2019版本

Thunder Sky Winston

使用説明書
Operator's Manual

LYP / LP雷天温斯頓水性鋰動力電池
LYP/LP Thunder Sky Winston Water-based lithium Power Battery

THUNDER SKY WINSTON BATTERY LIMITED

Thunder Sky Winston

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www.thundersky-winston.com

非常感謝您選用具有國際自主知識產權的雷天温斯頓動力牌電池，雷天牌及温斯頓牌LYP.LP水性鋰動力電池是本集團發明并注册的國際專利産品。

注意：在使用之前，請仔細閱讀本説明書，確保正確使用電池，并請妥善保存此手册，以備隨時查閱。

Thank you for choosing Thunder Sky Winston Power Battery. LYP、LP series of water–based lithium power battery which under the brand name of Thunder Sky and Winston are invented by our group and owned the international patent.

NOTE:Before first application, please read this manual carefully to ensure the proper operation of battery. Always keep this manual properly for in case of any need under some circumstances.

版 權 Copyright

商 標 Trademark

Thunder Sky Winston

若本公司因生産技術提升導致本手册的内容和圖解説明變更，恕不另行通知。

If the contents and illustrations in this manual are changed for the technology improvements of the company, it won't be noticed.

拆封開箱以后

After opening the box

確認物品是您所訂購的産品

Make sure the goods are what you ordered

請認准銘牌

Please recognize the accurate trademark

Thunder Sky Winston

注意 Notice

檢查産品在運輸途中是否有損壞。

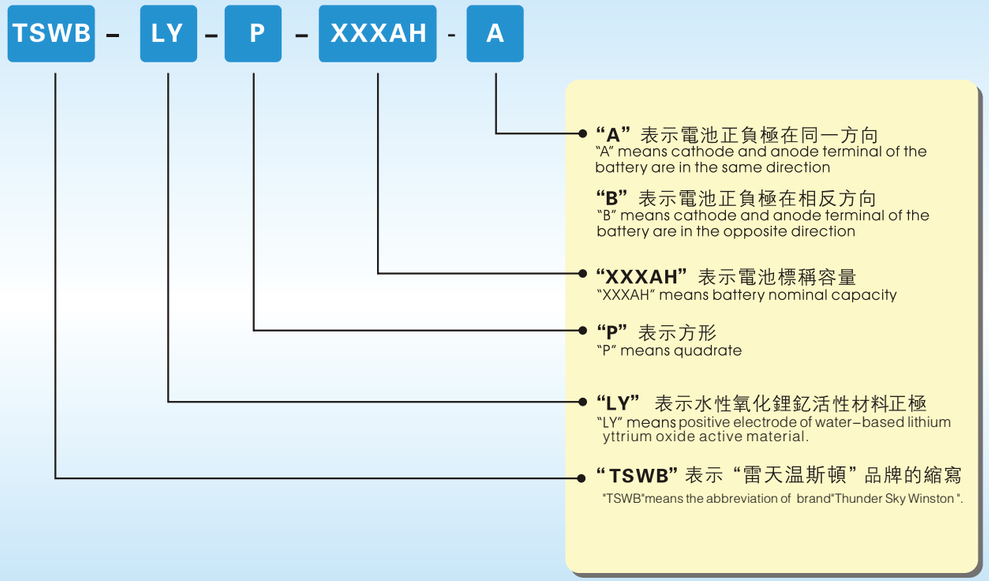
Check whether the product is damaged during shipment.

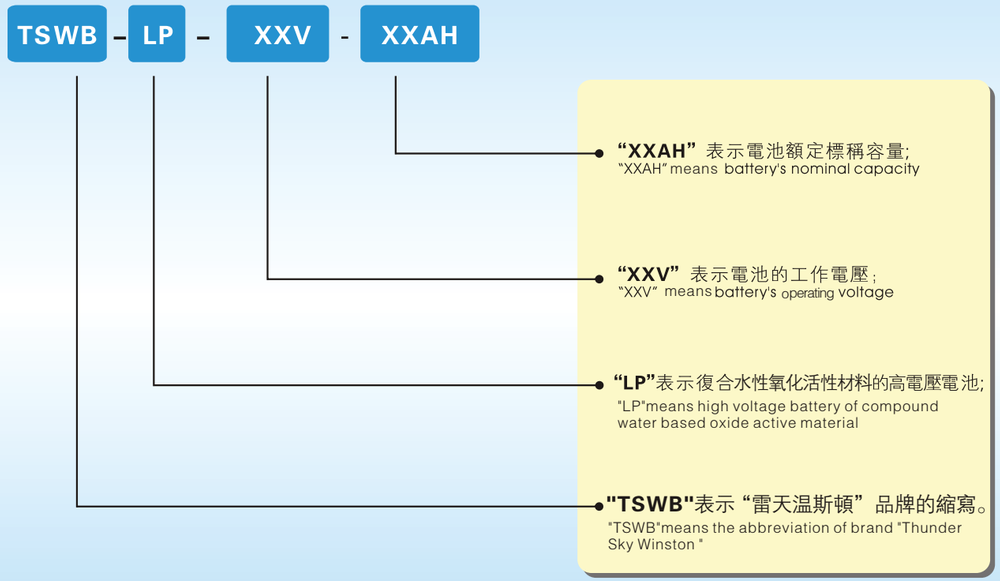
如産品型號、規格、數量不符合，或已經損壞，請與我公司聯系。

Please contact us if the type, specification and quantity is inconsistent with what you ordered, or being damaged.

使 用 說 明 書
An instruction manual

LYP /LP雷天温斯頓水性鋰動力電池
LYP/LP Thunder Sky Winston water–based lithium power battery


TSWB – LY – P – XXXAH - A
“A” 表示電池正負極在同一方向
“A” means cathode and anode terminal of the battery are in the same direction
“B” 表示電池正負極在相反方向
“B” means cathode and anode terminal of the battery are in the opposite direction
“XXXAH” 表示電池標稱容量
“XXXAH” means battery nominal capacity
“P” 表示方形
“P” means quadrate
“LY” 表示水性氧化鋰釔活性材料正極
“LY” means positive electrode of water–based lithium yttrium oxide active material.
“TSWB” 表示 “雷天温斯頓” 品牌的縮寫
“TSWB”means the abbreviation of brand“Thunder Sky Winston ”.


TSWB – LP – XXV - XXAH
“XXAH” 表示電池額定標稱容量;
“XXAH” means battery's nominal capacity
“XXV” 表示電池的工作電壓;
“XXV” means battery's operating voltage
“LP”表示復合水性氧化活性材料的高電壓電池;
“LP”means high voltage battery of compound water based oxide active material
"TSWB"表示 “雷天温斯頓” 品牌的縮寫。
“TSWB”means the abbreviation of brand “Thunder Sky Winston ”

電池短路
Battery short circuit

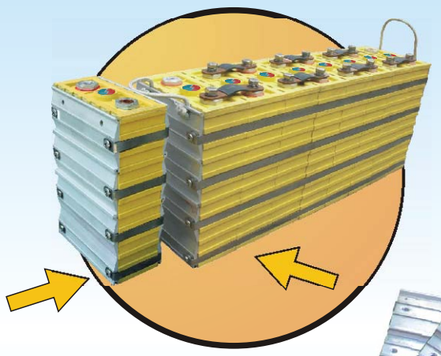
新出廠的電池切勿直接進行放電
Do not discharge the new battery directly for the first use

- 任何情况下不得將電池短路。
  Do not make the battery short-circuit in any situation.
- 新出廠的電池，切勿進行放電！必須先充滿電。
  Do not discharge the new battery! It must be fully charged at first.

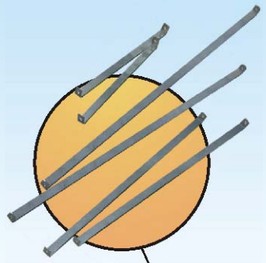
不得掀開電池安全閥！
Do not open the battery safety valve!

切忌猛力扭動電池極柱上端的螺絲
Do not violently wrest the screw on the terminal!

- 任何情况下不得掀開電池安全閥！
  Do not open the battery safety valve in any situation!
- 安裝導電條時，切忌猛力以免損壞電池極柱上端的螺紋！
  Do not install the terminal connector with violent force, to avoid the damage of terminal screw!

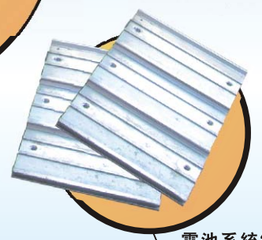


均要使用夾板固定電池
Must use jigs and straps to fix the battery



電池系統組合拉條
Battery pack straps

銅質導電條
Copper terminal connectors



電池系統組合夾板
Battery pack jigs

極柱的不銹鋼螺栓
The stainless steel bolt of the terminal post

平光墊圈和彈簧墊
Mat gloss washer and spring washer

- 正式使用前應該檢查電池配件（各型號有少許偏差，配件以實物爲準）
  Please check the accessories before using the battery (The pictures are for reference only. The accessories are subject to their actual features).
- 正常使用，不管單體或系統組合，均要使用夾板將電池固定，以防止鼓脹!
  Please use jigs and straps to fix the single cell or battery pack to avoid swelling for normal use!

七個串聯爲一組
Assemble 7 cells in series as one battery pack

要將多個單體電池系統組合，必須采用串聯或并聯的方式完成。一般理想的系統組合，應該衹有串聯，串聯系統組合對必須匹配安裝電池管理系統(BMS)較爲妥善。

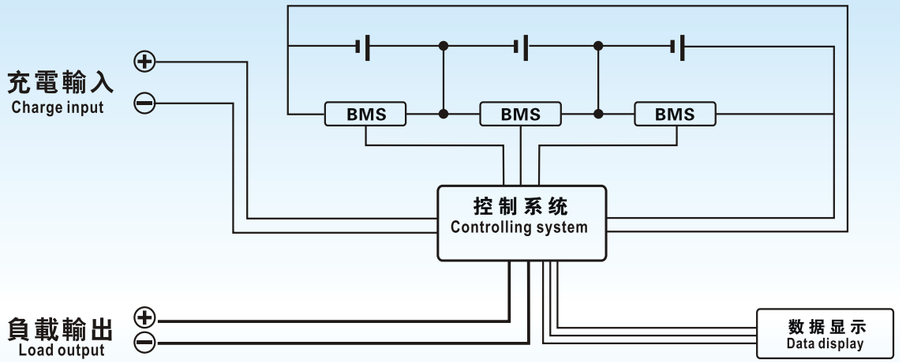
Put the cell into series or parallel connection to assemble the battery into pack.The ideal pack should only in series connection and with BMS.

配置一些拉條，螺絲等輔件
Collocate accessories including straps, bolts and screws etc.

如果要將多個電池串聯系統組合時，還要配置一些拉條，緊固件，螺栓和螺母等輔件才能完成。不管系統組合成多大功率的電池堆，衹要配置好這些主要輔件便可進行。

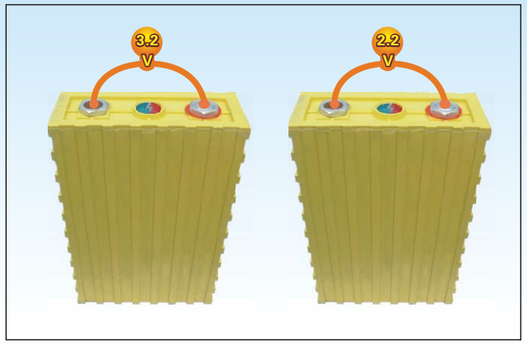
Accessories such as straps, bolts and screws will be needed to assemble several series connection together. Make sure the accessories are fixed however large of the battery is.

●电池管理系统(BMS)
Battery Management System



任何蓄電池通過串聯或并聯充放電使用，都要安裝一些電子綫路或監測綫路，對每個單體電池充電電壓和放電電壓進行有效的監測與保護，以免有部分電池出現過充電或過放電的不良現象而損傷電池。

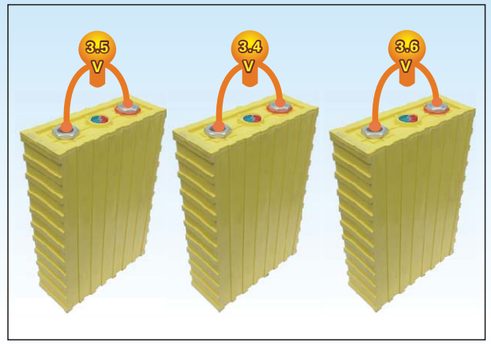
Any storage cell be used by parallel or series connection must install electronic circuit or monitor circuit to monitor the charging and discharging voltage and prevent the cells from damage caused by overchaged or over discharged.



不正常
Abnormal

●同一批電池中，有個别電池電壓明顯相差1V以上屬不正常電池

In the same batch, it is abnormal that battery's voltage is differing above 1V.



正常
Normal

●一般同一批次出廠的同型號電池電壓相差0.1V屬正常

In the same batch, it is normal that the voltage of the same model is differing at 0.1V

雷天温斯頓水性鋰動力電池是一種大容量，高功率，長壽命和安全性極佳的動力和儲能裝置，在日常使用時必須遵循正確的使用方法，按規定操作與存放，祇有這樣，使用任何一種類型的電池才能得心應手。

Thunder Sky Winston Water-based Lithium Power Battery is a kind of power and storage device with large capacity, high power density, long life and safety performance. During actual application, it is necessary to follow the instructions that operate and store it as prescribed which is the best way to use any type of our batteries.

操 作 Operation

不得拆卸分解、擠壓、刺穿電池，不得將電池正負極短接，不得加熱電池，不得將電池擲入火中，不得將不同品牌（如我司電池與其他公司電池）、不同類型（如LYP與LP）、不同容量以及新舊電池混用。

Do not disassemble, squeeze or pierce the battery, make the cathode and anode short circuit, heat the battery, throw it into fire. Do not use different brand(such as our company's battery and other company's battery), or different type (for example LYP and LP), or different capacity, or different conditions batteries together.

存放 Storage

電池需要存放在凉爽通風的地方（最佳温度爲25±3°C），電池放置需與墻壁保持適當距離，遠離潮濕、熱源。將電池保持在初始包裝中直至使用。

需要長期存放的電池，不能倒置儲存，首先 將電池充電至荷電的40-60%。以後需每月檢查電池的開路電壓，確定存放的同批電池的電壓一致，或相差不大，如發現電壓低于3.0V應盡快補充充電。一般正常情况下電池每月自放電率在1%左右，每半年補充充電一次即可。

The battery must be stored in cool and ventilated place (optimum temperature at 25 ± 5 ℃). Battery must maintain an appropriate distance from the wall and keep away from moist and heat. Keep the battery in the original package until be used.

Do not leave those battery which need to be stored in a long time upside-down, and those should be charged to 40%-60% before the storage. Check battery's open circuit voltage every month to make sure the voltage in the same batch is consistent or in slightly difference It should charge as soon as possible if the voltage is lower than 3.0V. The regular self-discharge rate is about 1% every month. Please recharge once every half year.

存放管理信息 Storage Management Information

1. 温度範圍
   Temperature range

儲存 Storage	+25℃ ±5℃
放電 Discharge	-45℃/+85℃
充電 Charge	-45℃/+85℃

2. 比能：（備注：WH=標準電壓*額定安時）KG=平均電池重量
   Specific Energy: (Note: Wh = Normal voltage x Rated Ah) kg = Average battery weight

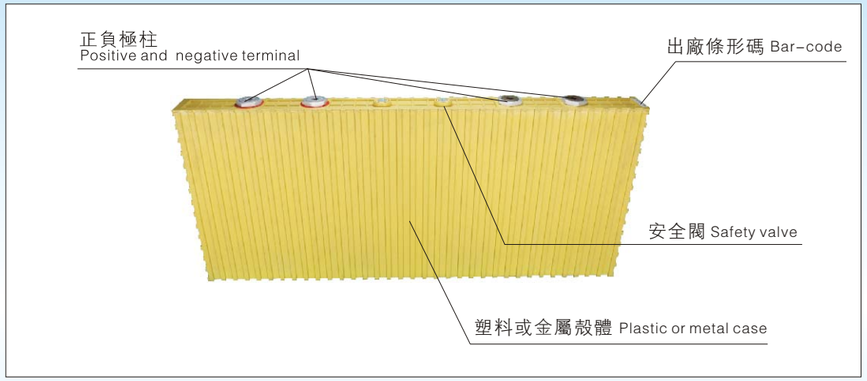
3. 比脉衝功率：600W-1200W/KG, 視電池尺寸不同。
   Specific Pulse Power: 600w-1200w/kg, Varies depending on battery size

4. 機械阻力：如IEC標準相關規定
   Mechanical Resistance : As defined in IEC relevant standard

WB-LYP

太陽能、風能、峰谷、不間斷電源（UPS）儲能類電池
Solar Energy、Wind Energy、Peak Valley 、UPS Storage Type Battery

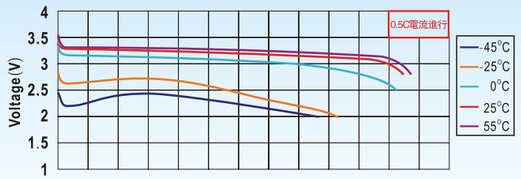
單體電池的結構
Structure of cell



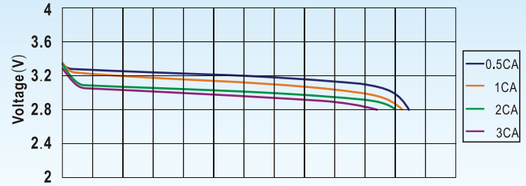
- LYP類電池是用作移動式動力源和儲能裝置最理想的電池
  LYP type battery is ideally used as a mobile power source and energy storage device.
- 該類電池具有極佳的安全性能，極佳的循環壽命
  This type of battery has excellent safety performance and cycle life.
- 充電時電池外殼温度若低于85度，該類電池允許采用3CA以下電流進行快速充放電
  When the battery case temperature below 85 degrees, this type of batteries can accept a fast charge and discharge under 3CA current.

LYP類電池的放電特性圖
Charge and discharge characteristis chart of LYP type battery

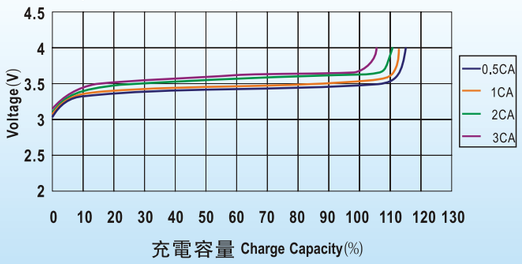
不同環境温度下LYP類電池的放電特性曲綫
Discharge characteristic curve of LYP type battary under different ambient temperature



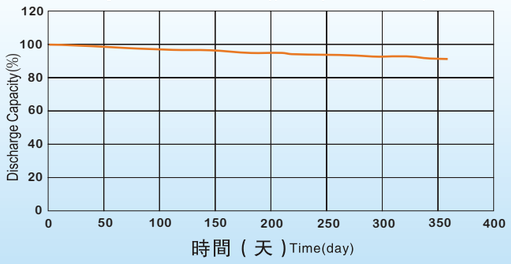
常温下LYP類電池的放電特性曲綫
Discharge characteristic curve of LYP type battery under normal temperature



常温下LYP類電池的充電特性曲綫
Charge characteristic curve of LYP type battery under normal temperture



在常温下LYP類電池的存儲特性曲綫
Storage characteristic curve of LYP type battery under normal temperature



由于LYP類電池正極活性物質采用氟化合物與水性混合燒制而成，而負極活性物質則采用納米碳素纖維與人造石墨，所以在接受大電流充電中，始終能保持其固有分子結構不變，晶格牢固，耐衝擊，壽命長等特點。

The LYP battery's cathode active material is made by fluorine compound and water based hybrid and the anode active material is made by nanometer carbon fiber and artificial graphite. Therefore in the large current charge, it can maintain its original molecular structure. Make the crystal lattice solid,have resistance to impact and sustain a long life.

- LYP類電池一般在常規環境中保持充電電壓≤4V；放電電壓≥2.7V；該類電池的循環壽命可大于3000次以上。
- 該類電池最大充電電流爲3CA，該類電池在反復充放電中，會不斷地提高容量，屬正常現象。
- 該類電池的工作電壓爲2.8-4V。標準的充電電流是0.3-0.5CA，并適應在-45℃至85℃環境温度下使用。
- 該類電池放電電壓低至2.0-2.5V，不會損壞電池，但建議放電截止電壓≥2.7V。

- In normal environment,the charging voltage of LYP battery should be kept at≤4V;discharging voltage ≥2.7V; cycle life can be more than 3000 times.
- The maximum charge current of LYP battery is 3CA. It is normal that battery capacity increased when charge and discharge repeatedly.
- LYP battery working voltage is 2.8~4V, nominal charging current is 0.3~0.5CA, can be operated under temperature between -45℃~-85℃。
- LYP battery will not be damaged when discharge voltage is below to 2.0~2.5V,but suggest the discharge end-off voltage is ≥2.7V.

■ 該類電池每月自放電率≤1%，常温放置狀態下每半年補充充電一次即可。

■ LYP類電池對于破壞性試驗，短路，槍擊，過充電過放電，擠壓，針刺，都不會因爲内部短路而發生起火燃燒和爆炸等危險。

■ 該類電池在組合使用時，如果没有使用有效的BMS（電池管理系統），并進行長期使用時，個别單體電池仍可能會出現過充電或過放電的現象，電池雖然不會出現起火燃燒等危險，但仍會造成電池性能下降或失效。

■ 匹配的BMS（電池管理系統）是在電池系統組合中最能保護每個單體防止過充電和過放電的有效的裝置，也能延長電池的使用壽命。

■ Discharging rate of the battery is ≤1%. Under normal condition, recharge the battery once every six months.

■ Under the destructive test, such as short circuit, gunshot, overcharge and overdischarge, extruding and nail penetration, battery will not on fire or explosion caused by internal short circuit.

■ When using the battery pack without the effective BMS(Battery Management System) for a long time, some of the single cells will appear overcharge and overdischarge. Under this circumstances, battery performance will degradation or even invalid,but there is no danger such as on fire.

■ Matched BMS(Battery Management System) is the best device to protect single cell from overcharge and overdischarge in the battery pack and ensure a long life endurance of the battery.

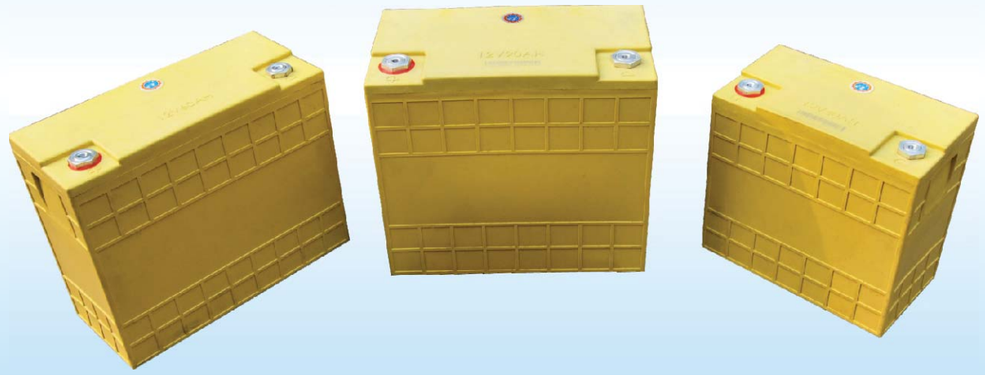
WB-LP

替代鉛酸類蓄電池，專門用于各類燃油汽車

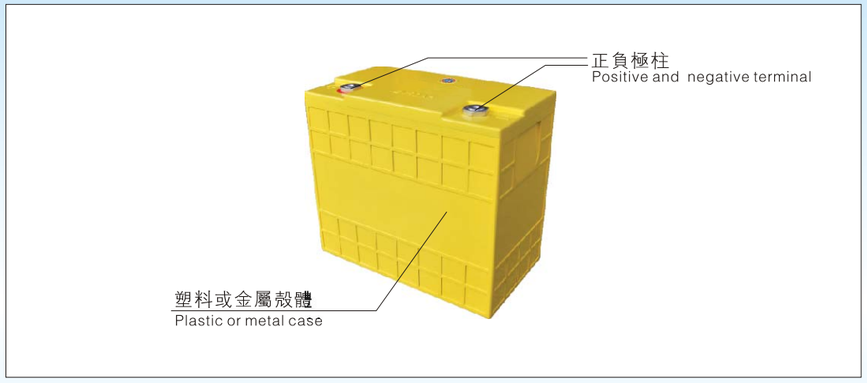
Replace Lead-acid Storage Battery, Specilized on various fuel automobiles

12V/24V/48V啓動電池

12V/24V/48V starter battery



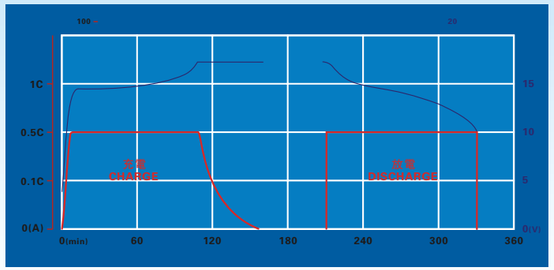
單體電池的結構
Structure of single cell



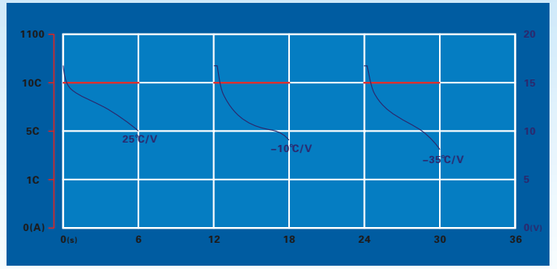
WB-LP12V90AH

- Lp類高電壓水性鋰動力電池是替代燃油汽車啓動鉛酸電池的最有效產品，該類電池生產、使用、回收對環境友好無污染。
  The LP high voltage water-based lithium power battery is the most effective product to replace the lead-acid battery as the starter battery. And the battery production, usage and recycling are environmentally friendly.

LP類電池最佳充放電圖
Chart of Best Charge of LP Battery



LP類電池標準充放電特性曲綫圖 ▲
Standard charge discharge characteristic curve of LP battery



LP類電池不同環境温度下瞬間放電特性曲綫圖 ▲
Transient discharge characteristic curves of LP battery under different environment temperature

LP類電池最大充電電流
Maximum Charging current of LP battery

LP類電池衹允許采用≤3CA以下電流充電，充放電最佳電壓範圍爲11V~16V，
LP battery only can be charged under (≤)3CA current. The best charging and discharging voltage range is 11V~ 16V;
最佳的充電電流是在0.5CA以下進行充電。
The best charging current is below 0.5CA.

■ 該類電池的工作電壓爲11V–16V，可直接替代鉛酸電池用作燃油車的起動電池，長期使用壽命大于10年。
LP battery's working voltage is 11V–16V. It can substitute the lead–acid battery directly in the fuel car as the start–up battery. The life is more than 10 years.

■ 一般在常規環境中保持充電電壓≤16V; 放電電壓≥11V時, 該類電池的循環壽命應大于3000次以上或10年。
Generally, LP battery's cycle life should be longer than 3000 times or 10 years when the charging voltage is≤16V and discharging voltage ≥11V at normal environment.

■ 該類電池適應–45℃至85℃環境温度下使用。
It can be used at temperature between – 45℃ to 85℃.

■ 該類電池不會因過充或過放電而發生意外，但仍會造成電池性能下降或失效。除非將電池作破壞性實驗，否則該類電池不會因内部短路而起火燃燒。
LP battery would not cause accident when it is over charged or over discharged, but the performance would degradation or get invalid. It won't cause fire when short circuit unless the user destroys it on purpose.

標準充放電
Standard Charge and Discharge

首次充放電 Charge/discharge setup for the first use.

新出廠的電池處于半荷電狀態，切勿直接使用！首次使用時必須將每個單體電池依照各類電池的特性設定充電標準，對電池充電，必須選擇匹配的專用充電器進行充電。
The new battery is in half electric charge condition, which can not be used directly! Before using the new battery for each new battery must charge according to each kind of battery's charge standard that is set by their characteristics. The battery must use the matched battery charger to charge.

	LYP類電池 LYP battery	LP類電池 LP battery
■ 充電最高電壓 The highest charge voltage:	4.00V	16V
■ 充電最佳電流 The best charge current:	0.5CA	0.5CA
■ 放電最低電壓 The lowest discharge voltage:	2.70V	11.0V
■ 放電最佳電流The best discharge current:	0.5CA	0.5CA

當電池經過首次充放電后，可依照各類別電池特性設定充放電電壓。
After initial charge and discharge, the user could set up the charge and discharge voltage according to each kind of battery's characteristics.

●常温環境下單體電池的充放電電流電壓標準（表一）
Single cell's charge and discharge current and voltage standard at normal temperature (Chart 1)

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 highest discharge voltage
25℃	LYP	0.5CA	≤3CA	4V	恒流 Constant Current 3 CA 脉衝 Pulse 10CA	2.7V
	LP	0.5CA	≤3CA	16V	恒流 Constant Current 3 CA 脉衝 Pulse 10CA	11V

●低温環境下單體電池的特殊充放電電流電壓（表二）
Single cell's special charge and discharge current and voltage at low temperature (Chart 2)

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 highest discharge voltage
-25℃	LYP	0.5CA	≤1CA	4.25V	恒流 Constant Current 3 CA 脉衝 Pulse 10CA	2.0V
	LP	0.5CA	≤1CA	17V	恒流 Constant Current 3 CA 脉衝 Pulse 10CA	10V

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（表一）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 1) the charge standard at normal temperature!

●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
	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)

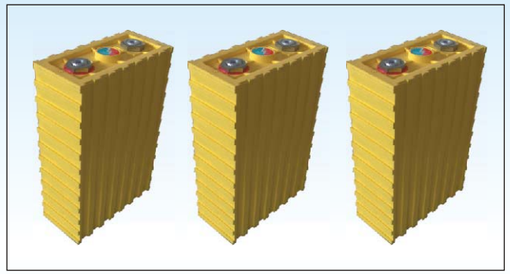
溫度 Temperature	類別 Category / 標準 Standard	標準充放電流 standard charge/discharge current	最大充電電流 The highest charge current	最高充電電壓 The highest charge voltage	最大放電電流 The highest discharge current	最低放電電壓 The lowest discharge voltage
-25℃	LYP	0.3CA~0.5CA	≤1CA	N×4.25V	恒流 Constant Current 3 CA 脉衝 Pulse 10CA	N×2.0V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

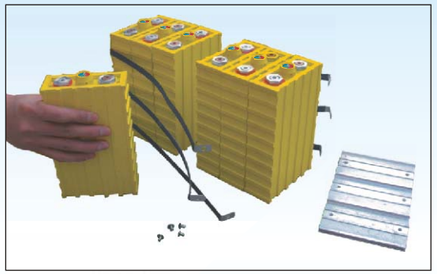
故障對策 Malfunction Solutions

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產生零電壓或低電壓?

Why is the voltage of some battery 0V or low voltage?

電池在使用中，會產生內阻變化，當個別電池內阻增大時，該電池在系統組合中與其他內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內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，更換同容量電池便可。（如圖）

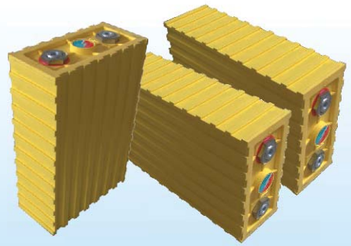
Discharge the battery pack to its standard minimum voltage and release the straps to replace the cell with new one of same capacity as the above picture.

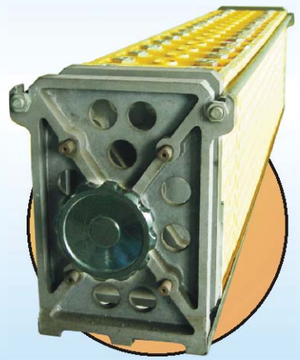
故障對策二：電池鼓脹怎么辦?

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換新的電池便可。

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。

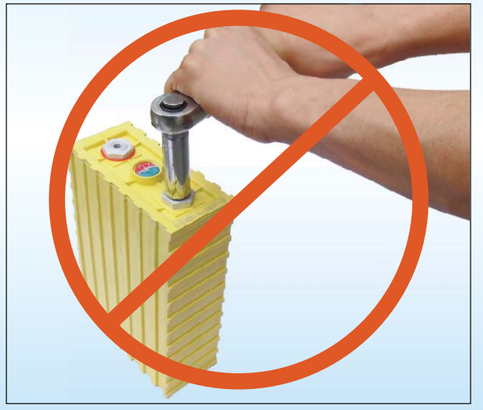
The battery case may give out heat during normal discharging and especially the temperature will rise to 80℃~100℃ when discharged by big current.If it happens please reduce the charging and discharging current until the temperature gets back to normal. Make sure the case temperature will not be over 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/LP類水性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。

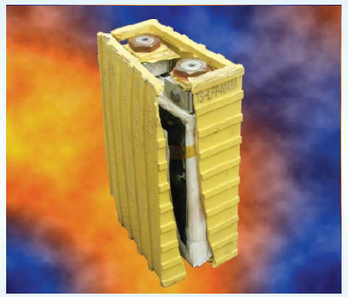
電池在燃燒中會泄漏，蒸發、分解、釋放電解物質，這時在燃燒中可能會形成氟化物（HF）輿磷氧化物，電解質中的LiPF6輿水發生的化學反應將産生氟化合物及二氧化碳。

Thunder Sky Winston LYP/ LP water-based 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。在確保感染者没有使用催吐劑，確保黏液没有阻隔呼吸道時，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?

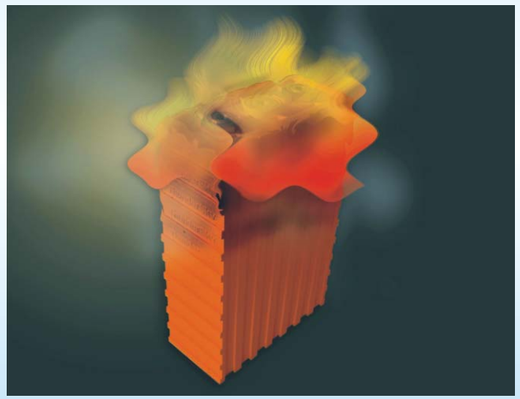
不小心被裸露電池的電解液或粉末傷害眼睛時，立刻用大量清水洗眼睛至少15分鐘或立即到醫院就醫。

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。

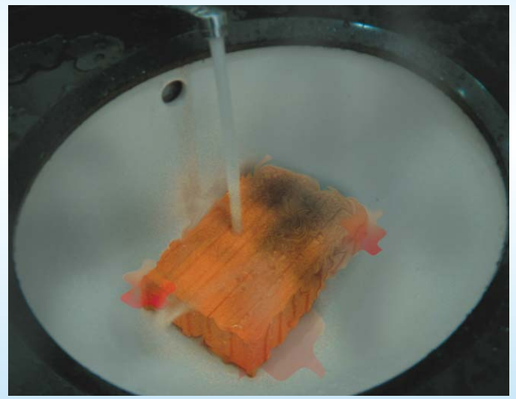
The internal material will leak or get fire only when the battery is misused ,and ignites.



濫用引起
Burning caused by misuse

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.

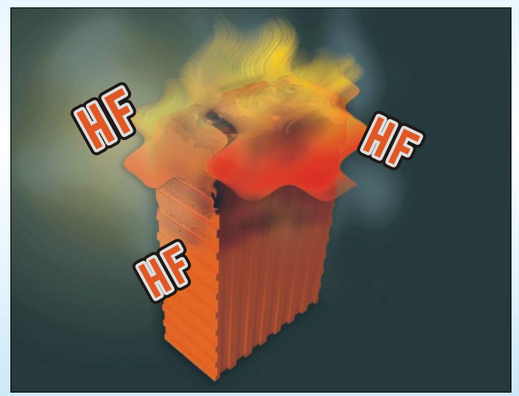


用水噴淋或將燃燒冒烟的電池浸泡在水池中
Spray the battery with or put the smoking or burning battery into water

電池在150℃情况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産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℃情况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

危機處理二：滅火媒介
Crisis treament Ⅱ :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，$C0_2$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

危機處理三：特殊防護工具
Crisis treament Ⅲ :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	輿皮膚接觸有害 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况下可能會過敏 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：水性鋰動力可充電電池 Name: Water-based lithium power rechargeable battery

1.1 產品：水性鋰動力電池
Product: water-based lithium power battery

型號 Model: LYP、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 国际销售 International sales
雷天温斯頓電池有限公司 Thunder sky Winston Battery ,Ltd.

1.3 中国生产制造商 Chinese Manufacturers
名稱: **東方醒獅新動力電池有限公司**
Description: Oriental Smart Lion New Power Battery Ltd.
地址: **中國福建省漳州市長泰經濟開發區興泰工業園區**
Address: Xingtai Industrial Park of Changtai Economic Development Zone, Zhangzhou City, Fujian Province, PRC.

1.4 联系方式 Contact Details
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傳真FAL: 86–0596–8186678
網址Http: www.thundersky–winston.com
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2 物理化學性質
Characteristics

2.1 物理性質 Physical properties:

在此材料安全數據表中所提及的水性鋰動力可充電電池均爲密封的單體，當按照生產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.

祇在濫用電池，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.

2.2 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(۲) Safety advice (2)
7440–65–5	$LiFeYPO_4$	> 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 指示的産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

雷天温斯頓水性鋰動力可充電電池不含有毒物。
Thunder Sky Winston water–based power 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，雷天温斯頓水性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.
水性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，衹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　水性鋰動力可充電電池，UN3480
Proper shipping name Water–based 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　水性鋰動力可充電電池，UN3480
Proper shipping name Water–based 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　水性鋰動力可充電電池，UN3480
Proper shipping name Water–based lithium power rechargeable battery, UN3480

2.雷天温斯頓電池有限公司聲明我們的產品符合聯合國手册及測試標準下條理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
試驗環境温度爲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内。
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，電壓表内阻至少應是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，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.

低温充電 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，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. 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。然後在同一温度下，以 0.3CA 恒流放電至終止電壓(2.0V)。計算放電容量 (以Ah爲計)。

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℃

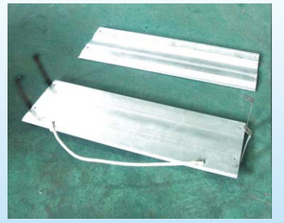
蓄電池充電後，在85℃ ± 2℃條件下貯存5h，然後同一温度下，以 0.3CA 恒流放電至終止電壓(3.0V)。計算放電容量 (以Ah計)。

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將塑料殼體的蓄電池按如下圖示安裝夾板固緊，(金屬殼體和LP類電池不需要)

Fastens the plastic casing of the cell according to the graph below. (Except metal case 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。第一階段將電池静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，静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）。第二階段將電池静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類電池電壓上升至4V時，静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 . 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, 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, 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，静止三十分鐘後在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，外部綫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，直到電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.

■ 循環壽命試驗 cycle life test (80DOD %)

蓄電池在20℃±5℃下，以 0.5CA 電流恒流充電,LYP電壓到達4.0V時轉恒壓充電，LTHP類電壓到達4.5V時轉恒壓充電，直至充電電流降至起始值的5%時停止充電擱置1h。

Place the cell under 20℃±5℃ condition and charge the cell with 0.5CA constant current, when the voltage of LYP battery reaches 4.0V, and LTHP battery reaches to 4.5v turn to constant voltage charge until the chargingcurrent drops to the 5% of initial value and place the cell for 1 hour.

蓄電池在20℃±5℃條件下，以 0.5CA 電流放電，直至放電容量達到額定容量的80%。充放電轉換時，可以擱置三十分鐘或一小時。共計進行100次，電池標稱容量下降率小于千分之一安時。

Place the cell under 20℃±5℃ condition and discharge the cell with 0.5CA current until the discharge capacity reaches 80% of rated capacity. There can be a 30 minutes to 1h interval between the charge and discharge of the cell. Repeat 100 times and the cell nominal capacity decrease rate should be less than 1‰ AH.

■ 簡單模擬工況 Simulated working condition

蓄電池充電後，在20℃±5℃條件下擱置1h，然後在同一温度下進行脉衝放電，以 0.3CA 放電8min後以1C1(A)脉衝放電1min爲第一階段;

Place the cell under 20℃±5℃ condition for 1h after charging the cell as the charging test method instructed and then pulsed discharge the cell in the same temperature, in the first stage discharge the cell with 0.3CA current for 8 minutes and change to 1C1 (A) pulsed discharge for one minute;

以 0.3CA 脉衝放電8min後以2C A 脉衝放電1min爲第二階段;

In the second stage pulsed discharge the cell with 0.3CA current for 8 minutes and discharge to 2C A pulsed discharge current for 1 minute;

以 0.3CA 放電8min以後3C A 脉衝放電1min爲第三階段;

In the third stage discharge the cell with 0.3CA current for 8 minutes and change to 3C A pulsed discharge for one minute;

以 0.3CA 放電8min後10C1(A)脉衝放電8秒爲第四階段；階段之間擱置0.5h,總計進行4個階段的脉衝放電，然後以 0.3CA 放電至100DOD%。放電過程中記録單體蓄電池電壓。在某個脉衝放電階段單體蓄電池電壓低于2.7V則停止放電。

In the fourth stage discharge the cell with 0.3CA current for 8 minutes and discharge by pulsed discharge current at 10C1(A) for 8 seconds; place the cell for 30 minutes between each stages and discharge the cell with 0.3CA current until 100DOD%. Record the voltage of single cells during discharging. Stop discharging if in some stage the volt age of single cells gets lower than 2.7V.

■ 耐振動試驗 Vibration test

蓄電池充電後，緊固到振動試驗臺上，按下述條件進行試驗：

Fasten the cell to vibration test machine after charging as the charging test method instructed, test as follows:

a)振動方向：上下單振動；
Vibrate direction: rack vibration up and down;

b)振動頻率：10～55HZ；
Vibrate frequency: 10～55HZ;

c)最大加速度：30m/S2；
Maximal acceleration: 30m/S2;

d)振動時間：2h；
Vibration duration: 2h;

e)放電：以 0.3CA 電流放電至蓄電池電壓達到3.0V停止放電。
Discharge: discharge the cell with 0.3CA current until the voltage reaches 3.0V.

不允許出現放電電流銳變、電壓异常、電池殼變形、電解液溢出等現象。

There should not be significant discharge current transformation, abnormal voltage, case distortion and electrolyte leakage.

WB-LP類電池的檢驗規則
Testing Instructions for WB-LP cell

單體電池檢驗項目
Testing items of 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、蓄電保持及恢復能力，脉衝充放電循環壽命，瞬間放電能力。

Exterior condition, terminals, weight and size, discharge capacity at 20℃, high-rate discharge capacity, discharge capacity at -25℃, discharge capacity at 85℃, retention and restorability, cycle life of impulsive charge and discharge, spark capacity.

■ 安全性項目 Items of safety

短路、過充過放電、火燒、槍擊、水浸

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

■ 蓄電池的要求 Requirement of the cell

單體電池的正負極應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。

Positive/negative terminal of singe cell must apply connector that could bear the maximum rate of current in accordance with Testing Method.

0.3C爲3h率額定容量,0.1C爲1h率額定容量。

0.3C is the rated capacity of 3h rate; 0.1C is the rated capacity of 1h rate.

常規試驗方法
Conventional Test Methods

■ 試驗條件 Test condition

環境條件Environment condition
試驗 温度爲15℃～35℃、相對濕度爲25%～85%。
Laboratory room temperature 15℃～35℃, humidity 25%～85%

■ 測量儀器、儀表 Measuring equipment and instrument
量程 Instrument range
所有儀表量程應隨被測電壓值或電流值改變，指會或儀表讀數應在量程的後三分之一範圍内。
Measurement range accordingly changes with voltage and current fluctuation; instrument value should fall in last 1/3 range of measurement instrument.

精度 Accuracy
a)測量電壓用的儀表應是不大于0.5級的電壓表，電壓表内阻至少應 1KΩ/V;
Accuracy level of voltage meter ≥ 0.5 class; resistance of voltage meter: 1kΩ/v;
b)測量電流用的儀表是不低于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，其他度值不應大于1℃;
Thermometer has applicable measurement range; scale value of thermometer ≤1℃
d)測量時間用的儀表應按時、分、秒分度，至少應該具有±1%的準確度。
Time measuring instrument can record scale 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;
Scale value ≤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 surface is dry, flat, no-damage;
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，是否與端子的析性一致。
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 Charge
在20℃±5℃條件下，蓄電池以 0.3CA 電流放電，至蓄電池電壓達到11V時停止放電，然後20℃±5℃條件下以 0.3CA 恒流充電，至電池電壓達16V時轉恒壓充電，充電電流降至起始值的5%時停止充電。
At 20℃±5℃ the cell is discharged at a current of 0.3CA till voltage of the cell reach 11V, and then start to perform constant current charge at a current of 0.3CA under 20℃±5℃ till voltage of the cell reaches 16V and simultaneously switches to constant voltage charge. When charging current value decreases to 5% of initial value, charging completes.

低温充電 Low temperature charging
在–45℃±5℃條件下，蓄電池以 0.3CA 電流放電，至蓄電池電壓達到 8V時停止放電，然後–45℃±5℃條件下以 0.3CA 恒流充電，至電池電壓達到17V時轉恒壓充電，當恒壓階段充電時間達1h時轉爲恒壓17V涓流充電，充電電流降至起始值的5%時停止充電。
At –45℃ ± 5℃ the cell is discharged at a current of 0.3CA till voltage of the cell reaches 8 V, and then start to perform constant current charge at a current of 0.3CA under –45℃ ± 5℃ till voltage of the cell reaches 17V and simultaneously switches to constant voltage charge and duration is 1 hours. After that,trickle charge will begin. Charging completes when charging current value decreases to 5% of initial value.

■ **20℃放電容量 (能量密度)20℃ Discharge Capacity (Energy Density)**
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 恒流放電至電池電壓11V。如果放電容量達不到額定容量，此項試驗允許重得3次。
After charging according to the charging test method, set aside the cell for 1h at 20℃ ± 5℃, then discharge by 0.3CA current at the same temperature, until voltage of the cell drop to 11V. If discharge capacity cannot reach the rated capacity, this test can be repeated 3 times.

■ **高倍率放電容量 High–rate discharge capacity**
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1C A 電 流放電至電池電壓11V時終止。
After charging according to the charging test method, set aside the cell for 1h at 20℃ ± 5℃, then discharge by 1CA current at the same temperature, until voltage of the cell arrives at 11V, and stop.

■ **–45℃放電容量 Discharge capacity at –45℃**
蓄電池在充電後，在–45℃±2℃條件下貯存下4h。然後在同一温度下，以 0.3CA 恒流放電至終止電壓(8 V)。計算放電容量 (以Ah計)。
After charging according to the charging test method, set aside the cell for 4h at –45℃ ± 2℃, then discharge by 0.3CA current at the same temperature, until voltage of the cell drops to final voltage (8 V). Calculate the discharge capacity (by Ah)

■ **55℃放電容量 Discharge capacity at 55℃**
蓄電池在充電後，在55℃±2℃條件下貯存3h，然後在同一温度下，以 0.3CA 恒流放電至終止電壓(11V)。計算放電容量 (以Ah計)。
After charging according to the charging test method, set aside the cell for 3h at 55℃ ± 2℃, then discharge by 0.3CA current at the same temperature, until voltage of the cell drops to final voltage (11V). Calculate the discharge capacity (by Ah)

■ **荷電保持和恢復能力 Retaining Ability and restorability**
荷電保持能力：蓄電池在充電後，在20℃±5℃條件下，以開路狀態貯存30天,然後在同一温度下以1/3C3(A)恒流放電至終止電壓(11V)。計算放電容量 (以Ah計)。
Retaining Ability: after charging according to the charging test method, set aside the cell by open circuit for 30days at 20℃ +5℃, then discharge by 1/3C3 (A) constant current at the same temperature, until voltage of the cell drops to final voltage (11V). Calculate the discharge capacity (by Ah).
容量恢復能力：蓄電池在充電後，在20℃±5℃條件下以 0.3CA 恒流放電至11V。計算放電容量 (以Ah計)。
Restorability: after charging according to the charging test method,then discharge by 0.3CA constant current at 20℃ ± 5℃condition, until voltage of the cell arrives at final voltage (11V). Calculate the discharge capacity (by Ah).

安全試驗方法
Safety test method

■ 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，外部綫路和電阻應小于或等于10mΩ。

After charging according to the charging test method, set aside the cell for 1h at 20℃±5℃, and short-circuit the cell by external for 10min, external circuit and resistance should be less than 10mΩ.

試驗過程中，蓄電池不得爆炸、冒烟。

The cell must not explode, smoke during the test.

■ 擠壓試驗 Extrusion test

蓄電池在充電後，在20℃±5℃條件下擱置1h。按下列條件進行試驗。

After charging according to the charging test method, set aside the cell for 1h at 20℃±5℃, test according to following conditions.

a)**擠壓方向：**垂直于蓄電池析板方向施壓；

Extrusion direction: press perpendicularly upon the cell plates

b)**擠壓面積：**垂直于施壓方向的外表面；

Extrusion area: outside surface of pressing direction

c)**擠壓程度：**直至蓄電池殼體破裂或内部短路爲止。

Extrusion level: until the cell case is broken or internal short circuit occurs

試驗過程中，蓄電池不得爆炸、冒烟。

The cell must not explode,smoke during the test.

■ 針刺試驗 Nail test

蓄電池在充電後，在20℃±5℃條件下擱置1h。用Φ3mm~Φ8mm 的鋼釘從垂直于蓄電池極板的方向迅速貫

After charging according to the charging test method, set aside the cell for 1h at 20℃±5℃. Using Φ3mm~Φ8mm steel nail that runs through quickly along the perpendicular direction (steel nail must not stay in the cell), this test must be carried out under full environment protection condition.

試驗過程中，蓄電池不得爆炸、冒烟。

The cell must not explode, smoke during the test.

■ 過充和過放電實驗 Overcharge and overdischarge test

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 0.3CA 電流充電，直到電池電壓達到20V時停止。

Over charge: After charging according to the charging test method, set aside the cell for 1h at 20℃±5℃, then charge by 0.3CA current at the same temperature, until the voltage arrives at 20V.

過放電：蓄電池在率電後，在20℃±5℃條件下擱置1h。蓄電池在20℃±5℃下，以 0.3CA 電流放電，直到電池電壓下降至零伏時即停止實驗。

Over discharge: After charging according to the charging test method, set aside the cell for 1h at 20℃±5℃, then discharge by 0.3CA current at the same temperature, until the voltage drops to 0V.

過充、過放電試驗過程中，蓄電池應不漏液、不爆炸、不起火。

The cell must not leak, explode and burn during 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。

After charging according to the charging test method, set aside the cell for 1h at 20℃±5℃, and then burn it in the blaze, until the cell is laid into ashes.

實驗過程中，蓄電池不得爆炸。

The cell must not explode during the test.

■ 循環壽命試驗(80DOD%) Cycle life test (80D0D %)

蓄電池在20℃±5℃下，以 0.3CA 電流恒流充電，至電壓到達16V時轉恒壓充電，直至充電電流降至起始值的5%時停止充電擱置1h。蓄電池在20℃±5℃條件下，以 0.3CA 電流放電，直至放電容量達到額定容量的80%。充放電轉換時，可以擱置三十分鐘或一小時。共計進行200次，電池容量下降率小于千分之二安時。
The cell charges by 0.3CA constant current at 20℃±5℃. Once the voltage reaches 16V, it will switch to constant voltage charge, until charging current drops to 5%of the initial value, then set it asides for 1h. The cell discharges by 0.3CA current at 20℃±5℃ until discharge capacity reaches 80% of the rated capacity. During the charge and discharge converting, the cell can be set aside for 30 to 60 minutes. After 200 times, decline rate of the cell capacity is less than 0.2% Ah.
循環25次爲一個周期，第25次循環進行一次全放電，然後再進行下一周期循環試驗。若某個周期的第25次循環的放電容量小于額定容量的80%，則停止循環壽命試驗。
25 times a cycle, carry out full discharging in the 25th circulation, then go to next cycle test. When the 25th circulation discharge capacity is less than 80% of the rated capacity in some cycle, stop the cycle life test.

■ 簡單模擬工况 Simulated working condition

蓄電池充電後，在20℃±5℃條件下擱置1h，然後在同一温度下進行脉衝放電，以 0.3CA 放電6min後以1C1(A)脉衝放電1min爲第一階段；
After charging according to the charging test method, set aside the cell for 1h at 20℃±5℃, then discharge by impulse at the same temperature, after 6min discharge by 0.3CA current, turn to 1 min 2 C1 (A) current impulse discharge as the first phase;

以 0.3CA 脉衝放電6min後以2C A 脉衝放電1min爲第二階段；
After 6min discharge by 0.3CA current, turn to 1min 2 CA current impulse discharge as the second phase;

以 0.3CA 放電6min以後3C A 脉衝放電1min爲第三階段；
After 6min discharge by 0.3CA current, turn to 1min 3C A current impulse discharge as the third phase;

以 0.3CA 放電6min後10C A 脉衝放電1min爲第四階段；
After 6min discharge by 0.3CA current, turn to 1min 10C A current impulse discharge as the fourth phase;

階段之間擱置0.5h,總計進行4個階段的脉衝放電，然後以 0.3CA 放電至100DOD%。放電過程中記録單體蓄電池電壓。在某個脉衝放電階段内蓄電池電壓低于8V則停止放電。
0.5h between each two phases, carry out four phases impulse discharge in total, then discharge by 0.3CA current to 100D0D%. Record the voltage of single the cell during the discharging. When the voltage of the single cell is less than 8V in any phase, stop discharging.

■ 耐振動試驗Vibration proof tests

蓄電池充電後，緊固到振動試驗臺上，按下述條件進行試驗：
After charging according to the charging test method, the cell should be fastened to vibration test stand, and be tested according to following conditions:
a)**振動方向：**上下單振動；
Vibration direction: single up and down vibration
b)**振動頻率：**10～55HZ；
Vibration frequency: 10~55Hz
c)**最大加速度：**30m/S2；
Maximal acceleration: 30m/S2
d)**振動時間：**2h；
Vibration duration: 2hours
e)**放電：**以 0.3CA 電流放電至蓄電池電壓達到10V停止放電。
Discharge: discharge by 0.3CA current, until voltage reaches 10V
不允許出現放電電流銳變、電壓异常、電池殼變形、電解液溢出等現象。
Discharge current metamorphosis, voltage abnormality, case distortion, electrolyte spillover etc are not allowed.

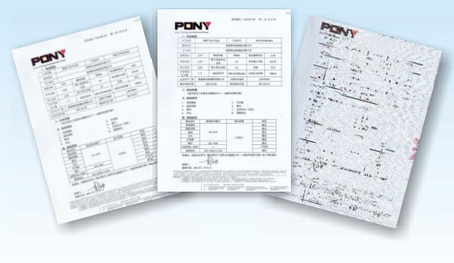
質量認證
Quality Certificate

通過標準質量體系認證
Quality System Certification





通過“PONY”權威認證
Authoritative PONY Certification

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