

## GO LOGGER SERVICE BULLETIN

### Important Information about Devices Containing Lithium Coin Batteries:

The following information is provided to help you ensure that you and other parties in your supply chain, use Cargo Solutions temperature-sensing GO Loggers (“Logger”) safely and recycle them properly. For Trackers, visit the [Go Real-Time Tracker Service Bulletin](#).



Each Logger uses a single CR2032 lithium coin cell installed in its circuit board for power. **The CR2032 battery cell installed in each Logger contains less than 0.1 grams of lithium metal per cell.** CR2032 lithium coin batteries are the most common battery coin providing long-lasting, reliable power for various devices, used to power small electronics devices such as calculators, wrist watches, various medical devices, fitness appliances, toys, etc. Handle all products containing batteries with care.

Loggers are designed and manufactured with features that protect the battery under normal and intended use. The batteries in Loggers are certified under UN 38.3, for a complete copy contact [CargoSupport@emerson.com](mailto:CargoSupport@emerson.com). The included [Logger Battery Safety Data Sheet and Testing Summary](#) provides information and instructions from the manufacturer.

The following initiatives are important to the safe and environmentally sound use/disposal of Loggers:

### Commitment to Safety & Quality - Customer Success Training

Emerson uses a standard component supplier for the coin batteries in Loggers. Our manufacturers are certified and have provided the above-linked safety data sheet and certification.

For training or additional information, email: [CargoSupport@Emerson.com](mailto:CargoSupport@Emerson.com), or view the GO Wireless Logger: How-To at <https://www.youtube.com/watch?v=72TkFb0Ix2Y>.

### GO GreenSense: Battery Return and Recycling Made Easy

Our GO GreenSense recycling program facilitates the proper shipping and recycling of batteries. We provide eco-friendly return boxes, pre-paid postage labels, and battery labels. Customers can place units in the return box and ship it back when full. GO GreenSense takes the hassle out of returning temperature monitoring devices for recycling. When those receiving cargo don't take advantage of this program, there is a risk that the batteries may be improperly disposed of, causing a safety or environmental hazard.

To get started, email: [GOGreen@Emerson.com](mailto:GOGreen@Emerson.com).

The contents of this notification are presented for informational purposes only as of the date of preparation. Cargo Solutions makes no warranties or guarantees, express or implied, with respect to this information, and disclaims all liabilities from reliance on it. Responsibility for proper selection, proper use of Logger remains solely with customer and customer is responsible for ensuring compliance by end users. Loggers are sold according to the Cargo Solutions Terms available at: <https://climate.emerson.com/documents/doc-cargot-c-rev06122019-en-us-5529276.pdf> (or within any fully executed, applicable agreement between customer and Cargo Solutions).



## PRODUCT SAFETY DATA SHEET

Coin/Button Lithium Manganese Dioxide Batteries

Type No.: CR2032

Approximate Weight: 3.2g

**CHEMICAL SYSTEM:** Lithium Manganese Dioxide **Designed for Recharge:** No

### HAZARDS IDENTIFICATION

Under normal conditions of use, the battery is hermetically sealed.

**Ingestion:** Swallowing may lead to serious injury or death in as little as 2 hours due to chemical burns and potential perforation of the esophagus. **Immediately see doctor.** Do not induce vomiting or give food or drink.

**Inhalation:** Contents of an open battery can cause respiratory irritation.

**Skin Contact:** Contents of an open battery can cause skin irritation.

**Eye Contact:** Contents of an open battery can cause severe irritation.

### INGREDIENTS

**IMPORTANT NOTE:** The battery should not be opened or burned. Exposure to the ingredients contained within or their combustion products could be harmful.

Material	CAS No.	Approximate Percent ( wt % )
Manganese dioxide	1313-13-9	26.8
Graphite	7782-42-5	2.2
Teflon	9002-84-0	1.5
Lithium	7439-93-2	2.1
Lithium Perchlorate	7791-03-9	0.9
Propylene carbonate	108-32-7	6.5
1,2 Dimethoxyethane	110-71-4	1.7
Stainless Steel	7439-89-6	53.6
Plastic	9003-07-0	4.7

### FIRST AID MEASURES

**Ingestion:** Swallowing may lead to serious injury or death in as little as 2 hours due to chemical burns and potential perforation of the esophagus. **Immediately see doctor.** Do not induce vomiting or give food or drink.

**Inhalation:** Provide fresh air and seek medical attention.

**Skin Contact:** Remove contaminated clothing and wash skin with soap and water.

**Eye Contact:** Immediately flush eyes thoroughly with water for at least 15 minutes, lifting upper and lower lids, until no evidence of the chemical remains. Seek medical attention.

**Note:** Carbon black is listed as a possible carcinogen by International Agency for Research on Cancer (IARC).

## FIRE FIGHTING MEASURES

In case of fire where lithium batteries are present, flood area with water or smother with a Class D fire extinguishant appropriate for lithium metal, such as Lith-X. Water may not extinguish burning batteries but will cool the adjacent batteries and control the spread of fire. Burning batteries will burn themselves out. Virtually all fires involving lithium batteries can be controlled by flooding with water. However, the contents of the battery will react with water and form hydrogen gas. In a confined space, hydrogen gas can form an explosive mixture. In this situation, smothering agents are recommended. A smothering agent will extinguish burning lithium batteries.

Emergency Responders should wear self-contained breathing apparatus. Burning lithium manganese dioxide batteries produce toxic and corrosive lithium hydroxide fumes.

## ACCIDENTAL RELEASE MEASURES

To cleanup leaking batteries:

**Ventilation Requirements:** Room ventilation may be required in areas where there are open or leaking batteries.

**Respiratory Protection:** Avoid exposure to electrolyte fumes from open or leaking batteries.

**Eye Protection:** Wear safety glasses with side shields if handling an open or leaking battery.

**Gloves:** Use neoprene or natural rubber gloves if handling an open or leaking battery.

Battery materials should be collected in a leak-proof container.

## HANDLING AND STORAGE

**Storage:** Store in a cool, well ventilated area. Elevated temperatures can result in shortened battery life. In locations that handle large quantities of lithium batteries, such as warehouses, lithium batteries should be isolated from unnecessary combustibles.

**Mechanical Containment:** If potting or sealing the battery in an airtight or watertight container is required, consult a **Universal Power Group, Inc.** representative for precautionary suggestions. Do not obstruct safety release vents on batteries. Encapsulation of batteries will not allow cell venting and can cause high pressure rupture.

**Handling:** Accidental short circuit for a few seconds will not seriously affect the battery. Prolonged short circuit will cause the battery to lose energy, generate significant heat and can cause the safety release vent to open. Sources of short circuits include jumbled batteries in bulk containers, metal jewelry, metal covered tables or metal belts used for assembly of batteries into devices. Damaging a lithium battery may result in an internal short circuit.

The contents of an open battery, including a vented battery, when exposed to water, may result in a fire and/or explosion. Crushed or damaged batteries may result in a fire.

If soldering or welding to the battery is required, consult **Universal Power Group, Inc.** for proper precautions to prevent seal damage or short circuit.

**Charging:** This battery is manufactured in a charged state. It is not designed for recharging. Recharging can cause battery leakage or, in some cases, high pressure rupture. Inadvertent charging can occur if a battery is installed backwards.

**Labeling:** If the label or package warnings are not visible, it is important to provide a package and/or device label stating:

WARNING: Battery can explode or leak and cause burns if installed backwards, disassembled, charged, or exposed to water, fire or high temperature.

Where accidental ingestion of small batteries is possible, the label should include:

**(1) KEEP OUT OF REACH OF CHILDREN.** Swallowing may lead to serious injury or death in as little as 2 hours due to chemical burns and potential perforation of the esophagus. **Immediately see doctor.** Keep in original package until ready to use. Dispose of used batteries immediately.

## EXPOSURE CONTROLS/PERSONAL PROTECTION

**Ventilation Requirements:** Not necessary under normal conditions.

**Respiratory Protection:** Not necessary under normal conditions.

**Eye Protection:** Not necessary under normal conditions.

**Gloves:** Not necessary under normal conditions.

## PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point @ 760 mm Hg (°C)	Not applicable for an Article
Vapor Pressure (mm Hg @ 25°C)	Not applicable for an Article
Vapor Density (Air = 1)	Not applicable for an Article
Density (g/cm <sup>3</sup> )	2.0 – 3.0
Percent Volatile by Volume (%)	Not applicable for an Article
Evaporation Rate (Butyl Acetate = 1)	Not applicable for an Article
Physical State	Solid
Solubility in Water (% by weight)	Not applicable for an Article
pH	Not applicable for an Article
Appearance and Odor	Solid object / no odor

## STABILITY AND REACTIVITY

Lithium manganese dioxide batteries do not meet any of the criteria established in 40 CFR 261.2 for reactivity.

## TOXICOLOGICAL INFORMATION

Lithium manganese dioxide batteries are not hazardous waste. Under normal conditions of use, lithium manganese dioxide batteries are non-toxic.

## ECOLOGICAL INFORMATION

Issues such as ecotoxicity, persistence and bioaccumulation are not applicable for articles.

## DISPOSAL CONSIDERATIONS

Dispose of in accordance with all applicable federal, state and local regulations.

## TRANSPORT INFORMATION

In general, all batteries in all forms of transportation (ground, air, or ocean) must be packaged in a safe and responsible manner. Regulatory concerns from all agencies for safe packaging require that batteries be packaged in a manner that prevents short circuits and be contained in "strong outer packaging" that prevents spillage of contents. All original packaging for lithium batteries are compliant with these regulatory concerns.

Lithium coin batteries are exempt from the classification as dangerous goods as they meet the requirements of the special provisions listed below. (Essentially, they are properly packaged and labeled, contain less than 1 gram of lithium and pass the tests defined in UN model regulation section 38.3).

Regulatory Body	Special Provisions
ADR	188, 230, 310, 636, 656
IMDG	188, 230, 310, 957
UN	UN 3090, UN 3091
US DOT	29, A54, A100, A101
IATA, ICAO	Packaging Instructions 968 - 970

## REGULATORY INFORMATION

Outside of the transportation requirements noted in Section 14, lithium manganese dioxide batteries marketed by LIXING are not regulated.

SARA/TITLE III - As an article, this battery and its contents are not subject to the requirements of the Emergency Planning and Community Right-To-Know Act.



## 1. Purpose

1.1 In order to avoid errors and deviations by different testing method or condition, we established this specification to define the battery model and test method of lithium battery manufactured by Lixing.

1.2 Give some guidance for using our products.

## 2. Description and Model

Table 1

Description	Model
Lithium manganese dioxide button battery	<b>CR2032</b>

## 3. Technical parameters

Table 2

No.	Items	Characteristics
1	Nominal Capacity	220mAh (or 2360h) (Continuously discharged under 30kΩ load till 2.0V end-point voltage at the temperature of 23? ±3 ).
2	Nominal Voltage	3V
3	Operating Temperature range	-20~+60?
4	Self-discharge Rate per year	≤2%
5	Max. Pulse Current*	12 mA
6	Max. Continuous Discharge Current*	4 mA
7	Max. Outline Dimensions	Diameter: 20.0 mm, Height:3.2 mm
8	Structures	Manganese dioxide cathode, lithium anode, organic electrolyte, polypropylene separator and stainless steel cell can and cap, etc.
9	Weight for Reference	about 3.2g

\* The max pulse current means that when a 40% discharged battery is discharged in this current for 15 seconds, the loaded voltage should be higher than 2.0V at 23? .

\* The max continuous discharge current means that when the battery is discharged in this current to 2.0V at 23? ,

50% of nominal capacity could be obtained.

## 4. Characteristics and test method

### 4.1 Normal characteristics

Table 3

No.	Items	Standard		Test Method
1	Max. Outline Dimensions	Diameter $\phi$ 20.0 mm, height 3.2 mm		Measured by caliper with the precision of which is not less than 0.02mm or other equal precision instrument.
2	Appearance	The surfaces of the batteries are clean. The mark is clear. There should not be deformation, scar or leakage.		Visual inspection
3	Off-load Voltage	3.0~3.5V		The battery in delivery state should be stored for more than 24hours at the temperature of $23^{\circ} \pm 3$ , a relative humidity of 45%~75%, and the voltage between the two terminals should be measured with a voltmeter at the same ambient environment.
4	Nominal Capacity	220mAh (or 2360h)		The samples should be stored for more than 24hours at $23^{\circ} \pm 3$ , 45%~75%RH., then be continuously discharged under 30k $\Omega$ load to 2.0V end-point voltage at the same ambient environment.
5	Terminals	The terminals should have good electro-conductibility. There is no rust , no leakage and no deformation.		Visual inspection
6	Temperature Characteristics	Discharged at lower temp.	60% of nominal capacity	The samples should be continuously discharged under 30k $\Omega$ load to 2.0V end-point voltage at $-20^{\circ} \pm 2$ .
		Discharged at high temp.	99% of nominal capacity	The samples should be continuously discharged under 30k $\Omega$ load to 2.0V end-point voltage at $60^{\circ} \pm 2$ .

### 4.2 Inspection for service output

4.2.1 Twelve samples should be tested for service output.

4.2.2 If the average value is equal to or more than the value of table 3 , and if the number of batteries showing a value less than 80% of the value of table 3 is 1 or less. The batteries are considered to conform to the requirement.

4.2.3 If the average value is less than the value of table 3 or if the number of batteries showing a value



less than 80% is 2 or more, the test should be repeated with other 12 pieces. At the second test, if the average value is equal to or more than the value of table 3 and if the number of batteries showing a value less than 80% of the value of table 3 is 1 or less, these batteries are considered to conform to the requirement.

4.2.4 At above second test, if the average value is less than the value of table 3 or if the number of batteries showing a value less than 80% of the value of table 3 is 2 or more, the batteries are considered not to conform to the requirement. A third test should not be performed.

### 4.3 Safety Characteristics

Table 4

No.	Items	Standard	Test Method
A	Altitude Simulation Test	NL、NC、NR、NE、NF	At 20 ? ±2 °C, the batteries should be stored at the pressure of 11.6 KPa or less for at least six hours.
B	Temperature Cycling	NL、NC、NR、NE、NF	The batteries should be submitted to 150 temperature cycles from 60? ~-10? ,and then be stored for more than 24hours at 23 ±3 , 45%~75%RH.
C	Vibration	NM、NL、NV、NC、NR、NE、NF	The batteries should be subjected to a simple harmonic motion with an amplitude of 0.8mm(1.6mm total maximum excursion). The frequency is to be varied at the rate of 1Hz per minute between 10 and 55Hz.The test should be last 90min~100min and the cell should be tested in two mutually perpendicular direction.
D	Shock	NM、NL、NV、NC、NR、NE、NF	The batteries should be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each battery should be subjected to a total of three shocks of equal magnitude. The shocks are to be applied in each of the three mutually perpendicular directions. Each shock is to be applied in a direction perpendicular to the face of the battery. For each shock the battery is to be accelerated in such a manner that, during the initial 3ms, the minimum average acceleration is 75×9.8m/s <sup>2</sup> . The peak acceleration should be between 125×9.8 m/s <sup>2</sup> ~175×9.8 m/s <sup>2</sup> .
E	External Short Circuit	NT、NR、NE、NF	The batteries to be tested should be temperature stabilized so that its external case temperature reaches 55 ± 2 °C and then the batteries should be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 55 ± 2 °C. This short circuit condition is continued for at least one hour after the battery external case temperature has returned to 55 ± 2 °C. The battery must be observed for a further six hours for the test to be concluded. The battery to be tested should have endured vibration and shock test. Otherwise the battery endured altitude simulation test should be test..



No.	Items	Standard	Test Method
F	Impact	NT, NE, NF	The test sample battery is to be placed on a flat surface. A 15.8 mm diameter bar is to be placed across the centre of the sample. A 9.1 kg mass is to be dropped from a height of 610 ±25 mm onto the sample. The battery is to be impacted with the flat surface of the sample parallel to the flat surface and the 15.8 mm diameter curved surface lying across its centre. The battery should be impacted for one time.
G	Crush	NT, NE, NF	A battery is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram with a 32 mm (1.25 inch) diameter piston. The crushing is to be continued until a pressure reading of 17 MPa is reached on the hydraulic ram, resulting in an applied force of 13 KN. Once the maximum pressure has been obtained it is to be released. A coin or button battery is to be crushed with the flat surface of the battery parallel with the flat surfaces of the crushing apparatus. Each sample battery is to be subjected to a crushing force in only one direction.
H	Forced-discharge	NE, NF	Each battery should be forced discharged at ambient temperature of 23? ±3 by connecting it in series with a 12 V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer. Each battery should be forced discharged for a time equal to the time in which a new cell is discharged to 2.0V .
I	Abnormal Charge	NE, NF	Sample batteries are to be connected reversely with a D.C. power supply , and subjected to a constant charging current at 3 times the I <sub>c</sub>
J	Free Drop	NV, NE, NF	The not-discharged battery is to be dropped from a height of 1m onto a concrete surface. Each sample is to be dropped six times, two times in each direction. The sample should be examined 1 hours after testing
K	Heating Test	NE, NF	The battery should be placed in an oven. The oven temperature should be increased at a rate of 5? ±2 per minute until the oven reached 130? ±2 .The oven should be maintained at 130 ? ±2 for 10min.

**Additional requirement:**

**Distortion:** Distortion should be reported with the cause.

**venting:** If electrolyte leaks from the vent area without vent operation, it should be considered as leakage.

**NM:** no weight loss

**NL :** no leakage

**NV:** no venting

**NF:** no fire

**NC :** no short circuit

**NR:** no rupture

**NE:** no explosion

**NT:** no overheating (the temperature at the surface of battery not exceed 150? )

## 4.4 Test condition

### 4.4.1 State of batteries:

The batteries should be in three months after the batteries been finished. The time when the batteries been finished is marked on the surface of batteries.

### 4.4.2 Normal testing environment:

If no special requirement, test should be made under the temperature of 15? ~25? and relative humidity of 45%-75%.

### 4.4.3 Test precision:

The measuring tolerances relative to the specified or actual values should be within these range:

Voltage	Current	Capacity	Temperature	Time	Weight	Dimension
±1%	±1%	±1%	±2?	±0.1%	±0.1%	±0.1%

These tolerances include all errors caused by precision of testing instrument, testing method and testing process.

## 5. Packaging

Dimension of box	Net weight	Gross weight
355mm×285mm×275mm	18KG	19.6KG

Normal package : 5600 pcs per box. (package figure is showed in appendix 3)

## 6. Environment requirement

The product does not contain controlled substances of level 1.

## 7. Producing standard and certification

Our batteries are produced according with the IEC standard, and have past UL, UN safety test.

## 8. Transportation

- The Batteries should be stored away from solarization, fire, rain, water, and never put together with corrosive during transportation.
- Vibration and shock during transportation and load-and-unload should be restrict to a minimum level.
- The height should not exceed 1.5m for cardboard packages.
- The batteries if transported by sea should be stored away from ship engines during prolonged

transit, and not left for long periods in unventilated environment during summer.

## 9. Information for safety

### ! Danger

- Do not overheat batteries or dispose of batteries in fire.
- Do not put batteries in water or moisten them.
- Do not put batteries together with metalwork such as necklace, coins, etc in one bag, or store them together
- Do not short-circuit batteries.
- Do not inset batteries in reverse. Observe the + and – markings on battery and equipment.
- Do not disassemble batteries.
- Do not weld or solder directly to batteries.
- Do not use deformed batteries or batteries with serious scar.
- Read the guide carefully before using batteries. Unsuitable operation will make batteries overheat, fire, explode, destroy or reduce battery's capacity.

### ! Warning

- Do not place the battery in heater, washer or high-pressure container.
- Do not use the battery together with different kind of or different type of battery.
- Stop using when the battery become heat, emit smell or appear other abnormality during use, or storing.
- Do not recharge the battery.
- Do not force-discharge the battery.
- Keep away from the battery when the battery is leakage or emit abnormal smell.
- Wash yourself quickly when the electrolyte infiltrate to your skin or clothes.
- Wash your eyes with clean water quickly and go to hospital for further check if the electrolyte infiltrate to your eyes.
- Please contact with us in advance If two or more batteries are to be connected in a series and / or placed in a parallel arrangement.

### ! Caution

- Keep the battery away from the children, avoid being swallowed.
- Read the guide carefully and pay attention to the guide when using the battery.
- Read the instrument guide carefully before installing the battery or uninstalling the battery from the instrument.
- Take out of the battery when the life of the battery is over.
- Take out of the battery and keep it under the condition of low temperature and low humidity

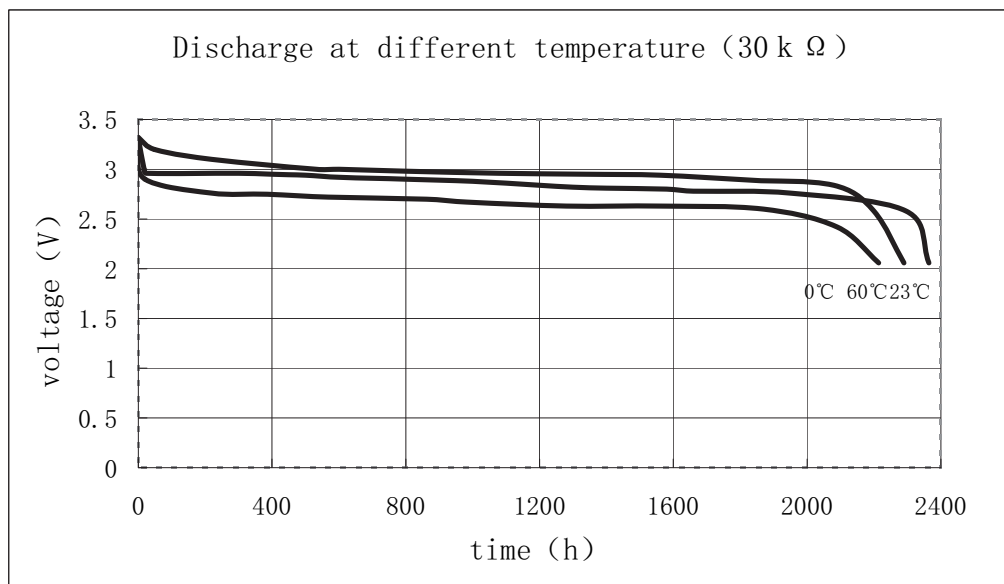
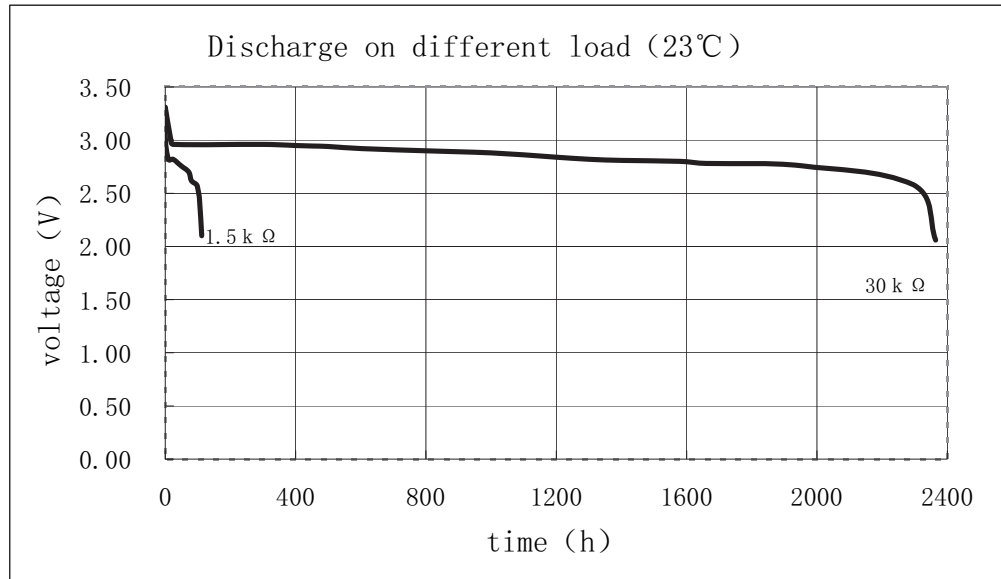
when the battery is not used for a long time.

- Clean the battery with dry cloth before use if the connection of the battery is dirty.
- Battery should be used and stored far from the electrostatic place.

## 10. Storage

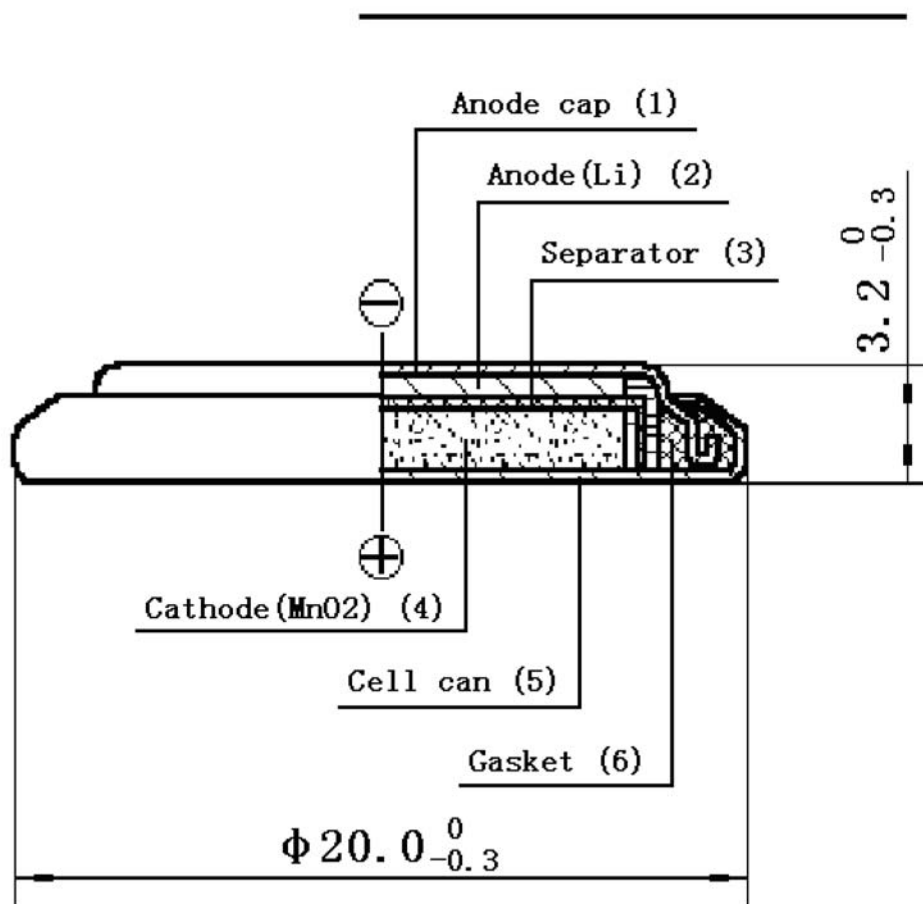
- The batteries should be stored at 10° ~25° (never exceed 30° ), 45%~75%RH.
- The batteries should not be stored next to heat sources nor in direct sunlight. The storage area should be clean, cool, dry, ventilated and weatherproof.
- The height to which batteries may be stacked is clearly dependent on the strength of the packaging. As a general rule, this height should not exceed 1.5m for cardboard packages nor 3m for wooden cases.
- Store and display batteries in their original package. The batteries may be short-circuited or damaged if been unpacked and stacked mussily.

## Appendix 1: CR2032 discharge curves



## Appendix 2: CR2032 Cross Section Draw

CR2032 Cross section view



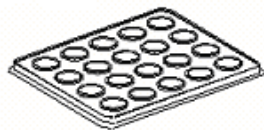
## Appendix 3: Structure Figure of Package

### Structure Figure of Package CR2032 5600 Pcs Per Box

1. Battery (-)

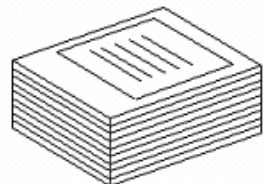


2. 20Pcs Per Plate

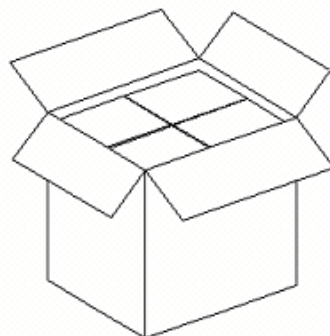


Outline Dimensions of  
Plate: 136×166×7

3. 10 Plates Per Min Package



4. 28 Min Package Per Box



Outline Dimensions of  
Box: 355×285×275  
Net: 18 kg  
Gross: 19.6 kg