

**Panasonic**  
ideas for life

# SHORT FORM CATALOG

ENGLISH

INDUSTRIAL BATTERIES

# 2013

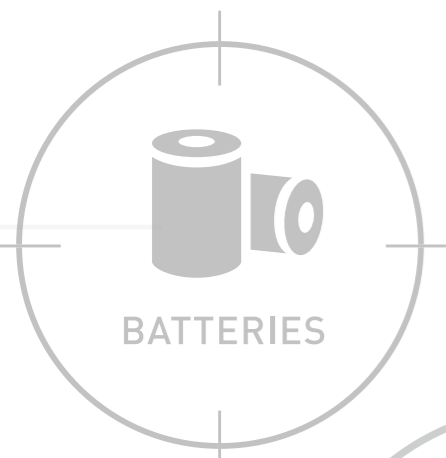


**Panasonic**  
**BATTERY FINDER**  
**app & find**

**BATTERIES FOR OEM CUSTOMERS**  
Lithium-Ion, Ni-MH, Lithium, VRLA,  
Zinc-Carbon, Alkaline and Battery Packs



**Panasonic BATTERIES**  
Quality is our Business.



# BATTERY FINDER app & find



Scan QR code to go to app store and download app free of charge.

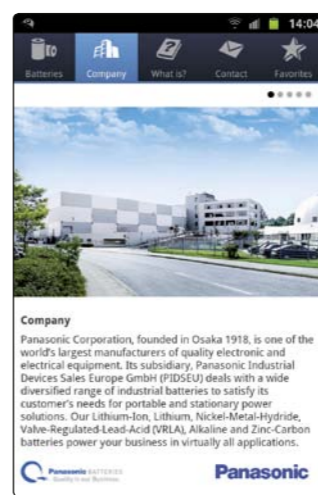
Designed for engineers, electronics specialists and developers who need batteries for their projects, the Battery Finder App provides an overview of what's available in the Panasonic range of industrial batteries, and gives a recommendation on the type of battery that's best suited to the user's application. It also offers a wealth of information, diagrams and animations on battery technology.

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'eco ideas' strategy	6 - 7
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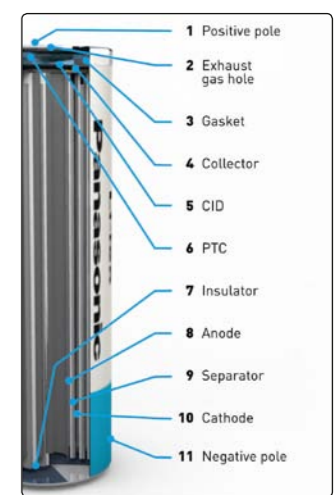
**HOME**  
This is the welcome screen. You can start looking for a battery straight from here, or check out the information on Panasonic and details on battery technologies. Good luck!



**COMPANY INFORMATION**  
This is a brief profile of Panasonic, telling you about the company and its industrial batteries division. You might also like to view our 'eco ideas' film.



**WHAT IS?**  
If you're looking for background info, you'll find it here - in the app's extensive glossary on battery technology. Find out about our battery types, product series and terminal types.



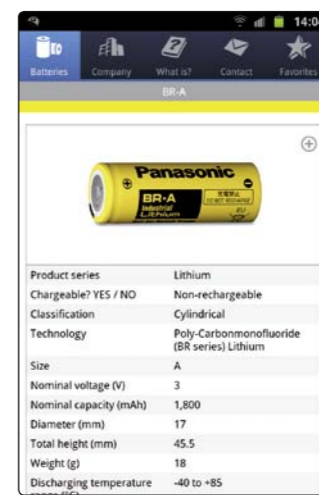
**3D ANIMATIONS**  
The glossary highlights are the 3D-animated films that guide you through the inner workings of the batteries.



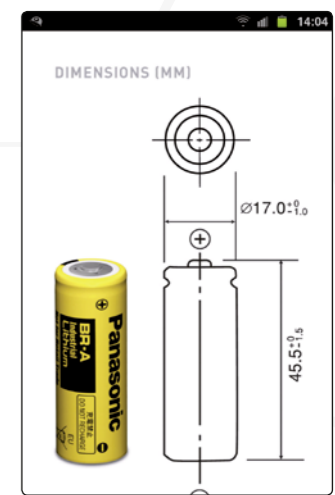
**BATTERY FINDER**  
You can search for batteries in three ways: by product series, by application or by model number.



**MATCHES LIST**  
Once you've entered your search options, the app will show you a list of matching batteries. Now you can choose your favorites.



**BATTERY INFORMATION**  
You're shown the selected battery with all the key details. You have also several options for requesting downloads and hardcopies.



**TECHNICAL DRAWINGS**  
You can view a detailed technical drawing of the battery and zoom in on particular details.

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**PANASONIC INDUSTRIAL DEVICES SALES 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 Devices Sales Europe GmbH (PIDSEU) markets a diverse portfolio of industrial products throughout Europe. Formed in 1998 to strengthen Panasonic’s pan-European industry operations, the company is now active in Automotive, Audio/Video & Communication, Home Appliance, Industry as well as Factory Solutions and Energy.

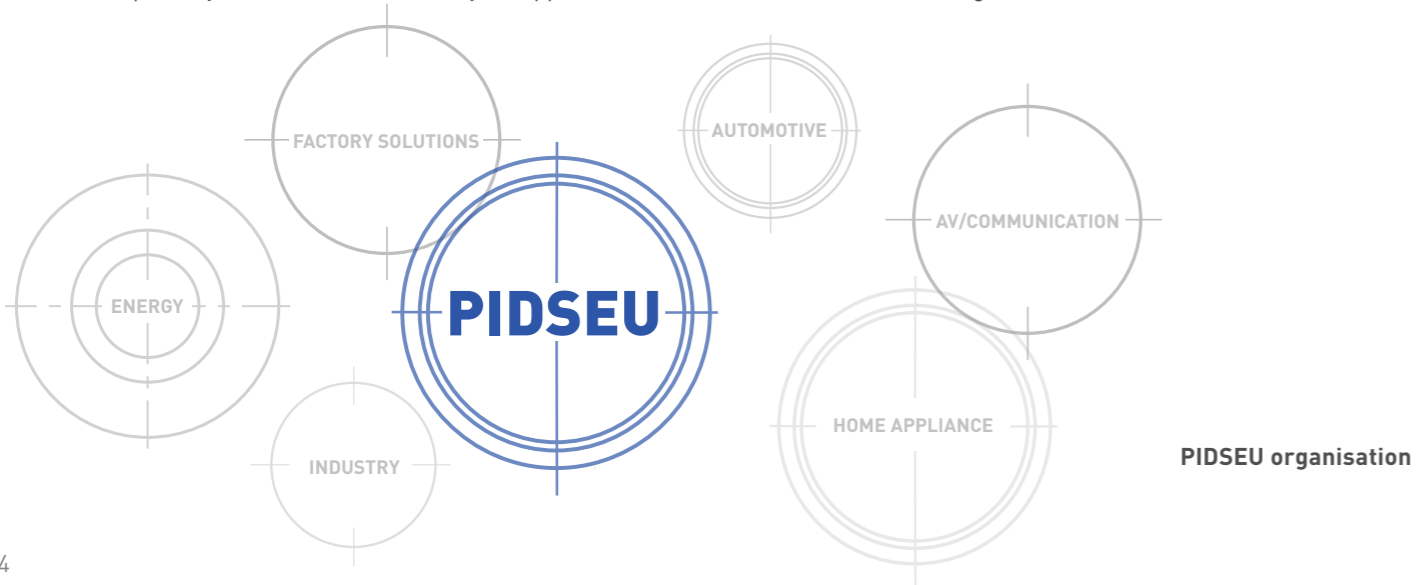


Panasonic quality – certified by authorised agencies.

**Company**

Panasonic offers a wide range of 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. With this breadth and depth to the portfolio, we can power your business in virtually all applications.

Panasonic Energy Company (PEC) began manufacturing batteries in 1931. Today PEC is the most diversified global battery manufacturer worldwide, with an extensive network of manufacturing companies globally. The company employees are dedicated to research, development and production of batteries for an energized world.



**Certifications**

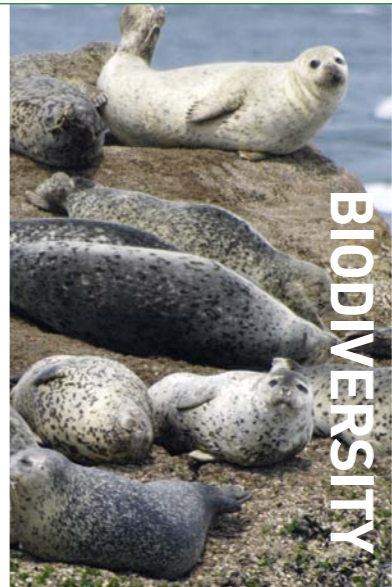
Our production facilities use leading-edge manufacturing processes that meet the toughest quality standards. All our factories are certified to ISO standards – with ISO 9000 and ISO 14000 being the minimum benchmarks. This means each factory has its own quality and environmental management, and delivers products that measure up to toughest standards of reliability.

Most of our factories are also certified to OHSAS 18001 (Occupational Health and Safety Assessment Series), an international standard to assess the management system which organisations have in place for occupational safety. This confirms our factories have been proactive in putting the occupational health and safety of staff at the centre of the company’s dealings. In addition our VRLA batteries are for example approved to German VdS standard and the US UL standard.

**Our batteries all deliver three key benefits**



- Power – is the basic customer requirement for all our batteries. Find out how we can power your business!
- Safety – our highest priority! We provide only safe products – for your peace of mind!
- Long-life – only reliably-designed batteries provide the long service life you need to power your applications.



**PANASONIC LEADS THE WAY ... WITH 'eco ideas'**

Pursuing coexistence with the global environment in its business vision, Panasonic is committed – in all its business activities – to reducing the environmental impact of its products. In its 'eco ideas' Strategy, Panasonic focuses in particular on rapid implementation of measures to prevent global warming, and on global promotion of environmental sustainability management.

**CO<sub>2</sub>**

Panasonic strives to increase the use of products with higher energy efficiency and energy-creating products such as photovoltaic power generation systems and fuel cells to decrease CO<sub>2</sub> emissions from customers' homes.

Together with the effort to improve energy efficiency of its production activities, Panasonic will reduce CO<sub>2</sub> emissions in every phase of its business activities, aiming for total CO<sub>2</sub> emissions to reach a peak in FY2019 (April 2018 – March 2019) and then decline.

**Resources**

Purchase of new materials can be reduced by effectively using recycled materials throughout the business processes, from product design to procurement, production, distribution, and recycling. With the two approaches of reducing the amount of waste generated from our operations and promoting the recycling of resources, Panasonic will continue to enhance

its recycling-oriented manufacturing with the effective use of finite resources.

**Water**

Water is vital for life, as well as for manufacturing products. It is said that available fresh water is only about 0.01% of the Earth's total water resources. To make the most of finite water resources, Panasonic is committed to pursuing water conservation through development and wide use of highly water-saving products, and also through initiatives of cyclic use of water in the course of manufacturing.

**Chemicals**

Chemical substances are used in many products including familiar home appliances, making our lives more convenient. Meanwhile, hazardous substances have been detected in the far regions of the Arctic and Antarctic, having been carried by the winds and ocean currents over a long period of time.

**GREEN BATTERY APPLICATIONS**

Working for future generations, Panasonic aims to become the No.1 Green Innovation Company in the Electronics Industry. With this commitment in mind, we are focusing on green battery applications such as wind turbines, e-bikes and solar street lighting. Take a look at this video – and see how we can power your business.

This raises concern about the impact on human health and the environment.

To reduce the impact on the environment, Panasonic will voluntarily decrease, substitute or discontinue the use of chemical substances in each phase throughout the cycle from procurement of materials to production, use, and recycling of products.

**Biodiversity**

The ecological system that supports and benefits our lives is based on a very fragile balance of diverse species. Once lost, each species is gone forever, and it can never be recovered by man.

We must therefore clearly recognize the impact of our business practices on biodiversity. At Panasonic, we focus on three areas - conserving green spaces at our business sites, procurement of materials that have little impact on the environment, and developing products that contribute to biodiversity.

**Stakeholder**

Panasonic cannot bring forth green innovations on a global scale without the collaboration with the society, including our customers worldwide, experts, and the supply chain.

Panasonic hopes for close communication through initiatives such as tree planting activities and environmental education programs for children worldwide to extend green innovations that lead to sustainable lifestyles across the world.

**By-Region**

Because every region has different circumstances and characteristics, Panasonic expands its Global Eco Project, which promotes products, production activities, and citizenship activities as specific initiatives tailored to each region.

Panasonic has formulated targets worldwide including the regions of Asia Pacific, Europe, China, North America, Latin America, Russia, Middle East & Africa, and Taiwan.

VIDEO



Scan QR code to view 3D animated video.

# LITHIUM-ION

**LITHIUM-ION** A perfect combination of high energy density (e.g. NNP technology), safety (e.g. PSS and HRL technology) and long-life shows what is possible with Lithium-Ion battery technology from Panasonic. 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]		Weight [max. g]
				Diameter	Height	
UR-14430Y	Li-Ion standard type	3.7	530	13.9	42.9	16.4
UR-14430P	Li-Ion standard type	3.7	700	13.9	42.9	17.5
UR-14500Y	Li-Ion standard type	3.7	710	13.9	49.2	19.3
UR-14500P	Li-Ion standard type	3.7	840	13.9	49.2	20.0
UR-14650P	Li-Ion standard type	3.7	980	13.9	64.7	26.0
UR-16650ZT	High voltage charge system	3.7	2,200*3	16.4	64.9	40.0
UR-18500Y	Li-Ion standard type	3.7	1,400	18.1	49.3	31.9
UR-18500F	Li-Ion standard type	3.7	1,700	18.1	49.3	33.5
UR-18650SA	Li-Ion high power type	3.7	1,300	18.1	64.8	44.3
UR-18650SAX	Li-Ion high power type	3.7	1,350	18.1	64.8	45.0
UR-18650W	Li-Ion high power type	3.7	1,600	18.1	64.8	46.5
UR-18650WX	Li-Ion high power type	3.7	1,600	18.1	64.8	45.8
UR-18650Y	Li-Ion standard type	3.7	2,000	18.1	64.8	43.3
UR-18650E	Li-Ion high power type	3.6	2,150	18.1	64.8	44.5
UR-18650A	Li-Ion standard type	3.6	2,250	18.1	64.8	43.0
NCR-18500	NNP + HRL	3.6	2,000	18.2	49.4	34.0
UR-18650ZY	Li-Ion standard type	3.7	2,600	18.2	64.8	47.0
UR-18650ZT	High voltage charge system	3.7	2,800*3	18.2	65.1	48.0
NCR-18650	NNP + HRL	3.6	2,900	18.2	65.1	45.5
NCR-18650F	NNP + HRL	3.6	2,900	18.2	65.1	45.5
UR-18650ZTA	High voltage charge system	3.7	3,000*4	18.2	65.1	48.0
NCR-18650A	NNP + HRL	3.6	3,070	18.2	65.1	46.3
NCR-18650B	NNP + HRL	3.6	3,350	18.3	65.1	47.5
NCR-18650E	NNP + HRL + Li-Ion high power type	3.6	2,250	18.6	65.2	45.5

### Applications

- Power tool
- GPS device
- Handheld
- Shaver
- Toothbrush
- E-bike
- Notebook
- Garden tool, etc.

### Features

- High energy density and high voltage (3.7V) ensure small battery dimensions
- Long-life, stable power supply with flat discharge voltage
- Use of Lithium-Ion batteries requires a safety unit
- Safety technology HRL available

### Model number (examples)

**UR-18650ZT**

Appendix stands for battery performance characteristics  
 Divide this by 10 to obtain the approx. battery height (in mm)  
 Stands for approx. diameter (in mm) of the battery  
 Panasonic Lithium-Ion battery, round

**NCR-18650A**

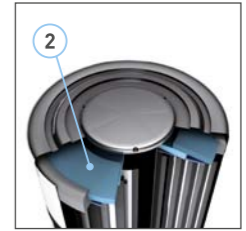
Appendix stands for battery performance characteristics  
 Divide this by 10 to obtain the approx. battery height (in mm)  
 Stands for approx. diameter (in mm) of the battery  
 Round  
 Panasonic Lithium-Ion battery



# LITHIUM-ION

## LI-ION • 3D ILLUSTRATION\*1

- Positive pole
- PTC (Positive Temperature Coefficient Device)
- Gasket
- Collector
- Insulator
- Cathode
- Anode
- Negative pole (cell can)
- Separator
- CID (Current Interrupt Device)
- Exhaust gas hole



### VIDEO



Scan QR code to view 3D animated video.

## PRISMATIC SINGLE CELL

### RECHARGEABLE 3.7V • 3.8V

Model number	Technology*2	Nominal voltage [V]	Typical capacity*3 [mAh]	Dimensions [mm]			Weight [max. g]
				Height	Thickness	Width	
UF-553436G	LCO system	3.7	830	35.6	5.5	33.9	15.6
UF-653436SU	LCO system	3.7	930	35.7	6.3	33.9	17.8
UF-752836F	LCO system	3.7	890	35.8	7.5	28.0	17.3
UF-583136R	LCO system	3.7	740	36.3	5.6	31.2	14.2
UF-553939S	LCO system	3.7	1,050	38.4	5.5	38.9	19.4
UF-653445ST	High voltage charge system	3.8	1,260*4	38.8	6.3	44.5	22.3
UF-653039SU	LCO system	3.7	960	38.8	6.4	30.0	17.5
UF-703141FU	LCO system	3.7	1,090	40.7	7.1	30.5	20.9
UF-4634436U	LCO system	3.7	850	42.6	4.6	33.9	16.0
UF-564447F	LCO system	3.7	1,420	46.6	5.6	43.9	27.0
UF-624447F	LCO system	3.7	1,580	46.6	6.2	43.9	29.9
UF-515148ST	High voltage charge system	3.8	1,660*4	47.5	5.1	50.9	28.7
UF-103450P	LCO system	3.7	2,000	48.8	10.5	33.8	38.5
UF-463450F	LCO system	3.7	960	49.6	4.5	33.9	18.5
UF-553450Z	LCO system	3.7	1,200	49.8	5.6	33.9	22.3
UF-653450S	LCO system	3.7	1,300	49.8	6.4	33.9	25.1
UF-703450F	LCO system	3.7	1,480	49.8	7.0	33.9	28.1
CGA-103450A	PSS	3.7	1,950	50.0	10.6	34.0	39.0
UF-495252ST	High voltage charge system	3.8	1,720*4	51.5	4.9	51.9	30.3
UF-534553F	LCO system	3.7	1,580	52.5	5.3	44.9	29.9
UF-534553FT	High voltage charge system	3.8	1,680*4	52.5	5.3	44.9	29.3
UF-485155S	LCO system	3.7	1,710	55.0	4.8	50.9	31.9
UF-495255S	LCO system	3.7	1,760	55.0	4.9	51.9	33.1
UF-495255ST	High voltage charge system	3.8	1,870*4	55.0	4.9	51.9	32.3
UF-514657F	LCO system	3.7	1,730	56.5	5.1	46.1	31.4
UF-384961S	LCO system	3.7	1,450	61.0	3.8	48.8	27.5
UF-464462FT	High voltage charge system	3.8	1,580*4	61.4	4.4	43.6	28.4
UF-464462F	LCO system	3.7	1,520	61.4	4.5	43.6	29.1
UF-484462S	LCO system	3.7	1,590	61.7	4.7	43.9	30.3
UF-484462ST	High voltage charge system	3.8	1,710*4	61.7	4.7	43.9	30.0



... we as KTM Sportmotorcycle AG have experienced that Panasonic Li-Ion batteries provide continuously high power and enhanced safety for electric motorcycles due to its superior technology.

Mr. Johannes Proschek  
 Product Manager E-Mobility  
 KTM Sportmotorcycle AG

### 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 on the following pages.

\*2 4.2V charge \*3 4.3V charge \*4 4.35V charge

\*1 Some batteries are not equipped with a PTC. Please consult Panasonic for further information. The illustration shows only one example of a Li-Ion battery structure.

\*2 Please find the explanations of our technologies on the following pages.

\*3 4.2V charge \*4 4.35V charge

## Applications

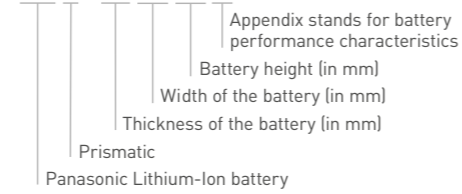
- Medical equipment
- Handheld
- Navigation device
- Voting machine
- Tracking & RFID
- Smartphone
- Distance meter
- E-book reader, etc.

## Features

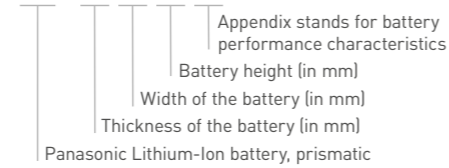
- High energy density and high voltage (3.8V) ensure small battery dimensions
- Long-life, stable power supply with flat discharge voltage
- Use of Lithium-Ion batteries requires a safety unit
- Safety technology PSS available

## Model number (examples)

**CGA-103450A**



**UF-103450SU**



## LI-ION • 3D ILLUSTRATION\*1

- Internal terminal
- Sealing tap
- Insulation frame body
- Lead
- Cathode
- Separator
- Anode
- Case
- (Lower) Gasket
- (Upper) Gasket
- Terminal
- Anode cap
- Anti-explosion valve



## TECHNOLOGIES

### Heat Resistance Layer (HRL)\*2

Nowadays all electronic devices getting more powerful, sophisticated and feature-laden and therefore require more robust and safer batteries. Increasing energy density, however, raises the risk of overheating and ignition due to internal short-circuiting. Panasonic deploys 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 prevents the battery from overheating if an internal short-circuit occurs.

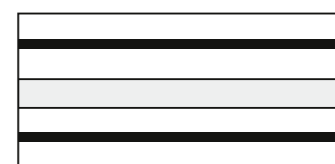
**Safety is the base for everything. Higher energy can be established based on safety technology.**

### HRL technology



HRL

### Existing technology



- + Material
- Separator
- Material

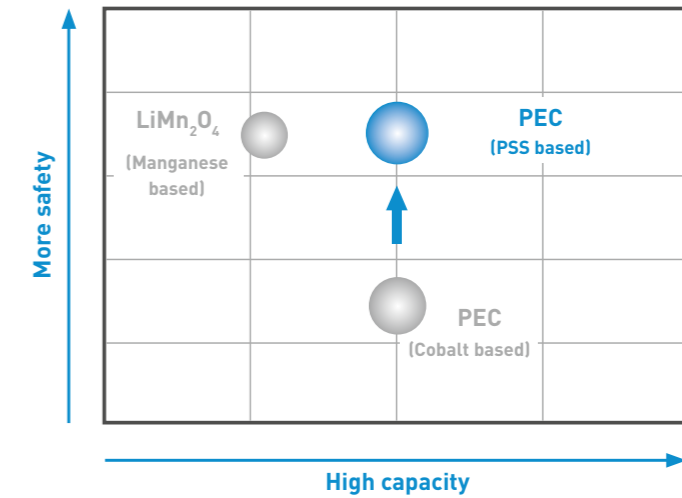
## Panasonic Solid Solution (PSS)

The **Panasonic Solid Solution** technology combines two major battery properties: capacity and safety. This technology provides the customer with a high capacity such as the standard Panasonic Lithium-Ion (Cobalt based) cells and also owns a high safety standard like the  $\text{LiMn}_2\text{O}_4$  (Manganese based) Lithium-Ion batteries.\*1

### Characteristics of the Panasonic PSS featured Lithium-Ion battery:

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

### COMPARISON BETWEEN CAPACITY AND SAFETY OF CATHODE MATERIALS



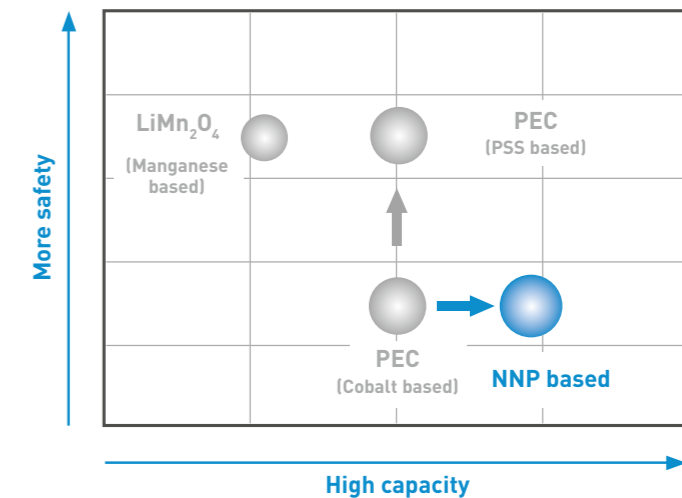
## Nickel Oxide Based New Platform (NNP)

This new Lithium-Ion battery technology contains on one side a unique high capacity Nickel based positive electrode and on the other side a material and processing technology. The latter prevents deformation of the alloy-based negative electrode when subjected to repeated charge and discharge. This is what our **Nickel Oxide Based New Platform** stands for.\*1

### Characteristics of the Panasonic NNP technology:

- Good cycle life performance
- High energy density
- The new Nickel positive electrode excels in durability in actual use and charge retention
- Low self-discharge
- Long storage reliability through reduced metal elution

### COMPARISON BETWEEN CAPACITY AND SAFETY OF CATHODE MATERIALS



\*1 Some batteries are not equipped with a PTC. Please consult Panasonic for further information. The illustration shows only one example of Li-Ion battery structure.

\*2 A couple of our batteries are not provided with our HRL technology yet. Please contact Panasonic to be informed about the current situation.

\*1 Panasonic Lithium-Ion cells must always be equipped with a safety unit.

# NICKEL-METAL-HYDRIDE

**CYLINDRICAL** Ni-MH battery technology is nowadays the Ni-Cd (Nickel-Cadmium) successor technology for rechargeable and portable devices. These batteries are ideal for less complex and cost-sensitive applications. Ni-MH batteries meet most standard customer needs.



## RECHARGEABLE 1.2V

Model number	Diameter	Size	Nominal voltage (V)	Nominal capacity (mAh)	Typical capacity (mAh)	Dimensions with tube (mm)		Approx. weight (g)	IEC
						Diameter	Height		
HHR-70AAA/FT	AAA	AAA	1.2	700	730	10.5 + 0/-0.7	44.5 + 0/-1.0	12.0	HR11/45
HHR-75AAA/HT*1	AAA	AAA	1.2	700	730	10.5 + 0/-0.7	44.5 + 0/-1.0	12.0	HR11/45
HHR-80AAA/HT*1	AAA	AAA	1.2	750	780	10.5 + 0/-0.7	44.5 + 0/-1.0	13.0	HR11/45
HHR-120AA/FT	AA	4/5AA	1.2	1,150	1,220	14.5 + 0/-0.7	43.0 + 0/-1.0	23.0	HR15/43
HHR-70AA/FT	AA	AA	1.2	700	780	14.5 + 0/-0.7	48.8 + 0/-1.5	21.0	HR15/49
HHR-70AA/HT*2	AA	AA	1.2	700	780	14.5 + 0/-0.7	50.5 + 0/-1.5	21.0	HR15/49
HHR-110AA/FT	AA	AA	1.2	1,100	1,180	14.5 + 0/-0.7	50.0 + 0/-1.0	24.0	HR15/51
HHR-150AA/FT	AA	AA	1.2	1,500	1,580	14.5 + 0/-0.7	50.0 + 0/-1.0	26.0	HR15/51
HHR-210AA/HT*2	AA	AA	1.2	2,000	2,080	14.5 + 0/-0.7	50.5 + 0/-1.0	29.0	HR15/51
HHR-200A/FT	A	4/5A	1.2	2,000	2,040	17.0 + 0/-0.7	43.0 + 0/-1.5	32.0	HR17/43
HHR-210A/FT	A	A	1.2	2,100	2,200	17.0 + 0/-0.7	50.0 + 0/-1.5	38.0	HR17/50
HHR-380A/FT	A	L-A	1.2	3,700	3,800	17.0 + 0/-0.7	67.0 + 0/-1.5	53.0	HR17/67
HHR-450A/FT	A	LFat/A	1.2	4,200	4,500	18.2 + 0/-0.7	67.0 + 0/-1.5	60.0	-
HHR-200SCP/FT*3	SC	4/5SC	1.2	1,900	2,100	23.0 + 0/-1.0	34.0 + 0/-1.5	43.0	-
HHR-260SCP/FT*3	SC	SC	1.2	2,450	2,600	23.0 + 0/-1.0	43.0 + 0/-1.5	55.0	HR23/43
HHR-300SCP/FT*3	SC	SC	1.2	2,800	3,050	23.0 + 0/-1.0	43.0 + 0/-1.5	57.0	HR23/43

### Applications

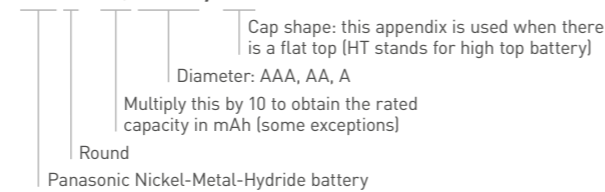
- ☉ Toothbrush
- ☉ Cordless phone
- ☉ Lady shaver
- ☉ Voting machine
- ☉ Torchtlight
- ☉ Two way radio
- ☉ Distance meter
- ☉ Medical equipment, etc.

### Features

- ☉ Standard Ni-MH battery technology suitable for nearly every application
- ☉ High quality and reliability
- ☉ Good balance in terms of capacity and lifetime
- ☉ Excellent discharge characteristics

### Model number (example)

H H R - 7 0 A A A / F T



## NI-MH • 3D ILLUSTRATION\*4

- 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



### VIDEO



Scan QR code to view 3D animated video.

\*1 Compatible with consumer AAA size.

\*2 Compatible with consumer AA size.

\*3 For high power use applications such as power tools.

\*4 The illustration shows only one example of Ni-MH battery structure.

# NICKEL-METAL-HYDRIDE

**CYLINDRICAL FOR BACK-UP USE** The Panasonic Ni-MH is a state-of-the-art high temperature battery family that delivers excellent reliability at high ambient temperatures and demanding conditions. These batteries offer the perfect combination of high power ability and long-life.



## RECHARGEABLE 1.2V

Model number	Diameter	Size	Nominal voltage (V)	Nominal capacity (mAh)	Typical capacity (mAh)	Dimensions with tube (mm)		Approx. weight (g)	IEC
						Diameter	Height		
HHR-60AAAH/FT	AAA	AAA	1.2	500	550	10.5 + 0/-0.7	44.5 + 0/-1.0	13.0	HR11/45
HHR-70AAH/FT	AA	AA	1.2	700	750	14.5 + 0/-0.7	48.3 + 0/-1.0	18.0	HR15/49
HHR-210AH/FT	A	A	1.2	1,900	2,050	17.0 + 0/-0.7	50.0 + 0/-1.5	36.0	HR17/50
HHR-330APH/FT*1	A	LFat/A	1.2	3,200	3,300	18.2 + 0/-0.7	67.0 + 0/-1.5	60.0	-
HHR-370AH/FT	A	LFat/A	1.2	3,500	3,700	18.2 + 0/-0.7	67.0 + 0/-1.5	60.0	-
HHR-250SCH/FT*1	SC	SC	1.2	2,500	2,650	23.0 + 0/-1.0	43.0 + 0/-1.5	55.0	HR23/43
HHR-300CH/FT*1	C	C	1.2	3,100	3,300	26.0 + 0/-1.0	50.0 + 0/-2.0	80.0	HR26/50

### Applications

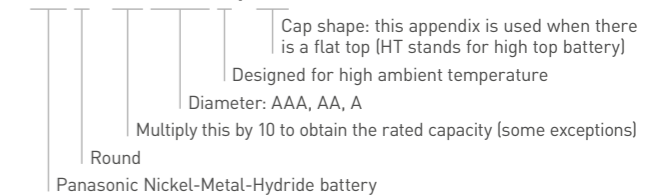
- ☉ Emergency lighting
- ☉ Medical equipment
- ☉ Energy storage
- ☉ Solar window shutter
- ☉ Alarm system
- ☉ Construction sites signaling
- ☉ Ticketing machine
- ☉ POS system, etc.

### Features

- ☉ High charge efficiency at elevated temperatures
- ☉ 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 Panasonic Ni-MH 9V block provides high energy density, good life cycle performance and no memory effect. It is versatile enough for a range of applications.



## RECHARGEABLE 9V

Model number	Diameter	Nominal voltage (V)	Nominal capacity (mAh)	Typical capacity (mAh)	Dimensions with tube (mm)			Approx. weight (g)	IEC
					Width	Height	Thickness		
HHR-9SRE/BA1	E-Block	8.4	170	175	26.0	48.5	16.3	42.0	-

### Applications

- ☉ Personal digital assistant
- ☉ Multimeter
- ☉ Measurement
- ☉ Toy
- ☉ Pager, etc.

**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 For high power use applications.

## LITHIUM CYLINDRICAL TYPE (PRIMARY)

**LITHIUM BATTERY TECHNOLOGIES** These days Lithium battery technologies are getting more and more important. Due to their high voltage, low self-discharge and proven reliability a broad range of applications can be powered. In particular the chemistries BR, CR and ER battery technologies are leading the industries. Please study the comparison overview below and find out why Panasonic is especially emphasizing on its famous BR and CR technology which is a proof for outstanding quality for years in the market.

### COMPARISON OF LITHIUM PRIMARY CHEMISTRY\*1

PRIMARY BR • CR • ER		BR	CR	ER	
Chemistry		CF	MnO <sub>2</sub>	SOCl <sub>2</sub>	
Material	Cathode	CF	MnO <sub>2</sub>	SOCl <sub>2</sub>	
	Anode	Li metal	Li metal	Li metal	
	Electrolyte	Organic electrolyte	Organic electrolyte	Organic electrolyte	
Performance	Nominal voltage	3V	3V	3.6V	
	Discharge capacity		+	+	
	Voltage during discharge (Initial)	Low current	+	+	++
		High current	+	++	-
	Voltage during discharge (End of capacity)	Low current	++	+	++
		High current	+	++	-
	Pulse performance at low temperature	Initial	+	++	-
		End of life	++	+	-
	Storage performance		++	+	++*2
Reliability		++	+	-*2	
Safety		++	++	-	
Environment	Eco friendly	++	++	-*3	

++ Very good capability  
+ Good capability  
- Not good capability

**BR CYLINDRICAL** Our Panasonic Poly-Carbonmonofluoride Lithium batteries (BR series) are ideal for applications such as meters or smoke detectors which demand either long-term power supply reliability and/or need to handle a wide temperature range of -40°C ~ +100°C.

### POLY-CARBONMONOFLUORIDE LITHIUM (BR SERIES)

Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal capacity*4 (mAh)	Continuous standard drain (mA)	Diameter	Height		
BR-1/2AA*5	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	BR17335
BR-2/3AG	3	1,450	2.5	17.0	33.5	13.5	BR17335
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

- ☉ Car alarm
- ☉ Emergency call (E-Call)
- ☉ Electric Toll Collection (ETC)
- ☉ Electricity meter
- ☉ Heat cost allocator
- ☉ Life jacket light
- ☉ Tracking & RFID, etc.

#### Features

- ☉ Wide operating temperature range: between -40°C ~ +100°C
- ☉ Self discharge rate at 20°C is just 0.5% per year
- ☉ Superior long-term reliability
- ☉ More than 40 years of experience in production

#### Model number (example)

**BR - 1 / 2 A A**

Round  
Poly-Carbonmonofluoride Lithium battery

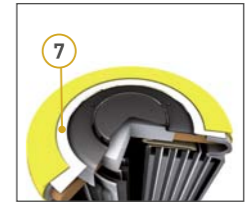
Battery diameter  
Battery size



## LITHIUM CYLINDRICAL TYPE (PRIMARY)

### BR CYLINDRICAL TYPE • 3D ILLUSTRATION\*1

- 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



#### VIDEO



Scan QR code to view 3D animated video.

**CR CYLINDRICAL FOR CONSUMER** Panasonic Photo-Lithium CR type cylindrical batteries come as either single cells or dual cell packs. All cylindrical type Manganese Dioxide (CR series) Lithium batteries feature a spiral structure. With the enlarged electrode surface areas, they permit a current as high as several amperes to be drawn.



### MANGANESE DIOXIDE LITHIUM (CR SERIES FOR CONSUMER)

#### PRIMARY 3V • 6V

Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal capacity*2 (mAh)	Continuous standard drain (mA)	Diameter	Height		
CR-2*3	3	850	20	15.6	27.0	11.0	CR15H270
CR-123A*3	3	1,400	20	17.0	34.5	17.0	CR17345
2CR-5*3	6	1,400	20	34.0	45.0	38.0	2CR5
CR-P2*3	6	1,400	20	35.0	36.0	37.0	CRP2
CR-V3*3	3	3,300	200	29.0 x 14.5	52.0	39.0	-

#### Applications

- ☉ Sanitary equipment
- ☉ Man over board device
- ☉ Search and rescue transponder
- ☉ Tracking & RFID
- ☉ Glucose meter
- ☉ Door lock system
- ☉ Window monitoring system, etc.

#### Features

- ☉ Operating temperature range: between -40°C ~ +70°C
- ☉ Very good pulse handling
- ☉ Stable voltage level during discharge
- ☉ Self discharge rate at 20°C just 1.0% per year

#### Model number (example)

**CR - 1 2 3 A**

Round  
Manganese Dioxide Lithium battery

Battery diameter  
Battery size

\*1 Please contact Panasonic to get more detailed information about this technical comparison overview.

\*2 Impedance is increasing due to the passivation phenomena.

\*3 Harmful substances included.

\*4 Capacity based on standard drain and cut off voltage down to 2.0V at 20°C.

\*5 Operating temperature range is from -40°C ~ +100°C.

\*1 The illustration shows only one example of Lithium battery structure.

\*2 Capacity based on standard drain and cut off voltage down to 2.0V or 4.0V at 20°C.

\*3 In case of usage below 20mA discharge please consult Panasonic.



## LITHIUM CYLINDRICAL TYPE (PRIMARY)

### CR CYLINDRICAL TYPE • 3D ILLUSTRATION\*1

- 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



**CR CYLINDRICAL FOR INDUSTRIAL** Ideal for industrial equipment, this series offers both excellent high-rate discharge performance and a long service life of up to ten years.



### MANGANESE DIOXIDE LITHIUM (CR SERIES FOR INDUSTRIAL)

#### PRIMARY 3V

Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal capacity*2 (mAh)	Continuous standard drain (mA)	Diameter	Height		
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

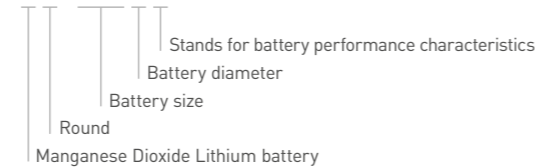
- ☉ Car alarm
- ☉ Emergency call (E-Call)
- ☉ Defibrillator (AED)
- ☉ Glucose meter
- ☉ Electricity meter
- ☉ Gas meter
- ☉ Smoke detector
- ☉ Life raft light
- ☉ Search and rescue transponder, etc.

#### Features

- ☉ Stable impedance throughout battery life
- ☉ 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)

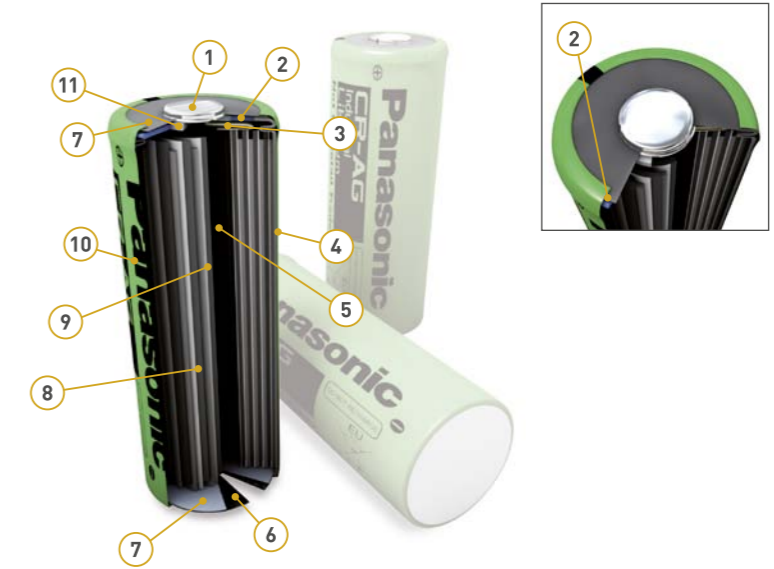
CR - 2 / 3 A Z



## LITHIUM CYLINDRICAL & COIN TYPE (PRIMARY)

### CR CYLINDRICAL TYPE • 3D ILLUSTRATION\*1

- 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



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



### POLY-CARBONMONOFLUORIDE LITHIUM (BR SERIES)

#### PRIMARY 3V

Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal capacity*2 (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	BR1225
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	BR2325
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

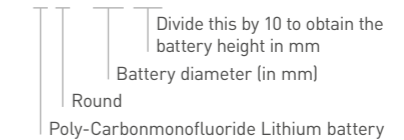
- ☉ Fax machine
- ☉ Real Time Clock (RTC)
- ☉ Tracking & RFID
- ☉ Multimeter
- ☉ Measurement, etc.

#### Features

- ☉ Self discharge rate at 20°C is just 1.0% per year
- ☉ Wide operating temperature range: between -30°C ~ +80°C
- ☉ Superior long-term reliability
- ☉ More than 40 years of experience in production

#### Model number (example)

BR - 2 3 3 0



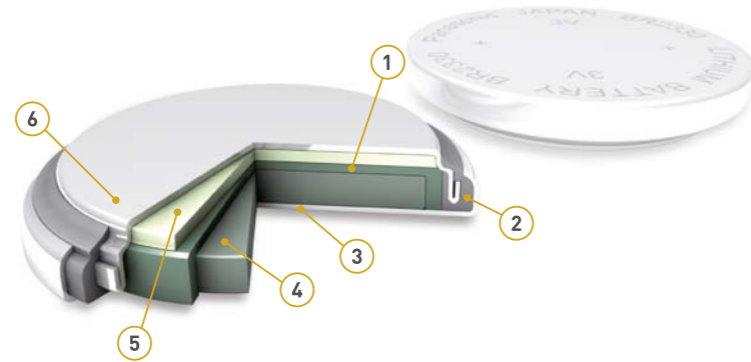
\*1 The illustration shows only one example of Lithium battery structure.  
\*2 Capacity based on standard drain and cut off voltage down to 2.0V at 20°C.

\*1 The illustration shows only one example of Lithium battery structure.  
\*2 Based on standard drain and cut off voltage down to 2.0V at 20°C.

# LITHIUM COIN TYPE (PRIMARY)

## BR COIN TYPE • 3D ILLUSTRATION\*1

- 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 high energy density and the special material for gasket and separator make this battery series the ideal power supply in high ambient temperature applications.



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

### PRIMARY 3V

Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal capacity*2 (mAh)	Continuous standard drain (mA)	Diameter	Height		
BR-1225A*3	3	48	0.03	12.5	2.5	0.8	-
BR-1632A*3	3	120	0.03	16.0	3.2	1.5	-
BR-2330A*3	3	255	0.03	23.0	3.0	3.2	-
BR-2450A*3	3	550	0.03	24.5	5.0	5.9	-
BR-2477A*3	3	1,000	0.03	24.5	7.7	8.0	-

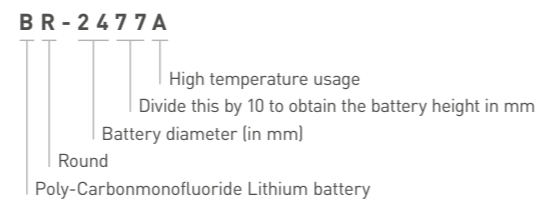
### Applications

- Electric Toll Collection (ETC)
- Tyre Pressure Monitoring System (TPMS)
- Medical equipment
- Heat cost allocator
- Water meter, etc.

### Features

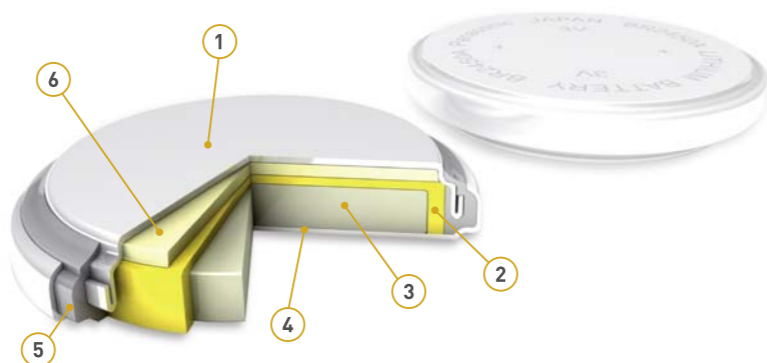
- Superior design for high temperature applications -40°C ~ +125°C
- Outstanding long-term reliability
- Years of experience in production
- Self discharge rate at 20°C is just 0.5% per year

### Model number (example)



## BR COIN 'A' TYPE • 3D ILLUSTRATION\*1

- 1 Negative pole
- 2 Separator
- 3 Cathode (Poly-Carbonmonofluoride)
- 4 Positive pole (cell can)
- 5 Gasket
- 6 Anode (Lithium)



# LITHIUM COIN TYPE (PRIMARY)

**CR COIN** These batteries have a proven track record of excellence in equipment requiring high currents. Additionally Panasonic has many years of manufacturing experience with this battery technology.



## MANGANESE DIOXIDE LITHIUM (CR SERIES)

### PRIMARY 3V

Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal capacity*1 (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

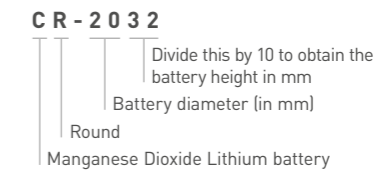
### Applications

- Remote Keyless Entry (RKE)
- Digital thermometer
- Glucose meter
- Scales
- Door lock system
- Price tag
- Watch
- Ticketing machine
- Personal digital assistant, etc.

### Features

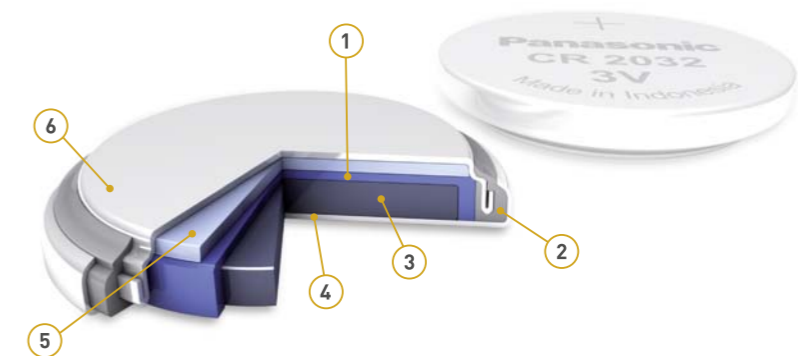
- Good pulse capability
- High discharge characteristics
- Stable voltage level during discharge
- Long-term reliability
- Self discharge rate at 20°C is just 1.0% per year
- Temperature range -30°C ~ +60°C

### Model number (example)



## CR COIN TYPE • 3D ILLUSTRATION\*2

- 1 Separator
- 2 Gasket
- 3 Cathode (Manganese Dioxide)
- 4 Positive pole (cell can)
- 5 Anode (Lithium)
- 6 Negative pole



### VIDEO



Scan QR code to view 3D animated video.

\*1 The illustration shows only one example of Lithium battery structure.

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

\*3 Only batteries with terminals are available.

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

\*2 The illustration shows only one example of Lithium battery structure.

## PIN & LITHIUM COIN TYPE (PRIMARY & RECHARGEABLE)

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

### PIN TYPE POLY-CARBONMONOFLUORIDE LITHIUM (BR SERIES)

#### 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 / MT COIN TYPE** These Panasonic rechargeable Lithium coin batteries are designed chiefly for memory back-up applications. 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	2	0.01	6.8	2.1	0.3	-
VL-1220*3	3	7	0.02	12.5	2.0	0.8	-
VL-2020*3	3	20	0.07	20.0	2.0	2.2	-
VL-2320*3	3	30	0.10	23.0	2.0	2.7	-
VL-2330*3	3	50	0.10	23.0	3.0	3.5	-
VL-3032*3	3	100	0.20	30.0	3.2	6.2	-

### 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-421	3	2	0.005	4.8	2.1	0.1	-
ML-614	3	3	0.005	6.8	1.4	0.2	-
ML-621	3	5	0.010	6.8	2.1	0.2	-
ML-920	3	11	0.010	9.5	2.0	0.4	-
ML-1220	3	17	0.030	12.5	2.0	0.8	-
ML-2020	3	45	0.030	20.0	2.0	2.2	-



## LITHIUM COIN TYPE (RECHARGEABLE)

### 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*1 capacity (mAh)	Continuous standard drain (mA)	Diameter	Height		
MT-516	1.5	2	0.4	5.8	1.6	0.2	-
MT-621	1.5	3	0.4	6.8	2.1	0.3	-
MT-920	1.5	5	0.4	9.5	2.0	0.5	-

#### Applications

- Remote Keyless Entry (RKE)
- Fax machine
- Calculator
- Remote control
- Real Time Clock (RTC)
- Tracking & RFID
- Vending machine
- Voting machine, etc.

#### Features

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

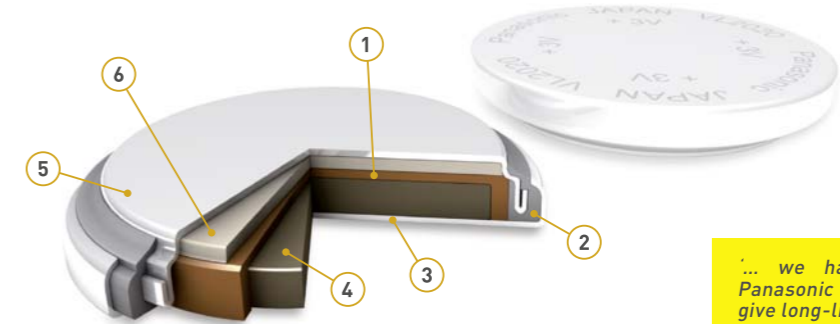
#### Model number (example)

##### VL-2020

Divide this by 10 to obtain the battery height in mm  
Battery diameter (in mm)  
Round  
Panasonic Vanadium Pentoxide Lithium battery

#### VL COIN TYPE • 3D ILLUSTRATION\*2

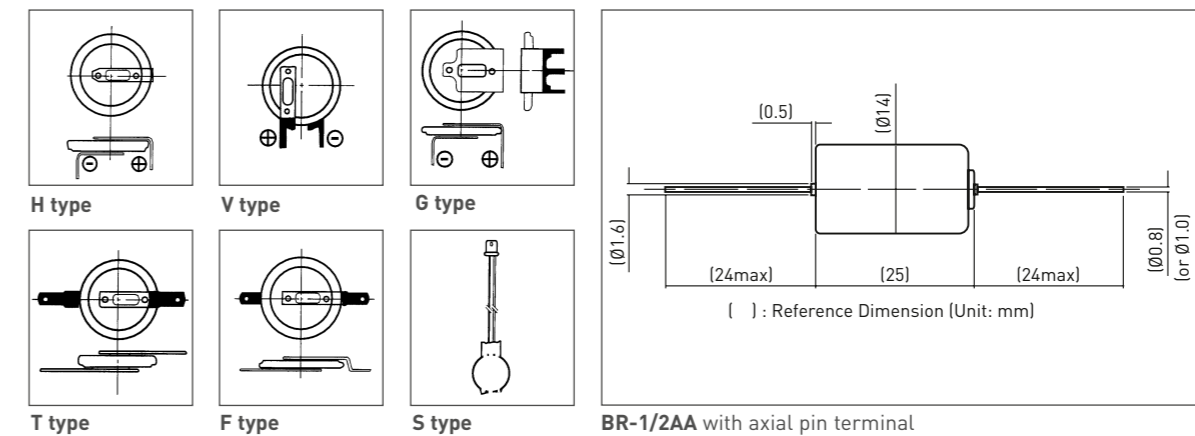
- Separator
- Gasket
- Positive pole (cell can)
- Cathode (Vanadium Pentoxide)
- Negative pole
- Anode (Lithium Aluminium alloy)



... we have experienced that Panasonic Lithium coin batteries give long-life energy provision.

Mr. Stephan Greiff  
Senior Produkt Manager  
Continental Automotive GmbH

**TERMINAL TYPES** Panasonic offers a broad range of different tabs for our Lithium batteries in order to meet all customer needs. In addition tailor-made solutions are possible as well.



\*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.

\*1 Based on standard drain and cut off voltage down to 1.0V at 20°C.  
\*2 The illustration shows only one example of Lithium battery structure.

## DRY CELL

**ALKALINE** Panasonic Alkaline batteries are made from the same basic materials as Zinc-Carbon batteries, but deliver generally higher performance on all criteria. These batteries can therefore power high-performance standard applications. Our Alkaline batteries are made in Europe and fulfill the highest quality standards.

### PRIMARY 1.5V • 9V

Model number	Size	Nominal voltage (V)	Dimensions (mm)		Approx. weight (g)	IEC
			Diameter	Height		
LR03AD	AAA	1.5	10.5	44.5	11.2	LR03
LR6AD	AA	1.5	14.5	50.5	23.3	LR06
LR14AD	C	1.5	26.2	50.0	69.5	LR14
LR20AD	D	1.5	34.2	61.5	142.7	LR20
6LR61AD	9V	9	17.5 x 26.5	48.5	44.3	6LR61

#### Applications

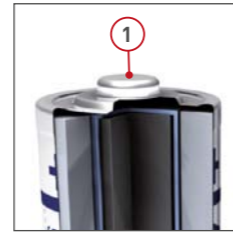
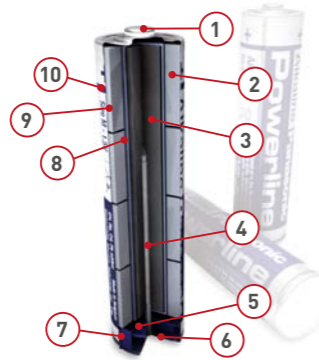
- ☉ Blood pressure meter
- ☉ Scales
- ☉ Distance meter
- ☉ Door lock system
- ☉ Smoke detector
- ☉ Flashlight
- ☉ Radio recorder
- ☉ Sanitary equipment
- ☉ Buoy, etc.

#### Features

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

### LR ALKALINE • 3D ILLUSTRATION\*1

- 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



#### VIDEO



Scan QR code to view 3D animated video.

**ZINC-CARBON** This is a standard solution for applications which do not require high voltages but still benefit from extraordinary performance. With years of production experience to call on, Panasonic can deliver best-in-class performance for these technology parameters. Our Alkaline batteries are made in Europe.

### PRIMARY 1.5V • 9V

Model number	Size	Nominal voltage (V)	Dimensions (mm)		Approx. weight (g)	IEC
			Diameter	Height		
R03	AAA	1.5	10.5	44.5	8.0	R3
R6	AA	1.5	14.5	50.5	19.0	R6
R14	C	1.5	26.2	50.0	49.0	R14
R20	D	1.5	34.2	61.5	106.0	R20
6F22	9V	9	17.5 x 26.5	48.5	38.0	6F22

#### Applications

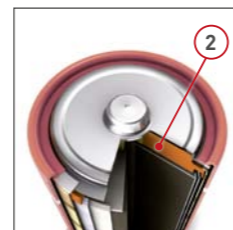
- ☉ Smoke detector
- ☉ Flashlight
- ☉ Remote control
- ☉ Torchlight
- ☉ Alarm clock
- ☉ Radio
- ☉ Toys, etc.

#### Features

- ☉ Established, reliable battery technology
- ☉ Outstanding price and quality
- ☉ Excellent performance affordability (cost per hour)

### ZINC-CARBON • 3D ILLUSTRATION\*2

- 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



\*1 The illustration shows only one example of Alkaline battery structure.

\*2 The illustration shows only one example of Zinc-Carbon battery structure.

## 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/VA	6 – 9 years	Trickle standard type		●
	LC-X/XD/XB	10 – 12 years	Trickle long-life type	●	
	LC-P/PA/PB	10 – 12 years	Trickle long-life type		●
	LC-QA	15 years	Trickle super long-life type		●
	UP-RW/RWA	6 – 9 years	High power standard type	●	
Back up and main power	UP-VW/VWA	6 – 9 years	High power long-life type		●
	UP-PW	10 – 12 years	High power long-life type		●
	LC-R/RA	6 – 9 years	Trickle and cycle standard type	●	
Main power	LC-CA	-	Cycle long-life type	●	
	LC-XC	-	Cycle long-life type	●	
	LC-T	-	Cycle long-life type for energy storage		●
	EC-FV	-	Cycle long-life type for motive power	Polypropylene	Polypropylene

**LC SERIES** The Panasonic LC series is a comprehensive range of high quality VRLA batteries serving the majority of VRLA battery applications. From batteries with a trickle design life of 6 – 9 years, 10 – 12 years and 15 years, to batteries for cyclic applications, the series includes solutions for every requirement. Various models are obtainable with flame retardant housing and with different terminals.



### TRICKLE DESIGN LIFE 6 – 9 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		
LC-R061R3P	6	1.3	97.0	24.0	55.0	0.3	-
LC-V061R3P	6	1.3	97.0	24.0	55.0	0.3	-
LC-R063R4P	6	3.4	134.0	34.0	66.0	0.6	-
LC-V063R4P	6	3.4	134.0	34.0	66.0	0.6	-
LC-R064R5P	6	4.5	70.0	48.0	108.0	0.7	-
LC-V064R5P	6	4.5	70.0	48.0	108.0	0.7	-
LC-R067R2P	6	7.2	151.0	34.0	100.0	1.3	-
LC-V067R2P	6	7.2	151.0	34.0	100.0	1.3	-
LC-R0612P	6	12.0	151.0	50.0	100.0	2.0	-
LC-V0612P	6	12.0	151.0	50.0	100.0	2.0	-
LC-R0615P	6	15.0	151.0	50.0	100.0	2.1	-
LC-R121R3PG	12	1.3	97.0	47.5	55.0	0.6	G196049
LC-R122R2PG	12	2.2	177.0	34.0	66.0	0.8	G188151
LC-R123R4PG	12	3.4	134.0	67.0	66.0	1.2	G191053
LC-R124R5P	12	4.5	70.0	97.0	108.0	1.5	-
LC-V124R5P	12	4.5	70.0	97.0	108.0	1.5	-
LC-R127R2PG	12	7.2	151.0	64.5	100.0	2.5	G193046
LC-V127R2PG	12	7.2	151.0	64.5	100.0	2.5	G193046
LC-RA1212PG	12	12.0	151.0	98.0	100.0	3.8	G100001
LC-VA1212PG	12	12.0	151.0	98.0	100.0	3.8	G100001
LC-RA1215P	12	15.0	151.0	98.0	100.0	4.2	-
LC-R1233P	12	33.0	195.6	130.0	180.0	12.0	-
LC-V1233P	12	33.0	195.6	130.0	180.0	11.1	-



# VALVE-REGULATED (SEALED)-LEAD-ACID

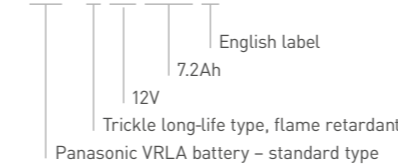
## TRICKLE DESIGN LIFE 10 - 12 YEARS

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		
LC-P067R2P	6	7.2		151.0	34.0	100.0	1.3	-
LC-P0612P	6	12.0		151.0	50.0	100.0	2.0	-
LC-P06200TA	6	200.0		407.0	173.0	250.0	41.0	-
LC-P122R2P	12	2.2		177.0	34.0	66.0	0.8	-
LC-P123R4P	12	3.4		134.0	67.0	66.0	1.2	-
LC-P127R2P	12	7.2		151.0	64.5	100.0	2.5	-
LC-PA1212P	12	12.0		151.0	98.0	100.0	3.8	-
LC-XD1217PG/APG	12	17.0		181.0	76.0	167.0	6.5	G104101
LC-X1220P/AP	12	20.0		181.0	76.0	167.0	6.6	-
LC-P1220P/AP	12	20.0		181.0	76.0	167.0	6.6	-
LC-X1224PG/APG	12	24.0		165.0	125.0	179.5/175.0	9.0	G198049
LC-P1224PG/APG	12	24.0		165.0	125.0	179.5/175.0	9.0	G198049
LC-X1228P/AP	12	28.0		165.0	125.0	179.5/175.0	11.0	-
LC-P1228P/AP	12	28.0		165.0	125.0	179.5/175.0	11.0	-
LC-X1238PG/APG	12	38.0		197.0	165.0	180.0/175.0	13.0	G100002
LC-P1238PG/APG	12	38.0		197.0	165.0	180.0/175.0	13.0	G100002
LC-X1242P/AP	12	42.0		197.0	165.0	180.0/175.0	16.0	-
LC-P1242P/AP	12	42.0		197.0	165.0	180.0/175.0	16.0	-
LC-X1265PG	12	65.0		350.0	166.0	175.0	20.0	G199090
LC-P1265PG	12	65.0		350.0	166.0	175.0	20.0	G199090
LC-X1275P	12	75.0		350.0	166.0	175.0	24.0	-
LC-P1275P	12	75.0		350.0	166.0	175.0	24.0	-
LC-XB12100P	12	100.0		407.0	173.0	236.0	36.5	-
LC-PB12100P	12	100.0		407.0	173.0	236.0	36.5	-
LC-X12120P	12	120.0		407.0	173.0	236.0	34.5	-
LC-P12120P	12	120.0		407.0	173.0	236.0	34.5	-
LC-P12150BP*1	12	150.0		532.0	183.0	214.0	43.0	-
LC-P12200BP*1	12	200.0		533.0	237.0	216.0	57.0	-

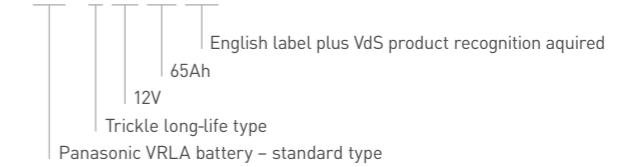


# VALVE-REGULATED (SEALED)-LEAD-ACID

## LC - P 1 2 7 R 2 P



## LC - X 1 2 6 5 P G



**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)		Dimensions (mm)			Mass approx. (kg)	VdS VdS N°
		20 hours rate		Length	Width	Height		
LC-QA06210TP	6	210.0		407.0	173.0	250.0	36.5	-
LC-QA1224AP	12	24.0		165.0	125.0	175.0	10.0	-
LC-QA1242P/AP	12	42.0		197.0	165.0	180.0	16.0	-
LC-QA1270P	12	70.0		350.0	166.0	175.0	23.5	-
LC-QA12110TP	12	110.0		407.0	173.0	236.0	36.0	-

### Applications

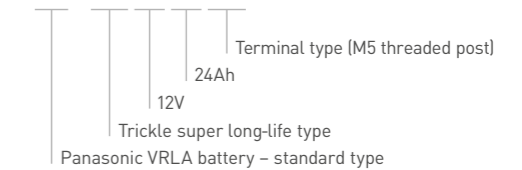
- Mainly telecommunications industry
- Emergency light for trains
- UPS systems
- Energy distribution, etc.

### 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

### Model number (examples)

#### LC - Q A 1 2 2 4 A P



## CYCLE LONG-LIFE AND CYCLE LONG-LIFE FOR ENERGY STORAGE

RECHARGEABLE 12V								
Model number	Nominal voltage (V)	Rated capacity (Ah)		Dimensions (mm)			Mass approx. (kg)	VdS VdS N°
		20 hours rate		Length	Width	Height		
LC-CA1212P	12	12.0		151.0	98.0	100.0	3.8	-
LC-CA1215P	12	15.0		151.0	98.0	100.0	4.2	-
LC-CA1216P	12	16.0		151.0	98.0	105.0	4.7	-
LC-XC1222P	12	22.0		181.0	76.0	167.0	6.6	-
LC-XC1228P	12	28.0		165.0	125.0	179.5	10.0	-
LC-XC1238P	12	38.0		197.0	165.0	179.5	15.0	-
LC-T12105P*2	12	105.0		407.0	173.0	236.0	35.0	-



### LC series standby applications

- UPS
- Energy storage
- Communication infrastructure
- Wind turbines (pitch system)
- Alarm systems
- Medical equipment
- Emergency lights, etc.

### Features

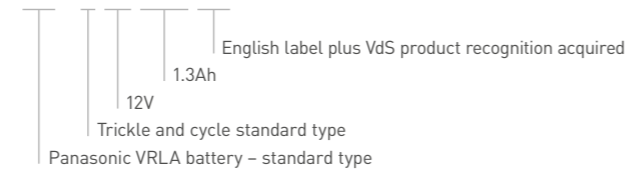
- State-of-the-art Absorbed Glass Mat (AGM) technology
- Superior design and low voltage spread gives excellent performance
- Enhanced lifespan due to low and stable charge current
- 100% inspection after final assembly and before shipment
- Years of experience in production
- Selected batteries with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

### LC series cyclic applications

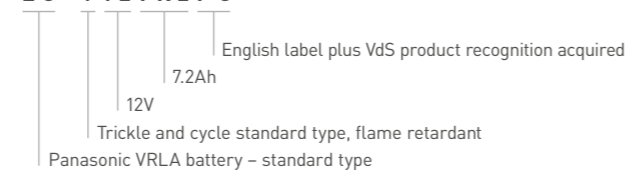
- Solar street lighting
- Medical equipment
- Lawn mowers
- Automated guided vehicles
- Wheelchairs, etc.

### Model number (examples)

#### LC - R 1 2 1 R 3 P G

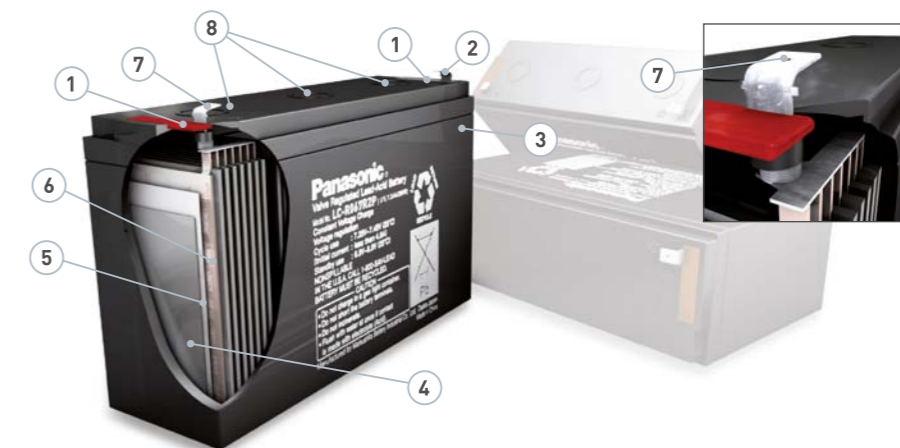


#### LC - V 1 2 7 R 2 P G



## VRLA • 3D ILLUSTRATION\*1

- Seals
- Negative plate terminal
- Battery case
- Negative electrode
- Separator
- Positive electrode
- Positive plate terminal
- Valve



### VIDEO



Scan QR code to view 3D animated video.

\*1 This battery is equipped with insert terminals.

\*2 Battery type is in particular designed for solar powered applications.

\*1 The illustration shows only one example of VRLA battery structure.

## VALVE-REGULATED (SEALED)-LEAD-ACID

**EV SERIES** The Panasonic EV series is designed specifically for electric vehicles and long-term cyclic applications. In both cases, the high cycle stability is a particular highlight, achieved in a recommended 5-step charging procedure.



### CYCLE VERY LONG-LIFE FOR MOTIVE POWER

#### RECHARGEABLE 8V • 12V

Model number	Nominal voltage (V)	Rated capacity (Ah)	Dimensions (mm)			Mass approx. (kg)	VdS VdS N°
		5 hours rate	Length	Width	Height		
EC-FV0890B1E	8	90.0	388.0	116.0	175.0	22.0	-
EC-FV1238	12	38.0	261.0	116.0	175.0	14.0	-
EC-FV1260	12	60.0	388.0	116.0	175.0	21.0	-

#### Applications

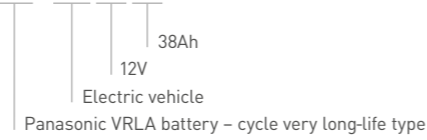
- Golf buggies
- Mobile floor sweepers
- Solar or wind powered street lighting and advertising displays, etc.

#### Features

- High capacity
- Designed for deep discharges
- Extraordinary cycle stability
- Excellent discharge characteristics at low temperatures and high currents

#### Model number (example)

**EC - F V 1 2 3 8**



**UP-RW / -PW / -VW SERIES** The Panasonic UP-RW / PW / VW series offers up to 30% higher energy density compared to conventional VRLA batteries with the same dimensions. The series is ideal for UPS systems which require a short discharge time of about 30 minutes or less.



### 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		
UP-RW0645P	6	135.0	6 - 9 years	151.0	34.0	100.0	1.3	-
UP-VW0645P	6	135.0	6 - 9 years	151.0	34.0	100.0	1.3	-
UP-RW1220P	12	120.0	6 - 9 years	140.0	38.5	100.0	1.4	-
UP-VW1220P	12	120.0	6 - 9 years	140.0	38.5	100.0	1.4	-
UP-RW1228P	12	200.0	6 - 9 years	151.0	64.5	100.0	1.9	-
UP-VW1228P	12	200.0	6 - 9 years	151.0	64.5	100.0	1.9	-
UP-RWA1232P1/P2	12	192.0	6 - 9 years	151.0	51.0	100.0	2.0	-
UP-VWA1232P1/P2	12	192.0	6 - 9 years	151.0	51.0	100.0	2.0	-
UP-RW1236P	12	224.0	6 - 9 years	151.0	64.5	100.0	2.1	-
UP-VW1236P	12	224.0	6 - 9 years	151.0	64.5	100.0	2.1	-
UP-RW1245P	12	270.0	6 - 9 years	151.0	64.5	100.0	2.6	-
UP-VW1245P	12	270.0	6 - 9 years	151.0	64.5	100.0	2.6	-
UP-PW1245P	12	270.0	10 - 12 years	151.0	64.5	100.0	2.6	-

#### Applications

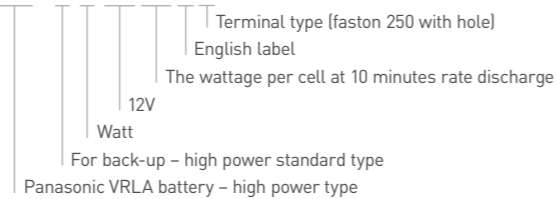
- UPS systems
- Servers, etc.

#### Features

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

#### Model number (example)

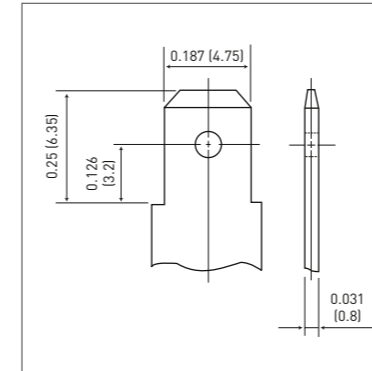
**UP - R W 1 2 2 0 P 1**



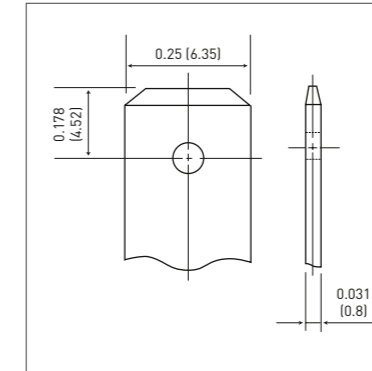
## VALVE-REGULATED (SEALED)-LEAD-ACID

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

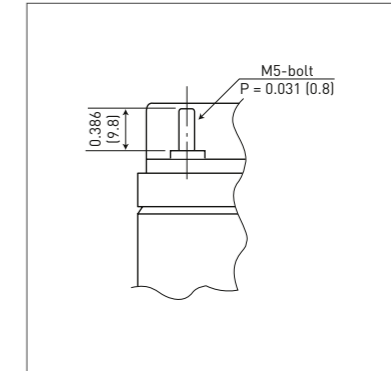
Unit: inch (mm)



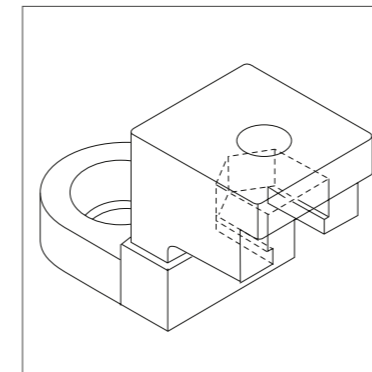
Faston tab type 187



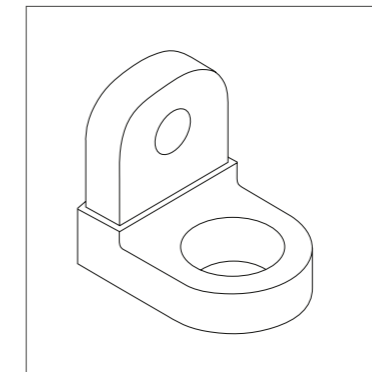
Faston tab type 250



M5 threaded post type



T-shape terminal (M10)



L-shape terminal (M5, 6, 8)

# OVERVIEW APPLICATIONS

Product series		Ni-MH			Lithium-Ion		Lithium			Alkaline		Zinc-Carbon		VRLA	
Battery Industry	Applications	Cylindrical	Cylindrical for back-up use	Prismatic	Cylindrical	Prismatic	Cylindrical	Coin	Coin Recharg.	Cylindrical	Prismatic	Cylindrical	Prismatic	Prismatic	
Automotive	Car alarm		HHR HT				BR/CR								
	Electric Toll Collection (ETC)						BR	BR							
	Emergency call (E-Call)		HHR HT				BR/CR								
	Remote Keyless Entry (RKE)							CR	VL/ML						
Communication	Tyre Pressure Monitoring System (TPMS)							BR							
	Base station													LC-P	
	Cordless phone	HHR													
	GPS device				NCR/UR	CGA/UF			CR						
	Handheld	HHR	HHR HT		NCR/UR	CGA/UF			CR						
	Navigation device	HHR				CGA/UF			CR						
	POS system	HHR	HHR HT		NCR/UR	CGA/UF			CR						
	Smartphone					CGA/UF			CR						
	Tablet PC				NCR/UR	CGA/UF			CR						
	Two way radio	HHR			NCR/UR	CGA/UF			CR						
Electric vehicle	Automated guided vehicle				NCR/UR									LC-R/LC-V/LC-CA/LC-XC/EV	
	E-bike	HHR			NCR/UR									LC-CA/LC-XC	
	Golf caddy	HHR			NCR/UR									LC-CA/LC-XC	
	Motorcycle				NCR/UR									LC-R	
	Pedelec	HHR			NCR/UR									LC-CA/LC-XC	
	Scooter				NCR/UR									LC-CA/LC-XC/EV	
Garden tools	Edge cutter	HHR			NCR/UR										
	Electric pruners	HHR			NCR/UR										
	Hedge trimmer	HHR			NCR/UR										
	Lawn mower				NCR/UR										
	Robot lawn mower	HHR			NCR/UR										
Green energy	Energy storage		HHR HT		NCR/UR									LC-V/LC-VA/LC-P/LC-PA/LC-XD/LC-X/LC-XB/LC-T/LC-QA/EV/LC-PB	
	Solar street lighting													LC-P/LC-X/LC-XB/LC-T/LC-CA/LC-XC/LC-QA/EV/LC-PB	
	Solar window opener		HHR HT		NCR/UR										
	Solar window shutter		HHR HT		NCR/UR										
	Wind powered advertising display													LC-P/LC-PB/LC-X/LC-XB/LC-T/LC-QA/EV	
Home appliance	Wind turbine													LC-R	
	Hair trimmer	HHR			NCR/UR										
	Robot cleaner	HHR	HHR HT		NCR/UR										
	Shaver	HHR			NCR/UR						LR				
	Toothbrush	HHR			NCR/UR						LR				
Infrastructure	Vacuum cleaner	HHR	HHR HT		NCR/UR										
	Construction sites signalling		HHR HT											LC-R/LC-RA/LC-P/LC-PB/LC-X/LC-XB	
	Railway signalling													LC-P/LC-X/LC-XB/LC-QA/LC-PB	
	Ticketing machine		HHR HT		NCR/UR			CR						LC-R/LC-RA/LC-P/LC-V/LC-VA	
Marine	UPS system		HHR HT		NCR/UR									LC-P/LC-PA/LC-PB/LC-R/LC-RA/LC-V/LC-VA/LC-X/LC-XB/LC-XD/LC-QA/UP-PW/UP-RW/UP-RWA/UP-VW/UP-VWA	
	Buoy														
	Diving torch	HHR			NCR/UR									LR	
	Life jacket light						BR/CR	CR						LR	
	Search and rescue transponder						CR	CR							
	Seismic surveying													LR	
	Ship														
	Signalling													LR	
	Submarine														LC-P/LC-X/LC-XB/LC-T/LC-PB
	Medical	Blood pressure meter	HHR												
Defibrillator (AED)		HHR	HHR HT						CR						
Digital thermometer									BR/CR						
Glucose meter								CR	CR						
Infusion pump			HHR HT		NCR/UR									LR	LC-R/LC-RA/LC-V/LC-VA
Inhaler			HHR HT		NCR/UR										
Medical lift					NCR/UR										LC-R/LC-RA/LC-V/LC-VA
Mobile surgery light			HHR HT		NCR/UR										LC-R/LC-RA/LC-V/LC-VA/LC-CA
Monitoring equipment		HHR	HHR HT		NCR/UR	CGA/UF									LC-X/LC-XD/LC-CA
Scales									CR						LC-R/LC-V
Metering	Wheelchair	HHR			NCR/UR										LC-R/LC-RA/LC-V/LC-VA/LC-P/LC-XD/LC-X/LC-T/LC-CA/LC-XC
	Distance meter	HHR			NCR/UR	CGA/UF									
	Electricity meter						BR/CR	CR							
	Gas meter						BR/CR								LR
	Heat cost allocator						BR	BR							
Others	Water meter						BR	BR							
	Price tag							CR							
	Remote control					CGA/UF		CR	VL/ML				R		
	Sanitary equipment						CR							LR	
	Torchlight	HHR			NCR/UR		CR							LR	R
Power tools	Tracking & RFID		HHR HT		NCR/UR	CGA/UF	BR/CR	BR/CR	VL/ML						
	Vending machine				NCR/UR		CR		VL/ML						
	Chain saw	HHR			NCR/UR										
	Drill / driver	HHR			NCR/UR										
	Grinding machine	HHR			NCR/UR										
Security	Jig saw	HHR			NCR/UR										
	Sealing gun	HHR			NCR/UR										
	Alarm system		HHR HT												LC-R/LC-RA/LC-V/LC-VA/LC-P/LC-XD/LC-X
	Door lock system						CR	CR						LR	
	Emergency lighting		HHR HT		NCR										LC-R/LC-V
UPS	Smoke detector						BR/CR						6LR		6F
	UPS		HHR HT		NCR/UR										LC-P/LC-PA/LC-PB/LC-R/LC-RA/LC-V/LC-VA/LC-X/LC-XB/LC-XD/LC-QA/UP-PW/UP-RW/UP-RWA/UP-VW/UP-VWA

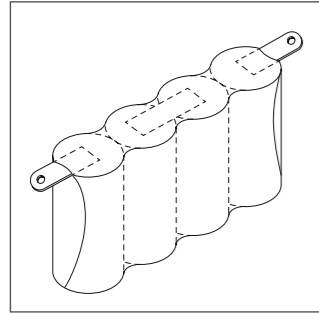
## Legend

- 6F** Zinc-Carbon battery
- 6LR** Alkaline battery
- BR** Lithium battery – Poly-Carbonmonofluoride Lithium series
- CGA** Lithium-Ion battery
- CR** Lithium battery – Manganese Dioxide Lithium series
- EV** VRLA battery – cycle long-life type for motive power
- HHR** Nickel-Metal-Hydrate battery
- HHR HT** Nickel-Metal-Hydrate battery for back up use
- LC-CA** VRLA battery – cycle long-life type
- LC-P** VRLA battery – trickle long-life type
- LC-PA** VRLA battery – trickle long-life type
- LC-PB** VRLA battery – trickle long-life type
- LC-QA** VRLA battery – trickle super long-life type
- LC-R** VRLA battery – trickle and cycle standard type
- LC-RA** VRLA battery – trickle and cycle standard type
- LC-T** VRLA battery – cycle long-life type for energy storage
- LC-V** VRLA battery – trickle standard type
- LC-VA** VRLA battery – trickle standard type
- LC-X** VRLA battery – trickle and cycle long-life type
- LC-XB** VRLA battery – trickle long-life type
- LC-XC** VRLA battery – cycle long-life type
- LC-XD** VRLA battery – trickle long-life type
- LR** Alkaline battery
- ML** Lithium battery – Manganese Lithium series
- NCR** Lithium-Ion battery
- R** Zinc-Carbon battery
- UF** Lithium-Ion battery
- UP-PW** VRLA battery – high power long-life type
- UP-RW** VRLA battery – high power standard type
- UP-RWA** VRLA battery – high power standard type
- UP-VW** VRLA battery – high power long-life type
- UP-VWA** VRLA battery – high power long-life type
- UR** Lithium-Ion battery
- VL** Lithium battery – Vanadium Pentoxide Lithium series

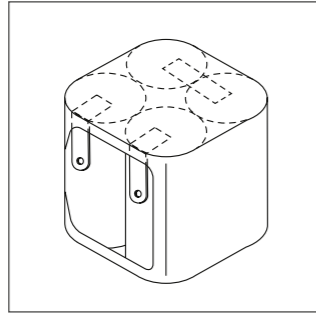
# BATTERY PACKS

Panasonic can provide a broad range of customised battery pack solutions to meet all energy needs. The type of battery, number of cells and pack shape are determined by the requirements of the application – its charge characteristics, for example, the available space and operating conditions. Panasonic is committed to promoting battery packs which emphasise safety and reliability. We can produce battery packs to satisfy the unique requirements of each of our customers, and can design and produce packs with nearly any chemistry. Please contact us to discuss your needs.

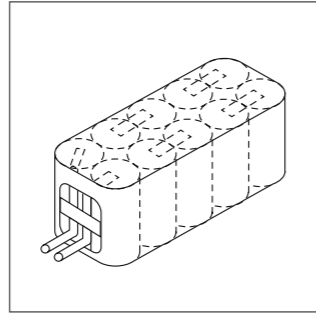
## SHAPES OF BATTERY PACKS (TYPICAL & STANDARD TYPES)



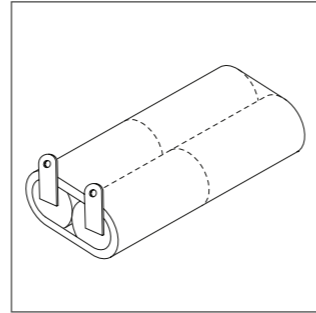
**F type**  
The required number of single cells are arranged side by side along their diameter connected by nickel plates and packed together with heat-shrinkable tubing.



**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 deliver to customised specifications (such as battery packs in plastic resin cases). Please contact Panasonic for more details about design-in, specifications, lead times, etc.

## SPECIAL PACK SHAPES



**Li-Ion pack - 1S1P CGR18650**  
plus safety unit placed on top



**Ni-MH assembled batteries and pack**



**Li-Ion pack - UF-653450**  
plus safety unit on top



**Lithium primary assembled cells - BR-C**



**Li-Ion pack - 2S1P CGA103450**  
plus safety unit on top



**Li-Ion pack - 4S1P NCR18650**  
plus safety unit and battery gauge



**Li-Ion pack - 1S1P NCR18650**  
plus safety unit placed on side



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### Notice to Readers

It is the responsibility of each user to ensure that every battery application is adequately designed safe and compatible with all conditions encountered during use, and in conformance with existing standards and requirements. This literature contains information concerning cells and batteries manufactured by Panasonic Corporation. This information is descriptive only and is not intended to make or imply any representation, guarantee or warranty with respect to any cells and batteries. Cell and battery designs are subject to modification without notice.

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For more details please contact:

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