

Specification For Approval

TYCORUN

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TYCORUN New Energy Technology Co., Ltd

太空人新能源科技有限公司

Specification For Approval

客户承认书

Customer Name Code 客户名称代码	
Model 产品型号	
Description 规格描述	16S4P-51.2V200Ah
Effective Date 生效日期	2021年12月16日

Made By 制订	Checked By 审核	Approved By 批准
李宗宝		

Customer Confirmation 客户确认	Company Name 公司名称:
	Signature 签名:
	Company Stamp 公司印章:

Factory address:

工厂地址:

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1、Scope of application documents/文件适用范围

The specification of this product is only applicable to the protection parameters of a rechargeable lithium-ion battery Product and cell designed by our company
本产品规格书仅适用由本公司设计的可充电锂离子电池产品和电芯的保护参数。

2、The Specification Amendment/规格书修订

If the raw materials, production processing, production system or battery usage environments & other conditions need to be changed, the amendment side needs provide the written advice to the other side, only the both sides come to agreement, the amendment will be effective.

如因原材料、生产制程、生产系统或电池使用环境或其他条件发生改变,修订方需将改变的信息以书面形式通知对方取得供需双方同意后再行修订。

3、Product or Cell testing conditions/设备产品或电芯的测试条件

It is recommended to use newly produced battery packs and new cells for related tests. Unless specified, testing and measurement shall be done under temperature of $20\pm 5^{\circ}\text{C}$ and relative humidity of 45~75%.

建议采用新生产的电池组和新的电芯作相关的测试。除非有特别要求,否则测试需要在温度 $20\pm 5^{\circ}\text{C}$,相对湿度45~75%的条件下进行。

4、Standard / 标准

4.1 Reference Standard/参考标准

参考 GB 31241-2014 便携式电子产品用锂离子电池和电池组安全要求

参考 UL1642安全标准-(锂电池)

参考 GB/T 31486-2015 电动汽车用动力蓄电池电性能要求及试验方法

参考 GB/T 31485-2015 电动汽车用动力蓄电池安全要求及试验方法

参考 GB/T 31484-2015 电动汽车用动力蓄电池循环寿命要求及试验方法

4.2 Measuring Instrument and Apparatus/测量器具及设备

.1 Dimension Measuring Instrument/尺寸测量器具

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.02mm.

尺寸测量器具的精度等级应不小于0.02 mm。

.2 Voltmeter (伏特计)

Standard class specified in the national standard or more sensitive class having inner impedance more than $10\text{k}\Omega/\text{V}$ 按照国家标准指定规格等级或采用灵敏度更高的,测量电压时内阻不应小于 $10\text{k}\Omega/\text{V}$ 。

.3 Ammeter (安培计)

Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01Ω . 按照国家标准指定规格等级或采用灵敏度更高的,包括电流表及电线在内的总外阻应小于 0.01Ω 。

.4 Impedance Meter (电阻计)

Impedance shall be measured by a sinusoidal alternating current method(1kHz LCR meter).

内阻测试仪测量原理应为交流阻抗法(1kHz LCR)。

4.3 Testing Conditions (Unless Specially Requirements) 测试条件 (除非特别规定)

Atmosphere Pressure : 86~106kPa 大气压力: 86~106kPa

Temperature: $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 环境温度: $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$

Relative Humidity: $\leq 75\%$ 环境湿度: $\leq 75\%$

5. Main specifications 主要技术参数(24140160-50Ah)

5.1 Cell Battery specifications (电芯技术参数)

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No	Item (项目)	General Parameter 常规参数		Remark (备注)
		Typical	50Ah	
1	Rated Capacity(额定容量)	Minimum	50Ah	Standard discharge after Standard charge 标准充电后 0.2C ₅ A 标准放电
2	Nominal Voltage 平台电压	3.2V		
3	Internal Impedance (内阻)	≤0.68mΩ		Under 20±5°C Environment Temperature , the Usage Frequency of Fully Charge(1KHz) , Use AC Internal Impedance test machine to test 20±5°C 环境温度下, 完全充电后使用频率为(1kHz)的交流内阻测试仪测量。
4	Standard charge (标准充电)	Constant Current 0.5C ₅ A Constant Voltage 3.6V 0.02C ₅ A cut-off		Charge time : Approx 2.5h
5	Rapid Charge (快速充电)	Constant Current 1C ₅ A Constant Voltage 3.6V 0.02C ₅ A cut-off		Charge time : Approx 1.5h
6	Standard Charge Cut-off Voltage 标准充电截止电压	3.6V		Voltage of the battery when the Charge is stopped 按电芯充电达到满电时停止的电压值
7	Standard Discharge Cut-off Voltage 标准放电截止电压	2.5V		Voltage of the battery when the discharge is stopped 按电芯平台放电达到放电截止的电压值
8	Standard discharge (标准放电)	Constant current 0.5C ₅ A end voltage 2.5 V		25A
9	Maximum discharge current 最大放电持续电流	Constant current: 1C ₅ A end voltage: 2.5 V		50A@±0°C
10	Dimension (尺寸)	Thickness/厚度: 24±0.5mm		Initial Dimension (初始尺寸)
		Width/宽度: 140.2±0.5mm		
		Height/高度: 163±0.5mm		
11	Weight (重量)	1150g±0.05kg		APPROX
12	Operating Temperature Range 工作温度范围	Temperature: -20~55°C Humidity: ≤85%RH 温度: -20~55°C 相对湿度: ≤85%		Recommended charge/discharge current ≤ 1I1 (50A), when cell temperature is lower than 0°C, Recommended cool the cell, when cell temperature is higher than 55°C
13	Storage Temperature Range 储存温度范围	-20°C ~25°C		Recommend (25±3°C); ≤65%RH storage moisture range. 推荐储存湿度范围 ≤65%RH

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5.2 Battery Pack specifications for single module (电池组技术参数)

No	Item (项目)	General Parameter		Remark (备注)
1	Combination method	16S4P		
2	Rated Capacity (额定容量)	Typical	200Ah	Standard discharge after Standard charge (package) 标准充电后标准放电
		Minimum	198Ah	
3	Factory Voltage (出厂电压)	51.2V-53V		Mean Operation Voltage (即工作电压)
4	Voltage at end of Discharge 放电终止电压	≤43.2V		Discharge Cut-off Voltage 放电截止电压
5	Charging Voltage (充电电压)	57V		
6	Internal Impedance (内阻)	≤100mΩ		Under 20±5°C Environment Temperature , the Usage Frequency of Fully Charge (1KHz) , Use AC Internal Impedance test machine to test 20±5°C 环境温度下, 完全充电后使用频率为 (1kHz) 的交流内阻测试仪测量。
7	Max Charging Current (Icm) 允许最大充电电流	100A		Ampere-meter , Maximum allowable charging current of the battery pack 电流表测量, 电池组最大充电电流
8	Limited Charging Voltage (Uc1) 充电限制电压	57.6V		Volta-meter (Serial*3.6V) , Battery pack safe charging voltage 电压表测量(串数*3.6V (电芯的安全充电电压)), 电池组安全充电电压
9	Max Discharging current 最大放电电流	100A		Maximum discharge current allowed by the battery pack 允许用最大放电电流进行放电。
10	Discharge Cut-off voltage (Udo) 放电截止电压	43.2V		Voltage of the battery when the discharge is stopped 为电池组中止放电的负载电压(按电芯平台放电达到放电截止的电压值)
11	Operation Temperature Range (工作温度范围)	Charge: 0~55°C		
		Discharge: -20~55°C		
12	Storage Temperature Range (储存温度范围)	-20°C~25°C		Recommend (25±3°C) ; ≤85%RH storage moisture range. 推荐 ≤85%RH 储存湿度范围。
13	Single module Size/weight 单模组尺寸/重量	680*485*180mm /90Kg		1PCS, 单模组约 90kg
	Main control box size/weight 主控箱尺寸(汇流箱)/重量	/		/

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5.3 System composition parameters 系统组成参数				
No	Item (项目)	General Parameter		Remark (备注)
1	Combination method (组合方式)	PACK*2-15		可支持 2-15 个电池组并机组合使用
2	Rated Capacity (额定容量)	Typical	standard	Standard discharge after Standard charge (package) (标准充电后标准放电 (针对电池组))
3		Minimum	standard	
4	Factory Voltage (出厂电压)	51.2V-53V		Mean Operation Voltage (即工作电压)
5	Voltage at end of Discharge	<=43.2V		Discharge Cut-off Voltage (放电截止电压)
6	Charging Voltage	57V		按 3.65V/cell 来算
7	Internal Impedance (内阻)	≤100mΩ		Internal resistance measured at AC 1KHz after 50% charge (半电态下用交流法测量内阻) The measure must uses the new batteries that within one week after shipment and cycles less than 5 times
8	Standard charge (标准充电)	standard		50A*并数
9	Standard discharge (标准放电)	standard		90A*并数
10	Maximum Continuous Charge Current	standard		50A*并数
11	Maximum Continuous Discharge Current	standard		90A*并数
12	Operation Temperature Range (工作温度范围)	Charge: 0~55°C		Recommend (25±3°C); ≤85%RH storage moisture range. 推荐 ≤85%RH 储存湿度范围。
13		Discharge: -20~55°C		
14	Storage Temperature Range (储存温度范围)	-20°C~25°C		
15	System size	standard		
16	System weight (系统重量)	standard		
17				

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5.3.1 Battery Management System 电池管理系统规范

A: BMS function introduction (BMS 功能介绍)

- 1) :The BMS is designed for 16 series lithium battery.
- 2) : The BMS have all functions which are : (该 BMS 系统具有以下一些功能)
 - .1 overcharge detection function (过充电保护功能)
 - .2 over discharge detection function (过放电保护功能)
 - .3 over current detection function (过电流保护功能)
 - .4 short detection function (短路保护功能)
 - .5 Temperature detection function 温度保护功能
 - .6 balance function (均衡功能)
 - .7 communicate function (通讯功能)
 - .8 Alarm function (告警功能,电量板显示)
 - .9 Total capacity function (总容量功能)
 - .10 Storage history function (存储历史记录功能)

B: BMS Protect parameter (电池管理系统保护参数) (software set)

Items	Details	Standard
Cell overcharge protection	Overcharge detection voltage	3.65±0.025V
	Overcharge detection delay time	Typical:1.0s
	Overcharge release voltage	3.4±0.05V
Cell over-discharge protection	Over-discharge detection voltage	2.7±0.5V
	Over-discharge detection delay time	Typical:1.0s
	Over-discharge release voltage	3.0±0.1V or charge
Over-current protection	discharge Over-current protection current1	120±10A
	discharge Over-current detection delay time 1	5S
	discharge Over-current protection current 2	200±10A
	discharge Over-current detection delay time 2	≤600m±50ms
	Charge Over-current protection current	120±10A
Short protection	Short protection current	300±50A
	Protection condition	Load short
	Detection delay time	≤30ms
	Protection release condition	Charging release
Temperature (T) protection	Charge high T protection	55±3℃
	Charge high T recover	50±5℃
	Discharge high T protection	60±5℃
	Discharge high T recover	55±5℃
	Charge low T protection	-5±5℃
	Charge low T recover	0±5℃
	Discharge low T protection	-20±5℃
	Discharge low T recover	-15±5℃
Balance	Balance threshold voltage	3.4V

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Communication	It has CAN and RS485 ,RS232 standard communication interface, it real-time monitoring the capacity of battery bank, the voltage, current,environment temperature, and charging/discharging current, RS485,RS232,Baud rate:9600Kb/S, CAN common Baud rate:500K/S, Master address:CODE 1.slave address:2-15 ,any number
Alarm	It has over-temperature, over charge, under-voltage, over-current, short circuit alarm Function.

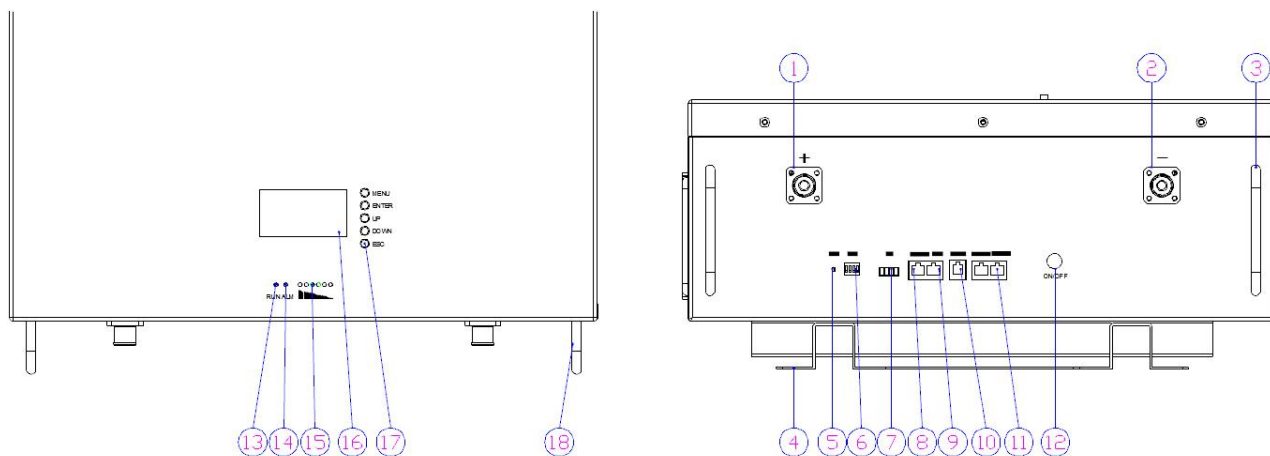
6. Appearance and structural dimensions 外观结构尺寸

There shall be no such defect as scratch, bur and other mechanical scratch, and the connector should be no rust dirt. The structure and dimensions see attached drawing of the product.

电池的表面应无明显的划痕毛刺及其其它机械划伤，外露的金属端子应无锈蚀污垢。

6.1 Main control box 外观

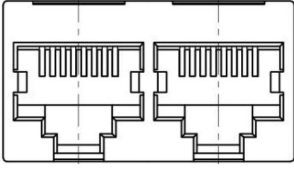
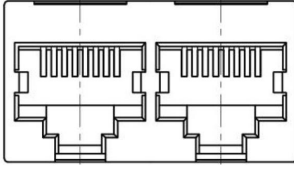
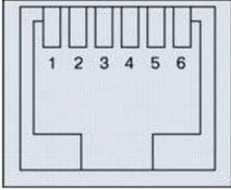
Battery module



No.	Description	Silk-screen	Remark
1	UES0600	P+	Output terminal
2	UES0600	P-	Output terminal
3	Handle		
4	Fixed bracket		
5	port Reset button	RST	For reset the batter
6	Dial switch	ADS	Set the address
7	DRY port	DO	
8	RS485 Port	RS485A	RS485 and inverter connection port
9	CAN bus Port	CAN bus	CAN bus and inverter connection port
10	RS232 Port	RS232	RS232 and inverter connection port
11	RS485 Port	RS485B	Pack parallel connection common port
12	Switch	ON/OFF	
13	RUN LED indicate	RUN	Operation indicator
14	ALARM LED indicate	ALM	Alarm indicator
15	SOC indicate	CAPACITY	Capacity indicator
16	LCD		
17	LCD KEY		

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If there is any change in the pin position of the communication line, the customer shall be notified in writing or provided with supporting communication wire.通信线脚位如有变, 需书面知会客户或提供配套通信线材.

Parallel communication 并机通信	 <p>并联通讯端口</p>	RS485-8P8C 立式 RJ45 插座(RS485-8P8C 立式 RJ45 插座		
		RJ45 引脚	定义说明	RJ45 引脚	定义说明	
		1,8	RS485-B	9,16	RS485-B	
		2,7	RS485-A	10,15	RS485-A	
		3,6	GND	11,14	GND	
4,5	NC	12,13	NC			
External communication 对外通信		RS485 立式 RJ45 插座		CAN 立式 RJ45 插座		
		RJ45 引脚	定义说明	RJ45 引脚	定义说明	
		1,8	RS485-B1	9,10,11,14,16		
		2,7	RS485-A1	12	CAN-L	
		3,6	GND	13	CAN-H	
4,5	NC	15	GND			
Communication with host computer 与上位机通信		RS232 立式 RJ11 插座				
		RJ11 引脚	定义说明	RJ11 引脚	定义说明	
		1	NC	4	RX	
		2	NC	5	GND	
3	TX	6	NC			

6.2 SOC Indicator & Status Indicator Guides

Chart 1: Battery Status

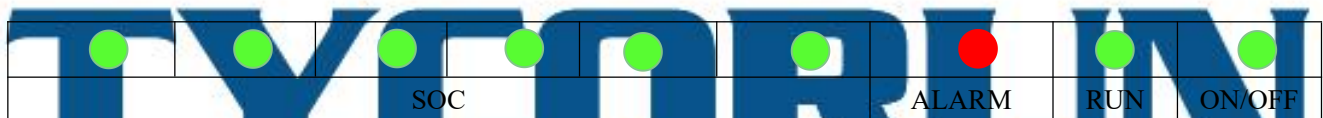


Chart 2: Battery Capacity

status	charge						discharge					
	L6	L5	L4	L3	L2	L1	L6	L5	L4	L3	L2	L1
SOC (%)	●	●	●	●	●	●	●	●	●	●	●	●
0-16.6%	OFF	OFF	OFF	OFF	OFF	Flash2	OFF	OFF	OFF	OFF	OFF	light
16.6-33.2%	OFF	OFF	OFF	OFF	Flash2	light	OFF	OFF	OFF	OFF	light	light
33.2-49.8%	OFF	OFF	OFF	Flash2	light	light	OFF	OFF	OFF	light	light	light
49.8-66.4%	OFF	OFF	Flash2	light	light	light	OFF	OFF	light	light	light	light
66.4-83%	OFF	Flash2	light	light	light	light	OFF	light	light	light	light	light
83-100%	Flash2	light	light	light	light	light	light	light	light	light	light	light
RUN LED	light						Flash(flash 3)					

Chart 3: LED flash and buzzer mode(Off by default)

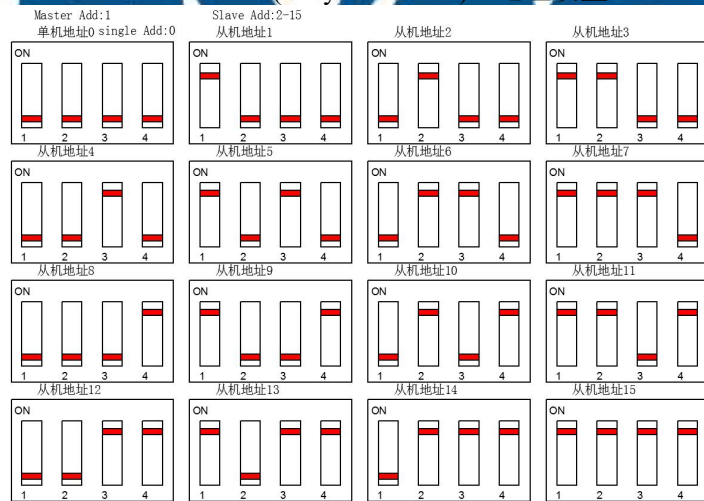
MODE	ON	OFF
Led Flash1	0.25S	3.75S
Led Flash2	0.5S	0.5S
Led Flash3	0.5S	1.5S
Buzzer1	0.25S	0.25S
Buzzer2	0.25S	2S
Buzzer3	0.25S	3S

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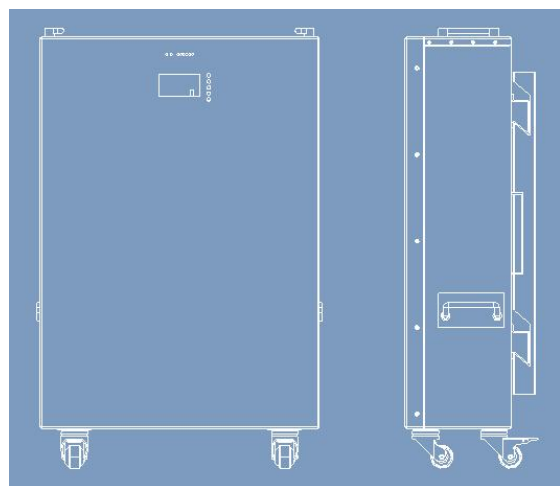
Chart4: LED flash mode

System status	Run status	ON/OFF	RUN	ALM	SOC						REMARK	
Power off	SLEEP	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All led off
Stand by	NORMAL	Light	Flash1	OFF	Lighting for SOC						stand by mode	
	ALARM	Light	Flash1	Flash3	Lighting for SOC						Low volt alarm	
CHARGE	NORMAL	Light	Light	OFF	Lighting for SOC(The LED flash2, while it is the high SOC)Alarm LED do not flash, when the BMS into OVP mode.							
	ALARM	Light	Light	Flash3	Lighting for SOC(The LED flash2, while it is the high SOC)Alarm LED do not flash, when the BMS into OVP mode.							
	OVP	Light	Light	OFF	Light	Light	Light	Light	Light	Light	No charge in, into standby	
	OTP, OCP, Fail	Light	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Stop charge
Discharge	NORMAL	Light	Flash3	OFF	Lighting for SOC							
	ALARM	Light	Flash3	Flash3	Lighting for SOC							
	UVP	Light	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Discharge off	
	OTP, OCP, SCP, invert connect, Fail	Light	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Discharge off
FAIL		OFF	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	NO Charge or discharge	

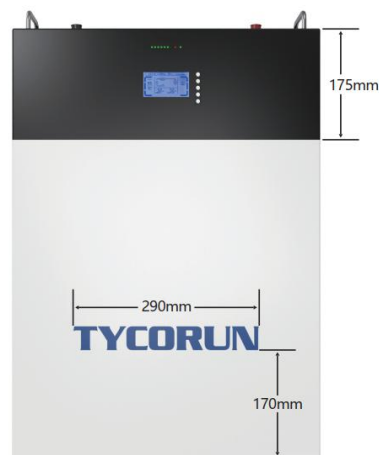
Address Switch function (Only in Parallel) (地址设置)



Complete product image 完整产品图:



轮式



壁挂

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7.Storage and Others 贮存及其它事项

7.1 Long Time Storage 长期贮存

If stored for a long time(don't used,exceed three months), the cell should be stored in drying and cooling place. The PACK is to be stored in a condition that the temperature of $23\pm 2^{\circ}\text{C}$ and the humidity of 45%-75%. Long-term use of unused batteries to recharge every 3 months. Ensure that the battery voltage is within the above range.

长期贮存的电池（未使用,超过3个月）须置于干燥、凉爽处。PACK 应储存在温度 $23\pm 2^{\circ}\text{C}$ ，湿度 45%-75% 的条件下。长期搁置未使用电池每3个月补电一次，确保电池电压在上述范围内。

Appendix (附录)

Li-ion battery operation instructions and precautions 锂离子电池操作指引及注意事项

Preface 前言

This document of 'Handling Precautions and Guideline Li-ion Rechargeable Batteries' shall be applied to the battery cells manufactured by our company

本檔“锂离子充电电池操作指示及注意事项”仅适用于本公司生产电池。

Note (1) : 声明一

The customer is requested to contact TGPRO New Energy Technology Co., Ltd.. in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

客户若需要将电池用于超出本规格书规定以外的设备，或在本规格书规定以外的使用条件下使用电池，应事先联系东莞市拓嘉新能源科技有限公司，因为需要进行特定的实验测试以核实电池在该使用条件下的性能及安全性。

Note (2) : 声明二

Our company will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

对于在超出本规格书规定以外的条件下使用电池而造成的任何意外事故，本公司概不负责。

Note (3): 声明三

Our company will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the cell, if it is deemed necessary.

如有必要，本公司会以书面形式告知客户有关正确操作使用电池的改进措施。

Danger!

Specification For Approval

- Do not immerse the battery in water or allow it to get wet.
- 勿将电池投入水中或将其弄湿!
- Do not use or store the battery near sources of heat such as a fire or heater.
- 禁止在火源或极热条件下给电池充电! 勿在热源(如火或加热器)附近使用或贮存电池! 如果电池泄漏或发出异味, 应立即将其从接近明火处移开;
- Do not use any chargers other than those recommended by TGPRO.
- 请使用专用充电器!
- Do not reverse the positive(+) and negative(-) terminals.
- 勿将正负极接反!
- Do not connect the battery directly to wall outlets or car cigarette-lighter sockets.
- 勿将电池直接连接到墙上插座或车载点烟式插座上!
- Do not put the battery into a fire or apply direct heat to it.
- 勿将电池投入火中或给电池加热!
- Do not short-circuit the battery by connecting wires or other metal objects to the positive(+) and negative(-) terminals.
- 禁止用导线或其它金属物体将电池正负极短路, 禁止将电池与项链、发夹或其它金属物体一起运输或贮存!
- Do not pierce the battery casing with a nail or other sharp object, break it open with a hammer, or step on it.
- 禁止用钉子或其它尖锐物体刺穿电池壳体, 禁止锤击或脚踏电池!
- Do not strike, throw or subject the battery to sever physical shock.
- 禁止撞击、投掷或者使电池受到机械震动
- Do not directly solder the battery terminals.
- 禁止直接焊接电池端子!
- Do not attempt to disassemble or modify the battery in any way.
- 禁止以任何方式分解电池!
- Do not place the battery in a microwave oven or pressurized container.
- 禁止将电池置入微波炉或压力容器中!
- Do not use the battery in combination with primary batteries(such as dry-cell batteries) or batteries of different capacity, type or brand.
- 禁止与一次电池(如干电池)或不同容量、型号、品种电池组合使用!
- Do not use the battery if it gives off an odor, generates heat, becomes discolored or deformed, or appears abnormal in any way. If the battery is in use or being recharged, remove it from the device or charger immediately and discontinue use.
- 如果电池发出异味、发热、变形、变色或出现其它任何异常现象时不得使用; 如果电池正在使用或充电, 应立即从用电器中或充电器上取出并停止使用!

Caution!注 意!

Do not use or store the battery where is exposed to extremely hot, such as under window of a car in direct sunlight in a hot day. Otherwise, the battery may be overheated. This can also reduce battery performance and/or shorten service life.

不要使用处于极热环境中的电池, 如阳光直射或热天的车内。否则, 电池会过热, 可能着火(点燃), 这样就会影响电池的性能、缩短电池的使用寿命。

If the battery leaks and electrolyte gets in your eyes, do not rub them. Instead, rinse them with clean running water and immediately seek medical attention. If left as is, electrolyte can cause eye injury.

如果电池漏液后电解液进入眼睛, 不要擦, 应用清水冲洗, 并立即寻求医疗救助。如不及时处理, 眼睛将会受到伤害。