



# HUANYU

# SPECIFICATIONS

HUANYU MODEL No. : HYCPSC2000N  
CUSTOMER MODEL No. : \_\_\_\_\_  
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VERSION No. : 1

**The Supplier:**

**HUANYU POWER SOURCE CO.,LTD**

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**The Customer:**

**Customer Approved:**

## 1. APPLICATION

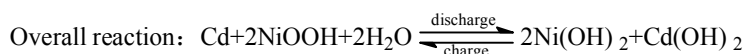
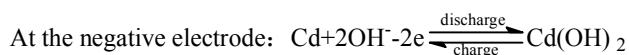
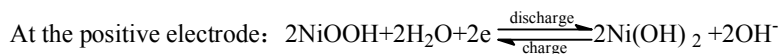
The specification applies to the following sealed Ni-Cd rechargeable battery made by HUANYU

Model: HYCPSC2000N

APPLICATION: Electric tools, Electric toys, Etc.

## 2. WORKING THEORY

The negative of HUANYU Nickel-Cadmium cylindrical battery is metal of Cadmium, the positive is NiOOH, and the electrolyte is KOH of high purity. The electrochemical processes are represented by the following reactions:



During discharge, Cadmium of negative is oxidized to  $\text{Cd(OH)}_2$ . The free electrons flow into the positive through the external circuit, NiOOH of positive receives the electrons and is deoxidized to  $\text{Ni(OH)}_2$ . Charge process is just the opposition of discharge.

## 3. CELL TYPE AND RATINGS

Cell	Ni-Cd Sealed Cylindrical Cell
Type	HYCPSC2000N
Size type	SC2000
Nominal cell voltage	1.2V
Weight of the single cell	46g
Diameter(Contain insulating packing)	23.0 <sup>0</sup> <sub>-0.0</sub> mm
Height(Contain insulating packing)	43.0 <sup>0</sup> <sub>-1.5</sub> mm

## 4. BEST EXPLOITATION CONDITIONS

Charge current	200mA (0.1I <sub>r</sub> A×16h) ≤ I ≤ 800mA (0.4I <sub>r</sub> A×3.5h)
Charge control method	Time、TCO=45℃
Temperature range for charge	15℃～25℃
Humidity	45%～85%
Discharge current	200mA (0.1I <sub>r</sub> A) ≤ I ≤ 2000mA (1I <sub>r</sub> A)
Temperature range for discharge	15℃～25℃
Temperature range for storage	0℃～25℃

**5. PERMISSION EXPLOITATION CONDITIONS**

<b>Low rate charge</b>	
Current	200mA (0.1I <sub>t</sub> A×16h) ≤ I < 800mA (0.4I <sub>t</sub> A×3.5h)
Control method	Time, TCO=45°C
Ambient temperature	10°C ~ 30°C
Humidity	45%~85%
<b>High rate charge</b>	
Current	800mA (0.4I <sub>t</sub> A×3.5h) ≤ I ≤ 2000mA (1I <sub>t</sub> A×1.2h)
Control method	-ΔV=10mV/cell, Time, TCO=45°C, dT/dt=1°C/3min~2°C/3min
Ambient temperature	10°C ~ 30°C
Humidity	45%~85%
<b>Discharge</b>	
Can be recycled continues discharge current	200mA (0.1I <sub>t</sub> A) ≤ I ≤ 20A (10I <sub>t</sub> A)
Cut-off voltage	1.0V/cell (I ≤ 1I <sub>t</sub> A) 0.9V/cell (1I <sub>t</sub> A < I ≤ 2I <sub>t</sub> A) 0.8V/cell (2I <sub>t</sub> A < I ≤ 5I <sub>t</sub> A) 0.7 V/cell (5I <sub>t</sub> A < I ≤ 10I <sub>t</sub> A)
Ambient temperature	-20°C ~ 55°C (I ≤ 0.2I <sub>t</sub> A) -10°C ~ 40°C (0.2I <sub>t</sub> A < I ≤ 1I <sub>t</sub> A) 0°C ~ 30°C (1I <sub>t</sub> A < I ≤ 5I <sub>t</sub> A) 15°C ~ 25°C (5I <sub>t</sub> A < I ≤ 10I <sub>t</sub> A)
Humidity	45%~85%
<b>Storage</b>	
Within a week	-20°C ~ 35°C
Within six months	-20°C ~ 25°C
Humidity	45%~85%

## 6. PERFORMANCE

### 6.1 TEST CONDITIONS

The test is carried out with new batteries (within one month after delivery). Before it is charged, the battery should be discharged at 0.2I<sub>r</sub>A to an end of voltage of 1.0V/cell under test conditions:

Temperature	:	20°C±5°C
Relative Humidity	:	45%~85%
Standard charge	:	400mA (0.2I <sub>r</sub> A) ×7.5h
Standard discharge	:	400mA (0.2I <sub>r</sub> A) to 1.0V/cell

### 6.2 TEST METHOD & PERFORMANCE

Test	Unit	Specification	Conditions	Remarks
Shipment Voltage	V/cell	≥0.8		AQL II =0.65%
Open Circuit Voltage (OCV)	V/cell	≥1.30	In 1h after standard charge	
Internal impedance	mΩ/cell	≤10	Upon fully charge (1KHz)	
Medium rate Discharge (1I <sub>r</sub> A)	min	≥54	Standard charge before discharge	end voltage is 1.0V/cell
High rate Discharge (5 C <sub>5</sub> A)	min	≥9	Normal charge before discharge	End Voltage is 0.8V/cell
High rate Discharge (10C <sub>5</sub> A)	min	≥4	Standard charge before discharge	End Voltage is 0.7V/cell
Over charge	min	≥300 No leakage No deformation	Charge for 28d at 0.1I <sub>r</sub> A, and rest for 1h~4h, then discharge at 0.2I <sub>r</sub> A to 1.0V/cell	Temp. 20°C±5°C
Charge retention	mAh	≥1300 (65%CN)	Standard charge; Storage of 28d; Standard discharge	Temp. 20°C±2°C
Cycle life	Cycle	≥500	IEC61951-1 (7.4.1.1)	Refer to <b>Note</b>
Leakage		No leakage No deformation	Fully charge at 0.4I <sub>r</sub> A, then storage of 14d	Temp. 20°C±5°C

**Cycle life:**

Prior to the endurance in cycles test, the cell shall be discharged at a constant current of 0.2 I<sub>t</sub>A to a final voltage of 1.0 V/cell.

The following endurance test shall then be carried out, irrespective of cell designation, in an ambient temperature of 20 °C ± 5 °C. Precautions shall be taken to prevent the cell-case temperature from rising above 35 °C during the test, by providing a forced air draught if necessary.

**Note:** IEC61951-1 (7.4.1.1):

Cycle number	Charge	Stand in charged condition	Discharge
1	0.1I <sub>t</sub> A for 16h	None	0.25I <sub>t</sub> A for 2h20min <sup>a</sup>
2-48	0.25I <sub>t</sub> A for 3h10min	Note	0.25I <sub>t</sub> A for 2h20min <sup>a</sup>
49	0.25I <sub>t</sub> A for 3h10min	Note	0.25I <sub>t</sub> A to 1.0V
50	0.1I <sub>t</sub> A for 16h	1h to 4h	0.20I <sub>t</sub> A to 1.0V <sup>b</sup>

a. If the cell voltage drops below 1.0V, the discharge may be discontinued.  
b. It is permissible to allow sufficient open-circuit rest time after the completion of discharge at cycle 50, so as to start cycle 51 at a convenient time. A similar procedure may be adopted at cycles 100, 150, 250, 300, 350, 400 and 450.

Cycles 1 to 50 shall be repeated until the discharge duration on any 50th cycle become less than 3 h. At this stage, a repeat capacity measurement as specified for cycle 50 shall be carried out. The endurance test is considered complete when two such successive capacity cycles give a discharge duration of less than 3 h. The total number of cycles obtained when the test is completed shall be not less than 500.

**6.3 Storage:**

Prior to this test, the cell shall be discharged, in an ambient temperature of 20 °C ± 5 °C, at a constant current of 0,2 I<sub>t</sub>A, to a final voltage of 1,0 V/cell. It shall then be charged of 0.1 I<sub>t</sub>A for 16h. The cell shall then be stored on open circuit for 12 months.

After completion of the storage period, the cell shall be discharged in an ambient temperature of 20 °C ± 5 °C, at a constant current of 0,2 I<sub>t</sub>A, to a final voltage of 1,0 V and five cycles are permitted for this test, the capacity for 0.2I<sub>t</sub>A constant current shall be not less than 5h.

**6.4 Vibration**

The battery shall not cause damage to its performances when tested with the amplitude at 4mm (0.158 in) and the frequency at 1000Hz.

**6.5 Drop test**

The battery shall not cause damage to its performances when dropped to the wooden board at a height of 450mm(17.716 in).

**6.6 Safety****6.6.1 Over-discharge device operation**

Discharged for 24h with an load resistor (Load(mΩ)=1.2V×n×1000/2I<sub>t</sub>A), but no leakage nor deformation.

**6.6.2 Safety valve performance**

Test method: the batteries are discharged to 0V at 0.2I<sub>t</sub>A, then increase the current to 1I<sub>t</sub>A and maintain 1h, leakage and deformation are allowed, but no disrupt and no burst.

**6.6.3 Short circuit**

Test method: charge at 0.4I<sub>t</sub>A for 3.5h, short-circuit directly between positive pole and negative pole for 1h, no disrupt, no burst, but leakage and deformation are allowed.

**7. USE AND MAINTENANCE**

7.1 Battery can be charged at constant current and constant power, charge current and charge

- control design can refer to the provisions of 5, don't control the battery with  $-\Delta V$  for first 5min at the beginning of charge; and not advice charge the battery with constant voltage charger.
- 7.2 Too hot or too cool will reduce the capacity and life of the battery, please keep the battery at  $15^{\circ}\text{C}\sim 25^{\circ}\text{C}$  as much as possible.
- 7.3 Please refer to the provision of 5 to design discharge current and cut-off voltage, not advice to set discharge current more than the provision of 5.
- 7.4 Please contact with us when your charge/discharge current is higher than the provision of 5 or the combination quantity more than 15 pieces.
- 7.5 Short circuit, over-charge, over-discharge, reverse charge, mix using new battery with semi-used battery, excessive temperature or incinerate, strike or drop, incorrect charge method all can cause battery drop performance, seriously can cause battery to leakage, deform or explode.
- 7.6 Please store the battery in a cool and dry place; charge battery before store it; long time storage can drop battery performance until lose effectiveness; The period of guaranteeing of our battery is 6 months after the day of purchase; please maintain the storing battery every 3 months; please charge/discharge the battery 3 times according to the provision of 5.
- 7.7 Battery can charge and discharge several hundreds times, but can lose effectiveness at last. When battery's work hours shortened obviously, please buy new battery.

## 8. SUGGESTION & ADVICE

- 8.1 avoiding to weld the battery or battery pack directly.
- 8.2 If find any noise, excessive temperature or leakage from a battery, please stop its use.
- 8.3 When not using the battery, please disconnect it from the device.
- 8.4 Don't put the battery into water or fire.
- 8.5 Keep away from children. If swallowed, contact a physician at once.
- 8.6 This specification copyright belongs to HENAN HUANYU POWER SOURCE CO., LTD. No copying before permitted. We reserve the right to modify this specification.
- 8.7 We'll not be held responsible if you use battery incorrectly.
- 8.8 If necessary, please contact HUANYU for detailed information.

**TEL: 0086-373-2688006/2688085**

**0086-755-27370590**

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**0086-755-27370594**

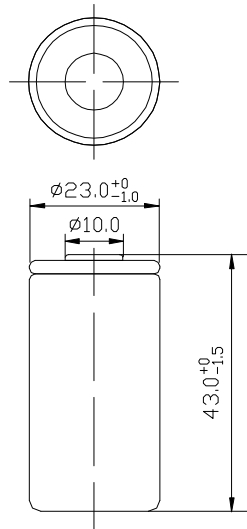
**Web-site: <http://www.huanyubattery.com>**

**TYPE: HYCPSC2000N**

**Specifications**

Nominal voltage		1.2V	
Capacity (mAh)			0.2 C <sub>5</sub> Ah <sup>[1]</sup>
	Minimum	2000	
Diameter		23.0 <sup>0</sup> <sub>-1.0</sub> mm	
Height		43.0 <sup>0</sup> <sub>-1.5</sub> mm	
Weight <sup>[2]</sup>		About 46g	
Internal impedance (1000Hz.) <sup>[2]</sup>		≤ 10mΩ(After charge)	
Charge	Standard		0.2I <sub>r</sub> A
	Rapid		1I <sub>r</sub> A
	Trickle	Max.	0.05I <sub>r</sub> A
		Min.	0.03I <sub>r</sub> A
Ambient temperature	Charge	Standard <sup>[3]</sup>	10°C~30°C    50°F~86°F
		Rapid <sup>[4]</sup>	10°C~30°C    50°F~86°F
	Discharge <sup>[5]</sup>		-20°C~55°C    -4°F~131°F
	Storage		-20°C~25°C    -4°F~77°F

**Appearance**(Contain insulating packing)



**Note:**

- [1] Charge 7.5h at 0.2I<sub>r</sub>A, rest 1h, then discharge at 0.2I<sub>r</sub>A, end at 1.0V/cell, 20°C.
- [2] Weight and IR are for reference.
- [3] Charge 7.5h at 0.2I<sub>r</sub>A.
- [4] Charge 1.2h at 1.0 I<sub>r</sub>A, -ΔV=10mV, TCO=45°C, dT/dt=1°C/3min ~2°C/3min
- [5] Discharge at 0.2I<sub>r</sub>A, end at 1.0V/cell.

**Typical Characteristics**

