 沃田新能源(广东)有限公司 Woteam New Energy(Guangdong) Co., Ltd.	VER: A0
RAYS01 16S1P 51.2V 184Ah SPECIFICATIONS RAYS01 16S1P 51.2V 184Ah 规格书	Page 1 of 19

SPECIFICATIONS

产品规格书

Lithium ion Battery

锂离子电池

Model 型号: RAYS01

Draft 制定	Checked 审核	Approval 批准


Customer 客户名称:

Customer	Checked 审核	Approval 批准
Approval 客户确认		

 沃田新能源(广东)有限公司 Woteam New Energy(Guangdong) Co., Ltd.	VER: A0
RAYS01 16S1P 51.2V 184Ah SPECIFICATIONS RAYS01 16S1P 51.2V 184Ah 规格书	Page 2 of 19

REVISION HISTORY 修订记录

Date 日期	Contents 内容	Remarks 备注
2022. 08. 25	V0	

 沃田新能源(广东)有限公司 Woteam New Energy(Guangdong) Co., Ltd.	VER: A0
RAYS01 16S1P 51.2V 184Ah SPECIFICATIONS RAYS01 16S1P 51.2V 184Ah 规格书	Page 3 of 19

目录

Front cover 封面.....	1
Revision history 修订记录.....	2
Content 目录.....	3
1. Application 适用.....	4
2. Battery pack dimensions 电池组尺寸.....	4
3. Battery pack specification 电池组规格.....	5
4. Function introduction 功能说明.....	6
5. Cell specification 电芯规格.....	11
6. Cell dimensions 电芯尺寸.....	11
7. Protect Function 保护功能.....	12
8. Battery Cell Performance Criteria and charge& discharge property 电芯性能检查、测试及充放电性能.....	15
9. Package 包装.....	15
10. Visual inspection 外观检查.....	15
11. Standard test conditions 标准测试环境.....	15
12. CAUTIONS IN USE 使用警告.....	15
13. Storage 贮存.....	17
14. Battery operating instruction 电池操作说明.....	17
15. Warranty Period 保质期.....	18
16. Other Chemical Reaction 其它化学反应.....	18
17. Note: 备注.....	19

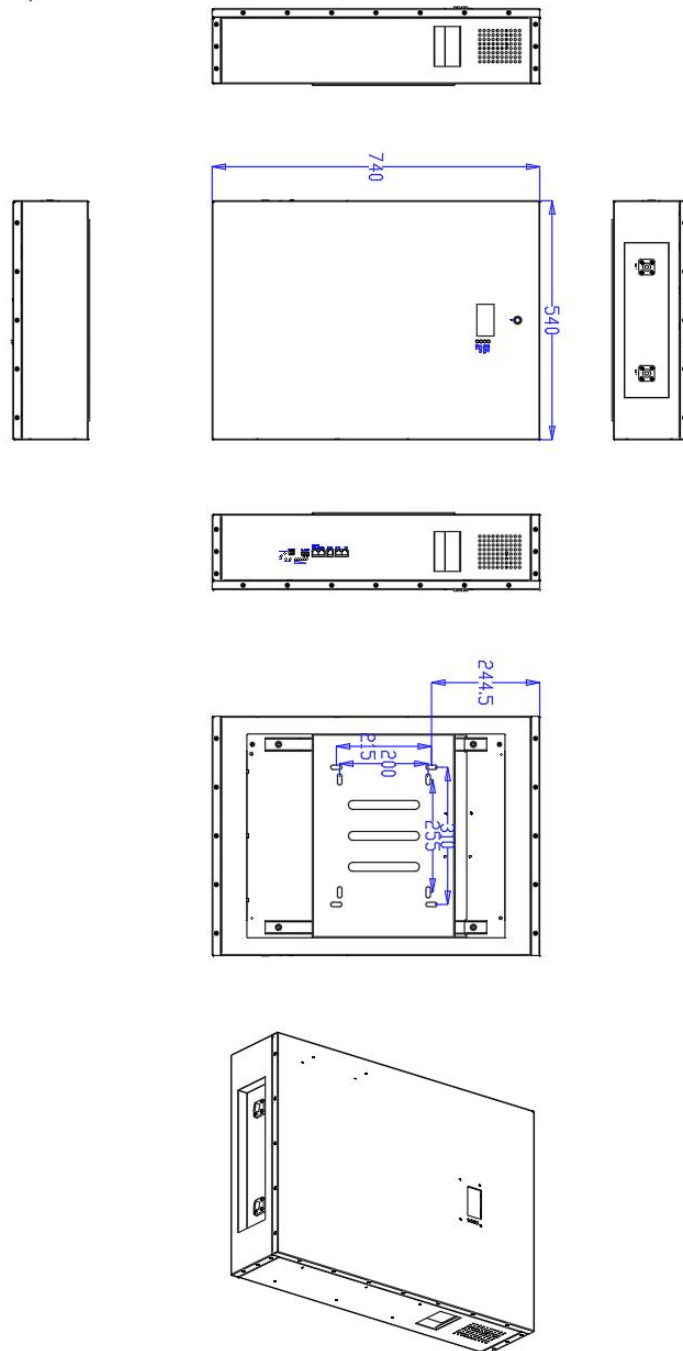
1. Application 适用范围

The specification is applicable to basic performance, technical requirement, testing method, warning and caution of the Li-ion rechargeable battery.

本标准规定了锂离子可充电电池的基本性能、技术要求、测试方法及注意事项。

2. Battery pack dimensions 电池组尺寸

Max 740 (L) *Max 540 (W) *Max 170 (H) (mm)



3. Battery pack Specifications 电池组规格

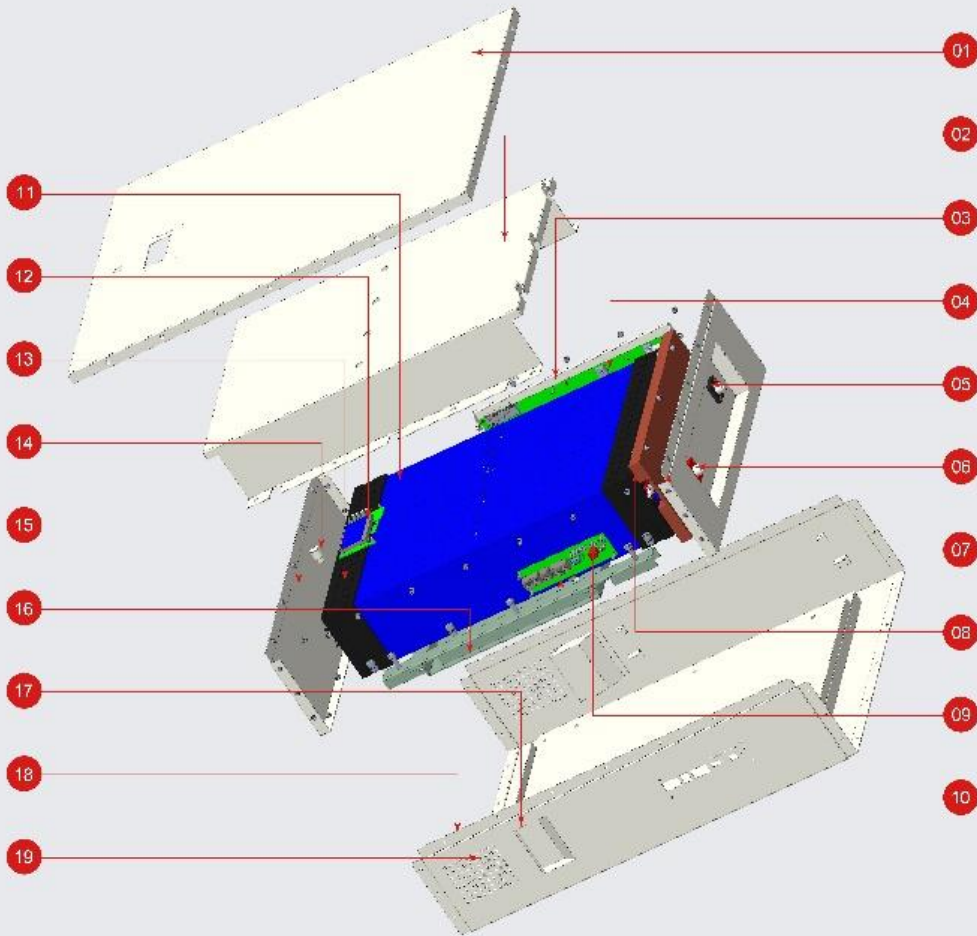
No. 序号	Item 项目	Specifications 规格	Comments 备注	
3.1	Initial Capacity 标称容量	184Ah	16S1P	
3.2	Nominal voltage 标称电压	51.2V	16S1P	
3.3	Approx. Weight (Kg) 参考重量	85 Kg		
3.4	Charge 充电	Limited charge voltage 充电限制电压	56.8V	
		Standard charge current 标准充电电流	61.3A	Cut-off current 9.2A 截止电流 9.2A
		Max Charge current 最大充电电流	92A	Cut-off current 9.2A 截止电流 9.2A
		Charging current limiting 充电限流	20A	Open conditions: charging current $\geq 97A$ 开启条件: 充电电流 $\geq 97A$
3.5	Discharge 放电	Min Discharge voltage 最低放电电压	43.2V	
		Standard Discharge current 标准放电电流	61.3A	
		Max Discharge Current 最大放电电流	184A	
3.6	Charge temperature 充电温度	0~60°C		
3.7	Discharge temperature 放电温度	-30~60°C		
3.8	Storage temperature 储存温度	0~45°C		
3.9	Storage humidity 储存湿度	$\leq 75\%R. H.$		
3.10	AC Impedance 交流内阻	$\leq 160m\Omega$	1KHz	
3.11	As of shipment (status of the Delivery) 出货状态	$\geq 48V$		
3.12	communication	RS485	customizable 可定制	

	通讯 communication 通讯	CAN	customizable 可定制
3.14	Maximum number of parallel machines 最大并机数量	16	

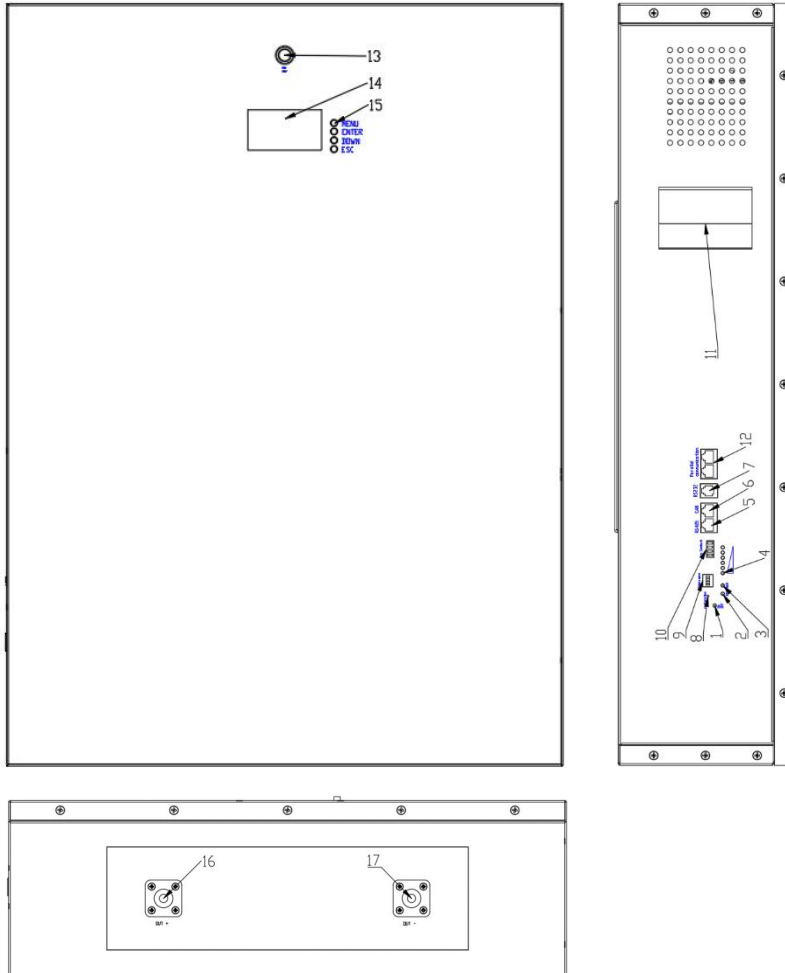
4. Function introduction 功能说明

4.1 Exploded Views 爆炸图

- | | | | | |
|-----------------|-------------------|---------------------|----------------|------------------|
| 01.Front panel | 02.Cells frame | 03.BMS fixture | 04.BMS | 05.Negative |
| 06.Positive | 07.Lower shell | 08.Insulation board | 09.Screw | 10.Interface PCB |
| 11.Cell | 12.Display screen | 13.Frame | 14.Switch | 15.Upper shell |
| 16.Wall-mounted | 17.Handling | 18.Bottom shell | 19.Ventilation | |



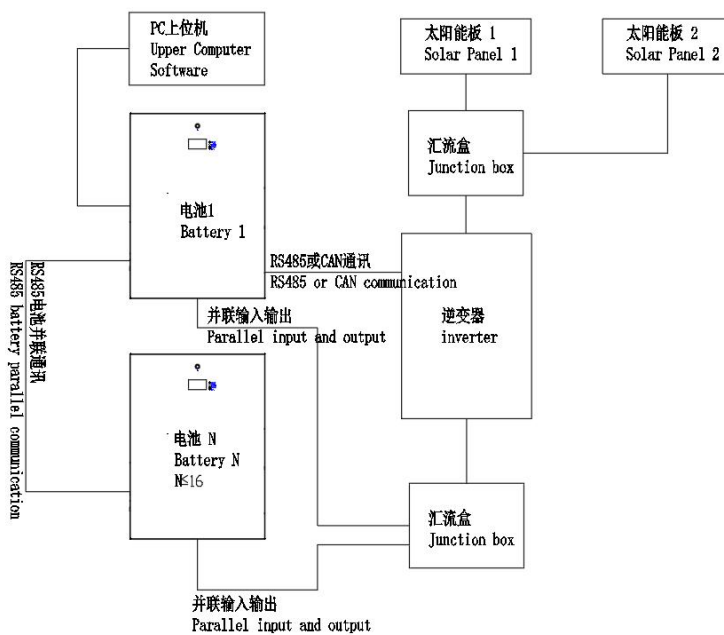
4.2 Panel introduction 面版说明



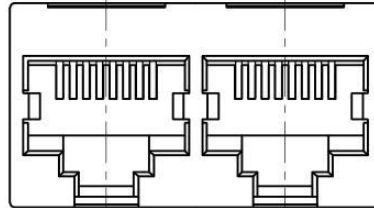
NO. 序号	Item 项目	Function declaration 功能说明	Remark 备注
1	ON/OFF 开关	ON/OFF Indicator 开关机指示	
2	RUN 运行	Run Indicator 运行指示	
3	ALM 报警	Alarm in case of abnormality 报警指示, 系统异常时报警指示	
4	Power indicator 电量指示	Battery capacity estimation 电池容量估算	
5	RS485	RS485 port for system communication 系统通信 RS485 接口	Inverter
6	CAN	CAN port for system communication 系统通信 CAN 接口	Inverter
7	RS232	RS232 port for system communication 系统通信 RS232 接口	PC

8	Reset 复位	The system is reset or forced to sleep. 系统复位或强制休眠	
9	Address switch 地址开关	Address assignment during system expansion 系统扩展应用时的地址分配	
10	Dry Contact 干接点	1-PIN1 to PIN2: Normal open, closed when fault protection; 常开, 故障保护时闭合; 2-PIN3 to PIN4: Normal open, closed when low power alarm; 常开, 低电量告警时闭合	
11	Handle 提手	Easy to handle, move and install 方便搬运, 挪动和安装	
12	RS485	Parallel communication 并联通讯	
13	Switch 开关	Startup & Shutdown 开关机	
14	Viewing screen 显示屏	System information 系统相关信息	
15	Key 按键	Display screen operation button 显示屏操作按键	
16	Positive electrode 正极	Charge and discharge positive electrode 充放电正极	
17	negative electrode 负极	Charge and discharge negative electrode 充放电负极	

4.3 Connection structure 连接结构



4.4 Interface specifier 接口说明

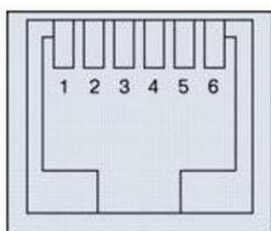


RS485- 8P8C-RJ45		CAN-8P8C-RJ45	
RJ45 Pin	Definition	RJ45 Pin	Definition
1、 8	RS485-B1	1、 2、 3、 6、 8	NC
2、 7	RS485-A1	4	CANL
3、 6	GND	5	CANH
4、 5	NC	7	GND

RS485 and CAN

RS485- 8P8C-RJ45		CAN-8P8C-RJ45	
RJ45 Pin	Definition	RJ45 Pin	Definition
1、 8	RS485-B	1、 8	RS485-B
2、 7	RS485-A	2、 7	RS485-A
3、 6	GND	3、 6	GND
4、 5	NC	4、 5	NC

RS485 Parallel communication



RS232- 6P6C-RJ11	
RJ11 Pin	definition
2	NC
3	TX
4	RX
5	GND

RS232

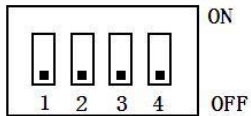


1 2 3 4

Dry contact-KF2EDGK-3.81-4P	
RJ11 Pin	definition
1	1-2, OPEN or CLOSE
2	
3	3-4, OPEN or CLOSE
4	

Dry contact

4.5 Address switch 地址开关

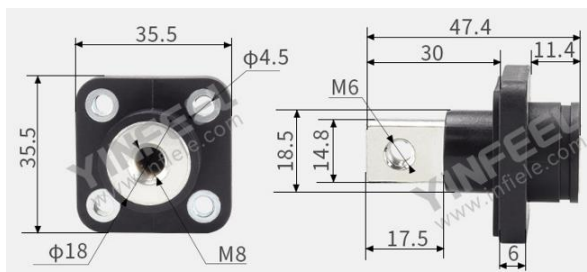



Address	Switch			
	1#	2#	3#	4#
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

4.6 Input and output connector 输入输出连接器 (UNIT: mm)

Red= Anode electrode

Black=Negative electrode

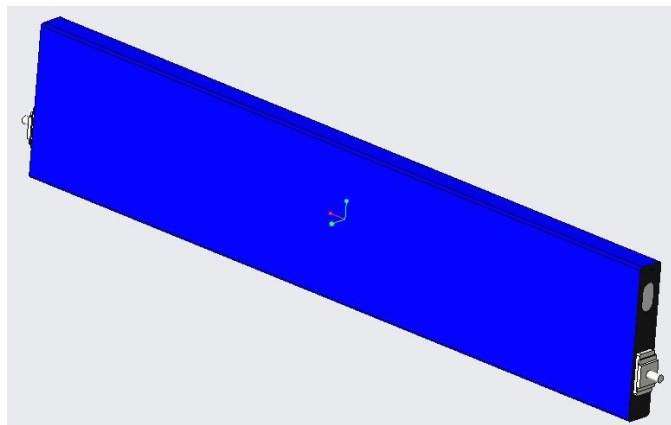


 沃田新能源(广东)有限公司 Woteam New Energy(Guangdong) Co., Ltd.	VER: A0
RAYS01 16S1P 51.2V 184Ah SPECIFICATIONS RAYS01 16S1P 51.2V 184Ah 规格书	Page 11 of 19

5. Cell specifications 电芯规格

NO. 序号	Items 项目	Specifications 规格	Remark 备注
5.1	Max charge voltage 最大充电电压	3.65V	
5.2	Min discharge voltage 放电终止电压	2.0V	
5.3	Initial capacity 标称容量	184Ah @ 0.33 C	
5.4	AC Impedance 交流内阻	$\leq 0.45\text{m}\Omega$	AC impedance 1KHz 交流阻抗 1KHz
5.5	Charge standard 标准充电	0.33C CC charge to Max Charge voltage, then CV charge till charging current decline to $\leq 0.05\text{C}$ 0.33C CC 充电至最高充电电压, 再 CV 充电直至充电电流 $\leq 0.05\text{C}$	CC=Constant Current CV=Constant Voltage
5.6	Charge time 充电时间	Standard:3.5hours (Ref.) 标准充电:3.5 小时(参考值)	
5.7	Discharge standard 标准放电	0.33C CC discharge to Discharge ending voltage; 0.33C CC 放电至放电截止电压;	CC=Constant Current
5.8	Cell Dimension 电芯尺寸	Height 高度: 21.7mm Max; Width 宽度: 118.3mm Max; Length 长度: 574.6mm Max;	

6. Cell dimensions 电芯尺寸




7.3	Over discharge alarm 过放报警	Single over discharge alarm voltage 单体过放报警电压	2.7±0.05V	
		Overall over discharge alarm voltage 总体过放报警电压	43.2±0.5V	
7.4	Over discharge detection 过放保护	Over discharge detection voltage 过放电检测电压	2.5±0.05V	
		Over discharge detection delay time 过放电检测延迟时间	1000mS	
		Over discharge recovery voltage 过放解除电压	2.95±0.05V	
		Overall over discharge detection voltage 总体过放电检测电压	40±0.5V	
		Overall over discharge detection delay time 总体过放电检测延迟时间	1000mS	
		Overall over discharge recovery voltage 总体过放解除电压	47.2±0.5V	
7.5	Overcurrent alarm 过流报警	Charging overcurrent alarm current 充电过流报警电流	97A±2A	
		Discharge overcurrent alarm current 放电过流报警电流	189A±2A	
7.6	Discharge overcurrent 过流保护	Discharge overcurrent alarm current 1 放电过流保护电流 1	195A±2A	
		Discharge overcurrent detection delay time 1 放电过流检测延迟时间 1	1000mS	
		Discharge overcurrent alarm current 2 放电过流保护电流 2	275A±5A	
		Discharge overcurrent detection delay time 2 放电过流检测延迟时间 2	100±30ms	
		Discharge overcurrent protection recovery conditions 放电过流保护解除条件	Charge release 充电解除	
		Charge overcurrent protection current 充电过流保护电流	102A±1A	
		Charge overcurrent detection delay time 充电过流检测延迟时间	1000mS	
		Charging overcurrent protection recovery conditions 充电过流保护解除条件	Discharge recovery 放电解除	
		Short-circuit protection 短路保护	YES	
		Short-circuit protection detection delay time	≤500uS	

		短路保护检测延时		
		Short-circuit protection recovery conditions	Charge or remove the load	
		短路保护恢复条件	充电或移除负载	
7.7	Temperature protection 温度保护	Charging high temperature protection 充电高温保护	65°C±5°C	
		Charging high temperature recovery 充电高温恢复	55°C±5°C	
		Charging Low temperature protection 充电低温保护	-5°C±5°C	
		Charging low temperature recovery 充电低温恢复	0°C±5°C	
		Discharge high temperature protection 放电高温保护	70°C±5°C	
		Discharge high temperature recovery 放电高温恢复	60°C±5°C	
		Discharge low temperature protection 放电低温保护	-20°C±5°C	
		Discharge low temperature recovery 放电低温恢复	-15°C±5°C	
7.8	Balanced 均衡功能	Balance detect Voltage 开启电压	3.50V±0.05V	
		Turn on the voltage difference 开启压差	30mV	
7.9	Current 电流	MAX Continuous discharge current 最大持续放电电流	200A	
7.10		Charging current limiting 充电限流	20A	
7.11		Open conditions: charging current 开启条件: 充电电流	≥97A	
7.12	Communication 通讯	RS232	Baud rate 9600bit/S	PC
		RS485	Baud rate 9600bit/S	inverter
		CAN	Baud rate 500K	inverter
		Parallel RS485	Baud rate 9600bit/S	
7.13	Dissipation 功耗	Consume current while working 电路工作时消耗电流	≤55mA	
		Sleep mode consumes current 休眠模式消耗电流	≤300 μ A	

8. Cell Performance Criteria and charge & discharge property

单颗电芯性能检查、测试及充放电性能

NO. 序号	Items 项目	Test Method and Condition 测试方法和环境	Criteria 标准	Remark 备注
8.1	Rated Capacity 电池容量	Discharge the cell with Standard discharge after Standard Charge. 该容量是指标准充电后, 按照标准放电所放出的容量。	≥184Ah	
8.2	Cycle Life 循环寿命	The cell shall be test as Rated Capacity method, repeat 2500 cycles 电池用测试电池容量的方法, 记录放电容量, 重复 2500 次.	≥80%SOH	
8.3	Self-discharge 自放电	Measure discharge capacity of cells after standard charge and stored at 25±5 °C for 28 days. 标准充电后, 在 25±5°C条件下贮存 28 天, 再以标准放电方法所放出的容量。	Residual capacity: ≥90% 容量保持: ≥90%	
8.4	Initial cell Impedance 电芯初始内阻	Measure AC impedance at 1kHz within 1 hour after 50% charge 半充状态下, 测量其 AC 1KHz 下的交流阻抗	≤0.45mΩ	
8.5	Vibration Test 振动测试	After standard charge, Vibrate cell in 1.6mm amplitude and frequency varied at 1Hz/min. between 10 to 55Hz and return in within 30 minutes per axis of X, Y, Z axes 将标准充电后的电池固定在振动台上, 沿 X、Y、Z 三个方向各振动 30 分钟, 振幅 1.6 mm, 振动频率为 10Hz~55Hz, 每分钟变化为 1Hz。	No fire 不起火 No smoke 不冒烟 No explosion 不爆炸	

 沃田新能源(广东)有限公司 Woteam New Energy (Guangdong) Co., Ltd.	VER: A0
RAYS01 16S1P 51.2V 184Ah SPECIFICATIONS RAYS01 16S1P 51.2V 184Ah 规格书	Page 16 of 19

8.6	High temperature and high humidity test 高温高湿测试	Keep battery under condition as 40°C±2°C Ambient Temperature & Humidity as90%-95%	No distortion No explosion 不变形, 不爆炸	
-----	---	--	---	--

9. Package 包装

The sketch, sizes, color of marking should match GB/T191-2000 requests.

标志的图形、尺寸、颜色应符合 GB/T 191-2000 的要求

- 9.1 Model and specification of product; 产品的名称和型号及规格;
- 9.2 Quantity;数量;
- 9.3 Measure up marking;合格品标识;
- 9.4 Manufacturing date 制造日期;
- 9.5 Other markings (color.etc).其他标识, 如颜色

10. Visual inspection 外观 检查

Scratch, flaw, crack, and leakage are not allowed

不允许有任何影响电池性能的外观缺陷, 诸如裂纹、裂缝、泄漏等。

11. Standard test conditions 标准测试环境

Unless otherwise specified, all tests should be conducted within one month of delivery under the following conditions:

Temperature: 20±5°C Humidity: 60±15%RH Barometric:86kpa-106kpa

除非特别说明, 本标准书中所有测试均在以下环境条件下进行:

温度: 20±5°C 湿度: 60±15%RH 大气压: 86kpa-106kpa

12. CAUTIONS IN USE 使用警告

please read the manual carefully before using it to ensure properly use.

为了使电池安全的使用及处理请在使用前认真的阅读操作说明

12.1 Do not make the battery exposure or thrown into fire.

- 不能把电池曝晒或丢在火中


12.2 Never reverse charge the battery.

- 电池充电时不能把正负极性装反

12.3 Never short circuit the battery.

- 避免短路电池

12.4 Avoid excessive physical shock or vibration.

 沃田新能源(广东)有限公司 Woteam New Energy (Guangdong) Co., Ltd.	VER: A0
WAYS01 16S1P 51.2V 184Ah SPECIFICATIONS WAYS01 16S1P 51.2V 184Ah 规格书	Page 17 of 19

- 避免过分的物理震动和冲击电池

12.5 Do not disassemble or deform the battery.

- 不能拆解或使电池变形

12.6 Never allow the battery to get wet or be immersed in water.

- 不能将电池浸入水中

12.7 Do not use different types together..

不能将其它不同厂家、类型、型号的电池混合使用

12.8 Keep away from children

- 禁止小孩接触电池

12.9 Charge at the appropriate conditions.

- 电池必须在合适的条件下充电

12.10 Never use the faulty charger to charging.

- 决不能用故障的充电器给电池充电

12.11 Never keep charging more than 24 hours.

- 电池持续充电不能超过 24hours

13. Storage 贮存

13.1 Store the battery in cool, dry and well-ventilated conditions.

- 电池贮藏在通风干燥的环境中

13.2 Store the battery in a individual room, separate from the other carriage.

- 电池应单独放置于专门的空间，与其他货物隔离开了。

13.3 Regulations vary for different countries. Dispose of in accordance with local regulations.


- 不同国家法规的不同，处理时根据当地的法规。

13.4 Please store the battery in the adequate temperature as mentioned in specifications and recharge if keep in storage more than 6 months.

- 电池贮存在规格书规定的温度范围内，如果电池贮存超过六个月，建议你给电池充电。

14. Battery operating instruction 电池操作说明

14.1 Charge 充电

 沃田新能源(广东)有限公司 Woteam New Energy (Guangdong) Co., Ltd.	VER: A0
RAYS01 16S1P 51.2V 184Ah SPECIFICATIONS RAYS01 16S1P 51.2V 184Ah 规格书	Page 18 of 19

Charge current: Never out of the max charge current as mentioned in specification.

充电电流：不能超过规格书规定的最大的充电电流。

Charge voltage: Never out of the max charge voltage as mentioned in specification.

充电电压：不能超过规格书规定的最高的限制电压。

Charge temperature: Please refer to the temperature range as specification.

充电温度：电池充电温度必须按照规格书的温度范围执行。

Charge as constant current before constant voltage, Never reverse charge the battery.

先恒流后恒压方式充电，禁止颠倒的方式充电。如果电池正负极颠倒充电会带来危险。

14.2 Discharge current 放电电流

The discharge current is not allowed to out of max current as specification. Otherwise, the battery will be over heat and capacity fading.

电池放电电流不能超过规格书规定的最大放电电流，过大的电流放电会造成电池发热和容量衰减。

14.3 Discharge temperature 放电温度

Please refer to the temperature range as specification.

电池放电温度必须按照规格书的温度范围执行。

14.4 Over-discharge 过放电

It' s workable if over charge and discharge for a short while but not allow to do it for a long time . over discharge may result in self-energy disappear . Please keep a certain electric quantity to prevent over discharge.

短时间的的过充过放不影响电池的使用，但是长时间的过放电会影响到电池的功能失效，电池永久性不能适用，电池可能过放还有一个原因是自动能量的消失。预防电池过放的出现方法是电池应保持一定的电量。

15. Warranty period 保质期

Quality assurance for one year against manufacturing defects, but. we are not responsible for the damage caused by inadequate and improper use. The information (subject to change without prior notice) contained in this document is for reference only and should not be used as a basis for product guarantee or warranty. For applications other than those described here, please contact our office. Manufacturer reserves the right to alter, amend the design, model and specification without prior notice.

电池的保质期从出货之日算起为 12 个月，如果证明电池的缺陷是在制造过程中形成的而不是由于用户滥用及错误使用造成，本公司负责退换电池。

16. Other Chemical Reaction 其它化学反应

The battery performance will reduce if over time using or unused for a long time due to it' s a reaction of chemical. In addition, the battery life will be shorten or injury or damage itself from electrolyte leakage, heating ignition or explosion for improper handling. It' s necessary to replace battery if unable to charge even with proper way.

由于电池是利用化学反应的原理，所以即使是存放很长一段时间而不使用也会随时间的增加而降低性能。如果使用条件如充电、放电及周围环境温度等情形不在指定的使用范围内，也会缩短电

 沃田新能源(广东)有限公司 Woteam New Energy(Guangdong) Co., Ltd.	VER: A0
RAYS01 16S1P 51.2V 184Ah SPECIFICATIONS RAYS01 16S1P 51.2V 184Ah 规格书	Page 19 of 19

池的使用寿命，或者产生漏液，导致电池损坏。如果电池使用指定的方法也不能充电，则需要更换电池。

17. Note: 备注:

Any other items which are not covered in this specification shall be agreed by both parties.

本说明书未包括事项应由双方协商约定。