Rechargeable
Batteries

SANYO

CADNICA

Ni-Cd Batteries

Rechargeable Nickel Cadmium Batteries for Industrial Use

SF-5109

Sanyo's rechargeable sealed nickel cadmium batteries —Cadnica—power numerous cordless products, replacing conventional dry batteries while also serving as power backup sources and filling a number of new applications. Since they were first introduced in the market in 1963, Sanyo has continued to develop advanced type of Cadnica batteries, aiming them towards diversified market needs. There are now six categories; capacity ranges from 50mAh to 20Ah.

Sanyo Cadnica batteries are mass-produced on fully automated manufacturing lines where in-process inspections assure consistently high performance. This combination of strict quality control and Sanyo technological expertise assure reliable, trouble-free use of each and every Sanyo Cadnica battery.

Features of Sanyo Cadnica Batteries

1. **Long battery life**
   Life expectancy exceeds 1,000 charge/ discharge cycles.
2. **Permits high-current discharging**
   Minimized internal resistance in addition to the current collector (patented) makes high-current discharging possible.
3. **Stable discharging voltage**
   Voltage remains constant for approximately 90% of the discharge period.
4. **Overcharge capability**
   Batteries efficiently consume the gas generated during overcharging.
5. **Maintenance-free operation**
   There is absolutely no need for any type of maintenance. Therefore, Cadnica batteries can be safely used in any position.
6. **Built for safety**
   A highly reliable coil-spring type safety vent assures Cadnica battery safety.
7. **Wide usable temperature range**
   Superior temperature characteristics assure high performance despite temperature changes. Operation remains stable over a wide temperature range.
8. **High resistance to shock**
   Solid construction makes Cadnica able to withstand impact and vibration.
9. **Interchangeable with dry cells**
   Cadnica batteries can be used in all equipment now powered by dry cells since their dimensions are the same as conventional batteries. (N-1U, N-2U, N-3U, N-6PT and N-180AAA)

Cadnica battery applications

Type	Features	Recommended applications
1. Standard charge batteries	• Long service life. • Simple charging circuit for easy charging. • Wide range of capacities and sizes.	• Wide range of general-purpose applications. • To power products which require a high discharge current.
2. High-capacity batteries (KR-Series)	• High-capacity, lightweight design. • Good charge retention. • Simple charging circuit for easy charging.	• General-purpose applications for which longer operating time and/or lighter battery weight are required.
3. High-temperature batteries (for Stand-by use)	• Higher charge/discharge efficiency under high temperatures. • Longer life under trickle charging conditions.	• Emergency lights, etc. which subject batteries to trickle charging for long periods of time at high temperatures. • Security equipment and standby power applications.
4. High-temperature batteries (for Cycle use)	• Higher charge/discharge efficiency under high temperatures.	• Medical equipment etc., which require charge/discharge cycle use at high ambient temperature.
5. Fast-charge batteries	• Charging is controlled by temperature sensor and takes only 1 hr. • Charges to full capacity in 5 hours.	• Products such as professional equipment which require frequent and quick charging.
6. Memory backup batteries	• Long memory retention. • Extra long life and superior reliability. • Can be directly mounted on printed circuit boards. • Special leak-proof structure.	• Computer memory backup.

Cell Construction

This diagram shows the structure of a typical Cadnica battery. The following key points provide the extra advantages in Sanyo Cadnica battery performance.

1) Positive and negative electrodes

Both positive and negative electrodes are manufactured using Sanyo's original techniques which make the plates highly durable, uniform in quality and capable of superior gas consumption.

2) Current collectors

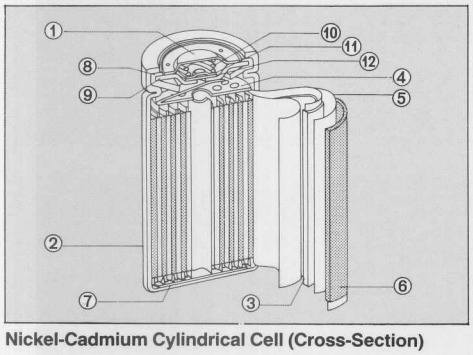
Sanyo's patented collectors are welded onto the positive and negative plates, ensuring a minimum amount of internal resistance and the capability of withstanding high-current discharging.

3) Safety vent

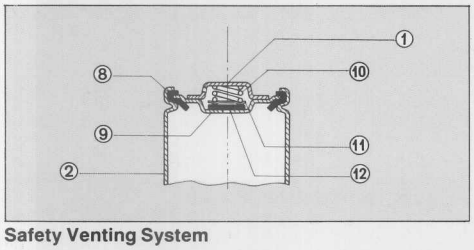
A self-resealable safety vent with highly dependable coil spring assures safety against all possible hazards.

4) Sealing method

Sanyo developed its own sealing construction to ensure resistance against leakage, and backs it up with fine precision production technology.



Nickel-Cadmium Cylindrical Cell (Cross-Section)



Safety Venting System

1 Positive Cap (Positive Terminal)
2 Casing (Negative Terminal)
3 Positive Electrode
4 Positive Collector
5 Separator
6 Negative Electrode
7 Negative Collector
8 Gasket
9 Cover Plate
10 Spring
11 Seal Plate
12 Rubber Plate

Characteristics

A. Discharge characteristics

The operating voltage of the Cadnica battery varies slightly, depending upon discharge currents. However, it remains at about 1.2V during 90% of the discharge period.
Fig. 1 shows the discharge characteristics.

Test conditions: Charge: 0.1C × 16 hours
Discharge rates: 0.2C, 1C, 4C, 10C
Temperature: 20°C

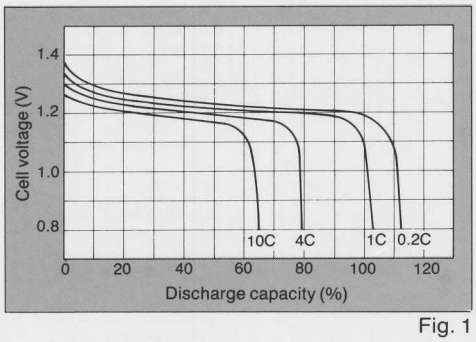


Fig. 1

B. Battery life

Since battery life is generally determined by actual use, it cannot be expressed in exact terms. However, under normal conditions, the Cadnica battery has a life expectancy of more than 1,000 charge/discharge cycles, as illustrated in Fig. 2.

Cyclical conditions: Charge: 0.1C × 11 hours
Discharge: 0.7C × 1 hour
Test conditions: Charge: 0.1C × 16 hours
Discharge: 0.2C
E.V.: 1.0V/cell

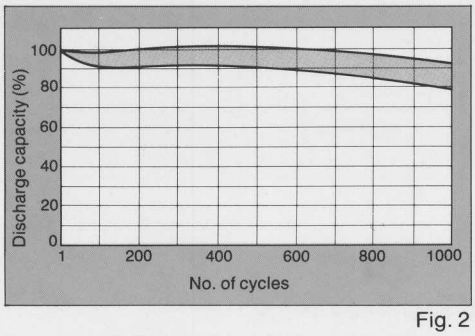


Fig. 2

C. Thermal characteristics

The Cadnica battery is designed to withstand extremely severe temperature conditions. Even so, it should be used within the following temperature ranges for normal efficiency.

Discharge:	− 20°C to + 60°C
Charge:	0°C to + 45°C
Storage:	− 30°C to + 50°C
(Long storage:	− 30°C to + 35°C)

The relationship between cell capacity and ambient temperature is shown in Fig. 3. Any loss of capacity due to changes in temperature is only temporary and can be recovered when normal conditions are restored.

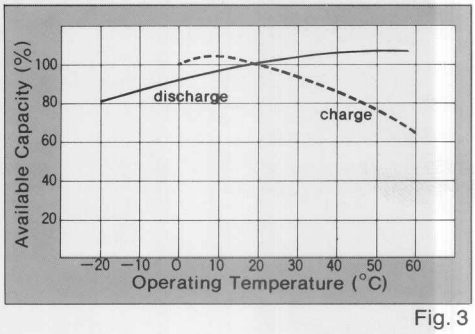


Fig. 3

D. Storage characteristics

Generally speaking, all batteries are subject to loss of voltage and capacity during long storage. In the Cadnica battery, self-discharge progresses at an increasingly faster rate, as shown in Fig. 4, with a rise in temperature. However, it will regain its normal performance level after only a few charge/discharge cycles.

Test conditions: Charge: 0.1C × 16 hours
Discharge after storage: 0.2C
E.V.: 1.0V/cell

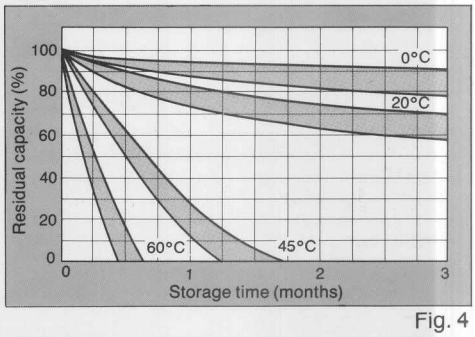


Fig. 4

Individual Cadnica Batteries
Standard Ratings & Dimensions

1. Standard Charge Batteries

Model No.	Nominal voltage (V)	Nominal capacity (mAH)	End voltage (V)	Standard Charge		Quick Charge		Max. Charging volt. (V)	Outside dimensions		Weight (g)	Size
				Current (mA)	Time (Hr)	Current (mA)	Time (Hr)		Dia. (D) (mm)	Height (H) (mm)		
N-120TA	1.2	120	1.0	12	14 ~ 16	36	4 ~ 6	1.6	$7.8^{+0}_{-0.5}$	42.5^{+0}_{-1}	7	
N-150N	1.2	150	1.0	15	14 ~ 16	45	4 ~ 6	1.6	$12.0^{+0}_{-0.5}$	29.5^{+0}_{-1}	9	N
N-50AAA	1.2	50	1.0	5	14 ~ 16	15	4 ~ 6	1.6	$10.5^{+0}_{-0.5}$	16.0^{+0}_{-1}	3.7	1/3 AAA
N-180AAA	1.2	180	1.0	18	14 ~ 16	54	4 ~ 6	1.6	10.5^{+0}_{-0}	44.5^{+0}_{-1}	10	AAA
N-100AA	1.2	100	1.0	10	14 ~ 16	30	4 ~ 6	1.6	$14.5^{+0}_{-0.5}$	17.0^{+0}_{-1}	8	1/3 AA
N-270AA	1.2	270	1.0	27	14 ~ 16	81	4 ~ 6	1.6	$14.5^{+0}_{-0.5}$	30.0^{+0}_{-1}	14	2/3 AA
N-500AA	1.2	550	1.0	55	14 ~ 16	165	4 ~ 6	1.6	$14.2^{+0}_{-0.5}$	50.0^{+0}_{-1}	24	AA
N-550AA	1.2	550	1.0	55	14 ~ 16	165	4 ~ 6	1.6	$14.2^{+0}_{-0.5}$	50.0^{+0}_{-1}	24	AA
N-160A	1.2	160	1.0	16	14 ~ 16	48	4 ~ 6	1.6	$17.0^{+0}_{-0.5}$	17.0^{+0}_{-1}	11	1/3 A
N-450A	1.2	450	1.0	45	14 ~ 16	135	4 ~ 6	1.6	$17.0^{+0}_{-0.5}$	28.0^{+0}_{-1}	19	1/2 A
N-600SC	1.2	600	1.0	60	14 ~ 16	—	—	1.6	23.0^{+0}_{-1}	26.0^{+0}_{-1}	29	2/3 SC
N-900SC	1.2	900	1.0	90	14 ~ 16	—	—	1.6	23.0^{+0}_{-1}	34.0^{+0}_{-1}	39	3/4 SC
N-1200SC	1.2	1200	1.0	120	14 ~ 16	—	—	1.6	23.0^{+0}_{-1}	43.0^{+0}_{-2}	50	SC
N-1000C	1.2	1000	1.0	100	14 ~ 16	—	—	1.6	26.0^{+0}_{-1}	30.0^{+0}_{-1}	44	2/3 C
N-1800C	1.2	1800	1.0	180	14 ~ 16	—	—	1.6	26.0^{+0}_{-1}	50.0^{+0}_{-2}	80	C
N-2500D	1.2	2500	1.0	250	14 ~ 16	—	—	1.6	34.0^{+0}_{-1}	44.0^{+0}_{-2}	115	2/3 D
N-4000D	1.2	4000	1.0	400	14 ~ 16	—	—	1.6	34.0^{+0}_{-1}	61.0^{+0}_{-2}	160	D
N-6PT	7.2	120	6.0	12	14 ~ 16	24	7 ~ 8	9.6	17.0×26.0×48.5		42	6F22

Temperature range;	Standard charge: 0° ~ 45°C Quick charge: 10° ~ 45°C	Discharge: −20° ~ 60°C	Storage: −30° ~ 50°C (Long Period: −30 ~ 35°C)

2. High-Capacity Batteries (KR-Series)

Model No.	Nominal voltage (V)	Nominal capacity (mAH)	End voltage (V)	Standard Charge		Max. charging volt. (V)	Outside dimensions (mm)		Weight (g)	Size
				Current (mA)	Time (Hr.)		Dia. (D)	Height (H)		
KR-1300SC	1.2	1300	1.0	130	14 ~ 16	1.6	23.0^{+0}_{-1}	43.0^{+0}_{-2}	48	SC
KR-2000C	1.2	2000	1.0	200	14 ~ 16	1.6	26.0^{+0}_{-1}	50.0^{+0}_{-2}	70	C
KR-2800D	1.2	2800	1.0	280	14 ~ 16	1.6	34.0^{+0}_{-2}	44.0^{+0}_{-2}	110	2/3 D
KR-4400D	1.2	4400	1.0	440	14 ~ 16	1.6	34.0^{+0}_{-2}	61.0^{+0}_{-2}	150	D
KR-7000F	1.2	7000	1.0	700	14 ~ 16	1.6	34.0^{+0}_{-2}	91.0^{+0}_{-2}	230	F
KR-10000M	1.2	10000	1.0	1000	14 ~ 16	1.6	43.0^{+0}_{-2}	91.0^{+0}_{-2}	400	M
KR-20000M	1.2	20000	1.0	2000	14 ~ 16	1.6	43.0^{+0}_{-2}	146.0^{+0}_{-2}	660	5/3 M

Temperature range;	Charge 0° ~ 45°C	Discharge −20° ~ 60°C	Storage : (Long Period: −30° ~ 50°C)

3. High-Temperature Batteries (for Stand-by use)

Model No.	Nominal voltage (V)	Nominal capacity (mAH)	End voltage (V)	Tickle Charge		Standard Charge		Max. Charging volt. (V)	Outside dimensions		Weight (g)	Size
				Current (mA)	Time (Hr)	Current (mA)	Time (Hr)		Dia. (D) (mm)	Height (H) (mm)		
KR-AAH	1.2	500	1.0	17	48	50	14 ~ 16	1.6	$14.2^{+0}_{-0.5}$	50.0^{+0}_{-1}	24	AA
KR-SCH	1.2	1200	1.0	40	48	120	14 ~ 16	1.6	23.0^{+0}_{-1}	43.0^{+0}_{-2}	47	SC
KR-CH	1.2	1800	1.0	60	48	180	14 ~ 16	1.6	26.0^{+0}_{-2}	50.0^{+0}_{-2}	70	C
KR-DH	1.2	4000	1.0	134	48	700	14 ~ 16	1.6	34.0^{+0}_{-2}	61.0^{+0}_{-2}	150	D
KR-FH	1.2	7000	1.0	230	48	700	14 ~ 16	1.6	34.0^{+0}_{-2}	91.0^{+0}_{-2}	230	F

Temperature range;	Charge: 0° ~ 70°C	Discharge: −20° ~ 70°C	Storage: −30° ~ 70°C (Long Period: −30 ~ 45°C)

4. High-Temperature Batteries (for Cycle use)

Model No.	Nominal voltage (V)	Nominal capacity (mAH)	End voltage (V)	Standard Charge		Quick Charge		Max. Charging volt. (V)	Outside dimensions		Weight (g)	Size
				Current (mA)	Time (Hr)	Current (mA)	Time (Hr)		Dia. (D) (mm)	Height (H) (mm)		
N-270AAK	1.2	270	1.0	27	14 ~ 16	81	4 ~ 6	1.6	$14.5^{+0}_{-0.5}$	30.0^{+0}_{-1}	14	2/3 M
N-550AAK	1.2	550	1.0	55	14 ~ 16	165	4 ~ 6	1.6	$14.2^{+0}_{-0.5}$	50.0^{+0}_{-1}	24	AA
N-1200SCK	1.2	1200	1.0	120	14 ~ 16	360	4 ~ 6	1.6	23.0^{+0}_{-1}	43.0^{+0}_{-2}	52	SC
N-1800CK	1.2	1800	1.0	180	14 ~ 26	—	—	1.6	26.0^{+0}_{-1}	50.0^{+0}_{-2}	80	C
Temperature range;		Standard Charge: 0° ~ 70°C Quick Charge: 10 ~ 70°C				Discharge: −20° ~ 70°C		Storage: −30° ~ 70°C (Long Period: −30 ~ 45°C)				

5. Fast-Charge Batteries

Model No.	Nominal voltage (V)	Nominal capacity (mAH)	End voltage (V)	Quick Charge*		1 Hour Charge**		Max. Charging volt. (V)	Outside dimensions		Weight (g)	Size
				Current (mA)	Time (Hr)	Current (mA)	Time (Hr)		Dia. (D) (mm)	Height (H) (mm)		
N-450AR	1.2	450	1.0	135	4 ~ 6	700	1	1.7	17.0^{+0}_{-1}	28.0^{+0}_{-1}	19	1/2 A
N-700AR	1.2	700	1.0	210	4 ~ 6	1000	1	1.7	17.0^{+0}_{-1}	43.0^{+0}_{-2}	30	A
N-800AR	1.2	800	1.0	240	4 ~ 6	1200	1	1.7	17.0^{+0}_{-1}	50.0^{+0}_{-2}	36	A
N-600SCR	1.2	600	1.0	180	4 ~ 6	900	1	1.7	23.0^{+0}_{-1}	26.0^{+0}_{-1}	29	2/3 SC
N-900SCR	1.2	900	1.0	270	4 ~ 6	1300	1	1.7	23.0^{+0}_{-1}	34.0^{+0}_{-1}	39	3/4 SC
N-1200SCR	1.2	1200	1.0	360	4 ~ 6	1800	1	1.7	23.0^{+0}_{-1}	43.0^{+0}_{-1}	52	SC
N-1500SCR	1.2	1500	1.0	—	—	2300	1	1.7	23.0^{+0}_{-1}	50.0^{+0}_{-2}	61	5/4 SC
N-1000CR	1.2	1000	1.0	300	4 ~ 6	1500	1	1.7	26.0^{+0}_{-1}	30.0^{+0}_{-1}	46	2/3C
N-1800CR	1.2	1800	1.0	—	—	2700	1	1.7	26.0^{+0}_{-1}	50.0^{+0}_{-2}	80	C
N-2500DR	1.2	2500	1.0	—	—	3800	1	1.7	34.0^{+0}_{-2}	44.0^{+0}_{-2}	115	2/3 D
N-4000DR	1.2	4000	1.0	—	—	6000	1	1.7	34.0^{+0}_{-2}	61.0^{+0}_{-2}	160	D
Temperature range;		Quick Charge* : 10° ~ 45°C 1 Hour Charge**: 5° ~ 40°C				Discharge: −20° ~ 60°C		Storage: −30° ~ 50°C (Long Period: −30 ~ 35°C)				

Note) Quick Charge * : Without control
1 Hour Charge**: With control (Ex. temperature sensor)

6. Memory Back-Up Batteries

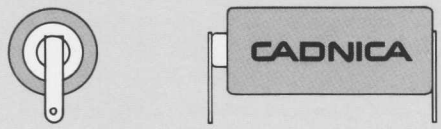
Note) SB-type: 5 Years' Warranty, Expected Life at room temperature is 10 Years.

Model No.	Nominal voltage (V)	Nominal capacity (mAH)	End voltage (V)	Standard Charge		Max. charging volt. (V)	Outside dimensions (mm)		Weight (g)	Size
				Current (mA)	Time (Hr.)		Dia. (D)	Height (H)		
N-50SB1	1.2	45	1.0	1.5	48	1.5	11.0	19.5	5	Tubular Coaxial-Lead Type Battery
N-50SB2	2.4	45	2.0	1.5	48	3.0	11.0	35.0	9	
N-50SB3	3.6	45	3.0	1.5	48	4.5	11.0	50.5	12	
N-SB1	1.2	90	1.0	3.3	48	1.5	15.5	21.5	9	
N-SB2	2.4	90	2.0	3.3	48	3.0	15.5	38.5	16	
N-SB3	3.6	90	3.0	3.3	48	4.5	15.5	55.5	24	
N-SB4	4.8	90	4.0	3.3	48	6.0	15.5	72.5	31	
N-150NS	1.2	135	1.0	5	48	1.5	12.0	29.0	9	N
N-50AAAS	1.2	45	1.0	1.5	48	1.5	11.0	16.0	4	1/3 AAA
N-180AAAS	1.2	160	1.0	6	48	1.5	11.0	44.5	10	AAA
N-100AAS	1.2	90	1.0	3.3	48	1.5	15.0	17.5	8	1/3 AA
N-270AAS	1.2	250	1.0	8	48	1.5	15.0	30.5	14	2/3 AA
N-550AAS	1.2	500	1.0	17	48	1.5	15.0	50.5	24	AA
Temperature range;		Charge: 0° ~ 80°C		Discharge: −20° ~ 80°C		Storage: −30° ~ 80°C (Long Period: −30 ~ 80°C)				

Assembled Cadnica Batteries

Standard Assembled Batteries

1. Individual Battery with Soldering Tabs

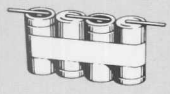
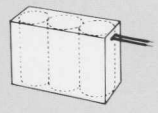
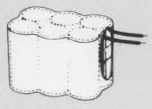
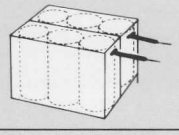
1N-Type		Tab direction can be changed upon customer request.

2. Assembled Batteries

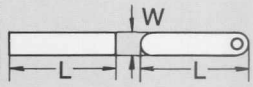
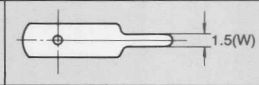
A) Available Voltage for Each Types

Type \ Jacket	Taped	Tubed Jacket	Plastic case	Terminals
S-Type	2.4 ~ 12V	2.4 ~ 12V	3.6 ~ 7.2V	Equipped with either soldering tabs or lead wires.
W-Type	4.8 ~ 24V	4.8 ~ 24V	7.2 ~ 14.4V	
L-Type	—	2.4 ~ 6V	2.4 ~ 12V	
Other-Type	2.4 ~ 24V	2.4 ~ 24V	2.4 ~ 24V	

B) Configuration of Assembled Batteries

Type \ Jacket	Taped	Tube jacket	Plastic case	Remarks
S-Type				Placed horizontally in a single row. (Side by side)
W-Type				Placed horizontally in two rows.
L-Type				Placed vertically in stick formation.
Other Types	Assembled batteries differing from the above configuration are available in Sanyo standard type.			Other than the above configuration.

C) Terminals

	Dimension (T)×(W)×(L)	Type-L	Type-T	Shape
Terminal Plate	0.15×3×L	AAA, N, AA, A	AAA, N, AA, A	Type-T Type-L 
	0.15×5×L	SC, C	SC, C	
	0.15×7×L	D, F, M	—	
Pin Terminal	Two pin terminal types are available for convenience in directly mounting the battery to a p.c. board.			

Special assembled batteries

- Sanyo will supply specially-assembled batteries upon customer request.
- To specially order a battery, see your nearby Sanyo sales representative or sales engineer.

Charging Circuits

Various charging system are available for Cadnica batteries. Their circuitry is so simple that they can be made small enough for incorporation into Cadnica battery-powered appliances. Described below are four representative charging circuits, in which no filter is required.

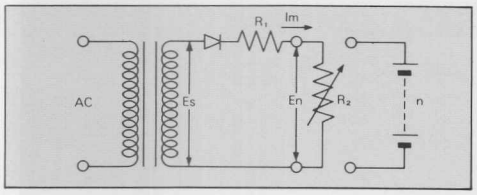
When the importance for designing a charging circuit, the charging current must be held below 10-hour rate (3-hour rate for quick-charge batteries) at end of the charging period.

Since the charge current magnitude is dependent upon the AC input voltage and the frequency, the maximum allowable value will be determined by the maximum input voltage (usually 110V for 100V power in the 60Hz region). When determining resistance R_1, measure its actual value. This is necessary because transformers are subject to voltage and other variations.

Half-wave charging circuit

Charge current is controlled in the circuit of this charger by output voltage on the secondary side of its small transformer.
Although variable according to charge currents, the effective AC voltage value on the output side of the transformer is decided by the following equation:

$$Es = 2.26En + \triangle E + Im \cdot R_1$$

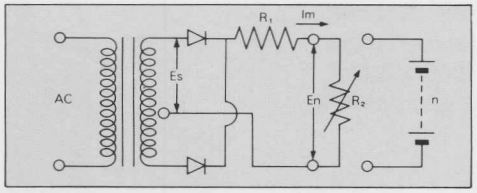


Im: charge current, $\triangle E$: voltage drop in rectifier,
$Im \cdot R_1$: voltage drop due to resistance,
En: No. of cells x 1V
R_2: variable resistance

Full-wave charging circuit

The center tap transformer employed in this circuit produces a larger power output than the one used in the above circuit.
The equation for calculating the effective AC voltage value on the output side of the transformer is as follows:

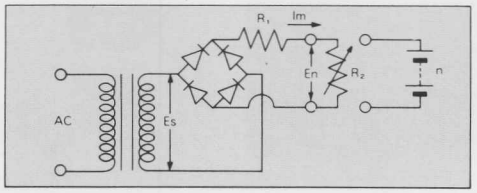
$$Es = 1.13En + \triangle E + Im \cdot R_1/2$$



Full-wave charging circuit with bridge rectifier

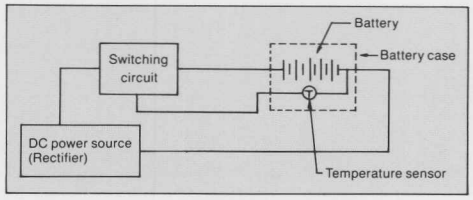
Using a bridge rectifier, this charging method is capable of producing a larger current than the above two circuits from a low secondary output voltage. Given below is the equation for calculating the effective AC voltage value on the secondary side of the transformer. In case a selenium rectifier is utilized, attention should be paid to reversed withstandable voltage.

$$Es = 1.13En + 2\triangle E + Im \cdot R_1$$



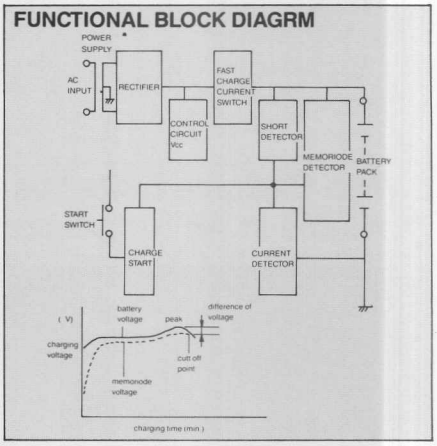
Temperature sensor fast charging circuit

The temperature sensor fast charging circuit allows the Cadnica battery to be charged in approximately 1 hour by the addition of a simple charger, as shown below.
In this system, a temperature sensor attached to the battery detects the rise in battery temperature after fully charged. The sensor then activates the switching circuit to complete the fast charging process.



Voltage Sensor fast recharging method with Memoriode (MD)

The MD Method of fast recharging was developed to facilitate the fast recharging of sealed Ni-Cd batteries. This method utilizes a memoriode Potential Memory Diode that stores information on the battery's peak voltage. When the voltage drops down to this level ($-\triangle$ voltage from the peak), the memoriode stops the charging process, making it possible to charge nearly 100% of a battery's capacity within 30 minutes to 1 hour, regardless of the ambient temperature.



Precautions

A. Do not solder lead wires directly to a Cadnica battery. If necessary, a plate should be electro-welded to each battery terminal so that a lead wire can be soldered to it. Cadnica batteries with welded terminal plates are available from SANYO.

B. While restricting charge current to less than the specified rating, **be sure to charge the Cadnica battery for a sufficient amount of time.** During long trickle-charge of those Cadnica batteries which are built into such appliances as emergency lighting systems, input current should be reduced to 20 to 50-hour rates, in due consideration of discharge frequencies, so as not to shorten battery life.

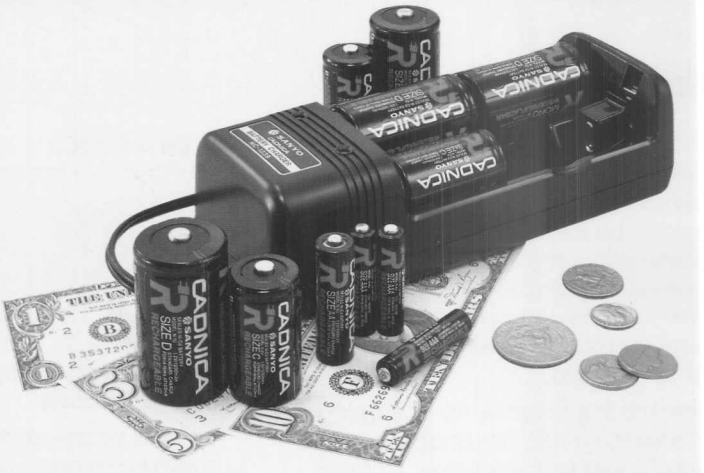
C. Do not short-circuit Cadnica batteries. Refrain from over-discharging them at an excessively large current rate.

D. To ensure normal performance of the Cadnica battery, **use it within the temperature ranges recommended in this catalog.** Charging it at an excessively high or low temperature will shorten its service live.

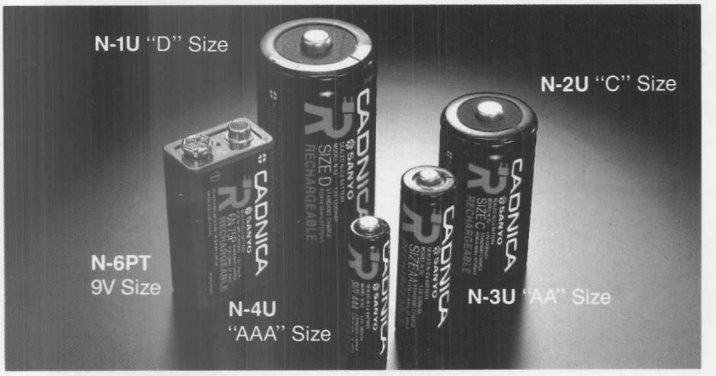
E. Keep Cadnica batteries in a dry, cool place when storing them for a long time.

The Economical Energy Source

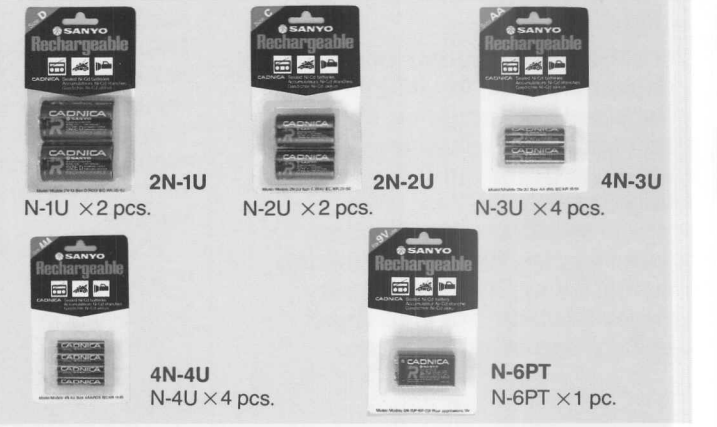
Replacing run-down batteries is not only an inconvenient nuisance, it's also expensive. But now there's an alternative—Sanyo Cadnica batteries. Compatible with ordinary dry cells, Cadnica batteries can be recharged hundreds of times to provide dependable power for all kinds of portable units. Isn't it time you stopped spending money on new batteries and started economical recharging?



Sanyo Cadnica Batteries— Available in All Shapes and Sizes



In Blister Packs



2N-1U
N-1U ×2 pcs.

2N-2U
N-2U ×2 pcs.

4N-3U
N-3U ×4 pcs.

4N-4U
N-4U ×4 pcs.

N-6PT
N-6PT ×1 pc.

SPECIFICATIONS Batteries

	N-1U (D size)	N-2U (C size)	N-3U (AA size)	N-4U (AAA size)	N-6PT (9V size)
Nominal capacity	1200mAh	1200mAh	500mAh	180mAh	120mAh
Nominal voltage	1.2V	1.2V	1.2V	1.2V	7.2V
Standard recharge	120mA	120mA	50mA	18mA	24mA
Charging time (hrs.)	14—16	14—16	14—16	14—16	7—8
Dimensions (Max.ϕ × H)	$1^{5}/_{16}$"×$2^{3}/_{8}$" (33×60.6mm)	1"×$1^{31}/_{32}$" (26×50mm)	$^{9}/_{16}$"×$1^{31}/_{62}$" (14.2×50mm)	$^{7}/_{16}$"×$1^{3}/_{4}$" (10.5×44.5mm)	1"(W)×$^{11}/_{13}$"(D)×$1^{15}/_{16}$"(H) (26.0×17.0×48.5mm)
Weight (approx.)	2.2ozs. (69g)	2 ozs. (58g)	0.8 ozs. (23g)	0.4 ozs. (10g)	1.4 ozs. (40g)

Chargers

	NC-75P	NC-752	NC-452	NC-310	NC-450S	NC-453	NC-1239	NC-10U
Power source	AC: Local Voltage	AC: Local voltage	AC: Local voltage	AC: Local voltage	AC: Local voltage	AC: Local voltage	AC: Local voltage	AC: 120V/240V, 50/60Hz
Compatible battery sizes	N-6PT (9V)×1	N-6PT (9V)×2	N-3U, N-500AA ("AA")×2/4	N-4U ("AAA")×2/4	N-3U, N-500AA ("AA")×2/4	N-1U, ("D")×2, N-2U ("C")×2, N-3U ("AA")×2/4, N-6PT (9V)×2	N-1U, N4000D ("D")×2/4, N-2U, N-1800C ("C")×2/4, N-3U, N-500AA ("AA")×2/4, N-6PT (9V)×2	N-1U ("D")×10 N-2U ("C")×10 N-3U ("AA")×10
Number of batteries that can be recharged simultaneously	1	2	2/4	2/4	2/4	"D", "C"×2, "AA"×2/4, "9V"×1	"D", "C", "A"×2/4, 9V×2	"D", "C", "AA"×10

Chargers

	NC-AM2
Power source	Solar energy
Compatible battery sizes	N-3U, N-500AA ("AA")×2
Number of batteries that can be recharged simultaneously	2

Battery Spacer

	NCS-T4U
Compatible batteries	N-4U ("AAA")
Number of batteries that can be recharged simultaneously	2
Compatible battery chargers	NC-1239, NC-10U, NC-1230

*Specifications subjects to change without notice.

SANYO

SANYO ELECTRIC INC./BATTERY DIVISION
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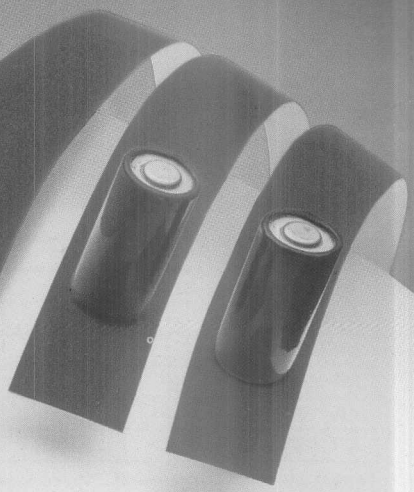
Chicago Office: 4310 Transworld Road, Schiller Park, IL 60176/(312) 671-3261
Los Angeles Office: West Artesia Blvd., Compton, CA 90220/(213) 537-5830

In the long run, the Sanyo Cadnica EXTRA™ series gives you 40% better performance.



The Sanyo Cadnica EXTRA Series. Another affirmation of Sanyo's leadership in technology, investment and commitment. And another reason why Sanyo is the *world leader* in rechargeable sealed Ni-Cd batteries.

The Cadnica EXTRA batteries run 40% longer than conventional Ni-Cd cells. So, with Sanyo Cadnica EXTRA batteries on board, your products will run longer. You get improved performance with no alteration in product design. And that means greater end-user satisfaction.

Longer Run Time

Energy Efficiency Improved

Charge-time is flexible. EXTRA series can meet virtually all your specifications. From extra-fast to standard or trickle-voltage rates.

For critical applications like hand-held field communications gear and medical instruments, they're the best battery to use. They're also an obvious first choice for emerging portable personal computers and for household appliances.

There's another important benefit. The Cadnica EXTRA series is part of the Sanyo No-Excuses Guarantee, your assurance of on-time, as-promised delivery; stable, fair prices; and the highest standards of performance. For further information on our latest technology, and for applications assistance, call or write: SANYO Energy Corp., 1201 Sanyo Ave., San Diego, CA 92073 (619) 690-6620.
In New Jersey: (201) 641-2333
In Chicago: (312) 595-5600
In Florida: (904) 376-6711

EXTRA SERIES

SANYO

There's something new going on at Sanyo.

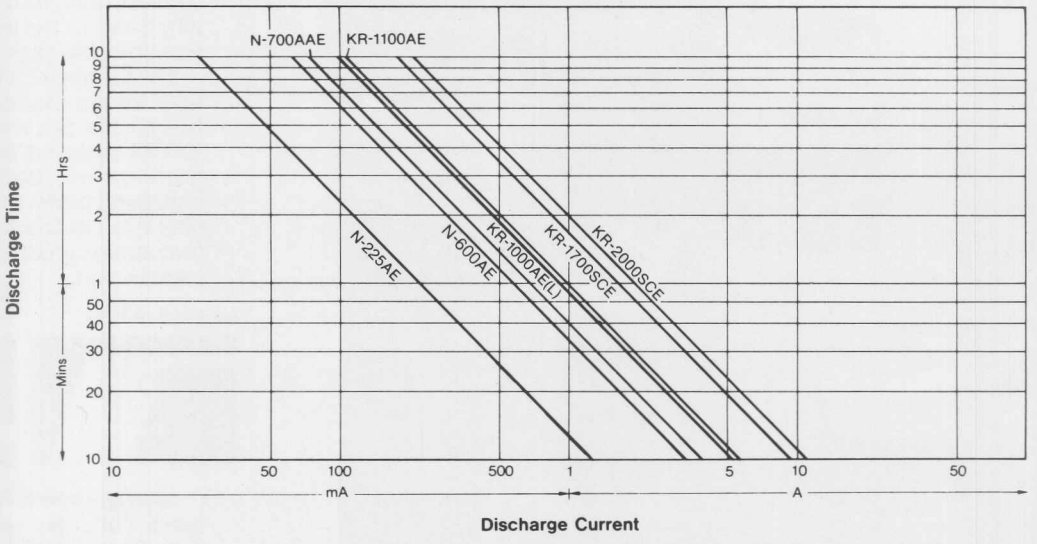
SANYO

High Capacity Batteries Characteristics

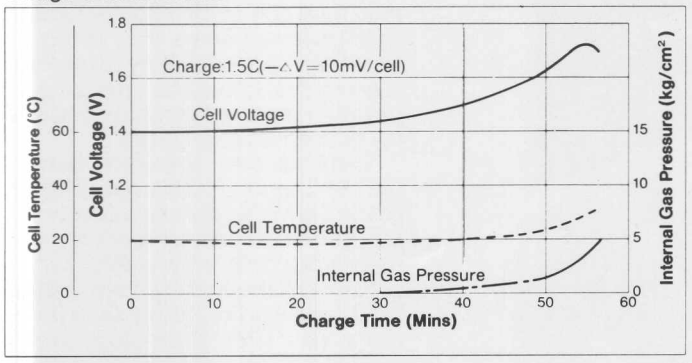
Model No.	Size	Nominal Voltage (V)	Nominal Capacity (mAH)	Standard Charge		Internal Impedance Ω	Outside Dimensions		Weight (g)
				Current (mA)	Time (Hr)		Dia.(D) (mΩ)	Height(H) (mm)	
N-225AE	1/3A	1.2	225	23	14 ∫ 16	20.0	17.0^{+0}_{-1}	17.0^{+0}_{-1}	12
N-600AE	2/3A	1.2	600	60		8.5	17.0^{+0}_{-1}	28.0^{+0}_{-1}	22
N-700AAE	AA	1.2	700	70		8.0	$14.2^{+0}_{-0.5}$	50.0^{+0}_{-1}	27
KR-1000AE(L)	4/5A	1.2	1000	100		8.0	17.0^{+0}_{-1}	43.0^{+0}_{-2}	31
KR-1100AE	A	1.2	1100	110		7.6	17.0^{+0}_{-1}	50.0^{+0}_{-2}	37
KR-1700SCE	SC	1.2	1700	170		5.5	23.0^{+0}_{-1}	43.0^{+0}_{-2}	53
KR-2000SCE	5/4SC	1.2	2000	200		5.5	23.0^{+0}_{-1}	50.0^{+0}_{-2}	63

Temperature Range; Charge: 0~45°C (Standard Charge). Discharge: −20~60°C. Storage: −30~50°C (Long Period: −30~35°C)

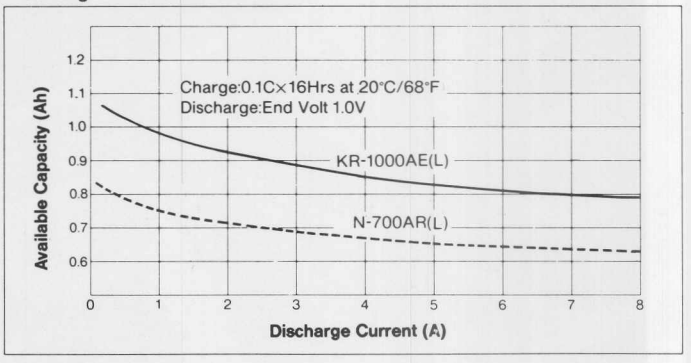
CADNICA Selector Guide



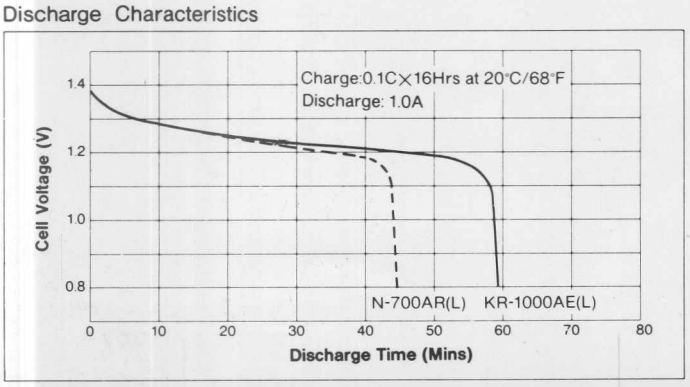
Charge Characteristics



Discharge Characteristics



Discharge Characteristics



Cycle Characteristics