

PANASONIC BATTERIES



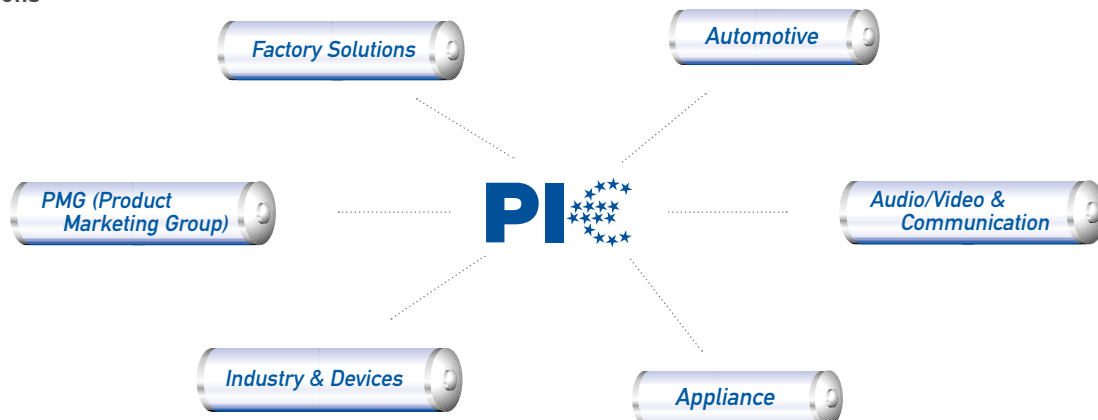
PANASONIC INDUSTRIAL EUROPE

Panasonic Corporation, founded in Osaka 1918, is one of the world's largest manufacturers of quality electronic and electrical equipment. Its subsidiary, Panasonic Industrial Europe GmbH (PIE) deals with a wide diversified range of industrial products for all European countries. This company was formed in 1998 to strengthen Panasonic's Pan-European industry operation, and today is active in such different business fields as Automotive, Audio/Video & Communication, Appliance and Industry & Devices to satisfy its customer's needs.

We are able to offer you a wide range of individual power solutions for portable and stationary applications. Our product range includes high reliability batteries such as Lithium-Ion, Lithium, Nickel-Metal-Hydrate, Valve-Regulated-Lead-Acid (VRLA), Alkaline and Zinc-Carbon. Based on this battery range we can power your business in virtually all applications.

Panasonic Energy (PEC) started its battery production in 1931. Today PEC is the most diversified global battery manufacturer with a network of 20 manufacturing companies in 14 countries. More than 16,000 employees are dedicated to the research & development and in the production of new batteries for a new world.

PIE Organisation Divisions





Panasonic quality – certified by authorised companies.

When it comes to production our facilities employ leading edge manufacturing processes meeting the highest quality standards. Our factories are certified to ISO standards. This means that each factory has its own quality and environmental management. The ISO 9000 and ISO 14000 series are the minimum benchmarks that ensure our excellent product reliability.

Furthermore the majority of our factories is also certified to OHSAS 18001 (Occupational Health and Safety Assessment Series), an international standard for assessing a management system for occupational safety. This confirms that our factories have been proactive in putting the occupational health and safety of its staff at the centre of the company's dealings. In addition our VRLA batteries are for example approved to German VdS standard and U.S. UL standard.



PANASONIC LEADS THE WAY ... WITH 'ECO IDEAS'

Pursuing coexistence with the global environment in its business vision, Panasonic places reduction of the environmental impact in all its business activities as one of the important themes in its mid-term management plan. In its 'eco ideas' Strategy, which focuses in particular on rapid implementation of measures to prevent global warming and global promotion of environmental sustainability management, Panasonic is advancing three key initiatives: 'eco ideas' for Manufacturing, 'eco ideas' for Products, and 'eco ideas' for Everybody, Everywhere.

Our **energy** will Drive **eco** Innovation.

THE PANASONIC 'ECO IDEAS' HOUSE

We are approaching a global turning corner and it would not be an exaggeration to call it the 'Environmental Industrial Revolution'. Based on this recognition, Panasonic has built an 'eco ideas' House on the premise of our showroom, Panasonic Center Tokyo in April 2009 in order to help create a carbon-free society and reduce CO₂ emissions from a household sector.

The concept of this 'eco ideas' House can be described as follows:

1. Virtually zero CO₂ emissions in an entire house envisaged in three to five years into the future
 2. Synergy of technology and nature
- Aforementioned concepts shows that Panasonic is not only aware of its environmental responsibility moreover this Panasonic takes action.



'ECO IDEAS' FOR MANUFACTURING

Our Plans

We will reduce CO₂ emissions across all our manufacturing sites.

Our Goals

In each of our factories a CO₂ emissions of 10% reduction till 2010.

Our Measures

Our factories are evaluated with regard to CO₂ emission, waste disposal, recycling measures as well as chemical and water consumption within the scope of the 'Clean Factory' program and they are set performance targets according to these indicators.

Example

The Wakayama Plant of the Energy Company is strengthening its management structure to cut CO₂ emissions from the main production bases for Lithium-Ion batteries, which are a core component of Panasonic's energy business. As a result, it has succeeded in roughly halving CO₂ emissions per production unit, as well as sharply curbing an increase in CO₂ emissions even as production has expanded.

'ECO IDEAS' FOR PRODUCTS

Our Plans

We will produce energy-efficient products.

Our Goals

In March 2010 at least 20 products with the 'Superior Green Products' classification should be available.

Our Measures

The developers at Panasonic carry out an environmental impact assessment for all our products. Products that meet the highest environmental requirements in the branch with regard to conservation of energy and energy efficiency are classified as a 'Superior Green Product' and awarded the Panasonic logo 'eco ideas'.

Example

We have dispensed with the use of highly toxic Lithium Thionyl Chloride in the production of our Lithium batteries. This is quite rightly classified as highly toxic and should never under any circumstances be released into the environment.

'ECO IDEAS' FOR EVERYBODY, EVERYWHERE

Our Plans

We will encourage the spread of environmental activities throughout the world.

Our Goals

Intensive commitment on the part of the company owners, international cooperations and involvement of the employees.

Our Measures

Not only do we sponsor the work of the WWF for the Arctic, Panasonic has also launched a couple of other environmental initiatives such as the ECO RELAY initiative in which hundreds of colleagues the world over take part voluntarily for several days in environmental campaigns.

Example

With the support of the GRS Batterien (German Battery Recycling Association) Panasonic arranged a battery collection day with the aim of collecting as many of these spent energy sources as possible and giving out information about the recycling loop of batteries from which valuable raw materials such as Zinc, Manganese and Iron can be recovered.

NICKEL-METAL-HYDRIDE

CYLINDRICAL More and more electric products with sophisticated functions require extremely compact and light battery solutions delivering a high level of energy density. To meet these needs Panasonic Ni-MH batteries have been developed and manufactured with nickel hydroxide for the positive electrode and hydrogen-absorbing alloys, capable of absorbing and releasing hydrogen at high-density levels, for the negative electrode. The Ni-MH battery technology is nowadays the Ni-Cd (nickel cadmium) successor technology for rechargeable and portable devices. All of our Ni-MH batteries are cadmium-free, in order not to be harmful to human beings and our environment.



RECHARGEABLE 1.2V

Model Number	Diameter	Size	IEC	Nominal Voltage (V)	Discharge Capacity*1 (mAh)		Dimensions with Tube (mm)		Approx. Weight (g)
					Average*2	Rated (min.)	Diameter	Height	
HHR-70AAA/FT	AAA	AAA	HR11/45	1.2	730	700	10.5 + 0/-0.7	44.5 + 0/-1.0	12.0
HHR-75AAA/HT*3	AAA	AAA	HR11/45	1.2	730	700	10.5 + 0/-0.7	44.5 + 0/-1.0	12.0
HHR-80AAA/HT*3	AAA	AAA	HR11/45	1.2	780	750	10.5 + 0/-0.7	44.5 + 0/-1.0	13.0
HHR-35AA/FT	AA	2/3AA	-	1.2	390	350	14.5 + 0/-0.7	28.5 + 0/-1.0	10.5
HHR-120AA/FT	AA	4/5AA	HR15/43	1.2	1,220	1,150	14.5 + 0/-0.7	43.0 + 0/-1.0	23.0
HHR-70AA/FT	AA	AA	HR15/49	1.2	780	700	14.5 + 0/-0.7	48.8 + 0/-1.5	21.0
HHR-70AA/HT*4	AA	AA	HR15/51	1.2	780	700	14.5 + 0/-0.7	50.5 + 0/-1.5	21.0
HHR-110AA/FT	AA	AA	HR15/51	1.2	1,180	1,100	14.5 + 0/-0.7	50.0 + 0/-1.0	24.0
HHR-150AA/FT	AA	AA	HR15/51	1.2	1,580	1,500	14.5 + 0/-0.7	50.0 + 0/-1.0	26.0
HHR-210AA/HT*4	AA	AA	HR15/51	1.2	2,080	2,000	14.5 + 0/-0.7	50.5 + 0/-1.0	29.0
HHR-260AA/HT*4	AA	AA	HR15/51	1.2	2,500	2,400	14.5 + 0/-0.7	50.5 + 0/-1.0	30.0
HHR-200A/FT	A	4/5A	HR17/43	1.2	2,040	2,000	17.0 + 0/-0.7	43.0 + 0/-1.5	32.0
HHR-210A/FT	A	A	HR17/50	1.2	2,200	2,100	17.0 + 0/-0.7	50.0 + 0/-1.5	38.0
HHR-380A/FT	A	L-A	HR17/67	1.2	3,800	3,700	17.0 + 0/-0.7	67.0 + 0/-1.5	53.0
HHR-450A/FT	A	LFat/A	-	1.2	4,500	4,200	18.2 + 0/-0.7	67.0 + 0/-1.5	60.0
HHR-200SCP/FT*5	SC	4/5SC	-	1.2	2,100	1,900	23.0 + 0/-1.0	34.0 + 0/-1.5	43.0
HHR-260SCP/FT*5	SC	SC	HR23/43	1.2	2,600	2,450	23.0 + 0/-1.0	43.0 + 0/-1.5	55.0
HHR-300SCP/FT*5	SC	SC	HR23/43	1.2	3,050	2,800	23.0 + 0/-1.0	43.0 + 0/-1.5	57.0
HHR-650D/FT*5	D	D	HR33/62	1.2	6,800	6,500	33.0 + 0/-1.0	60.8 + 0/-2.0	170.0

Applications

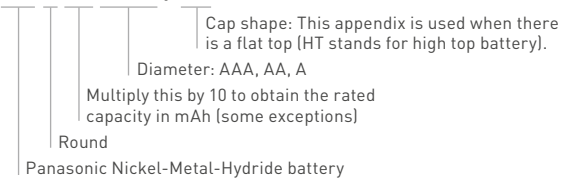
E-Bikes, Pedelects, Scooters, Golf-Trollies, Powertools, Grape-Cutters, Multimeters, Barcode Readers, Handheld Scanners, Labelprinters, Vacuum Cleaners, Muscle Electro-Stimulations, Toothbrushes, etc.

Features

- Standard Ni-MH battery technology for nearly every application
- High quality and reliability
- Good balanced batteries in terms of capacity and cycle life
- Excellent discharge characteristics

Model Number (example)

H H R 7 0 A A A / F T



NI-MH • 3D ILLUSTRATION

- 1 Positive pole
- 2 Top plate
- 3 Gasket
- 4 Safety vent
- 5 Collector
- 6 Separator
- 7 Cathode (nickel hydroxide)
- 8 Negative pole (cell can)
- 9 Anode (hydrogen - absorbing alloy)
- 10 Insulation plate
- 11 Exhaust gas hole
- 12 Tube



*1 After charging at 0.1CmA for 16 hours, discharging at 0.2CmA. *2 For reference only. *3 Compatible with consumer AAA size.

*4 Compatible with consumer AA size. *5 For high power use applications such as Powertools.

NICKEL-METAL-HYDRIDE

CYLINDRICAL FOR BACK-UP USE The specifically designed Panasonic Ni-MH high temperature battery family is state-of-the-art, providing the batteries with excellent reliability under high ambient temperature and demanding conditions. These batteries give the perfect combination of high power ability and technical expertise.



RECHARGEABLE 1.2V

Model Number	Diameter	Size	IEC	Nominal Voltage (V)	Discharge Capacity *1 (mAh)		Dimensions with Tube (mm)		Approx. Weight (g)
					Average*2	Rated (min.)	Diameter	Height	
HHR-60AAAH/FT	AAA	AAA	HR11/45	1.2	550	500	10.5 + 0/-0.7	44.5 + 0/-1.0	13.0
HHR-70AAH/FT	AA	AA	HR15/49	1.2	750	700	14.5 + 0/-0.7	48.3 + 0/-1.0	18.0
HHR-210AH/FT	A	A	HR17/50	1.2	2,050	1,900	17.0 + 0/-0.7	50.0 + 0/-1.5	37.0
HHR-330APH/FT*3	A	LFat/A	-	1.2	3,300	3,200	18.2 + 0/-0.7	67.0 + 0/-1.5	60.0
HHR-370AH/FT	A	LFat/A	-	1.2	3,700	3,500	18.2 + 0/-0.7	67.0 + 0/-1.5	60.0
HHR-250SCH/FT*3	SC	SC	HR23/43	1.2	2,650	2,500	23.0 + 0/-1.0	43.0 + 0/-1.5	55.0
HHR-300CH/FT*3	C	C	HR26/50	1.2	3,300	3,100	26.0 + 0/-1.0	50.0 + 0/-2.0	80.0
HHR-10000VH/FT*3,4	V	V	-	1.2	95,000	90,000	62.0 + 0/-1.0	173.5 + 0/-1.5	1,650.0

Applications

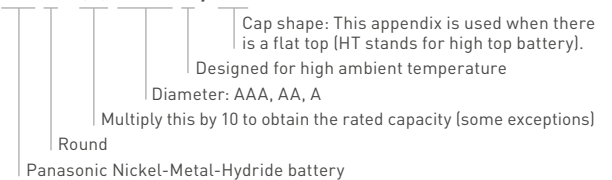
Combined Solar Applications,
Portable Medical Devices,
POS Terminals,
Emergency Light for buildings and trains,
Smoke Detectors,
Elevator Safety Systems,
ETC (Electronic Toll Collection) Systems,
Emergency Light, etc.

Features

- Trickle charge technology
- High charge efficiency at elevated temperatures
- High cycle number
- Long lifetime when using intermittent charge
- Low self discharge

Model Number (example)

H H R - 6 0 A A A H / F T



9V BLOCK The Ni-MH Panasonic 9V Block provides high energy density, a good life cycle performance and no memory effect. It's suitable for many applications, such as pagers, toys, multimeters, etc.



RECHARGEABLE 9V

Model Number	Diameter	IEC	Nominal Voltage (V)	Discharge Capacity *1 (mAh)		Dimensions with Tube (mm)			Approx. Weight (g)
				Average*2	Rated (min.)	Width	Height	Thickness	
HHR-9SRE/BA1	E-Block	-	8.4	175	170	26.0	48.5	16.3	42.0

Ni-MH BATTERY CHARGER The Panasonic micro-processor-controlled universal battery charger is designed for charging Ni-MH battery packs. This charger is particular optimised for a broad range of Panasonic battery packs.



Features

- Designed to charge battery packs from 4 to 24 cells
- Optimised for Panasonic batteries
- 3 charge detection criteria: -dU, dT/dt, Tmax
- Charge current: 2.0A DC
- Indication of function by two LEDs
- World-wide approved

*1 After charging at 0.1CmA for 16 hours, discharging at 0.2CmA.

*2 For reference only.

*3 For high power use applications.

*4 Customer specification is required. Development concluded but large-scale production not started yet.

LITHIUM-ION

Panasonic is one of the leading Lithium-Ion battery manufacturers in the world. A perfect combination of high energy density, safety and long life shows what is possible with this battery technology. A continuous co-development with electronical companies all over the world has led to outstandingly good results. Panasonic especially focuses on enhancing safety technologies such as PSS and HRL in order to always guarantee people's safety. On the top of this we have invented our so called NNP technology which gives us the possibility to achieve eminently high battery capacities. Excellent battery safety on one hand, and superior battery performance on the other: this is what Panasonic stands for.



CYLINDRICAL SINGLE CELL

RECHARGEABLE 3.6V • 3.7V

Model Number	Technology*1	Nominal Voltage (V)	Typical Capacity*2 (mAh)	Dimensions (mm)		Approx. Weight (g)
				Diameter	Height	
CGR-14500	PSS	3.6	750	14.4 + 0/-0.7	50.0 + 0/-1.0	18.0
CGR-17360A	PSS	3.6	780	16.9 + 0/-0.7	36.0 + 0/-1.0	19.0
CGR-18650CG	PSS	3.6	2,250	18.6 + 0/-0.7	65.2 + 0/-1.0	44.0
CGR-18650CH	PSS	3.6	2,250	18.6 + 0/-0.7	65.2 + 0/-1.0	45.0
CGR-18650DA	PSS + HRL	3.6	2,450	18.6 + 0/-0.7	65.2 + 0/-1.0	45.0
CGR-18650EA	Lithium Cobalt Oxide + HRL	3.7	2,550	18.6 + 0/-0.7	65.2 + 0/-1.0	46.5
CGR-18650K*3	PSS + HRL	3.6	1,650	18.6 + 0/-0.7	65.2 + 0/-1.0	46.5
CGR-18650KA*3	PSS	3.6	1,750	18.6 + 0/-0.7	65.2 + 0/-1.0	43.5
CGR-26650A*3	PSS + HRL	3.6	2,650	26.5 + 0/-0.3	65.4 + 0/-0.5	90.0
CGR-26650B	PSS + HRL	3.6	3,300	26.5 + 0/-0.3	65.4 + 0/-0.5	95.0
NCR-18500	NNP + HRL	3.6	2,000	18.6 + 0/-0.7	50.0 + 0/-1.0	33.5
NCR-18650	NNP + HRL	3.6	2,900	18.6 + 0/-0.7	65.2 + 0/-1.0	45.0
NCR-18650A	NNP + HRL	3.6	3,100	18.6 + 0/-0.7	65.2 + 0/-1.0	45.0



Applications

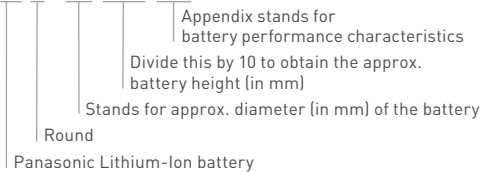
Laptops,
Medical Equipments,
Powertools, Vacuum Cleaners,
Shavers, Toothbrushes,
Web Pads,
Portable POS Terminals,
Bluetooth Pens,
Hedge Trimmers,
Wireless Microphones, etc.

Features

- High energy density and high voltage (3.6V) lead to small battery dimensions
- Supply long stable power with flat discharge voltage
- From 2.4Ah capacity onwards all our batteries are equipped with our HRL safety technology
- No memory effect
- Use of Lithium-Ion batteries require use of a safety unit

Model Number (example)

CGR-18650DA



LI-ION • 3D ILLUSTRATION*4

- 1 Positive pole
- 2 PTC (positive temperature coefficient device)
- 3 Gasket
- 4 Collector
- 5 Insulator
- 6 Cathode
- 7 Anode
- 8 Negative pole (cell can)
- 9 Separator
- 10 CID (current interrupt device)
- 11 Exhaust gas hole



⚠ Notice to Readers

We are unable to support single cell business or accept orders from consumers. We design Lithium-Ion battery packs including a suitable safety unit device based on the technical specification of the customer. Due to the need for careful review when selecting Lithium-Ion battery solutions please contact your local Panasonic Sales Office. In order to avoid a lack of supply please check the battery availability with your Panasonic sales team before design-in.

*1 Please find the explanations of our technologies at the next pages. *2 4.2V charge *3 For high power use applications.

*4 Some batteries are not equipped with a PTC. Please consult Panasonic for further information.

LITHIUM-ION

PRISMATIC SINGLE CELL

RECHARGEABLE 3.7V

Model Number	Technology	Nominal Voltage (V)	Typical Capacity*1 (mAh)	Dimensions (mm)			Approx. Weight (g)
				Width	Height	Thickness	
CGA-103450A	Lithium Cobalt Oxide	3.7	1,950	34.0 + 0/-0.6	50.0 + 0/-1.0	10.5 + 0/-0.6	40.0
CGA-633450B	Lithium Cobalt Oxide	3.7	1,200	34.0 + 0/-0.6	50.0 + 0/-1.0	6.3 + 0/-0.6	24.0



Applications

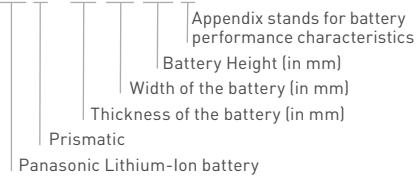
PDA's,
Portable POS Terminals,
Measuring Instruments,
Digital Still Cameras,
Handheld Scanners,
Barcode Readers,
Portable Navigation
Handhelds, etc.

Features

- High energy density and high voltage (3.7V) leads to small battery dimensions
- Supply long stable power with flat discharge voltage
- No memory effect
- Use of Lithium-Ion batteries require use of a safety unit device

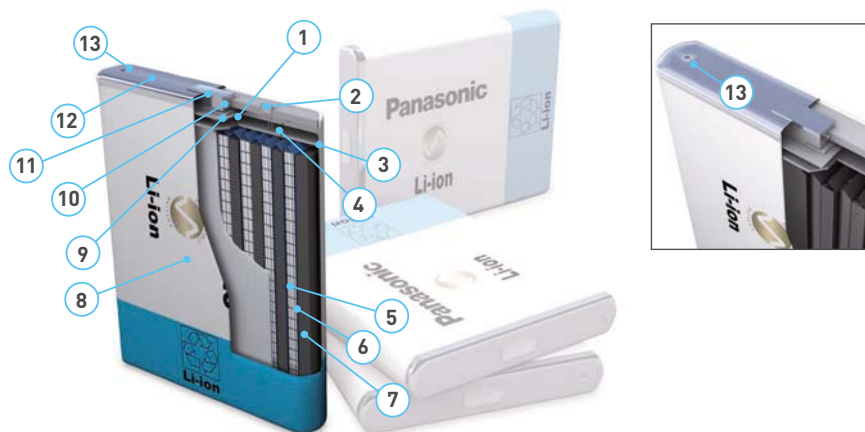
Model Number (example)

CGA-633450B



LI-ION • 3D ILLUSTRATION *2

- 1 Internal terminal
- 2 Sealing tap
- 3 Isulation frame body
- 4 Lead
- 5 Cathode
- 6 Separator
- 7 Anode
- 8 Case
- 9 (Lower) Gasket
- 10 (Upper) Gasket
- 11 Terminal
- 12 Anode cap
- 13 Anti-explosion valve



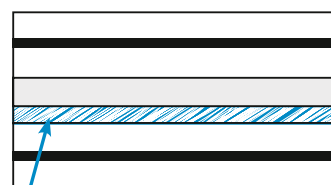
SAFETY TECHNOLOGIES

HRL TECHNOLOGY *3

As a power source for mobile and digital equipment essential for a ubiquitous networking society, demand for Lithium-Ion batteries has grown fast. As such equipment including notebook PCs, mobile phones, medical equipment and power-tools become more powerful, sophisticated and feature-laden, they require more robust and safer batteries. Increasing energy-density, however, raises the risk of overheating and igniting due to short-circuiting. Panasonic employs the **HRL (Heat Resistance Layer)** Technology to improve the safety of Lithium-Ion batteries significantly. This heat resistance layer consists of an insulating metal oxide on the surface of the electrodes which leads the battery not to overheat even if a short-circuit occurs.

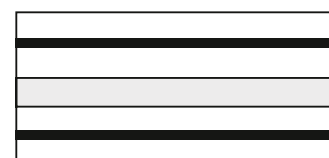
Safety is the base for everything. Higher Energy can be established based on safety technology.

HRL Technology



HRL

Existing Technology



+ Material
Separator
- Material

*1 4.2V charge

*2 Some batteries are not equipped with a PTC. Please consult Panasonic for further information.

*3 A couple of our batteries are not provided with our HRL technology yet. Please contact Panasonic to be informed about the current situation.

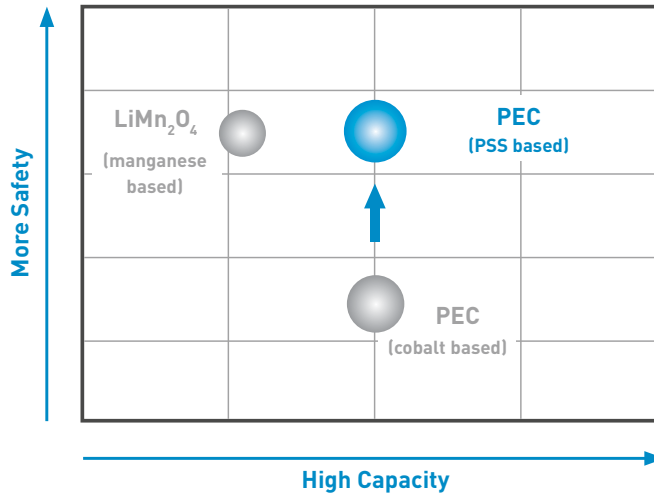
PSS TECHNOLOGY

Panasonic has developed a Lithium-Ion battery generation by using a **Solid Solution** Technology. Idea: Development of a future oriented Lithium-Ion cell technology which secures a balance of high capacity on the one hand and high safety on the other hand. The goal was to develop a technology which provides the customer with a high capacity such as the standard Panasonic Lithium-Ion (cobalt based) cells and owns a high safety standard like the LiMn_2O_4 (manganese based) Lithium-Ion batteries.*1

Characteristics of the Panasonic PSS driven Lithium-Ion battery:

- Thermal stability of cathode materials leads to high safety
- Same energy density as cobalt-based Lithium-Ion batteries
- Excellent cycle life
- High reliability at high temperature
- Less voltage drop at initial discharge than cobalt based Lithium-Ion batteries
- Same charge voltage as cobalt-based Lithium-Ion batteries

COMPARISON BETWEEN CAPACITY AND SAFETY OF CATHODE MATERIALS



NEW ELECTRODE TECHNOLOGY FOR HIGHER CAPACITY

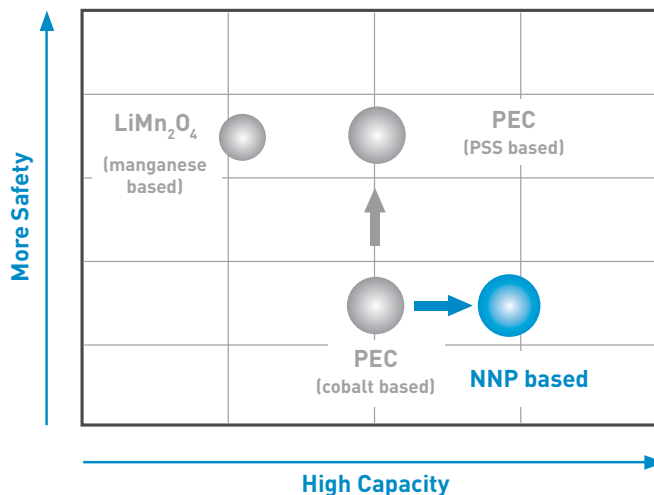
NNP TECHNOLOGY

Li-Ion battery cells have become indispensable as a power source for cordless equipment, such as laptops, that supports a ubiquitous society. As cordless devices become more sophisticated and powerful, they require more robust battery cells. Panasonic has responded to these challenges with the new battery cells, employing its unique high capacity nickel based positive electrode technology as well as its material and processing technology which prevents deformation of the alloy-based negative electrode when subjected to repeated charge and discharge. This new battery technology is called **Nickel Oxide based New Platform**.*2

Characteristics of the new Panasonic NNP Technology:

- Superior cycle life performance
- High energy density contributes to downsizing and weight reduction
- The new nickel positive electrode exceeds regarding durability in actual use and charge retention
- Excellent shelf-life due to low self-discharge performance

COMPARISON BETWEEN CAPACITY AND SAFETY OF CATHODE MATERIAL



*1 Panasonic cells must always be equipped with a safety unit in order to avoid human beings accidents.

*2 Please contact Panasonic to get further information about our new NNP battery series and our entire Li-Ion line-up

LITHIUM CYLINDRICAL TYPE (PRIMARY)

BR CYLINDRICAL Ever since their market launch in 1973, our Poly-Carbonmonofluoride Lithium batteries (BR series) have accumulated a proven track record and figured prominently as the batteries of choice for varied applications. In particular, their long-term operating performance spanning some ten years has made them the ideal power supply for products such as meters or smoke detectors, and they continue to lead the way in applications that demand long-term reliability.



POLY-CARBONMONOFLUORIDE (BR SERIES) LITHIUM

PRIMARY 3V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal*1 Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
BR-1/2AA*2	3	1,000	2.5	14.5	25.5	8.0	-
BR-2/3A	3	1,200	2.5	17.0	33.5	13.5	BR-17335
BR-2/3AG	3	1,450	2.5	17.0	33.5	13.5	BR-17335
BR-A	3	1,800	2.5	17.0	45.5	18.0	-
BR-AG	3	2,200	2.5	17.0	45.5	18.0	-
BR-C	3	5,000	5.0	26.0	50.5	42.0	-

Applications

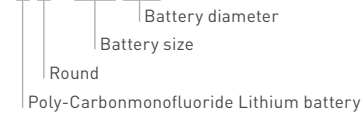
Heatcost Allocators,
Water & Gas Meters,
ETC (Electronic Toll Collection) Systems,
Smoke Detectors,
Entry Systems,
Data Loggers, etc.

Features

- Wide operating temperature range between -40°C ~ +85°C
- Self discharge rate at 20°C is just 0.5% per year
- Superior long-term reliability
- Distinguished production experience

Model Number (example)

BR - 1 / 2 A A



BR CYLINDRICAL TYPE • 3D ILLUSTRATION

- 1 Positive pole
- 2 Positive pole platform
- 3 Tube
- 4 Cell can
- 5 Collector
- 6 Negative pole
- 7 Insulator
- 8 Anode (lithium)
- 9 Cathode (carbonmonofluoride)
- 10 Separator
- 11 Gasket



*1 Capacity based on standard drain and cut off voltage down to 2.0V at 20°C.

*2 Operating temperature range is from - 40°C ~ + 100°C.

LITHIUM CYLINDRICAL TYPE (PRIMARY)

CR CYLINDRICAL FOR CONSUMER Panasonic Lithium cylindrical batteries type CR come as either single cells or dual cell packs. Pack batteries are packaged in a resin case enabling easy replacement by users. Their development was pioneered by Panasonic. All cylindrical type Manganese Dioxide (CR series) Lithium batteries feature a spiral structure, and by enlarging the surface areas of the electrodes they allow a current as high as several amperes to be drawn.



MANGANESE DIOXIDE (CR SERIES FOR CONSUMER) LITHIUM

PRIMARY 3V - 6V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal*1 Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
CR-2*2	3	850	20	15.6	27.0	11.0	CR-15H270
CR-123A*2	3	1,400	20	17.0	34.5	17.0	CR-17345
2CR-5*2	6	1,400	20	34.0	45.0	38.0	2CR-5
CR-P2*2	6	1,400	20	35.0	36.0	37.0	CR-P2
CR-V3*2	3	3,300	200	29.0 x 14.5	52.0	39.0	-

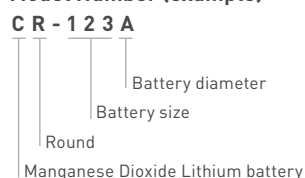
Applications

Cameras,
High Energy Flashlights,
Sanitary Devices, etc.

Features

- Operating temperature range between -40°C ~ +70°C
- Good Pulse Capability
- Stable voltage during discharge
- Self discharge rate at 20°C just 1.0% per year

Model Number (example)



CR CYLINDRICAL TYPE • 3D ILLUSTRATION

- 1 Positive pole
- 2 PTC (positive temperature coefficient device)
- 3 Collector
- 4 Cell can
- 5 Cathode (manganese dioxide)
- 6 Negative pole
- 7 Insulator
- 8 Anode (lithium)
- 9 Separator
- 10 Tube
- 11 Vent diaphragm
- 12 Gasket



*1 Capacity based on standard drain and cut off voltage down to 2.0V or 4.0V at 20°C.

*2 In case of usage below 20mA discharge please consult Panasonic.

LITHIUM CYLINDRICAL TYPE (PRIMARY)

CR CYLINDRICAL FOR INDUSTRIAL Industrial equipment-targeted series offering both excellent high-rate discharge performance and long-term use.



MANGANESE DIOXIDE (CR SERIES FOR INDUSTRIAL) LITHIUM

PRIMARY 3V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal*1 Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
CR-AAZ*2	3	1,700	2.5	14.5	50.5	19.0	CR-14500
CR-2/3AZ	3	1,600	2.5	17.0	33.5	17.0	-
CR-AG	3	2,400	2.5	17.0	45.5	24.0	-

Applications

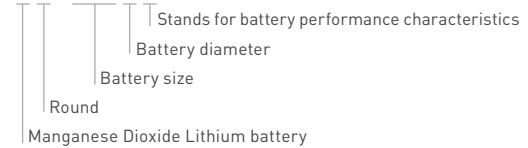
Smoke Detector,
ETC (Electronic Toll Collection)
Systems,
Alarm Systems,
Marine Devices, etc.

Features

- Full capacity even at low discharge rates
- Operating temperature range between -40°C ~ +70°C
- High discharge characteristics
- Long-term reliability
- Self discharge rate at 20°C is just 1% per year

Model Number (example)

CR - 2 / 3 A Z



CR CYLINDRICAL TYPE • 3D ILLUSTRATION

- 1 Positive pole
- 2 PTC (positive temperature coefficient device)
- 3 Collector
- 4 Cell can
- 5 Cathode (manganese dioxide)
- 6 Negative pole
- 7 Insulator
- 8 Anode (lithium)
- 9 Separator
- 10 Tube
- 11 Vent diaphragm



*1 Capacity based on standard drain and cut off voltage down to 2.0V at 20°C.

*2 Development concluded but large-scale production not started yet.

LITHIUM COIN TYPE (PRIMARY)

BR COIN Panasonic Lithium batteries coin type BR feature a high energy density, and were developed and commercialised using Panasonic's extensive experience in battery technology. They exhibit stable performance under high environmental temperatures.



POLY-CARBONMONOFLUORIDE (BR SERIES) LITHIUM

PRIMARY 3V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal*1 Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
BR-1220	3	35	0.03	12.5	2.0	0.7	-
BR-1225	3	48	0.03	12.5	2.5	0.8	BR-1225
BR-1632	3	120	0.03	16.0	3.2	1.5	-
BR-2032	3	200	0.03	20.0	3.2	2.5	-
BR-2325	3	165	0.03	23.0	2.5	3.0	BR-2325
BR-2330	3	255	0.03	23.0	3.0	3.2	-
BR-3032	3	500	0.03	30.0	3.2	5.5	-

Applications

ETC (Electronic Toll Collection) Systems, Varied range of meters, Memory Back-Up Power Supplies, Notebooks, etc.

Features

- Self discharge rate at 20°C is just 1.0% per year
- Wide operating temperature range -30°C ~ +80°C
- Superior long-term reliability
- Distinguished production experience

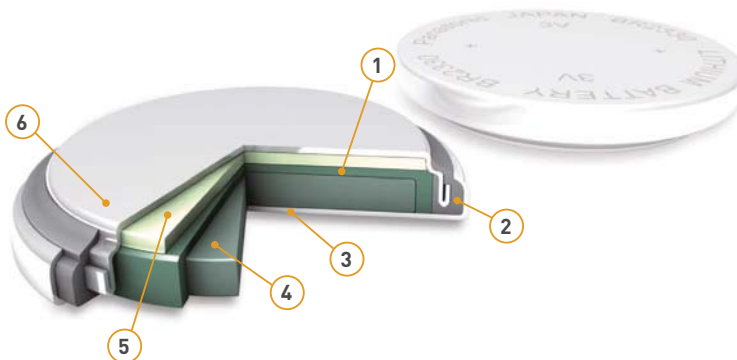
Model Number (example)

BR - 2 3 3 0

Divide this by 10 to obtain the battery height in mm
Battery diameter (in mm)
Round
Poly-Carbonmonofluoride Lithium battery

BR COIN TYPE • 3D ILLUSTRATION

- 1 Separator
- 2 Gasket
- 3 Positive pole (cell can)
- 4 Cathode (poly-carbonmonofluoride)
- 5 Anode (lithium)
- 6 Negative pole



BR-A SERIES COIN TYPE LITHIUM FOR HIGH TEMPERATURE USAGE The materials for the gasket and separator featured in these coin-type Lithium batteries have been replaced with a special engineering plastic and the operating temperature has been significantly increased by employing an electrolyte with a high boiling point. These benefits make this battery series the ideal power supply in high ambient temperature applications.

POLY-CARBONMONOFLUORIDE (BR-A SERIES) LITHIUM FOR HIGH TEMPERATURE USAGE

PRIMARY 3V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal*1 Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
BR-1225A*2	3	48	0.03	12.5	2.5	0.8	-
BR-1632A*2	3	120	0.03	16.0	3.2	1.5	-
BR-2330A*2	3	255	0.03	23.0	3.0	3.2	-
BR-2450A*2	3	550	0.03	24.5	5.0	5.9	-
BR-2477A*2	3	1,000	0.03	24.5	7.7	8.0	-

*1 Based on standard drain and cut off voltage down to 2.0V at 20°C.

*2 Only batteries with terminals are available.

LITHIUM COIN TYPE (PRIMARY)

Applications

Tire Pressure Monitoring Systems (TPMS),
Water Meters,
Heat Cost Allocators,
Memory Back-Up Power Supplies in high
ambient temperature applications, etc.

Features

- Superior design for high temperature applications
-40°C ~ +125°C
- Outstanding long-term reliability
- Distinguished production experience
- Self discharge rate at 20°C is just 0.5% per year

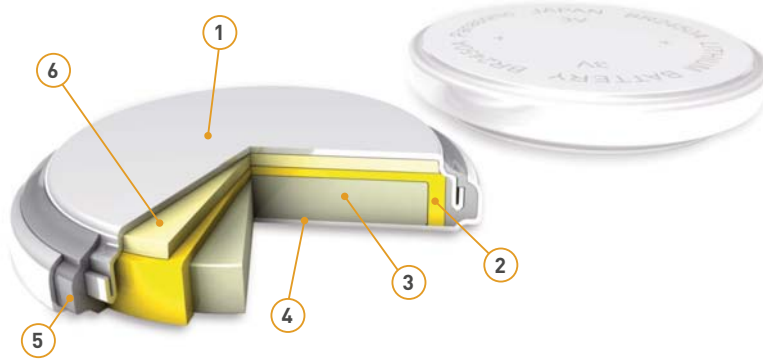
Model Number (example)

BR - 2 4 7 7 A

Round
Battery diameter (in mm)
Divide this by 10 to obtain the battery height in mm
A = High temperature usage
Poly-Carbonmonofluoride Lithium battery

BR COIN "A" TYPE • 3D ILLUSTRATION

- 1 Negative pole
- 2 Separator
- 3 Cathode (poly-carbonmonofluoride)
- 4 Positive pole (cell can)
- 5 Gasket
- 6 Anode (lithium)



CR COIN TYPE As with the BR series of coin-type Lithium batteries, these Panasonic Lithium coin-type CR batteries feature a high-energy density, and they were developed and commercialised using Panasonic's extensive experience in battery technology. These batteries have proven to be especially useful in equipment requiring high currents.



MANGANESE DIOXIDE (CR SERIES) LITHIUM

PRIMARY 3V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal*1 Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
CR-1025	3	30	0.10	10.0	2.5	0.7	CR1025
CR-1216	3	25	0.10	12.5	1.6	0.7	CR1216
CR-1220	3	35	0.10	12.5	2.0	1.2	CR1220
CR-1612	3	40	0.10	16.0	1.2	0.8	-
CR-1616	3	55	0.10	16.0	1.6	1.2	CR1616
CR-1620	3	75	0.10	16.0	2.0	1.3	CR1620
CR-1632	3	140	0.10	16.0	3.2	1.8	-
CR-2012	3	55	0.10	20.0	1.2	1.4	CR2012
CR-2016	3	90	0.10	20.0	1.6	1.6	CR2016
CR-2025	3	165	0.20	20.0	2.5	2.5	CR2025
CR-2032	3	220	0.20	20.0	3.2	3.1	CR2032
CR-2330	3	265	0.20	23.0	3.0	4.0	CR2330
CR-2354	3	560	0.20	23.0	5.4	5.9	CR2354
CR-2412	3	100	0.20	24.5	1.2	2.0	-
CR-2450	3	620	0.20	24.5	5.0	6.3	CR2450
CR-2477	3	1,000	0.20	24.5	7.7	10.5	-
CR-3032	3	500	0.20	30.0	3.2	7.1	CR3032

*1 Based on standard drain and cut off voltage down to 2.0V at 20°C.

LITHIUM COIN & PIN TYPE (PRIMARY & RECHARGEABLE)

Applications

Keyless Entry, RFID, Price Tags, ETC (Electronic Toll Collection) Systems, Notebooks, Back-Up for vending machines, Bicycle Computer, etc.

Features

- Good Pulse Capability
- High discharge characteristics
- Stable voltage during discharge
- Long-term reliability
- Self discharge rate at 20°C is just 1.0% per year
- Temperature range -30°C ~ +60°C

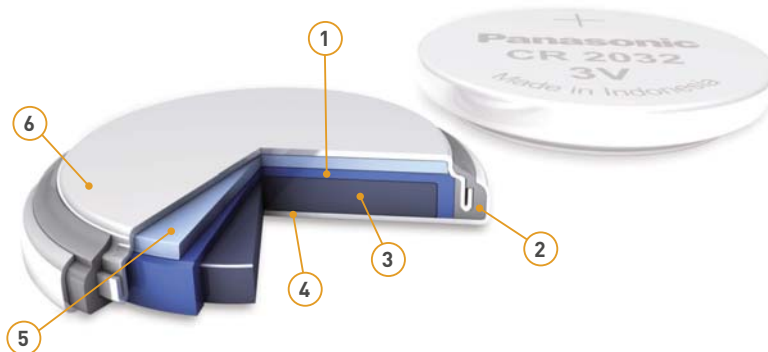
Model Number (example)

CR - 2 0 3 2

Divide this by 10 to obtain the battery height in mm
 Battery diameter (in mm)
 Round
 Manganese Dioxide Lithium Battery

CR COIN TYPE • 3D ILLUSTRATION

- 1 Separator
- 2 Gasket
- 3 Cathode (manganese dioxide)
- 4 Positive pole (cell can)
- 5 Anode (lithium)
- 6 Negative pole



PIN TYPE These slim-line Pin Type Lithium batteries are contained in an aluminum casing and were originally developed by Panasonic. A single cell Lithium pin battery can light an LED.



PIN TYPE POLY-CARBONMONOFLUORIDE (BR SERIES) LITHIUM

PRIMARY 3V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal*1 Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
BR-425	3	25	0.5	4.2	25.9	0.6	-
BR-435	3	50	1.0	4.2	35.9	0.9	-

VL, ML, NBL, MT COIN These Panasonic rechargeable Lithium coin batteries are mostly designed for memory back-up applications such as pagers, mobile phones, watches, data terminals and fax machines. Their voltage ranges from 1.5V to 3V.

VANADIUM PENTOXIDE LITHIUM (VL SERIES)

RECHARGEABLE 3V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal*2 Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
VL-621*3	3	1.5	0.01	6.8	2.1	0.3	-
VL-1220*3	3	7.0	0.02	12.5	2.0	0.8	-
VL-2020*3	3	20.0	0.07	20.0	2.0	2.2	-
VL-2320*3	3	30.0	0.10	23.0	2.0	2.7	-
VL-2330*3	3	50.0	0.10	23.0	3.0	3.5	-
VL-3032*3	3	100.0	0.20	30.0	3.2	6.2	-

*1 Based on standard drain and cut off voltage down to 2.0V at 20°C.

*2 Based on standard drain and cut off voltage down to 2.5V at 20°C.

*3 Only batteries with terminals are available.

LITHIUM COIN TYPE (RECHARGEABLE)

MANGANESE LITHIUM (ML SERIES)

RECHARGEABLE 3V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal* ¹ Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
ML-414	3	1.2	0.005	4.8	1.4	0.1	-
ML-421	3	2.3	0.005	4.8	2.1	0.1	-
ML-614	3	3.4	0.010	6.8	1.4	0.2	-
ML-621	3	5.0	0.010	6.8	2.1	0.2	-
ML-920	3	11.0	0.030	9.5	2.0	0.4	-
ML-1220	3	17.0	0.030	12.5	2.0	0.8	-
ML-2020	3	45.0	0.120	20.0	2.0	2.2	-

NIOBIUM LITHIUM (NBL SERIES)

RECHARGEABLE 2V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal* ² Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
NBL-414	2	1	0.008	4.8	1.4	0.1	-
NBL-621	2	4	0.010	6.8	2.1	0.2	-

MANGANESE TITANIUM LITHIUM (MT SERIES)

RECHARGEABLE 1.5V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	IEC
	Nominal Voltage (V)	Nominal* ² Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height		
MT-516	1.5	1.8	0.4	5.8	1.6	0.2	-
MT-621	1.5	2.5	0.4	6.8	2.1	0.3	-
MT-920	1.5	5.0	0.4	9.5	2.0	0.5	-

Applications

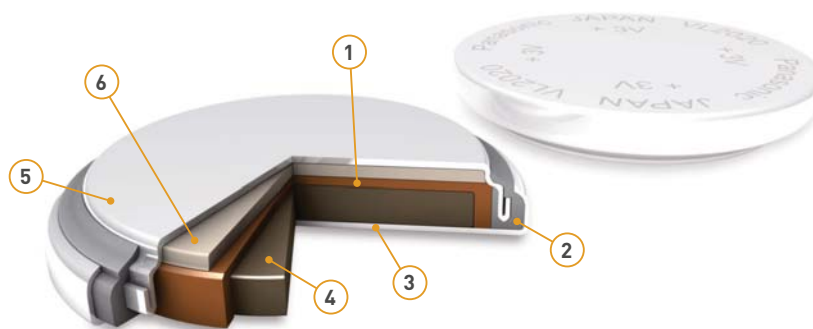
Computers,
Keyless Entry,
Fax Machines,
Mobile Phones,
Watches, etc.

Features

- Rechargeable Lithium technology
- Self discharge rate at 20°C is only 2.0% per year for VL, ML and NBL battery types
- 1,000 charge-discharge cycles for VL, ML and NBL at 10% depth of discharge
- Superior long-term reliability
- Distinguished production experience

VL COIN TYPE • 3D ILLUSTRATION

- 1 Separator
- 2 Gasket
- 3 Positive pole (cell can)
- 4 Cathode (vanadium pentoxide)
- 5 Negative pole
- 6 Anode (lithium aluminium alloy)



*1 Based on standard drain and cut off voltage down to 2.0V at 20°C.

*2 Based on standard drain and cut off voltage down to 1.0V at 20°C.

LITHIUM COIN TYPE (REFLOWABLE RECHARGEABLE)

ML-R, NBL-R These batteries are able to use the reflow soldering process for automatic mounting, by adopting four high heat-resistant materials. ML-R series feature large capacity close to non-reflowable ML series. The NBL-R series eliminates the need for a voltage boosting circuit since they can be charged at a low voltage. They help to simplify charging circuits.

REFLOWABLE MANGANESE (ML-R SERIES) LITHIUM

RECHARGEABLE 3V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	Reflowable temperature	Operating temperature
	Nominal Voltage (V)	Nominal*1 Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height			
ML-414RM*2	3	1.0	0.005	4.8	1.8	0.1	Max. 260°C	-20 to +60°C

Applications

Memory Back-Up Power Supplies for mobile phones,
Memory Cards,
Pagers and other compact communications equipment,
Data Terminals,
Office Automation Equipment, etc.

Features

- High voltage level of 3V
- Low self discharge rate at 20°C of only 2.0% per year
- Superior long-term reliability

REFLOWABLE NIOBIUM (NBL-R SERIES) LITHIUM

RECHARGEABLE 2V

Model Number	Electrical Characteristics at 20°C			Dimensions (mm)		Approx. Weight (g)	Reflowable temperature	Operating temperature
	Nominal Voltage (V)	Nominal*1 Capacity (mAh)	Continuous Standard Drain (mA)	Diameter	Height			
NBL-414L*2	2	0.5	0.005	4.8	1.4	0.1	Max. 230°C	-20 to +60°C

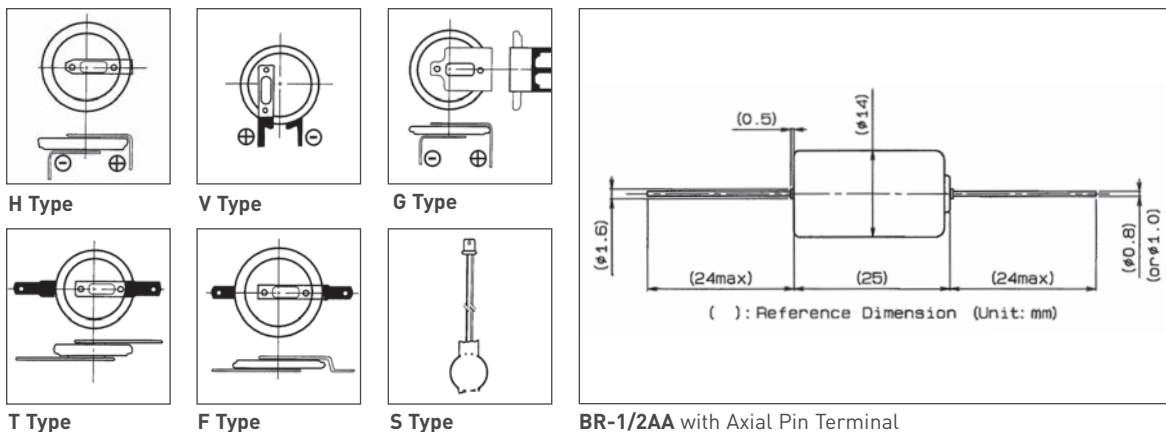
Applications

Memory back-up power supplies for mobile phones using ICs which are driven at 2.5V or below

Features

- Low charging voltage
- Superior long-term reliability
- Low self discharge rate at 20°C of only 2.0% per year

Panasonic offers a broad range of different tabs in order to meet all customer needs.



*1 Based on standard drain and cut off voltage down to 2.0V at 20°C.
*2 Based on standard drain and cut off voltage down to 1.25V at 20°C.

DRY CELL

ALKALINE The Panasonic Alkaline battery is composed of manganese dioxide (+), zinc powder (-) and caustic alkali (potassium hydroxide) as electrolyte. These Alkaline batteries are made from the same basic materials as Zinc-Carbon batteries, but their performance is generally higher for all criteria. All things considered we can say that this Alkaline technology offers a high-performance battery for higher standard applications.



PRIMARY 1.5V - 9V

Model Number	Size	Nominal Voltage (V)	Dimensions (mm)		Approx. Weight (g)
			Diameter	Height	
LR03	AAA	1.5	10.5	44.5	11.2
LR6	AA	1.5	14.5	50.5	23.3
LR14	C	1.5	26.2	50	69.5
LR20	D	1.5	34.2	61.5	142.7
6LR61	9V	9	17.5 x 26.5	48.5	44.3

Applications

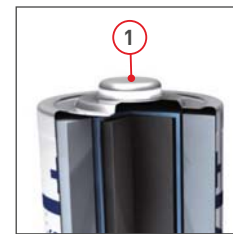
Smoke Detectors, Toys, Marine Devices, Medical equipment, Blood Pressure Meters, Analogue Cameras, Portable Audio Devices, High Energy Flashlights, Highway Telephones, Buoyage, Scales, Cleaning and Hygiene Services, etc.

Features

- Developed for high and medium drain appliances
- Continuously reliable energy provision
- Long shelf life
- Excellent leakage resistance
- Superior low temperature behaviour

LR ALKALINE • 3D ILLUSTRATION

- 1 Positive pole
- 2 Cathode (manganese-dioxide-carbon)
- 3 Anode (zinc-gel)
- 4 Nail
- 5 Safety vent
- 6 Negative pole
- 7 Sealing
- 8 Separator
- 9 Cell can
- 10 Tube



ZINC-CARBON The Zinc-Carbon chemistry is a predecessor of the Alkaline battery technology. It is a standard solution for many applications which do not require high voltages and extraordinary performance characteristics. Panasonic's long production experience has led to the best performance based on the technological prerequisites.



PRIMARY 1.5V - 9V

Model Number	Size	Nominal Voltage (V)	Dimensions (mm)		Approx. Weight (g)
			Diameter	Height	
R03	AAA	1.5	10.5	44.5	8.0
R6	AA	1.5	14.5	50.5	19.0
R14	C	1.5	26.2	50.0	49.0
R20	D	1.5	34.2	61.5	106.0
6F22	9V	9	17.5 x 26.5	48.5	38.0

Applications

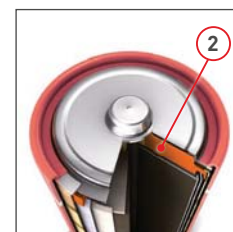
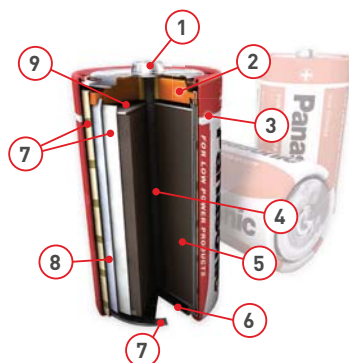
Alarm Clocks, Remote Controls, Radios, Flashlights, etc.

Features

- Established and reliable battery technology
- Outstanding price versus quality ratio
- Economical in terms of cost per hour for low current consumption

ZINC-CARBON • 3D ILLUSTRATION

- 1 Positive pole
- 2 Polyethylene gasket
- 3 Tube
- 4 Carbon stick
- 5 Cathode (manganese)
- 6 Negative pole
- 7 Insulator
- 8 Anode (zinc can)
- 9 Paper plate



VALVE-REGULATED (SEALED)-LEAD-ACID

BATTERY TYPES AND MODEL NUMBERS

Product Category					
Application	Series	Trickle Design Life (at 20°C)	Category	Standard ABS (UL94 HB)	FR ABS = Flame Retardant ABS (UL94 V-0)
Back Up	LC-V	6 – 9 years	Trickle standard type		●
	LC-X	10 – 12 years	Trickle long life type	●	
	LC-P	10 – 12 years	Trickle long life type		●
	LC-QA	15 years	Trickle super long life type		●
	UP-RW	6 – 9 years	High power standard type	●	
	UP-PW	10 – 12 years	High power long life type		●
Back Up and Main Power	LC-R	6 – 9 years	Trickle and cycle standard type	●	
Main Power	LC-CA	-	Cycle long life type	●	
	LC-XC	-	Cycle long life type	●	

LC SERIES Panasonic LC series (Valve-Regulated-Lead-Acid battery) was developed by studying and analysing the factors which cause deterioration of conventional batteries in various aspects. The results of this analysis are reflected in our continuous battery development activities. The Panasonic LC series is available with a trickle design life of 6–9 years and 10–12 years on the one hand and long life cycle types for main power supply on the other. The majority of our VRLA batteries are available with different types of terminals.



TRICKLE DESIGN LIFE 6 – 9 YEARS

RECHARGEABLE 6V · 12V

Model Number	Nominal Voltage (V)	Rated Capacity (Ah) 20 hours rate	Dimensions (mm)				Mass approx. (kg)	VdS VdS N°
			Length	Width	Height	Approx.Total Height		
LC-R061R3P*1	6	1.3	97	24	50	55	0.3	-
LC-R063R4P*1	6	3.4	134	34	60	66	0.6	-
LC-R064R5P*1	6	4.5	70	48	102	108	0.7	-
LC-R067R2P*1	6	7.2	151	34	94	100	1.3	-
LC-R0612P*1	6	12.0	151	50	94	100	2.0	-
LC-R0615P	6	15.0	151	50	94	100	2.1	-
LC-R121R3PG	12	1.3	97	47.5	50	55	0.6	G196049
LC-R122R2PG	12	2.2	177	34	60	66	0.8	G188151
LC-R123R4PG	12	3.4	134	67	60	66	1.2	G191053
LC-R124R5P	12	4.5	70	97	102	108	1.5	-
LC-R127R2PG*2	12	7.2	151	64.5	94	100	2.5	G193046
LC-RA1212PG	12	12.0	151	98	94	100	3.8	G100001
LC-RA1215P	12	15.0	151	98	94	100	4.2	-
LC-R1233P	12	33.0	195.6	130	155	180	12.0	-
LC-V1233P	12	33.0	195.6	130	155	180	11.1	-



*1 This battery is also available with a flame retardant battery case resin (UL94 V-0).

*2 LC-R127R2P is available with flame retardant case resin (UL94 V-0) but with no VdS certification.

VALVE-REGULATED (SEALED)-LEAD-ACID

TRICKLE DESIGN LIFE 10 – 12 YEARS

RECHARGEABLE 6V · 12V

Model Number	Nominal Voltage (V)	Rated Capacity (Ah)	Dimensions (mm)				Mass approx. (kg)	VdS VdS N°
		20 hours rate	Length	Width	Height	Approx. Total Height		
LC-P061R3P	6	7.2	151	34	94	100	1.3	-
LC-P067R2P	6	7.2	151	34	94	100	1.3	-
LC-P0612P	6	12	151	50	94	100	2.0	-
LC-X06200P*1	6	200	407	173	210	250	41.0	-
LC-P121R3P	12	2.2	177	34	60	66	0.8	-
LC-P122R2J	12	2.2	177	34	60	66	0.8	-
LC-P123R4J	12	3.4	134	67	60	66	1.2	-
LC-P127R2P	12	7.2	151	64.5	94	100	2.5	-
LC-PA1212P	12	12	151	98	94	100	3.8	-
LC-XD1217PG/APG	12	17	181	76	167	167	6.5	G104101
LC-X1220P/AP*1	12	20	181	76	167	167	6.6	-
LC-X1224PG/APG	12	24	165	125	175	179.5/175	9.0	G198049
LC-X1228P/AP*1	12	28	165	125	175	179.5/175	11.0	-
LC-X1238PG/APG	12	38	197	165	175	180/175	13.0	G100002
LC-X1242P/AP*1	12	42	197	165	175	180/175	16.0	-
LC-X1265PG	12	65	350	166	175	175	20.0	G199090
LC-X1275P*1	12	75	350	166	175	175	24.0	-
LC-XB12100P*1	12	100	407	173	210	236	36.5	-
LC-X12120P*1	12	120	407	173	210	236	35.5	-



CYCLE LONG LIFE

RECHARGEABLE 12V

Model Number	Nominal Voltage (V)	Rated Capacity (Ah)	Dimensions (mm)				Mass approx. (kg)	VdS VdS N°
		20 hours rate	Length	Width	Height	Approx. Total Height		
LC-CA1212P	12	12	151	98	94	100	3.80	-
LC-CA1215P	12	15	151	98	94	100	4.20	-
LC-CA1216P	12	16	151	98	99	105	4.70	-
LC-XC1222P	12	22	181	76	167	167	6.55	-
LC-XC1228P	12	28	165	125	175	179.5	10.00	-
LC-XC1238P	12	38	197	165	175	179.5	15.00	-



Applications

LC Series stand-by applications

UPS,
Communication Infrastructure,
Wind Turbines,
Alarm Systems,
Medical Equipment,
Vending Machines,
Emergency Lights, etc.

Applications

LC Series cyclic applications

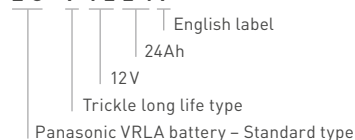
Lawn Mowers,
Golf-Caddies,
Scooters,
E-Bikes,
Wheelchairs,
Toys, etc.

Features

- State-of-the-art Absorbed Glass Mat (AGM) technology
- Superior design and low spread gives an excellent performance
- Enhanced life-time due to low and stable charge current
- 100% inspection after final assembly and before shipment
- Distinguished production experience
- Selected batteries with flame retardant battery containers according to UL94 V-0
- Various VdS approved batteries

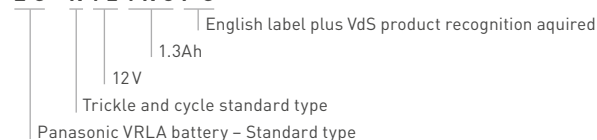
Model Number (example 1)

LC - P 1 2 2 4 P



Model Number (example 2)

LC - R 1 2 1 R 3 P G

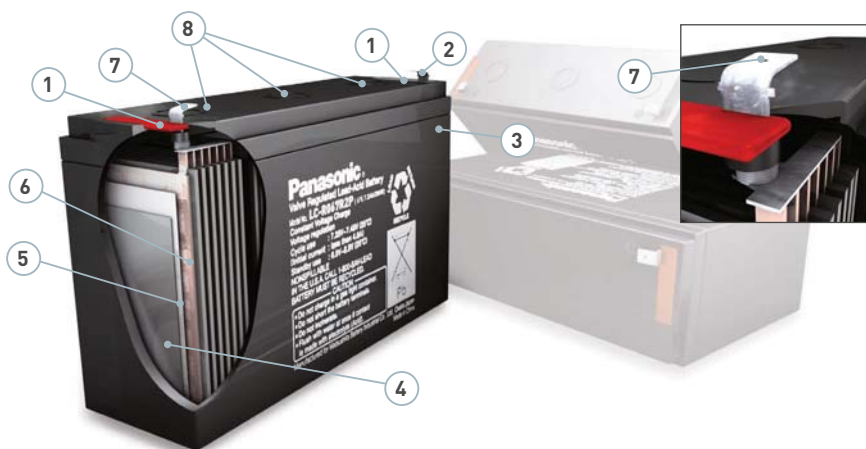


*1 This battery is also available with a flame retardant battery case resin (UL94 V-0).

VALVE-REGULATED (SEALED)-LEAD-ACID

VRLA • 3D ILLUSTRATION

- 1 Seals
- 2 Negative plate terminal
- 3 Battery case
- 4 Negative electrode
- 5 Separator
- 6 Positive electrode
- 7 Positive plate terminal
- 8 Valve



UP-RW / PW SERIES The Panasonic UP-RW/PW series offers up to 30% higher energy density compared to conventional VRLA batteries with the same dimensions. Suitable applications are UPS systems which require a short discharge time of about 30 minutes. Long-lasting experience with market leaders in the power supply business field are evidence for the high-performance of this battery series.



TRICKLE DESIGN LIFE 6 – 9 AND 10 – 12 YEARS

RECHARGEABLE 6V • 12V

Model Number	Nominal Voltage (V)	Rated Power (W)		Expected Trickle Design Life (at 20°C)	Dimensions (mm)				Mass approx. (kg)	VdS VdS N°
		10 minutes rate			Length	Width	Height	Approx. Total Height		
UP-RW0645P*1	6	135		6 – 9 years	151	34	94	100	1.3	-
UP-RW1220P*1	12	120		6 – 9 years	140	38,5	94	100	1.4	-
UP-RW1228P*1	12	200		6 – 9 years	151	64,5	94	100	1.9	-
UP-RWA1232P1/P2*1	12	192		6 – 9 years	151	51	94	100	2.0	-
UP-RW1236P*1	12	224		6 – 9 years	151	64,5	94	100	2.1	-
UP-RW1245P*1	12	270		6 – 9 years	151	64,5	94	100	2.6	-
UP-PW1245P	12	270		10 – 12 years	151	64,5	94	100	2.6	-

Applications

UPS Systems

Features

- 30% higher energy density compared to conventional VRLA batteries
- Superior quality
- 100% inspection after final assembly and before shipment
- Distinguished production experience
- Batteries with flame retardant battery container according to UL94 V-0 available

Model Number (example)

UP - RW 12 20 P 1

| Terminal type (Faston 250 with hole)
 | English label
 | The wattage per cell at 10 minutes rate discharge.
 | 12V
 | Watt
 | For Back Up – High Power Standard Type
 | Panasonic VRLA battery – High Power Type

VALVE-REGULATED (SEALED)-LEAD-ACID

LC-QA SERIES The hallmarks of the Panasonic LC-QA battery series are a very long service life of 15 years (at 20°C) and excellent product quality. The latest LC-QA models are the result of a research programme to prolong the service life of lead-acid batteries, which Panasonic started back in 1984.



TRICKLE DESIGN LIFE 15 YEARS

RECHARGEABLE 6V · 12V

Model Number	Nominal Voltage (V)	Rated Capacity (Ah) 20 hours rate	Dimensions (mm)				Mass approx. (kg)	VdS VdS N°
			Length	Width	Height	Approx. Total Height		
LC-QA06210TP	6	210	407	173	210	250	36.5	-
LC-QA1224AP	12	24	165	125	175	175	10.0	-
LC-QA1242P/AP	12	42	197	165	175	180	16.0	-
LC-QA1270P	12	70	350	166	175	175	23.5	-
LC-QA12110TP	12	110	407	173	210	236	36.0	-

Applications

Mainly Telecommunications Industry,
Emergency Light for trains,
UPS Systems,
Energy Distribution, etc.

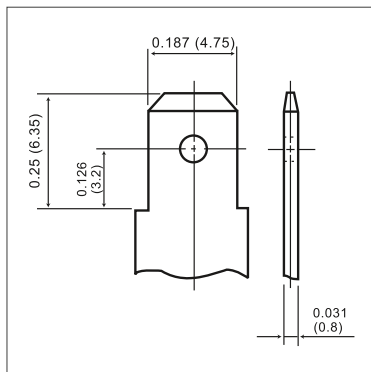
Features

- Innovative lead-calcium tin alloy minimises harmful corrosion to the positive electrode
- Reliable seal thanks to a rubber washer and epoxy resin
- Flame-retardant housing according to UL 94-V0

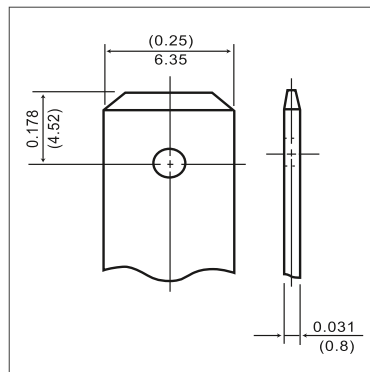
TERMINAL TYPES Panasonic offers the appropriate terminal type for each VRLA battery depending on the technical prerequisites. Additionally, some batteries are available with different terminal alternatives.

TERMINAL TYPES (EXAMPLES)

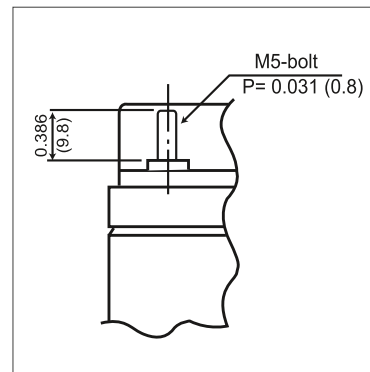
Unit: inch (mm)



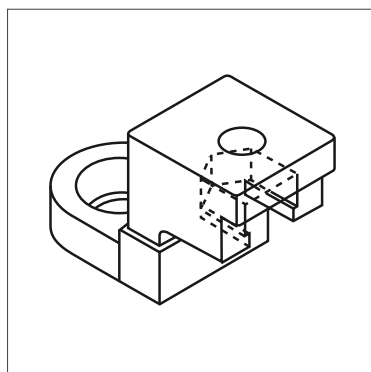
Faston tab type 187



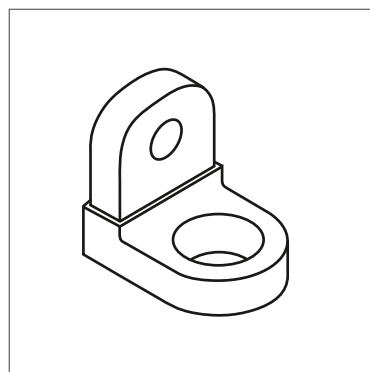
Faston tab type 250



M5 threaded post type



T-shape terminal (M10)



L-shape terminal (M5, 6, 8)

OVERVIEW APPLICATIONS

Area of application	Applications	NiMH			Li-Ion	
		Standard	High Temp. Type	E-Block	Cylinder	Prismatic
Automotive	ETC					
	Keyless Entry					
	TPMS					
Medical	E-Call					
	Wheelchair				CGR	
	Inhaler					CGA
	Infusion Pump	HHR	HHR High Temp		CGR	
	Mobile Surgery Light					
	Defibrillator (AED)					
	Diode Laser				CGR	
	Scales					
	Laryngoscope Devices	HHR				
	Portable Ultrasound Scanner	HHR				
	Blood Pressure Meter	HHR				
Power Tool	Mobile Surgery Table					
	Digital Thermometer					
	Glucose Meter					
	Medical Lift	HHR				
	Drill & Driver				CGR	
	Tapping Machine				CGR	
	Grinding Machine				CGR	
	Sealing Gun				CGR	
	Blind Riveting Machine				CGR	
	Chain Saw				CGR	
Garden Tools	Lawn Mover				CGR	
	Grape Cutter				CGR	
	Hedge Trimmer				CGR	
	Garden Scissor				CGR	
Metering	Electricity Meter					
	Gas Meter					
	Water Meter					
	Heat Cost Allocation					
Security	UPS					
	Alarm System					
	Smoke Detector					
	Emergency Lighting		HHR High Temp			
Telecom	Door Lock System					
	Two Way Radio		HHR High Temp			CGA
	Base Station					
Energy Saving	Cordless Phones	HHR				
	Solar Heating System					
	Solar Street Lighting					
RFID	Pitch System for Wind Turbine					
	RFID Tag					
Home Appliance	RFID Handheld				CGR	
	Shaver	HHR			CGR	
	Tooth Brush	HHR				
	Radio Cassette Recorder	HHR				
Electric Vehicle	Vaccum Cleaner				CGR	
	Scoter					
	E-Bike	HHR			CGR	
	Cleaning Machine					
	Pedelec	HHR			CGR	
	Golf Caddy				CGR	
	Two-Wheeled Vehicle (e.g. Segway)				CGR	
Marine	Emergency Position Indicating Radio Beacon					
	PLB – Personal Location Beacon					
	Life Jacket Lights					
	Search and Rescue Transponder					
	Man Over Board Device					
	Radio Equipment					
	Life Raft Lights					
Computer	Diving Torch	HHR			CGR	
	Tablet PC				CGR	
	Personal Digital Assistant					CGA
	Weather Station					
Others	E-Paper				CGR	
	RTC (Real Time Clock)					
	Watch					
	Calculators					
	Ticket Machine					
	GPS Device		HHR High Temp			CGA
	Remote Control	HHR				
	Fax Machine					
	Melody Cards					
	Multimeter			HHR		
	Cow Dirt Robot					
Portable Payment Terminal					CGA	
Speed Limit Sign / Flashlight						
Distance Meter				CGR		

OVERVIEW APPLICATIONS

Cylinder	Lithium		Dry Cell		VRLA
	Coin	Coin Rechargeable	Alkaline	Zinc-Carbon	VRLA
	BR				
	CR	VL			
	BR High Temp				
BR/CR					LC-XC
					LC-R / LC-X
					LC-R / LC-X
CR					
	CR		LR6		
			LR03,LR6,6LR61		
					LC-CA / LC-XC
	CR				
CR	CR				LC-CA / LC-XC
					LC-XC
BR/CR					
BR/CR			LR20		
	BR High Temp	VL			
BR					LC-X / UP
					LC-R / LC-X
CR			LR6		
CR			LR6		LC-R
					LC-X
					LC-R / LC-X
					LC-X
					LC-R
CR	CR				
			LR		
					LC-CA / LC-XC
					LC-CA / LC-XC
					LC-CA / LC-XC
CR					
CR					
CR					
CR					
CR					
CR					
			LR6		
			LR6		
BR	CR				
CR		NBL/MT			
	CR	VL			
					LC-R / LC-X
			LR6	R6	
		ML			
	CR		LR6		
					LC-CA / LC-XC
					LC-R / LC-X

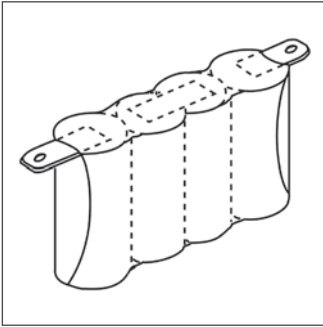
Legend

- BR** Cylindrical Poly-Carbonmonofluoride Lithium battery
- BR High Temp** Cylindrical Poly-Carbonmonofluoride Lithium battery for high temperature
- CGA** Prismatic Lithium-Ion battery
- CGR** Cylindrical Lithium-Ion battery
- CR** Manganese Dioxide Lithium battery
- HHR** Cylindrical Nickel-Metal-Hydride battery
- HHR High Temp** Cylindrical Nickel-Metal-Hydride battery for high temperature
- LC-CA** Cycle long life type battery
- LC-R** Trickle and cycle standard type battery
- LC-X** Trickle and cycle long life type battery
- LC-XC** Cycle long life type battery
- LR** Alkaline battery
- ML** Manganese Lithium battery
- MT** Manganese Titanium Lithium battery
- NBL** Niobium Lithium battery
- R** Zinc-Carbon battery
- UP** VRLA battery – High Power type battery
- VL** Vanadium Pentoxide Lithium battery

BATTERY PACKS

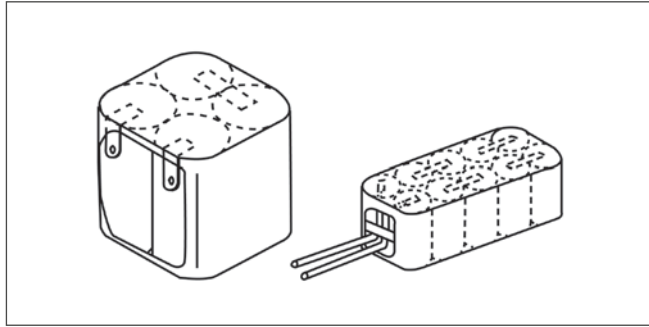
Panasonic can provide a broad range of customised battery pack solutions to meet all customers' energy needs. The requirements of the application, such as charge characteristics, available space and operating conditions, determine the type of battery, number of cells and shape of the pack. At Panasonic we are working in particular on the promotion of battery packs which emphasise safety and reliability of the batteries. We can create battery packs to satisfy the unique requirements of each of our customers and are able to design and produce battery packs of nearly all chemistry. Do not hesitate to contact us regarding your specific needs.

SHAPES OF BATTERY PACKS (TYPICAL & STANDARD TYPES)



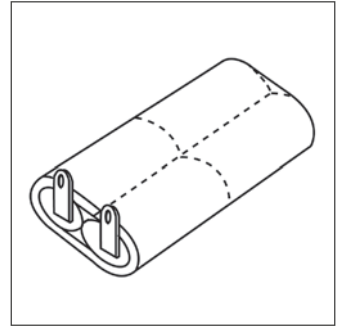
F Type

The required number of single cells are arranged side by side along their diameter connected by nickel plates and packed together with heat-shrinkable tubing.



Composite F Type

Single cells are connected in the F type configuration but in two to five rows rather than one row and packed together by heat-shrinkable tubing.



L Type

The required number of single cells are arranged in a line in the axis of the batteries connected by connecting plates and packed together by heat-shrinkable tubing.

Composite L Type

Single cells connected in the L type configuration are further connected in two to five rows and packed together by heat-shrinkable tubing.

Panasonic can meet customers' needs for customised specifications (such as battery packs in plastic resin cases). Please contact Panasonic for detailed discussions concerning design-in, specifications, lead times, etc.

SPECIAL PACK SHAPES



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