

**Panasonic**

FIND THE  
RIGHT BATTERY  
FOR YOUR  
APPLICATION



**SHORT FORM CATALOG** INDUSTRIAL BATTERIES FOR PROFESSIONALS



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# WORLD'S LARGEST BATTERY MANUFACTURER

249,500  
EMPLOYEES



## PANASONIC ENERGY

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-Hydride, Nickel-Cadmium, 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 began manufacturing batteries in 1931 and is today the most diversified global battery producer worldwide, with an extensive network of manufacturing companies. The company employees are dedicated to research, development and production of batteries for an energised world.

## PANASONIC AUTOMOTIVE & INDUSTRIAL SYSTEMS EUROPE GMBH (PAISEU)

Panasonic Corporation, founded in Osaka 1918, is one of the world's largest manufacturers of quality electronic and electrical equipment. Its subsidiary, Panasonic

57  
BILLION  
SALES\*<sup>1</sup>



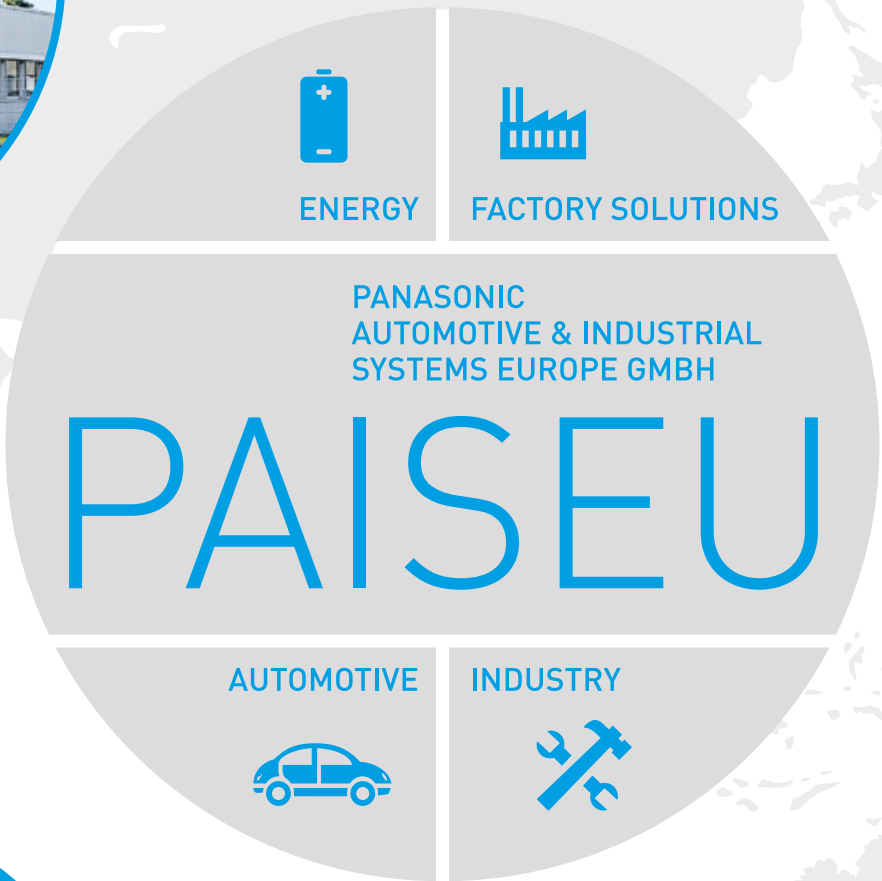
Automotive & Industrial Systems Europe GmbH (PAISEU), markets a diverse portfolio of industrial products throughout Europe. Formed in 2014 to strengthen Panasonic's pan-European industry operations, the company is now active in Automotive, Industry, Factory Solutions, and Energy.

In October 2014, Panasonic Automotive & Industrial Systems Europe GmbH (PAISEU), Sanyo Component Europe GmbH (SCE) and Panasonic Industrial Devices Sales Europe GmbH (PIDSEU) merged and now operate





OFFICE PAISEU  
IN HAMBURG



### CERTIFICATIONS



'Quality is our Business' – this is what Panasonic stands for. It is the principle for all our batteries and supporting services. This commitment is confirmed by numerous certifications.



as one AIS (Automotive & Industrial Systems) company. In addition, Panasonic Electric Works Europe AG (PEWEU) became a wholly owned subsidiary of PAISEU in October 2014. This new organisation reinforces Panasonic's position in the market, creating a stronger business partner for customers, who benefit from the capabilities and technical solutions of the combined product and service portfolios.

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, delivers products that measure up to toughest standards of reliability.

# FIND THE RIGHT BATTERY FOR YOUR APPLICATION

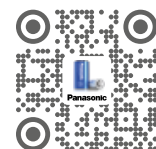


## BATTERY FINDER APP 3.0 FOR PROFESSIONALS

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, gives a recommendation on the type of battery that's best suited to the user's application. It also offers a wealth of information, graphics and videos on battery technology.

The features include:

- Completely redesigned version 3.0 (NEW)
- Improved intuitive usability
- Search for batteries using three different tools:
  - Parametric Search (NEW)
  - Application Search
  - Model Number Search
- Current Panasonic range: now 250 batteries – including new Ni-Cd series and Lithium-Ion pin type battery
- Easy usage due to 'Drawer' menu (NEW)
- Pictures and technical drawings of all products
- Product datasheets
- Favorites selection and sending to interested person
- Personal notes function (NEW)
- Function for comparing up to 3 batteries based on technical details (only online application) (NEW)
- Function for requesting product material in hardcopy or PDF format
- Function for recommendation
- Function for sending an inquiry
- Function to save images to smartphone gallery
- Extensive information on battery technology ('What is' glossary)
- Videos showing battery structure
- Direct link to Panasonic Battery Channel on YouTube
- Information about Panasonic company
- All contact details for Panasonic Automotive & Industrial Systems Europe GmbH





## SMARTPHONE APP



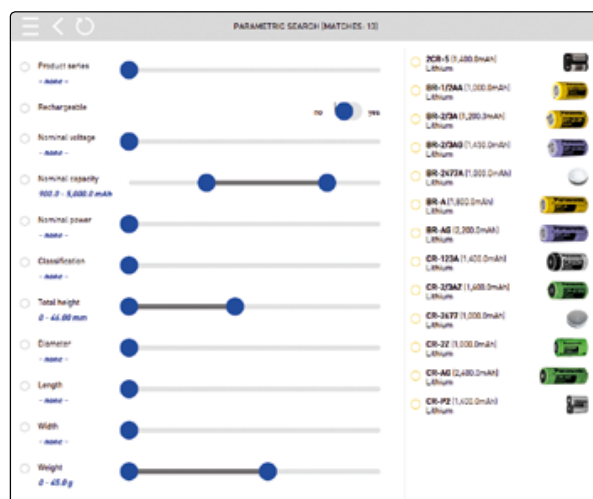
Home screen

Parametric Search

Version 3.0 of the Battery Finder Smartphone App has been fully revised and is packed with a host of practical new features. The new home screen navigates users even faster to the functions they're looking for. Thanks to the Parametric Search, it's easier than ever to locate the right battery – and parameters can even be combined. There's also an enhanced battery information screen, with options to make and save notes. And last but not least, Battery Finder 3.0 makes it more intuitive and faster to locate applications. These are just a few examples of the many new possibilities.

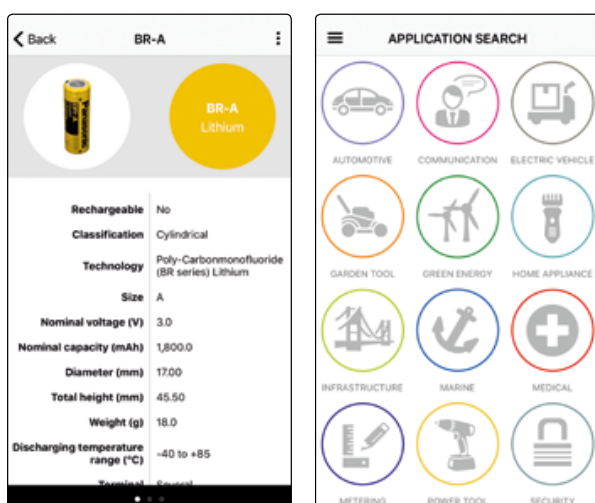


## HTML APP



Parametric Search

The newly designed Battery Finder HTML App 3.0 also has plenty of innovative features in store. The design is identical to that of the smartphone app, making it easier for users to switch seamlessly between mobile devices and PCs. The battery information screen provides all the available information on the selected battery, with a layout that ensures clarity of presentation. The Parametric Search makes it easier to locate the right battery; there is a wide choice of parameters, and options can also be combined. The extended favorites function now offers detailed comparisons of up to three batteries. All in all – it's now easier than ever to find the right battery!

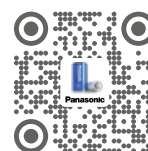


Battery information screen

Application Search



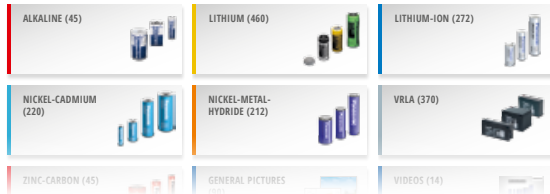
Battery information screen





## MEDIAPOOL

DOWNLOAD THE RIGHT  
BATTERY MEDIA FILES



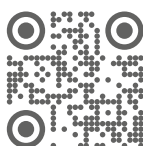
The Panasonic Mediapool is a complete online library of Panasonic battery images, videos, press releases and white papers, providing you with just the right material for all sorts of projects. The Mediapool is open to all visitors to the Panasonic website, and offers material for both print and web. The image files differ with respect to their resolution (image size) and color space (CMYK or RGB). For each product, there is a version without shadow (suitable for use on white, colored or grey background). The library contains images in three formats: TIF, AI and PNG.

### NEW

- White papers now available
- Videos and press releases now available
- New files appear in the folder 'New files' for three months

You can assemble as many files as you need and download them directly to your computer. Here's an overview of what you can do:

- Locate the material you need by product name or by clicking through the categories
- Preview file details – the preview function tells you the full name of the file, its size, format and resolution
- Select the files you wish to download. You can take files from multiple folders, or select all the material in a particular folder or category in one-click operation – there's no need to select each one individually
- Preview your personal 'Download bag' of the files you have selected
- The Mediapool zips your data into a file, which you then download to your computer. You unzip the file to the location of your choice simply by double-clicking the file name. The material is then ready for use.



## YOUTUBE CHANNEL

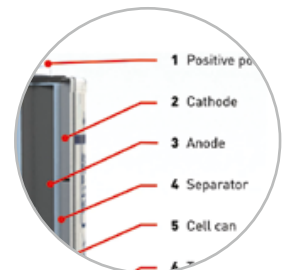
FIND THE RIGHT  
BATTERY VIDEO



Please find a comprehensive selection of Panasonic battery videos at our YouTube Channel. You can discover videos about the inner structure of our different battery chemistries, a video which gives you a clear insight about 'green' battery applications and last but not least a video which explains the working of our Battery Finder App in detail. Find out how we can power your business!



Panasonic Battery Finder  
Update 3.0 – App & Online  
Version



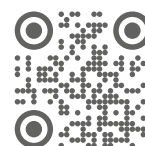
Panasonic Alkaline  
product video for  
professionals



Panasonic Good Energy –  
Smoke detector



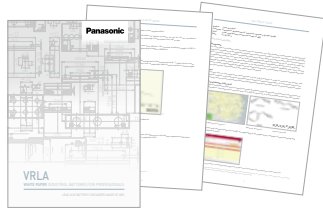
Panasonic Ni-MH product  
video for professionals





## WHITE PAPER

FIND THE RIGHT  
TECHNICAL INFORMATION



Panasonic is offering a new service: our white papers provide detailed, unbiased insights into various aspects of battery technology.

White papers are publicly available documents written by specialists on a specific technical issue. As such, they are of considerable value to professional users. White papers can be downloaded and freely disseminated. They are also routinely quoted in technical publications, and contain not only explanatory text, but also images and graphics, tables, charts and links.

Our white papers give developers and technical professionals the opportunity to leverage the expertise of our specialists for their own projects. We have been manufacturing batteries for a number of decades, and over this time have accumulated considerable knowledge and experience that we wish to share.

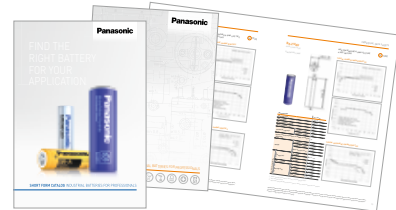
The first white paper is titled 'Lead acid battery containers made of ABS' and takes a detailed look at the experience of our engineers with the material ABS for VRLA containers. One of the issues addressed is the extent to which tensioned mounting straps can have a negative impact on the battery container. As well as a full description, the document provides valuable recommendations on the subject.

In the near future there will be a whole series of white papers with detailed insights into battery technology. We will let you know when the next one is out!

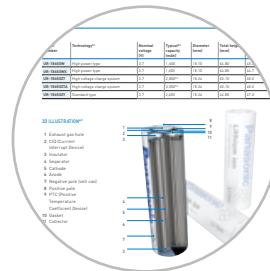


## SHORT FORM CATALOG AND HANDBOOKS

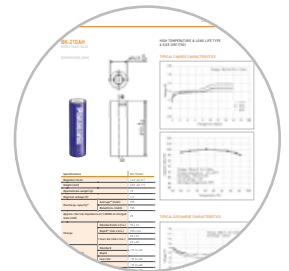
GET THE RIGHT PRODUCT OVERVIEW



Our range of digital tools to help you in your daily work are complemented by our 'classics' on paper: the Short Form Catalog and the handbooks on the various battery product groups. These remain popular with customers as valuable reference aids.



Short Form Catalog –  
a compact summary of  
all the batteries



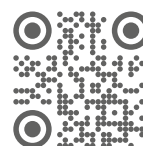
Ni-MH handbook –  
details about all the  
batteries of this  
particular chemistry



Short Form Catalog –  
an overview of latest  
news and innovations



Short Form Catalog –  
QR codes provide  
fast access to relevant  
information





# EXCELLENT BATTERY SAFETY AND SUPERIOR PERFORMANCE



STABLE POWER SUPPLY  
WITH FLAT DISCHARGE VOLTAGE

EXCELLENT RELIABILITY

LOW SELF-DISCHARGE

HIGH ENERGY DENSITY

Scan QR code  
to view product  
series video.





## CYLINDRICAL SINGLE CELL

A perfect combination of high energy density (NNP technology), safety 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.

### FEATURES

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

### APPLICATIONS

- Power tool
- Garden tool
- Emergency lighting
- UPS system
- Portable POS terminal
- GPS device
- Shaver
- E-bike
- Pedelec, etc.

### MODEL NUMBER (EXAMPLE)

#### NCR-18650A

|   |   |   |   |   |   |   |   |   |                                                                |
|---|---|---|---|---|---|---|---|---|----------------------------------------------------------------|
| N | C | R | - | 1 | 8 | 6 | 5 | 0 | A                                                              |
|   |   |   |   |   |   |   |   |   |                                                                |
|   |   |   |   |   |   |   |   |   | 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                                                          |
|   |   |   |   |   |   |   |   |   | Lithium-Ion battery                                            |

#### UR-18650ZT

|   |   |   |   |   |   |   |   |   |                                                                |
|---|---|---|---|---|---|---|---|---|----------------------------------------------------------------|
| U | R | - | 1 | 8 | 6 | 5 | 0 | Z | T                                                              |
|   |   |   |   |   |   |   |   |   |                                                                |
|   |   |   |   |   |   |   |   |   | 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             |
|   |   |   |   |   |   |   |   |   | Lithium-Ion battery, round                                     |

| Model number | Technology* <sup>1</sup>       | Nominal voltage (V) | Typical* <sup>2</sup> capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) |
|--------------|--------------------------------|---------------------|--------------------------------------|---------------|-------------------|------------|
| UR-18650U    | Back-up type                   | 3.6                 | 1,200                                | 18.10         | 64.80             | 41.5       |
| UR-14650R    | High power type                | 3.6                 | 1,050                                | 13.90         | 64.80             | 26.6       |
| UR-18650RX   | High power type                | 3.6                 | 2,050                                | 18.24         | 65.10             | 46.5       |
| UR-18650AA   | High power type                | 3.6                 | 2,250                                | 18.10         | 64.80             | 42.1       |
| UR-18650EA   | High power type                | 3.6                 | 2,350                                | 18.24         | 65.10             | 46.0       |
| UR-18650NSX  | High power type                | 3.6                 | 2,600                                | 18.25         | 65.07             | 47.3       |
| NCR-18500A   | NNP, HRL                       | 3.6                 | 2,040                                | 18.15         | 49.36             | 33.5       |
| NCR-18650    | NNP, HRL                       | 3.6                 | 2,900                                | 18.15         | 65.10             | 45.0       |
| NCR-18650A   | NNP, HRL                       | 3.6                 | 3,070                                | 18.15         | 65.10             | 46.0       |
| NCR-18650BF  | NNP, HRL                       | 3.6                 | 3,350                                | 18.24         | 65.10             | 46.5       |
| NCR-18650PF  | NNP, HRL, High power type      | 3.6                 | 2,900                                | 18.15         | 65.10             | 47.0       |
| NCR-18650BD  | NNP, HRL, High power type      | 3.6                 | 3,180                                | 18.25         | 65.10             | 49.5       |
| NCR-18650GA  | NNP, HRL, High power type      | 3.6                 | 3,450                                | 18.24         | 65.10             | 48.5       |
| NCR-18650F   | NNP, HRL, Low temperature type | 3.6                 | 2,900                                | 18.15         | 65.10             | 45.0       |
| UR-18650A    | Standard type                  | 3.6                 | 2,250                                | 18.10         | 64.80             | 43.0       |

\*<sup>1</sup> Please find the explanations of our technologies on the following pages. \*<sup>2</sup> 4.20V charge



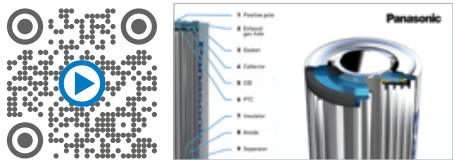
| Model number | Technology*1               | Nominal voltage (V) | Typical*2 capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) |
|--------------|----------------------------|---------------------|--------------------------|---------------|-------------------|------------|
| UR-18650W    | High power type            | 3.7                 | 1,600                    | 18.10         | 64.80             | 45.3       |
| UR-18650WX   | High power type            | 3.7                 | 1,600                    | 18.10         | 64.80             | 44.7       |
| UR-18650ZT   | High voltage charge system | 3.7                 | 2,800*3                  | 18.24         | 65.10             | 48.0       |
| UR-18650ZTA  | High voltage charge system | 3.7                 | 3,000*4                  | 18.24         | 65.10             | 48.0       |
| UR-18650ZY   | Standard type              | 3.7                 | 2,600                    | 18.24         | 64.80             | 47.0       |

3D ILLUSTRATION\*5

- 1 Exhaust gas hole
- 2 CID (Current Interrupt Device)
- 3 Insulator
- 4 Separator
- 5 Cathode
- 6 Anode
- 7 Negative pole (cell can)
- 8 Positive pole
- 9 PTC (Positive Temperature Coefficient Device)
- 10 Gasket
- 11 Collector



Scan QR code to view 3D animated video.



PRISMATIC SINGLE CELL

A perfect combination of high energy density (NNP technology), safety 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.

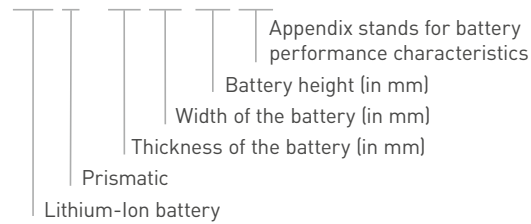
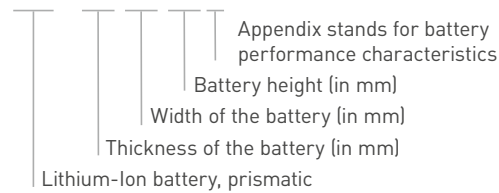
FEATURES

- High energy density and high voltage ensure small battery dimensions
- Long-life, stable power supply with flat discharge voltage
- Use of Lithium-Ion batteries requires a safety unit
- Safety technologies such as PSS and HRL available

APPLICATIONS

- Power tool
- Garden tool
- Emergency lighting
- UPS system
- Portable POS terminal
- GPS device
- Shaver
- E-bike, pedelec, etc.

\*1 Please find the explanations of our technologies on the following pages. \*2 4.20V charge \*3 4.30V charge \*4 4.35V charge  
\*5 Some batteries are not equipped with a PTC. Please consult Panasonic for further information. The illustration shows only one example of a Lithium-Ion battery structure.

**MODEL NUMBER (EXAMPLE)****NCA - 7 5 2 8 3 6 A****UF - 1 0 3 4 5 0 P**

| Model number | Technology* <sup>1</sup> | Nominal voltage (V) | Typical* <sup>2</sup> capacity (mAh) | Width (mm) | Thickness (mm) | Total height (mm) | Weight (g) |
|--------------|--------------------------|---------------------|--------------------------------------|------------|----------------|-------------------|------------|
| NCA-473136   | NNP, HRL                 | 3.6                 | 650                                  | 30.90      | 4.70           | 35.45             | 11.6       |
| NCA-463436A  | NNP, HRL                 | 3.6                 | 720                                  | 34.30      | 4.60           | 35.50             | 12.4       |
| NCA-603134   | NNP, HRL                 | 3.6                 | 730                                  | 31.10      | 6.06           | 34.45             | 13.7       |
| NCA-523436   | NNP, HRL                 | 3.6                 | 840                                  | 34.30      | 5.15           | 35.50             | 14.1       |
| NCA-572742SA | NNP, HRL                 | 3.6                 | 890                                  | 27.00      | 5.70           | 41.75             | 14.5       |
| NCA-752836A  | NNP, HRL                 | 3.6                 | 1,010                                | 27.90      | 7.80           | 35.70             | 16.7       |
| NCA-623535   | NNP, HRL                 | 3.6                 | 1,100                                | 35.20      | 6.30           | 35.10             | 17.6       |
| NCA-622944SA | NNP, HRL                 | 3.6                 | 1,170                                | 28.70      | 6.25           | 44.70             | 18.1       |
| NCA-573544   | NNP, HRL                 | 3.6                 | 1,190                                | 34.60      | 5.80           | 44.00             | 19.9       |
| NCA-673440   | NNP, HRL                 | 3.6                 | 1,265                                | 33.80      | 6.75           | 40.35             | 20.3       |
| NCA-593446   | NNP, HRL                 | 3.6                 | 1,300                                | 33.80      | 5.90           | 46.00             | 20.6       |
| NCA-843436   | NNP, HRL                 | 3.6                 | 1,300                                | 33.90      | 8.70           | 35.70             | 23.0       |
| NCA-882936SA | NNP, HRL                 | 3.6                 | 1,310                                | 28.70      | 8.80           | 36.30             | 20.1       |
| NCA-793540   | NNP, HRL                 | 3.6                 | 1,570                                | 35.10      | 7.95           | 40.50             | 24.7       |
| NCA-103443   | NNP, HRL                 | 3.6                 | 2,010                                | 33.80      | 10.50          | 42.45             | 33.4       |
| NCA-103450   | NNP, HRL                 | 3.6                 | 2,350                                | 33.80      | 10.50          | 48.50             | 38.3       |
| NCA-653864SA | NNP, HRL                 | 3.6                 | 2,400                                | 38.10      | 6.50           | 64.60             | 37.0       |
| NCA-903864A  | NNP, HRL                 | 3.6                 | 3,280                                | 38.00      | 9.00           | 64.05             | 50.7       |
| UF-553436G   | LCO system               | 3.7                 | 830                                  | 33.85      | 5.50           | 35.60             | 15.6       |
| UF-463443GU  | LCO system               | 3.7                 | 850                                  | 33.85      | 4.55           | 42.60             | 16.0       |
| UF-553048F   | LCO system               | 3.7                 | 930                                  | 29.65      | 5.40           | 47.80             | 17.9       |
| UF-463450F   | LCO system               | 3.7                 | 960                                  | 33.85      | 4.45           | 49.60             | 18.5       |
| UF-553443ZU  | LCO system               | 3.7                 | 1,040                                | 33.80      | 5.55           | 42.80             | 18.7       |
| UF-703141FU  | LCO system               | 3.7                 | 1,090                                | 30.50      | 7.05           | 40.70             | 20.9       |
| UF-553450Z   | LCO system               | 3.7                 | 1,200                                | 33.85      | 5.55           | 49.80             | 22.3       |
| UF-653450S   | LCO system               | 3.7                 | 1,300                                | 33.85      | 6.35           | 49.80             | 25.1       |
| UF-703450F   | LCO system               | 3.7                 | 1,480                                | 33.85      | 7.00           | 49.80             | 28.1       |
| UF-103450P   | LCO system               | 3.7                 | 2,000                                | 33.80      | 10.50          | 48.80             | 38.5       |

\*<sup>1</sup> Please find the explanations of our technologies on the following pages. \*<sup>2</sup> 4.20V charge

| Model number | Technology*1               | Nominal voltage (V) | Typical*2 capacity (mAh) | Width (mm) | Thickness (mm) | Total height (mm) | Weight (g) |
|--------------|----------------------------|---------------------|--------------------------|------------|----------------|-------------------|------------|
| CGA-463443XA | High voltage charge system | 3.8                 | 910*3                    | 33.80      | 4.60           | 42.45             | 15.5       |
| CGA-463450XA | High voltage charge system | 3.8                 | 1,030*3                  | 33.80      | 4.55           | 49.45             | 17.6       |
| CGA-553450XA | High voltage charge system | 3.8                 | 1,310*3                  | 33.80      | 5.70           | 49.65             | 21.5       |
| UF-564447FT  | High voltage charge system | 3.8                 | 1,580*3                  | 43.90      | 5.55           | 46.60             | 26.5       |
| UF-544357SX  | High voltage charge system | 3.8                 | 1,880*3                  | 42.25      | 5.40           | 56.50             | 30.2       |
| CGA-583864ZA | High voltage charge system | 3.85                | 2,080*4                  | 37.50      | 5.83           | 64.35             | 33.0       |

## 3D ILLUSTRATION\*5

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



## PIN TYPE

The industry's smallest-diameter cylindrical rechargeable battery has been developed using extremely fine components and materials compared to standard Lithium-Ion batteries. Its outstanding technical design makes this battery ideal for wearable devices with heavy power demands.

Panasonic intends to expand this new battery line-up successively to meet the requirements of next-generation mobile communication devices.

## FEATURES

- 3.65mm diameter pin-shaped Lithium-Ion battery which expands design options for micro devices
- Rechargeable battery that can be used repeatedly and has the output capability required for near field communications
- High-strength metal exterior provides excellent reliability

## APPLICATIONS

- Electric pen
- Wearables
- Hearing aid
- Smart clothes
- Wearable access, etc.

| Model number | Technology*1 | Nominal voltage (V) | Typical*3 capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) |
|--------------|--------------|---------------------|--------------------------|---------------|-------------------|------------|
| CG-320A*6    | LCO system   | 3.8                 | 15                       | 3.65          | 20.0              | 0.6        |

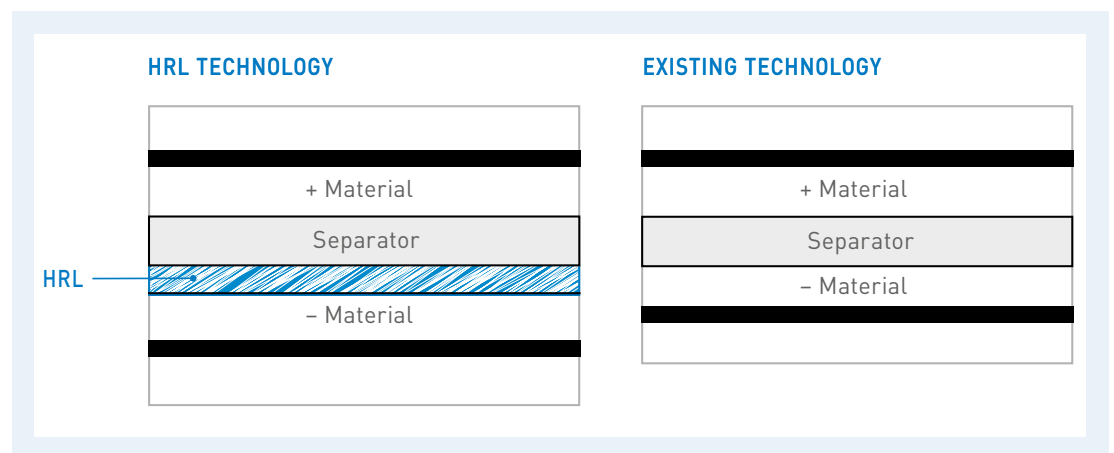
\*1 Please find the explanations of our technologies on the following pages. \*2 4.20V charge \*3 4.35V charge \*4 4.40V charge

\*5 Some batteries are not equipped with a PTC. Please consult Panasonic for further information. The illustration shows only one example of a Lithium-Ion battery structure. \*6 This battery is supplied with tabs or lead wires.

## LI-ION TECHNOLOGIES

### HEAT RESISTANCE LAYER (HRL)\*<sup>1</sup>

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.



### HIGH POWER TYPE

These batteries are designed specifically for applications such as power tools: with optimised electrode material and cell structure for low internal resistance, these Panasonic batteries can drive high drain applications with huge power consumption such as cleaning machines and drills / drivers.

### HIGH VOLTAGE CHARGE SYSTEM

Panasonic develops the High Voltage Charge technology: high capacity under the prerequisite of a charging voltage up to 4.40V. This technology is ideal to power devices such as laptops, notebooks, etc.

### LCO SYSTEM

This Panasonic Lithium-Ion battery system uses a cobalt-based cathode, offers high capacity and is a standard solution for a variety of applications.

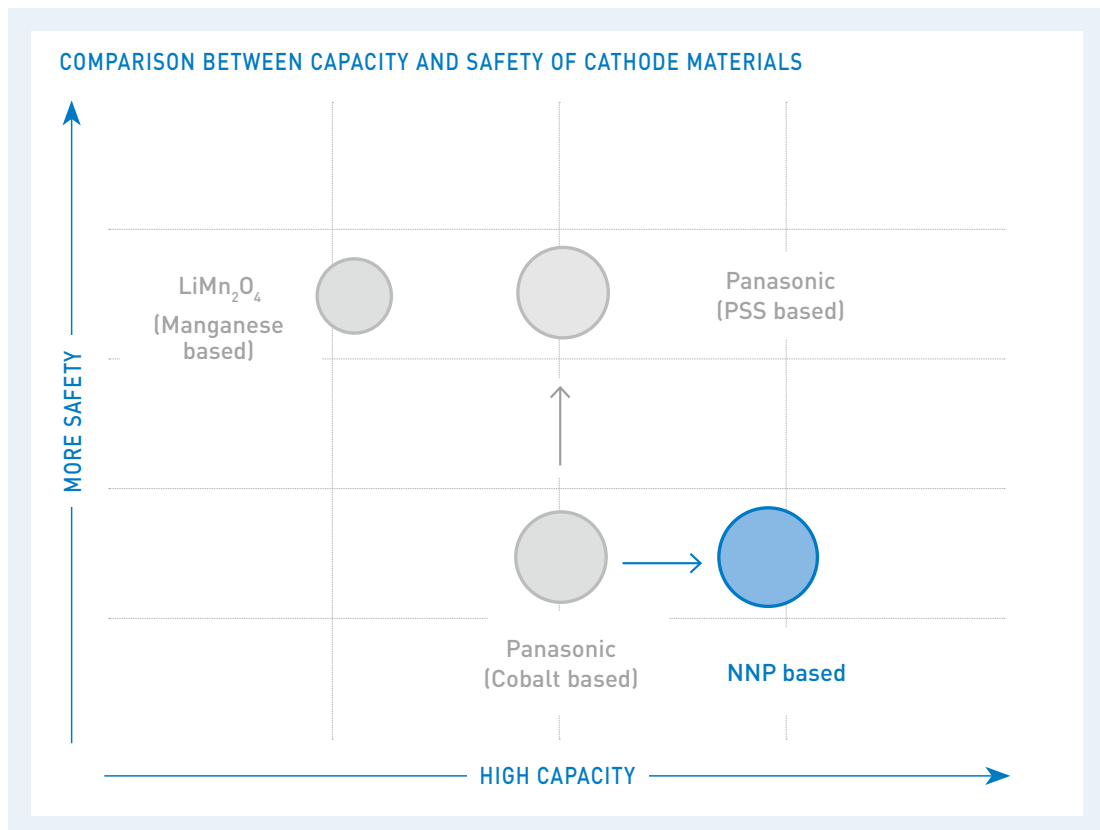
### NICKEL OXIDE BASED NEW PLATFORM (NNP)

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.\*<sup>2</sup>

\*<sup>1</sup> A couple of our batteries are not provided with our HRL technology yet. Please contact Panasonic to be informed about the current situation. \*<sup>2</sup> Panasonic Lithium-Ion cells must always be equipped with a safety unit.

## 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



## STANDARD TYPE

The Panasonic Lithium-Ion batteries feature a good mix of performance and safety, and can power a comprehensive range of applications.



## 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.

Moreover this all Panasonic cells must always be equipped with a safety unit. Our battery CG-320A is supplied with tabs or lead wires.

# IDEAL FOR LESS COMPLEX AND COST-SENSITIVE APPLICATIONS



SUITABLE FOR NEARLY EVERY APPLICATION

HIGH QUALITY AND RELIABILITY

GOOD BALANCE IN TERMS OF CAPACITY AND LIFETIME

EXCELLENT DISCHARGE CHARACTERISTICS

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to view product  
series video.







## HIGH TEMPERATURE & LONG-LIFE TYPE

**(H) TYPE**

The expected life of these back-up batteries is about 6 to 10 years and therefore approximately twice the lifetime compared to standard Ni-MH batteries. In addition they are capable of delivering excellent charge characteristics at high temperature (60°C). Recommended applications are for example emergency light, vending machines and back-up for base station.

### FEATURES

- High charge efficiency at elevated temperatures
- Small size and light weight
- Long lifetime when using intermittent charge
- Most suitable for exchanging with Nickel-Cadmium batteries\*<sup>1</sup>
- Long-life and excellent charging performance at 75°C\*<sup>1</sup>

### APPLICATIONS

- Emergency call (E-Call)
- Medical equipment
- Emergency lighting
- Ticketing machine
- POS system
- Solar window shutter
- Shaver
- Guidance light\*<sup>2</sup>
- LED light\*<sup>2</sup>, etc.

### MODEL NUMBER (EXAMPLE)

**BK - 60 AAA H**

|  |  |  |  |                                                                    |
|--|--|--|--|--------------------------------------------------------------------|
|  |  |  |  | High temperature & long-life type                                  |
|  |  |  |  | Diameter: AAA, AA, A                                               |
|  |  |  |  | Multiply this by 10 to obtain the rated capacity (some exceptions) |
|  |  |  |  | Nickel-Metal-Hydride battery                                       |

|     | Model number                   | Old model number | Diameter | Size   | Nominal voltage [V] | Nominal capacity [mAh] | Typical capacity [mAh] | Diameter (mm) | Total height (mm) | Weight (g) | IEC     |
|-----|--------------------------------|------------------|----------|--------|---------------------|------------------------|------------------------|---------------|-------------------|------------|---------|
|     | <b>BK-60AAAH</b>               | HHR-60AAAH       | AAA      | AAA    | 1.2                 | 500                    | 550                    | 10.5 +0/-0.7  | 44.5 +0/-1.5      | 13         | HR11/45 |
| NEW | <b>BK-60AAAHU*<sup>1</sup></b> | -                | AAA      | AAA    | 1.2                 | 500                    | 550                    | 10.5 +0/-0.7  | 44.5 +0/-1.5      | 13         | HR11/45 |
|     | <b>BK-70AAH</b>                | HHR-70AAH        | AA       | AA     | 1.2                 | 700                    | 750                    | 14.5 +0/-0.7  | 49.0 +0/-1.5      | 18         | HR15/49 |
| NEW | <b>BK-110AAH</b>               | -                | AA       | AA     | 1.2                 | 1,100                  | 1,180                  | 14.5 +0/-0.7  | 50.5 +0/-1.0      | 26         | HR15/51 |
| NEW | <b>BK-120AAHU*<sup>1</sup></b> | -                | AA       | AA     | 1.2                 | 1,200                  | 1,280                  | 14.5 +0/-0.7  | 50.5 +0/-1.5      | 23         | HR15/51 |
| NEW | <b>BK-150AAH</b>               | -                | AA       | AA     | 1.2                 | 1,450                  | 1,530                  | 14.5 +0/-0.7  | 50.5 +0/-1.0      | 26         | HR15/51 |
|     | <b>BK-160AH</b>                | -                | A        | 4/5A   | 1.2                 | 1,600                  | 1,720                  | 17.0 +0/-0.7  | 43.0 +0/-1.5      | 29         | HR17/43 |
|     | <b>BK-210AH</b>                | HHR-210AH        | A        | A      | 1.2                 | 1,900                  | 2,050                  | 17.0 +0/-0.7  | 50.0 +0/-2.0      | 36         | HR17/50 |
|     | <b>BK-370AH</b>                | HHR-370AH        | A        | LFat/A | 1.2                 | 3,500                  | 3,700                  | 18.2 +0/-0.7  | 67.5 +0/-1.5      | 60         | -       |



## HIGH RATE DISCHARGE & HIGH TEMPERATURE TYPE

**(PH) TYPE**

These state-of-the-art back-up batteries deliver excellent current discharge characteristics at high temperature (60°C). They are able to power applications such as back-up for UPS, POS systems and solar window shutter.

### FEATURES

- Excellent large current discharge characteristics at 60°C
- Small size and light weight
- Energy saving
- Making large discharging current possible, long-life and excellent charging performance at 75°C\*<sup>1</sup>

### APPLICATIONS

- Medical equipment
- Power tool
- Garden tool
- Robot cleaner
- Electric vehicle
- Motive power\*<sup>3</sup>
- Elevator\*<sup>3</sup>
- Emergency light\*<sup>3</sup>, etc.

\*<sup>1</sup> New back-up type which can be operated at high ambient temperatures up to 75 °C. Not in mass production yet.

\*<sup>2</sup> New back-up battery types BK-60AAAHU and BK-120AAHU are particular designed to power this application.

\*<sup>3</sup> New back-up battery types BK-220SCHU and BK-310CHU are particular designed to power this application.

## MODEL NUMBER (EXAMPLE)

**B K - 330 A P H**

|  |  |  |                                                                       |
|--|--|--|-----------------------------------------------------------------------|
|  |  |  | High rate discharge & high temperature type                           |
|  |  |  | Diameter: A, SC, C                                                    |
|  |  |  | Multiply this by 10 to obtain the rated capacity<br>(some exceptions) |
|  |  |  | Nickel-Metal-Hydride battery                                          |

|     | Model number        | Old model number | Dia-meter | Size   | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC     |
|-----|---------------------|------------------|-----------|--------|---------------------|------------------------|------------------------|---------------|-------------------|------------|---------|
|     | <b>BK-330APH</b>    | HHR-330APH       | A         | LFat/A | 1.2                 | 3,200                  | 3,300                  | 18.2 +0/-0.7  | 67.5 +0/-1.5      | 60         | -       |
| NEW | <b>BK-220SCHU*1</b> | -                | SC        | SC     | 1.2                 | 2,200                  | 2,400                  | 23.0 +0/-1.0  | 43.0 +0/-1.5      | 55         | HR23/43 |
|     | <b>BK-250SCH</b>    | HHR-250SCH       | SC        | SC     | 1.2                 | 2,500                  | 2,650                  | 23.0 +0/-1.0  | 43.0 +0/-1.5      | 55         | HR23/43 |
|     | <b>BK-310CH</b>     | -                | C         | C      | 1.2                 | 3,100                  | 3,300                  | 25.8 +0/-1.0  | 50.0 +0/-2.0      | 80         | HR26/50 |
| NEW | <b>BK-310CHU*1</b>  | -                | C         | C      | 1.2                 | 3,100                  | 3,300                  | 25.8 +0/-1.0  | 50.0 +0/-2.0      | 80         | HR26/50 |



## BUTTON TOP TYPE

**B** TYPE

The Panasonic button type batteries are compatible with dry batteries such as Alkaline and can be used up to 1,800 times based on JIS standards. Besides they provide a high capacity level and a low self-discharge. Last but not least they can power applications which require superior low temperature characteristics.

## FEATURES

- Offers long charge / discharge cycle life, about 1,800 times
- High capacity level and low self-discharge (still have 90% capacity after storage for 1 year)
- Offers excellent temperature characteristics especially in low temperature

## APPLICATIONS

- Flash light
- Personal digital assistant
- Toothbrush
- Shaver
- Remote control, etc.

## MODEL NUMBER (EXAMPLE)

**B K - 80 A A A B**

|  |  |  |                                                                       |
|--|--|--|-----------------------------------------------------------------------|
|  |  |  | Cap shape: button top type                                            |
|  |  |  | Diameter: AAA, AA                                                     |
|  |  |  | Multiply this by 10 to obtain the rated capacity<br>(some exceptions) |
|  |  |  | Nickel-Metal-Hydride battery                                          |

|  | Model number       | Old model number | Dia-meter | Size | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC     |
|--|--------------------|------------------|-----------|------|---------------------|------------------------|------------------------|---------------|-------------------|------------|---------|
|  | <b>BK-65AAAB*2</b> | -                | AAA       | AAA  | 1.2                 | 650                    | 700                    | 10.5 +0/-0.7  | 44.5 +0/-1.0      | 12         | HR11/45 |
|  | <b>BK-80AAAB*2</b> | HHR-80AAAB       | AAA       | AAA  | 1.2                 | 750                    | 780                    | 10.5 +0/-0.7  | 44.5 +0/-1.0      | 13         | HR11/45 |
|  | <b>BK-110AAB*3</b> | HHR-110AAB       | AA        | AA   | 1.2                 | 1,000                  | 1,050                  | 14.5 +0/-0.7  | 50.5 +0/-1.0      | 20         | HR15/51 |
|  | <b>BK-200AAB*3</b> | -                | AA        | AA   | 1.2                 | 1,900                  | 2,000                  | 14.5 +0/-0.7  | 50.5 +0/-1.0      | 29         | HR15/51 |

\*1 New back-up type which can be operated at high ambient temperatures up to 75 °C. Not in mass production yet.

\*2 Compatible with consumer AAA size. \*3 Compatible with consumer AA size.



## STANDARD TYPE

**N** TYPE

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. For example medical equipment and distance meter.

### FEATURES

- High quality and reliability
- Good balance in terms of capacity and lifetime

### MODEL NUMBER (EXAMPLE)

**B K - 7 0 A A**

Diameter: AAA, AA, A  
Multiply this by 10 to obtain the rated capacity (some exceptions)  
Nickel-Metal-Hydride battery

### APPLICATIONS

- Medical
- Communication
- Shaver
- Toothbrush
- Navigation device
- Torchlight
- Measurement, etc.

| Model number         | Old model number | Dia-meter | Size   | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC     |
|----------------------|------------------|-----------|--------|---------------------|------------------------|------------------------|---------------|-------------------|------------|---------|
| <b>BK-65AAAK</b>     | HHR-65AAAK       | AAA       | AAA    | 1.2                 | 650                    | 700                    | 10.5 +0/-0.7  | 44.5 +0/-1.5      | 12         | HR11/45 |
| <b>BK-70AAAJ</b>     | HHR-70AAAJ       | AAA       | AAA    | 1.2                 | 700                    | 730                    | 10.5 +0/-0.7  | 44.5 +0/-1.5      | 12         | HR11/45 |
| <b>BK-90AAA</b>      | -                | AAA       | L-AAA  | 1.2                 | 830                    | 880                    | 10.5 +0/-0.7  | 50.5 +0/-1.5      | 14         | HR11/67 |
| <b>BK-120AA</b>      | HHR-120AA        | AA        | 4/5AA  | 1.2                 | 1,150                  | 1,220                  | 14.5 +0/-0.7  | 43.0 +0/-1.5      | 23         | HR15/43 |
| <b>BK-70AA</b>       | HHR-70AA         | AA        | AA     | 1.2                 | 700                    | 780                    | 14.5 +0/-0.7  | 49.0 +0/-1.5      | 18         | HR15/49 |
| <b>BK-110AAO</b>     | HHR-110AAO       | AA        | AA     | 1.2                 | 1,100                  | 1,180                  | 14.5 +0/-0.7  | 50.5 +0/-1.5      | 26         | HR15/51 |
| <b>BK-150AA</b>      | HHR-150AA        | AA        | AA     | 1.2                 | 1,500                  | 1,580                  | 14.5 +0/-0.7  | 50.5 +0/-1.5      | 26         | HR15/51 |
| <b>NEW BK-200AAP</b> | -                | AA        | AA     | 1.2                 | 1,900                  | 2,000                  | 14.5 +0/-0.7  | 50.5 +0/-1.5      | 29         | HR15/51 |
| <b>BK-200A</b>       | HHR-200A         | A         | 4/5A   | 1.2                 | 2,000                  | 2,040                  | 17.0 +0/-0.7  | 43.0 +0/-1.5      | 32         | HR17/43 |
| <b>BK-210A</b>       | HHR-210A         | A         | A      | 1.2                 | 2,100                  | 2,200                  | 17.0 +0/-0.7  | 50.0 +0/-2.0      | 38         | HR17/50 |
| <b>BK-380A</b>       | HHR-380A         | A         | L-A    | 1.2                 | 3,700                  | 3,800                  | 17.0 +0/-0.7  | 67.0 +0/-2.0      | 53         | HR17/67 |
| <b>BK-450A</b>       | HHR-450A         | A         | LFat/A | 1.2                 | 4,200                  | 4,500                  | 18.2 +0/-0.7  | 67.5 +0/-1.5      | 60         | -       |



## HIGH RATE DISCHARGE & RAPID CHARGE TYPE

**P** TYPE

These battery types provide excellent current discharge characteristics and are designed for rapid charging. They are most suitable for power tools, robot cleaners and electric vehicles.

### FEATURES

- Excellent large current discharge characteristics
- Rapid charge-capable

### MODEL NUMBER (EXAMPLE)

**B K - 3 0 0 S C P**

High rate discharge & rapid charge type  
Diameter: SC  
Multiply this by 10 to obtain the rated capacity (some exceptions)  
Nickel-Metal-Hydride battery

### APPLICATIONS

- Medical equipment
- Power tool
- Garden tool
- Robot cleaner
- Electric vehicle, etc.

| Model number       | Old model number | Dia-meter | Size  | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC     |
|--------------------|------------------|-----------|-------|---------------------|------------------------|------------------------|---------------|-------------------|------------|---------|
| <b>BK-200SCP*1</b> | HHR-200SCP       | SC        | 4/5SC | 1.2                 | 1,900                  | 2,100                  | 23.0 +0/-1.0  | 34.0 +0/-1.5      | 42         | HR23/34 |
| <b>BK-260SCP*1</b> | HHR-260SCP       | SC        | SC    | 1.2                 | 2,450                  | 2,700                  | 23.0 +0/-1.0  | 43.0 +0/-1.5      | 55         | HR23/43 |
| <b>BK-300SCP*1</b> | HHR-300SCP       | SC        | SC    | 1.2                 | 2,800                  | 3,050                  | 23.0 +0/-1.0  | 43.0 +0/-1.5      | 57         | HR23/43 |



## LOW TEMPERATURE TYPE

**L** TYPE

This Panasonic battery type is especially designed for low temperature discharge down to -30°C. Thus these batteries are ideal to power two way radios and other outdoor applications.

### FEATURES

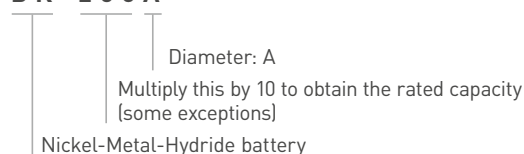
- Designed for applications which require low temperature discharge down to -30°C

### APPLICATIONS

- Two way radio
- Construction sites signaling
- UPS, etc.

### MODEL NUMBER (EXAMPLE)

**B K - 2 5 0 A**



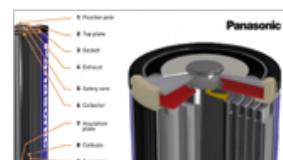
| Model number   | Old model number | Dia-meter | Size | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC     |
|----------------|------------------|-----------|------|---------------------|------------------------|------------------------|---------------|-------------------|------------|---------|
| <b>BK-250A</b> | -                | A         | A    | 1.2                 | 2,450                  | 2,600                  | 17.0 +0/-0.7  | 50.0 +0/-2.0      | 40         | HR17/50 |

### 3D ILLUSTRATION\*2

- Exhaust gas hole
- Safety vent
- Insulation plate
- Tube
- Anode (hydrogen - absorbing alloy)
- Separator
- Cathode (Nickel Hydroxide)
- Negative pole (cell can)
- Positive pole
- Top plate
- Gasket
- Collector



Scan QR code to view 3D animated video.



\*1 For high power use application such as power tools. \*2 The illustration shows only one example of Ni-MH battery structure.



### INFRASTRUCTURE TYPE

These battery types offer high capacity on the one hand and an outstanding efficiency even at low temperature environments on the other. They are particular designed for power storage and auto-mated guided vehicles (AGV).

#### FEATURES

- Realisation of lightweight and space-saving
- Alternative compared to VRLA batteries
- By using Nickel-Metal-Hydride battery, power supply provides high efficiency even at a low temperature

#### APPLICATIONS

- UPS
- Green energy
- Solar window shutter
- Wind turbine
- Energy storage
- Floating machine, etc.

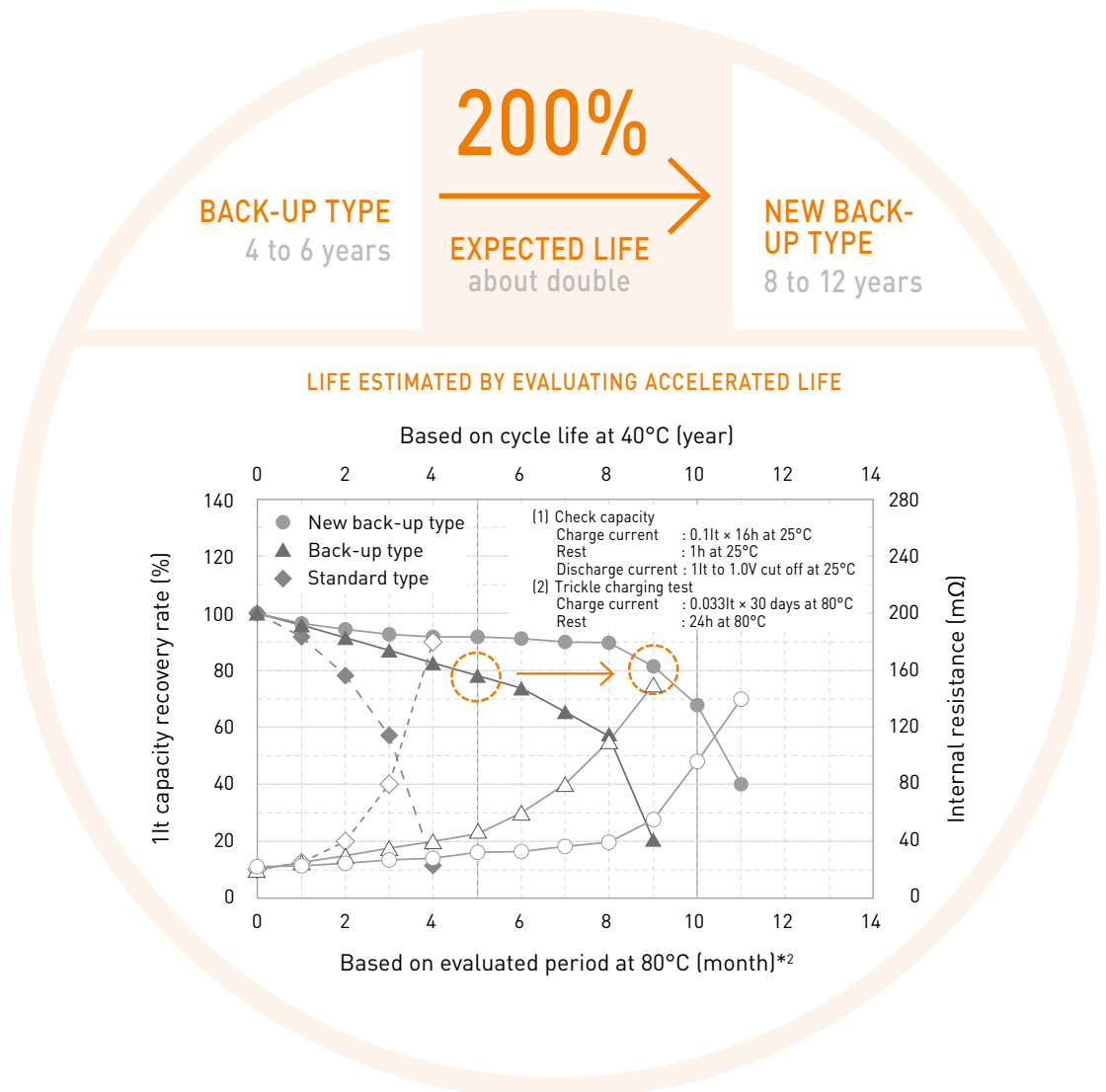
|     | Model number | Old model number | Dia-meter | Size | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm)  | Total height (mm) | Weight (g) | IEC |
|-----|--------------|------------------|-----------|------|---------------------|------------------------|------------------------|----------------|-------------------|------------|-----|
| NEW | BK-06V1S1    | -                | V         | V    | 1.2                 | 60,000                 | 63,000                 | 62.6 +1.0/-1.0 | 136.9 +1.0/-1.0   | 1,100      | -   |
|     | BK-10V1S1    | -                | V         | V    | 1.2                 | 90,000                 | 95,000                 | 62.6 +1.0/-1.0 | 188.7 +1.0/-1.0   | 1,700      | -   |
| NEW | BK-06V10T1   | -                | Pack      | Pack | 12.0                | 60,000                 | 63,000                 | 428.0 x 159.0  | 220.0             | 16,000     | -   |
|     | BK-10V10T1   | HHR-10V10T       | Pack      | Pack | 12.0                | 90,000                 | 95,000                 | 428.0 x 159.0  | 270.0             | 23,000     | -   |

## Ni-MH TECHNOLOGIES

### NEW BACK-UP TYPE\*<sup>1</sup>

New battery type which provides high temperature durability and long-life adapted to the IEC-U standard.

- Excellent charging and discharging performance in different environments (-20°C to 75°C)
- Long-life in trickle charging (most suitable for replacing Nickel-Cadmium batteries)
- Fit well for various equipments and applications
- Small, light-weight and space-saving



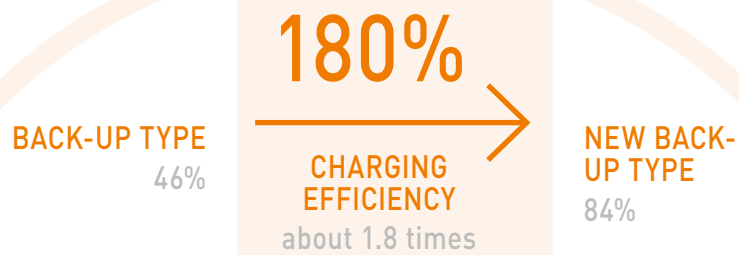
### LONG-LIFE (IN TRICKLE CHARGING)

\*<sup>1</sup> New back-up type which can be operated at high ambient temperatures up to 75 °C. Not in mass production yet.

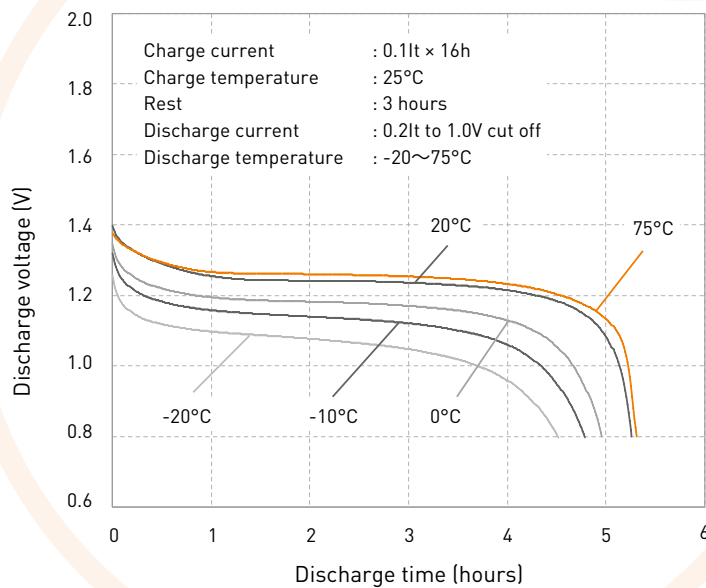
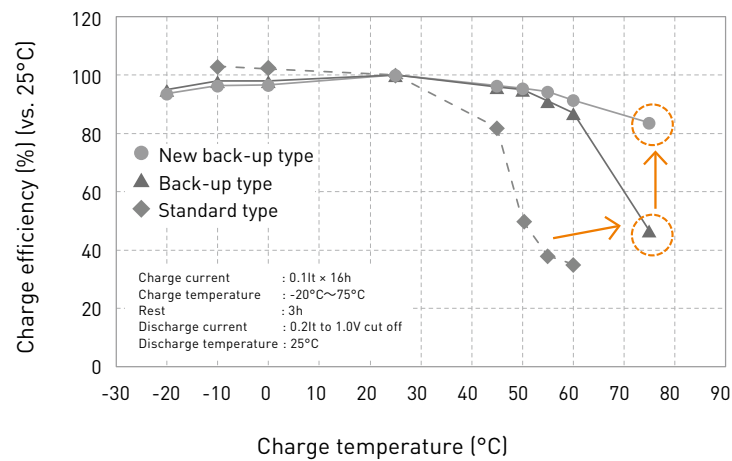
\*<sup>2</sup> It is accelerated evaluation on the condition that trickle charging current is 0.033It at 80°C.



EXCELLENT CHARGING PERFORMANCE AT HIGH TEMPERATURE  
ENVIRONMENT UP TO 75°C



CHARGING CHARACTERISTICS



TYPICAL DISCHARGE CHARACTERISTICS

# WELL SUITED TO TOUGH CONDITIONS



QUALITY SINCE 1964

LOW INTERNAL RESISTANCE

SUPERIOR RESISTANCE TO SHOCK AND VIBRATION

OUTSTANDING STORAGE CHARACTERISTICS

Panasonic Nickel-Cadmium batteries have been well known for their quality since 1964. With exceptional discharge performance and durability, Cadnica batteries are well-suited to tough conditions, including power tools and emergency lighting systems. Likewise, many medical devices are powered by these rechargeable batteries. Panasonic Nickel-Cadmium batteries feature low internal resistance, are easy to handle, and offer superior resistance to shock and vibration, and last but not least, outstanding storage characteristics.



### STANDARD TYPE

These basic Nickel-Cadmium battery types are characterised by their high capacity and good performance per cost unit.

| Model number | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) |
|--------------|---------------------|------------------------|------------------------|---------------|-------------------|------------|
| KR-7000F     | 1.2                 | 7,000                  | 7,700                  | 33.2 +0/-0.9  | 91.0 +0/-1.4      | 224        |
| KR-10000M    | 1.2                 | 10,000                 | 12,000                 | 43.1 +0/-1.0  | 91.0 +0/-1.4      | 395        |



### LONG-LIFE TYPE

These batteries exhibit superior performance over a long period in both continuous charge and cycle modes. They achieve significantly longer life than standard Cadnica batteries.

| Model number | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) |
|--------------|---------------------|------------------------|------------------------|---------------|-------------------|------------|
| N-600AACL    | 1.2                 | 600                    | 650                    | 14.3 +0/-0.5  | 48.9 +0/-1.0      | 22         |
| N-600AAC     | 1.2                 | 600                    | 650                    | 14.3 +0/-0.5  | 50.2 +0/-1.0      | 22         |
| N-700AACL    | 1.2                 | 700                    | 750                    | 14.3 +0/-0.5  | 48.9 +0/-1.0      | 23         |
| N-700AAC     | 1.2                 | 700                    | 750                    | 14.3 +0/-0.5  | 50.2 +0/-1.0      | 23         |



### RAPID CHARGE TYPE

These Panasonic Cadnica batteries are ready-charged in just one hour. During charging, the sharp temperature rise of the batteries makes it easy to detect where to cut off the charging process.

| Model number | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) |
|--------------|---------------------|------------------------|------------------------|---------------|-------------------|------------|
| N-1250SCRL   | 1.2                 | 1,200                  | 1,250                  | 22.9 +0/-1.0  | 34.0 +0/-1.2      | 43         |
| N-1300SCR    | 1.2                 | 1,300                  | 1,400                  | 22.9 +0/-1.0  | 43.0 +0/-1.2      | 51         |
| N-1700SCR    | 1.2                 | 1,700                  | 1,850                  | 22.9 +0/-1.0  | 43.0 +0/-1.2      | 55         |
| N-3000CR     | 1.2                 | 3,000                  | 3,200                  | 26.0 +0/-0.8  | 50.0 +0/-1.2      | 86         |



## HIGH TEMPERATURE TYPE

These high temperature batteries offer excellent charge efficiency and long service life under severe temperature conditions. Emergency lighting devices, for example, can be powered for approx. four to six years.

| Model number | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) |
|--------------|---------------------|------------------------|------------------------|---------------|-------------------|------------|
| KR-AAH       | 1.2                 | 600                    | 650                    | 14.3 +0/-0.5  | 48.9 +0/-1.0      | 23         |
| KR-SCH(1.2)  | 1.2                 | 1,200                  | 1,300                  | 22.9 +0/-1.0  | 43.0 +0/-1.2      | 47         |
| KR-SCH(1.5)  | 1.2                 | 1,500                  | 1,600                  | 22.9 +0/-1.0  | 43.0 +0/-1.2      | 49         |
| KR-SCH(1.6)  | 1.2                 | 1,600                  | 1,650                  | 22.9 +0/-1.0  | 43.0 +0/-1.2      | 49         |
| KR-CH(2.0)   | 1.2                 | 2,000                  | 2,100                  | 26.0 +0/-0.8  | 50.0 +0/-1.3      | 72         |
| KR-CH(2.5)   | 1.2                 | 2,500                  | 2,600                  | 26.0 +0/-0.8  | 50.0 +0/-1.3      | 75         |
| KR-CH(3.0)   | 1.2                 | 2,900                  | 3,050                  | 26.0 +0/-0.8  | 50.0 +0/-1.3      | 78         |
| KR-FH        | 1.2                 | 7,000                  | 7,700                  | 33.2 +0/-0.9  | 91.0 +0/-1.4      | 224        |
| KR-MH        | 1.2                 | 10,000                 | 12,000                 | 43.1 +0/-1.0  | 91.0 +0/-1.4      | 395        |
| KR-5/3MH     | 1.2                 | 20,000                 | 22,000                 | 43.1 +0/-1.0  | 146.1 +0/-1.5     | 648        |



## HEAT-RESISTANT TYPE

These Panasonic Nickel-Cadmium batteries are designed for superior durability under severe rapid-charge conditions at temperatures as high as 70°C.

| Model number | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) |
|--------------|---------------------|------------------------|------------------------|---------------|-------------------|------------|
| N-600AAK     | 1.2                 | 600                    | 650                    | 14.3 +0/-0.5  | 50.2 +0/-1.0      | 22         |
| N-1200SCK    | 1.2                 | 1,200                  | 1,350                  | 22.9 +0/-1.0  | 43.0 +0/-1.2      | 52         |



## HEAT-RESISTANT & HIGH POWER TYPE

This Cadnica battery series was developed by improving upon the standard Nickel-Cadmium long-life series. This superior batteries are suitable for back-up applications where both high power and heat resistance are critical.

| Model number | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) |
|--------------|---------------------|------------------------|------------------------|---------------|-------------------|------------|
| N-1600SCB    | 1.2                 | 1,550                  | 1,700                  | 22.9 +0/-1.0  | 42.9 +0/-1.2      | 57         |
| N-2000CB     | 1.2                 | 2,000                  | 2,300                  | 26.0 +0/-0.8  | 50.0 +0/-1.3      | 85         |



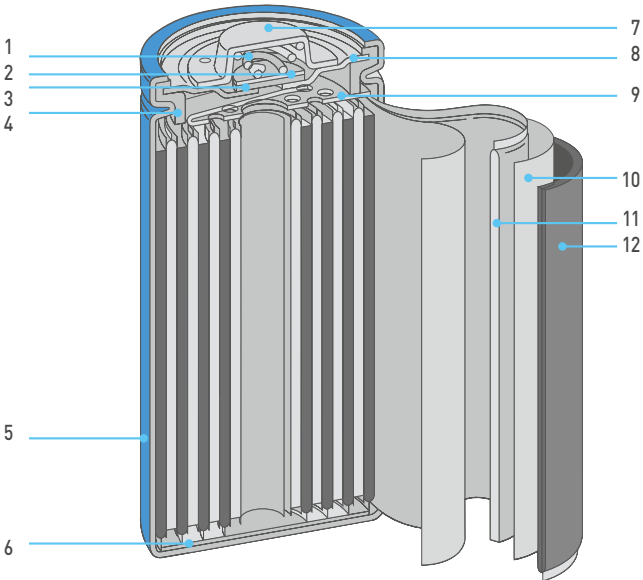
LOW TEMPERATURE TYPE

This Panasonic battery line-up is particularly designed to meet the very demanding needs from the infrastructure industry such as back-up power supplies, traffic signals, emergency lighting in cold-storage warehouses etc. Our Cadnica GT series batteries are developed to operate at a wide range of temperatures, from extreme cold temperatures of -40°C to temperatures up to 60°C (140°F).

| Model number | Nominal voltage (V) | Nominal capacity (mAh) | Typical capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) |
|--------------|---------------------|------------------------|------------------------|---------------|-------------------|------------|
| GT-2300C     | 1.2                 | 2,300                  | 2,500                  | 26.0 +0/-0.8  | 50.0 +0/-1.3      | 73         |
| GT-4000D     | 1.2                 | 4,000                  | 4,300                  | 33.2 +0/-0.9  | 59.5 +0/-1.5      | 143        |
| GT-6500F*1   | 1.2                 | 6,500                  | 6,800                  | 33.2 +0/-0.9  | 91.0 +0/-1.4      | 218        |

3D ILLUSTRATION\*2

- 1 Spring
- 2 Seal plate
- 3 Rubber plate
- 4 Gasket
- 5 Casing (negative terminal)
- 6 Negative current collector
- 7 Positive pole
- 8 Cover plate
- 9 Positive current collector
- 10 Separators
- 11 Positive electrode
- 12 Negative electrode



\*1 This battery model is under development.  
\*2 The illustration shows only one example of Nickel-Cadmium battery structure.

# OUTSTANDING QUALITY FOR DEMANDING APPLICATIONS



SUITABLE FOR NEARLY EVERY APPLICATION

HIGH QUALITY AND RELIABILITY

GOOD BALANCE IN TERMS OF CAPACITY AND LIFETIME

EXCELLENT DISCHARGE CHARACTERISTICS

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series video.



## BATTERY TYPES AND MODEL NUMBERS

| Application            | Series     | Trickle design life (at 20°C) | Category                                | Standard ABS (UL94 HB) | FR ABS = Flame-retardant ABS (UL94 V-0) |
|------------------------|------------|-------------------------------|-----------------------------------------|------------------------|-----------------------------------------|
| Back-up and main power | LC-R/RA    | 6 – 9 years                   | Trickle and cycle standard type         | ○                      |                                         |
| Back-up                | LC-P/PA/PB | 10 – 12 years                 | Trickle long-life type                  |                        | ○                                       |
|                        | LC-QA      | 15 years                      | Trickle super long-life type            |                        | ○                                       |
|                        | LC-V/VA    | 6 – 9 years                   | Trickle standard type                   |                        | ○                                       |
|                        | LC-X/XD/XB | 10 – 12 years                 | Trickle long-life type                  | ○                      |                                         |
|                        | UP-PW      | 10 – 12 years                 | High power long-life type               |                        | ○                                       |
|                        | UP-VW/VWA  | 6 – 9 years                   | High power type                         |                        | ○                                       |
| Main power             | LC-CA/XC   | -                             | Cycle long-life type                    | ○                      |                                         |
|                        | LC-T       | -                             | Cycle long-life type for energy storage | ○                      |                                         |
| Motive and hybrid      | EC-FV/HV   | -                             | Cycle long-life type for motive power   | *1                     | *1                                      |



## 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 and 10 – 12 years to batteries of 15 years, the series includes solutions for every requirement. Various models are obtainable with flame-retardant housing and with different terminals.

## FEATURES

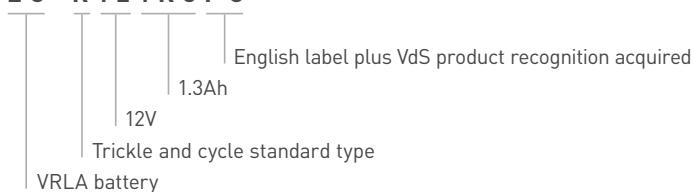
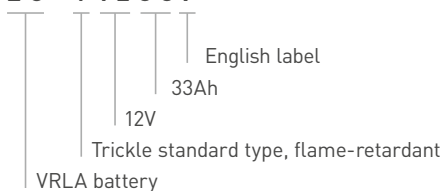
- State-of-the-art Absorbed Glass Mat (AGM) technology
- Superior design and low voltage spread
- Enhanced lifespan due to excellent recombination efficiency
- Highest quality control standards
- Almost 50 years of experience in production
- Selected batteries with flame-retardant battery containers according to UL94 V-0
- Various VdS approved batteries

## APPLICATIONS

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

## LC SERIES – TRICKLE DESIGN LIFE 6 – 9 YEARS

## MODEL NUMBER (EXAMPLE)

**LC - R 1 2 1 R 3 P G****LC - V 1 2 3 3 P**

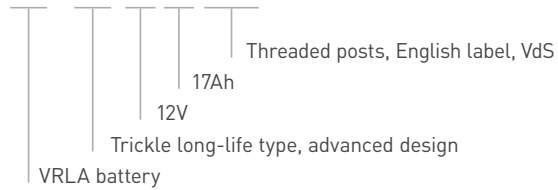


| Model number      | Nominal voltage (V) | Nominal capacity (Ah) 20 hours rate | Length (mm) | Width (mm) | Total height (mm) | Weight (kg) | VdS number |
|-------------------|---------------------|-------------------------------------|-------------|------------|-------------------|-------------|------------|
| LC-R061R3P        | 6                   | 1.3                                 | 24.0        | 97.0       | 55.0              | 0.3         | -          |
| LC-R063R4P        | 6                   | 3.4                                 | 34.0        | 134.0      | 66.0              | 0.6         | -          |
| LC-R064R5P        | 6                   | 4.5                                 | 48.0        | 70.0       | 108.0             | 0.7         | -          |
| LC-R067R2P        | 6                   | 7.2                                 | 34.0        | 151.0      | 100.0             | 1.3         | -          |
| LC-R0612P         | 6                   | 12.0                                | 50.0        | 151.0      | 100.0             | 2.0         | -          |
| LC-R121R3PG*1     | 12                  | 1.3                                 | 47.5        | 97.0       | 55.0              | 0.6         | G196049    |
| LC-R122R2PG*1     | 12                  | 2.2                                 | 34.0        | 177.0      | 66.0              | 0.8         | G188151    |
| LC-R123R4PG*1     | 12                  | 3.4                                 | 67.0        | 134.0      | 66.0              | 1.2         | G191053    |
| LC-R124R5P*1      | 12                  | 4.5                                 | 70.0        | 97.0       | 108.0             | 1.5         | -          |
| LC-R127R2PG/PG1*1 | 12                  | 7.2                                 | 64.5        | 151.0      | 100.0             | 2.5         | G193046    |
| LC-RA1212PG/PG1*1 | 12                  | 12.0                                | 98.0        | 151.0      | 100.0             | 3.8         | G100001    |
| LC-RA1215P/P1*1   | 12                  | 15.0                                | 98.0        | 151.0      | 100.0             | 4.2         | -          |
| LC-V1233P         | 12                  | 33.0                                | 130.0       | 195.6      | 180.0             | 11.1        | -          |

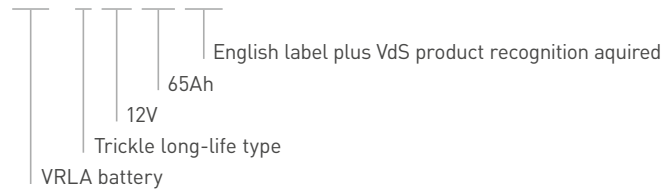
## LC SERIES – TRICKLE DESIGN LIFE 10-12 YEARS

### MODEL NUMBER (EXAMPLE)

#### LC - X D 1 2 1 7 A P G



#### LC - X 1 2 6 5 P G



| Model number    | Nominal voltage (V) | Nominal capacity (Ah) 20 hours rate | Length (mm) | Width (mm) | Total height (mm) | Weight (kg) | VdS number |
|-----------------|---------------------|-------------------------------------|-------------|------------|-------------------|-------------|------------|
| LC-P067R2P/P1   | 6                   | 7.2                                 | 34.0        | 151.0      | 100.0             | 1.3         | -          |
| LC-P0612P/P1    | 6                   | 12.0                                | 50.0        | 151.0      | 100.0             | 2.0         | -          |
| LC-P06200TA     | 6                   | 200.0                               | 173.0       | 407.0      | 250.0             | 41.0        | -          |
| LC-P122R2P      | 12                  | 2.2                                 | 34.0        | 177.0      | 66.0              | 0.8         | -          |
| LC-P123R4P      | 12                  | 3.4                                 | 67.0        | 134.0      | 66.0              | 1.2         | -          |
| LC-P127R2P/P1   | 12                  | 7.2                                 | 64.5        | 151.0      | 100.0             | 2.5         | -          |
| LC-PA1212P/P1   | 12                  | 12.0                                | 98.0        | 151.0      | 100.0             | 3.7         | -          |
| LC-PA1216P/P1   | 12                  | 16.0                                | 98.0        | 151.0      | 105.0             | 4.1         | -          |
| LC-XD1217PG/APG | 12                  | 17.0                                | 76.0        | 181.0      | 167.0             | 5.9         | G104101    |
| LC-P1220P/AP    | 12                  | 20.0                                | 76.0        | 181.0      | 167.0             | 6.6         | -          |
| LC-P1224P/APG   | 12                  | 24.0                                | 125.0       | 165.0      | 179.5/175.0       | 9.0         | G198049    |
| LC-P1228P/AP    | 12                  | 28.0                                | 125.0       | 165.0      | 179.5/175.0       | 11.0        | -          |
| LC-P1238PG/APG  | 12                  | 38.0                                | 165.0       | 197.0      | 180.0/175.0       | 13.0        | G100002    |

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

| Model number  | Nominal voltage (V) | Nominal capacity (Ah) 20 hours rate | Length (mm) | Width (mm) | Total height (mm) | Weight (kg) | VdS number |
|---------------|---------------------|-------------------------------------|-------------|------------|-------------------|-------------|------------|
| LC-P1242P/AP  | 12                  | 42                                  | 165.0       | 197.0      | 180.0/175.0       | 13.5        | -          |
| LC-X1265PG    | 12                  | 65                                  | 166.0       | 350.0      | 175.0             | 23.5        | G199090    |
| LC-P1265PG    | 12                  | 65                                  | 166.0       | 350.0      | 175.0             | 20.0        | G199090    |
| LC-P1275P     | 12                  | 75                                  | 166.0       | 350.0      | 175.0             | 24.0        | -          |
| LC-XB12100P   | 12                  | 100                                 | 173.0       | 407.0      | 236.0             | 36.5        | -          |
| LC-PB12100P   | 12                  | 100                                 | 173.0       | 407.0      | 236.0             | 36.5        | -          |
| LC-P12120P    | 12                  | 120                                 | 173.0       | 407.0      | 236.0             | 34.5        | -          |
| LC-P12150BP*1 | 12                  | 150                                 | 183.0       | 532.0      | 214.0             | 43.0        | -          |
| LC-P12200BP*1 | 12                  | 200                                 | 237.0       | 533.0      | 216.0             | 57.0        | -          |



## LC CYCLIC SERIES

The Panasonic LC cyclic series is a main power source for electrical devices which require reliable power frequently. Based on our proven technology for stand-by and occasional back-up, this series uses different plate design and other tweaks to achieve long cycle life.

### 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

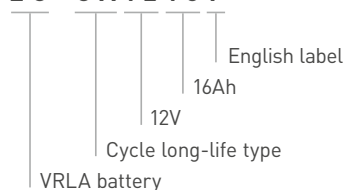
### APPLICATIONS

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

## LC CYCLIC – CYCLE LONG-LIFE AND CYCLE LONG-LIFE FOR ENERGY STORAGE

### MODEL NUMBER (EXAMPLE)

#### LC - CA 12 16 P



| Model number  | Nominal voltage (V) | Nominal capacity (Ah) 20 hours rate | Length (mm) | Width (mm) | Total height (mm) | Weight (kg) | VdS number |
|---------------|---------------------|-------------------------------------|-------------|------------|-------------------|-------------|------------|
| LC-CA1212P/P1 | 12                  | 12                                  | 98.0        | 151.0      | 100.0             | 3.8         | -          |
| LC-CA1215P/P1 | 12                  | 15                                  | 98.0        | 151.0      | 100.0             | 4.2         | -          |
| LC-CA1216P/P1 | 12                  | 16                                  | 98.0        | 151.0      | 105.0             | 4.7         | -          |
| LC-XC1222P/AP | 12                  | 22                                  | 76.0        | 181.0      | 167.0             | 6.6         | -          |
| LC-XC1228P/AP | 12                  | 28                                  | 125.0       | 165.0      | 179.5             | 10.0        | -          |
| LC-XC1238P/AP | 12                  | 38                                  | 165.0       | 197.0      | 179.5             | 15.0        | -          |
| LC-T1270P*2   | 12                  | 70                                  | 166.0       | 350.0      | 175.0             | 24.5        | -          |
| LC-T12105P*2  | 12                  | 105                                 | 173.0       | 407.0      | 236.0             | 34.0        | -          |

\*1 This battery is equipped with insert terminals.

\*2 This battery type is designed for energy storage applications.



## LC-QA SERIES – TRICKLE DESIGN LIFE 15 YEARS

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.

### FEATURES

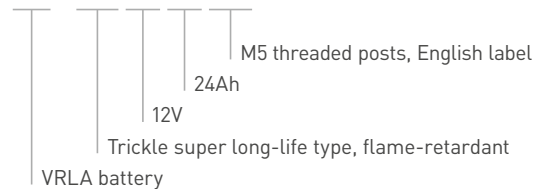
- ☐ Innovative Lead-Calcium-Tin alloy minimises harmful corrosion to the positive electrode
- ☐ Reliable seal thanks to a rubber washer and epoxy resin
- ☐ Flame-retardant housing according to UL 94-V0

### APPLICATIONS

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

### MODEL NUMBER (EXAMPLE)

#### LC - QA 12 24 AP



| Model number  | Nominal voltage (V) | Nominal capacity (Ah) 20 hours rate | Length (mm) | Width (mm) | Total height (mm) | Weight (kg) | VdS number |
|---------------|---------------------|-------------------------------------|-------------|------------|-------------------|-------------|------------|
| LC-QA06210TP  | 6                   | 210                                 | 173.0       | 407.0      | 250.0             | 36.5        | -          |
| LC-QA1224P/AP | 12                  | 24                                  | 125.0       | 165.0      | 175.0             | 10.0        | -          |
| LC-QA1242P    | 12                  | 42                                  | 165.0       | 197.0      | 180.0             | 13.5        | -          |
| LC-QA1270P    | 12                  | 70                                  | 166.0       | 350.0      | 175.0             | 23.5        | -          |
| LC-QA12110TP  | 12                  | 110                                 | 173.0       | 407.0      | 236.0             | 36.0        | -          |



## UP-VW / -PW SERIES – TRICKLE DESIGN LIFE 6–9 AND 10–12 YEARS

The Panasonic UP-VW / -PW 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.

### FEATURES

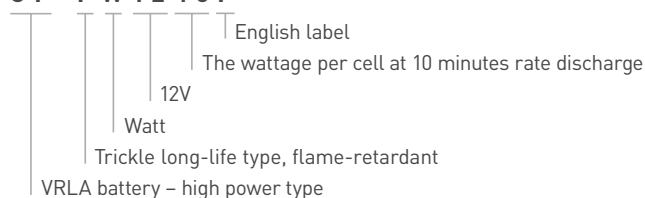
- ☐ 30% higher energy density compared to conventional VRLA batteries
- ☐ Superior quality
- ☐ 100% inspection after final assembly and before shipment
- ☐ Years of experience in production
- ☐ Batteries with flame-retardant battery container according to UL94 V-0

### APPLICATIONS

- ☐ UPS systems
- ☐ Servers, etc.

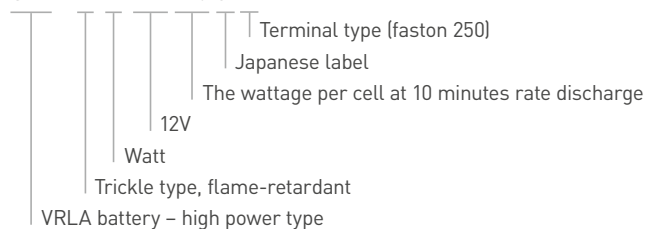
### MODEL NUMBER (EXAMPLE)

#### UP - PW 12 45 P



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

### UP - VW 1220J1



| Model number    | Nominal voltage (V) | Rated power (W) 10 minutes rate | Length (mm) | Width (mm) | Total height (mm) | Weight (kg) | VdS number |
|-----------------|---------------------|---------------------------------|-------------|------------|-------------------|-------------|------------|
| UP-VW0645P1     | 6                   | 135                             | 34.0        | 151.0      | 100.0             | 1.3         | -          |
| UP-VW1220P1     | 12                  | 120                             | 38.5        | 140.0      | 100.0             | 1.4         | -          |
| UP-VWA1232P1/P2 | 12                  | 192                             | 51.0        | 151.0      | 100.0             | 2.0         | -          |
| UP-VW1228P1     | 12                  | 200                             | 64.5        | 151.0      | 100.0             | 1.9         | -          |
| UP-VW1236P1     | 12                  | 224                             | 64.5        | 151.0      | 100.0             | 2.1         | -          |
| UP-VW1245P1     | 12                  | 270                             | 64.5        | 151.0      | 100.0             | 2.6         | -          |
| UP-PW1245P1     | 12                  | 270                             | 64.5        | 151.0      | 100.0             | 2.6         | -          |



## EV SERIES - CYCLE VERY LONG-LIFE FOR MOTIVE POWER

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.

### FEATURES

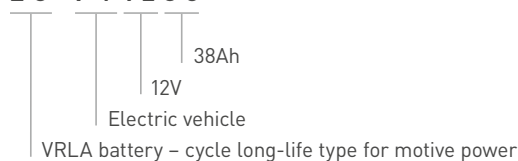
- High capacity
- Designed for deep discharges
- Extraordinary cycle stability
- Excellent discharge characteristics at low temperatures and high currents

### APPLICATIONS

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

### MODEL NUMBER (EXAMPLE)

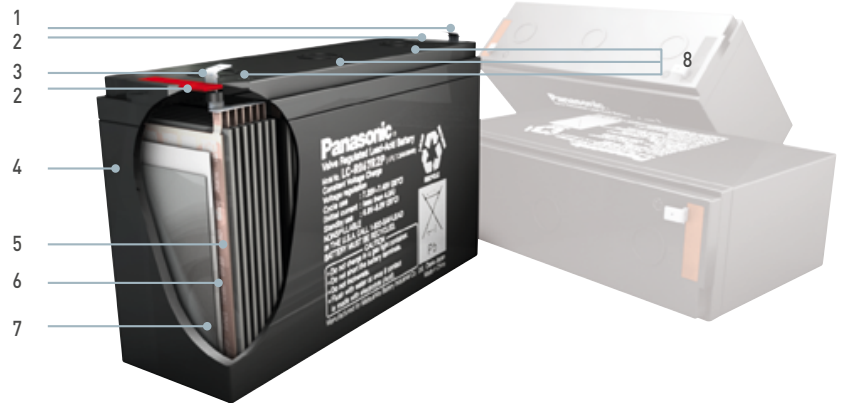
#### EC - FV 1238



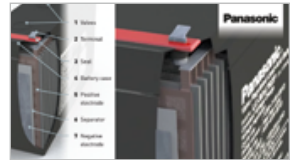
| Model number | Nominal voltage (V) | Nominal capacity (Ah) 20 hours rate | Length (mm) | Width (mm) | Total height (mm) | Weight (kg) | VdS number |
|--------------|---------------------|-------------------------------------|-------------|------------|-------------------|-------------|------------|
| EC-FV0890B1E | 8                   | 90                                  | 116.0       | 388.0      | 175.0             | 22.0        | -          |
| EC-FV1238    | 12                  | 38                                  | 116.0       | 261.0      | 175.0             | 14.0        | -          |
| EC-HV1255    | 12                  | 55                                  | 116.0       | 388.0      | 175.0             | 22.0        | -          |
| EC-FV1260    | 12                  | 60                                  | 116.0       | 388.0      | 175.0             | 21.0        | -          |

### 3D ILLUSTRATION\*1

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



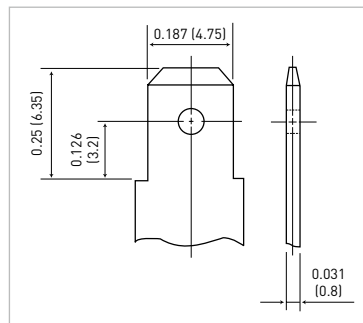
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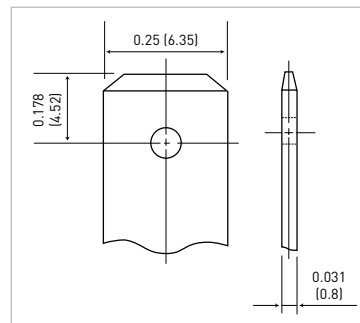
### TERMINAL TYPES

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.

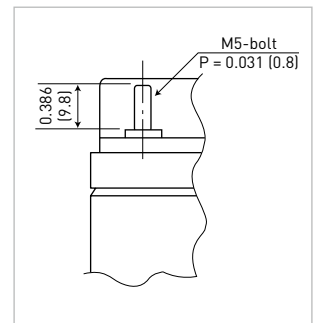
#### FASTON TAB TYPE 187 (P)



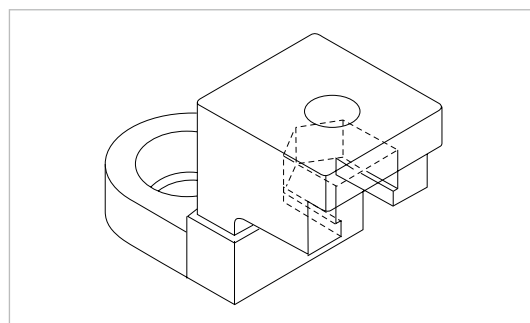
#### FASTON TAB TYPE 250 (P1)



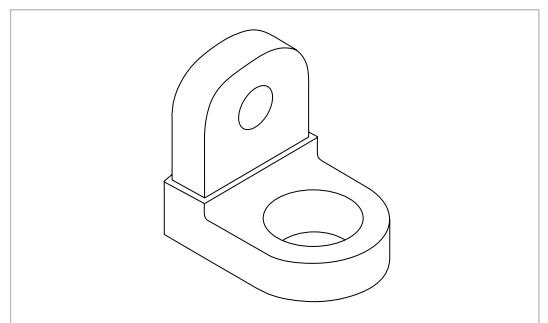
#### M5 THREADED POST TYPE (AP)



#### T-SHAPE TERMINAL (M10) (T)



#### L-SHAPE TERMINAL (M5, 6, 8) (BOLT & NUT) (P)



Unit: inch (mm)

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

# STATE-OF-THE-ART LITHIUM BATTERIES



LOW SELF-DISCHARGE  
DECADES OF MASS PRODUCTION EXPERIENCE  
SUPERIOR DESIGNED BATTERY RANGES  
PROVEN RELIABILITY

Scan QR code  
to view product  
series video.



## PRIMARY BR – CR

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

| Chemistry   |                                            | BR                  | CR                  | ER                  |
|-------------|--------------------------------------------|---------------------|---------------------|---------------------|
| Material    | Cathode                                    | CF                  | MnO <sub>2</sub>    | SOCl <sub>2</sub>   |
|             | Anode                                      | Lithium metal       | Lithium metal       | Lithium 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                 |
| Environment | Safety                                     | ++                  | ++                  | –                   |
|             | Eco friendly                               | ++                  | ++                  | –*3                 |

++ Very good capability  
+ Good capability  
– Not good capability



## LITHIUM BR CYLINDRICAL SERIES (NON-RECHARGEABLE)

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 or need to handle a wide temperature range.

### FEATURES

- Operating temperature range: between -40°C ~ +85°C
- Self-discharge rate at 20°C is just 0.5% per year
- Superior long-term reliability
- Years of experience in production

### APPLICATIONS

- Heat cost allocators
- Water & gas meters
- Car alarm
- Smoke detectors
- Tracking & RFID
- Marine devices, etc.

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

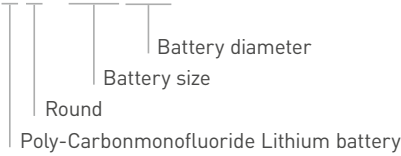
\*2 Impedance is increasing due to the passivation phenomena.

\*3 Harmful substances included.



MODEL NUMBER (EXAMPLE)

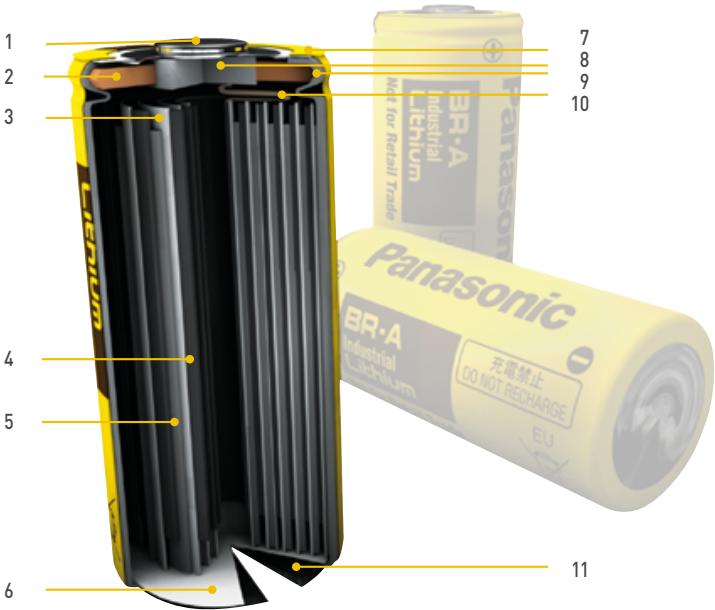
BR - 1 / 2 A A



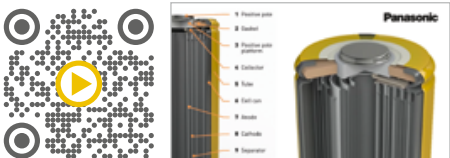
| Model number | Nominal voltage (V) | Nominal*1 capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC     |
|--------------|---------------------|--------------------------|---------------|-------------------|------------|---------|
| BR-1/2AA*2   | 3                   | 1,000                    | 14.5          | 25.5              | 8.0        | -       |
| BR-2/3A      | 3                   | 1,200                    | 17.0          | 33.5              | 13.5       | BR17335 |
| BR-2/3AG     | 3                   | 1,450                    | 17.0          | 33.5              | 13.5       | BR17335 |
| BR-A         | 3                   | 1,800                    | 17.0          | 45.5              | 18.0       | -       |
| BR-AG        | 3                   | 2,200                    | 17.0          | 45.5              | 18.0       | -       |
| BR-C         | 3                   | 5,000                    | 26.0          | 50.5              | 42.0       | -       |

3D ILLUSTRATION\*3

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



Scan QR code to view 3D animated video.



\*1 Capacity based on standard drain and cut off voltage down to 2.0V or 4.0V at 20°C.  
\*2 Operating temperature range is from -40°C ~ +100°C.  
\*3 The illustration shows only one example of Lithium battery structure.



## LITHIUM CR CYLINDRICAL SERIES FOR CONSUMERS

[NON-RECHARGEABLE]

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.

### FEATURES

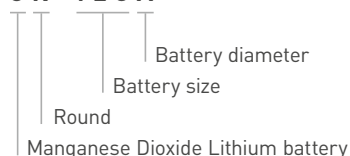
- Operating temperature range: between -40°C ~ +70°C
- Good pulse capability
- Stable voltage level during discharge
- Self-discharge rate at 20°C just 1% per year

### APPLICATIONS

- Medical equipment
- Door lock systems
- Marine devices
- Cameras
- High energy flashlights
- Sanitary equipment, etc.

### MODEL NUMBER (EXAMPLE)

**C R - 1 2 3 A**



| Model number          | Nominal voltage (V) | Nominal* <sup>1</sup> capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC      |
|-----------------------|---------------------|--------------------------------------|---------------|-------------------|------------|----------|
| CR-2* <sup>2</sup>    | 3                   | 850                                  | 15.6          | 27.0              | 11.0       | CR15H270 |
| CR-123A* <sup>2</sup> | 3                   | 1,400                                | 17.0          | 34.5              | 17.0       | CR17345  |
| CR-V3* <sup>2</sup>   | 3                   | 3,300                                | 28.4 x 14.4   | 52.0              | 39.0       | -        |
| 2CR-5* <sup>2</sup>   | 6                   | 1,400                                | 34.0 x 17.0   | 45.0              | 38.0       | 2CR5     |
| CR-P2* <sup>2</sup>   | 6                   | 1,400                                | 35.0 x 19.5   | 36.0              | 37.0       | CRP2     |

### 3D ILLUSTRATION\*<sup>3</sup>

- 1 Positive pole
- 2 Vent diaphragm
- 3 Gasket
- 4 Separator
- 5 Anode (Lithium)
- 6 Cathode (Manganese Dioxide)
- 7 Tube
- 8 Insulator
- 9 PTC (Positive Temperature Coefficient Device)
- 10 Collector
- 11 Cell can
- 12 Negative pole



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

\*<sup>2</sup> In case of usage below 20mA discharge please consult Panasonic.

\*<sup>3</sup> The illustration shows only one example of Lithium battery structure.



LITHIUM CR CYLINDRICAL SERIES FOR PROFESSIONALS

[NON-RECHARGEABLE]

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

FEATURES

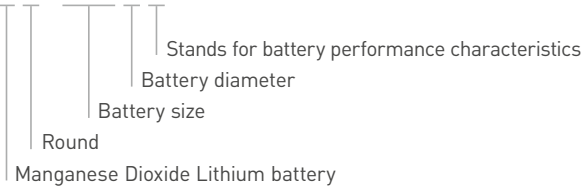
- Stable impedance throughout battery life
- Operating temperature range: between -40°C ~ +70°C
- High discharge characteristics
- Long-term reliability
- Self-discharge rate at 20°C is just 1% per year

APPLICATIONS

- Medical equipment
- E-Call
- Tracking & RFID
- Smoke detectors
- Alarm systems
- Marine devices
- Smart meter, etc.

MODEL NUMBER (EXAMPLE)

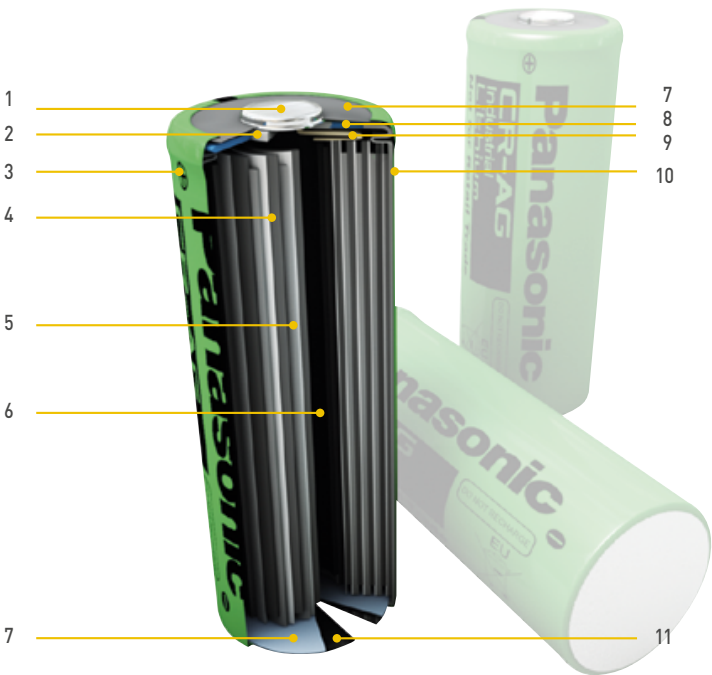
CR - 2 / 3 A Z



|     | Model number | Nominal voltage (V) | Nominal*1 capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC |
|-----|--------------|---------------------|--------------------------|---------------|-------------------|------------|-----|
| NEW | CR-2Z        | 3                   | 1,000                    | 15.0          | 27.0              | 11.0       | -   |
|     | CR-2/3AZ     | 3                   | 1,600                    | 17.0          | 33.5              | 17.0       | -   |
| NEW | CR-AAZ       | 3                   | 1,650                    | 14.5          | 50.5              | 18.0       | -   |
|     | CR-AG        | 3                   | 2,400                    | 17.0          | 45.5              | 24.0       | -   |

3D ILLUSTRATION\*2

- 1 Positive pole
- 2 Vent diaphragm
- 3 Tube
- 4 Anode (Lithium)
- 5 Separator
- 6 Cathode (Manganese Dioxide)
- 7 Insulator
- 8 PTC (Positive Temperature Coefficient Device)
- 9 Collector
- 10 Cell can
- 11 Negative pole



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

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



## LITHIUM BR COIN SERIES (NON-RECHARGEABLE)

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.

### FEATURES

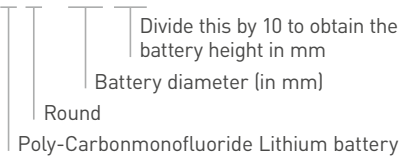
- Self-discharge rate at 20°C is just 1.0% per year
- Wide operating temperature range: between -30°C ~ +80°C
- Superior long-term reliability
- Years of experience in production

### APPLICATIONS

- Tracking & RFID
- Memory back-up
- Meters, etc.

### MODEL NUMBER (EXAMPLE)

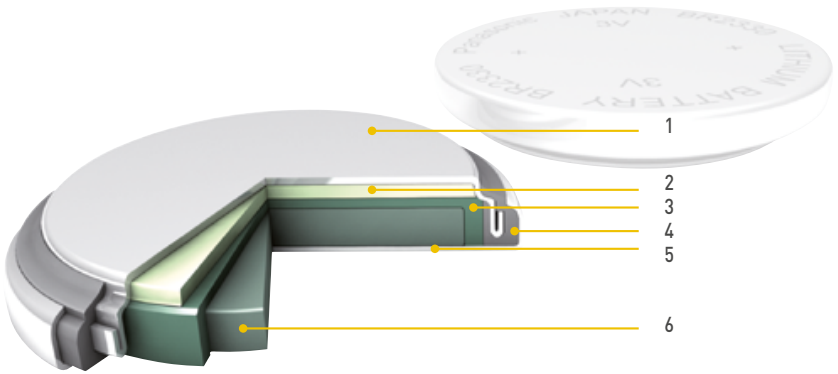
#### BR - 2 3 3 0



| Model number | Nominal voltage (V) | Nominal*1 capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC    |
|--------------|---------------------|--------------------------|---------------|-------------------|------------|--------|
| BR-1220      | 3                   | 35                       | 12.5          | 2.0               | 0.7        | -      |
| BR-1225      | 3                   | 48                       | 12.5          | 2.5               | 0.8        | BR1225 |
| BR-1632      | 3                   | 120                      | 16.0          | 3.2               | 1.5        | -      |
| BR-2325      | 3                   | 165                      | 23.0          | 2.5               | 3.0        | BR2325 |
| BR-2032      | 3                   | 200                      | 20.0          | 3.2               | 2.5        | -      |
| BR-2330      | 3                   | 255                      | 23.0          | 3.0               | 3.2        | -      |
| BR-3032      | 3                   | 500                      | 30.0          | 3.2               | 5.5        | BR3032 |

### 3D ILLUSTRATION\*2

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



\*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.



LITHIUM BR-A SERIES COIN TYPE FOR HIGH TEMPERATURE USAGE  
[NON-RECHARGEABLE]

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.

FEATURES

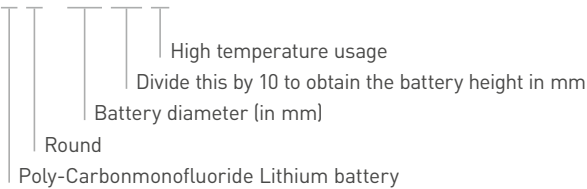
- Superior design for high temperature applications -40°C ~ +125°C
- Outstanding long-term reliability
- Years of experience in production
- Self-discharge rate at 20°C is just 0.5% per year

APPLICATIONS

- Tire Pressure Monitoring Systems (TPMS)
- Electric Toll Collection (ETC)
- Heat cost allocators, etc.

MODEL NUMBER (EXAMPLE)

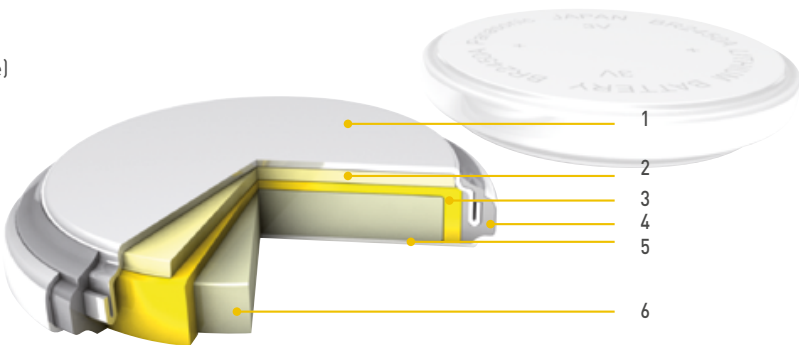
**BR - 2 4 7 7 A**



| Model number | Nominal voltage (V) | Nominal*1 capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC |
|--------------|---------------------|--------------------------|---------------|-------------------|------------|-----|
| BR-1225A*2   | 3                   | 48                       | 12.5          | 2.5               | 0.8        | -   |
| BR-1632A*2   | 3                   | 120                      | 16.0          | 3.2               | 1.5        | -   |
| BR-2330A*2   | 3                   | 255                      | 23.0          | 3.0               | 3.2        | -   |
| BR-2450A*2   | 3                   | 550                      | 24.5          | 5.0               | 5.9        | -   |
| BR-2477A*2   | 3                   | 1,000                    | 24.5          | 7.7               | 8.0        | -   |

3D ILLUSTRATION\*3

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



\*1 Based on standard drain and cut off voltage down to 2.0V at 20°C.  
\*2 Only batteries with terminals are available.  
\*3 The illustration shows only one example of Lithium battery structure.



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

(NON-RECHARGEABLE)

Panasonic offers a unique pin shape and space-saving design to meet the requirements of small-scale applications.

### FEATURES

- Superior design for high temperature applications -30°C ~ +80°C
- Outstanding long-term reliability
- Years of experience in production
- Self-discharge rate at 20°C is just 0.5% per year

### APPLICATIONS

- LED-type night fishing floats
- Various illumination products
- Fishing pole tip lights
- Toys, etc.

| Model number | Nominal voltage (V) | Nominal*1 capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC |
|--------------|---------------------|--------------------------|---------------|-------------------|------------|-----|
| BR-425       | 3                   | 25                       | 4.2           | 25.9              | 0.6        | -   |
| BR-435       | 3                   | 50                       | 4.2           | 35.9              | 0.9        | -   |



## LITHIUM CR COIN MANGANESE DIOXIDE SERIES (NON-RECHARGEABLE)

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.

### 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

### APPLICATIONS

- Remote Keyless Entry (RKE)
- Electricity meters
- Medical equipment
- Tracking & RFID
- Vending machines
- Price tags, etc.

### 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                    |

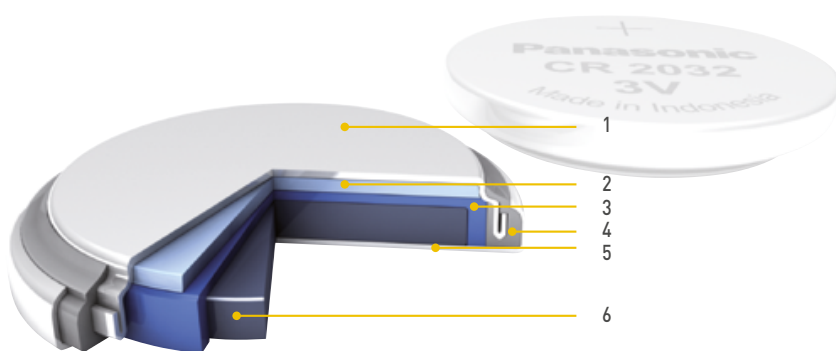
| Model number | Nominal voltage (V) | Nominal*1 capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC    |
|--------------|---------------------|--------------------------|---------------|-------------------|------------|--------|
| CR-1025      | 3                   | 30                       | 10.0          | 2.5               | 0.7        | CR1025 |
| CR-1216      | 3                   | 25                       | 12.5          | 1.6               | 0.7        | CR1216 |
| CR-1220      | 3                   | 35                       | 12.5          | 2.0               | 1.2        | CR1220 |
| CR-1612      | 3                   | 40                       | 16.0          | 1.2               | 0.8        | -      |
| CR-1616      | 3                   | 55                       | 16.0          | 1.6               | 1.2        | CR1616 |
| CR-1620      | 3                   | 75                       | 16.0          | 2.0               | 1.3        | CR1620 |
| CR-1632      | 3                   | 140                      | 16.0          | 3.2               | 1.8        | -      |
| CR-2012      | 3                   | 55                       | 20.0          | 1.2               | 1.4        | CR2012 |

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

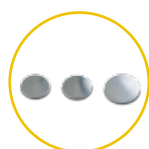
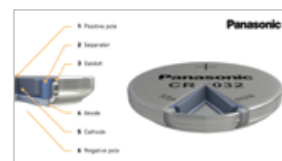
| Model number | Nominal voltage (V) | Nominal* <sup>1</sup> capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC    |
|--------------|---------------------|--------------------------------------|---------------|-------------------|------------|--------|
| CR-2016      | 3                   | 90                                   | 20.0          | 1.6               | 1.6        | CR2016 |
| CR-2025      | 3                   | 165                                  | 20.0          | 2.5               | 2.5        | CR2025 |
| CR-2032      | 3                   | 220                                  | 20.0          | 3.2               | 3.1        | CR2032 |
| CR-2330      | 3                   | 265                                  | 23.0          | 3.0               | 4.0        | CR2330 |
| CR-2354      | 3                   | 560                                  | 23.0          | 5.4               | 5.9        | CR2354 |
| CR-2412      | 3                   | 100                                  | 24.5          | 1.2               | 2.0        | -      |
| CR-2450      | 3                   | 620                                  | 24.5          | 5.0               | 6.3        | CR2450 |
| CR-2477      | 3                   | 1,000                                | 24.5          | 7.7               | 10.5       | -      |
| CR-3032      | 3                   | 500                                  | 30.0          | 3.2               | 7.1        | CR3032 |

3D ILLUSTRATION\*<sup>2</sup>

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



Scan QR code  
to view 3D  
animated video.



## LITHIUM VL, ML, MT COIN SERIES (RECHARGEABLE)

These Panasonic rechargeable Lithium coin batteries are designed chiefly for memory back-up applications. Their voltage ranges from 1.5V to 3V.

## FEATURES

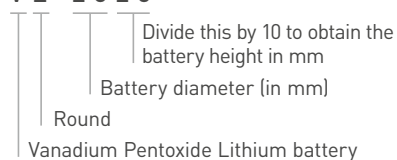
- Rechargeable Lithium technology
- Self-discharge rate at 20°C is only 2.0% per year for VL and ML battery types
- 1,000 charge-discharge cycles for VL and ML at 10% depth of discharge
- Superior long-term reliability
- Years of experience in production

## APPLICATIONS

- Computers
- Remote Keyless Entry (RKE)
- Fax machines
- Mobile phones
- Watches, etc.

## MODEL NUMBER (EXAMPLE)

## VL - 2020



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

\*<sup>2</sup> The illustration shows only one example of Lithium battery structure.

## VANADIUM PENTOXIDE LITHIUM (VL SERIES)

| Model number | Nominal voltage (V) | Nominal* <sup>1</sup> capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC |
|--------------|---------------------|--------------------------------------|---------------|-------------------|------------|-----|
| VL-621       | 3                   | 1.5                                  | 6.8           | 2.1               | 0.3        | -   |
| VL-1220      | 3                   | 7.0                                  | 12.5          | 2.0               | 0.8        | -   |
| VL-2020      | 3                   | 20.0                                 | 20.0          | 2.0               | 2.2        | -   |
| VL-2320      | 3                   | 30.0                                 | 23.0          | 2.0               | 2.7        | -   |
| VL-2330      | 3                   | 50.0                                 | 23.0          | 3.0               | 3.5        | -   |
| VL-3032      | 3                   | 100.0                                | 30.0          | 3.2               | 6.2        | -   |

## MANGANESE LITHIUM (ML SERIES)

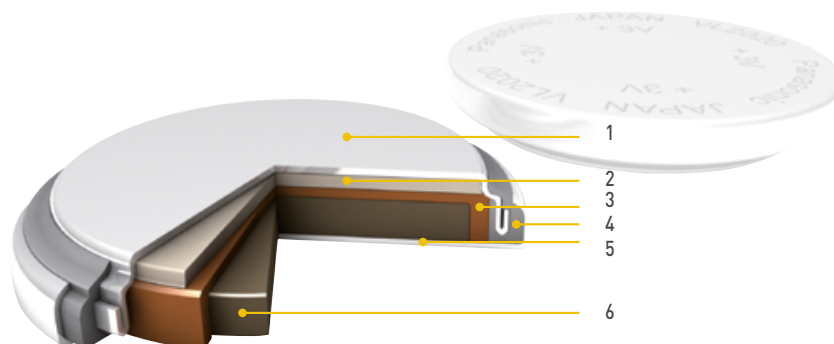
| Model number | Nominal voltage (V) | Nominal* <sup>2</sup> capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC |
|--------------|---------------------|--------------------------------------|---------------|-------------------|------------|-----|
| ML-421       | 3                   | 2.3                                  | 4.8           | 2.1               | 0.1        | -   |
| ML-614       | 3                   | 3.4                                  | 6.8           | 1.4               | 0.2        | -   |
| ML-621       | 3                   | 5.0                                  | 6.8           | 2.1               | 0.2        | -   |
| ML-920       | 3                   | 11.0                                 | 9.5           | 2.0               | 0.4        | -   |
| ML-1220      | 3                   | 17.0                                 | 12.5          | 2.0               | 0.8        | -   |
| ML-2020      | 3                   | 45.0                                 | 20.0          | 2.0               | 2.2        | -   |

## MANGANESE TITANIUM LITHIUM (MT SERIES)

| Model number | Nominal voltage (V) | Nominal* <sup>3</sup> capacity (mAh) | Diameter (mm) | Total height (mm) | Weight (g) | IEC |
|--------------|---------------------|--------------------------------------|---------------|-------------------|------------|-----|
| MT-516       | 1.5                 | 1.8                                  | 5.8           | 1.6               | 0.2        | -   |
| MT-621       | 1.5                 | 2.5                                  | 6.8           | 2.1               | 0.3        | -   |
| MT-920       | 1.5                 | 5.0                                  | 9.5           | 2.0               | 0.5        | -   |

3D ILLUSTRATION\*<sup>4</sup>

- 1 Negative pole
- 2 Anode (Lithium Aluminium alloy)
- 3 Separator
- 4 Gasket
- 5 Positive pole (cell can)
- 6 Cathode (Vanadium Pentoxide)



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

\*<sup>2</sup> Based on standard drain and cut off voltage down to 1.0V at 20°C.

\*<sup>3</sup> Based on standard drain and cut off voltage down to 0.5V at 20°C.

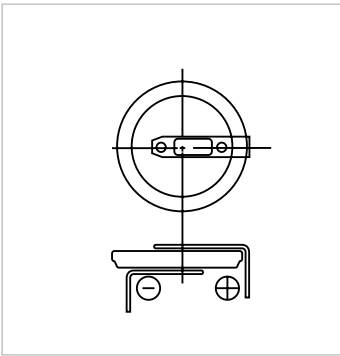
\*<sup>4</sup> The illustration shows only one example of Lithium battery structure.



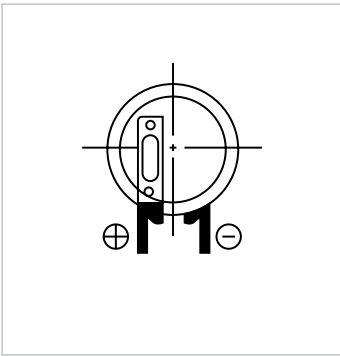
TERMINAL TYPES

Panasonic offers a broad range of different tabs for our Lithium batteries in order to meet all customer needs. In addition tailormade solutions are possible as well.

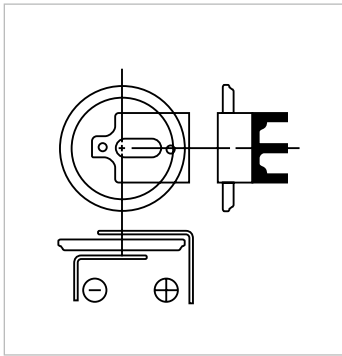
H TYPE



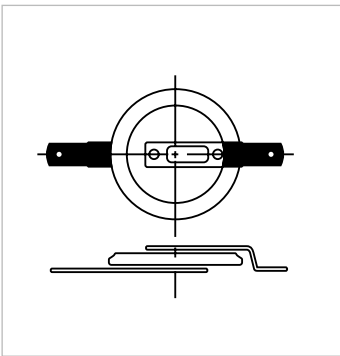
V TYPE



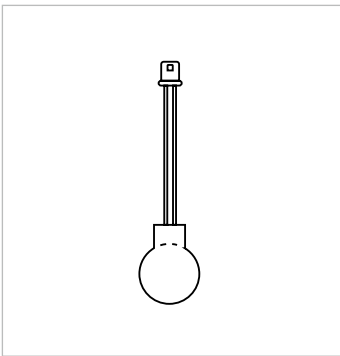
G TYPE



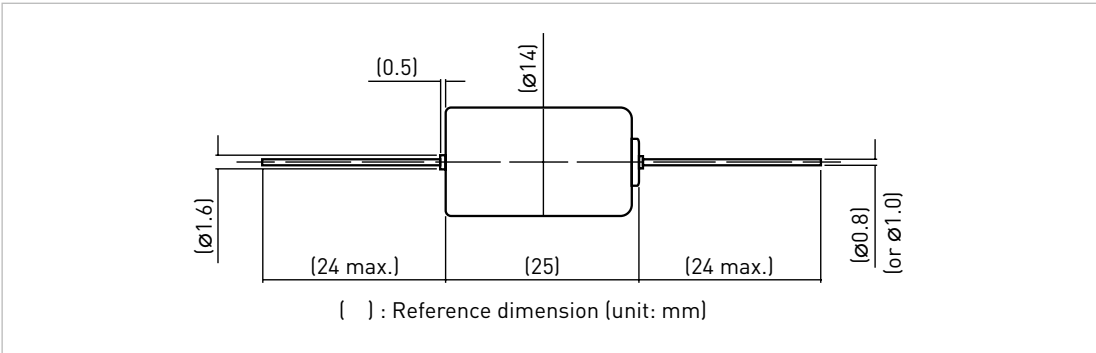
F TYPE



S TYPE



BR-1/2A WITH AXIAL PIN TERMINAL



# IDEAL FOR HIGH-PERFORMANCE STANDARD APPLICATIONS



MADE IN  
EUROPE

HIGH AND MEDIUM DRAIN APPLICATIONS  
CONTINUOUSLY RELIABLE ENERGY PROVISION  
LONG SHELF LIFE  
SUPERIOR LOW TEMPERATURE BEHAVIOR

Scan QR code  
to view product  
series video.





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.

FEATURES

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

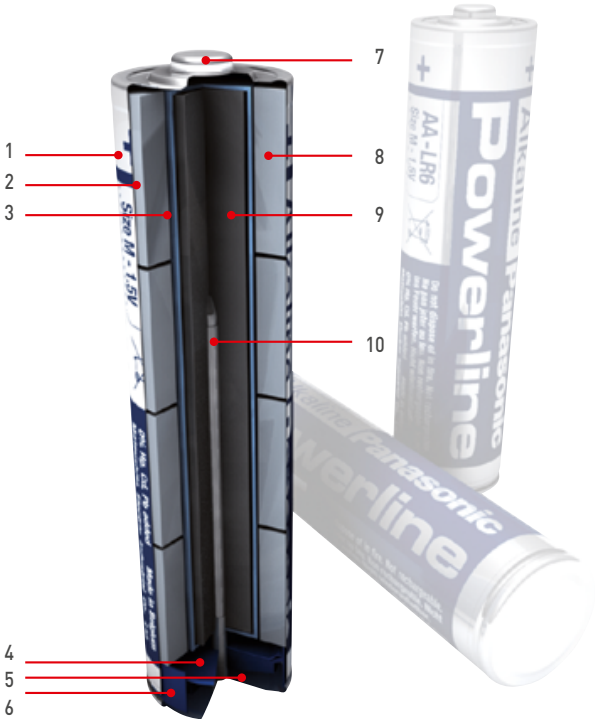
APPLICATIONS

- Smoke detectors
- Marine devices
- High energy flashlights
- Scales
- Cleaning and hygiene services
- Gas barbecue igniter, etc.

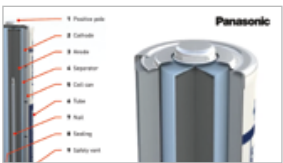
| Model number | Size | Nominal voltage (V) | Diameter (mm) | Total height (mm) | Weight (g) | IEC   |
|--------------|------|---------------------|---------------|-------------------|------------|-------|
| LR03AD       | AAA  | 1.5                 | 10.5          | 44.5              | 11.2       | 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   | 9.0                 | 26.5 x 17.5   | 48.5              | 44.3       | 6LR61 |

3D ILLUSTRATION\*1

- 1 Tube
- 2 Cell can
- 3 Separator
- 4 Safety vent
- 5 Negative pole
- 6 Sealing
- 7 Positive pole
- 8 Cathode (Manganese-Dioxide-Carbon)
- 9 Anode (Zinc-gel)
- 10 Nail



Scan QR code to view 3D animated video.



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

# THE SOLUTION FOR LESS COMPLEX AND COST- SENSITIVE APPLICATIONS



MADE IN  
EUROPE

EXCELLENT PERFORMANCE AFFORDABILITY  
CONTINUOUSLY RELIABLE ENERGY PROVISION  
LONG SHELF LIFE



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 Zinc-Carbon batteries are made in Europe.

FEATURES

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

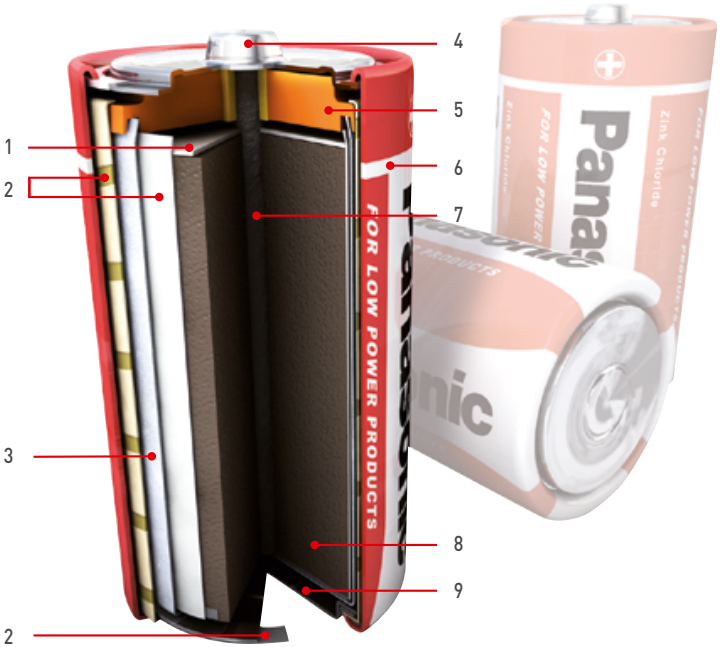
APPLICATIONS

- Alarm clocks
- Remote controls
- Radios
- Flashlights, etc.

| Model number | Size | Nominal voltage (V) | Diameter (mm) | Total height (mm) | Weight (g) | IEC  |
|--------------|------|---------------------|---------------|-------------------|------------|------|
| 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   | 9.0                 | 26.5 x 17.5   | 48.5              | 38.0       | 6F22 |

3D ILLUSTRATION\*1

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



\*1 The illustration shows only one example of Zinc-Carbon battery structure.



# FIND THE RIGHT CONTACT



## Website for Panasonic Battery Finder

Get more information on Panasonic Battery Finder website.

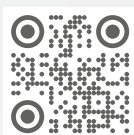
<http://eu.industrial.panasonic.com/battery-finder>

<http://eu.industrial.panasonic.com/battery-finder-html-app>



## App Stores for Panasonic Battery Finder

The Panasonic Battery Finder App is available for Android and iOS (iPhone) devices and can be downloaded free of charge in both stores. Scan QR code to be redirected to the appropriate store and download app.



## E-mail and website for all European countries

[battery-solutions@eu.panasonic.com](mailto:battery-solutions@eu.panasonic.com)

<http://eu.industrial.panasonic.com/>

## 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:

## United Kingdom/Ireland

Panasonic Automotive & Industrial  
Systems Europe GmbH (PAISEU)

Willoughby Road  
Bracknell Berkshire

RG12 8FP, England

Phone: +44 1344 - 8532 60

Fax: +44 1344 - 8533 13

## Panasonic Italia

Branch Office of

Panasonic Marketing Europe GmbH

Viale dell'Innovazione 3

20126 Milano, Italy

Phone: +39 02 - 6788 - 232

Fax: +39 02 - 6788 - 207

## Spain/Portugal

Panasonic Automotive & Industrial  
Systems Europe GmbH (PAISEU)

Sucursal en España

Parque Empresarial @ Sant Cugat,

Via Augusta 15-25

Edificio B2 Planta 4 Oficina 17

08174 Sant Cugat del Valles

Barcelona, Spain

Phone: +34 93 - 504 30 10

Fax: +34 93 - 675 58 92

## France

Panasonic Automotive & Industrial  
Systems Europe GmbH (PAISEU)

10, rue des petits ruisseaux

91370 Verrières-le-Buisson, France

Phone: +33 1 - 60 13 57 62

Fax: +33 1 - 60 13 57 72

## Germany

(all other European countries)

Panasonic Automotive & Industrial  
Systems Europe GmbH (PAISEU)

Winsbergring 15

22525 Hamburg, Germany

Phone: +49 40 - 85 496 - 373

Fax: +49 40 - 85 386 - 238