

Twicell[®] Sanyo Nickel-Metal Hydride Rechargeable Batteries



Twicell Batteries Handling Precautions

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 battery, do not let babies or small children remove the battery from the charger or the equipment being used.

● Children should not use Twicell batteries unless they have been carefully instructed on the contents of this instruction manual and their parents or guardians have confirmed that the children understand and appreciate the proper usage and safety hazards presented by the batteries.

● Be sure to charge Twicell batteries within a temperature range of 0 to 40°C (degrees Celsius). When used at temperatures outside this range (0 to 40°C) the batteries may cause leakage of battery fluid or heat generation. It could also impair performance or shorten service life of Twicell batteries.

● Do not charge Twicell battery when it has been cooled to 0°C or below. Doing so may cause leakage of battery fluid, impair performance or shorten operating life of Twicell batteries.

● 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 Twicell batteries.

● Do not use old and new batteries mixed together, or batteries at different charge levels. Do not use the Twicell battery mixed together with a dry cell or other battery of different capacity, type, or brand name. This may cause leakage of battery fluid and heat generation.

● When more than two batteries are to be used together, charge them simultaneously prior to use. If they are not charged at the same time, it could cause leakage of battery fluid and heat generation.

● Do not connect Twicell batteries in parallel as this may cause leakage of battery fluid, heat generation, bursting and fire.

● For the recommended charging method for Twicell batteries, read the battery charger's instruction manual carefully.

● If Twicell batteries do not perform or function well with certain equipment, refer to the instruction manual or warnings of the subject equipment.

● Do not charge Twicell batteries beyond the recommended time described in the instruction manual for charger or equipment. Over charging cause leakage of battery fluid, heat generation, bursting and fire. It could also impair performance and shorten service life of Twicell batteries.

● After long term storage, there is a possibility that the battery could not be fully charged. In order to fully charge it, charge and discharge the battery for a few times.

● Be sure to turn off the equipment after use of Twicell batteries, as this may result in leakage of battery fluid.

● After they have been removed from equipment, store Twicell batteries in a dry place and within the recommended storage temperature range. This will help preserve the batteries' performance and durability and to minimize the possibility of leakage of battery fluid or corrosion. (For the indicated storage temperature range, refer to the rating table of this catalog. Sanyo recommends a temperature range from -20 to 30°C for longer service life).

● Before using the Twicell, be sure to read the operation manual and all precautions carefully, then store the manual and precautions carefully to use as reference when the need arises. If you have specific questions about the operation manual or the precautions, contact Sanyo at the location listed on the last page of this manual.

● If corrosion, heat generation or other abnormalities with new Twicell batteries are detected. Immediately stop using them and return them to the store that they were purchased from.

● If the Twicell battery terminals become dirty, clean 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.

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 a nickel oxide compound and a negative electrode made of a hydrogen 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.

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.

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.

High Reliability

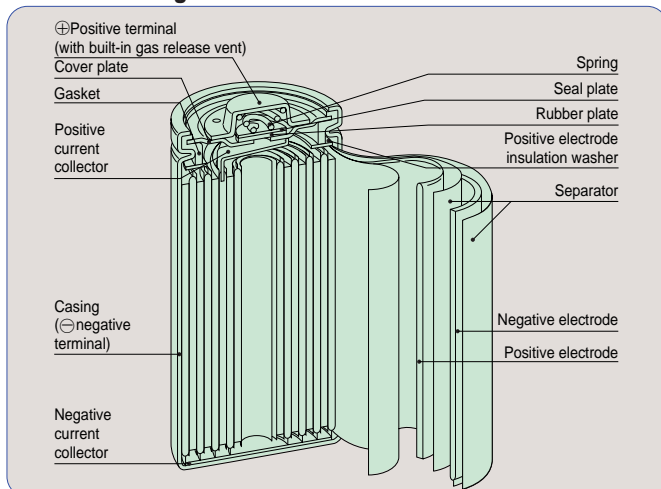
SANYO's advanced manufacturing technology and strict quality control are the secrets behind the outstanding reliability of Twicell.

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. 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.

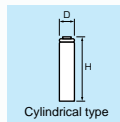
A broad range

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

Use

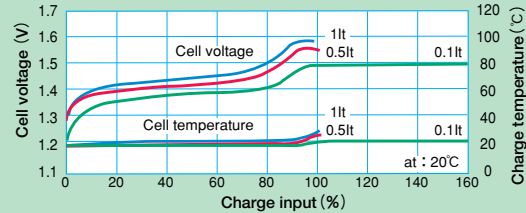
For mobile phones, 2-way radios and other communication devices.

For notebook computers, etc.

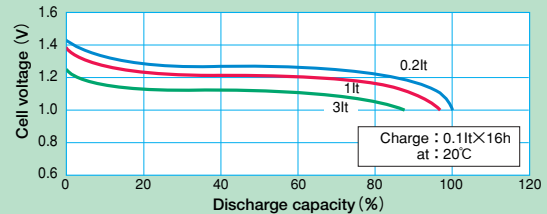


Characteristics(HR-AAU)

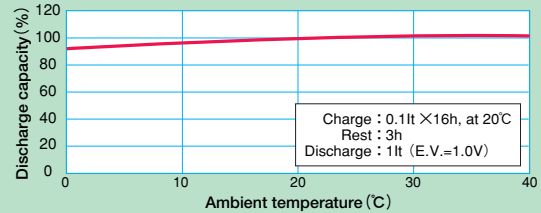
● Charge Characteristics



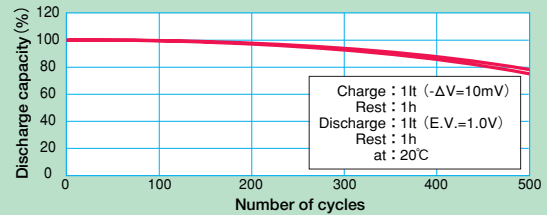
● Discharge Characteristics



● 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-AAAAU	1.2	730	650	730	1.1	10.5	43.6	13	For cordless phone, DECT and other communication devices
						10.5	44.5		
HR-5/4AAAU	1.2	850	760	850	1.1	10.5	50.0	15	For cordless phone, DECT and other communication devices
HR-4/5AAU	1.2	1350	1300	1350	1.1	14.5	43.0	24	For 2-way radios and other communication devices
HR-AA	1.2	1100	1000	1100	1.1	14.2	50.0	27	For home appliance uses, etc.
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						

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

*2 Minimum capacity when a single cell is discharged at 0.2lt after being charged at 0.1lt for 16 hours. *3 Consult Sanyo according to conditions of use. *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

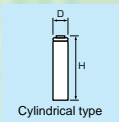
A broad range of high durability Twicell is available. High durability Twicell is available for many applications.

Newly developed "T series" realizes higher durability than conventional "C series" for emergency lights, etc.

Use

T series : For emergency lights, power back-up uses, etc.

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



■ 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-4/5FAUPT NEW	1.2	1650	1500	1650	1.1	18.1	43.2	38	For emergency lights, power back-up uses, etc.
HR-5/4SCUT NEW	1.2	3250	3000	3250	1.1	23.0	50.0	69	For emergency lights, power back-up uses, etc.

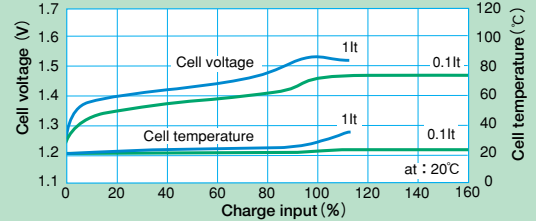
〈High durability Twicell〉									
Model No.	Voltage (V)	Typical Capacity (mAh)*1	Minimum Capacity (mAh)*2	Quick-Charge*3		Dimensions(mm) (incl. tube)*4		Weight (approx.g)*4	Notes
				Current(mA)*3	Time(hr.)	Diameter(D)	Height(H)		
HR-4UC	1.2	650	600	650	1.1	10.5	44.5	13	For cordless phones, PHS, etc
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	1000	950	1000	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.

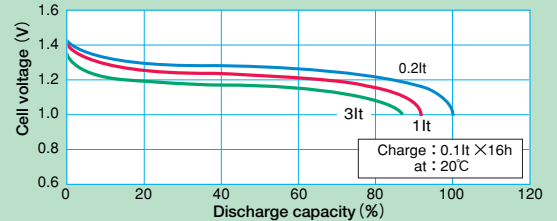
*2 Minimum capacity when a single cell is discharged at 0.2It after being charged at 0.1It for 16 hours. *3 Consult Sanyo according to conditions of use. *4 Including tube.

Characteristics(HR-AAC)

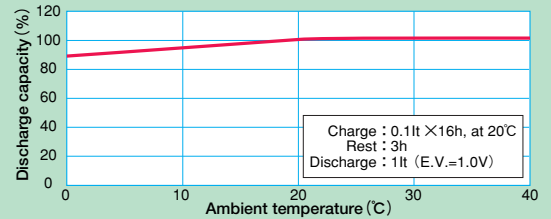
● Charge Characteristics



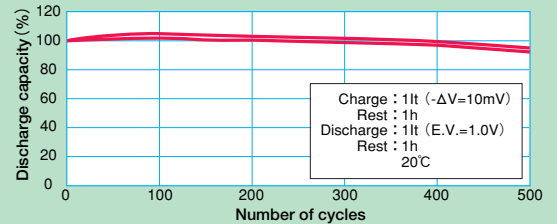
● Discharge Characteristics



● Temperature Characteristics



● Charge/Discharge Cycle Characteristics



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

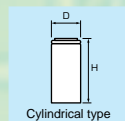
In addition to displaying only minimal variation in performance over a wide temperature range.

A powerful range

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

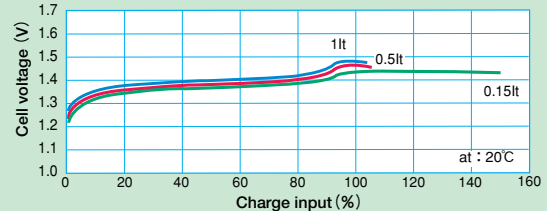
Use

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

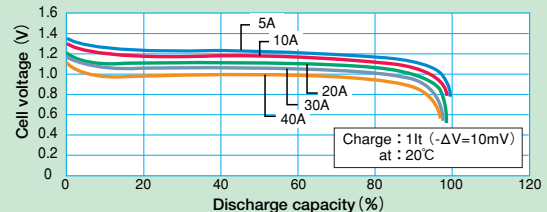


Characteristics(HR-4/3FAUP)

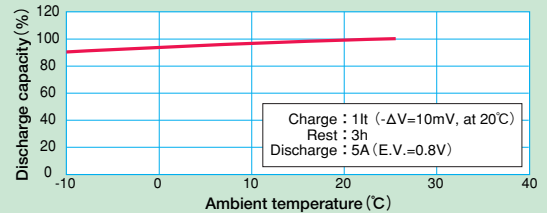
● Charge Characteristics



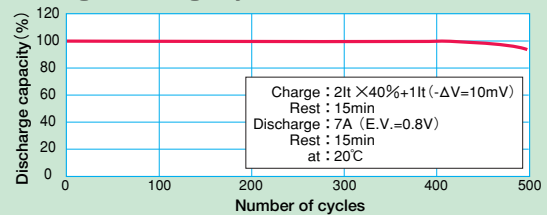
● Discharge Characteristics



● 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-4/3AAUP	1.2	2000	1800	2000	1.1	14.2	67.0	36	For power tools, cleaners, power back-up uses, etc.
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-4/3FAUHP NEW	1.2	2700	2500	2700	1.1	18.1	67.0	58	For power tools, etc. (Super high-rate discharge model for 50W/cell class high-rate discharge)
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.
		3600	3400	3600				58	For notebook computers, electric motor applications, 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	59	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.
HR-DU	1.2	9000	8450	5000	2.0	34.0	59.3	178	For electric motor applications, 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 Consult Sanyo according to conditions of use. *4 Including tube.

High Capacity and Convenience

■ Features

Dry cell compatible shape

Dry cell compatible Twicell can be used for most of equipment using AA and AAA size dry cells.

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 reduce waste (the amount of used batteries) than that of dry cell.

A powerful range

PTC^{*1} embedded model for toy uses and I-C3 system^{*2} embedded model for very rapid charging are newly developed.

*1 PTC(Positive Temperature Coefficient) :

Thermal protect device, it restrains current in case of external short circuit.

*2 I-C3 (In-cell-charge-control) system :

The system which has a pressure control mechanism developed by Rayovac Corporation.

Use

For digital cameras, PDA and audio equipment, etc.



AA size HR-3U

AAA size HR-4U

■ Ratings

〈Dry cell compatible 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-4U UP	1.2	900	840	900	1.1	10.5	44.5	13	For PDA, audio equipment, etc.
HR-3U UP	1.2	1700	1600	1700	1.1	14.2	50.0	27	For digital cameras, information equipment, etc.
		2100	2000	2100		14.35	50.4	29	
		2300	2100	2300				30	
		2500	2300	2500					
HR-3UR NEW	1.2	2200	2050	2200	1.1	14.35	50.4	30	For digital cameras, etc. (Special model for high-speed charging)
HR-3URS NEW	1.2	2300	2100	—*5	—*5	14.35	50.4	30	For digital cameras, etc. (I-C ³ system embedded for high-speed charging)
HR-3UHS NEW	1.2	1700	1550	160*6	12*6	14.2	50.0	27	For toys, etc. (Thermal protect device (PTC) embedded)

*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 Consult Sanyo according to conditions of use. *4 Including tube. *5 Need specific charging system. *6 Recommend low-rate charging shown in the rating.

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-MQR02N

■ Features

●NC-MQR02N can charge AA/AAA size Nickel-Metal Hydride batteries at a time.

AA size Nickel-Metal Hydride batteries (HR-3U, Typ.2500mAh type)
: approx. 280min.(four batteries), approx.125min.(two batteries)

AAA size Nickel-Metal Hydride batteries (HR-4U, Typ.900mAh type)
: approx. 185min.(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-MQR02N is handy to carry. Weight : approx.95g (except the batteries), Thickness : 27.5mm. And they have the storage space of plug.



Cylindrical type

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.

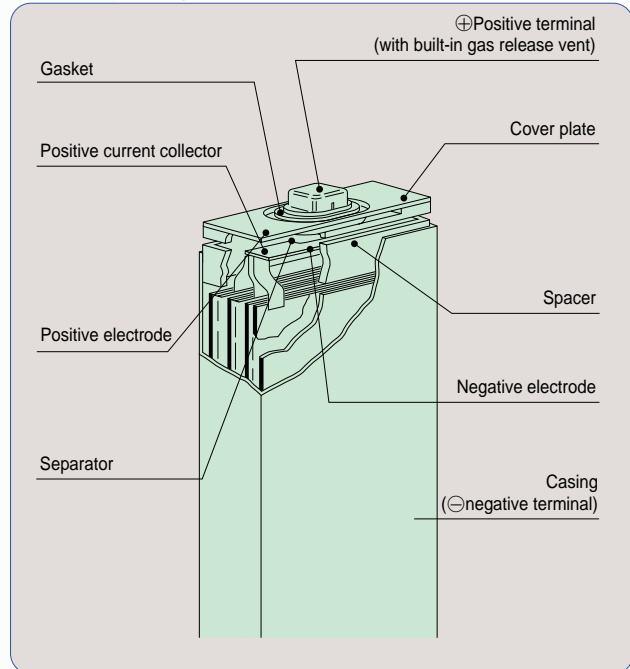
Long life and high reliability

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

Use

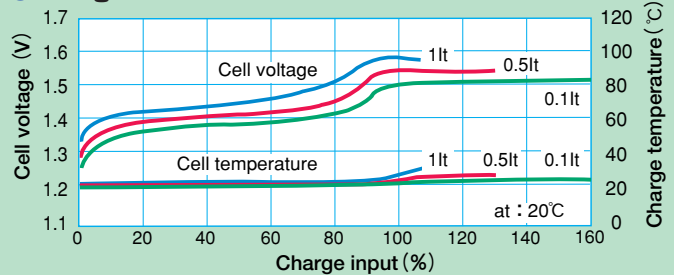
For mobile phones, 2-way radios and other communication devices
For audio equipment, etc.

Structural Design

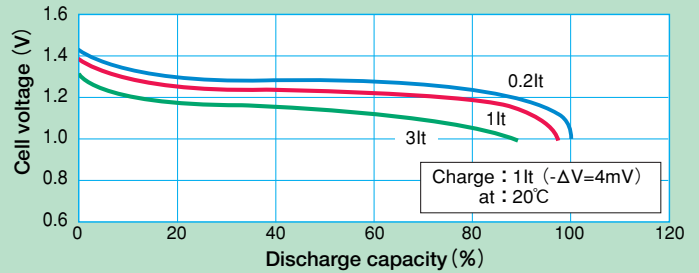


Characteristics (HF-C1U)

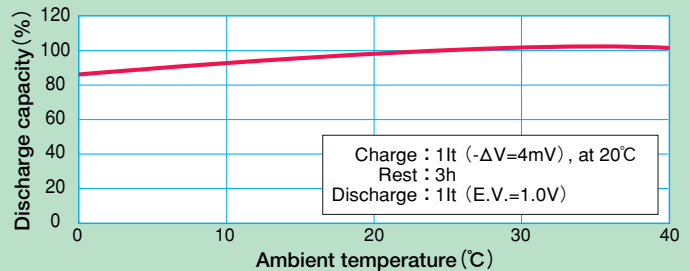
● Charge Characteristics



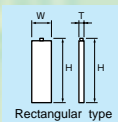
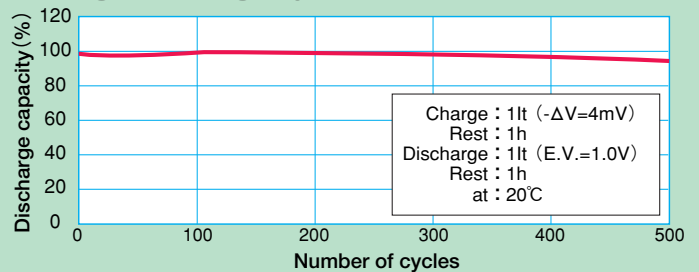
● Discharge Characteristics



● Temperature Characteristics



● Charge/Discharge Cycle Characteristics



Ratings

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
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 0.2lt after being charged at 0.1lt for 16 hours.

*2 Minimum capacity when a single cell is discharged at 0.2lt after being charged at 0.1lt for 16 hours. *3 Consult Sanyo according to conditions of use. *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		●	●
	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		●	
	Dry Cell-applied Products		●	
Others	Robots, Uninterrupted Power Systems (UPS)		●	
	Measuring Instrument		●	●

Typical applications are shown in the table. For other purposes, consult Sanyo.

⚠ 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.



Certified by ISO 9000S



SANYO Electric Co., Ltd. Mobile Energy Company, as a part of the SANYO Electric Group, have received the Environmental Management System ISO 14001 certification.

- Approval Certificate NO: EC00J0303
- Registration Date: 19/Mar/2001

USA

SANYO Energy (USA) Corporation
TEL : (+1)619-661-6620
FAX : (+1)619-661-6743
New Jersey Office
TEL : (+1)201-843-7200
FAX : (+1)201-843-3870
Florida Office
TEL : (+1)352-376-6711
FAX : (+1)352-376-6772
Atlanta Office
TEL : (+1)770-476-4558
FAX : (+1)770-476-7558
Dallas Office
TEL : (+1)972-398-0307
FAX : (+1)972-398-8477

CANADA

SANYO Canada Inc.
TEL : (+1)905-760-9944
FAX : (+1)905-760-9303

EUROPE

SANYO Component Europe GmbH
TEL : (+49)89-4600950
FAX : (+49)89-460095190
Scandinavia Representative Office
TEL : (+45)33-27-09-10
FAX : (+45)33-27-04-44
Italy Representative Office
TEL : (+39)2-55180490
FAX : (+39)2-55180502
France Representative Office
TEL : (+33)1-4131-8484
FAX : (+33)1-4131-8485

SANYO Energy (UK) Company Ltd.

TEL : (+44)1442-213121
FAX : (+44)1442-212021

ASIA

SANYO Energy (HK) Company Ltd.

TEL : (+886)2-8780-8810
FAX : (+886)2-8780-8850

SANYO Energy (Taiwan) Company Ltd.

TEL : (+886)2-8780-8810
FAX : (+886)2-8780-8850

SANYO Energy (Singapore) Corporation Pte., Ltd.

TEL : (+65)6736-3100
FAX : (+65)6736-1230

AUSTRALIA

SANYO Australia Pty. Ltd.

TEL : (+61)2-8825-2822
FAX : (+61)2-9678-9381

SANYO Electric Co., Ltd.

〈Mobile Energy Company〉

〈Factory, Sales〉

Sumoto-city, Hyogo, Japan

TEL : (+81)799-24-4111

FAX : (+81)799-24-4123

