

SPECIFICATION FOR APPROVAL

承认书

客户 / CUSTOMER : _____

客户型号 / CUSTOMER P/N : _____

产品名称 / ITEM : 6-10节1A2A3A镍氢电池充电器/6-10 series 1A2A3A NI-MH battery charger

产品种类 / DESCRIPTION : 线 充/wire type charger

本公司产品型号 / OUR MODEL NO. : CH-RMH090-01

标准 / STANDARD : _____

额定 / RATING : I/P:AC 100V~240V 50Hz/60Hz
O/P :DC20V 1000mA/2000mA/3000mA

备注 / REMARKS : 输出电流由转换开关切换
Switch the toggle to select charge current

注意:在贵司出单前,请确认签回以下项目/ Attention: Before placing orders, please confirm to sign back the followings:

- ☐ 产品规格(首页) /Production Spec(Front Page)
- ☐ 铭牌规格(如有) /Nameplate Spec(if any)
- ☐ 包装规格(如有)/Packing Spec(if any)

版本 REV	描述/DESCRIPTION	日期 DATE
A0	首次发行/FIRST EDITION	
A1	修改格式/CHANGE FORMAT	2019-1-28

瑞鼎电子/ Ryder Electronics	
	批准/Approved by
签名 Signature	衣绍鹏
日期/DATE	2019-1-28

客户/ CUSTOMER	
确认	
Approved by	
	
(签字或公司盖章)	
日期/DATE	

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1 产品特点 Product Characteristics

- 本产品是一款智能型镍氢电池包专用充电器，使用微电脑芯片控制， $-\Delta V$ 检测功能，确保充电的质量及安全。It is a smart charger special for NI-MH battery pack. The charger has $-\Delta V$ detection function with MCU to ensure the quality and safety.
- 适应 6 至 10 串镍氢电池包充电。The charger is suitable for 6-10 series NI-MH battery pack.
- 通过面板上 3 档拨动开关选择 6 至 10 串镍氢电池充电。Switch the 3-level toggle on the panel to select charge 6-10 series NI-MH battery pack.
- 恒电流充电， $-\Delta V$ 检测，确保电池快速充电及电池充电的饱和度 $\geq 85\%$ 。Constant charge current, $-\Delta V$ detection, to ensure quick charge and charge saturation $\geq 85\%$.
- 充电时将充电器的两个输出端和电池包正、负极正确连接，接入 AC 电源即可，使用非常方便。Convenience with AC connection and correct battery connection.
- 具有电池反接保护功能，确保充电器及电池在误操作（接反）的情况下不会损坏充电器及电池；注意请不要长时间反接电池充电。Battery reversely connected protection function, to make sure that battery or charger will not be damaged under the condition of reverse.
- 硬件看门狗，确保软件失控，及硬件异常的情况下有效保护电池，防止电池过充出现意外事故。Hardware watchdog to prevent unforeseen accident and protect battery when software lost control or hardware is abnormal.
- 双色发光二极管指示充电状态，显示直观。Bicolor LED.
- 宽电压 AC 输入，100-240V AC 50/60Hz 适应全球。AC input : 100-240V AC 50/60Hz

注意：请不要拿本充电器充适应范围以外的其它电池及电池包，本规格书所提及的所有电池及电池包均指 6-10 串的镍氢电池组。

Caution: this spec and charger are only suitable for 6-10 series NI-MH battery pack.

2 电气性能 Electrical Specification

2.1 输入特性 Input characteristics

2.1.1 输入电压 Input voltage

输入电压范围：Input voltage

100-240VAC 50/60Hz

2.1.2 输入电流 Input current

额定工作电流：rated input current

$\leq 1.0A$

2.1.3 浪涌电流：Surge current

浪涌电流：surge current

60A MAX

2.1.4 最大漏电流 Maximum leakage current

最大漏电流：maximum leakage current

$\leq 0.25\text{ mA}$

2.1.5 启动延迟时间 Start-up delay time

接入市电时，启动延迟时间：start-up delay time (AC input)

$\leq 3S$

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2.2 输出特性 Output characteristics

2.2.1 充电电压范围 Charge voltage range

充电电压范围 Charge voltage range

5.0V-16V (最大可充电电压范围) (Maximum chargeable voltage range)

2.2.2 额定充电电流: (正常充电条件下) Rated charge current (Normal condition)

额定充电电流 : 1000mA \pm 10% (1A 档)

额定充电电流 : 2000mA \pm 10% (2A 档)

额定充电电流 : 3000mA \pm 10% (3A 档)

Rated charge current: 1000mA \pm 10% (1A level)

Rated charge current: 2000mA \pm 10% (2A level)

Rated charge current: 3000mA \pm 10% (3A level)

2.2.3 输出空载电压: Output no-load voltage

输出空载电压: output no-load voltage

18.0V-20.0V

2.2.4 充电方式 Charge method

采用恒流充电方式 adopt constant current charge method.

2.2.5 涓流电流(正常充电条件下) Trickle current (Normal condition)

涓流电流: 100mA 平均值 (@1A 档位时), (占空比=10%)

200 mA 平均值 (@2A 档位时), (占空比=10%)

300 mA 平均值 (@3A 档位时), (占空比=10%)

Trickle current: 100mA average value (@1A level), (duty circle =10%)

200mA average value (@2A level), (duty circle=10%)

300mA average value (@3A level), (duty circle=10%)

2.2.6 输出短路电流 Output short circuit current

当输出端短路时, 充电器将无电流输出, 红色指示灯闪烁;

No current will output and red light will flash when there is an output short circuit.

短路排除, 充电器自动进入充电状态。

When cause of short circuit is removed, the charger turns into charge state.

短路电流: \leq 50mA

Short circuit current : \leq 50mA

2.2.7 反灌电流 Reverse current

充电器反灌电流: reverse current

\leq 1mA, (当无市电输入时) (NO AC input)

2.2.8 反向保护电流 Reverse protect current

充电器具有反接保护功能: 当电池接反时, 充电器自动保护, 不会损坏充电器, 注意: 不要将充电器长时间反接充电。

Charge has reverse protection function: Charger applies auto-protection function when battery was connected to charger reversely. Caution: please don't charge the battery in reverse direction for a long time.

充电器反向保护电流: \leq 100mA

Reverse protect current: \leq 100mA

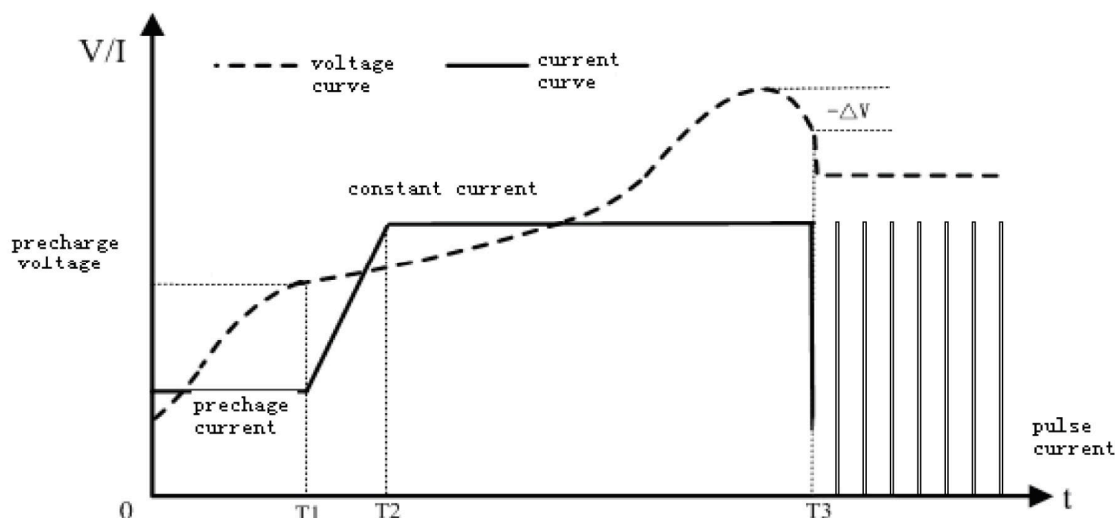
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2.2.9 停止充电的条件 Condition of stop charging

当电池充饱时出现 $-\Delta V$ ，当 $-\Delta V$ 为 10-30mV 时，停止充电。

When battery is fully charged and a $-\Delta V$ occurs($-\Delta V$ is range from 10mA to 30mA), the charger will stop charging.

2.2.10 充电输出特性图 Output curve



T0-T1: 唤醒阶段，当电池包的电压 $\leq 6V$ 时，充电器将会用 22mA 电流去唤醒电池。

T0-T1: Wake-up period. The charger will apply 22mA current to wake battery up when battery pack's voltage is lower than or equal to 6V.

T1-T2: 电流上升阶段，当电池包的电压 $\geq 6V$ 时，充电器将会从唤醒状态转换为电流上升状态。在此阶段，电流上升到恒流充电电流；1000mA $\pm 10\%$ （1A 档），2000mA $\pm 10\%$ （2A 档），3000mA $\pm 10\%$ （3A 档）。

T1-T2: Current rise period. The charger will turn into current rise period from wake-up period when battery pack's voltage is higher than or equal to 6V. In this period, the current rise to constant charge current: 1000mA $\pm 10\%$ （1A level），2000mA $\pm 10\%$ （2A level），3000mA $\pm 10\%$ （3A level）.

T2-T3: 恒流充电阶段,在此阶段，检测电池的 $-\Delta V$ ，当检测到 $-\Delta V$ 为 10-30mV 时，就会转入充电饱阶段；在由红灯转为绿灯，指示充电饱状态。

T2-T3: Constant charge current period. In this period, when a $-\Delta V$ (10-30mA) was detected, charger will turn into full-charged period.

T3-T4; 充电阶段，红色充电指示灯就会熄灭，绿灯亮起。充电器转入涓流电流：1A 档位时 1000mA 平均值，（占空比=10%）；2A 档位时 2000mA 平均值（占空比=10%），3A 档位时 3000mA 平均值（占空比=10%）。

T3-T4: Full-charged period. The red light turns to green light. Charge current turns into trickle current: 1A level 1000mA average value (duty circle=10%).2A level 2000mA average value (duty circle=10%).3A level 3000mA average value (duty circle =10%)

2.2.11 适用电池 Suitable battery

本充电器适用于 6 至 10 串 镍氢电池组充电。

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This charger is suitable for 6-10 series NI-MH battery pack.

3 充电方式及 LED 指示状态 Charge method and LED indication

3.1 电池放置 Battery placing

将 6 至 10 串镍氢电池正负极与充电器对接，充电器自动识别有电池接入后，并开始充电。

The charger can distinguish the battery when 6-10 series battery was correctly connected to charger.

3.2 LED 指示 LED indication

不接电池	充电指示灯——红灯慢闪
充电状态	充电指示灯——红灯常亮
充电状态	充电指示灯——绿灯常亮
输出短路	充电指示灯——红灯快闪
电池反接	充电指示灯——红灯闪烁

No battery	LED —— red light flash slowly
Charging	LED —— red light
Full-charged	LED —— green light
Output short circuit	LED —— red light flash quickly
Battery is reversely connected	LED —— red light flash

4 适用环境 Applicable environment

4.1 工作温度：Working temperature

0~+40℃

4.2 工作湿度 Working humidity

工作湿度：working humidity
 $\leq 90\%$ （不结露 no condensation）

4.3 贮存温度 Storage temperature

贮存温度：storage temperature

4.4 存储湿度 storage humidity

相对湿度：relative humidity $\leq 85\%$

4.5 大气压力 atmospheric pressure

大气压力：atmospheric pressure
70~106KPa

5 安全要求 Safety requirements

5.1 抗电强度 dielectric withstanding voltage

初、次级抗电强度 $\geq 3000\text{VAC}$ 50HZ/60HZ 正弦波有效值一分钟无击穿、飞弧现象，漏电流 $\leq 10\text{mA}$
Primary, secondary dielectric withstanding voltage $\geq 3000\text{VAC}$ 50HZ/60HZ effective value of sine wave. one minute without breakdown, arcing phenomenon. Leakage current $\leq 10\text{mA}$.

5.2 绝缘电阻 Insulation resistance

绝缘电阻 insulation resistance
 $\geq 10\text{M}\Omega$ (DC500V)

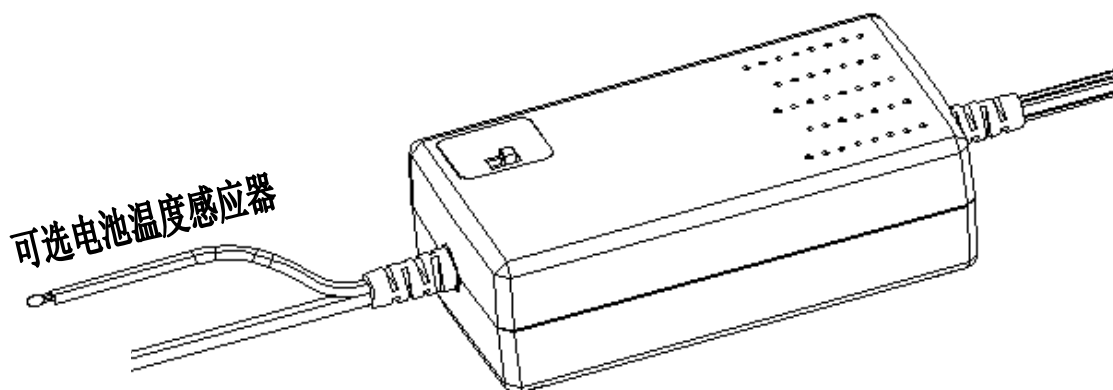
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6 机械 Mechanics

6.1 外观图 Appearance

具体外形及印字按实际样品而定

Appearance and print can be customized



6.2 输入插头及 AC 线材要求 Input AC plug and cable

具体 AC 插头标准及线材标准按客户要求订制

AC plug and cable standard can be customized.

6.3 输出线材及 DC 插头要求 Output DC plug and cable

具体 DC 插头标准及线材标准按客户要求订制

DC plug and cable standard can be customized.

6.4 铭牌标贴 Label

具体规格及标准按客户要求订制

Label can be customized.

7 可靠性能 Reliable Performance

- 1 高温试验：实验温度为 $65^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ，产品不包装，持续时间为 5 小时。在常温下放置待恢复后对其外观、绝缘强度、指示功能及电气性能进行重新测试；外观应平整无划痕、毛刺以及其它机械损伤；外露金属部分不应有锈蚀；绝缘测试无击穿、飞弧现象；LED 指示功能及电气性能正常。

High temperature test: under $65^{\circ}\text{C} \pm 2^{\circ}\text{C}$, the charger without packing, last for 5 hours. Then take it into the room temperature, test its appearance, LED and electrical specification. The appearance should have no scratches, burrs and other mechanical damage, metal parts rust should have no corrosion. Insulation test has no breakdown or arcing phenomenon. LED indication function and electrical performance works normally

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- 2 低温试验：实验温度为 $-20^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ，产品不包装，持续时间为 8 小时。在常温下放置待恢复后对其外观、绝缘强度、指示功能及电性能进行重新测试；外观应平整无划痕、毛刺以及其它机械损伤，外露金属部分不应有锈蚀；绝缘测试无击穿、飞弧现象；LED 指示功能及电气性能正常。

Low temperature test: under $-20^{\circ}\text{C} \pm 3^{\circ}\text{C}$, the charger without packing, last for 8 hours. Then take it into the room temperature, test its appearance, LED and electrical specification. The appearance should have no scratches, burrs and other mechanical damage, metal parts rust should have no corrosion. Insulation test has no breakdown or arcing phenomenon. LED indication function and electrical performance works normally

- 3 恒定湿热试验：实验温度为 $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ，湿度为 90%~95%，产品不包装，持续时间为 48 小时。测试后对其外观、绝缘强度、指示功能及电性能进行重新测试。外观应平整无划痕、毛刺以及其它机械损伤，外露金属部分不应有锈蚀；绝缘测试无击穿、飞弧现象；LED 指示功能及电气性能正常。

The constant humidity and heat test: under $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$, humidity 90%~95%, the charger without packing, last for 48 hour. Then test its appearance, LED and electrical specification. The appearance should have no scratches, burrs and other mechanical damage, metal parts rust should have no corrosion. Insulation test has no breakdown or arcing phenomenon. LED indication function and electrical performance works normally

- 4 振动试验：频率为 10~55HZ，振幅为 0.35mm，每个方向上扫频循环次数为 10 次。实验后对其外观、绝缘强度、指示功能及电性能进行重新测试。外观应平整无划痕、毛刺以及其它机械损伤，外露金属部分不应有锈蚀；绝缘测试无击穿、飞弧现象；LED 指示功能及电气性能正常。

Vibration test: 10~55HZ, amplitude 0.35mm, Sweep cycles in each direction 10 times. Then test its appearance, LED and electrical specification. The appearance should have no scratches, burrs and other mechanical damage, metal parts rust should have no corrosion. Insulation test has no breakdown or arcing phenomenon. LED indication function and electrical performance works normally

- 5 跌落试验：高度为 1 米，实验台厚度为 20mm 的硬木板，6 个表面，每个方向 1 次。实验后对其外观、绝缘强度、指示功能及电性能进行重新测试。产品内部无异响，外观无机械破损，外露金属部分不应有锈蚀；绝缘测试无击穿、飞弧现象；LED 指示功能及电气性能正常。

Drop test: from 1M, the test platform is the hardboard with 20mm thickness. 6 surface, once in each direction. Then test its appearance, Dielectric strength, LED and electrical specification. The appearance should have no damage, no abnormal noise inside; metal parts rust should have no corrosion. Insulation test has no breakdown or arcing phenomenon. LED indication function and electrical performance works normally

8 外观要求 Appearance Requirement

充电器外壳表面平整无划痕，毛刺及其它机械损伤，丝印完整清晰，外露金属部份无锈蚀。

Charger case should be smooth and have no scratches, burrs and other mechanical damage,
 Complete and clear screen, the exposed metal parts no rust

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9 体积与重量 Volume And Weight

9.1 体积 Volume

L 119* W* 61 H38: 275842 mm³

9.2 重量 Weight

net: 236g

10 抽样标准: Sampling Standard

产品抽样检验参照 MIL-STD-105E 标准制定满足本公司产品品质检验之抽样计划, 并严格督导实施。

当客户或合同有特殊要求时。可按客户和合同要求执行。

Product sampling reference MIL-STD-105E standards to meet the company's products quality inspection of the sampling plan, and implement strict supervision. Also can be based on the customer requirement

11 包装: Packing

具体包装方式可按客户要求订制。

Packing can be customized

12 使用注意事项: Caution

- 不可以拿本充电器充适应范围以外的电池及电池包。

This charger is only suitable for 6-10series NI-MH battery pack.

- 不可在超过 40℃环境使用本充电器对电池充电; 建议在 35℃以下的环境下充电, 电池在充足的时候有轻微的发热, 属正常现象, 请放心使用。

Do not use the charger to charge when temperature is over 40℃, temperature below 35℃ is recommended. It is normal that there is some heat when battery was fully charged.

- 为了安全, 建议使用 TENERGY 公司的 6-10 节串联的镍氢镍镉电池包。

For safety, 6-10 series NI-MH battery pack made by TENERGY Co.,Ltd is recommended to use.

- 充电时远离热源和火源。

Far away from heat and fire

- 不得在酸、碱、和有腐蚀的环境中使用本充电器及电池。

Do not use the charger under the environment of acids, alkalis, and corrosion

- 不得让充电器进水或淋雨, 以免引起安全问题。

Do not place the charger into rain or water, or may cause problems

- 不得拆解充电器和电池, 以免引起危险。

Do not disassemble charger and battery, to avoid danger.

- 不得让小孩单独使用本充电器; 请勿将充电器放置于小孩可接触到的地方, 以免发生危险。

Do not let children use the charger alone. Place the charger out of the reach of children.

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- 当电池长时间放置不用后再次使用时，可能会出现假象- ΔV 现象，导致充电器误判而停止充电，出现此情况后，请对电池反复充电、放电几次后即可修复或部分修复。

When the battery is not in use for a long time, there may be false $-\Delta V$ phenomenon, resulting in wrong detection and stop charging. In this case, please charge and discharge the battery repeatedly for a few times.

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