

鈕型鋰錳電池規格書
SPECIFICATIONS
FOR MANGANESE DIOXIDE LITHIUM BATTERY

CR2016

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鈕型鋰錳電池 Manganese Dioxide Lithium Battery CR2016

1、範圍 Scope

該規格書適用於由松柏(廣東)電池工業有限公司提供之“Vinnic”商標鈕型鋰錳 CR2016 電池。

This specification is applicable to the “Vinnic” brand Coin Type Manganese Dioxide Lithium Battery CR2016 supplied by CHUNG PAK BATTERY WORKS LTD.

2、產品類型 Kind of Products Specified

Vinnic	IEC	ANSI	JIS	其他 Others
CR2016	CR2016	5000LC	/	ECR2016, DL2016

3、規範性引用文件 Normative references

GB/T 8897.1-2021 原電池 第 1 部分：總則 (IEC 60086-1: 2015, MOD);

GB/T 8897.2-2021 原電池 第 2 部分：外形尺寸和電性能要求 (IEC 60086-2: 2015, MOD);

GB 8897.4-2008 原電池 第 4 部分：鋰電池的安全要求(IEC 60086-4:2019, MOD);

符合 2006/66/EC(EEC)環保要求。

IEC 60086-1 ED13 (2021) Primary batteries - Part 1: General

IEC 60086-2 ED14 (2021) Primary batteries - Part 2: Physical and electrical specifications

IEC 60086-4 ED5 (2019) Primary batteries - Part 4: Safety of lithium batteries

Conform to Directive 2006/66/EC.

4、化學體系 Chemical System

鋰-二氧化錳 Lithium -Manganese Dioxide

5、技術參數 Technology Parameters

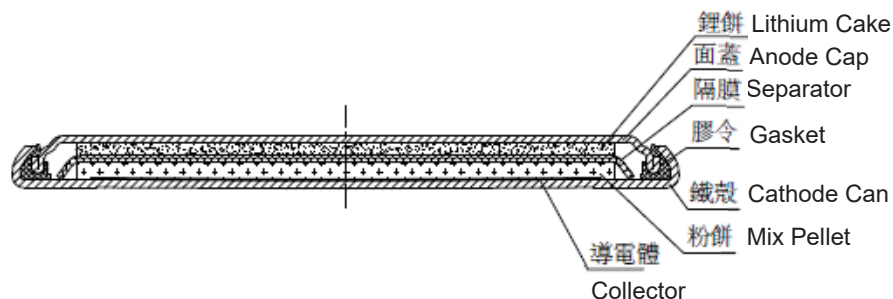
No.	項目 Item	特性 Characteristics	備註 Remark
5.1	型號 Model No.	CR2016	
5.2	標稱電壓 Nominal Voltage	3.0V	
5.3	額定容量 Nominal capacity	90mAh	20±2℃條件下，以 30KΩ 連續放電，終止電壓 2.0 V，取 8pcs 電池的放電平均值 Continuously discharged under 30KΩ load till 2.0 V end voltage at temperature of 20±2℃. The average discharging time of 8pcs batteries.
5.4	標準放電電流 Standard discharge current	0.1mA	
5.5	最大放電電流 Maximum discharge current	3mA	
5.6	放電時間 Typical discharge duration	815hrs	20±2℃條件下，以 30KΩ 連續放電，終止電壓 2.0 V，取 8pcs 電池的放電平均值 Continuously discharged under 30KΩ load till 2.0 V end voltage at temperature of 20±2℃. The average discharging time of 8pcs batteries.

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(續上表 Continuous)

5.7	外形尺寸 Dimension	總高 Height (H)	$1.60^{+0}_{-0.20}$ mm	
		直徑 Diameter (Φ)	$20.00^{+0}_{-0.30}$ mm	
5.8	重量 Nominal weight	1.7g		
5.9	使用溫度 Operating Temperature	-20℃~60℃		
5.10	貯存條件 Storage Condition	溫度 Temperature	10℃~25℃	貯存溫度不應當超過 30℃ Storage temperature should never exceed 30℃.
		濕度 Humidity	55±20%	避免長時間處於極端濕度(相對濕度高於 95%或低於 40%)下 Extremes of humidity (over 95% RH and below 40% RH) for sustained periods should be avoid.

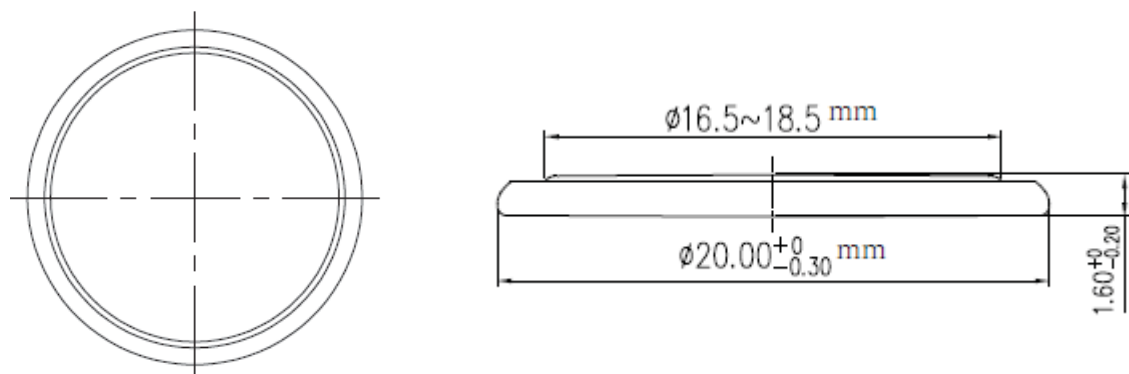
5.11 成品電池結構圖 The drawing of the finished battery :



注：以上電池結構圖配件形狀與實物會有偏差，僅供參考使用。

Remark: There is deviation between part shape of "The Finished Battery Drawing" and actual product. The Drawing of Finished Battery is for reference only.

5.12 外形尺寸與端子 Outline shape dimensions and terminals :



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6、特性 Performance

6.1 空載電壓 Off-load voltage

溫度 Temperature	20±2℃	0±2℃	備注 Remarks
初制成 Initial	3.13V~3.50V	3.05V~3.50V	開路狀態 Off-load
貯存 12 個月後 After 12 months	3.10V~3.40V	3.05V~3.40V	
貯存 24 個月後 After 24 months	3.05V~3.35V	3.02V~3.35V	
貯存 36 個月後 After 36 months	3.02V~3.30V	3.00V~3.30V	

6.2 負載電壓 On-load voltage

溫度 Temperature	20±2℃	0±2℃	備注 Remarks
初制成 Initial	3.00V~3.35V	3.00V~3.35V	30KΩ 負載 0.8 秒 30KΩ load after 0.8sec.
貯存 12 個月後 After 12 months	3.00V~3.35V	3.00V~3.35V	
貯存 24 個月後 After 24 months	3.00V~3.30V	3.00V~3.30V	
貯存 36 個月後 After 36 months	3.00V~3.25V	3.00V~3.25V	

6.3 放電特性 Self-discharge characteristic

參考 要求 Reference Requirement	放電條件 Discharge Condition				最小平均放電時數 Average Minimum duration			
	負載 電阻 Load resistance	放電 方法 Discharge method	溫 度 Temperature	終止 電壓 (V) End point voltage (V)	初 制 成 Initial	存放 12 個月后 After 12 months storage	存放 24 個月后 After 24 months storage	存放 36 個月后 After 36 months storage
IEC	30KΩ	連續 Continuous	20±2℃	2.0V	815Hrs	800Hrs	775Hrs*	750Hrs*
REF	30KΩ	連續 Continuous	60±2℃**	2.0V	780Hrs	/	/	/
REF	30KΩ	連續 Continuous	0±2℃	2.0V	760Hrs	/	/	/

自放電率<2%/年。Selfdischarge rate<2%/year.

“**”: 為 REF 標準; It's REF standard;

“***”: 經高溫(60±2℃)存放 20 天后, 在 20±2℃條件下連續放電。

After 20 days storage at the high temperature (60±2℃) and then shall be continuously discharge at 20±2℃ under 30KΩ till 2.0V.

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“初制成”是指生產後一個月或一個月以內的產品，包括那些生產後已開始放電尚不到三個月的電池。
The word “initial” is applicable to the products elapsed one month or less after production, including those to which tests have been started in less than three month after production.

符合性標準 Satisfaction Standard:

1)每批放電標準用 8 個電池作測試;

8 piece of battery will be tested for each discharging standard;

2)每個放電標準下的平均放電時間的結果等於或者大於平均最小放電時間要求;不多於一個電池的電性能輸出低於規格要求的 80%;

The result of the average discharging time from each discharging standard shall be equal to or more than the average minimum time requirement and no more than one battery has a service output less than 80% of the specified requirement.

3)允許一次重新測試來確定先前的結果。

One re-test is allowed to confirm the previous result.

6.4 抗漏液試驗 Resistance to leakage

項 目 Test items	條 件 Condition	貯存期 Storage period	特 性 Requirement	備 注 Remarks
高 溫 High temp.	60±2℃	30 Days	無漏液 No leakage	存放到期,電池應置於 20±2℃ 至少 8hrs 后,用裸眼觀察。 After storage, the battery should be kept at 20±2℃ for 8hrs. (shall be inspected by visual means)
過放電 Over discharge	20±2℃	/	無漏液、無變形 No leakage, no deformation	以 30KΩ 連續放電,終止電壓 1.2 V。 Continuously discharged under 30KΩ till 1.2V.

6.5 外部短路 External short circuit

電池應在 55±2℃ 的環境下達到平衡后,在相同溫度下經受外電路總阻值小 0.1Ω 於的短路,短路繼續至電池外殼溫度回落至 55±2℃ 后,再持續 1h 以上。試驗進行至結束,電池無漏液、不着火。

The test batteries shall be stabilized at 55±2℃ and then subjected to a short-circuit condition with a total external resistance of less than 0.1Ω at 55±2℃. This short condition is continued for at least 1hr after the battery case temperature has returned to 55±2℃. There is no explosion, no fire.

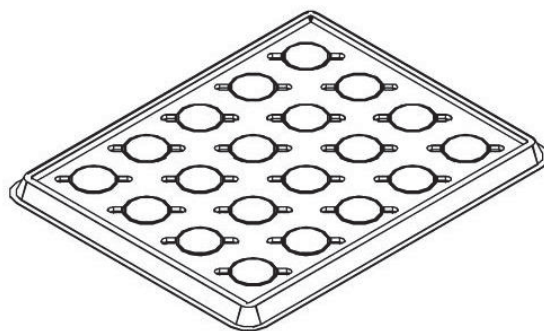
6.6 保存期: 5 年。(溫度 20±2℃, 相對濕度 55±20%)

Storage life: 5 years. (Temperature: 20±2℃, Relative Humidity 55±20%)

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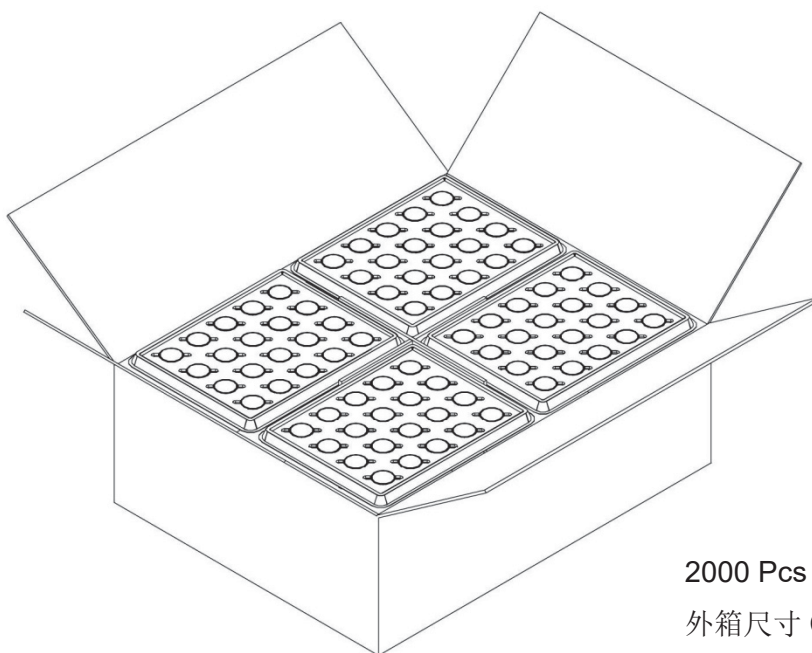
7、商標與包裝 Brand and packaging

7.1 標準与包裝附圖 Standard and packaging :



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20 Pcs/白磁托 Per Display Pallet
白磁托尺寸 White Insulate Pallet Measure :
170X136X6 mm



2000 Pcs Per Display Carton
外箱尺寸 Carton Measure: 35.5X28.2X9.9 cm

7.2 可按客戶要求特別安排。

Both OEM and ODM orders are welcome. Any specific design and packing requirements will be accommodated as required.

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8、測試 Testing

8.1 初制成 Initial test

電池生產後不超過 3 個月的產品。

Means the test begin in three months or less after production.

8.2 測試環境 Test conditions for Samples

如果沒有規定，一般地，樣品貯存條件為：溫度 $20\pm 2^{\circ}\text{C}$ ，濕度 $55\pm 20\%$ 。

樣品測試條件為：溫度 $20\pm 2^{\circ}\text{C}$ ，濕度 $55+20/-40\%\text{RH}$ 。

Unless otherwise specified, the storage conditions for samples shall be, as a general rule, at the temperature of $20\pm 2^{\circ}\text{C}$ and the relative humidity of $55\pm 20\%$.

And the test conditions is temperature of $20\pm 2^{\circ}\text{C}$ and the relative humidity of $55+20/-40\%\text{RH}$.

8.3 測試儀器及設備 Measuring instruments

8.3.1 電壓表 Voltmeter:

測量電壓的儀器準確度應不低於 0.25%，精密度應不低於最後一位有效數值的 50%，內阻應不小於 $1\text{M}\Omega$ 。

The accuracy of the measuring equipment shall be $\leq 0.25\%$ and the precision shall be $\leq 50\%$ of the value of the last significant digit. The internal resistance of the measuring instrument shall be $\geq 1\text{M}\Omega$.

8.3.2 負載電阻 Load resistance:

負載電阻包括所有外電路，其容許誤差為 $\pm 0.5\%$ 以內。

The load resistance shall include all of the external circuit, and its allowance shall be within $\pm 0.5\%$.

8.3.3 游標卡尺 Caliper:

游標卡尺應具有 0.02mm 或更高的精確度。

The caliper shall be the one having precision of 0.02minimeters or the one having the same or superior precision to this.

8.4 測試方法 Test methods

8.4.1 規格尺寸 Dimensions:

用 8.3.3 規定的游標卡尺進行測量，在測量總高時，須將卡尺兩外爪絕緣。

Dimension shall be measured with instruments specified in subparagraph 8.3.3 above, provided that either one or both side of such instruments shall be insulated in measuring the overall height of the batteries.

8.4.2 外觀 Appearance: 目視 Visual inspection.

8.4.3 空載電壓 Off-load Voltage

被測試電池應在 8.2 規定的溫度環境中擱置不少於 8 hrs，然後在相同環境條件下，用 8.3.1 規定的電壓表進行測試。

The specimen batteries shall be kept for 8 hours or longer at the ambient temperature specified in 8.2, and then the voltage between both terminals shall be measured at the same ambient temperature with a voltmeter as specified in subparagraph 8.3.1.

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8.4.4 負載電壓 On-load voltage

被測試電池應在 8.2 規定的溫度環境中擱置不少於 8hrs，然後在相同環境條件下，將規定的電阻連接於電池兩端，0.8 秒鐘后，用 8.3.1 規定的電壓表進行測試。

The specimen batteries shall be kept for 8 hours or longer at the ambient temperature specified in 8.2, and then the voltage between both terminals shall be measured with a voltmeter as specified in subparagraph 8.3.1 while the specified load is connected between both terminals at the same ambient temperature as specified above; provided that the measured value shall be based on meter reading taken 0.8 seconds after the circuit is closed.

8.4.5 放電時間 Service life

被測試電池應在 8.2 規定的溫度環境中擱置不少於 8 hrs，然後在相同環境條件下，用規定的電阻進行連續放電，直至電池兩端電壓等于終止電壓。自電路閉合開始，至電池兩端電壓降到終止電壓的時間即為放電時間。

Test specimen batteries shall be kept for 8 hours or longer at the ambient temperature specified in 8.2, and shall then be continuously discharged at same ambient temperature and through the specified load resistance. The discharge shall be continued until the terminal voltage of 2.0V, and the time during which the terminal voltage has been maintained equal to and above the discharge end-point voltage shall be taken as the service life.

8.4.6 經高溫存放後放電特性 Service life after high-temperature storage

被測試電池應在 6.3 規定的溫度環境中存放規定的時間。存放到期后，將電池擱置於常溫下(20±2℃, RH55±20%)，不少於 12 小時。然後在相同環境條件下，用規定的電阻進行連續放電，直至電池兩端電壓等于終止電壓。自電路閉合開始，至電池兩端電壓降到終止電壓的時間即為經高溫存放後放電時間。

Test specimen batteries, after having been stored at the temperature and period specified in 6.3, shall be kept for 12 hours or longer at ordinary temperature (20±2℃) and at ordinary humidity (55±20%RH) and shall then be continuously discharged through the load resistance 30KΩ at ambient temperature of 20±2℃. The discharge shall be continued until the voltage falls below the discharge end-point voltage of 2.0V, and the time during which the voltage has been maintained equal to and above the discharge end-point voltage shall be taken as the service life.

8.4.7 常溫自放電 Self-discharge

被測電池應在常溫下(20±2℃, RH55±20%)存放 12 個月存放到期后，參照 8.4.5 規定的方法進行放電測試。自放電程度可按以下公式求出：

Test specimen batteries which have been stored for 12 months at the ambient temperature of 20±2℃ and at the relative humidity of 55±20% shall be tested for service life in accordance with the method specified in subparagraph 8.4.5.

$$\text{自放電率 Self-discharge rate (\%)} = \frac{X_1 - X_2}{X_1} \times 100\%$$

X₁:初制成電池放電平均時間 Average initial discharge life of batteries of the same lot

X₂:經存放后，同批電池放電平均時間 Average discharge life after storage

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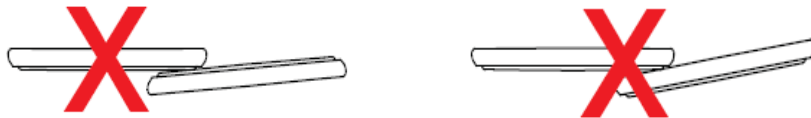
9、安全指導 Safety instructions

！ 使用注意事項 Caution

- 電池重疊 Overlapping Batteries

當電池雜亂地重疊或混合在一起時，它們的正極和負極會相互接觸，導致短路。

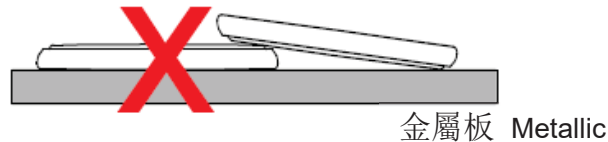
When batteries are overlapped or mixed together in a disorder way, their positive and negative terminals touch each other, causing short circuits.



- 電池放在金屬容器或金屬板上 Batteries put in a Metallic Container or on a Metallic Plate

與電池重疊問題類似，當電池置於金屬容器或金屬板上時，其正極和負極端子可能會因放置位置不同而通過導電表面短路。

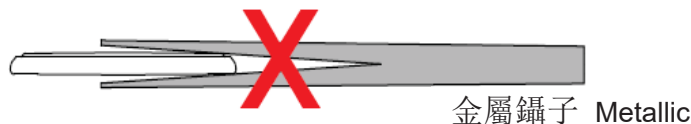
Similar to the overlapping battery problem, when batteries are put in a metallic container or on a metallic plate, their positive and negative terminals may short circuit through the conductive surface depending on the placement.



- 當電池用鑷子夾住時 When a Battery is Held with Tweezers

當用一對如下圖所示的金屬鑷子夾住時，電池會通過鑷子短路。

When held with a pair of metallic tweezers as shown below, the battery short-circuits through the tweezers.



- 接觸電池端子應使用鍍鎳鐵或鍍鎳不銹鋼。

Use Nickel-plated iron or Nickel-plated stainless steel for the terminals that contact the battery.

- 確保端子接觸壓力最小為 50g，以獲得穩定的接觸。

Make sure that terminal contact pressure is 50g minimum, for a stable contact.

- 保持電池和接觸端子表面清潔，無水分和異物。

Keep the battery and contact terminal surfaces clean and free from moisture and foreign matter.

- 插入電池前，檢查電池接觸端子是否正常，是否彎曲或損壞。(彎曲的端子可能與電池接觸不良或導致短路。)

Before inserting the battery, check the battery contact terminals to make sure they are normal, not bent or damaged. (Bent terminals may not make good contact with the battery or may cause short circuit.)

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- 應按電池及電器具上標明的極性標誌(+和-)正確地裝入電池。

Always insert batteries correctly with regard to the polarities (+ and -) marked on the battery and the equipment.



- 請勿將端子與導電金屬、物品接觸。把電池放在不導電的托盤裡。

Do not contact terminals with conductive i.e. metal, goods. Keep batteries in non-conductive, i.e. plastic, trays.



- 當電池雜亂堆放時，可能會產生短路、發熱、甚至引起爆炸。

When the batteries are piled up in a disorderly way, their positive and negative terminals may short-circuit, consuming some batteries while charging others, causing explosion.

- 快用完的鋰電池輸出的電壓幾乎與新電池相同，請不要僅用電壓表來判斷電池。請勿混合使用不同型號和品牌的電池，或新舊電池。電池組應該用相同電壓、容量和內阻的單個電池組裝。

更換電池時，要用相同牌號，相同類型的新電池同時換掉所有的電池。

Lithium batteries that are almost exhausted can output a voltage that is almost the same as that of a new battery: Please does not judge a battery only with a Voltmeter. Do not mix batteries of different types and brands, or new and used batteries. We are well informed that battery pack should be assembled with single batteries of similar voltage, capacity and inner resistance.

Battery characteristics vary with type and grade, even when batteries are the same size and shape. When replacing batteries with new ones, be sure to carefully check the symbols and numbers on them.



- 鋰電池即使發生輕微的短路，也需要一段時間來恢復正常電壓。因此，如果電池短路，在測量其電特性之前，要等待足夠長的時間讓電池恢復。

Lithium batteries need a period of time to recover their normal voltage after even a slight short circuit. Therefore, if the battery is short-circuited, wait an adequate long time for batteries to recover before measuring their electrical characteristics.

- 使用高阻抗(1M 或更高)電壓表測量電池電壓。

Use a high impedance (1M or higher) voltmeter to measure battery voltage.

- 電池艙尺寸應合適，不宜過松或過緊，避免振動時對電池絕緣層、絕緣件造成破壞。

Reduce impact to insulation layer from vibration, but the dimension will enlarge.

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！ 危險 Danger

- 電池應放在兒童拿不到的地方。吞食會導致化學灼傷，軟組織穿孔和死亡。萬一誤吞，應立即就醫。

Keep batteries out of the reach of children. Swallowing coin cells or batteries can cause chemical burns, perforation of soft tissue, and in severe cases can cause death. They need to be removed immediately if swallowed.



- 無成人監督時請勿讓兒童更換電池。

Do NOT allow children to replace batteries without adult supervision.

- 請勿對電池充電。試圖對不可充電的原電池充電會使電池內部產生氣體和熱量，導致泄放、泄漏、爆炸和人身傷害。

Do NOT charge batteries. Attempting to charge a non-rechargeable (primary) battery may cause internal gas and/or heat generation resulting in venting, leakage, explosion and personal injury.



- 請勿拆卸電池。拆卸電池時與電池內的部件接觸是有害的，可能會導致人身傷害或著火。

Do NOT dismantle batteries. When a battery is dismantled or taken apart, contact with the components can be harmful and may cause personal injury or possibly fire.



- 請勿破壞電池。不要對電池擠壓、打孔或進行其他形式的破壞，可能導致泄放、泄漏、爆炸及人身傷害。

Do NOT deform batteries. Batteries should not be crushed, punctured, or otherwise mutilated. Such abuse may result in venting, leakage and explosion and cause personal injury.



- 請勿用火處理電池。用火處理電池時，所產生的熱量可導致電池爆炸和人身傷害。不要焚燒電池，除非被允許在可以控制的爐子進行處理。

Do NOT dispose of batteries in fire. When batteries are disposed of in fire, the heat build-up may cause explosion personal injury. Do Not incinerate batteries except for approved disposal in a controlled incinerator.



鈕型鋰錳電池 Manganese Dioxide Lithium Battery CR2016

- 不要過度放電電池。當電池與外部電源連接或與其他電池串聯時發生過放電，可能發生爆炸。
DO NOT over-discharge the battery. In case the battery is over-discharged when connected with exterior power source or connected with other batteries in series, explosion may occur.
- 當儲存或扔掉電池時，一定要用膠帶把它蓋上。如果電池與其他金屬物體接觸，可能會引起火災或損壞。
- When storing a battery or throwing it away, be sure to cover it with tape. If the battery is contacted with other metal objects, it could cause fire or become damaged.

！警告 Warning

- 使用前請仔細閱讀使用說明書，不正確的操作可能导致泄漏、发热、冒烟、爆炸或火灾，造成设备故障或损伤。
Thoroughly read the user's manual before use, inaccurate handling may cause leakage, heat, smoke, explosion, or fire, causing device trouble or injury.
- 按電池及用電器標明的極性標誌(+和-)正確裝入電池。
Insert the battery with the "+" and "-" ends correctly oriented.
- 不要將新舊電池或不同類型或牌號的電池混用。
If the battery is used together with new batteries, do not use it with a different type battery.
- 不要直接焊接電池。
Do not solder the battery directly. Protect the welding point and connector.
- 電池最好存放在乾燥和涼爽的環境中。避免將電池存放在陽光直射的地方，或過熱潮濕的地方。為了保證電池的使用壽命，必須避免高溫儲存。
The battery should be preferably stored in dry and cool conditions. Avoid storing the battery in direct sunlight, or in excessively hot and humid place. Storage at high temperature must be avoided to preserve the battery life time.

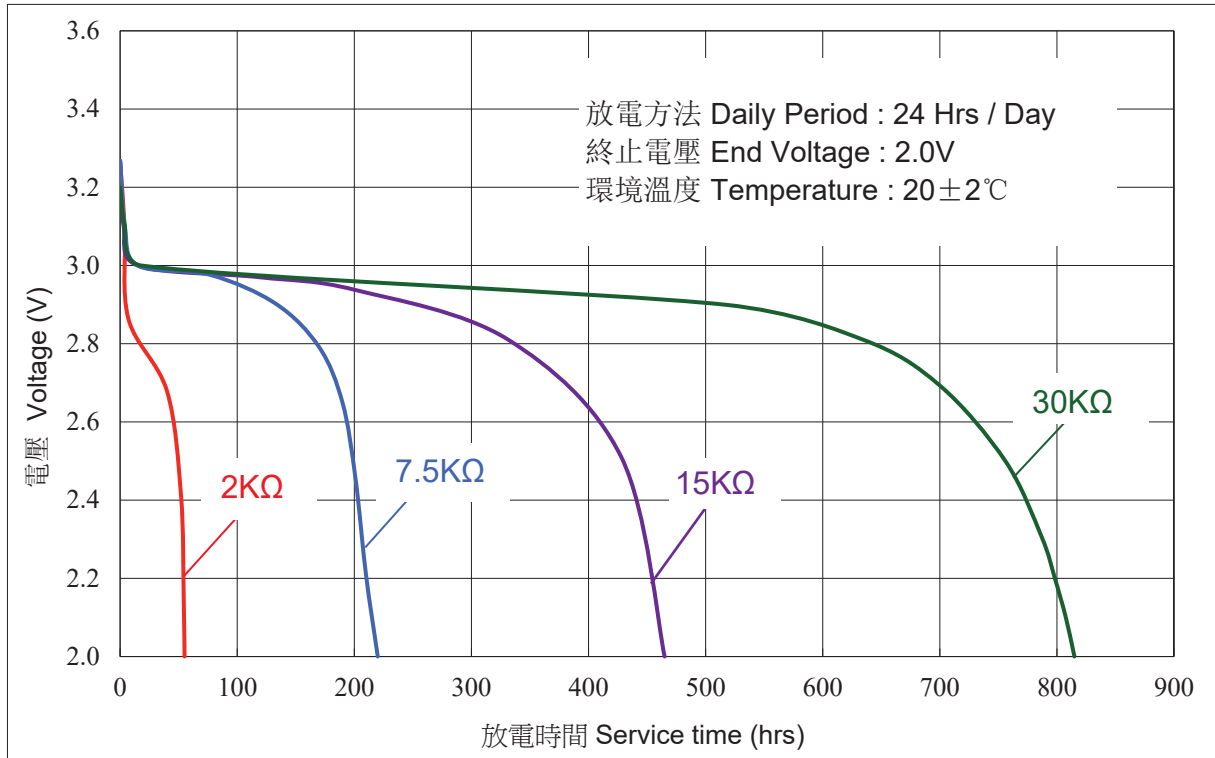
！存放 Warning

- 電池最適宜儲存于干燥和涼爽的環境中。正常的貯存溫度應在 10℃~25℃之間，不應當超過 30℃。相對濕度應在 55±20%。應避免長時間處於極端濕度(相對濕度高於 95%或低於 40%)下。高溫或高濕可能會損害電池性能或造成電池表面腐蝕，對電池和包裝都有害。
The cell should be preferably stored in dry and cool conditions. For normal storage, the temperature should be between 10℃ and 25℃, and should never exceed 30℃. The relative humidity should be 55±20%. Extremes of humidity (over 95%RH and below 40%RH) for sustained periods should be avoided. High temperature or high humidity may cause deterioration of the battery performance or surface corrosion, and detrimental to both batteries and packaging.
- 鈕型鋰電池安裝前後需要特殊方法以避免短路。由于下列情況下容易發生短路，請在處理電池時小心。
Button lithium batteries need special method to avoid short-circuiting before and after they are installed. As short circuits tend to occur in the following cases, please take care when handling the batteries.

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附錄 Appendix : 放電特性曲線圖 Discharge Characteristics

標準放電曲線 Standard Discharge Curve:



溫度特性曲線 Temperature Characteristic:

