

Note: This Approval Sheet ( Version Number:SP07A110-0.16E) prepared by Union Suppo Battery (Liaoning)Co., Ltd., is subject to be modified without prior notice.

## 1. MODEL: HX9V-160

## 2. Product Description

HX9V-160 is a new generation of Nickel Metal Hydride rechargeable battery which combines the advantage of both dry cells and rechargeable batteries, which has higher outpower, higher capacity retention and good discharge performance at low temperature compared with dry battery. It can be used right now after purchasing.

## 3. SPECIFICATION

- Nominal voltage: 8.4V
- Nominal capacity: 160 mAh
- Standard charge: 16 mA×12hrs
- Rapid charge: 160 mA(controlled by at least 2 following methods simultaneously);
  - Delta V = 10--15mV(controlling voltage-decreasing while charging);
  - $\Delta T/\Delta t = 0.8-1$  Celsius/min(controlling surface temperature increment);
  - TCO = 40-45 Celsius(controlling battery surface temperature);
  - 63 min(controlling charging time at constant current).
  - or use specil charger
- Discharge end-voltage: 7.0V
- Max constant current of discharge: 160 mA(at 20 Celsius)
- Ambient temperature range(humidity: 65±10%)
  - Standard charge: 0 -- 40 Celsius
  - Rapid charge: 10--35 Celsius
  - Discharge: -10-- +50 Celsius
- Storage temperature range(humidity: 65±10%)\*
  - Within 12 months: -20 -- +35 Celsius
  - Within 3 months: -20 -- +45 Celsius
  - Within 1 month: -20 -- +55 Celsius

\*We recommend the best storage temperature is below 20 Celsius if the storage temperature is above 20 Celsius the capacity retention rate can be decreased compared with what we claimed. The battery should keep open. Any conductive connection no matter direct or indirect will cause a bad effect. When the battery is not in use please put it in the holder, which appends with the battery.

## 4. Appearance & Dimension/Weight

As per attached drawing

## 5. Performance Testing

### 5.1 Test Requirement

Unless otherwise stipulated, all tests are carried out in ambient temperature 20±5 Celsius, humidity 65±10%; Tests should be made within one month after receipt of the battery.

**Important: New batteries are delivered in a 100% charged state, discharge to 7.0V before any test!**

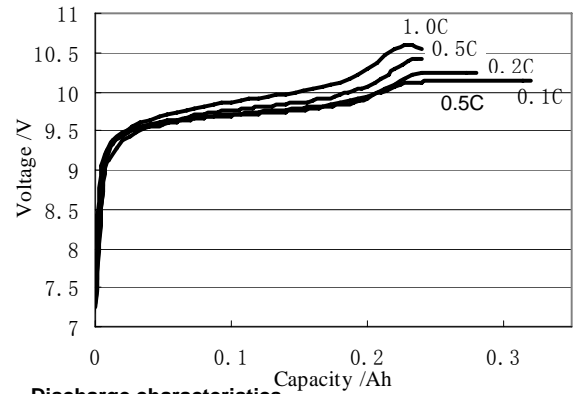
## 5.2 Testing Procedure and Standard

Item	Measuring Procedure	Standard
1. Appearance	Visual check	Refusal of dirty, in shape of scratched pack
2. Dimension	Measured by calipers	As per attached drawing
3. Weight	Weighed by balance with precision of 0.1g	Max 45.0 g
4. Open-circuit voltage	Measure open-circuit voltage 14 days after standard charge	Min 8.75V
5. Capacity	Calculate capacity when discharge at 32 mA to 17.0V, after one hour standard charge	Typical 160 mAh
		Min 160 mAh
6. Impedance	Measure the impedance of battery by applying AC with frequency of 1000Hz within one hour after standard charge (by milliohm meter)	Max 700m $\Omega$
7.Capacity retention(180d)	Lay standard charged battery for 180 days at environmental temperature below20 Celsius, Measure capacity when discharge at 32 mA to 7.0V	typ.retention rate 85%*
Capacity retention(360d)	Lay standard charged battery for 360 days at environmental temperature below20 Celsius, Measure capacity when discharge at 32 mA to 7.0V	typ.retention rate 80%*
8. Over-charge	Charge at 32 mA for 48hrs	No abnormality on appearance and structure should be observed
9. Charge at high temperature	Put the battery in constant temperature box of 40 $\pm$ 2 Celsius for 2 hours Charge at 32 mA,3hrs and with - $\Delta$ V=15mV rapid charge cut-off control,stand it in ambient temperature of 20 $\pm$ 5 Celsius for 1 hour, discharge at 64 mA to 7.0V	Discharge Capacity 144 mAh min
10. Low-temperature discharge	Put the standard charged battery in an Constant Temperature Box at 0 Celsius, for 2 hours, discharge at 32 mA to 7.0V	Discharge Capacity 128 mAh min
11. Over-discharge	Connect standard charged batteries with a resistor of 12 $\Omega$ / cell in series for 8 hrs	No deformation
12. Cycle life	As per IEC Standard, inspect the capacity at 500th cycle	Typical min 96 mAh
13. Humidity test	Put standard charged battery in ambient temperature: 33 $\pm$ 3 Celsius humidity:80 $\pm$ 5% for 14 days	No deformation No leakage
14. Vibration-proof	Lay the standard charged battery for 1 hour with open-circuit, vibrate the battery Amplitude 4mm Frequence 1000times/min Direction Any Time 60min	Open circuit voltage variation below 0.02V/cell No deformation No leakage
15. Impact-proof	Lay the battery standard charged for 1 hour with open-circuit,drop with the follow conditions: Height: 45cm Target : Hard wood plate Direction: Any direction Times: 3	Open circuit voltage variation below 0.03V/cell No deformation No leakage
16. Safety	Short-circuit the positive and negative polarity for 1 hour using a leading wire of 0.75mm <sup>2</sup>	No explosion but leakage or deformation allowed
* if the ambient temprature is changed, the data may be different from the above value.		
Note: If batteries are properly used, it is kept in seal status, safety vent won't be active. But in case of abuse use such as long time over charge, short circuit, over-discharge etc., battery inner pressure will increase and lead to safety vent open. when the battery is not in use,turn off the equipment. Read instruction carefully before use.		

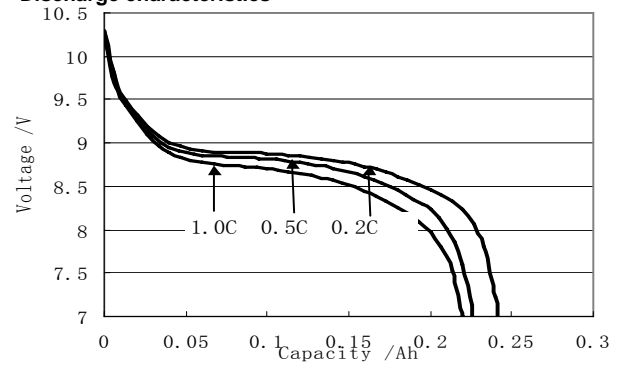
## Parameters

Nominal Voltage		8.4V
normal capacity(0.2C)		160
Dimension	L(mm)	26.6(0/-0.6)
	W(mm)	15.7(0/-0.7)
	H(mm)	48.5(0/-1.0)
Weight(g)		45.0
Impedance(1000Hz)		700mΩ
Charge	Standard Charge	16 mA×15hrs
	Rapid Charge (need control)	160 mA×1.2hrs
	Charge	Standard charge: 0-40 Deg Rapid Charge: 10-35Deg
Ambient Temperature	Discharge	-20-- 50Deg.
	Storage	1 year: -20-35 Deg.
		3 months: -20- 45 Deg.
1 month: -20-55 Deg.		

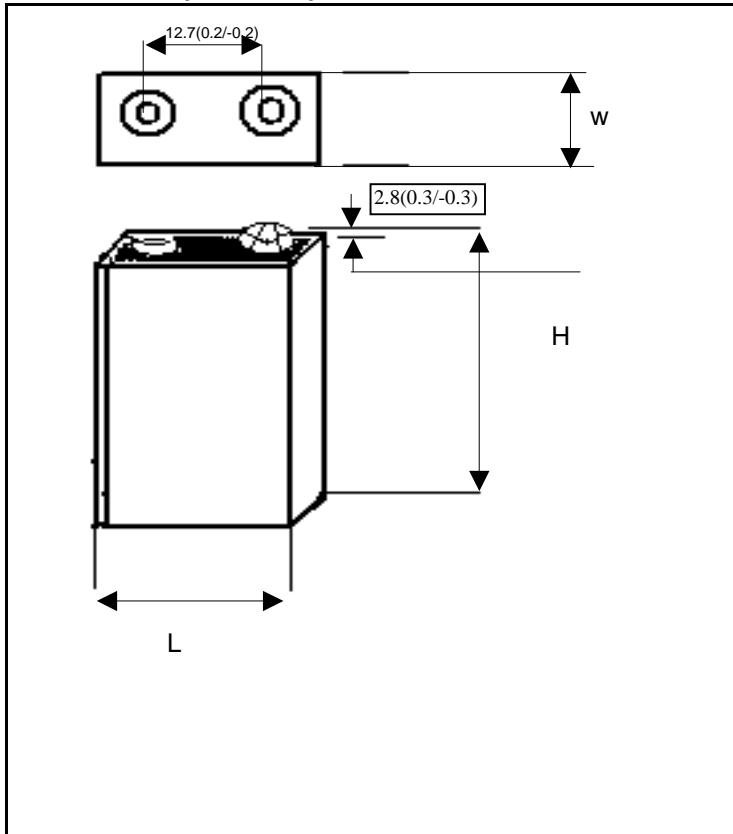
## Charge characteristics



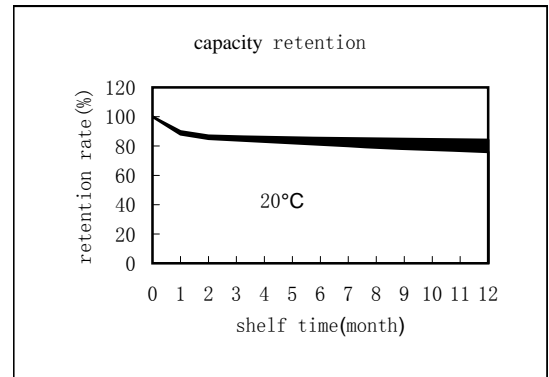
## Discharge characteristics



## Dimension(with tub)mm



## Capacity retention characteristics



## Capacity retention characteristics

