SHORT FORM CATALOG

ENGLISH INDUSTRIAL BATTERIES

2013

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

Quality is our Business.
BATTERY FINDER app & find

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

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

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

Our batteries all deliver three key benefits

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

Panasonic Corporation, founded in Osaka 1918, is one of the world’s largest manufacturers of quality electronic and electrical equipment. Its subsidiary, Panasonic Industrial Devices Sales Europe GmbH (PIDSEU) markets a diverse portfolio of industrial products throughout Europe. Formed in 1998 to strengthen Panasonic’s pan-European industry operations, the company is now active in Automotive, Audio/Video & Communication, Home Appliance, Industry as well as Factory Solutions and Energy.
Pursuing coexistence with the global environment in its business vision, Panasonic is committed – in all its business activities – to reducing the environmental impact of its products. In its ‘eco ideas’ Strategy, Panasonic focuses in particular on rapid implementation of measures to prevent global warming, and on global promotion of environmental sustainability management.

**CO2**
Panasonic strives to increase the use of products with higher energy efficiency and energy-creating products such as photovoltaic power generation systems and fuel cells to decrease CO2 emissions from customers’ homes. Together with the effort to improve energy efficiency of its production activities, Panasonic will reduce CO2 emissions in every phase of its business activities, aiming for total CO2 emissions to reach a peak in FY2019 (April 2018 – March 2019) and then decline.

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

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

**Chemicals**
Chemical substances are used in many products including familiar home appliances, making our lives more convenient. Meanwhile, hazardous substances have been detected in the far regions of the Arctic and Antarctic, having been carried by the winds and ocean currents ever a long period of time. This raises concern about the impact on human health and the environment. To reduce the impact on the environment, Panasonic will voluntarily decrease, substitute or discontinue the use of chemical substances in each phase throughout the cycle from procurement of materials to production, use, and recycling of products.

**Biodiversity**
The ecological system that supports and benefits our lives is based on a very fragile balance of diverse species. Once lost, each species is gone forever, and it can never be recovered by man. We must therefore clearly recognize the impact of our business practices on biodiversity. At Panasonic, we focus on three areas – conserving green spaces at our business sites, procurement of materials that have little impact on the environment, and developing products that contribute to biodiversity.

**Stakeholder**
Panasonic cannot bring forth green innovations on a global scale without the collaboration with the society, including our customers worldwide, experts, and the supply chain. Panasonic hopes for close communication through initiatives such as tree planting activities and environmental education programs for children worldwide to extend green innovations that lead to sustainable lifestyles across the world.

**By-Region**
Because every region has different circumstances and characteristics, Panasonic expands its Global Eco Project, which promotes products, production activities, and citizenship activities as specific initiatives tailored to each region. Panasonic has formulated targets worldwide including the regions of Asia Pacific, Europe, China, North America, Latin America, Russia, Middle East & Africa, and Taiwan.
LITHIUM-ION

A perfect combination of high energy density (e.g. NNP technology), safety (e.g. PSS and HRL technology) and long-life shows what is possible with Lithium-Ion battery technology from Panasonic. Excellent battery safety on one hand, and superior battery performance on the other: this is what Panasonic stands for.

CYLINDRICAL SINGLE CELL

---

**Model number (example) UR-18650ZT**

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

---

**Model number (examples) NCR-18650A**

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

---

**Applications**

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

---

**Features**

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

---

**Model number (example) UR-18650ZT**

- **Appendix stands for battery performance characteristics**
- Output: this by 10 to obtain the approx. battery height [mm]
- Standards for approx. diameter [mm] of the battery

---

**LITHIUM-ION**

---

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---

**NCR-18650A**

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- Standards for approx. diameter [mm] of the battery

---

**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.

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**LITIUM-ION**

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Nowadays all electronic devices get 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.

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

Some Lithium-Ion batteries require a safety unit. Safety technology PSS available.

**Panasonic Solid Solution (PSS)**

The Panasonic Solid Solution technology combines two major battery properties: capacity and safety. This technology provides the customer with a high capacity such as the standard Panasonic Lithium-Ion (Cobalt based) cells and also owns a high safety standard like the LiMn2O4 (Manganese based) Lithium-Ion batteries.

Characteristics of the Panasonic PSS featured Lithium-Ion battery:

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

**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.

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
NICKEL-METAL-HYDRIDE

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

### Applications
- Medical equipment, etc.
- Distance meter
- Torchlight
- Voting machine
- Lady shaver
- Cordless phone
- Personal digital assistant
- Measuring instrument
- Construction sites signaling
- Alarm system
- Solar window shutter
- POS system, etc.

### Features
- Excellent discharge characteristics
- High quality and reliability
- Good balance in terms of capacity and lifetime
- Designed for high power use applications

### Specifications
<table>
<thead>
<tr>
<th>Model number</th>
<th>Diameter</th>
<th>Size</th>
<th>Nominal voltage (V)</th>
<th>Nominal capacity (mAh)</th>
<th>Typical capacity (mAh)</th>
<th>Dimensions with tube (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH-H150AAh/FT</td>
<td>A A</td>
<td>1.2</td>
<td>500</td>
<td>500</td>
<td>18.5 x 0.17</td>
<td>130</td>
<td>HR15/13</td>
</tr>
<tr>
<td>HH-H170AAh/FT</td>
<td>A A</td>
<td>1.2</td>
<td>700</td>
<td>700</td>
<td>14.5 x 0.20</td>
<td>18.0</td>
<td>HR15/13</td>
</tr>
<tr>
<td>HH-H190AAh/FT</td>
<td>A A</td>
<td>1.2</td>
<td>1,000</td>
<td>1,000</td>
<td>17.0 x 0.21</td>
<td>36.0</td>
<td>HR17/19</td>
</tr>
<tr>
<td>HH-H210AAh/FT</td>
<td>A A</td>
<td>1.2</td>
<td>1,300</td>
<td>1,300</td>
<td>19.2 x 0.22</td>
<td>40.0</td>
<td>HR19/21</td>
</tr>
<tr>
<td>HH-H230AAh/FT</td>
<td>A A</td>
<td>1.2</td>
<td>1,600</td>
<td>1,600</td>
<td>23.0 x 0.25</td>
<td>49.0</td>
<td>HR21/23</td>
</tr>
<tr>
<td>HH-H250AAh/FT</td>
<td>A A</td>
<td>1.2</td>
<td>1,900</td>
<td>1,900</td>
<td>27.0 x 0.29</td>
<td>55.0</td>
<td>HR23/25</td>
</tr>
<tr>
<td>HH-H270AAh/FT</td>
<td>A A</td>
<td>1.2</td>
<td>2,200</td>
<td>2,200</td>
<td>31.0 x 0.31</td>
<td>63.0</td>
<td>HR25/27</td>
</tr>
<tr>
<td>HH-H290AAh/FT</td>
<td>A A</td>
<td>1.2</td>
<td>2,500</td>
<td>2,500</td>
<td>37.0 x 0.36</td>
<td>70.0</td>
<td>HR27/29</td>
</tr>
<tr>
<td>HH-H310AAh/FT</td>
<td>A A</td>
<td>1.2</td>
<td>2,800</td>
<td>2,800</td>
<td>44.0 x 0.41</td>
<td>80.0</td>
<td>HR29/31</td>
</tr>
</tbody>
</table>

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

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

### Features
- High charge efficiency at elevated temperatures
- Long lifetime when using intermittent charge
- Low self discharge

### Specifications
<table>
<thead>
<tr>
<th>Model number</th>
<th>Diameter</th>
<th>Size</th>
<th>Nominal voltage (V)</th>
<th>Nominal capacity (mAh)</th>
<th>Typical capacity (mAh)</th>
<th>Dimensions with tube (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH-B520AAh/FT</td>
<td>SC SC</td>
<td>1.2</td>
<td>2,500</td>
<td>2,500</td>
<td>23.0 x 0.17</td>
<td>47.0</td>
<td>HR15/23</td>
</tr>
<tr>
<td>HH-B540AAh/FT</td>
<td>SC SC</td>
<td>1.2</td>
<td>2,700</td>
<td>2,700</td>
<td>25.0 x 0.19</td>
<td>55.0</td>
<td>HR21/23</td>
</tr>
<tr>
<td>HH-B560AAh/FT</td>
<td>SC SC</td>
<td>1.2</td>
<td>3,000</td>
<td>3,000</td>
<td>27.0 x 0.22</td>
<td>63.0</td>
<td>HR23/25</td>
</tr>
<tr>
<td>HH-B580AAh/FT</td>
<td>SC SC</td>
<td>1.2</td>
<td>3,300</td>
<td>3,300</td>
<td>29.0 x 0.25</td>
<td>71.0</td>
<td>HR25/27</td>
</tr>
</tbody>
</table>

**9V BLOCK** The Panasonic Ni-MH 9V block provides high energy density, good life cycle performance and no memory effect. It is versatile enough for a range of applications.

### Applications
- Personal digital assistant
- Multimeter
- Measurement
- Toy
- Pager, etc.

### Features
- Designed for charging Ni-MH battery packs from 4 to 24 cells
- Optimised for Panasonic battery packs
- High charge efficiency
- 3 charge detection criteria: -dU, dT/dt, Tmax
- Indication of function by two LEDs
- World-wide approved

### Specifications
<table>
<thead>
<tr>
<th>Model number</th>
<th>Diameter</th>
<th>Size</th>
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<th>Nominal capacity (mAh)</th>
<th>Typical capacity (mAh)</th>
<th>Dimensions with tube (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH-R12E/BA1</td>
<td>E-B</td>
<td>6.4</td>
<td>110</td>
<td>110</td>
<td>20.0 x 17.0</td>
<td>3.0</td>
<td>HZ58</td>
</tr>
</tbody>
</table>

### For high-power use applications.

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

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

### Specifications
<table>
<thead>
<tr>
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<th>Diameter</th>
<th>Size</th>
<th>Nominal voltage (V)</th>
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<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH-R12E/BA1</td>
<td>E-B</td>
<td>6.4</td>
<td>110</td>
<td>110</td>
<td>20.0 x 17.0</td>
<td>3.0</td>
<td>HZ58</td>
</tr>
</tbody>
</table>
LITHIUM BATTERY TECHNOLOGIES These days Lithium battery technologies are getting more and more important. Due to their high voltage, low self-discharge and proven reliability a broad range of applications can be powered. In particular the chemistries BR, CR and ER battery technologies are leading the industries. Please study the comparison overview below and find out why Panasonic is especially emphasizing on its famous BR and CR technology which is a proof for outstanding quality for years in the market.

COMPARISON OF LITHIUM PRIMARY CHEMISTRY*1

<table>
<thead>
<tr>
<th>PRIMARY BR • CR • ER</th>
<th>Chemistry</th>
<th>BR</th>
<th>CR</th>
<th>ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anode</td>
<td>Li metal</td>
<td>Li metal</td>
<td>Li metal</td>
<td></td>
</tr>
<tr>
<td>Cathode</td>
<td>Carbonmonofluoride</td>
<td>MnO2</td>
<td>SOCl2</td>
<td></td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>3V</td>
<td>3V</td>
<td>3.6V</td>
<td></td>
</tr>
<tr>
<td>Discharge capacity</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Voltage during discharge (End of capacity)</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td></td>
</tr>
<tr>
<td>Pulse performance at low temperature</td>
<td>++</td>
<td>++</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>++</td>
<td>++</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Eco friendly</td>
<td>++</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

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

POLY-CARBONMONOFLUORIDE LITHIUM (BR SERIES)

<table>
<thead>
<tr>
<th>Model number (example)</th>
<th>Battery size</th>
<th>Battery diameter</th>
<th>Battery weight</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR-1/2AA**</td>
<td>Round</td>
<td>15.0 x 15.5</td>
<td>52.0</td>
<td>--</td>
</tr>
<tr>
<td>BR-2/3A</td>
<td>Round</td>
<td>17.0</td>
<td>34.5</td>
<td>17.0</td>
</tr>
<tr>
<td>BR-2/3Ag</td>
<td>Round</td>
<td>17.0</td>
<td>38.0</td>
<td>17.0</td>
</tr>
<tr>
<td>BR-1/2AA*5</td>
<td>Round</td>
<td>15.0 x 15.5</td>
<td>52.0</td>
<td>--</td>
</tr>
<tr>
<td>BR-C</td>
<td>Round</td>
<td>17.0</td>
<td>34.5</td>
<td>17.0</td>
</tr>
</tbody>
</table>

BR CYLINDRICAL Our Panasonic Poly-Carbonmonofluoride Lithium batteries (BR series) are ideal for applications such as meters or smoke detectors which demand either long-term power supply reliability and/or need to handle a wide temperature range of -40°C ~ +100°C. With the enlarged electrode surface areas, they permit a current as high as several amperes to be drawn.

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

LITHIUM CYLINDRICAL TYPE (PRIMARY)

1 Volts per cell + Very good capability ++ Good capability + Not good capability

CR-123A** | 3 | 1,000 | 20 | 17.0 | 34.5 | 17.0 | CR123A |
2CR-8** | 6 | 1,000 | 20 | 34.0 | 45.0 | 38.0 | 2CR8 |
CR-P24** | 6 | 1,000 | 20 | 35.0 | 36.0 | 37.0 | CRP24 |
CR-P2** | 6 | 1,000 | 20 | 35.0 | 36.0 | 37.0 | CRP2 |

MANGANESE DIoxide LITHIUM (CR SERIES FOR CONSUMER)

<table>
<thead>
<tr>
<th>Model number (example)</th>
<th>Battery diameter</th>
<th>Battery weight</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR-123A</td>
<td>Battery size Round</td>
<td>Manganese Dioxide Lithium battery</td>
<td>--</td>
</tr>
</tbody>
</table>
CR CYLINDRICAL TYPE + 3D ILLUSTRATION

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

CR CYLINDRICAL FOR INDUSTRIAL

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

MANGANESE DIOXIDE LITHIUM (CR SERIES FOR INDUSTRIAL)

<table>
<thead>
<tr>
<th>Model number</th>
<th>Electrical characteristics at 20°C</th>
<th>Dimensions (mm)</th>
<th>Approx. weight (g)</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR-2/3AZ</td>
<td>3.0 V 1,600 mAh (2.5 C rate)</td>
<td>17.0 x 55.5 x 33.5</td>
<td>17.0</td>
<td>24.0</td>
</tr>
<tr>
<td>CR-40</td>
<td>3.0 V 2,400 mAh (2.5 C rate)</td>
<td>17.0 x 45.5 x 24.0</td>
<td>17.0</td>
<td>24.0</td>
</tr>
</tbody>
</table>

Applications
- Car alarm
- Emergency call (E-Call)
- Defibrillator
- Blood pressure meter
- Gas meter
- Smoke detector
- Life raft light
- Search and rescue transponder, etc.

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

Model number (example)
CR-2/3AZ

CR CYLINDRICAL & COIN TYPE (PRIMARY)

BR COIN

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

POLY-CARBONMONOFLUORIDE LITHIUM (BR SERIES)

<table>
<thead>
<tr>
<th>Model number</th>
<th>Electrical characteristics at 20°C</th>
<th>Dimensions (mm)</th>
<th>Approx. weight (g)</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR-1220</td>
<td>3.0 V 35 mAh (0.3 C rate)</td>
<td>12.5 x 2.5</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>BR-1225</td>
<td>3.0 V 48 mAh (0.3 C rate)</td>
<td>12.5 x 2.5</td>
<td>0.8</td>
<td>BR1225</td>
</tr>
<tr>
<td>BR-1632</td>
<td>3.0 V 120 mAh (0.3 C rate)</td>
<td>16.0 x 3.2</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>BR-2032</td>
<td>3.0 V 200 mAh (0.3 C rate)</td>
<td>20.0 x 3.2</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>BR-2325</td>
<td>3.0 V 165 mAh (0.3 C rate)</td>
<td>23.0 x 3.0</td>
<td>3.0</td>
<td>BR2325</td>
</tr>
<tr>
<td>BR-2330</td>
<td>3.0 V 255 mAh (0.3 C rate)</td>
<td>23.0 x 3.2</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>BR-3032</td>
<td>3.0 V 500 mAh (0.3 C rate)</td>
<td>30.0 x 5.5</td>
<td>5.5</td>
<td></td>
</tr>
</tbody>
</table>

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

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

Model number (example)
BR-1225
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.

### Lithium Coin Type (Primary)

#### BR Coin Type + 3D Illustration

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

#### BR-A Series Coin Type Lithium for High Temperature Usage

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

#### Poly-Carbonmonofluoride Lithium (BR-A Series) for High Temperature Usage

<table>
<thead>
<tr>
<th>Model number</th>
<th>Electrical characteristics at 20°C</th>
<th>Dimensions (mm)</th>
<th>Approx. weight (g)</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal voltage (V)</td>
<td>Nominal capacity*2 (mAh)</td>
<td>Continuous standard drain (mA)</td>
<td>Diameter</td>
</tr>
<tr>
<td>BR-1225A*3</td>
<td>3</td>
<td>48</td>
<td>0.03</td>
<td>12.5</td>
</tr>
<tr>
<td>BR-1632A*3</td>
<td>3</td>
<td>120</td>
<td>0.03</td>
<td>16.0</td>
</tr>
<tr>
<td>BR-2330A*3</td>
<td>3</td>
<td>295</td>
<td>0.03</td>
<td>23.0</td>
</tr>
<tr>
<td>BR-2035A*3</td>
<td>3</td>
<td>390</td>
<td>0.02</td>
<td>24.5</td>
</tr>
<tr>
<td>BR-2077A*3</td>
<td>3</td>
<td>1,000</td>
<td>0.02</td>
<td>24.5</td>
</tr>
</tbody>
</table>

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

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

**Model number (example)**

BR - 2 4 7 7 A

High temperature usage

Divide this by 10 to obtain the battery height in mm

Battery diameter (in mm)

Round

Poly-Carbonmonofluoride Lithium battery

#### Lithium Coin Type (Primary)

#### Primary 3V

<table>
<thead>
<tr>
<th>Model number</th>
<th>Electrical characteristics at 20°C</th>
<th>Dimensions (mm)</th>
<th>Approx. weight (g)</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal voltage (V)</td>
<td>Nominal capacity*2 (mAh)</td>
<td>Continuous standard drain (mA)</td>
<td>Diameter</td>
</tr>
<tr>
<td>CR-1625</td>
<td>3</td>
<td>30</td>
<td>0.10</td>
<td>10.0</td>
</tr>
<tr>
<td>CR-1216</td>
<td>3</td>
<td>25</td>
<td>0.10</td>
<td>12.5</td>
</tr>
<tr>
<td>CR-1220</td>
<td>3</td>
<td>35</td>
<td>0.10</td>
<td>12.5</td>
</tr>
<tr>
<td>CR-1616</td>
<td>3</td>
<td>95</td>
<td>0.10</td>
<td>16.0</td>
</tr>
<tr>
<td>CR-1620</td>
<td>3</td>
<td>120</td>
<td>0.10</td>
<td>16.0</td>
</tr>
<tr>
<td>CR-1212</td>
<td>3</td>
<td>55</td>
<td>0.10</td>
<td>20.0</td>
</tr>
<tr>
<td>CR-2012</td>
<td>3</td>
<td>150</td>
<td>0.20</td>
<td>20.0</td>
</tr>
<tr>
<td>CR-2025</td>
<td>3</td>
<td>350</td>
<td>0.20</td>
<td>20.0</td>
</tr>
<tr>
<td>CR-2030</td>
<td>3</td>
<td>400</td>
<td>0.20</td>
<td>23.0</td>
</tr>
<tr>
<td>CR-2056</td>
<td>3</td>
<td>560</td>
<td>0.20</td>
<td>23.0</td>
</tr>
<tr>
<td>CR-2412</td>
<td>3</td>
<td>620</td>
<td>0.20</td>
<td>24.5</td>
</tr>
<tr>
<td>CR-2450</td>
<td>3</td>
<td>1,000</td>
<td>0.03</td>
<td>24.5</td>
</tr>
<tr>
<td>CR-2477</td>
<td>3</td>
<td>1,000</td>
<td>0.03</td>
<td>24.5</td>
</tr>
</tbody>
</table>

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

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

**Model number (example)**

CR - 2 0 3 2

Divide this by 10 to obtain the battery height in mm

Battery diameter (in mm)

Round

Manganese Dioxide Lithium Battery

**Video**

Scan QR code to view 3D animated video.
PIN & LITHIUM COIN TYPE (PRIMARY & RECHARGEABLE)

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

PIN TYPE POLY-CARBONMONOFUORIDE LITHIUM (BR SERIES)

<table>
<thead>
<tr>
<th>Model number</th>
<th>Nominal voltage (V)</th>
<th>Nominal capacity (mAh)</th>
<th>Continuous standard drain (mA)</th>
<th>Diameter (mm)</th>
<th>Height (mm)</th>
<th>Approx. weight (g)</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR-425</td>
<td>2</td>
<td>1.0</td>
<td>4.2</td>
<td>25.9</td>
<td>0.4</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>BR-426</td>
<td>2</td>
<td>1.0</td>
<td>4.2</td>
<td>35.9</td>
<td>0.5</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

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

VANADIUM PENTOXIDE LITHIUM (VL SERIES)

<table>
<thead>
<tr>
<th>Model number</th>
<th>Nominal voltage (V)</th>
<th>Nominal capacity (mAh)</th>
<th>Continuous standard drain (mA)</th>
<th>Diameter (mm)</th>
<th>Height (mm)</th>
<th>Approx. weight (g)</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL-621*3</td>
<td>3</td>
<td>20.0</td>
<td>0.01</td>
<td>2.1</td>
<td>6.8</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>VL-1220*3</td>
<td>3</td>
<td>70.0</td>
<td>0.02</td>
<td>2.0</td>
<td>12.5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>VL-2020*3</td>
<td>3</td>
<td>200.0</td>
<td>0.05</td>
<td>2.2</td>
<td>23.0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>VL-2320*3</td>
<td>3</td>
<td>300.0</td>
<td>0.10</td>
<td>2.7</td>
<td>23.0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>VL-3032*3</td>
<td>3</td>
<td>1000.0</td>
<td>0.20</td>
<td>3.5</td>
<td>30.0</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

MANGANESE LITHIUM (ML SERIES)

<table>
<thead>
<tr>
<th>Model number</th>
<th>Nominal voltage (V)</th>
<th>Nominal capacity (mAh)</th>
<th>Continuous standard drain (mA)</th>
<th>Diameter (mm)</th>
<th>Height (mm)</th>
<th>Approx. weight (g)</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML-421</td>
<td>3</td>
<td>120.0</td>
<td>0.005</td>
<td>2.1</td>
<td>6.8</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>ML-414</td>
<td>3</td>
<td>120.0</td>
<td>0.005</td>
<td>2.1</td>
<td>6.8</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>ML-427</td>
<td>3</td>
<td>150.0</td>
<td>0.010</td>
<td>2.0</td>
<td>9.5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>ML-420</td>
<td>3</td>
<td>200.0</td>
<td>0.010</td>
<td>2.0</td>
<td>12.5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>ML-1220</td>
<td>3</td>
<td>1000.0</td>
<td>0.030</td>
<td>2.2</td>
<td>23.0</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

LITHIUM COIN TYPE (RECHARGEABLE)

MANGANESE TITANIUM LITHIUM (MT SERIES)

<table>
<thead>
<tr>
<th>Model number</th>
<th>Nominal voltage (V)</th>
<th>Nominal capacity (mAh)</th>
<th>Continuous standard drain (mA)</th>
<th>Diameter (mm)</th>
<th>Height (mm)</th>
<th>Approx. weight (g)</th>
<th>IEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT-516</td>
<td>1.5</td>
<td>50.0</td>
<td>0.4</td>
<td>1.6</td>
<td>4.4</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT-621</td>
<td>1.5</td>
<td>30.0</td>
<td>0.6</td>
<td>2.1</td>
<td>4.4</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT-1220</td>
<td>1.5</td>
<td>50.0</td>
<td>0.8</td>
<td>2.0</td>
<td>4.4</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

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

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

Model number (example)
VL - 2 0 2 0

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

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

VL COIN TYPE • 3D ILLUSTRATION*

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

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

Mr. Stephan Greiff Senior Product Manager Continental Automotive GmbH

*1 Based on standard drain and cut off voltage down to 2.0V at 20°C.
*2 Based on standard drain and cut off voltage down to 2.5V at 20°C.
*3 Only batteries with terminals are available.
*4 Based on standard drain and cut off voltage down to 1.0V at 20°C.
*5 The illustration shows only one example of Lithium battery structure.
**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.

**Applications**
- Blood pressure meter
- Scales
- Distance meter
- Door lock system
- Smoke detector
- Flashlight
- Radio recorder
- Sanitary equipment
- Bus, etc.

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

---

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

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

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

---

**BATTERY TYPES AND MODEL NUMBERS**

<table>
<thead>
<tr>
<th>Application</th>
<th>Series</th>
<th>Trickle design life (at 20°C)</th>
<th>Category</th>
<th>Standard AEC (UL94 HB)</th>
<th>FR AEC x Flame Retardant AEC (UL94 V-0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back up</td>
<td>LC-147K</td>
<td>6 – 9 years</td>
<td>Trickle standard type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC-147KA/B</td>
<td>6 – 9 years</td>
<td>Trickle long-life type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC-147PB/PA</td>
<td>6 – 9 years</td>
<td>Trickle long-life type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC-SN</td>
<td>6 – 9 years</td>
<td>High power standard type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UP-147K/M</td>
<td>6 – 9 years</td>
<td>High power long-life type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back up and multi-use</td>
<td>LC-CA</td>
<td>-</td>
<td>Cycle long-life type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC-XC</td>
<td>-</td>
<td>Cycle long-life type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC-TP</td>
<td>-</td>
<td>Cycle long-life type for energy storage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC-PV</td>
<td>-</td>
<td>Cycle long-life type for motive power</td>
<td>Polypropylene</td>
<td>Polypropylene</td>
<td></td>
</tr>
</tbody>
</table>

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

---

**TRICKLE DESIGN LIFE 6 – 9 YEARS**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LC-R061235P</td>
<td>6</td>
<td>1.3</td>
<td>97.0 x 56.0 x 54.0</td>
<td>1.7</td>
<td>Scan QR code to view 3D animated video.</td>
</tr>
<tr>
<td>LC-R061235A</td>
<td>6</td>
<td>1.3</td>
<td>97.0 x 56.0 x 54.0</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>LC-R061260P</td>
<td>6</td>
<td>3.6</td>
<td>136.0 x 54.0 x 54.0</td>
<td>3.4</td>
<td></td>
</tr>
<tr>
<td>LC-R061260A</td>
<td>6</td>
<td>3.6</td>
<td>136.0 x 54.0 x 54.0</td>
<td>3.4</td>
<td></td>
</tr>
<tr>
<td>LC-R061220P</td>
<td>6</td>
<td>7.2</td>
<td>151.0 x 86.0 x 86.0</td>
<td>6.3</td>
<td></td>
</tr>
<tr>
<td>LC-R061220A</td>
<td>6</td>
<td>7.2</td>
<td>151.0 x 86.0 x 86.0</td>
<td>6.3</td>
<td></td>
</tr>
<tr>
<td>LC-R061250P</td>
<td>6</td>
<td>12.0</td>
<td>191.0 x 106.0 x 106.0</td>
<td>11.7</td>
<td></td>
</tr>
<tr>
<td>LC-R061250A</td>
<td>6</td>
<td>12.0</td>
<td>191.0 x 106.0 x 106.0</td>
<td>11.7</td>
<td></td>
</tr>
<tr>
<td>LC-R061290P</td>
<td>6</td>
<td>18.0</td>
<td>151.0 x 127.0 x 127.0</td>
<td>16.0</td>
<td></td>
</tr>
<tr>
<td>LC-R061290A</td>
<td>6</td>
<td>18.0</td>
<td>151.0 x 127.0 x 127.0</td>
<td>16.0</td>
<td></td>
</tr>
<tr>
<td>LC-R061263P</td>
<td>6</td>
<td>24.0</td>
<td>191.0 x 177.0 x 177.0</td>
<td>24.0</td>
<td></td>
</tr>
<tr>
<td>LC-R061263A</td>
<td>6</td>
<td>24.0</td>
<td>191.0 x 177.0 x 177.0</td>
<td>24.0</td>
<td></td>
</tr>
</tbody>
</table>

---

**ZINC-CARBON – 3D ILLUSTRATION**

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

---

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

*The illustration shows only one example of Zinc-Carbon battery structure.*
CYCLE LONG-LIFE AND CYCLE LONG-LIFE FOR ENERGY STORAGE

**RECHARGEABLE 12V**

<table>
<thead>
<tr>
<th>Model number</th>
<th>Nominal voltage (V)</th>
<th>Rated capacity (Ah)</th>
<th>Dimensions (mm)</th>
<th>Mass approx. (kg)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC-QA1224Ap</td>
<td>12V</td>
<td>24.0</td>
<td>197.0 x 165.0</td>
<td>236.0</td>
<td>11.0</td>
</tr>
<tr>
<td>LC-QA1224P</td>
<td>12V</td>
<td>28.0</td>
<td>197.0 x 165.0</td>
<td>236.0</td>
<td>11.0</td>
</tr>
<tr>
<td>LC-QA12110Tp</td>
<td>12V</td>
<td>26.0</td>
<td>197.0 x 165.0</td>
<td>236.0</td>
<td>11.0</td>
</tr>
<tr>
<td>LC-QA1224Ap</td>
<td>12V</td>
<td>34.0</td>
<td>197.0 x 165.0</td>
<td>236.0</td>
<td>11.0</td>
</tr>
<tr>
<td>LC-QA1224P</td>
<td>12V</td>
<td>42.0</td>
<td>197.0 x 165.0</td>
<td>236.0</td>
<td>11.0</td>
</tr>
</tbody>
</table>

**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.

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

Model number (examples)

**LC - P 12 7 R 2 P**

- English label plus VdS product recognition acquired
- 12V Trickle long-life type, flame retardant
- Panasonic VRLA battery – standard type

**LC - X 12 6 5 P G**

- English label plus VdS product recognition acquired
- 12V Trickle long-life type
- Panasonic VRLA battery – standard type

**TRICKLE DESIGN LIFE 15 YEARS**

<table>
<thead>
<tr>
<th>Model number</th>
<th>Nominal voltage (V)</th>
<th>Rated capacity (Ah)</th>
<th>Dimensions (mm)</th>
<th>Mass approx. (kg)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC-QA6210Tp</td>
<td>6V</td>
<td>105.0</td>
<td>607.0 x 173.0</td>
<td>236.0</td>
<td>36.5</td>
</tr>
<tr>
<td>LC-QA1224P</td>
<td>12V</td>
<td>24.0</td>
<td>607.0 x 173.0</td>
<td>236.0</td>
<td>36.5</td>
</tr>
</tbody>
</table>

**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
- Various VdS approved batteries

**Applications**

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

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

**RECHARGEABLE 12V**

<table>
<thead>
<tr>
<th>Model number</th>
<th>Nominal voltage (V)</th>
<th>Rated capacity (Ah)</th>
<th>Dimensions (mm)</th>
<th>Mass approx. (kg)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC-CA1212P</td>
<td>12V</td>
<td>12.0</td>
<td>151.0 x 98.0</td>
<td>100.0</td>
<td>3.8</td>
</tr>
<tr>
<td>LC-CA1270P</td>
<td>12V</td>
<td>16.0</td>
<td>151.0 x 98.0</td>
<td>100.0</td>
<td>3.2</td>
</tr>
<tr>
<td>LC-CA1212P</td>
<td>12V</td>
<td>18.0</td>
<td>151.0 x 98.0</td>
<td>100.0</td>
<td>4.0</td>
</tr>
<tr>
<td>LC-CA1222P</td>
<td>12V</td>
<td>22.0</td>
<td>151.0 x 98.0</td>
<td>100.0</td>
<td>4.6</td>
</tr>
<tr>
<td>LC-CA1222P</td>
<td>12V</td>
<td>26.0</td>
<td>151.0 x 98.0</td>
<td>100.0</td>
<td>5.4</td>
</tr>
<tr>
<td>LC-CA1222P</td>
<td>12V</td>
<td>30.0</td>
<td>151.0 x 98.0</td>
<td>100.0</td>
<td>6.0</td>
</tr>
<tr>
<td>LC-CA1222P</td>
<td>12V</td>
<td>35.0</td>
<td>151.0 x 98.0</td>
<td>100.0</td>
<td>6.2</td>
</tr>
</tbody>
</table>

**Features**

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

**Applications**

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

**CYCLE LONG-LIFE DATABASE**

**VRLA + 3D ILLUSTRATION**

Scan QR code to view 3D animated video.
VALVE-REGULATED (SEALED)-LEAD-ACID

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

CYCLE VERY LONG-LIFE FOR MOTIVE POWER

<table>
<thead>
<tr>
<th>Model number</th>
<th>Nominal voltage (V)</th>
<th>Rated power (W)</th>
<th>Expected trickle design life (at 20°C)</th>
<th>Dimensions (mm)</th>
<th>Mass approx. (kg)</th>
<th>Vds n°</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-FV0890B1E</td>
<td>8</td>
<td>135.0</td>
<td>6 – 9 years</td>
<td>388.0</td>
<td>111.0</td>
<td>150</td>
</tr>
<tr>
<td>EC-FV1228</td>
<td>12</td>
<td>200.0</td>
<td>6 – 9 years</td>
<td>410.0</td>
<td>116.0</td>
<td>175</td>
</tr>
<tr>
<td>EC-FV1228B</td>
<td>12</td>
<td>200.0</td>
<td>6 – 9 years</td>
<td>410.0</td>
<td>116.0</td>
<td>175</td>
</tr>
</tbody>
</table>

Applications
- UPS systems
- Servers, etc.

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

Model number (example)
EC-FV1228

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

TRICKLE DESIGN LIFE 6 – 9 AND 10 – 12 YEARS

<table>
<thead>
<tr>
<th>Model number</th>
<th>Nominal voltage (V)</th>
<th>Rated power 5 hours rate (W)</th>
<th>Expected trickle design life (at 20°C)</th>
<th>Dimensions (mm)</th>
<th>Mass approx. (kg)</th>
<th>Vds n°</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP-RW0645P</td>
<td>6</td>
<td>135.0</td>
<td>6 – 9 years</td>
<td>388.0</td>
<td>111.0</td>
<td>150</td>
</tr>
<tr>
<td>UP-RW1220P</td>
<td>12</td>
<td>200.0</td>
<td>6 – 9 years</td>
<td>410.0</td>
<td>116.0</td>
<td>175</td>
</tr>
<tr>
<td>UP-RW1228P</td>
<td>12</td>
<td>200.0</td>
<td>6 – 9 years</td>
<td>410.0</td>
<td>116.0</td>
<td>175</td>
</tr>
<tr>
<td>UP-RW0890B1E</td>
<td>8</td>
<td>135.0</td>
<td>6 – 9 years</td>
<td>388.0</td>
<td>111.0</td>
<td>150</td>
</tr>
<tr>
<td>UP-WV1238</td>
<td>12</td>
<td>200.0</td>
<td>6 – 9 years</td>
<td>410.0</td>
<td>116.0</td>
<td>175</td>
</tr>
<tr>
<td>UP-WV1260</td>
<td>12</td>
<td>200.0</td>
<td>6 – 9 years</td>
<td>410.0</td>
<td>116.0</td>
<td>175</td>
</tr>
</tbody>
</table>

Applications
- UPS systems
- Servers, etc.

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

Model number (example)
UP-RW1220P1

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.

<table>
<thead>
<tr>
<th>Terminal type (faston 250 with hole)</th>
<th>English label</th>
<th>Wattage per cell at 10 minutes rate discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5 threaded post type</td>
<td>12V</td>
<td>For back-up – high power standard type</td>
</tr>
<tr>
<td>M5 bolt</td>
<td></td>
<td>Panasonic VRLA battery - high power type</td>
</tr>
</tbody>
</table>

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.

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</tr>
<tr>
<td>M5 bolt</td>
<td></td>
<td>Panasonic VRLA battery - high power type</td>
</tr>
<tr>
<td>Product Category</td>
<td>Application</td>
<td>Battery Industry</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Automotive</td>
<td>Emergency call (911)</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Brake l...</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Remote Keyless Entry (RKE)</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Tire Pressure Monitoring System (TPMS)</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td>Base station</td>
<td>Cordless phone</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>GPS device</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Mobile phone</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Smart phone</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Tablet PC</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Smartphone</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Cordless drill</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Jaw drill</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Angle grinder</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Jig saw</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Grinding machine</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Drill / driver</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Chain saw</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Vending machine</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Tracking &amp; RFID</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Door lock system</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Remote keyless entry</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Emergency lighting</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>Smoke detector</td>
<td>Nickel-Metal-Hydride</td>
</tr>
<tr>
<td></td>
<td>UPS</td>
<td>Nickel-Metal-Hydride</td>
</tr>
</tbody>
</table>

**Legend**

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

**BATTERY PACKS**

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

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

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

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

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

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

### SPECIAL PACK SHAPES

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

- **Ni-MH assembled batteries and pack**
  - plus safety unit on top

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

- **Lithium primary assembled cells - BR-C**
  - plus safety unit placed on side

- **Li-ion pack - 2S1P CGR18650**
  - plus safety unit on top

- **Li-ion pack - 4S1P nCR18650**
  - plus safety unit placed on side

- **Li-ion pack - 1S1P NCR18650**
  - plus safety unit placed on top

- **Li-ion pack - 4S1P NCR18650**
  - plus safety unit and battery gauge
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Fax: +49 40 - 85 384 - 238

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