

## **Twicell**® Sanyo Nickel-Metal Hydride Rechargeable Batteries



Carefully read this instruction manual before using Twicell batteries for the first time.

**Important:** For your safety and that of your customers observe all cautionary information provided in this manual. Save this manual for future reference. The following information is intended to highlight potential safety hazards that can be associated with the misuse, misapplication or damage to Twicell batteries. Please carefully evaluate the information in this section when using Twicell batteries (single cell or packed cells) or when using or manufacturing equipment incorporating Twicell batteries.

This manual is no substitute for your independent evaluation of equipment incorporating Twicell batteries. Customers incorporating Twicell batteries into their equipment must assure that their completed product has been properly designed, manufactured and tested. End users of equipment incorporating Twicell batteries should also be provided with sufficient warnings and instructions on their safe operation. As appropriate, some or all of the following warnings and information should be incorporated by you into the instruction manual accompanying your equipment.

## DANGER!

● Failure to carefully observe the following procedures and precautions can result in leakage of battery fluid (electrolyte), heat generation, bursting, fire and serious personal injury!

• Never dispose of Twicell batteries in a fire or heat them.

Doing so may melt the insulation, damage the gas release vents or protective devices, ignite hydrogen gas, cause leakage of battery fluid (electrolyte), heat generation, bursting and fire.

• Do not connect the ⊕(positive) and ⊖(negative) terminals of Twicell batteries together with electrically conductive materials, including lead wires. Do not transport or store Twicell batteries with their uncovered terminals or connected with a metal necklace or other conductive material. Doing so may short circuit a battery, which would result in excessive current flow and possibly cause leakage of battery fluid, heat generation, bursting and fire. When carrying or storing batteries, use a special case.

• Only charge Twicell batteries using those specific chargers that satisfy Sanyo's specifications. Only charge batteries under the conditions specified by Sanyo. Failure to follow proper charging procedures may cause excessive current flow, loss of control during charging, leakage of battery fluid, heat generation, bursting and fire.

• Never disassemble Twicell 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, bursting and fire. Also, this is dangerous as it may cause splashing of alkaline fluid.

• Never modify or reconstruct Twicell batteries. Protective devices to prevent danger are built into batteries (single cell or packed cells). If these are damaged, excessive current flow may cause loss of control during charging or discharging of the battery, leakage of battery fluid, heat generation, bursting and fire.

• Never solder lead wires directly on to Twicell batteries.

The heat of the soldering operation may melt the insulation, damage the gas release vents or protective devices, cause leakage of battery fluid, heat generation, bursting and fire.

• The ⊕(positive) and ⊖(negative) terminals of Twicell batteries are predetermined. Do not force the terminal connection to a charger or equipment. If the terminals can not be easily connected to the charger or equipment, check if the ⊕ and ⊖ terminals are correctly positioned. If the terminals are reversed, during charging the battery may be discharged rather than charged. Furthermore, reversed connections may cause abnormal chemical reaction in the battery, the flow of abnormal currents, leakage of battery fluid, heat generation, bursting and fire.

• The gas release vent which release internal gas is located in the ⊕ positive terminal of the Twicell battery. For this reason, never deform this section or cover or obstruct its gas release structure. If this section is deformed or covered or obstructed, the gas release vent will not function properly, possibly causing leakage of battery fluid, heat generation, bursting and fire.

• Do not directly connect Twicell batteries to a direct power source or the cigarette lighter socket in a car. High voltage may cause excessive current flow, leakage of battery fluid, heat generation, bursting and fire.

• Do not use Twicell batteries in any equipment other than those specified by Sanyo. Depending on the equipment being used, doing so may cause abnormal current flow, leakage of battery fluid, heat generation, bursting and fire.

● Twicell batteries contain the strong colorless alkaline solution (electrolyte). The alkaline solution is extremely corrosive and will cause skin damage. If any fluid from Twicell battery comes in contact with a user's eyes, they should immediately flush their eyes and wash them thoroughly with clean water enough 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 Twicell batteries are to be incorporated in equipment or housed within a case, avoid air-tight structures as this may lead to the equipment or case being damaged or may be harmful to users.

## WARNING!

● Do not apply water, seawater or other oxidizing reagents to Twicell 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 bursting.

● Do not connect more than 21 Twicell batteries in series, as this may cause electrical shocks, leakage of battery fluid and heat generation.

● Keep Twicell batteries or the equipment out of the reach of babies and small children, in order to avoid them to swallow batteries. In the event the batteries are swallowed, consult a doctor immediately.

● Do not charge or use Twicell batteries with the ⊕ and ⊖ terminals reversed. Charging batteries with the terminals reversed may discharge rather than charge the batteries, or it may cause abnormal chemical reaction in the batteries. Using batteries with the terminals reversed may discharge with of abnormal current, leakage of battery fluid, heat generation, bursting and fire.

● Do not over-charge Twicell batteries by exceeding the predetermined charging period specified by the battery charger's instructions or indicator. If Twicell batteries are not fully charged after the battery charger's predetermined charging period has elapsed, stop the charging process. Prolonged charging may cause leakage of battery fluid, heat generation, bursting. Be sure to handle recharged batteries carefully as they may be hot.

● 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, bursting and fire.

● If Twicell batteries leak fluid, change color, change shape, or change in any other way, do not use them, otherwise they may cause heat generation, bursting and fire.

● Twicell batteries contain the strong colorless alkaline solution (electrolyte). If the skin or clothing comes in contact with fluid from Twicell battery, thoroughly wash the area immediately with clean water from the tap or another source. Battery fluid can irritate the skin.

● When the operating time of a Twicell 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!

● Do not strike or drop Twicell batteries. Sharp impacts or concussions to Twicell batteries may cause leakage of battery fluid, heat generation, bursting and fire.

● Store Twicell batteries out of the reach of babies and small children. When charging or using a bat-

# Twicell®

The name "Twicell" derives from that it can be used for approximately twice as long as our standard Cadnica (Nickel-Cadmium) battery after one charging.

## High Capacity, Quick Charging, Greater Reliability- Twicell Provides Powerful Support for High-Tech Equipment.

SANYO named its high-performance nickel-metal hydride rechargeable batteries "Twicell", a name to suggest their outstanding characteristics. Twicell batteries last twice as long as SANYO's standard Cadnica [nickel-cadmium] batteries from a single charging cycle. In 1990, SANYO began the mass-production of Twicell batteries. Now Twicell batteries are one of the keys for the downsizing and advanced functions of high-tech equipment.

Twicell batteries use a positive electrode made of nickel oxide compound and a negative electrode made of an oxide absorbing alloy. These sophisticated materials combine with SANYO's proprietary technology to ensure unbeatably high performance and dependability. As a result, Twicell batteries have been a top seller right from the start. And now an extended Twicell line accommodates a broader range of applications.



### A Powerful Range

A broad range of nickel-metal hydride rechargeable batteries is available, ranging from cylindrical to rectangular (prismatic) types. Twicell SLIM rectangular batteries are ideal for more compact, efficient applications.

### High Capacity

SANYO's pursuit of higher capacity has increased Twicell capacity up nearly twice as high as standard Cadnica batteries, meaning Twicell batteries work much longer. This performance makes Twicell an effective power source for many kinds of high-tech equipment. Twicell batteries can also withstand over 500 charge / discharge cycles (conditions stipulated in IEC61951-2(Clause 4.4) ) for superior economy.

### Rapid Charging Capability

When a specifically designed charger is used, Twicell batteries can be charged in only 1.2 hours\*. A charge control module is also available.

\* Needs special charge control circuit.

### High Reliability

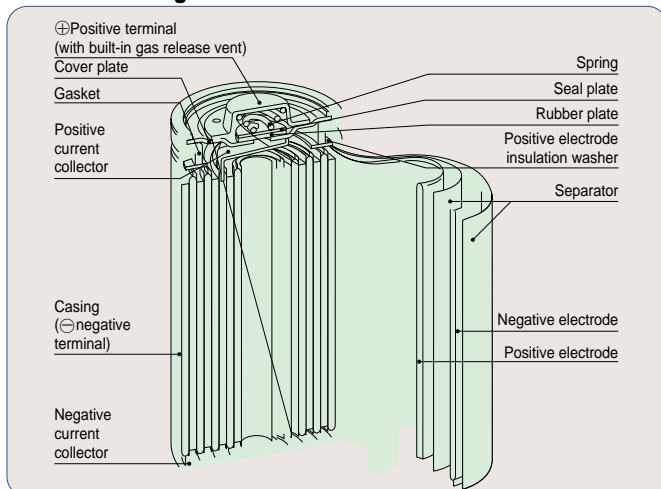
Following the market launch of Twicell batteries in October 1990, SANYO opened a new plant in Tokushima, Japan, in April 1992. SANYO's advanced manufacturing technology and strict quality control are the secrets behind the outstanding reliability of Twicell.

## High Cost Performance, Stable Discharge Voltage Powerful Twicell

### ■ Principle of the Nickel-Metal Hydride Battery

The nickel-metal hydride battery makes electrochemical use of the reversibility of the hydrogen absorption/release reaction in the hydrogen absorbing alloy. The battery uses a nickel oxide compound for the positive electrode, a hydrogen absorbing alloy for the negative electrode, and an aqueous alkaline solution for the electrolyte, which includes such constituents as potassium hydroxide (KOH). During charging, the electrolytic reaction of water causes the hydrogen, which forms in atomic form on the surface of the hydrogen absorbing alloy in the negative electrode, to diffuse into and be absorbed by the alloy (charge reaction). During discharge, the absorbed hydrogen reacts with hydroxide ions at the surface of the hydrogen absorbing alloy to once again become water (discharge reaction). In other words, the active material of the negative electrode reaction is hydrogen, and the hydrogen absorbing alloy acts as a storage medium for the active material. Sanyo has developed a hydrogen absorbing alloy, which absorbs a large quantity of hydrogen at low pressure and which can also release it. Sanyo employs this alloy in the Twicell.

### Structural Design



### ■ Features of Twicell Batteries

#### Extended service life and superior economy

Despite discharge capacity that is virtually equal to that of conventional dry cells, Sanyo Twicell batteries feature minimal internal resistance and exhibit excellent discharge characteristics under high-rate discharge current conditions. With output power much higher than that of dry cells. Twicell batteries can withstand over 500 repeated charge / discharge cycles (conditions stimulated in IEC61951-2(Clause 4.4) , as well as offering outstanding economy. In addition, even though the batteries are stored for a long time, the original capacity is almost recovered by repeated charging/discharging, offering excellent storage characteristics.

#### Wide-ranging lineup and interchangeability with dry cells

Customized assembled batteries tailored to specific equipment space requirements are also available.

#### Excellent high-rate discharge performance and overcharge/overdischarge capability

Sanyo's original electrode manufacturing process and current collectors minimize internal resistance, which in turn enables high-rate discharging and guarantees stable discharge voltage.

#### Improved reliability with wide operating temperature and humidity ranges

In addition to displaying only minimal variation in performance over a wide temperature range, their totally-sealed construction gives Twicell batteries high resistance to humidity. Sanyo Twicell batteries are manufactured under strict quality control conditions, and undergo 100% inspection before shipment. This assures superior reliability.

#### Simple to maintain and strong

The special sealed construction eliminates the need to replenish the electrolyte, for easier maintenance. As Sanyo Twicell batteries may be installed in any direction in equipment, they are exceptionally easy to handle. Moreover, Twicell batteries employ a rigid metal casing for superior resistance to shock and vibration.

## Twicell Line up

A broad range of Twicell is available. Twicell significantly contributes to the compact, lightweight, multi-function and low-cost features of various portable equipment



High capacity Twicell  
For mobile phones,  
notebook computers, etc



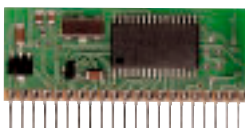
High-rate discharge Twicell  
For power tools, electric motor  
applications, etc



High durability Twicell  
For cordless phones, razors,  
power back-up uses, etc

Dry cell compatible Twicell  
For digital cameras,  
audio equipment, etc

High capacity Twicell Slim  
For mobile phones,  
audio equipment, etc



### ●Twicell and Cadnica chargers.

SANYO developed and manufactured fast-speed charging control hybrid IC (Integrated Circuit)SI-111"for charging Twicell (Nickel-metal hydride rechargeable) and Cadnica (Nickel-Cadmium) batteries. The SI-111 charging system is perfect for batteries as it makes maximum use of the specialized knowhow accumulated by

an advanced battery manufacturer like SANYO which is dedicated to researching battery performance and features.Orders for the charger involved the initial development stages right up to the finished product as this new technology aroused considerable interest. SANYO manufactures chargers optimized for battery categories and applications that require normal or fast charging.

# High Cost Performance, High Energy Density

### ■ Features

#### High capacity

High capacity Twicell has shown the high energy density by using newly developed materials and constitution. High capacity Twicell can contribute to prolonging the running time of the equipment.

#### Rapid charging capability

When a specifically designed charger is used, Twicell batteries can be charged in only 1.1 hours\*. A charge control module is also available.

\* Needs special charge control circuit.

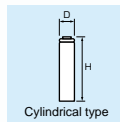
#### A broad range

A broad range of high capacity Twicell is available. High capacity Twicell is ideal for more compact, efficient applications.

### ■ Use

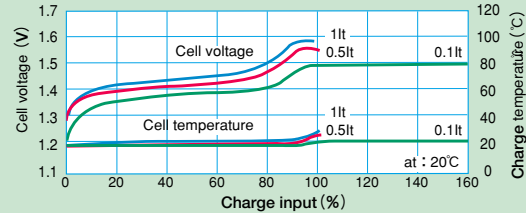
For mobile phones, 2-way radios and other communication devices.

For notebook computers, etc.

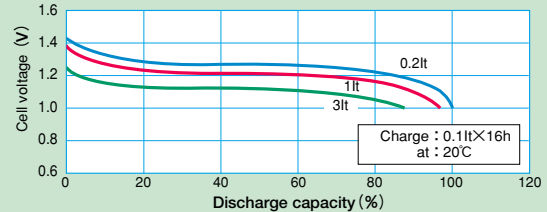


### Characteristics(HR-AAU)

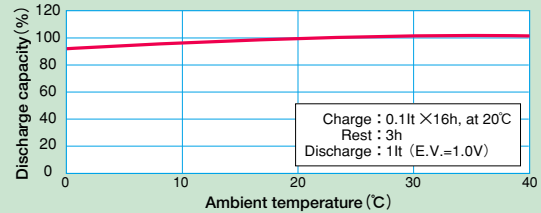
#### ● Change Characteristics



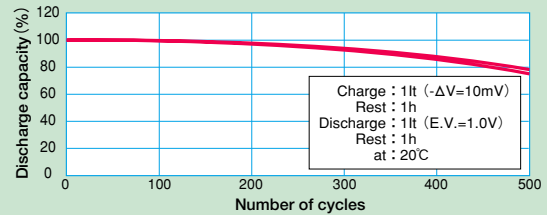
#### ● Discharge Characteristics



#### ● Temperature Characteristics



#### ● Charge/Discharge Cycle Characteristics



### ■ Ratings

〈High capacity Twicell〉									
Model No.	Voltage (V)	Typical Capacity (mAh)*1	Minimum Capacity (mAh)*2	Quick-Charge*3		Dimensions(mm) (incl. tube)*4		Weight (approx.g)*4	Notes
				Current(mA)*3	Time(hr.)	Diameter(D)	Height(H)		
HR-AAAU	1.2	730	650	730	1.1	10.5	43.6	13	For mobile phones and other communication devices
						10.5	44.5		
HR-5/4AAAU	1.2	850	760	850	1.1	10.5	50.0	15	For mobile phones and other communication devices
HR-5/3AAAU	1.2	1000	920	1000	1.1	10.5	67.5	19	For mobile phones and other communication devices
HR-4/5AAU	1.2	1350	1300	1350	1.1	14.5	43.0	24	For mobile phones and other communication devices
HR-AAUL	1.2	1450	1300	1450	1.1	14.2	49.0	27	For 2-way radios and other communication devices
HR-AAU	1.2	1650	1500	1650	1.1	14.2	50.0	28	For 2-way radios and other communication devices
HR-4/5AU	1.2	2150	1950	2150	1.1	17.0	43.0	35	For 2-way radios and other communication devices
HR-AU	1.2	2700	2450	2700	1.1	17.0	50.0	40	For 2-way radios and other communication devices
HR-4/3AU	1.2	4000	3600	3000	1.5	17.0	67.5	55	For notebook computers, etc.
HR-4/3FAU	1.2	4000	3600	3000	1.5	18.0	67.5	62	For notebook computers, etc.
		4500	4100	3000					

\*1 Average capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours.

\*2 Minimum capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours. \*3 Needs specific charger. \*4 Including tube.

# Superior Reliability and Stable Characteristics

### ■ Features

#### Superior service life

High durability Twicell realizes superior service life than high capacity Twicell at continuous low-rate charging and charge and discharge cycles. High durability Twicell offers better performance for cordless phones, power back-up uses, etc.

#### A powerful range

A broad range of high durability Twicell is available. High durability Twicell is available for many applications.

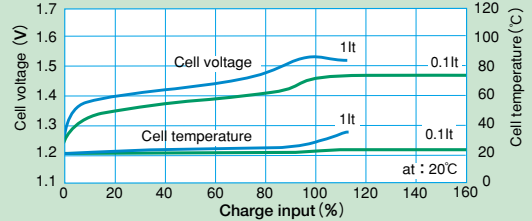
### ■ Use

For cordless phones, razors, power back-up uses, etc.

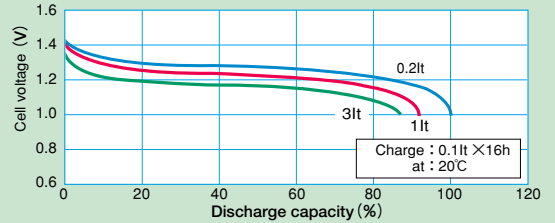


### Characteristics(HR-AAC)

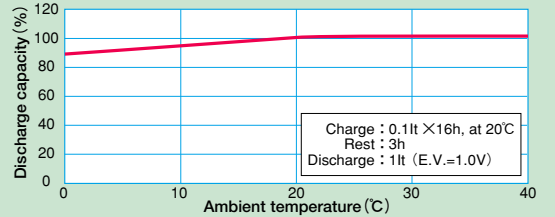
#### ● Change Characteristics



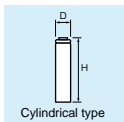
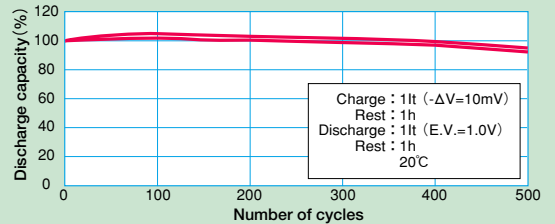
#### ● Discharge Characteristics



#### ● Temperature Characteristics



#### ● Charge/Discharge Cycle Characteristics



### Ratings

〈High durability Twicell〉									
Model No.	Voltage (V)	Typical Capacity (mAh)*1	Minimum Capacity (mAh)*2	Quick-Charge*3		Dimensions(mm) (incl. tube)*4		Weight (approx.g)*4	Notes
				Current(mA)*3	Time(hr.)	Diameter(D)	Height(H)		
HR-2/3AAAUC	1.2	400	350	400	1.1	10.5	30.0	9	For cordless phones, PHS, etc.
HR-4UC	1.2	650	600	650	1.1	10.5	44.5	13	For cordless phones, PHS, etc.
HR-4/5AAUC	1.2	1100	1000	1100	1.1	14.2	43.0	23	For razors, cordless phones, toothbrushes, etc.
HR-AAC	1.2	1100	950	1100	1.1	14.2	50.0	27	For razors, cordless phones, toothbrushes, etc.
HR-4/5AUC	1.2	1700	1550	1700	1.1	17.0	43.0	35	For razors, toothbrushes, etc.
HR-AUC	1.2	2100	1900	2100	1.1	17.0	50.0	40	For power back-up uses, etc.
HR-4/3FAUC	1.2	3700	3300	3000	1.5	18.0	67.5	62	For power back-up uses, etc.
HR-SCC	1.2	2100	1900	2100	1.1	23.0	43.0	59	For power back-up uses, etc.

\*1 Average capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours.

\*2 Minimum capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours. \*3 Needs specific charger. \*4 Including tube.

# Stable Discharge Voltage at High-rate Discharge

### ■ Features

#### Superior high-rate discharge characteristics

Sanyo's original electrode manufacturing process and current collectors minimize internal resistance, which in turn enables high-rate discharging and guarantees stable discharge voltage.

#### Improved reliability with wide operating temperature

In addition to displaying only minimal variation in performance over a wide temperature range.

#### A powerful range

High-rate discharge Twicell consists of wide variation. It enables to be used many applications.

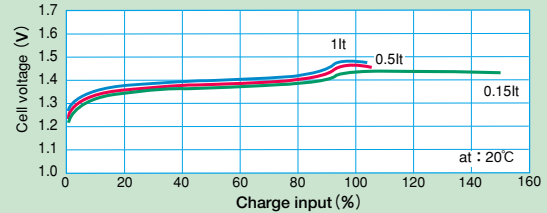
### ■ Use

For power tools, cordless cleaners, electric motor applications, power back-up uses, etc.

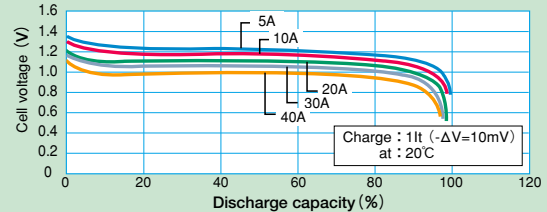


### Characteristics(HR-4/3FAUP)

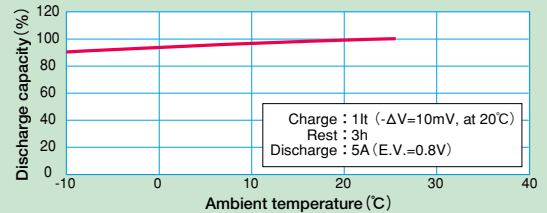
#### ● Charge Characteristics



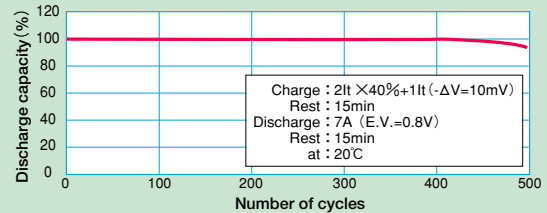
#### ● Discharge Characteristics



#### ● Temperature Characteristics



#### ● Charge/Discharge Cycle Characteristics



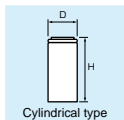
### Ratings

#### <High-rate discharge Twicell>

Model No.	Voltage (V)	Typical Capacity (mAh)*1	Minimum Capacity (mAh)*2	Quick-Charge*3		Dimensions(mm) (incl. tube)*4		Weight (approx.g)*4	Notes
				Current(mA)*3	Time(hr.)	Diameter(D)	Height(H)		
HR-4/5FAUP	1.2	1950	1800	1950	1.1	18.1	43.2	39	For power tools, cleaners, electric motor applications, power back-up uses, etc.
HR-4/3FAUP	1.2	3200	3050	3200	1.1	18.1	67.0	60	For power tools, cleaners, electric motor applications, power back-up uses, etc.
HR-4/5SCU	1.2	2100	1900	2100	1.1	23.0	33.5	47	For power tools, cleaners, electric motor applications, etc.
HR-SC	1.2	2600	2300	2600	1.1	23.0	43.5	62	For power tools, cleaners, electric motor applications, power back-up uses, etc.
HR-SCU	1.2	3000	2700	3000	1.1	23.0	43.5	61	For power tools, cleaners, electric motor applications, power back-up uses, etc.
HR-D	1.2	7300	6500	5000	1.7	34.0	59.3	175	For electric motor applications, power back-up uses, etc.

\*1 Average capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours.

\*2 Minimum capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours. \*3 Needs specific charger. \*4 Including tube.





# High Capacity and Convenience

### ■ Features

#### Top level capacity in retail use rechargeable battery.

The equipment which need the high capacity like the digital camera is suitable.

#### Long charge/discharge cycle life as well as offering outstanding economy

Twicell can withstand over 500 repeated charge/discharge cycles (conditions stipulated in IEC61951-2(Clause 4.4) ). Twicell can reduce waste (the amount of used batteries) than that of dry cell.

### ■ Use

For digital cameras, PDA and audio equipment, etc.



**Portable charger which can charge AA/AAA size batteries at a time quickly and have auto voltage function for AC100V-240V**

### The charger for Nickel-Metal Hydride batteries

#### NC-MQR02

#### ■ Features

#### ● NC-MQR02 can charge AA/AAA size Nickel-Metal Hydride batteries at a time.

AA size Nickel-Metal Hydride batteries (HR-3U, Typ.2100mAh type)  
: approx. 230min.(four batteries), approx.105min.(two batteries)

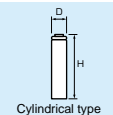
AAA size Nickel-Metal Hydride batteries (HR-4U, Typ.750mAh type)  
: approx. 145min.(two batteries)

#### ● Newly developed control systems prevent the battery from overcharging and charging error.

Newly developed peak detection and pulse control systems prevent the battery from overcharging and charging error. And the light informs the charging status.

#### ● Light weight and compact design.

NC-MQR02 is handy to carry. Weight : approx.95g (except the batteries), Thickness : 27.5mm. And they have the storage space of plug.



### ■ Ratings

〈Dry cell compatible Twicell〉									
Model No.	Voltage (V)	Typical Capacity (mAh) <sup>*1</sup>	Minimum Capacity (mAh) <sup>*2</sup>	Quick-Charge <sup>*3</sup>		Dimensions(mm) (incl. tube) <sup>*4</sup>		Weight (approx.g) <sup>*4</sup>	Notes
				Current(mA) <sup>*3</sup>	Time(hr.)	Diameter(D)	Height(H)		
HR-4U	1.2	750	700	750	1.1	10.5	44.2	13	For PDA, audio equipment, etc.
		1850	1750	1850	1.1	14.2	50.0	28	For digital cameras, information equipment, etc.
HR-3U	1.2	2100	2000	2100	1.1	14.35	50.4	29	

\*1 Average capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours.

\*2 Minimum capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours. \*3 Needs specific charger. \*4 Including tube.

# Space Saving Twicell SLIM / Rectangular Type

### ■ Features

#### Flat, rectangular shape

Compared with a cylindrical battery of the same capacity, storage space is reduced.

#### Charges in almost one hour

The revolutionary Twicell SLIM, with its superior gas recombination ability and voltage characteristics, can be initially charged in one hour in the fast charge control circuit using the cell voltage sensing method.

#### High energy density

Twicell SLIM has shown the high energy density by using newly developed materials and constitution. Twicell SLIM can contribute for prolong the running time of the equipment.

#### Stable discharge characteristics

This battery can maintain almost stable voltage during discharge.

#### Special sealed configuration

This effectively sealed battery can be installed in any direction for easy incorporation into equipment. In addition, there is no need to replenish electrolyte, making maintenance easy.

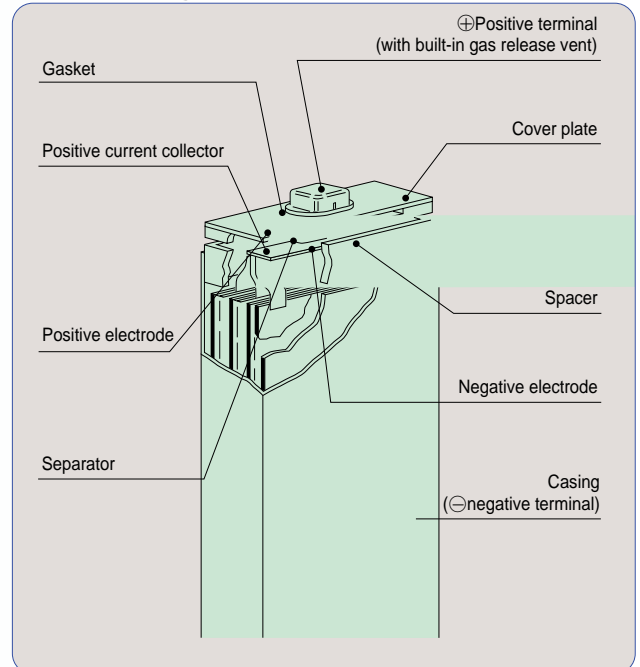
#### Long life and high reliability

Sanyo's innovative technologies realize high performance for a long time.

### ■ Use

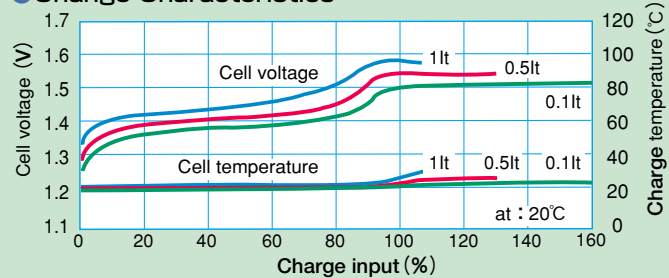
For mobile phones, 2-way radios and other communication devices  
For audio equipment, etc.

### Structural Design

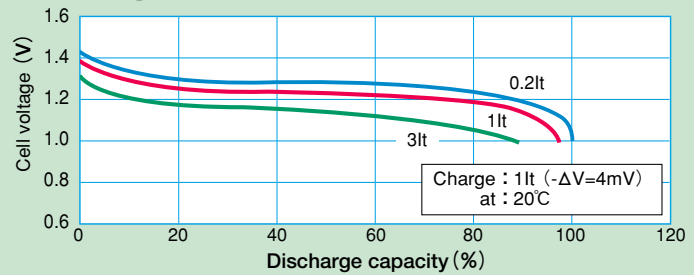


## Characteristics (HF-CIU)

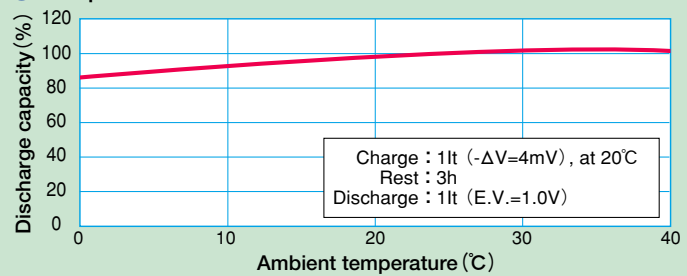
### ● Charge Characteristics



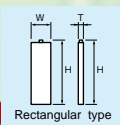
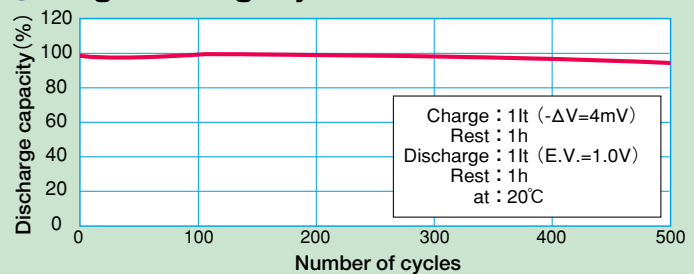
### ● Discharge Characteristics



### ● Temperature Characteristics



### ● Charge/Discharge Cycle Characteristics



## Ratings

### <High capacity Twicell Slim>

Model No.	Voltage (V)	Typical Capacity (mAh)*1	Minimum Capacity (mAh)*2	Quick-Charge*3		Dimensions(mm) (incl. tube)*4			Weight (approx.g)*4	Notes
				Current(mA)*3	Time(hr.)	Width(W)	Height(H)	Thickness(T)		
HF-C1U	1.2	650	580	650	1.1	17.0	35.5	6.2	13	For mobile phones and other communication devices
	1.2	700	670	700	1.1	17.0	35.5	6.2	14	
HF-C2U	1.2	900	830	900	1.1	17.0	35.5	8.4	18	For mobile phones and other communication devices
HF-B1U	1.2	860	785	860	1.1	17.0	48.0	6.2	18	For mobile phones and other communication devices
HF-A1U	1.2	1350	1250	1350	1.1	17.0	67.0	6.2	26	For mobile phones, PDA, etc.
	1.2	1350	1300	1350	1.1	17.0	67.0	6.2	26	For audio equipment, etc.
HF-D4U	1.2	640	600	640	1.1	16.0	34.0	6.6	13	For mobile phones and other communication devices
HF-E5U	1.2	900	830	900	1.1	14.5	48.2	7.4	18	For mobile phones and other communication devices

\*1 Average capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours.

\*2 Minimum capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours. \*3 Needs specific charger. \*4 Including tube.

# Types and Applications of Twicell Batteries

Application	Type	Twicell Batteries	
		Twicell	Twicell SLIM
Audio	Radio Cassette Recorder	●	●
	Radio	●	●
	Head Set Stereo	●	●
	Mini Disc	●	●
	Wireless Microphone	●	
Camera	Camcorder	●	
	AF Camera	●	
	Digital Camera	●	
Remote controller	Remote controller		
Information	Notebook Computer	●	
	Mini-Notebook Computer, PDA	●	
	Potable Printer	●	
	Organizer, Calculator	●	●
	Fax, Copy		
	Data Entry	●	●
Communication	2 Way Radio	●	●
	Cordless Phone	●	
	Mobile Phone	●	●
	DECT Phone	●	●
Home Appliance	Electric Razor	●	
	Vacuum Cleaner	●	
Power Tool	Power Tool	●	
Emergency	Fire Alarm	●	
	Emergency lights	●	
	Emergency Communicator	●	
Light	Photographic Lighting Equipment	●	
	Light	●	
Toy	Remote Control Toys	●	
	Game Machine	●	●
Medical	Medical Equipment	●	
Construction	Solar-powered Equipment	●	
Transport	Power Assisted Bicycles or Vehicles	●	
Others	Dry Cell-applied Products	●	
	Robots,, Uninterrupted Power Systems (UPS)	●	
	Measuring Instrument	●	

## ⚠ Precautions for Incorporating Assembled Batteries

- When batteries are used at high temperature, their charge efficiency decreases and degradation of their performance and material properties is accelerated. To prevent this, keep the battery away from heat generating parts such as in transformers, and attempt to improve the heat radiation of equipment and battery.
- Reverse charging of battery may cause leakage of electrolyte (strong alkaline), thus calling for alkaline-resistant materials in the periphery of the battery. Together with the electrolyte, oxygen or hydrogen gas may leak. During design, measures must be incorporated to prevent combustion, which may be caused by sparks from motors or switches.
- Avoid contact-type connections such as those employing a spring, as an oxidized coating will form on the contact surface after prolonged periods of use, leading to possible improper contact. If a contact-type connection is used, remove the battery and wipe the contact with a cloth every few months to improve conductivity.
- Select the material for the connection plate that has excellent resistance to alkaline. The materials that contain copper may cause a trouble like rust.
- Avoid direct attachment to a printed board, as leakage will corrode the board. If direct attachment is necessary, consult Sanyo representative.

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