆炸。 No Leakage、No Fluid、No Fire、No Explosion.																													
9.3	振动测试 Vibration Test	电芯按标准充电后，固定在振动台上，然后按下表参数进行正弦振动测试。 <table><tr><th colspan="2">频率</th><th rowspan="2">振动参数</th><th rowspan="2">对数扫频循环时间 (7 Hz-200 Hz-7 Hz)</th><th rowspan="2">轴向</th><th rowspan="2">振动周期数</th></tr><tr><th>起始</th><th>至</th></tr><tr><td>$f_1=7$ Hz</td><td>f_2</td><td>$a_1=1 g_s$</td><td rowspan="4">15 min</td><td>X</td><td>12</td></tr><tr><td>f_2</td><td>f_3</td><td>$S=0.8$ mm</td><td>Y</td><td>12</td></tr><tr><td>f_3</td><td>$f_4=200$ Hz</td><td>$a_2=8 g_s$</td><td>Z</td><td>12</td></tr><tr><td colspan="3">返回至 $f_1=7$ Hz</td><td>总计</td><td>36</td></tr></table> f_1, f_4——下限、上限频率； f_2, f_3——交越点频率($f_2 \approx 17.62$ Hz, $f_3 \approx 49.84$ Hz)； a_1, a_2——加速度幅度； S——位移幅度。 注：振动参数是指位移或加速度的最大绝对数值，例如：位移量为 0.8 mm 对应的峰—峰值的位移量为 1.6 mm。 每个方向进行 12 个循环，每个方向循环时间共计 3h 的振动。电池按照三个相互垂直的方向进行振动试验。 Standard charge the cell, after which cell is firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face.	频率		振动参数	对数扫频循环时间 (7 Hz-200 Hz-7 Hz)	轴向	振动周期数	起始	至	$f_1=7$ Hz	f_2	$a_1=1 g_s$	15 min	X	12	f_2	f_3	$S=0.8$ mm	Y	12	f_3	$f_4=200$ Hz	$a_2=8 g_s$	Z	12	返回至 $f_1=7$ Hz			总计	36	不起火、不爆炸，不冒烟。 No Fire、No Explosion, No Smoking.
频率		振动参数	对数扫频循环时间 (7 Hz-200 Hz-7 Hz)	轴向					振动周期数																							
起始	至																															
$f_1=7$ Hz	f_2	$a_1=1 g_s$	15 min	X	12																											
f_2	f_3	$S=0.8$ mm		Y	12																											
f_3	$f_4=200$ Hz	$a_2=8 g_s$		Z	12																											
返回至 $f_1=7$ Hz				总计	36																											
9.4	跌落测试 Drop Test	Standard charge. Then let itself fall off from a height of 1m(the lowest height) to cement floor and then observe the variation of the battery’s appearance and temperature for 1 hrs. 电池标准充电后，测量电池的初始状态，将电池样品由高度（最低点高度）为 1m 的位置从 XYZ 三个方向自由跌落到水泥地面上。然后观察 1 小时	不起火、不爆炸。 No Fire、No Explosion,																													

10.安全性能 Safety Performance

序号 NO.	项目 Item	测试方法和条件 Test methods and condition	标准 Criteria
10.1	过充 Overcharge Test	将电池标准充电后，继续以 1C 恒流充电至 6.0V 并保持该电压进行恒压充电 1h。 Standard charge the cell, CC charge at 1C to 6.0V and maintain the voltage for 1 h.	不起火、不爆炸。 No Explosion、No Fire.
10.2	短路 Short-circuit Test	标准充电后，在 $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的环境下使用总内阻 $80 \pm 20\text{m}\Omega$ 的导线短路正负极，当电池温度下降到比峰值低约 20% 时，结束试验 Standard charge the cell, after which short-circuit the cell by connecting positive and negative terminal with $80 \pm 20\text{m}\Omega$ wire under the environment of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$, until the temperature drops to 20% lower than the maximum value.	不起火、不爆炸。 No Explosion, No Fire.
10.3	热冲击 Thermal Shock	电池放置于热箱中，温度以 $(5 \pm 2^{\circ}\text{C})$ 的速率升温至 $(130 \pm 2^{\circ}\text{C})$ 并保温 30 分钟。 Heat up cell in an oven with temperature ramp of $5^{\circ}\text{C} \pm 2^{\circ}\text{C} / \text{min}$, cutoff temperature of $130^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Maintain the temperature for 30 minutes.	不起火、不爆炸。 No Explosion, No Fire.
10.4	过放测试 Discharge Test	将电池充满电后，以 2A 电流恒流放电至保护电路动作。放电后静置 10 分钟，并继续充满电。 The battery is fully charged, CC discharge at 2A until the protection circuit reacts. Fully charge the battery after 10 minutes rest.	不起火、不爆炸。 No Explosion, No Fire.

备注：以上安全性能实验应在有保护措施的条件下进行。

Note: Test of safe performance above must be with protective equipment.

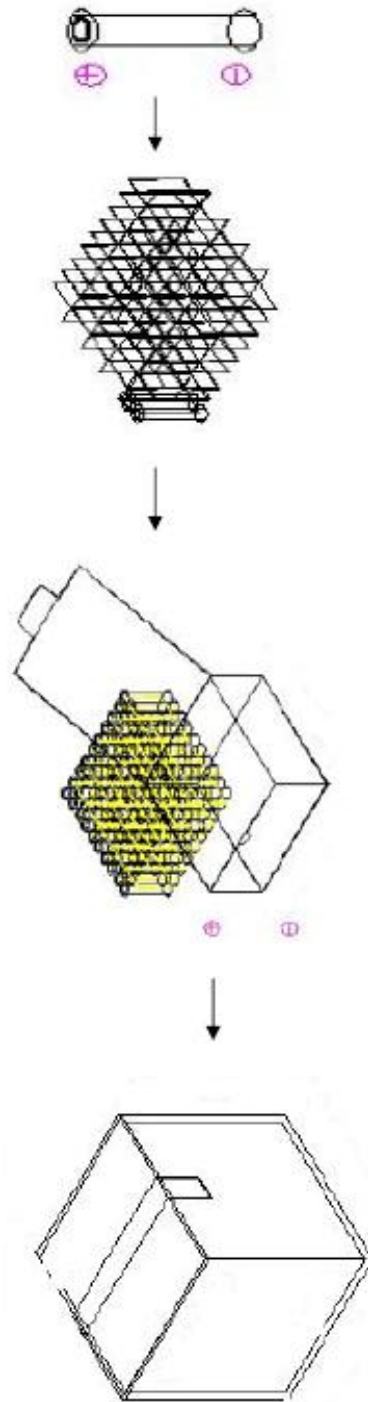
11.质量保证 Warranty

保质期从出厂开始 12 个月。在此期限内，如果非江西迪比科股份有限公司的制程原因而是客户的误用造成的电芯质量问题，江西迪比科股份有限公司不承诺免费更换。

The quality guarantee period is 12 months from the time leaving factory. even though the problem occurs within this period, we will not replace a new cell for free as long as the problem is not due to the failure of DBK manufacturing process or is due to customer's abuse or misuse.

- 江西迪比科股份有限公司对违反安全守则操作所产生的问题不承担任何责任。
DBK will not be responsible for trouble occurred by handling outside of the precautions in instructions .
- 江西迪比科股份有限公司对于电路、电池组、充电器搭配使用产生的问题不承担任何责任。
DBK will not be responsible for the trouble occurred by matching electric circuit ,cell pack and charger .
- 出货后客户在电芯组装过程中产生的不良电芯不在江西迪比科股份有限公司质量保证的范围之列。
DBK will be exempt from warrantee any defect cells during assembling after acceptance.
- 江西迪比科股份有限公司有权修改规格书并且会及时通知客户。
DBK have the right to modify this specification with notifying the clients

12. 包装图 Packing Drawing



13.警告及注意事项 Warning and cautions

为防止电池可能发生的泄露、发热、起火，请注意以下预防措施：

To prevent the possibility of the battery from leaking, heating, fire, please observe the following precautions:

- 严禁将电池浸入海水或水中。
Do not immerse the battery in fresh water or seawater.
- 禁止将电池在热高温源旁，如火、加热器等使用设备
Do not use and leave the battery near a heat source such as fire and heater.
- 禁止颠倒正负极使用电池
Do not reverse use the position and negative terminals.
- 严禁将电池直接接入电源插座
Do not connect the battery to an electrical outlet directly.
- 禁止用金属直接连接电池正负极短路，任何时候禁止短路电芯，它会使电芯受到严重损坏。
Do not short circuit the positive and negative terminal directly with metal objects such as wire, which is strictly prohibited under any circumstance, it may damage battery.
- 禁止将电池与金属，如发夹、项链等一起运输或储存。
Do not transport and store the battery together with metal objects such as necklaces, hairpins.
- 严禁敲击或抛掷，踩踏电池等。
Do not strike, throw or trample the battery.
- 禁止直接焊接电池或用钉子或其它利器刺穿电池
Do not directly solder the battery and pierce the battery with a nail or other sharp object.
- 禁止与不同型号的锂离子电池混合使用
Do not mix with others different lithium ion battery model.
- 禁止坠落、冲击电池
Do not drop, hit the battery.
- 电池外壳设计和包装禁止损伤电池
Battery case design and pack must not injury the battery.
- 任何情况不得拆卸电池
Battery disassemble is prohibited.
- 更换电芯应由电芯供应商或设备供应商完成，用户不得自行更换。
Battery replacement shall be conducted only by either battery supplier or device supplier. Unauthorized replacement by user is prohibited.
- 禁止在强静电和强磁场的地方使用，否则易损坏电池安全保护装置，带来不安全的隐患。
Do not use the battery under strong electrostatic and magnetic field, otherwise, the safety devices may be damaged, causing potential risk of safety.
- 如果电池发生异味、发热、变色、变形或使用、储存、充电过程中出现任何异常现象，立即将电池从装置或充电器中移除并停用。
If the battery diffuses odors, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, remove it from the device or battery charge and stop using immediately

- 如果电池弄脏，使用前应用干布抹净，否则可能会导致接触不良功能失效。
In case the battery terminals are covered with 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.
- 禁止在高温下（直热的阳光下或很热的汽车中）使用或装置电池，否则可能会引起电池过热，起火或功能失效，寿命减短。
Do not use or leave the battery under high temperature conditions (for example, strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it may cause overheat, fire, performance degeneration or decreased cycle life.
- 废弃之电池应用绝缘纸包住电极，以防起火、爆炸。
Be aware discharged batteries may cause fire; wrap the terminals to insulate them.

14.其他事项 Others

- a) 对于在超出文件规定以外的条件下使用电池而造成电池的任何意外事故，江西迪比科股份有限公司概不负责。
DBK will take no responsibility for any accident when the battery is used under other conditions than those described in this Document.
- b) 如有必要，江西迪比科股份有限公司会以书面形式告知客户有关正确操作使用电池的改进措施。
DBK will inform, in a written form, the customer of improvement regarding proper use and handling of the battery, if it is deemed necessary.
- c) 任何本说明书中未提及的事项，须经双方协商确定。
Any subject that this specification does not cover should be conferred between the customer and DBK.

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