

<b>TYPE: 78320 SC 4000 NIMH FT-1Z</b>		<b>DATA SHEET</b>
<b>Specifications</b>		
Nominal Voltage (V)		1.2
Capacity *	Typical (mAh)	4000
	Minimum (mAh)	3600
Dimension	Diameter (mm)	23.0 <sup>+0.0</sup> <sub>-0.7</sub>
	Height(mm)	43.00 <sup>+0.0</sup> <sub>-1.5</sub>
Weight	Approx. 60g	
Charging	Standard	360mA(0.1C <sub>5</sub> )×16h
	Rapid	1800mA(0.5C <sub>5</sub> )×2.4h
	Trickle	180mA(0.05C <sub>5</sub> )×48h
Operation Temperature (°C)	Standard Charging	0~45
	Rapid Charging	10~40
	Discharging	-20~60
	Storage	-20~35
Cut-off Voltage (V)		1.00
Self-discharge (20°C)		≤40%
<b>Dimensions (mm)</b>		
<p>Technical drawing showing the dimensions of the battery. The top view shows an outer diameter of <math>\varnothing 23.0^{+0.0}_{-0.7}</math> mm and an inner diameter of <math>\varnothing 11.0_{\pm 0.1}</math> mm. The side view shows a height of <math>43.0^{+0.0}_{-1.5}</math> mm.</p>		
		<p><b>Charging curves at various charging rates</b></p> <p>The graph plots Voltage (V) on the y-axis (0.9 to 1.6) against Capacity input (%) on the x-axis (0 to 160). Three curves are shown for charging rates of 1C, 0.5C, and 0.2C. All curves show a rapid initial voltage rise followed by a plateau around 1.4V.</p>
		<p><b>Discharge curves at various discharge rates</b></p> <p>The graph plots Voltage (V) on the y-axis (0 to 1.6) against Capacity discharged (%) on the x-axis (0 to 100). Three curves are shown for discharge rates of 5C, 10C, and 15C. The voltage starts at approximately 1.3V and decreases as capacity is discharged, with higher discharge rates showing a steeper decline.</p>
		<p><b>Cycle life curve</b></p> <p>The graph plots Nominal capacity (%) on the y-axis (0 to 120) against the Number of cycles on the x-axis (0 to 540). The capacity remains relatively stable around 100% for the first 360 cycles, then shows a gradual decline to approximately 75% after 540 cycles.</p>
<p><b>Note:</b></p> <p>*: Discharge capacity when the single cell is discharged at 720mA after being charged at 360mA for 16 hours.</p>		

**1.BATTERY MODEL**

78320  
SC 4000 NIMH FT-1Z

**2.NOMINAL SPECIFICATION**

2-1.Nominal Voltage	1.2V
2-2.Typical Capacity* <sup>1</sup>	4000mAh
2-3.Minimum Capacity* <sup>1</sup>	3600mAh
2-4.Charging Current* <sup>2</sup>	4000mAh
2-5.Charging Time* <sup>2</sup>	Approx.72 min
2-6.End Voltage of Discharge	1.0V
2-7.Temperature(Recommended)	
Charge:	0~+40deg.C
Discharge:	0~+50deg.C
Storage: Less than 30 days	-20~+50deg.C
Less than 90 days	-20~+40deg.C
Less than 1 year	-20~+30deg.C
2-8.Humidity	45~85%
2-9.Weight	Approx. 60g

\*1: Discharge capacity when the battery pack is discharged at 720 mA after being charged at 360 mA for 16 hours.

\*2: Use recommended charging systems.

**3.DESIGN,CONSTRUCTION,PHYSICAL DIMENSIONS**

The battery unit shall be of the design, construction and physical dimensions shown in the attached drawing.

**4.APPEARANCE**

There shall be no practical damage such as conspicuous liquid electrolyte leakage, flow and dirt under conditions of storage or operation as specified herein.

**5.ELECTRICAL CHARACTERISTICS**

5-1.Full-charge

Full-charge is defined as charged up to fully charged state using a specified fast charger.

The specified fast charger is as follows.

- Charging Current:360mA
- Full charge detection: Peak Voltage

5-2.Terminal voltage(O.C.V)

Open circuit voltage shall be a minimum voltage of 1.30V within 14 days after being fully charged.

5-3.Capacity

5-3-1.

The battery unit shall be capable of supplying 3600mA continuous discharge current for a minimum of 49 minutes to 1.0V end voltage within 1 hour after being fully charged.

5-3-2.

The battery unit shall be capable of supplying 1800mA continuous discharge current for a minimum of 108 minutes to 1.0V end voltage within 1 hour after being fully charged.

5-3-3.

The battery unit shall be capable of supplying 720 mA continuous discharge current for a minimum of 300 minutes to 1.0V end voltage within 1 hour after following process.

- Charge with 720 mA for 16 hours after discharged with 720 mA to 1.0V.

Remarks: Item 5-3-3.is applied only for the capacity measurement. Please do not use item 5-3-3.for the design of the charger.

5-4. Internal Impedance

After the battery unit is fully charged, within 1~4 hour(s), the internal impedance is not greater than 8mΩ, as tested by 1000Hz AC source.

5-5.Cycle Life

The battery unit shall be capable of 300 minimum cycles under the conditions as follows(The ambient temperature is 18~22 deg.C).

Charge	:Paragraph 5-1
Rest	:1 hour

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Discharge :Paragraph 5-3-2  
Rest :1 hour

After 300 cycles, discharge time as specified in paragraph 5-3-2 shall be a minimum of 72 minutes.

## 5-6.Over-discharge

Fully charged battery unit, when discharged with 7 ohm load for 8 hours,shall not cause damage, leakage, salting or degradation in performance characteristics as specified herein.

## 5-7.Temperature Characteristics

### 5-7-1.

Within 1 hour after fully charged at 40 deg.C, discharge time shall be a minimum of 84 minutes at 20 deg.C as specified in paragraph 5-3-2.

### 5-7-2.

Within 1 hour after fully charged at 20 deg.C, discharge time shall be a minimum of 84 minutes at 0 deg.C as specified in paragraph 5-3-2.

## 5-8.Self-discharge

### 5-8-1.

After fully charged unit is stored for 30 days at 20 deg.C, discharge time shall be a minimum of 72 minutes as specified in paragraph 5-3-2.

### 5-8-2.

After fully charged unit is stored for 7 days at 40 deg.C, discharge time shall be a minimum of 72 minutes as specified in paragraph 5-3-2.

## 5-9.Safety

### 5-9-1.

The battery unit shall not explode when it is charged at 1800 mA for 5 hours.

However, it is acceptable for the battery unit to sustain leakage of battery fluid and show a change in appearance.

## 5-10.Vibration

The battery unit shall not sustain damage to its battery performance, when it is tested under the following conditions.

Conditions:	Amplitude	---4mm
	Cycle	---16.7Hz
	Direction	---Three directions(X,Y,Z)
	Time	---60 minutes

## 5-11.Supply

The battery unit shall be shipped at charged state.

## 6.STANDARD TEST CONDITIONS

The battery shall be evaluated within 1 month from the arrival date.

Above mentioned specifications are tested at 18~22 deg.C temperature and 60~70% humidity.

Please keep in mind the following points when designing and manufacturing equipment. Please insert in your instruction manual. To prevent equipment malfunctions from affecting the batteries, be sure to use protection devices for electrical circuits and batteries.

 ,!Danger!

- Failure to carefully observe the following procedures and precautions can result in leakage of battery fluid(electrolyte), heat generation, explosion, fire and serious personal injury!
- Never dispose of RD batteries in a fire or heat them.
- Do not connect the (+) positive and (-) negative terminals of RD batteries together with electrically conductive materials, including lead wires. Do not transport or store RD batteries with their uncovered terminals or connected with a metal necklace or other electrically conductive material. When carrying or storing batteries, use a special case.
- Only charge RD batteries using those specific chargers that satisfy Wentronic's specifications. Only charge batteries under the conditions specified by Wentronic.
- Never disassemble RD batteries. Doing so may cause an internal or external short circuit or

result in exposed material of battery reacting chemically with the air. It may also cause heat generation, explosion and fire. Also, this is dangerous as it may cause splashing of alkaline fluid.

- Never solder lead wires directly on to RD batteries.
- The (+) positive and (-) negative terminals of RD batteries are predetermined. Do not force the terminals to connect to a charger or equipment. If the terminals can not be easily connected to the charger or the equipment, check if the (+) and (-) terminals are incorrectly positioned.
- The gas release vent which release internal gas is located in the (+) positive terminal of the RD battery. For this reason, never deform his section or cover or obstruct its gas release structure.
- Do not directly connect RD batteries to a direct power source or the cigarette lighter socket in a car.
- Do not use RD batteries in any equipment other than those specified by Wentronic.
- RD batteries contain a strong colorless alkaline solution(electrolyte). The alkaline solution is extremely corrosive and will cause skin damage. If any fluid from a RD battery comes in contact with user's eyes, they should immediately flush their eyes and wash them thoroughly with clean water from the tap or another source and consult a doctor urgently. The strong alkaline solution can damage eyes and lead to permanent loss of eyesight.
- When RD batteries are to be incorporated in equipment or housed within a case, avoid air-tight structures, as this may lead to the equipment or the case being damaged or may be harmful to users.

### ,!Warning!

- Do not apply water, seawater or other oxidizing reagents to RD batteries, as this can cause rust and heat generation. If a battery becomes rusted, the gas release vent may no longer operate, and can result in explosion.
- Do not over-charge RD batteries by exceeding the predetermined charging period specified by the battery charger's instructions or indicator. If RD batteries are not fully charged after the battery charger's predetermined charging period has clasped, stop the charging process. Prolonged charging may cause leakage of battery fluid, heat generation, and explosion. Be sure to handle recharged batteries carefully as they may be not.
- RD batteries contain a strong colorless alkaline solution (electrolyte).If the skin or clothing comes in contact with fluid from a RD battery; thoroughly wash the area immediately with clean water from the tap or another source. Battery fluid can irritate the skin.
- Do not connect more than 21 RD batteries in series, as this may cause electrical shocks, leakage of battery fluid and heat generation.
- Do not remove the outer tube from a battery or damage it. Doing so will expose the battery to the risk of a short circuit, and may cause leakage of battery fluid, heat, generation, explosion and fire.
- If RD batteries leak fluid, change color, change shape, or change in any other way, do not use them, otherwise they may cause heat generation, explosion and fire.
- Keep RD batteries and the equipment using them out of the reach of babies and small children, in order to avoid accidental swallowing of the batteries. In the event the batteries are swallowed, consult a doctor immediately.
- When the operating time of a RD battery becomes much shorter than its initial operating time even after recharged, it should be replaced to a new battery as its battery life has ended.

### ,!CAUTION!

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- Do not strike or drop RD batteries.
- Store RD batteries out of the reach of babies and small children. When charging or using a battery, do not let babies or small children remove the battery from the charger or the equipment being used.
- Be sure to charge RD batteries within a temperature range of 0 to 40 deg C (degrees Celsius)
- Be sure to use the recommended charging method for RD batteries read the battery charger's instruction manual carefully
- Do not use or store battery at high temperature, such as in strong direct sunlight, in cars during hot weather, or directly in front of a heater. This may cause leakage of battery fluid. It could also impair performance and shorten operating life of RD batteries
- Be sure to turn off the equipment after use of RD batteries, otherwise may result in leakage of battery fluid
- After removed from equipment, store RD batteries in a dry place and within the recommended storage temperature range. This will help preserve the batteries' performance and durability and minimize the possibility of leakage of battery fluid or corrosion. (Wentronic recommends the storage temperature range from -20 to +30deg. (for longer service life).
- To use batteries for the first time after purchase or having not used them for a long period of time, be sure to charge them.
- After long term storage, there is a possibility that the battery could not be fully charged. In order to fully charge it, please charge and discharge battery for a few times.
- Do not use old and new batteries mixed together, or batteries at different charge levels. Do not use the RD battery mixed with a dry cell or other batteries of different capacity, type, or brand name. This may cause leakage of battery fluid and heat generation.
- If the RD battery terminals become dirty, clean up them with a soft dry cloth prior to use. Dirt on the terminals can result in poor contact with the equipment, loss of power, or inability to charge.

### WARRANTY

Wentronic will be responsible for replacing the batter against any defects or poor workmanship for six months from the date of shipping.

Any other problems caused by malfunction of the equipment or misuse of the battery are not under this warranty.

### SAFETY

To assure safety, please consult to the Wentronic technical staff for your applications including electrical specifications, mechanical designs, protective devices and any special specification.