

Think GAIA  
For Life and the Earth

**SANYO**

**eneloop:**  
a helpful guide book  
for customer usage



**eneloop**  
Ready to use Rechargeable Battery  
**book**

**eneloop**  
Ready to use Rechargeable Battery

Please make use of eneloop keeping in a safe place.

The number of dry batteries sold in one year in worldwide is about 40 billion.\*1

eneloop represents a lifestyle change!

Change the future of the environment by changing your battery.

## index

eneloop is not only rechargeable, but it is also recyclable. This makes eneloop an excellent choice from both an environmental and economic point of view.

What is eneloop? P.3

Economic Benefits of eneloop P.4

Low Self-Discharge Battery P.5

eneloop can be used in the same range of applications as disposable batteries and has a significantly longer runtime.\*2

eneloop versus Dry-Cell Batteries P.6

High-Power Battery P.7

High Performance in Low-Temperature Conditions P.8

Wide Range of Applications P.9&10

eneloop Q&A P.11-18



\*1: Sanyo's presumption.

\*2: Please refer P9-10 for details of the recommended application.

## What is eneloop?

It is a new battery that can be used as easily as a dry-cell battery, and reused simply by recharging it. eneloop is the new battery that might just change your life style.

### Advantages of

#### Rechargeable Batteries

Reusable, recyclable, and durable.



### Advantages of

#### Dry-cell Batteries

Can be used right after purchasing, and can be stored for a long period of time.

The advantages of the rechargeable battery and the dry-cell battery are combined into one

## Economic benefits of eneloop

Because you can recharge eneloop up to 1,000 times<sup>\*1</sup>, the cost per use is only 4 yen.<sup>\*2</sup> The average cost per recharge of only 0.2 yen<sup>\*3</sup> makes it far more economical than using disposable batteries.

### Dry-Cell Batteries



eneloop



Re-charge

The cost for one-time use is only 4 yen.

eneloop can be recharged 1,000 times, which represents a huge economic advantage

\*1: A guide-line for battery life based on IEC61951-2 : 2003 (7.4.1.1)

\*2: For HR-3UTG in Japan, calculation was made according to the (price of charger + price of battery + electricity cost) ÷ 1000 cycles.

\*3: Calculation made when one HR-3UTG battery was charged on our charger NC-TG1.

## Low Self-Discharge Battery

Sanyo eneloop batteries represent a solution to the problem of excessive self-discharge.

### How much energy still remains? \*1



**Because self-discharge is controlled, you can use eneloop right after purchasing.**  
(all batteries have been charged before shipping)

- applications which is used for a long period of time can also be used.
- eneloop is an ideal battery for both high-current and low-current applications.
- eneloop can be used as a spare battery in emergencies.

eneloop is ready-to-use even  
2 years after purchasing \*2

\*1: Result of a test made by leaving the battery at an ambient temperature of 20 deg. C (self discharging condition: 740mA (EV=1.0V). A comparison made with our Nickel-Metal Hydride battery (2500mAh).

\*2: Avoid leaving the battery in high temperature areas or areas which are excessively humid. Also, we recommend that your eneloop batteries be charged every year.

## eneloop versus Dry-Cell Batteries

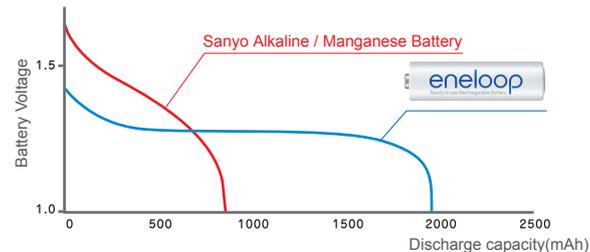
### Advantage of eneloop

eneloop supplies constant voltage from beginning to end.

### Things That Must Be Taken into Account

Unlike dry-cell batteries, the initial voltage of eneloop is low. eneloop may not function in equipment that requires batteries with higher voltage. Also, eneloop may function when used in flashlights but may provide only a dim light, in contrast to a higher voltage battery.

### Change in voltage compared with dry-cell batteries (under a continuous discharge at 500mA, 25 deg.C)



eneloop can be used for a long  
time at a constant voltage

## High Power Battery



A digital camera can take approximately 4.4 times more shots.

Number of Shots a Digital Camera can take\*

About  
**4.4 Times**  
More Powerful



About  
**514** Shots  
eneloop

About  
**117** Shots  
Sanyo Dry-Cell Battery

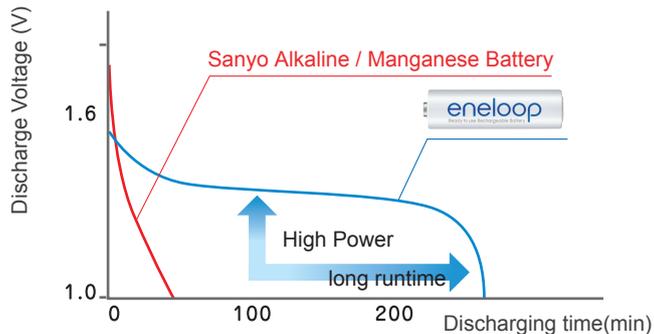
Digital camera can take up to 500 shots

\*Testing Condition at HR-3UTG. When used Sanyo digital camera DSC-S4. One picture taken every 20 seconds with LCD on and flash used every third shot. This may change depending on the equipment and other conditions and number of shots made. This is a comparison made with Sanyo Alkaline dry cell battery(LR6B)

## High Performance in Low-Temperature Conditions

eneloop has superior performance at 0 deg.C and can even be used at temperature as low as -10 deg.C.\*

### Discharging Characteristics at 0 deg.C (at 500mA continuous discharge)



Superior discharge at low temperature!

Shows great performance in outdoor use such as skiing etc.

\*operation time will be shorter than that of room temperature.

# Wide Range of Applications (eneloop can be used in various applications)

The table below compares the runtimes of an eneloop rechargeable battery and a dry-cell battery.

High Current Medium Current Low Current

*1					*2		*3
Digital Camera	Flash Gun	Dry-Cell Shaver	Motor-Driven Brush Electric Toothbrush	4-Wheel Drive Car	Flash Light	Stereo Radio Cassette Recorder	
							
Continuous Shoot Time	Continuous Flash Time	Continuous Use Time	Continuous Use Time	Continuous Run Time	Continuous Use Time	Continuous Play Time	
Dry-cell Battery About 0.5 to 1 hour	Dry-cell Battery About 1 to 2 hours	Dry-cell Battery About 1.5 to 2.5 hours	Dry-cell Battery About 1.5 to 2.5 hours	Dry-cell Battery About 1 to 2 hours	Dry-cell Battery About 3 to 4 hours	Dry-cell Battery About 4 to 5 hours	
eneloop About 2 to 3 hours	eneloop About 1.5 to 2 hours	eneloop About 3 to 4 hours	eneloop About 3 to 4 hours	eneloop About 2 to 3 hours	eneloop About 3 to 5 hours	eneloop About 5 to 6 hours	
MP3 Player	IC Recorder	Game Equipment	CD Player	Radio Tranceiver (special small power type)	Clock	Remote Controller	
							
Continuous Play Time	Continuous ON Time	Continuous ON Time	Continuous Play Time	Continuous ON Time*4	Battery ON Time	ON Time	
Dry-cell Battery About 5 to 6 hours	Dry-cell Battery About 10 to 12 hours	Dry-cell Battery About 18 to 20 hours	Dry-cell Battery About 20 to 30 hours	Dry-cell Battery About 40 to 60 hours	Dry-cell Battery*5 About 1 to 5 years	Dry-cell Battery*5 About 1 to 5 years	
eneloop About 6 to 7 hours	eneloop About 10 to 12 hours	eneloop About 18 to 20 hours	eneloop About 20 to 30 hours	eneloop About 40 to 60 hours	eneloop About 1 to 2 years	eneloop About 1 to 3 years	

\*1 The above specifications are based on the theoretical capacity of the battery and the consumption power rate of the equipment. It may vary greatly depending on the conditions of use, models used, ambient temperature and the condition of the equipment used.

\*2 For eneloop, runtime is measured beginning from a fully charged state. Performance time may be shorter if the battery has been left unused for a period of time after being fully charged.

\*3 The data in the table are approximations, and runtime specifications may be different when eneloop is used with applications not included in the table.

\*4 Dry-cell battery: AA Alkaline/Manganese dry-cell battery used. eneloop: AA Nickel Metal Hydrogen battery used. For MP3 player and IC recorder, AAA batteries were used.

\*1: For digital camera, Sanyo's DSC-S4 was used. One shot was taken every 20 seconds (flash ON every third time)

\*2: For flash lamp, two AA batteries were used.

\*3: For stereo radio-cassette recorder, 4 AA batteries were used.

\*4: For transmission, reception, and waiting times, a ratio of 1 transmission, 1 reception, to 8 waiting time was used.

\*5: As Manganese batteries are recommended for use in some remote controls and clocks, both test result s of Manganese and Alkaline batteries are shown.

## Do you want to know more about eneloop?

### Can eneloop be charged up to 1,000 times?

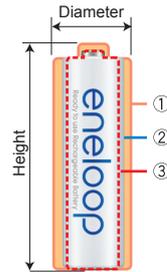
This is an estimate based on test results for battery life according to IEC standards (number of times after charging/discharging). The number may vary, however, depending on how the batteries were used. The number of times a battery may be used decreases as battery life draws to an end.

### What's the difference between 1.5V and 1.2V?

1.5V is the nominal voltage for dry cell batteries and Nickel-Metal Hydride batteries has nominal voltage of 1.2V. Dry cell batteries has slightly higher voltage than working voltage required in actual equipment. Though the Nickel-Metal Hydride battery is 1.2V, Nickel-Metal Hydride batteries are capable to provide similar performance as standard dry-cell batteries. Many devices which uses dry cell can also be used with eneloop.

### Size Difference with Dry-Cell Batteries

eneloop's size is based on IEC (International Electrotechnical Commission) standards. Some dry-cell batteries are smaller than eneloop. When you are trying to insert eneloop into such equipment, you may find the casing tight, or sometimes you may not be able to fit them at all. Do



not force the battery as you may damage eneloop's outer casing. In such cases, never use eneloop batteries. eneloop is suitable for most equipment.

- ① Maximum dimensions for dry-cell battery.\*<sup>1</sup>
- ② Size of eneloop.\*<sup>2</sup>
- ③ Size of Sanyo dry-cell battery\*<sup>2</sup>

\*1: IEC 60086-2 \*2: Actual measured value.

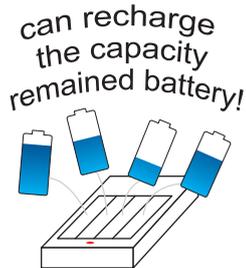
### What is the Difference Between "Best Before Date" and the Manufacturing Date?

"Best Before Date" refers to the optimal performances guaranteed if you use the battery only within this period. This limitation does not apply to eneloop, because Nickel-Metal Hydride batteries such as eneloop can be used at any time if they are electrically charged first. For reference the Manufacturing Date is printed on the package. eneloop batteries are shipped in charged status. (Due to the unique low self discharge characteristic, if it is within two years from Manufacturing Date, you can use them directly after purchasing without charging it first.)

## What is Memory Effect?

If Ni-Cd batteries and Nickel-Metal Hydride batteries are repeatedly charged before the stored energy is used up, the battery “memorizes” its altered, decreased life cycle. When you use it the next time, the voltage decreases immediately. Sometimes this causes the equipment to shut down. This is called the “memory effect”.

The voltage of enloop is higher than that of conventional Nickel-Metal Hydride batteries, and even if the battery is charged excessively, sufficient voltage is maintained, no memory effect occurs, and you can recharge the battery according to your needs.



## What about Connecting Two or More Batteries?

Do not use newer enloop batteries with batteries of different capacities or different manufacturers. Connecting enloop with older enloop batteries is no problem unless they are virtually dead. (We recommend that enloop be fully charged before use.) To ensure satisfactory performance, we recommend using batteries with the same capacities.

## My Equipment Does Not Work. Why?

It may be due to the following reasons:

### Cause 1 The battery may not be charged.

enloop is a rechargeable battery. Once it is used for the first time, it must be recharged before it is used again. Use our charger for this operation.

### Cause 2 The terminals may not be clean.

Touching the battery with your fingers may leave dust or dirt on the surface of positive and negative terminals. This causes the electrical resistance on the surface of the electrode to increase, which affects battery performance. If this happens, clean the terminals with a dry towel.

### Cause 3 Over-discharge.

If enloop batteries are used in low-current applications, there may be a voltage cutoff point below which enloop cannot power the application (e.g. a flashlight). When the enloop’s voltage falls below the cutoff point, the flashlight will go out, but enloop batteries will continue to discharge, as the circuit is not broken. Consequently, a film will develop on the terminals due to inactive electric current, and the enloop battery will become inactive. To fix the problem, drain the batteries in a high-current application (e.g. a digital camera) until the battery is empty, and then recharge it. Repeat this operation 2 to 3 times. If an application still does not function, it may be that the enloop battery charger is broken and failed to recharge the batteries, or the customer simply forgot to recharge them when they thought they did.



## Can enloop Be Used in Underwater Lamps?

No. Do not use it in equipment that must be air-tight. Such applications do not have a function to stop the discharge of electricity, and when more than one battery is used, it may cause the batteries to over-discharge. This in turn can trigger the generation of hydrogen gas inside of the battery, and since air-tight equipment is designed to prevent gas from being diffused, the flammable gas may cause an explosion when the equipment is switched on.



## My Battery Gets Hot. Is It OK?

Nickel-Metal Hydride batteries like enloop sometimes get as hot as 50 deg.C (hot when touched), but it is not abnormal. Our enloop charger has a temperature protective circuit in case of a temperature rise. After charging is complete, wait until the battery cools off before using it. If the battery gets abnormally hot, it may be because it is a dysfunctional battery. In this case, contact Sanyo's customer support.

## Where is the Best Place to Store My enloop Batteries?

Do not store them in humid or sunlit areas. Do not expose them to high temperatures. It is recommended to store them at room temperature. If stored fully charged, it is possible to use them for approximately two years. Depending on how they are stored, to ensure that they can be used for a long time, it is recommended that they be charged at least once every year. Do not store or keep them close to metallic items such as key chains, necklaces, money, and cell phones, as this may cause electrical shortage. Also, when storing enloop batteries in a metal box, do not put them adjacent to each other or other metallic items. (enloop should not even be placed next to gum wrappers).

## Is it Possible to Charge enloop with Other Manufacturers' Chargers?

No, we do not recommend it. Neither the construction nor the characteristics of both battery and charger are the same. Accordingly, we do not recommend that other manufacturers' batteries be charged with Sanyo chargers.

## When Selecting an Appropriate Charger

Items such as those listed below should be considered:

- What is the size of my battery, and how many of them can be charged at the same time?
- Charging speed.
- Does the charging lamp show that charging is complete?
- Is it compact?
- Can it be used in overseas countries (given the differences in voltage).

## Is it Possible to Use eneloop Worldwide?

Yes, if your charger has a function called Auto Voltage which is applicable to any voltage between 100 and 240V. You will likely need a plug adapter for your charger in these countries.

## Tips for using eneloop

- **eneloop lasts longer if stored in low temperatures and in dry conditions. But one must take care to prevent any part of the condensation.**
- **Leaving eneloop in an application may result in the battery discharging. If an application will not be used for a long period of time, remove the battery from the equipment.**



## What is a Spacer?

A spacer is a piece of equipment that enables smaller batteries to power applications that normally require size D and C batteries. In this way, eneloop size AA batteries can power an application that requires much larger batteries. Spacers have no relation to the battery's capacity. Spacers can be used with most applications. However, in some applications spacers do not reach the contact point of the battery holder. In such cases, do not use the spacer, and use size D and C batteries instead. The spacer is designed for emergency use. It is not intended as an equivalent alternative for D and C size cells. Finally, we also have another lineup of Nickel-Metal Hydride batteries besides eneloop that can be used in this spacer.



Just plug the eneloop into the adaptor and you can use it in your equipment. Of course the adaptors only adapt the mechanical dimensions of the eneloop.

(length and diameter and obviously not its electrical characteristics. The voltage and the capacity remains unchanged to the eneloop AA specification).