● 常温環境下電池系統組合的標準充放電電流電壓（表三）
Battery Pack's standard charge and discharge current and voltage at normal temperature (Chart 3)

溫度 Temperature	類別 Category / 標準 Standard	標準充放電流 standard charge/discharge current	最大充電電流 The highest charge current	最高充電電壓 The highest charge voltage	最大放電電流 The highest discharge current	最低放電電壓 The lowest discharge voltage
25℃	LYP	0.3CA~0.5CA	≤3CA	N×3.8V	恒流 Constant Current 3 CA 脉衝 Pulse 10CA	N×2.7V
	LTHP	0.5CA	≤1CA	N×4.5V	恒流 Constant Current 3 CA 脉衝 Pulse 10CA	N×2.7V
	LP	/	/	/	/	/

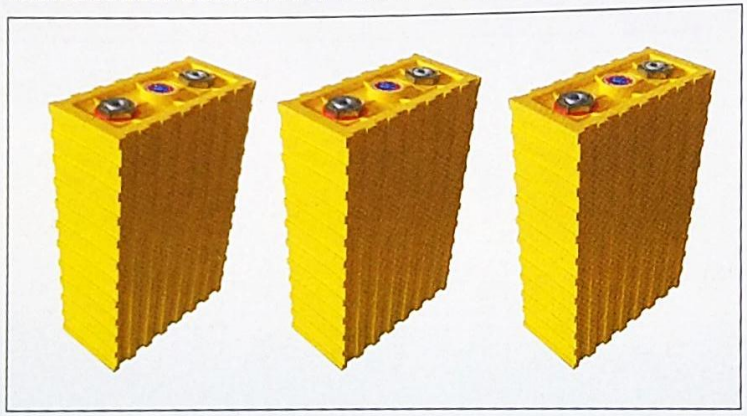
● 低温環境下電池系統組合的特殊充放電電流電壓（表四）
Battery Pack's standard charge and discharge current and voltage at low temperature (Chart 4)

溫度 Temperature	類別 Category / 標準 Standard	標準充放電流 standard charge/discharge current	最大充電電流 The highest charge current	最高充電電壓 The highest charge voltage	最大放電電流 The highest discharge current	最低放電電壓 The lowest discharge voltage
-25℃	LYP	0.3CA~0.5CA	≤1CA	N×4.25V	恒流 Constant Current 3 CA 脉衝 Pulse 10CA	N×2.0V
	LTHP	0.5CA	≤1CA	N X 4.5V	恒流 Constant Current 3 CA 脉衝 Pulse 10CA	N×2.5V
	LP	/	/	/	/	/

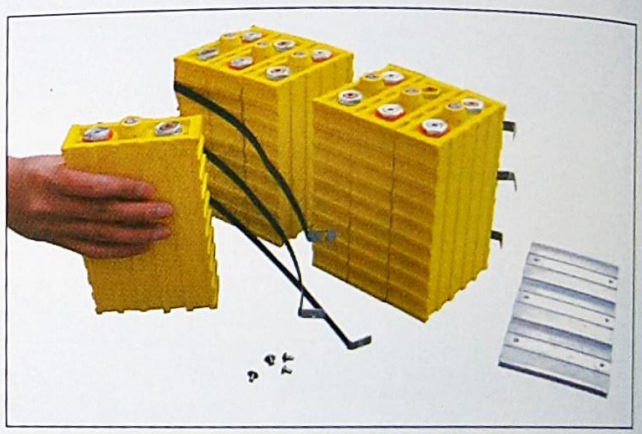
特別注意，當環境温度或電池温度升高時，所有指標應回復到（表三）常温充電標準！
Special Notice: When the ambient temperature or battery's temperature increases, all the index should go back to (Chart 3) the charge standard at normal temperature!

故障對策
Malfunction Solutions

故障對策一：電池出現零電壓或低電壓怎么辦?
Malfunction Solutions Ⅰ: How to solve if the cell voltage is 0V or low voltage



同型號及同容量電池
Cells with same capacity and same model



拆開拉條，更換同容量電池
Release the straps and replace the cell with same capacity

爲什么有個別電池會産生零電壓或低電壓?
Why is the voltage of some battery 0V or low voltage?

電池在使用中，會産生内阻變化，當個別電池内阻增大時，該電池在系統組合中與其他内阻小的電池一起串聯或并聯使用，會出現欠充和過放,，這種現象最終會導致該電池内部出現短路或微短路，使電池電壓爲零或低于正常電壓範圍。

The impedance of cells may rise during using. If put any cell of which the impedance is larger to used with other cells in series or parallel connection, it will cause unsaturated charging or over–discharging, which will make the internal circuit short or capacity decreased or voltage reduced to 0V.

對檢查出系統組合電池中有0V電池怎么辦?
What to do if the voltage of the cell is 0V among the battery pack?

首先將系統組合電池放電至最低電壓標準值，然後拆開拉條，更换同容量電池便可。（如圖）

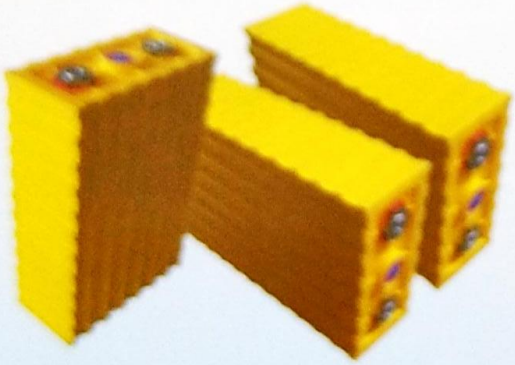
Discharge the battery pack to its standard minimum voltage and release the straps to replace the cell with new one of same capacity as the above picture.

故障對策二：電池鼓脹怎么辦?

Malfunction Solutions Ⅱ : What to do with swelling?

電池殼體是 PP塑料制成，一般正常使用不會發生鼓脹。
如過充電，或過放電才會導致電池鼓脹。鼓脹的電池其內阻、容量、電壓均正常，則可以按圖恢復其原型。
如不正常，則應及時從組合中更換。

The battery case is made of plastic (PP) and it will not swell during normal use.
The battery swelling usually happens when it is overcharged or over discharged. If the impedance, capacity and voltage are normal, please renewer as the picture shows to make the c ase back to normal shape.If not,please replace the swelled one as soon as possible.



電池恢復機器
Battery Renewer

故障對策三:電池殼破裂或漏液怎么辦?

Malfunction Solutions Ⅲ : What to do with battery case split or electrolyte leakage?

電池殼體破裂，或極柱周圍或安全閥漏液怎么辦?

What to do with battery case split or electrolyte leakage through the terminals or safety valve?

電池使用時，受激烈碰撞或振動產生殼體破裂，電池不會發生任何危險。此時，可以采用充分放完電後再拆下來更换新的電池便可。

There is no danger if the battery case split caused by strong impact or shock during operation. But when it happens, please completely discharge the battery and replace it.

電池因工作環境温度過高或放電電流過大，導至極柱周圍或安全閥處會有少量液體滲出，此時可采用吸綿或幹布清潔便可。

If the ambient temperature is too high or discharging current is too big, the internal electrolyte will leak from safety valve. Please wipe up by dry duster cloth or absorptive sponge.

電池在放電中極柱、殼體發熱正常嗎?

Is it normal that the terminal and case give out heat during discharging?

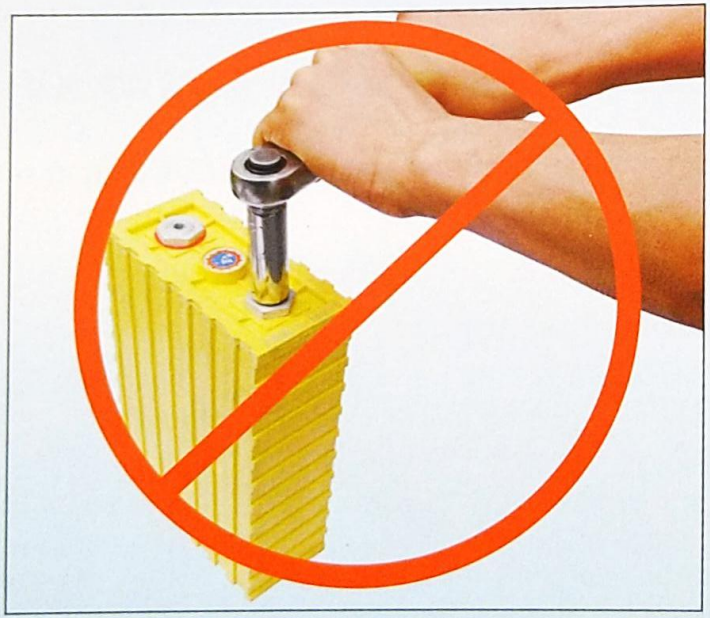
電池外殼一般在正常放電時會發熱，大電流充放電其温度升高有時會達到80℃~100℃以上，此時應降低充放電電流，以達到温度下降爲正常。正常使用時，電池外殼温度不得高于85℃，而且特别注意，當電池 外殼在150℃~250℃範圍内，可能會溶化。

The battery case may give out heat during normal discharging and especially the temperature will rise to 80℃~100℃ when discharged by big current.If it happens please reduce the charging and discharging current until the temperature gets back to normal. Make sure the case temperature will not be over 85℃ during normal use. Please pay special attention that the case may be melt at temperature of 150℃~250℃.

故障對策四:電池極柱的螺紋滑牙怎么辦?
Malfunction SolutionsⅣ: What to do if the terminal screw thread damaged and become less crowded?

電池極柱是鋁或銅金屬制成，當不慎用力過猛地擰緊導電條中的固定螺絲，會引起極柱中間螺絲滑牙，這時應采用專用開螺紋工具重新開牙。

The battery terminal is usually made of Aluminum or Copper material. If you use too hard power to fix the bolt of terminal connector, it will cause the thread of screw in the terminal damaged and become less crowded. At this time, Please remake the screw thread with special tool.



電池極柱中間螺絲滑牙
Terminal screw thread damaged and become less crowded

用專用開螺紋工具重新開牙
Please remake the screw thread with special tool

故障對策五：電池燃燒及冒烟怎么辦？
Malfunction Solutions Ⅴ: What to do if the battery is burning and smokes?

雷天温斯頓LYP/LTHP/LP類稀土鋰動力電池是不會出現燃燒起火的，除非是外部影響或不正當使用導致電池過熱冒烟起火燃燒，在這種情况下首先應疏散危險區人員并提供烟氣的通風口，滅火最好的解决方法是采用水噴淋或將冒烟燃燒的電池浸入到水中，也可以使用D型滅火器，CO2幹燥化學物質進行撲滅。

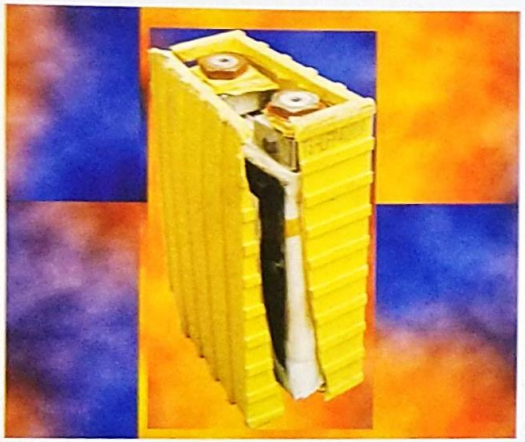
電池在燃燒中會泄漏，蒸發、分解、釋放電解物質，這時在燃燒中可能會形成氟化物（HF）與磷氧化物，電解質中的LiPF6與水發生的化學反應將産生氟化合物及二氧化碳。

Thunder Sky Winston LYP/LTHP/LP rare earth lithium power battery will never burn under normal condition.Improper external influence or improper use might cause the overheat of battery and it may omit smoke and fire .In this case ,people be evacuated first and smoke vent should be provided.The best solution to extuiguish the fire is to use a water spray or please in danger zone should immerse the smoking battery into the water.The alternative solution is to use type D fire extinguisher,CO2 chemical desiccation.

If the battery is burning, the internal composition may leak, vaporize or decompose and the electrolytic material will release. While battery burning, there may be fluoride (HF) and phosphide to come into being, and if the LiPF6 in the electrolyte contacts with water, it will produce fluorin–oxide and carbon dioxide.

急救措施
First aid Treatment

急救措施一：裸露電池
First aid treatment Ⅰ: Uncovered Cell



裸露的電池
Uncovered cell

將裸露的電池泡入水中
Put the uncovered cell into water

裸露的電池被水完全浸泡
Uncovered cell gets fully soaked by water

裸露電池與水接觸不會發生任何危險！
There is no danger when uncovered cell contacts with water!

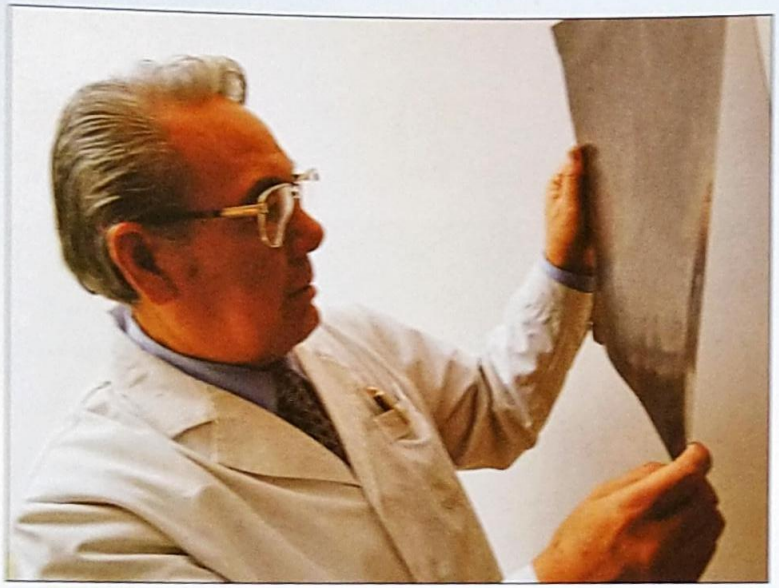
急救措施二：皮膚接觸
First aid treatment Ⅱ : Skin Contact

不小心接觸
Carelessly Touch

立即用大量清水及肥皂清洗干净便可
Immediately clean with massive clean water and soap

用大量清水及肥皂清洗干净便可！
Wash contacted skin with soap and plenty of water!

急救措施三：誤吞食及眼睛接觸
First aid treatment Ⅲ : Mistaken Ingestion and Eyes Contact



誤吞食怎么辦？

What to do if swallow the battery material incautiously?

誤吞食電池部分物質，不會造成即時危險。在確保感染者沒有使用催吐劑，確保黏液沒有阻隔呼吸道時，建議到醫院就醫。

It will not cause immediate danger if swallow some battery material incautiously. Since this situation happens, please make sure the infected person not use emetic and then seek immediate medical attention.

接觸到眼睛怎么辦？

What to do if battery material contact with eyes?

不小心被裸露電池的電解液或粉末傷害眼睛時，立刻用大量清水洗眼睛至少15分鐘或立即到醫院就醫。

If the uncovered materil such as electrolyte or powder hurt your eyes, please open your eyes and wash them by plenty of water for at least 15 minutes and seek immediate medical attention.

危機處理一：電池燃燒及冒烟

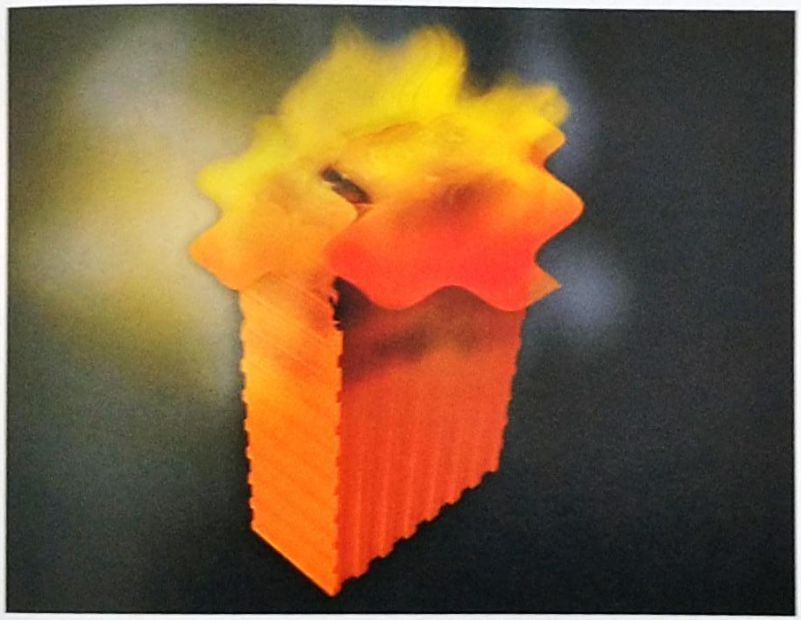
Crisis treament Ⅰ:Battery emits smoke or fire

電池祇有在濫用的情况下，受到外來火源引燃，才有可能出現泄漏或燃燒等意外。

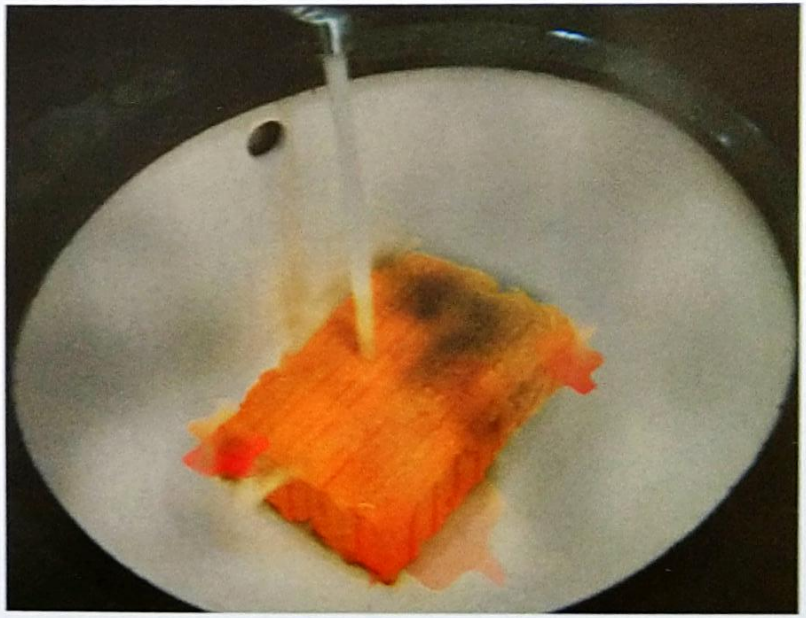
The internal material will leak or get fire only when the battery is misused ,and ignites.

在電池破裂冒烟或燃燒的情况下，首先應疏散危險區人員并提供烟氣的通風口，同時立即用水噴淋或將燃燒冒烟的電池浸泡在水池中。

If the battery break,smoke or burn,please firstly evacuate the people in dangerous area and provide smoke intake,and put out the fire by water or put the amoking battery into water.



濫用引起
Burning caused by misuse



用水噴淋或將燃燒冒烟的電池浸泡在水池中
Spray the battery with or put the smoking or burning battery into water

電池在150℃情況下使用或濫用會導致泄漏，蒸發、分解、釋放易燃電解質。在燃燒中可能會形成氟化物（HF)與磷氧化物，電解質中的LiPF6與水發生的化學反應將產生氟氧化物及二氧化碳。

If the battery used at temperature of 150℃ or misused in other ways,the internal composition may leak,vaporize or decompose and the flammable electrolytic material will release.While battery burning,there may be fluoride (HF) and phosphide coming into being,and if the LiPF6 in the electrolyte contact with water,it will produce fluorin-oxide and carbon dioxide.

電池在150℃情況下使用或濫用導致泄漏
The battery is used at temperature of 150℃ or misused in other ways

在燃燒中可能會形成氟化物（HF)與磷氧化物
Fluoride(HF)and phosphide may come into being while battery burning

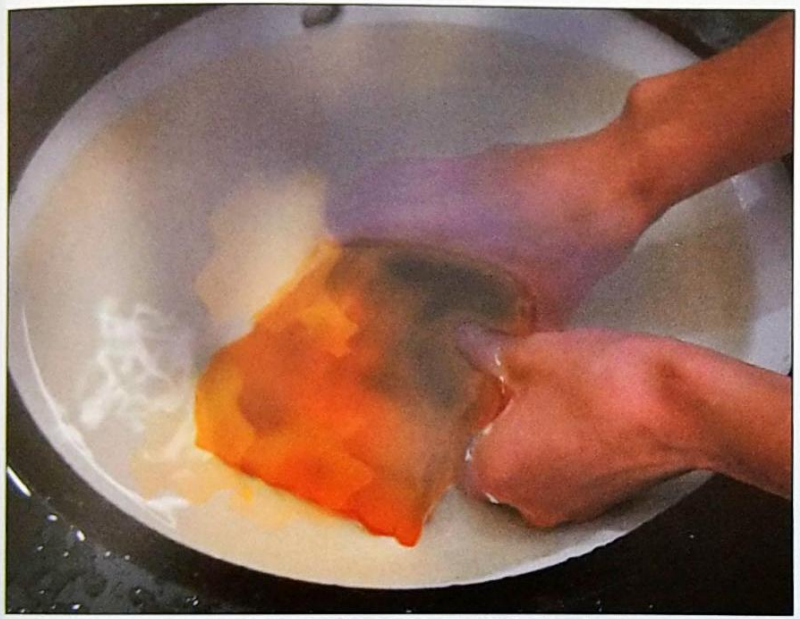
危機處理一：滅火媒介
Crisis treament Ⅰ:Extinguishing Media

如電池冒烟或燃燒，最好的解决方法是采用水噴淋或將冒烟燃燒的電池浸入到水中。

If the battery smoke or get fire,the best solution is to spray the smoking or burning battery with water or put them into water.

也可使用D型滅火器，CO_2幹燥化學物質.

The alternative solutions are Type D fire extinguisher,CO_2 chemical desiccations.



將冒烟燃燒的電池浸入水中
Put the burning battery into water

也可使用D型滅火器，CO_2干燥化學物質或泡沫滅火器
Type D fire extinguisher ,Co_2 chemical desiccations

危機處理二： 特殊防護工具
Crisis treament Ⅱ:Special protection tools

- 使用呼吸設備避免吸入刺激性氣體
  Please use aerophore to prevent breathing irritant gas.
- 穿上防護衣或用其他裝置來避免身體接觸到電解質液
  Put on protection clothes or other devices to keep your body away from electrolyte.

安全建議
Safety Instructions

安全建議 Safety Advice	特殊風險性質 Nature of Special Risk
放在兒童不可觸到的地方 keep out of reach from children	觸電或短路危險 Electric shock or short-circuit hazard
防止潮濕、不要吸入灰塵 keep away from moisture, keep the top free of grime	與皮膚接觸有害 Sensitization in contact with skin
避免皮膚接觸 Avoid contact with skin	吞食有害 Harmful if swallowed
若不慎接觸到眼睛，立即用大量的清水清洗并立刻就醫 In case of contact with eyes, clean immediately with plenty of water and seek medical attention.	對眼睛造成嚴重傷害的危險 Risk if eye contact with internal material
戴好適宜的手套 Wear suitable gloves	在吸入和皮膚接觸的情況下可能會過敏 May cause allergic reaction if contact with skin or inhalation

材料安全數據表
Material Safety Data Sheet

材料安全數據表（根據 EEC Directive 93/112/EC 制定）
MATERIAL SAFETY DATA SHEET(According to EEC Directive 93/112/EC))

1 名稱：稀土鋰動力可充電電池 Name: Rare earth lithium power rechargeable battery

1.1 產品：稀土鋰動力電池

Product: Rare earth lithium power battery

型號 Model: WB-LYP、WB-LTHP、WB-LP

電池化學系統：摻雜鋰、氧化釔、鉀、鈉、氟化合物等元素

Electrochemical system : mixed Lithium, Yttyia, Phosphide, Sodium, Fluoride compound.

電極 Electrode	負極 Negative electrode 碳 / 石墨Carbon / Graphite 納米纖維素Nano cellulose	正極positive electrode LiFeYP04	粘結劑 Binder 水溶性 Solvent
電解液 Electrolyte	在混合的有機溶液中溶解 Solution of Lithium hexaflu orophosphate (LiPF 6) In a mixture of organic solvents**		
額定電壓 Rated voltage	3.3 伏 (V)		

** 碳酸乙烯（EC）+ 碳酸二乙基（DMC）+ 碳酸二乙基（DEC）+ 醋酸乙荃（EA）.
** Ethylene Carbonate (EC) + DiEthyl Carbonate (DMC) + DiEthyl Carbonate (DEC) + Ethyl Acetate (EA).

1.2 供應商Supplier:

名稱：雷天温斯頓電池有限公司 Thunder Sky Winston Battery Limited
地 址:中國深圳公明李鬆蔭第三工業區
Address: NO.3 Industrial Zone,Lisonglang Village, Gongming Twon,Shenzhen City,China
電話 Tel: +86-755-8602 6789 傳真 Fax:+86-755-8602 6678
緊急郵箱: winston@chung.tw 網址: www.winston-battery.com

3 物理化學性質
Characteristics

3.1 物理性質 Physical properties:

在此材料安全數據表中所提及的稀土鋰動力可充電電池均爲密封的單體，當按照生産者建議使用時并不危險。
The Lithium–Ion rechargeable batteries described in this Material Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the manufacturer.

在正常情况下使用,若電池體及其密封保持完整性，則固態電極和液態電解液不會發生化學反應。
Under normal conditions of use, the solid electrode materials and liquid electrolyte they contain are non– reactive provided the battery integrity is maintained and seals remain intact.

衹在濫用電池，電池破裂，受到外來火源引燃的情况下才有起火燃燒的危險。。
There is Risk of fire only in case of abuse, which leads to the activation of the safety valve and/or the rupture of the battery container.

當電解液泄漏時,在潮濕或有水的情况下電極物質可能發生反應或引發電池冒烟，視具體情况而定。
Electrolyte leakage, electrode materials reaction with moisture/water or battery vent, depending upon the circumstances.

在内部壓力過大或温度過低、過高影響的情况下，雷天温斯頓電池有一個安全通風口以防止電池殼破裂。
In case of excessive internal pressure and/or low temperature, Winston batteries are fitted with a safety vent for protection of rupture of the cell case.

3.2 化學性質
Chemical Properties

物質 Substance		融化點 Melting point	沸點 Boiling point	分類 Classification			
CASNO	化學式 Chemical formula			爆炸極限 Explosion limit	危險指示 Indication of Danger	特殊風險(1) Special Risks	安全指示(Y) Safety advice (2)
12190-79-3	$LiFeYPO_4$	> 1000 ℃	N/A			R22 R43	S2 S22 S24 S26 S36 S37 S43 S45
EC: 96-49-1 DMC: 616-38-6 DEC: 105-58-8 EA: 141-78-6	有機溶液 Organic solution (DC-DMC DEC-EA)	EC: 38 ℃ DMC: 4 ℃ DEC:-43 ℃ EA: -84 ℃	EC: 24 ℃ DMC: 90 ℃ DEC: 127 ℃ EA: 77 ℃	未建立的 Unfound OSHA	易燃的 Inflammable	R21 R22 R41 R42/43	S2 S24 S26 S36 S37 S45
21324-40-3	$LiPF_6$	N/A(分解于 160℃) N/A(Decomposing in160℃)	N/A	未建立的 UnfoundOSHA	刺激物 腐蝕 Stimulator Corrosion	R14 R21 R22 R41 R43	S2 S8 S22 S24 S26 S36 S37 S45

根據 67/548/EEC 指示的產品中含有的危險物分類
Classification of dangerous substances contained into the product as per directive 67/548/EEC

運輸與回收
Transportation & Recycling

■ 有毒物信息
Hazards Identification

雷天温斯頓稀土鋰動力可充電電池不含有毒物。
Thunder Sky Winston Lithium Rechargeable Battery does not contain hazardous materials.

■ 可循環再造

在正確使用至電池壽命終止時，可回收再造，雷天温斯頓稀土鋰動力可充電電池不會帶來環境污染。
Under normal conditions of use till the end of the battery life, it can recycle and won't bring any pollution to the environment.

■ 處理事項
Solutions:

根據可適用的規則處理，因各國法律而异。
Comply with the requirement of local laws and regulations in different countries.
稀土鋰動力電池的電極必須保持絶緣并且最好在處理前用獨立塑料包裝袋包裝。
Keep the insulation of the cell electrode, packed with individual plastic bag before disposing of the battery.
焚燒：使用者不可焚燒電池，祇能由權威的機構合理處理。
Burning: Do not dispose of the battery into fire except for authorized agency.
回收：交給權威的機構回收處理。
Recycling: It is best to deliver the waste battery to the local authorized recycler.

■ 運輸信息
TRANSPORT INFORMATION

1.UN-NO.3480

ARD /RID

九類	二類包裝	ARD/RID標簽	9
Class 9	Packing Group II	ADR/RID-Labels	9

適當運輸品名　稀土鋰動力可充電電池，UN3480
Proper shipping name Rare earth lithium power rechargeable battery, Un3480

IMO

等級	二類包裝	IMO-標簽	9
Class	Packing Group II	IMO-Labels	9

適當運輸品名　稀土鋰動力可充電電池，UN3480
Proper shipping name Rare earth lithium power rechargeable battery, Un3480

IATA-DGR

等級	二類包裝	ICAO-標簽	9
Class	Packing Group II	ICAO-Labels	9

適當運輸品名　稀土鋰動力可充電電池，UN3480
Proper shipping name Rare earth lithium power rechargeable battery, UN3480

2.雷天温斯顿電池有限公司聲明我們的產品符合聯合國手册及测試標準下條理38.3的要求。
Thunder Sky Winston Battery Ltd. declares that UN Manual of Tests and Criteria, Part III, sub-section 38.3 is met

3.在航空運輸中，當他們能够滿足IATA條款UN3480條款下Ed.52規定的要求和ICAO包裝要求965條款II的要求及每個包裝不高于10KG的要求情况下，小容量的（單體≤20WH或者電池組≤100WH）鋰離子電池被認爲是期望型產品。在通用的IATA規定下，標題貨物可以像正常的貨物一樣運輸。
In airfreight, small Lithium-ion batteries (cells≤20WH or packs≤100WH) are considered as "Expected Lithium-ion Batteries", when they meet the requirements of Ed. 52of IATA regulations (UN3480) and ICAO Packing Instruction 965 section II, specifying less than 10kg gross per package. Caption shipment can move as normal cargo under current IATA

4.在其他情况下（針對電池容量單體＞20WH或者電池組＞100WH），鋰離子電池被認爲是九類產品（如965條款I空運要求）。
In other cases (mainly for large cells >20WH or packs > 100WH), they are considered as Class 9 (See Packing Instruction 965 section I for airfreight).

5.在航海運輸中，當電池滿足IMO中IMDG危險產品的規定（UN3480）情况下，密封的鋰離子電池被認爲是不受限制-鋰離子電池。
In Seafreight, sealed Lithium-ion batteries are considered as "Lithium-ion Batteries-Not Restricted", when they meet the requirements of IMDG of IMO Dangerous Goods Regulations (UN3480).

6.關于可充電鋰離子電池的運輸各種機構的相關規定，請參考IATA，IMO，ADR/RID。
The transport of rechargeable lithium-ion batteries is regulated by various bodies, refer to: IATA, IMO, ADR/RID.

性能測試規範
Performance Test Instructions

雷天温斯頓電池的檢驗規則
Inspection Rules for Batteries of Thunder-Sky Winston

單體電池檢驗項目
Testing items for single cell

■ **常規項目 Conventional items**

外觀、極性、重量及尺寸、20℃放電容量、高倍率放電容量、-25℃放電容量 、85℃放電容量、荷電保持及恢復 能力、循環壽命。

Appearance, terminals (anode and cathode), weight & size, discharge capacity at 20℃, high rate discharge capacity,discharge capacity at -25℃,discharge capacity at 85℃, energy retain ability and restorability, cycling life.

■ **安全性項目Safety items**

短路、槍擊、過充過放電、水浸、火燒。

Short circuit, shooting test, overcharge/overdischarge, water immersion test, fire test

■ **蓄電池的要求 Requirement of cell**

單體蓄電池的正負極應有能承受檢驗方法中規定的最大放電倍率的放電而不損壞的連接片。

The terminals of single cell must use connector that could bear the maximum current in accordance with Testing Methods.

0.3CA爲3h率額定容量，1C爲1h率額定容量。

0.3CA is the rated capacity of 3 hours, and 1C is the rated capacity of 1 hours.

常規試驗方法
Conventional Test Methods

■ 試驗條件Test conditions

環境條件Environment condition

試驗環境溫度爲15℃～35℃、相對濕度爲25%～85%。

Laboratory room temperature 15℃～35℃，humidity25%～85%

■ 測量儀器、儀表 Instrument

量程Measurement range of instrument

所有儀表量程應隨被測電壓值或電流值改變，指針或儀表讀數應在量程的後三分之一範圍內。

Measurement range accordingly change with voltage and current fluctuation; instrument value should fall in the last 1/3 range of measurement instrument.

精度Accuracy

a)測量電壓用的儀表應是不低于0.5級的電壓表，電壓表內阻至少應是1KΩ/V；

Accuracy level of voltage meter ≥ 0.5 class; resistance of voltage meter at least 1kΩ/v;

b)測量電流用的儀表應是不低于0.5級的電流表；

Accuracy level of current meter ≥ 0.5 class;

c)測量温度用的温度計應具有適當的量程，其分度值不應大于1℃；

Thermometer has applicable measurement range; dividing value of thermometer ≤1℃

d)測量時間用的儀表應按時、分、秒分度，至少應具有±1%的準確有度；

Time measuring instrument can record values of hour, minute and second; accuracy deviation: ±1%;

e)測量蓄電池外形尺寸的量具，其分度值不應大于1mm;
Scalle value should be≤1mm for instruments of measuring external dimension.
f)稱量蓄電池重量的衡器，應具有±0.5%的精度。
Accuracy deviation of weighing machine: ±0.5%

■ 外觀 Appearance

目視檢查蓄電池表面是否平整、幹燥、有無外傷等。
Visual examination:whether the cell ell surface is dry, flat, nondamaged;
目視檢查蓄電池標志是否齊全、清晰。
Visual examination: whether the cell identifications are complete and clear;

■ 極性 Terminal

用電壓表檢測蓄電池的端壓，是否與端子的極性一致。
To detect if I/O voltage of the cell is consistent with terminals by voltage meter

■ 重量及尺寸 Weight & Dimension

用量具測量蓄電池的外形尺寸。
Measure external dimension of the cell by measuring tools
用衡器稱量蓄電池的重量。
Measure weight of the cell by weighing machine

■ 充電Charging

在20℃±5℃條件下，蓄電池以 0.5CA 電流放電，至蓄電池電壓達到3.0V時停止放電，然後20℃±5℃條件下以 0.5CA 恒流充電， LYP 類 電池電壓達4V時轉恒壓充電，LTHP類電池電壓達4.5V時轉恒壓充電,充電電流降至超始值的5%時停止充電。
At 20℃ ± 5℃, the cell is discharged at a current of 1/3C3(A) till voltage of the cell reaches 3.0V, and

then start to perform constant current charge at a current of 1/3C3(A) under 20℃ ± 5℃ till voltage of the cell reaches 4V and simultaneously switch to constant voltage charge. When charging current value decreases to 5% of initial value, charging completes.

低溫充電 Low temperature charging

在-45℃ ± 5℃條件下，恒流充電，LYP類電池電壓達到4.25V時轉恒壓充電，LTHP類電池達到4.5V時轉恒壓充電，充電電流降至起始值的5%時停止充電。

It can be in constant current charge at temperature – 45℃ ± 5℃. The LYP battery should be in constant voltage charge when the voltage reaches 4.25V. And the LTHP battery should be in constant voltage charge when the voltage reaches 4.5V. When charge current is below 5% of initial value, please stop charging.

■ 20℃放電容量 (能量密度)Discharge capacity (energy density) at 20℃

蓄電池在充電後，在20℃ ± 5℃條件下擱置1h，然後在同一温度下以 0.3CA 電流放電至電池電壓3.0V。如果放電容量達不到額定容量，此項試驗允許重復3次。

When the charging test is finished the cell will standby 1 hour at 20℃ ± 5℃ temperature, and then discharges at current of 0.3CA till voltage of the cell reaches 3.0V. If value of discharge capacity does not reach the standard of rated capacity, this test is allowed to repeat 3 times.

■ 高倍率放電容量 High rate discharge capacity

蓄電池充電後，在20℃ ± 5℃條件下擱置1h，然後在同一温度下以 1CA 電流放電至電池電壓 2.7V時終止。

When the charging test item is finished, the cell will standby 1 hour at 20℃ ± 5℃ temperature, and then discharges at current of 1CA till voltage of the cell reaches 2.7V.

■ -45℃放電容量Discharge capacity at -45℃

蓄電池充電後，在-45℃±2℃條件下貯存8h，然後在同一溫度下，以 0.3CA 恒流放電至終止電壓(2.0V)。計算放電容量 (以Ah為計)。

When the charging test is finished, the cell will standby 8hours at -45℃±2℃ temperature, and then performs constant current discharge at current of 0.3CA till voltage of the cell reaches 2.0V. Calculate discharge capacity(by Ah).

■ 85℃放電容量 Discharge capacity at 85℃

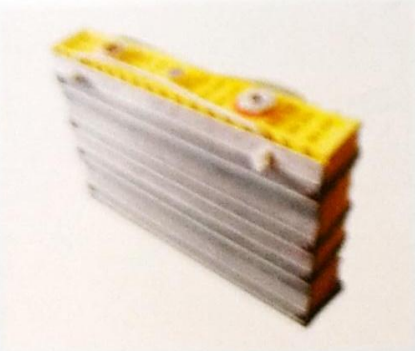
蓄電池充電後，在85℃±2℃條件下貯存5h，然後同一溫度下，以 0.3CA 恒流放電至終止電壓(3.0V)。計算放電容量 (以Ah計)。

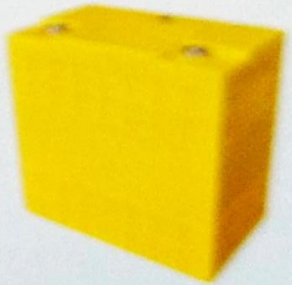
When the charging test is finished, the cell will standby 5 hours at 85℃±2℃ temperature, and then performs constant current discharge at current of 0.3CA till voltage of the cell reaches 3.0V. Calculate discharge capacity(by Ah).

■ 快速充放電能力Quick charge and discharge capacity

①將塑料般體的蓄電池按如下圖示安裝夾板固緊，(金屬般體和LTHP類及LP類電池不需要)

Fastens the plastic casing of the cell according to the graph below. (Except metal case LTHP and LP battery)





2.將夾緊的電池充好電後，用2CA（標稱容量的2倍電流）對電池恒電流放電，LYP類電池電壓下降到2.8V時停止，LTHP電池電壓下降到3.0V時停止（計算容量）。第一階段將電池靜止三十分鐘或一小時後，用2CA（標稱容量的2倍電流）對電池恒電流充電，LYP類電池電壓上升到4V時，LTHP類電池上升到4.5V時，靜止三十分鐘或一小時後，用3CA（標稱容量的3倍電流）對電池恒電流放電，至電池電壓下降到2.5V時終止（計算容量）。第二階段將電池靜止三十分鐘或一小時後，用3CA（標稱容量的3倍電流）對電池恒電流充電，LYP類電池電壓上升到4V時，LTHP類電池上升到4.5V時，靜止三十分鐘或一小時後，用3CA（標稱容量的3倍電流）對電池恒電流放電，至電池電壓下降到2.5V時停止放電（計算容量）。

After the clamping battery be fully charged, using 2CA(two times current of the nominal capacity) to discharge the battery by constant current, stop when the voltage of LYP battery decreased to 2.8V and LTHP battery decreased to 3.0V(by calculating the capacity). Leave the battery static for 30 minutes or an hour at the first stage, using 2CA(two times current of the nominal capacity) to charge the battery by constant current, when the voltage of LYP battery up to 4V, LTHP battery up to 4.5V, leave it static for 30 minutes or an hour before use 3CA(three times current of the nominal capacity) to discharge the battery by constant current, stop when battery voltage decreased to 2.5V(by calculating the capacity). the second stage also need to leave the battery static for 30 minutes or an hour before use 3CA(three times current of the nominal capacity) to charge the battery by constant current, stop when voltage of LYP battery up to 4V and LTHP battery up to 4.5V, leave it static for 30 minutes or an hour before use 3CA(three times current of the nominal capacity) to discharge the battery by constant current, stop when battery voltage decreased to 2.5V(by calculating the capacity).

■ 荷電保持和恢復能力 Retaining Ability and restorability

荷電保持能力：蓄電池充電後，在20℃±5℃條件下，以開路狀態貯存30天，然後在同一温度下以 0.3CA 恒流放電至終止電壓(3.0V)。計算放電容量 (以Ah計)。

Retaining Ability: after fully charge , the cell is stored under open circuit condition at 20℃ ± 5℃, for 30 days and then discharge by 0.3CA constant current at the same temperature, until the voltage reaches final voltage (3.0V). Calculate the capacity (by Ah)

容量恢復能力：蓄電池充電結束後，靜止三十分鐘後在20℃±5℃條件下以 0.3CA 恒流放電至3.0V。計算放電容量(以Ah計)。

Restorability: after charge according to the charging test method, keep it still for 30min at 20℃ ± 5℃, and then discharge by 0.3CA constant current, until the voltage reaches 3.0V. Calculate the capacity (by Ah).

安全試驗方法
Safety testing methods

■ 短路試驗 Short circuit test

蓄電池充電後，在20℃±5℃條件下擱置1h，將蓄電池經外部短路10min，外部線路電阻應小于或等于10mΩ。

Place the cell under 20℃ ± 5℃ condition for 1h after charging the cell as the charging test method instructed, the cell remain situation of external short circuit for 10 minutes, external circuit resistance should be less than or equal to 10mΩ.

試驗過程中，蓄電池不得爆炸或起火、允許冒烟。

The cell should not get fire or explode during the test, but smoke is acceptable.

■ 槍擊 Shooting test

蓄電池在充電後，在20℃±5℃條件下擱置1h，用AK47或手槍從垂直于蓄電池極板方向開槍，子彈迅速穿透電池，該試驗應在有充分環境保護的條件下進行。

Place the cell under 20℃ ± 5℃ condition for 1h after charging the cell as the charging test method instructed, shoot the cell with AK47 or pistol from the direction vertical to the cell, the bullet goes through the cell immediately, the test should only be conducted under condition with sufficient protection.

試驗過程中，蓄電池不得爆炸、允許冒烟。

The cell should not explode in the test, but smoke is acceptable.

■ 過充和過放電實驗 Overcharge /Overdischarge

過充電：蓄電池在充電後，在20℃±5℃條件下擱置1h。蓄電池在20℃±5℃下，以1C(A)電流充電，直到電池電壓達到10V即停止。

Overcharge test: Place the cell under 20℃ ± 5℃ condition for 1h after charging the cell as the charging test method instructed, charge the cell with 1C (A) current under 20℃ ± 5℃ condition until the cell voltage reaches 10V.

過放電：蓄電池在充電後，在20℃ ± 5℃條件下擱置1h，蓄電池在20℃ ± 5℃下，以1C(A)電流放電，直到蓄池電壓下降至零伏時即停止。

Over discharge test: Place the cell under 20℃ ± 5℃ condition for 1h after charging the cell as the charging test method instructed, discharge the cell with 1C (A) current under 20℃ ± 5℃ condition until the cell voltage reaches 0V.

過充、過放電試驗過程中，蓄電池應不漏液、不爆炸、不起火，允許冒烟。

The cell should not leak, explode or get fire in the charge and discharge test, but smoke is acceptable.

■ 水浸實驗 Water immersion test

蓄電池在充電後，在20℃ ± 5℃條件下，擱置1h，然後將該電池放在裝滿自來水或海水、河水的池子裏浸泡1h。

Place the cell under 20℃ ± 5℃ condition for 1h after charging the cell as the charging test method instructed, put the cell in pool full of tap water, seawater or river water for 1h.

實驗過程中，蓄電池不得爆炸、不得起火燃燒。

The cell should not get fire or explode in the test.

■ 火燒實驗 Fire test

蓄電池充電後，在20℃ ± 5℃條件下，擱置1h，然後將該電池置于烈火中焚燒，直至該電池燒成餘灰爲止。

Place the cell under 20℃ ± 5℃ condition for 1h after charging the cell as the charging test method instructed, put the cell in a fire until the cell turn to ash.

實驗過程中，蓄電池不得爆炸。

The cell should not explode in the test.