

深圳市萨伦科技有限公司
Shenzhen Cyclen Technology Co.,Ltd
产品开发协议书
Product Development Agreement

51.2V160Ah 电池产品规格书 A0 版

51.2V160Ah Battery Specification Version A0

型 号(Model): IFR 51.2V160Ah

客户名称(Customer): _____

日 期(Date): 2022-05-25

批 准 (Approval)	审 核 (Check)	拟 定 (Prepare)
客户确认 Customer Confirmation	客户签名 (Customer Signature) :	公司印章 (Corporate Seal:) :
	日期 (Date) :	
	客户代码 (Customer Code) :	

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一. 文件适用范围/Scope of application documents

本产品规格书仅适用由深圳市萨伦科技有限公司设计的可充电锂离子电池产品和电芯的保护参数.

The specification of this product is only applicable to the protection parameters of a rechargeable lithium-ion battery Product and cell designed by Shenzhen Cyclen Technology Co.,Ltd.

二. 产品技术规格

该型号产品为 51.2V160Ah 电池组，带通讯功能(RS232+CAN+双 RS485)，带英文显示屏，保护板持续流 100A，20A 限流，快插端子，弱电开关。

2.1 电芯常规技术参数

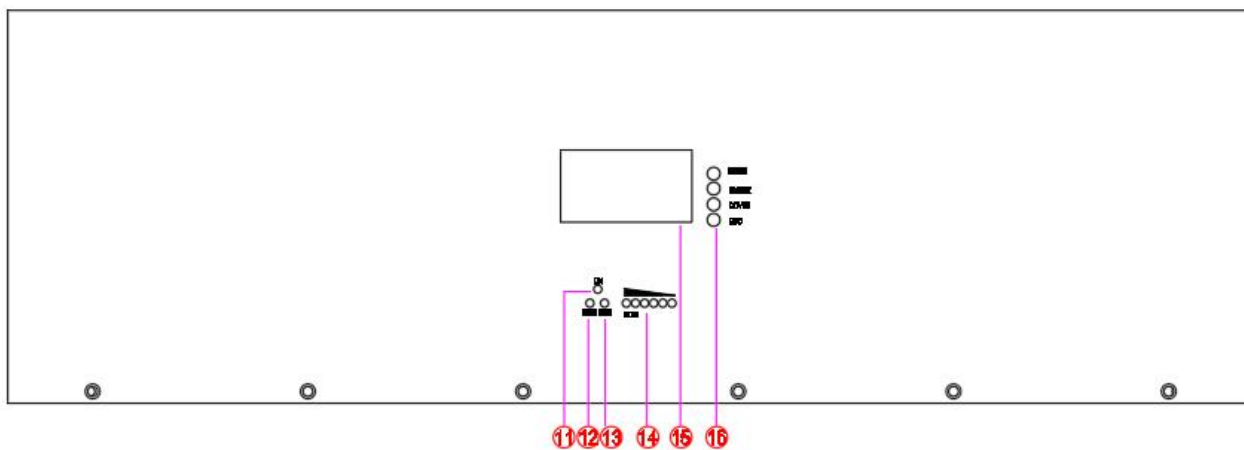
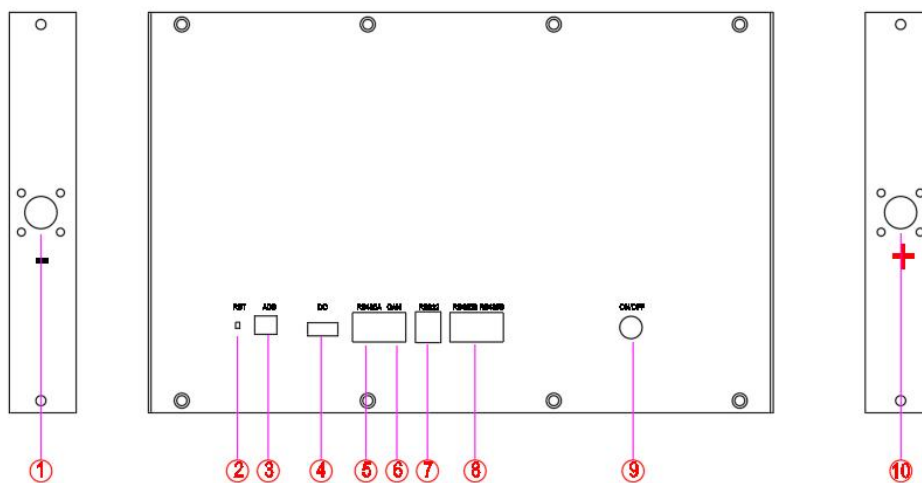
No. (序号)	Item (项目)	General Parameter (常规参数)		Remark (备注)
1	Rated Capacity (额定容量)	Typical (标称容量)	161Ah	Standard discharge (0.5C ₅ A) after Standard charge (标准充电后 0.5C ₅ A 标准放电)
		Minimum (最小容量)	160Ah	
2	Nominal Voltage (正常电压)	3.2V		Mean Operation Voltage (即工作电压)
3	Internal Impedance (内阻)	≤0.6mΩ		AC1kHz
4	Dimension (尺寸)	Thickness/厚度:62±0.5mm		Initial Dimension (初始尺寸)
		Width/宽度: 280±0.5mm		
		Hight/高度: 82±0.5mm		
5	Weight (重量)	≤3.1kg		Approx
6	Standard charge (标准充电)	Constant Current 0.5C ₅ A Constant Voltage3.6V 0.5C ₅ A cut-off (持续电流: 0.5C ₅ A 持续电压: 3.6V 截止电流: 0.5C ₅ A		
7	Standard discharge (标准放电)	Constant current 0.5C ₅ A end voltage2.7 V (持续电流: 0.5C ₅ A 截止电压: 2.7V)		

2.2 电池组常规技术参数

No. (序号)	Item (项目)	General Parameter (常规参数)		Remark (备注)
1	Combination method (组合方式)	16S1P		
2	Rated Capacity (额定容量)	Typical (标称容量)	160Ah	Standard discharge (0.5C ₅ A) after Standard charge (标准充电后 0.5C ₅ A 标准放电)
		Minimum (最小容量)	160Ah	
3	Nominal Voltage (正常电压)	51.2V		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)	57.8V		
6	Internal Impedance (内阻)	≤50mΩ		半电态内阻
7	Standard charge (标准充电)	Constant Current 80A Constant Voltage 57.8V 0.02CA cut-off (持续电流: 80A 持续电压: 57.8V 截止电流: 0.02CA)		Charge time : Approx 3.5h (充电时间: 大约 3.5 个小时)
8	Standard discharge (标准放电)	Constant current: 80A end voltage 43.2V (持续电流: 80A 截止电压: 43.2V)		
9	Operation Temperature Range (工作温度范围)	Charge (充电): 0~45℃		
		Discharge(放电): -20~60℃		
10	Storage Temperature Range (储存温度范围)	Recommend (25±3℃); ≤85%RH storage moisture range. 推荐 ≤85%RH 储存湿度范围。		
11	Dimensions (尺寸/ mm)	680*440*215		APPROX
12	Weight (重量)	68kg		APPROX

2.3 Appearance and structural dimensions 外观结构尺寸

2.3.1 电池组结构 (长×宽×高: 680mm×440mm×215mm)



No.	Description	Silk-screen	Remark
1	UES0600	P-	Output terminal
2	port Reset button	RST	For reset the batter
3	Dial switch	ADS	Set the address
4	DRY output	DO	
5	RS485A Port	RS485A	RS485 and inverter connection port
6	CANbus Port	CANbus	CANbus and inverter connection port
7	RS232 Port	RS232	RS232 and host computer connection port
8	RS485B Port	RS485B	Battery and Battery connection port
9	Switch	ON/OFF	
10	UES0600	P+	Output terminal
11	LED	ON	Starting up
12	LED	RUN	Operation indicator
13	LED	ALM	Alarm indicator
14	LED	CAPACITY	Capacity indicator
15	LCD		
16	LCD key		

三. 电池管理系统说明

3.1 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)

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

Items	Details	Standard
Cell overcharge	Overcharge detection voltage	$3.65 \pm 0.025V$
	Overcharge detection delay time	Typical:1.0s
	Overcharge release voltage	$3.38 \pm 0.05V$
Cell over-discharge protection	Over-discharge detection voltage	$2.7 \pm 0.5V$
	Over-discharge detection delay time	Typical:1.0s
	Over-discharge release voltage	2.9 ± 0.1 or charge release
Over-current protection	discharge Over-current protection current1	$110 \pm 10A$
	discharge Over-current detection delay time 1	1S
	discharge Over-current protection current 2	$150 \pm 10A$
	discharge Over-current detection delay time 2	$\leq 100m \pm 50ms$
	Charge Over-current protection current	$110 \pm 10A$
Short protection	Short protection current	$350 \pm 50A$
	Protection condition	Load short
	Detection delay time	$\leq 30ms$
	Protection release condition	Charging release
Temperature(T) protection	Charge high T protection	$55 \pm 3^{\circ}C$
	Charge high T recover	$50 \pm 5^{\circ}C$
	Discharge high T protection	$65 \pm 5^{\circ}C$
	Discharge high T recover	$55 \pm 5^{\circ}C$
	Charge low T protection	$-5 \pm 5^{\circ}C$
	Charge low T recover	$0 \pm 5^{\circ}C$
	Discharge low T protection	$-20 \pm 5^{\circ}C$
Discharge low T recover	$-15 \pm 5^{\circ}C$	
Balance	Balance threshold voltage	3.4V

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,
Alarm	It has over-temperature, over charge, under-voltage, over-current, short circuit alarm Function.

3.3 显示屏开机界面



四. 测试条件

除特殊指出外，所有测试都在以下条件进行（标准测试条件）：

环境温度： 25±5℃(若周边环境温度低于 20℃，电池组需在 ≥20℃条件下静置 5 小时以上，再进行测试)

环境湿度： 30%~80%

大气压力： 86kpa~106kpa

成组标准充放电

标准充电：将电池组以 80A 电流恒流恒压充电至截止电压 57.8V，截止电流 0.02C；

标准放电：将电池组以 80A 电流恒流放电至截止电压 43.2V.

五. 电性能, 安全性能, 机械性能测试

(表中未提及项目符合: UL1642 安全标准-(锂电池), GB/T 31486-2015 电动汽车用动力蓄电池电性能要求和 GB/T 31485-2015 电动汽车用动力蓄电池安全要求)

5.1 电气性能测试

测试项目	测试方法	技术要求
放电容量	在标准测试条件下,对电池组进行标准充电,以 0.1C 电流放电,记录放电容量。	≥100%标称容量
-20℃低温放电容量	电池组标准充电后,在-20±2℃低温环境中储存 8H 后,以 0.1C 电流放电至终止电压,记录放电容量。	≥65%标称容量 (不带 BMS)
55℃高温放电容量	电池组标准充电后,在 55±2℃高温环境中储存 4H 后,以 0.1C 电流放电至终止电压,记录放电容量。	≥97%标称容量
荷电保持能力(残余容量)和容量恢复能力	电池组标准充放电后,记录初始容量;电池标准充电后,在 15~35℃的条件下搁置 28d,然后放电记录残余容量;在将电池进行标准充放电,记录恢复容量。	残余容量(荷电保持率)≥95% 恢复容量≥97%
循环寿命	将电池组标准充电后,以 0.5C 放电,当放电容量小于起始容量的 80%时终止循环寿命测试。	≥3000 次
55℃7 天储存	电池组标准充放电后,记录初始容量;电池标准充电后,在 55±2℃高温环境中储存 7 天,然后放电记录残余容量;在将电池进行标准充放电,记录恢复容量。	残余容量≥92% 恢复容量≥95%

5.2 安全性能

测试项目	测试方法	技术要求
短路	将电池组标准充电后,放置在防爆箱中,用内阻小于 100mΩ 的导线短路于电池组外部的正负极,试验过程中记录电池表面温度,短路持续时间 10min,即完成测试。或以单体电芯进行短路安全评估测试。	不起火,不爆炸 (不带保护线路及壳体试验)
过充电	将电池组标准充电后,用恒流恒压源对电池组某一单节进行 0.2C 充电,恒流充电至 5V 后转为恒压充电,直到截止电流到 0A 或表面温度小于环境温度+10℃以下时,结束试验。	不起火,不爆炸 (不带保护线路及壳体试验)

过放电	将电池组标准充电后，用负载仪对电池组进行 0.5C 持续放电，直至某一单节电池电压到达 0~0.5V 时，结束试验。	不起火，不爆炸 (不带保护线路及壳体试验)
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5.3 机械性能

振动	<ol style="list-style-type: none"> 1. 将整组包装完整待出货试验品放置于振动台面上，以 10~90HZ 来回扫描振动 5H，扫描速度为 1HZ/S, 分别以前后，上下，左右六个面扫描振动；振动完成检查内部和外部包装，并对电池组进行检查和标准充放电测试。 2. 将电池组放置于振动台面上，以 10~90HZ 来回扫描振动 5H，扫描速度为 1HZ/S, 分别以前后，上下，左右六个面扫描振动；振动完成后对电池进行检查并进行标准充放电； 	<ol style="list-style-type: none"> 1. 内部包装部件无破损，电池组无变形破损及任何安全隐患；放电容量 ≥99%标称容量 2. 电池组外部无变形破损；放电容量 ≥99%标称容量
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六. 电池系统使用要求 Battery usage catalog

1. 电池系统工作外部环境温度要求：充放电：-20℃~60℃；

1. Temperature requirements for battery operation: Charge and discharge temp: -20℃~60℃.

2. 电池系统工作外部环境湿度要求：10%≤湿度≤90%RH；

2. Humidity requirements for the external environment of the battery :10%≤Humidity≤90%RH.

3. 电池系统运营状态下尽量保持 20%以上的 SOC；

3. Please maintain more than 20% SOC when the battery is under operation.

4. 电池系统短期不使用的状态下，要求保持 60%以上的 SOC，存储在 5℃~45℃干燥、清洁及通风良好的仓库内。

4. When the battery is not being used for a short period of time, please maintain more than 60% SOC and store it in a dry, clean and well-ventilated warehouse at the temperature between 5℃ to 45℃.

5. 电池包装过程中，要求轻搬轻放，严防摔掷、翻滚、撞击；

5. When packaging the battery, please move it gently to prevent it from being thrown, rolled or hit.

6. 存储状态下不得倒置；严禁将电池包长期暴晒、淋雨、泡水；

6. Do not put it upside down in the storage state; it is strictly prohibited to expose the battery pack to long-term exposure, rain or water.
7. 保证电池系统在运营或存储状态下远离易燃易爆物品、高温环境；
7. Ensure that the battery system is kept away from flammable and explosive materials and high temperature environment during operation or storage.
8. 严禁在电池系统短路、过充、高温告警状态下强制运行；
8. It is not allowed to operate the battery under short circuit, overcharge, high temperature alarm state.
9. 严禁客户在未经允许状态下对电池系统进行私自拆卸；
9. Customers are not allowed to disassemble the battery system without permission.

七. 贮存与运输 Storage and Transportation

1. 根据电池的特性，磷酸铁锂电池组在贮存运输过程应满足其贮存的环境条件，以最大的保护电池的性能。
1. Based on the character of cell, proper environment for transportation of LiFePO₄ battery pack need to be created to protect the battery.
2. 磷酸铁锂电池存贮及运输过程中，应有适当的保护，保持 50% 左右的 SOC 水平，确保不会短路及液体进入磷酸铁锂电池组或浸泡在液体中（如水、油等）
2. During transportation, 50% SOC must be kept to ensure that short circuit, appearance of liquid in the battery or immersion of battery in liquid never occur.
3. 如果暂不使用，电池应贮存在 -20℃ ~ 45℃ 干燥、清洁及通风良好的仓库内。
3. Battery should be kept at -20℃ ~ 45℃ in warehouse where it's dry, clean and well-ventilated.
4. 电池在装卸过程中，应轻搬轻放，严防摔掷、翻滚、重压。
4. During loading of battery, attention must be paid against dropping, turning over and serious stacking.

八. 电池使用时警告及注意事项 Warnings and Tips

为防止电池可能发生泄漏、发热、爆炸，请注意以下预防措施：

In order to prevent the battery leaking, getting hot and exploding, please pay attention to preventing measure as following:

警 告 ！ (Warning !)

- 严禁将电池浸入海水或水中,保存不用时,应放置于阴凉干燥的环境中;
- Never throw the battery into water, keep it under dry, shady and cool circumstance when not use.
- 严禁颠倒正负极使用电池;
- Never upside down the positive and negative.
- 禁止用金属直接连接电池正负极短路;
- Never connect the positive and negative of battery with metal.
- 禁止将电池与金属,如发夹、项链等一起运输或贮存;
- Never ship or store the battery together with metal.
- 禁止敲击或抛掷、踩踏电池等;
- Never knock, throw or trample the battery.
- 禁止直接焊接电池和用钉子或其它利器刺穿电池;
- Never cut through the battery with nail or other edge tool.

注 意 ! (Notices!)

- 禁止在高温下使用或放置电池,否则可能会引起电池过热、起火或功能失效、寿命减短;电池长期储存建议最佳温度为 10-45℃。
- Never use or keep the battery under the high temperature. Otherwise it will cause battery heat, get into fire or lose some function and reduce the life. The proposed temperature for long-term storage is 10-45℃.
- 禁止将电池丢于火或加热器中以防起火、爆炸及污染环境;报废电池应退回供应商或电池回收点处理。
- Never throw the battery into fire or heating machine to avoid fire, explosion and environment pollution; scrap battery should be returned to the supplier and handled by the recycle station.
- 禁止在强静电和强磁场的地方使用,否则易破坏电池安全保护装置,带来不安全的隐患。
- Never use the battery under strong static and strong magnetic field, otherwise it will destroy the protecting device.
- 若电池发生泄露,电解液进入眼睛,千万不可揉擦,应立即用清水冲洗眼睛,并立即送医院治疗,否则会伤害眼睛。
- If battery leaked, the electrolyte get into eyes, please don't knead, please wash eyes by water and send to hospital. Otherwise it will hurt eyes.

- 如果电池发出异味，发热、变色、变形或使用、贮存、充电过程中出现任何异常，应立即将电池从装置或充电器中移离并停用。
- If battery emit peculiar smell, heating, distortion or appear any unconventionality during using, storage or charging process, please take it out from device or charge and stop using.
- 禁止将电池正负极直接插入电源插座中，必须选用锂离子电池专用充电器。
- Never cut the battery in socket directly; please use the stated charger when charging.
- 安装前需检查电池电压和连接件，一切正常后方可使用。
- Check the voltage of battery and relevant connectors before using the battery. It can't be used until everything turns out to be normal.
- 充电前需认真检查所有电线的绝缘性及破损和老化情况，所有导线决不能有破损和老化；另组合电池的电压必须大于等于 40V 为正常，若电压低于 40V 为异常，此时需要对此出现异常的箱子进行标识并与我司售后服务部联系，暂不充电，待我司派人检修后方可进行充电。
- Prior to charging, fully check the insulativity, physical condition and ageing status, since breakage and ageing are never allowed; the pack voltage must not be less than 40 V, if not, it's abnormal and that battery needs to be labeled. The user should contact our Customer Service Dept and It can't be charged until repaired by our staff.
- 电池半电存贮，若电池半年没有用过，需进行补充电一次。
- The battery should be stored in half SOC. It needs to be charged once if out of use for as long as half a year.
- 若电极弄脏，使用前应用干布抹净，否则可能会导致接触不良、功能失效。
- Clean the dirty electrode, if any, with a clean dry cloth, or poor contact or operation failure may occur.

Appendix (附录)

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

本檔“锂离子充电电池操作指示及注意事项”仅适用于深圳市萨伦科技有限公司生产电池。

Note (1) : 声明一

The customer is requested to contact Shenzhen Cyclen 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,应事先联系深圳市萨伦科技有限公司,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

Shenzhen Cyclen Technology Co.,Ltd. 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,深圳市萨伦科技有限公司概不负责。

Note (3): 声明三

Shenzhen Cyclen Technology Co.,Ltd. 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,深圳市萨伦科技有限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。