

LITHIUM CYLINDRICAL TYPE (PRIMARY)

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

COMPARISON OF LITHIUM PRIMARY CHEMISTRY\*1

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

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

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

POLY-CARBONMONOFLUORIDE LITHIUM (BR SERIES)

PRIMARY 3V							
Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal capacity*4 (mAh)	Continuous standard drain (mA)	Diameter	Height		
BR-1/2AA*5	3	1,000	2.5	14.5	25.5	8.0	-
BR-2/3A	3	1,200	2.5	17.0	33.5	13.5	BR17335
BR-2/3AG	3	1,450	2.5	17.0	33.5	13.5	BR17335
BR-A	3	1,800	2.5	17.0	45.5	18.0	-
BR-AG	3	2,200	2.5	17.0	45.5	18.0	-
BR-C	3	5,000	5.0	26.0	50.5	42.0	-

Applications

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

Features

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

Model number (example)

BR - 1 / 2 A A

Round  
Poly-Carbonmonofluoride Lithium battery

Battery size  
Battery diameter

\*1 Please contact Panasonic to get more detailed information about this technical comparison overview.  
\*2 Impedance is increasing due to the passivation phenomena.  
\*3 Harmful substances included.  
\*4 Capacity based on standard drain and cut off voltage down to 2.0V at 20°C.  
\*5 Operating temperature range is from - 40°C ~ + 100°C.

LITHIUM CYLINDRICAL TYPE (PRIMARY)

BR CYLINDRICAL TYPE • 3D ILLUSTRATION\*1

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



VIDEO



Scan QR code to view 3D animated video.

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



MANGANESE DIOXIDE LITHIUM (CR SERIES FOR CONSUMER)

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

Applications

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

Features

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

Model number (example)

CR - 1 2 3 A

Round  
Manganese Dioxide Lithium battery

Battery size  
Battery diameter

\*1 The illustration shows only one example of Lithium battery structure.  
\*2 Capacity based on standard drain and cut off voltage down to 2.0V or 4.0V at 20°C.  
\*3 In case of usage below 20mA discharge please consult Panasonic.

LITHIUM CYLINDRICAL TYPE (PRIMARY)

CR CYLINDRICAL TYPE • 3D ILLUSTRATION\*1

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



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



MANGANESE DIOXIDE LITHIUM (CR SERIES FOR INDUSTRIAL)

PRIMARY 3V

Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal capacity*2 (mAh)	Continuous standard drain (mA)	Diameter	Height		
CR-2/3AZ	3	1,600	2.5	17.0	33.5	17.0	-
CR-AG	3	2,400	2.5	17.0	45.5	24.0	-

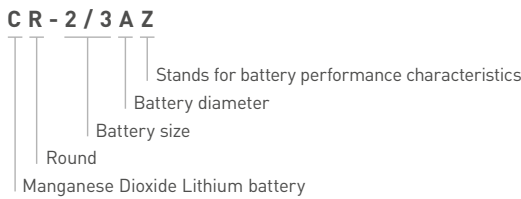
Applications

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

Features

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

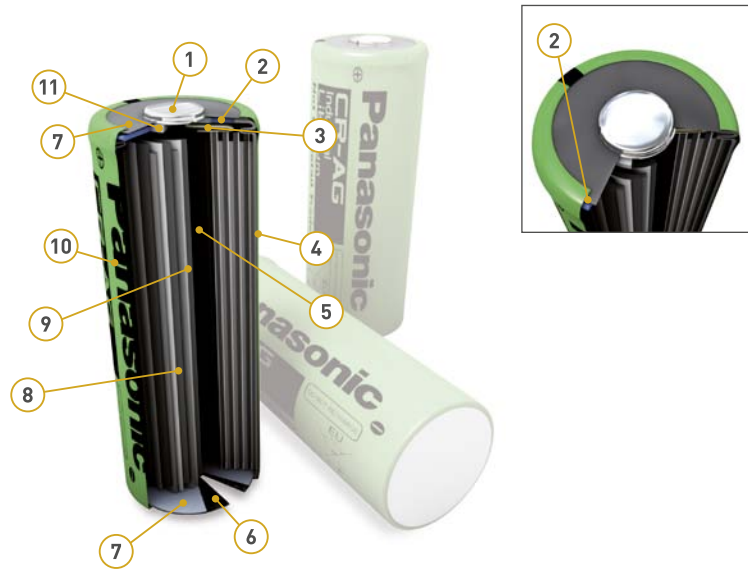
Model number (example)



LITHIUM CYLINDRICAL & COIN TYPE (PRIMARY)

CR CYLINDRICAL TYPE • 3D ILLUSTRATION\*1

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



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



POLY-CARBONMONOFLUORIDE LITHIUM (BR SERIES)

PRIMARY 3V

Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal capacity*2 (mAh)	Continuous standard drain (mA)	Diameter	Height		
BR-1220	3	35	0.03	12.5	2.0	0.7	-
BR-1225	3	48	0.03	12.5	2.5	0.8	BR1225
BR-1632	3	120	0.03	16.0	3.2	1.5	-
BR-2032	3	200	0.03	20.0	3.2	2.5	-
BR-2325	3	165	0.03	23.0	2.5	3.0	BR2325
BR-2330	3	255	0.03	23.0	3.0	3.2	-
BR-3032	3	500	0.03	30.0	3.2	5.5	-

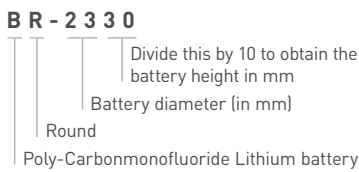
Applications

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

Features

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

Model number (example)



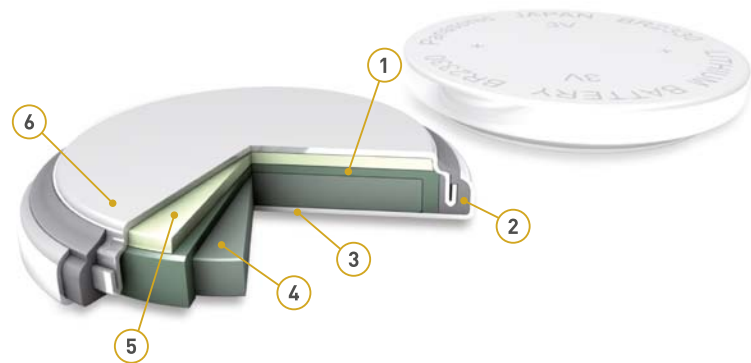
\*1 The illustration shows only one example of Lithium battery structure.  
\*2 Capacity based on standard drain and cut off voltage down to 2.0V at 20°C.

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

LITHIUM COIN TYPE (PRIMARY)

BR COIN TYPE • 3D ILLUSTRATION\*1

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



**BR-A SERIES COIN TYPE LITHIUM FOR HIGH TEMPERATURE USAGE** The high energy density and the special material for gasket and separator make this battery series the ideal power supply in high ambient temperature applications.



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

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

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

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

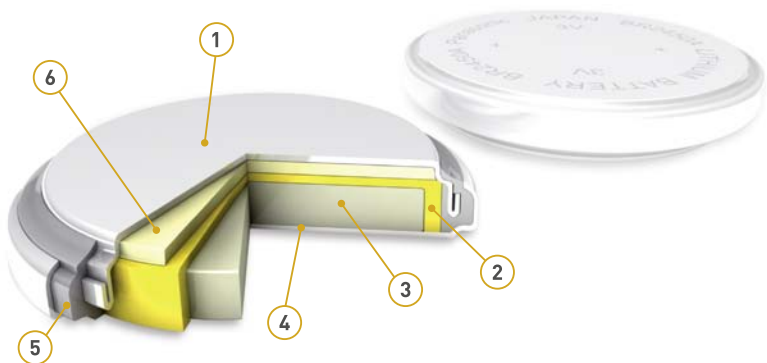
**Model number (example)**

**BR - 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

BR COIN 'A' TYPE • 3D ILLUSTRATION\*1

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



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

LITHIUM COIN TYPE (PRIMARY)

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



MANGANESE DIOXIDE LITHIUM (CR SERIES)

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

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

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

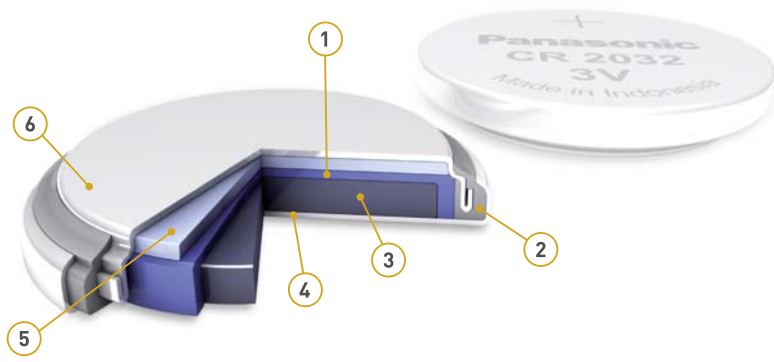
**Model number (example)**

**CR - 2 0 3 2**

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

CR COIN TYPE • 3D ILLUSTRATION\*2

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



\*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.

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-CARBONMONOFLUORIDE LITHIUM (BR SERIES)

PRIMARY 3V							
Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal*1 capacity (mAh)	Continuous standard drain (mA)	Diameter	Height		
BR-425	3	25	0.5	4.2	25.9	0.6	-
BR-435	3	50	1.0	4.2	35.9	0.9	-

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

VANADIUM PENTOXIDE LITHIUM (VL SERIES)

RECHARGEABLE 3V							
Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal*2 capacity (mAh)	Continuous standard drain (mA)	Diameter	Height		
VL-621*3	3	2	0.01	6.8	2.1	0.3	-
VL-1220*3	3	7	0.02	12.5	2.0	0.8	-
VL-2020*3	3	20	0.07	20.0	2.0	2.2	-
VL-2320*3	3	30	0.10	23.0	2.0	2.7	-
VL-2330*3	3	50	0.10	23.0	3.0	3.5	-
VL-3032*3	3	100	0.20	30.0	3.2	6.2	-

MANGANESE LITHIUM (ML SERIES)

RECHARGEABLE 3V							
Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal*1 capacity (mAh)	Continuous standard drain (mA)	Diameter	Height		
ML-421	3	2	0.005	4.8	2.1	0.1	-
ML-614	3	3	0.005	6.8	1.4	0.2	-
ML-621	3	5	0.010	6.8	2.1	0.2	-
ML-920	3	11	0.010	9.5	2.0	0.4	-
ML-1220	3	17	0.030	12.5	2.0	0.8	-
ML-2020	3	45	0.030	20.0	2.0	2.2	-

\*1 Based on standard drain and cut off voltage down to 2.0V at 20°C.  
\*2 Based on standard drain and cut off voltage down to 2.5V at 20°C.  
\*3 Only batteries with terminals are available.

LITHIUM COIN TYPE (RECHARGEABLE)

MANGANESE TITANIUM LITHIUM (MT SERIES)

RECHARGEABLE 1.5V							
Model number	Electrical characteristics at 20°C			Dimensions (mm)		Approx. weight (g)	IEC
	Nominal voltage (V)	Nominal*1 capacity (mAh)	Continuous standard drain (mA)	Diameter	Height		
MT-516	1.5	2	0.4	5.8	1.6	0.2	-
MT-621	1.5	3	0.4	6.8	2.1	0.3	-
MT-920	1.5	5	0.4	9.5	2.0	0.5	-

**Applications**

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

**Features**

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

**Model number (example)**

**VL - 2 0 2 0**

Divide this by 10 to obtain the battery height in mm

Battery diameter (in mm)

Round

Panasonic Vanadium Pentoxide Lithium battery

VL COIN TYPE • 3D ILLUSTRATION\*2

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 Produkt Manager  
Continental Automotive GmbH

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

H type

V type

G type

T type

F type

S type

BR-1/2AA with axial pin terminal

[ ] : Reference Dimension (Unit: mm)

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