**Safety Precautions and Usage Guidance**

Some batteries contain flammable substance which, if misused or mishandled, may result in electrolyte leakage, deformation, heat-generation, rupture, and/or fire. Please be sure to observe the following safety precautions.

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**DANGER: READ BEFORE USE**

1. Do not dispose batteries to heat water; dispose them, or use in any other liquid, or allow batteries to get wet. Water or safety equipment may be compromised, potentially resulting in heat-generation, smoke-generation, rupture, and/or fire.
2. Do not use or leave batteries near fire, smoke, or other high-temperature objects 80 °C or over. If the plastic separator gets damaged due to heat exposure, short-circuiting inside batteries may cause heat-generation, smoke-generation, rupture, and/or fire.
3. Never charge any battery type except rechargeable batteries. Ensure the device’s circuit design prevents current intrusion from other power sources.
4. When charging batteries, use approved battery chargers only and observe battery charging safety conditions specified by Panasonic. When charging batteries in other charging conditions (undercharged temperatures, undesignated voltage, current, or modified chargers), over-charging, charging with abnormal current flow, or an abnormal chemical reaction inside batteries may occur, resulting in heat-generation, smoke-generation, rupture, and/or fire.
5. Every battery has a predetermined polarity. If the battery does not fit comfortably in a battery charger or appliance, do not insert the battery by force. Instead, check the battery's polarity. If a reverse connection is detected, batteries may charge backwards causing an abnormal chemical reaction which may result in leakage, heat-generation, smoke-generation, rupture, and/or fire.
6. Do not attach batteries to an AC socket or directly to a vehicle’s electrical outlet. This may result in electric shock, voltage spikes, and excessive current flow within the battery, resulting in heat-generation, leakage, heat-generation, smoke-generation, rupture, and/or fire.
7. Using batteries for unapproved applications may affect battery performance or reduce battery life. Change in some devices may damage batteries due to abnormal current flow, resulting in heat-generation, smoke-generation, rupture, and/or fire.
8. Never disassemble or modify batteries to harvest energy, such as creating a battery charger or appliance, do not insert the battery by force. Instead, check the battery's polarity. If a reverse connection is detected, batteries may charge backwards causing an abnormal chemical reaction which may result in leakage, heat-generation, smoke-generation, rupture, and/or fire.
9. Do not use batteries where static electricity greater than 100 V may damage built-in battery safety mechanisms, resulting in battery leakage, heat-generation, smoke-generation, rupture, and/or fire.
10. Do not penetrate batteries with nails, strike with a hammer, etc. This will destroy the battery housing, damage the battery insulators, or damage the battery, resulting in heat-generation, smoke-generation, rupture, and/or fire.
11. Do not place batteries in direct sunlight, use, or store batteries inside cars in hot weather. This may result in battery leakage, heat-generation, and/or smoke-generation. Product performance and lifespan may be also reduced.
12. Do not use batteries where static electricity greater than 100 V may damage battery safety mechanisms, resulting in battery leakage, heat-generation, smoke-generation, rupture, and/or fire.
13. If an abnormal odor, temperature, discoloration, deformation, or other unusual symptoms is detected when using, charging, or storing batteries, take them out of the device or charger, and do not use them. Using them as-is may result in fire.
14. Do not charge the batteries beyond the designated temperature range. Charging batteries outside the designated temperature range may result in battery leakage, heat-generation, smoke-generation, and/or fire.
15. Do not use batteries in liquid. Batteries may leak electrolyte, resulting in heat-generation, smoke-generation, and/or fire.
16. Some batteries incorporate a gas-venting structure to discharge internal gases. For this reason, do not install the positive electrode.
Panasonic Energy Device Business Division

Panasonic commenced in-house dry battery production in 1931. For almost 90 years, we’ve developed countless batteries and overcome the challenges of mass-production to deliver a cumulative total of over 200 billion units to more than 120 countries. Panasonic batteries play a vital role in the automotive industry, where our products contribute to on-road safety; in commercial infrastructure where 5G/LPWA wireless networks are deployed; and in IoT-based medical equipment. We will continue creating high-quality batteries that support healthy society while contributing to the growth of our customers’ businesses.

History of Energy Device Business Division

1918
Matsushita Electric Housewares Manufacturing Works (now Panasonic) is established

1931
Matsushita Electric Factory No.3 starts in-house production of dry batteries

1933
Osaka Moriyachi Factory

1936
Matsushita Electric Factory No.4 starts in-house production of dry batteries

1947
Ebara Project (now Matsushita Ebara Industry Co., Ltd.) is established

1954
Natural High-Temperature Dry Battery

1969
Kurashiki High-Temperature Dry Battery

1977
Osaka Ultra-NiMT Lithium Battery

1990
Nickel-metal hydride battery for industrial use

2000
Cylindrical-type Lithium Battery

2005
Micro-battery production commences

2015
Panasonic commenced in-house production of Coin-type Lithium Batteries

2017
Panasonic commenced in-house production of Cylindrical-type Lithium Batteries

Product Lineup

Coin-type Lithium Batteries

With strong durability and reliability, Panasonic cylindrical Lithium batteries make ideal power sources for meters such as intelligent gas meters, which automatically shut off the gas if abnormalities are detected. Cylindrical-type Lithium offers an extended product lineup without need of maintenance.

- CR Series Manganese Dioxide Lithium Batteries (Standard Type)
- CR Series Manganese Dioxide Lithium Batteries (Long-life Type)
- M Series Poly-carbonate Lithium Batteries

Coin-type Rechargeable Lithium Batteries

Coin-type rechargeable batteries are designed for long-life stability. These robust cells make ideal memory-backup power supplies for industrial devices, medical equipment, and wireless communications devices, or as emergency storage devices for small-scale applications.

- V Series Vanadium Rechargeable Lithium Batteries
- M Series Manganese Rechargeable Lithium Batteries
- M Series Manganese Silicon Rechargeable Lithium Batteries
- C Series Cobalt Titanate Rechargeable Lithium Batteries
- M Series Manganese Titanate Rechargeable Lithium Batteries

Coin-type Li-ion Batteries

Panasonic’s pin-type lithium-ion series comprises rechargeable batteries suitable for tiny appliances such as hearing aids, wireless earphones, and insulin pens. They are not only small and light, but also deliver high reliability and strong performance from a rechargeable power product for pin-type devices and wearable technology such as smart glasses.

- CR Series Manganese Dioxide Lithium Batteries
- CR Series Manganese Dioxide Lithium Batteries for High Temperatures
- BR Series Poly-carbonate Lithium Batteries

Nickel-metal Hydride Batteries

Nickel-metal hydride batteries are eco-friendly rechargeable cells designed to maintain long life performance in the most demanding environments. This battery type plays an important role in industrial and commercial applications with versatility to serve as a power source in smaller devices, or as a backup power supply for emergency situations.

- Alkaline Batteries
- Manganese Batteries

Dry Batteries

Dry batteries deliver excellent all-round performance with long endurance, extended storage life, and effective leakage protection to meet ever-changing, current high reliability and stability from a family of products to suit a wide variety of devices, from high-capacity batteries for high-drain devices to low-capacity designs for low-current applications.

- Infrastructure Backup
- Large-scale Infrastrcture Applications
- Automobile Backup
- Battery Top
- Standard
- High-rate Discharge

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Panasonic batteries for automotive applications, such as anti-theft security systems and eCall systems (emergency call systems), can be counted on to function reliably in emergencies. They are safe, long-lasting, and ideally suited to automotive backup applications.

Remote Keyless Entry / Anti-theft Security Systems

eCall Systems (Emergency Call Systems)

Event Data Recorder (EDR)

Tire Pressure Monitoring Systems (TPMS)

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Emergency Lights / Guide Lights

Gas Meters / Water Meters

Fire Alarms

Panasonic batteries for infrastructure support where they serve as main power sources in smaller devices or as emergency backup supplies. They are engineered to sustain long-life performance in the toughest environments. Infrastructure-type batteries contribute to a comfortable, safe, and secure society by supplying requisite electricity in a way that protects people and the environment.

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Batteries for IoT / LPWA

IoT devices connected to LPWA networks enable data communication over long distances with minimal power consumption and are usually installed in difficult-to-access locations, meaning cell replacement should be infrequent. Batteries for IoT / LPWA applications must therefore possess outstanding endurance. Panasonic offers a variety of long-lasting battery types designed for stable discharge over long periods.

- Pin-type Lithium Batteries
- Cylindrical Lithium Batteries
- Ni-MH Batteries
- Alkaline Dry Batteries

Batteries for Wearables and Small Medical Devices

Pin-type lithium-ion batteries are perfectly adapted power-sources for small portable devices. The super-small slimline batteries not only enable more compact, stylish device design, but also deliver high output, excellent levels of safety, and extended reliability. They are used in wearable technology and in small medical appliances such as hearing aids. Panasonic pin-type lithium-ion batteries play an important role in product development and are already expanding application possibilities in these markets.

- Pin-type Lithium-ion Batteries

Construction Machinery

Medical Devices

Agricultural Machinery

Water-level Sensors

Hearing Aids

Stylus Pens

Wireless Earphones

Smart Glasses (Electric Photochromatic Sunglasses, Electric Bifocal Glasses, etc.)
Lithium Battery Features

(1) Wide Product Range
We provide a wide selection of different products engineered to suit an even wider range of applications from primary power supply to backup power insurance in emergency situations.

(2) Proven Reliability
We possess more than 40 years' experience in lithium battery design, innovation, product development, and mass production techniques with a proven track record for safety and reliability.

(3) Durable Performance in Tough Conditions
Expect dependable performance in the harshest conditions and excellent resistance to extremes in temperature—a welcome characteristic when deployed in meters that are in use for extended periods.

Example Lithium Battery Model-Number Composition (Coin Type)

- **CR Series** (Manganese Dioxide Lithium Batteries)
- **BR Series** (Poly-carbononfluoride Lithium Batteries)
- **CR Series** (Manganese Dioxide Lithium Batteries)
- **BR Series** (Poly-carbononfluoride Lithium Batteries)
- **BR Series** (Poly-carbononfluoride Lithium Batteries)
- **VL Series** (Vanadium Rechargeable Lithium Batteries)
- **ML Series** (Manganese Rechargeable Lithium Batteries)
- **MS Series** (Manganese Silicon Rechargeable Lithium Batteries)
- **CTL Series** (Cobalt Titanium Rechargeable Lithium Batteries)
- **MT Series** (Manganese Titanium Rechargeable Lithium Batteries)

Example Lithium Battery Model-Number Composition (Cylindrical Type)

- **CR Series** (Manganese Dioxide Lithium Batteries)
- **BR Series** (Poly-carbononfluoride Lithium Batteries)
- **CR Series** (Manganese Dioxide Lithium Batteries)
- **BR Series** (Poly-carbononfluoride Lithium Batteries)
- **BR Series** (Poly-carbononfluoride Lithium Batteries)
- **VL Series** (Vanadium Rechargeable Lithium Batteries)
- **ML Series** (Manganese Rechargeable Lithium Batteries)
- **MS Series** (Manganese Silicon Rechargeable Lithium Batteries)
- **CTL Series** (Cobalt Titanium Rechargeable Lithium Batteries)
- **MT Series** (Manganese Titanium Rechargeable Lithium Batteries)

Pin-type Lithium-ion Battery Features

(1) Ultra Small, Super Slim Batteries
Tiny slimline batteries support stylish device design with high power output.

(2) High Safety and Reliability
High-strength stainless exterior case enhances safety and reliability.

(3) Supports Rapid Charging
 Faster recharge times make portable devices easier to use.

Example Pin-type Lithium-ion Battery Model-Number Composition

- **CG Series** (Manganese Lithium Cobaltite)
- **LG Series** (Lithium Cobaltite)
- **CG Series** (Manganese Lithium Cobaltite)
- **LG Series** (Lithium Cobaltite)
- **CG Series** (Manganese Lithium Cobaltite)
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- **CG Series** (Manganese Lithium Cobaltite)
- **LG Series** (Lithium Cobaltite)
- **CG Series** (Manganese Lithium Cobaltite)
- **LG Series** (Lithium Cobaltite)

Nickel-Metal Hydride Battery Features

(1) Works in a Range of Temperatures
Stable performance in harsh conditions with a wide operating temperature.

(2) Eco-friendly Power
Reusable designs limit wastage for reduced environmental impact.

(3) Ideal Replacement for Nickel-Cadmium Batteries
A longer-lasting alternative to nickel-cadmium batteries.

Example Nickel-Metal Hydride Battery Model-Number Composition (Coin Type)

- **BR Series** (Poly-carbononfluoride Lithium Batteries)
- **CR Series** (Manganese Dioxide Lithium Batteries)
- **BR Series** (Poly-carbononfluoride Lithium Batteries)
- **VL Series** (Vanadium Rechargeable Lithium Batteries)
- **ML Series** (Manganese Rechargeable Lithium Batteries)
- **MS Series** (Manganese Silicon Rechargeable Lithium Batteries)
- **CTL Series** (Cobalt Titanium Rechargeable Lithium Batteries)
- **MT Series** (Manganese Titanium Rechargeable Lithium Batteries)

Dry Battery Features

(1) A Tradition of Quality and Reliability
Panasonic continues to innovate on a foundation of almost 90 years' experience in battery design and manufacture on a global scale.

(2) Excellent Reliability in Various Devices
High- to low-rate discharge recommended for use in a wide variety of devices.

(3) Designed for Global Users
Our exclusive industrial batteries are labeled in English, Japanese, and Chinese.

Dry Batteries

- Alkaline Batteries
- Manganese Batteries
**Panasonic Coin-type Lithium** is renowned for stellar performance in small electric appliances and for flexible implementation in memory-backup applications in temperatures as high as 125 °C. Select from a CR or BR chemistries, a choice of sizes, and a range of capacities up to 1,000 mAh.

### CR Series Manganese Dioxide Lithium Batteries

**Features**
- Offers high-rate pulse discharge
- Available in a range of compact sizes and capacities, from thin-type to high-capacity models
- Excellent low-temperature performance enhanced by manganese-dioxide positive pole

**Applications**
- Remote keyless entry, card remote controls, memory backup, security price tags, smart transmitter tags, etc.

### CR Series Manganese Dioxide Lithium Batteries for High Temperatures

**Features**
- Superior discharge characteristics
- Engineered for use in equipment operating in high-temperature environments (max. 125 °C)

**Applications**
- Automotive electronic components (TPMS, ETC), hot water and electricity meters, etc.

### BR Series Poly-carbonmonofluoride Lithium Batteries

**Features**
- BR Series batteries developed with exclusive Panasonic technology
- Exhibits stable performances after long periods in storage due to low self-discharge characteristics
- Primarily used for memory-backup power in low-drain applications

**Applications**
- Commercial equipment (communication/measurement devices), electricity meters, memory backup (security cameras, security sensors), automotive electronic components (ETC), etc.

### BR Series Poly-carbonmonofluoride Lithium Batteries for High Temperatures

**Features**
- In addition to the appeal of our BR Series coin-type lithium batteries, poly-carbonmonofluoride cells can operate in temperatures up to 125 °C

**Applications**
- Automotive electronic components (TPMS, ETC), hot water and electricity meters, memory backup (hot computers, FA equipment), etc.

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1. Nominal capacity shown above is based on standard drain and cutoff voltage down to 2.0 V at 20 °C.
2. Please consult your Panasonic sales representative when anticipating usage in operating temperatures of 70 °C or above.
3. Tabulated type batteries only. * Nominal capacity shown above is based on standard drain and cutoff voltage down to 2.0 V at 20 °C.
4. Tabulated type batteries only. * Nominal capacity shown above is based on standard drain and cutoff voltage down to 2.0 V at 20 °C.
Cylindrical-type Lithium Batteries

CR Series Manganese Dioxide Lithium Batteries (Standard Type)

Features
- Offers super-high rate discharge with ample power and extended life when used in cameras, lights, etc.
- Also available in the consumer marketplace

Applications
Lights, security devices (electronic door/locks, fire alarms), automotive electronic components (eCall systems), medical equipment (AEDs), etc.

CR Series Manganese Dioxide Lithium Batteries (Long-life Type)

Features
- Long-life batteries exhibiting excellent discharge stability for long-term use
- The superior choice for in-vehicle apparatus with compact design and outstanding discharge performance at very low temperatures

Applications
Security devices (electronic door locks, fire alarms), automotive electronic components (tracking systems, security alarms), meters (gas, water, electricity), medical equipment (AEDs), etc.

BR Series Poly-carbonmonofluoride Lithium Batteries

Features
- Uncommonly long storage-life to suit metering devices and memory-backup

Applications
Commercial equipment (communication/measurement devices), meters (gas, water, electricity, hot water), memory backup (large FA equipment), automotive electronic components (security alarms), etc.

Pin-type Lithium Batteries

BR Series Poly-carbonmonofluoride Lithium Batteries

Features
- Panasonic original battery design
- Tiny device that can generate continuous power for LED lights, etc.

Applications
Electrical flaring, flashlights, small transmitters, etc.

The data provided in this document is for descriptive purposes only and does not imply any guarantee or warranty.
Coin-type rechargeable lithium is intended for applications where battery replacement is inconvenient, or the device's construction renders replacement impractical. These batteries are ideal for memory backup or solar watches.

### VL Series Vanadium Rechargeable Lithium Batteries

#### Features
- Retains high-discharge voltage performance

#### Applications
- Memory backup (printers, composite machines, medical equipment, FA equipment, remote keyless entry, fire alarms, etc.)

### MS Series Manganese Silicon Rechargeable Lithium Batteries

#### Features
- Supports more than 100 complete charge-discharge cycles

#### Applications
- Memory backup (cameras), etc.

### CTL Series Cobalt Titanium Rechargeable Lithium Batteries

#### Features
- Rechargeable batteries with excellent charge-discharge cycle stability
- Compared to MT Series, CTL Series retains a higher voltage (2.3 V)
- Long-term reliability proved by applications in many solar watch designs

#### Applications
- Digital/solar watches, sensing devices, etc.

### ML Series Manganese Rechargeable Lithium Batteries

#### Features
- Ideal for long-term memory backup with extra-high capacity

#### Applications
- Memory backup (drive recorders, PCs, communication/radio, medical equipment, FA equipment, etc.)

### MT Series Manganese Titanium Rechargeable Lithium Batteries

#### Features
- High-current 1.5 V lithium rechargeable battery with sustained discharge endurance

#### Applications
- Watches, etc.

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<table>
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<th><strong>Nominal capacity (mAh)</strong></th>
<th><strong>Continuous drain (mA)</strong></th>
<th><strong>Discharge capacity (mAh)</strong></th>
<th><strong>Mass (g)</strong></th>
<th><strong>Charge voltage (V)</strong></th>
<th><strong>Operating temperature range</strong></th>
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<th><strong>Nominal voltage (V)</strong></th>
<th><strong>Nominal capacity (mAh)</strong></th>
<th><strong>Continuous drain (mA)</strong></th>
<th><strong>Discharge capacity (mAh)</strong></th>
<th><strong>Mass (g)</strong></th>
<th><strong>Charge voltage (V)</strong></th>
<th><strong>Operating temperature range</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MT621F</td>
<td>3.2</td>
<td>1000</td>
<td>200</td>
<td>20</td>
<td>140</td>
<td>3.2</td>
<td>-20 °C to 60 °C</td>
</tr>
<tr>
<td>MT614F</td>
<td>3.2</td>
<td>1000</td>
<td>200</td>
<td>19</td>
<td>130</td>
<td>3.2</td>
<td>-20 °C to 60 °C</td>
</tr>
<tr>
<td>MT614F</td>
<td>3.2</td>
<td>1000</td>
<td>200</td>
<td>18</td>
<td>120</td>
<td>3.2</td>
<td>-20 °C to 60 °C</td>
</tr>
<tr>
<td>MT614F</td>
<td>3.2</td>
<td>1000</td>
<td>200</td>
<td>17</td>
<td>110</td>
<td>3.2</td>
<td>-20 °C to 60 °C</td>
</tr>
<tr>
<td>MT614F</td>
<td>3.2</td>
<td>1000</td>
<td>200</td>
<td>16</td>
<td>100</td>
<td>3.2</td>
<td>-20 °C to 60 °C</td>
</tr>
</tbody>
</table>

---

The data provided in this document is for descriptive purposes only and does not imply any guarantee or warranty.

* Nominal capacity shown above is based on standard drain and cutoff voltage down to 2.5 V at 20 °C.

*1 Nominal capacity shown above is based on standard drain and cutoff voltage down to 2.0 V at 20 °C.
### Pin-type Lithium-ion Batteries

**Features**
- Small, slim battery design enables high output in smaller, more stylish products
- High-strength stainless casing boosts safety and reliability
- Rapid charging improves usability of portable devices

**Applications**
- Hearing aids, small medical devices, wireless earphones, stylus pens, smart glasses, wristband devices, etc.

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### Lithium Batteries

#### Lithium Batteries with Terminals

<table>
<thead>
<tr>
<th>Tabbed Type</th>
<th>Lead Wire Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pin-type Lithium-ion Batteries</strong></td>
<td><strong>F-type</strong></td>
</tr>
<tr>
<td><strong>G-type</strong></td>
<td><strong>Mount Type</strong></td>
</tr>
<tr>
<td><strong>H-type</strong></td>
<td><strong>Hook Type</strong></td>
</tr>
<tr>
<td><strong>V-type</strong></td>
<td><strong>Connector-lead Wire Type</strong></td>
</tr>
</tbody>
</table>

#### Pin-type Lithium-ion Batteries

### General Li-ion 18650-size

- **Diameter**: 3.65 mm
- **Height**: 20 mm
- **Weight**: 0.5 g

---

Note: Panasonic lithium batteries are available in a selection of terminal shapes to meet your needs in a variety of applications. Typical types are shown above. For the latest technical and product information, please visit our website at [https://industrial.panasonic.com/ww/products/batteries/primary-batteries/lithium-batteries](https://industrial.panasonic.com/ww/products/batteries/primary-batteries/lithium-batteries)

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Note: Panasonic testing
Nickel-Metal Hydride Batteries

U Infrastructure Backup (Long-life Type)

Features
- Long 8–10-year operational life*1
- Excellent recharging performance in high temperatures (up to 75 °C)
- High-rate discharge (3 to 5 lt discharge/20 °C)
- Great alternative to other nickel-cadmium batteries

Applications
Emergency lights, guidance lights, LED lights, wireless base-stations, servers, elevators, ATMs, POS equipment, vending machines, medical equipment, etc.

PH Infrastructure Backup (High-rate Discharge Type)

Features
- Long 4–6-year operational life*2
- High-rate discharge (5 lt discharge/30 °C)
- Ideal substitute for nickel-cadmium batteries

Applications
Elevators, automated guided vehicles, UPS systems, POS equipment, ATMs, streetlights, exit signs, etc.

H Infrastructure Backup (General Type)

Features
- Long 4–6-year operational life*2
- Stable performance in a wide range of temperatures (-10 °C to 60 °C)
- Ideal substitute for nickel-cadmium batteries

Applications
Emergency lights, guidance lights, LED lights, wireless base-stations, servers, elevators, ATMs, POS equipment, vending machines, medical equipment, etc.

V Large-type for Infrastructure Applications

Features
- Designed for extra large power capacity
- Highly efficient power supply even in low temperatures
- 5-stage LED indicates remaining battery life (BK-10V10T)

Applications
Automated guided vehicles, rail vehicles, wireless base-stations, UPS systems, etc.

<table>
<thead>
<tr>
<th>Size</th>
<th>Model No.</th>
<th>Discharge capacity (mAh)*1</th>
<th>Dimensions with tube (mm)</th>
<th>Mass (g)</th>
<th>Operating temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>BK150AAH</td>
<td>1,200</td>
<td>756x756 14.5 x 0.5 x 0.5</td>
<td>17.0</td>
<td>-10 °C to 60 °C</td>
</tr>
<tr>
<td>A</td>
<td>BK220AAH</td>
<td>1,200</td>
<td>756x756 14.5 x 0.5 x 0.5</td>
<td>17.0</td>
<td>-10 °C to 60 °C</td>
</tr>
<tr>
<td>A</td>
<td>BK310CHU</td>
<td>1,200</td>
<td>756x756 14.5 x 0.5 x 0.5</td>
<td>17.0</td>
<td>-10 °C to 60 °C</td>
</tr>
<tr>
<td>A</td>
<td>BK450CHU</td>
<td>1,200</td>
<td>756x756 14.5 x 0.5 x 0.5</td>
<td>17.0</td>
<td>-10 °C to 60 °C</td>
</tr>
<tr>
<td>A</td>
<td>BK600CHU</td>
<td>1,200</td>
<td>756x756 14.5 x 0.5 x 0.5</td>
<td>17.0</td>
<td>-10 °C to 60 °C</td>
</tr>
<tr>
<td>A</td>
<td>BK1100FHU</td>
<td>1,200</td>
<td>756x756 14.5 x 0.5 x 0.5</td>
<td>17.0</td>
<td>-10 °C to 60 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Model No.</th>
<th>Discharge capacity (mAh)*1</th>
<th>Dimensions with tube (mm)</th>
<th>Mass (g)</th>
<th>Operating temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>BK-10V16</td>
<td>1200</td>
<td>85.3 x 30.5 x 40.3</td>
<td>1240</td>
<td>26 % 20°C to 80°C</td>
</tr>
</tbody>
</table>

Note: 1 lt = rated capacity (Ah)/(hr.)

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*1 0.2 lt discharge capacity after charging at 0.1 lt for 16 hours.

*2 Lifespan compared to Panasonic standard-type battery life cycle (3 to 5 years) charged using intermittent charging method.

*3 Please consult your Panasonic sales representative when anticipating usage in operating temperatures between 75 °C and 85 °C.

Reusable, eco-friendly nickel-metal hydride batteries are widely used to support infrastructure. A long-lasting variant with efficient charging in high temperatures is available for backup applications together with high-capacity types and more.
### Nickel-Metal Hydride Batteries

Panasonic nickel-metal hydride batteries provide for safety and longevity in automotive backup applications as well as devices that suit button-top and high-rate-discharge battery types.

#### W Automotive Backup

**Features**
- Stable power delivery in a wide range of temperatures (-30 °C to 65 °C)
- Installable in tough environments as electrolyte solution is aqueous
- Easy charging and battery health checks

**Applications**
- TID, UAC, system, dashboard cameras, anti-theft security systems, etc.

#### B Button Top

**Features**
- Offers extended charge/discharge life of about 1,800 cycles \(^*2\)
- Low self-discharge and long storage life
- Excellent temperature resistance especially in freezing conditions

**Applications**
- Electric toothbrushes, electric shavers, remote controllers, etc.

#### N Standard

**Features**
- Secure and safe performance with proven reliability
- Offers a wide range of models to suit various applications

**Applications**
- Radios, intercommunication systems, cordless phones, medical equipment, etc.

#### P High-rate Discharge

**Features**
- Excellent high-current discharge characteristics
- Rapid charging capability

**Applications**
- Power tools, cordless cleaners, electric toys (e.g. radio-controlled cars), etc.

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*1 lt (A) = rated capacity (Ah)/(hr.)

*2 Measured under conditions complying with JIS C8708 2013 (7.5.1.1). Actual capacity depends on usage conditions. *3 AAA-size compatible. *4 AA-size compatible. Note: 1 lt (A) = rated capacity (Ah)/(hr.)
# Nickel-Metal Hydride Batteries

## General Comparison of Various Charging

<table>
<thead>
<tr>
<th>Charge System</th>
<th>Cycle (Repetitive) Use</th>
<th>Standby (Backup) Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant-current charge</td>
<td>Semi-constant-current charging method</td>
</tr>
<tr>
<td></td>
<td>Trickle-charging method*2</td>
<td>Internalized charging method</td>
</tr>
</tbody>
</table>

### Operation Overview

- **VB:** Battery Voltage
- **ΔV:** Voltage Change
- **I ch:** Charge Current
- **T:** Battery Surface Temperature

### Features

- **Max current:** rapid-charging method
- **Charging circuit:** is simple and affordable
- **ΔV:** cutoff charging method
- **Charging circuit:** is simple and affordable
- **Applicable to devices requiring continued charging, for long periods.
- **ΔV:** cutoff charging method
- **ΔV:** cutoff charging method

### Battery Pack

Many of our industrial batteries are sold in packs. When battery packs are installed, the battery type, number of cells, pack shape, and constituent parts are determined by the application. Considerations include voltage and current; charging specifications; available space; and usage conditions. We design and manufacture to the most common industrial applications to best meet customer needs while maintaining safety, quality, and reliability as our central focus.

### Reliable Battery Packs for Automotive Applications

Compared to the consumer market, a higher standard of quality and reliability is expected in industrial battery applications, particularly where batteries are intended for vehicles where harsh vibration and high temperature fluctuations are commonplace. To ensure quality and reliability in this environment, Panasonic selects components for battery packs with utmost care and applies stringent controls for structural assembly and battery production. Suitability for automotive use is evidenced by PPAP (Production Part Approval Process) certification and IATF16949 compliance.

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**Nickel-Metal Hydride Batteries**

- Manganese dioxide is used for the cathode material, zinc for the anode's active material, and potassium-hydride for the electrolyte solution

**Applications**

- Self-kindled gas/oil equipment, electric toys, portable radios, flashlights, wireless mice, electric toothbrushes, wall clocks, clocks, remote controllers, etc.

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**Alkaline Batteries**

- Manganese dioxide is used for the cathode material, zinc for the anode's active material, and solutions including zinc chloride as the electrolyte

**Applications**

- Self-kindled gas/oil equipment, electric toys, portable radios, flashlights, wireless mice, electric toothbrushes, wall clocks, clocks, remote controllers, etc.

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**Manganese Batteries**

- Manganese dioxide is used for the cathode material, zinc for the anode's active material, and solutions including zinc chloride as the electrolyte

**Applications**

- Self-kindled gas/oil equipment, electric toys, portable radios, flashlights, wall clocks, clocks, remote controllers, etc.