

深圳市赫宇鑫科技有限公司

Shenzhen Heyuxin Technology Co., Ltd.

Lithium iron phosphate battery specifications

磷酸铁锂电池组规格书

MODEL: 48.0V200A

规格型号: 48.0V200A

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1 Scope (适用范围)

This manual is applicable to the batteries manufactured by Shenzhen Heyuxin Technology Co., Ltd. mentioned in this book.

本说明书适用于本书中所提及的深圳市赫宇鑫科技有限公司制造的电池。

2 Product Specification (产品技术规格)

Table 1 (表 1)

No. (序号)	Item (项目)	General Parameter (常规参数)		Remark (备注)
		Typical (标称容量)		
1	Rated Capacity (额定容量)	200Ah	200Ah	Standard discharge (40A0.2C) after Standard charge (标准充电后 100A0.5C 标准放电)
		Minimum (最小容量)		
2	Nominal Voltage (标称电压)	48.0V		Mean Operation Voltage (即工作电压)
3	Voltage at end of Discharge (放电终止电压)	39.0V ±0.5V		Discharge Cut-off Voltage (放电截止电压)
4	Battery limit voltage (充电限制电压)	54.75V ±0.5V		max
5	Internal Impedance (内阻)	≤100mΩ		Internal resistance measured at AC 1 KHz 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 (使用出货后不到一个星期 及循环次数少于 5 次的新 电池测量)
6	Standard charge (标准充电)	Constant Current 40 A Constant Voltage 54.75 V ≤1000mAh cut-off (持续电流: 40A 持续电压: 54.75V 截止电流: ≤1000mAh)		Charge time : Approx 5h (充电时间: 大约 5 小时)
7	Standard discharge (标准放电)	Constant current 100 A end voltage 39.0V ±0.5 V (持续电流: 100A 截止电压: 39.0V ±0.5V)		0.5C
8	Fast charge (快速充电)	Constant Current 100 A Constant Voltage 54.75 V ≤2000mAh cut-off (持续电流: 100A 持续电压: 54.75V 截止电流: ≤1000mAh)		Charge time : Approx 2h (充电时间: 大约 2 小时)

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Continuous the table 1 (续表 1)

No. (序号)	Item (项目)	General Parameter (常规参数)	Remark (备注)
9	Maximum Continuous Charge Current (最大充电持续电流)	100A	0.5C
10	Maximum Continuous Discharge Current (最大放电持续电流)	100A	0.5C
11	Operation Temperature Range (工作温度范围)	Charge (充电) : 0~45℃	60±25%R.H. Bare Cell (单体电池储存湿度范围)
		Discharge (放电) : -10~60℃	
12	Storage Temperature Range (储存温度范围)	Battery storage ambient temperature (0℃~45℃) 电池储存环境温度 (0℃~45℃)	60±15%R.H. at the shipment state (出货状态时的湿度范围)
		Charge quantity 30%~50% 荷电量 30%~50%	

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3 Performance And Test Conditions (电池性能及测试条件)

3.1 Standard Test Conditions (标准测试条件)

Test should be conducted with new batteries within one week after shipment from our factory and the cells shall not be cycled more than five times before the test. Unless otherwise specified, test and measurement shall be done under temperature of $20 \pm 5^\circ\text{C}$ and relative humidity of 45~75%. If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature 15~30°C and humidity 25~75%RH.

测试必须使用出厂时间不超过一个星期的新电池，且未进行过五次以上的充放电循环。除非特别说明，否则测试会在温度 $20 \pm 5^\circ\text{C}$ ，相对湿度 45~75%的条件下进行。如果经鉴定测试结果不受上述条件影响，测试也可以在温度 15~30°C，相对湿度 25~75%RH 的条件下进行。

3.2 Measuring Instrument or Apparatus (测量器具及设备)

3.2.1 Dimension Measuring Instrument (尺寸测量器具)

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm.

尺寸测量器具的精度等级应不小于 0.01 mm。

3.2.2 Voltmeter (伏特计)

Standard class specified in the national standard or more sensitive class having inner impedance more than $10\text{k}\ \Omega/V$

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 $10\text{k}\ \Omega/V$ 。

3.2.3 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 $0.01\ \Omega$.

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 $0.01\ \Omega$ 。

3.2.4 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)。

3.3 Standard Charge\Discharge (标准充放电)

3.3.1 标准充电：测试过程及标准如下：

0.2C

Charging shall consist of charging at a 40A constant current rate until the cell reaches 54.75V. The cell shall then be charged at constant voltage of 54.75V volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to 1000mAh. Charge time : Approx 5h, The cell shall demonstrate no permanent degradation when charged between 0°C and 45°C .

电池先 40A 恒流充至 54.75V，当充电电流逐渐减小时再以 54.75V 恒压充至电流减小到 1000mAh，充电时间大约为 5 小时。在 0°C - 45°C 内充电电池应没有永久损害。

3.3.2 Standard Discharge (标准放电)

0.5C

Cells shall be discharged at a constant current of 10A to 39.0Volts @ $20^\circ \pm 5\text{C}$

电池以 100A 恒流放电至 39.0V @ $20^\circ \pm 5\text{C}$

3.3.3 If no otherwise specified, the rest time between Chare and Discharge amount to 30min.

如果没有特别说明，电池充放电间隔时间为 30 分。

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3.4 Appearance (外观)

There shall be no such defect as flaw, crack, rust, leakage, which may adversely affect commercial value of battery.

电池外观应没有划伤、破裂、污渍、生锈、漏液等影响市场价值的缺陷存在。

3.5 Initial Performance Test (初始性能测试)

Table 2 (表 2)

Item (项目)	Test Method and Condition (测试方法及条件)	Requirements (要求)
1、Li-ion Battery Voltage 电池组电压	As of shipment 出货电压	$\geq 49V$
(2) Open-Circuit Voltage (开路电压)	The open-circuit voltage shall be measured within 24 hours after standard charge. (标准充电后 24 小时内测量开路电压)	$\geq 49V$
(3) Internal impedance (初始内阻)	Internal resistance measured at AC 1KHz after 50% charge. (半充电状态下, 测量其 AC 1KHz 下的交流阻抗)	$\leq 100m \Omega$
(4) Minimal Rated Capacity (最小额定容量)	The capacity on 0.5C discharge till the voltage tapered to 39.0V shall be measured after rested for 30 min then finish standard charge. (标准充电后, 搁置 30min, 测量 100A 放电至 39.0V 截止电压所放出的容量)	$\geq 200Ah$

3.6 Temperature Dependence of discharge capacity (放电温度特性)

Cells shall be charged per 3.3. 1 and discharged @0.2 C₅A to 3.0 volts. Except to be discharged at temperatures per Table 3. Cells shall be stored for 3 hours at the test temperature prior to discharging and then shall be discharged at the test temperature. The capacity of a cell at each temperature shall be compared to the capacity achieved at 23 °C and the percentage shall be calculated. Each cell shall meet or exceed the requirements of Table 3.

电池按 3.3. 1 规定充电。按表 3 的温度中放电, 电池必须先在该试验温度中放置 3 个小时。在每一个温度中的放电容量应不小于表 3 的要求。

Table 3 (表 3)

Discharge Temperature (放电温度)	-20°C	-10°C	0°C	23°C	60°C
Discharge Capacity (200A) (放电容量/200A)	30%	50%	80%	100%	95%

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3.7 Cycle Life and Leakage-Proof (循环寿命及漏液试验)

Table 4 (表 4)

No. (序号)	Item (项目)	Criteria (标准)	Test Conditions (测试条件)
1	Cycle Life 循环寿命 (200A)	Higher than 80% of the Initial Capacities of the Cells (初始容量的 80%)	Carry out 3500cycle Charging/Discharging in the below condition. ◆ Charge: Standard Charge, per 3.3. 1 ◆ Discharge: Standard discharge , per 3.3.2 ◆ Rest Time between charge/discharge: 30 min. ◆ Temperature: 20±5°C 循环 2000 次 充放电按以下条件: ◆ 充电: 标准充电, 按 3.3. 1 规定 ◆ 放电: 标准放电, 按 3.3.2 规定 ◆ 搁置: 30min. ◆ 温度: 20±5°C

4. Mechanical characteristics and Safety Test (安全测试及机械特性)

Table 5 (表 5)

(Mechanical characteristics)

No. (序号)	Items (项目)	Test Method and Condition (测试方法及条件)	Criteria (标准)
1	Vibration Test 振动测试	After standard charging, fixed the Li-ion Battery to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1 Hz per minute between 10Hz and 55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes. 将标准充电后的电池组固定在振动台上, 沿 X、Y、Z 三个方向各振动 30 分钟, 振幅 1.6mm, 振动频率为 10Hz~55Hz, 每分钟变化 1Hz。	No leakage 无泄漏 No fire 不起火
2	Drop Test 跌落测试	The Li-ion Battery is to be dropped from a height of 0.5 meter twice onto concrete ground. 将标准充电后的电池组从 0.5 米高度跌落至混凝土地面 2 次	No explosion, No fire, no leakage. 无爆炸、无起火、无泄漏
3	Collisions 碰撞	After the vibration test, according to X.Y.Z each battery average three vertical pulse peak acceleration, the setting for the 100m/s ² , every minute, 40 ~ 80 collision frequency, pulse duration 16ms collision frequency ± 10 thousand. 振动试验结束后, 将电池组平均按 X.Y.Z 三个互相垂直轴向上, 设置脉冲峰值加速度为 20m/s ² , 每分钟碰撞次数 5~10, 脉冲持续时间 16ms, 碰撞次数 100±10.	No explosion, No fire, no leakage. 无爆炸、无起火、无泄漏

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Table 6 (表 6)

No. (序号)	Item (项目)	Battery Condition (电池要求)	Test Method (测试方法)	Requirements (要求)
4	Crush 挤压试验	Fresh, Fully charged (充满电的新 电池)	Crush between two flat plates. Applied force is about 13kN(1.72Mpa) for 30min. (电池放置在两块平面金属板间, 施加 13KN (1.72Mpa) 的作用力, 且持续保持 30 分钟)	No explosion, No fire (无起火无爆炸)
5	Short Circuit 短路试验	Remove outer protective circuit 撤除外部 保护电路	This test will be placed the battery electric dipole in the fume hood, short-circuit the anode (total resistance is not more than 50m lines Ω), monitor temperature changes, when the battery is low temperature dropped to about 10 degrees than peak, the end of experiment. 本项试验将接有电热偶的电池置于通风橱中, 短路其正负极(线路总电阻不大于 50m Ω), 监视温度变化, 当电池温度下降到比峰值低约 10 $^{\circ}\text{C}$ 时, 试验结束.	No explosion, No fire The Temperature of the surface of the Cells are lower than 150 $^{\circ}\text{C}$ (无起火无爆炸 电池表面温度应低于 150 $^{\circ}\text{C}$)
6	Impact 重物冲击	Fresh, Fully charged 充满电 的新电池	A 56mm diameter bar is inlayed into the bottom of a 10kg weight. And the weight is to be dropped from a height of 1 m onto a sample battery and then the bar will be across the center of the sample. (用一条直径为 56mm 的圆棒放置在电池中央, 将一 10Kg 的重锤从 1m 的高度垂直落下在电池的中心位置)	No explosion, No fire (无起火无爆炸)
7	Thermal shock 热冲击	Fresh, Fully charged 充满电 的新电池	Batteries in hot box Temperature in 5 $^{\circ}\text{C} \pm 2^{\circ}\text{C}/\text{min}$, rising to 50 $^{\circ}\text{C} \pm 2^{\circ}\text{C}$ keep 30min. 电池置于热箱中, 温度以 5 $^{\circ}\text{C} \pm 2^{\circ}\text{C}/\text{min}$, 升至 50 $^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 并保持 30min.	No explosion, No fire (无起火无爆炸)
8	Forced Discharge 过放试验	Fresh, Fully charged (充满电的新 电池)	Discharge at a current of 0.5C for 2h. (以 100A 的电流放电 2 小时)	No explosion, No fire (无起火无爆炸)

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Table 6 (表 7)

No. (序号)	Item (项目)	Battery Condition 电池要求	Test Method (测试方法)	Requirements (要求)
9	High temperature performance 高温性能	Fresh, Fully charged (充满电的新电池)	After charging Will a battery into $80 \pm 2^\circ\text{C}$ In the case of high temperature 2h Batteries in $80 \pm 2^\circ\text{C}$ 100A discharge current to the termination voltage, discharge time should not below 2h,, Battery will in environmental temperature $20^\circ\text{C} \pm 5^\circ\text{C}$ place 2h 充电结束后. 将电池放入 $80^\circ\text{C} \pm 2^\circ\text{C}$ 的高温箱中恒温 2h, 电池在 $80^\circ\text{C} \pm 2^\circ\text{C}$ 下 100A 电流放电至终止电压, 放电时间应不低于 2h, 将电池取出在环境温度 $20^\circ\text{C} \pm 5^\circ\text{C}$ 的条件下搁置 2h	No explosion, No fire (无起火无爆炸)
10	Low temperature performance 低温性能	Fresh, Fully charged (充满电的新电池)	After charging, will be a battery into -20 ± 2 degrees Celsius in the box, then 16h constant 24h ~ 0.2C5A with discharge current to the termination voltage, discharge time should not below 3 h. After the experiment, the battery will in environmental temperature of $20 \pm 5^\circ\text{C}$ condition 2h aside 充电结束后, 将电池放入 $-20 \pm 2^\circ\text{C}$ 的低温箱中恒温 16h~24h, 然后以 40A 电流放电至终止电压, 放电时间应不低于 3h。该试验结束后, 将电池取出在环境温度 $20 \pm 5^\circ\text{C}$ 下搁置 2h	No deformation and burst (无变形无爆炸)
11	Charged 荷电保持	Fresh, Fully charged (充满电的新电池)	A full battery, at ambient temperature $20 \pm 5^\circ\text{C}$ under the conditions of the battery will be open to 28d aside, 100A to terminate discharge current voltage, 标准充电结束后, 在环境温度 $20 \pm 5^\circ\text{C}$ 的条件下, 将电池开路搁置 28d, 再以 100A 电流进行放电至终止电压.	the discharge time not below 2h 放电时间不低于 2h
12	Constant damp performance 恒定湿热性能	Fresh, Fully charged (充满电的新电池)	Standard after the battery, Will a battery into $40^\circ\text{C} \pm 2^\circ\text{C}$, Relative humidity 90% ~ 95% At constant temperature and humidity box after 48 h Battery will in environmental temperature $20^\circ\text{C} \pm 5^\circ\text{C}$ Aside 2h, 100A to terminate discharge current voltage, 标准充电结束后, 将电池放入 $40^\circ\text{C} \pm 2^\circ\text{C}$, 相对湿度为 90%~95% 的恒温恒湿箱中搁置 48h 后, 将电池取出在环境温度 $20^\circ\text{C} \pm 5^\circ\text{C}$ 的条件下搁置 2h, 再以 100A 电流放电至终止电压,	No obvious deformation, hands rust, smoke, explosion, discharge time not less than 2h 无明显变形、锈蚀、冒烟或爆炸; 放电时间不低于 2h

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5. Handling of Cells (电池操作注意事项)

5.1. Prohibition of disassembly (禁止拆卸)

1) Never disassemble the cells

The disassembling may generate internal short circuit in the cell, which may cause gassing, firing, explosion, or other problems.

2) Electrolyte is harmful

LI battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.

1、不要拆卸电池。

拆卸电池会发生电池内部短路，会引起起火、爆炸、有害气体或者其它问题。

2、电解液是有害的

万一电解液沾到皮肤、进入眼睛，应立即用清水冲洗以及求助医生。

5.2 Prohibition of dumping of cells into fire (不要把电池倾倒入火中)

Never incinerate nor dispose the cells in fire. These may cause explosion of the cells, which is very dangerous and is prohibited.

不要焚毁电池，否则会致电池爆炸，这个很危险，必须禁止。

5.3 Prohibition of cells immersion into liquid such as water (禁止浸泡电池)

The cells shall never be soaked with liquids such as water, seawater, drinks such as soft drinks, juices, coffee or others.

请不要把电池浸泡在液体当中，像清水、海水，及非酒精饮料、果汁、咖啡或者其它的饮料。

5.4 Battery cells replacement (更换电池)

The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user.

更换电池应由电池生产商或设备供应商完成，用户不要自行更换。

5.5 Prohibition of use of damaged cells (禁止使用损坏的电池)

The cells might be damaged during shipping by shock. If any abnormal features of the cells are found such as damages in a plastic envelop of the cell, deformation of the cell package, smelling of an electrolyte, an electrolyte leakage and others, the cells shall never be used any more.

The Cells with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing or explosion.

电池可能在出货途中碰撞而受损。如果发现电池有异常，例如包装损坏、电池包裹变形，有电解液的味道、发现漏液等等，不要再使用这些电池。

电池如果有电解液的味道或者出现漏液，电池放置应该远离火源避免起火及爆炸。

6. Period of Warranty (保质期)

The delivery period from battery date for If the battery is proved in manufacturing process defect formation rather than the user abuse and error caused by use of this company is responsible

for replacement battery.

电池的保质期从出货之日算起。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。

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7. Storing the Batteries (电池的存放)

The batteries should be stored at room temperature, charged to about 30% to 50% of capacity.

We recommend that batteries be charged about once per half 3 months to prevent over discharge.

电池应当在室温下存放，应充到 30%至 50%的电量。如长时间储存，建议每三个月充一次电以防止电池过放电。

8. Other The Chemical Reaction (其它的化学反应)

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.

由于电池是利用化学反应的原理，所以随时间的增加电池的性能会降低，即使是存放很长一段时间而不使用。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，会使缩短电池的使用寿命，或者会产生漏液导致设备损坏。如果电池长周期不能充电，即使充电方法正确，这样需要更换电池了。

9.Note: (注释)

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议确定。

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Inverter(逆变器)

暂无
Not available

10. Assembly schematic (装配示意图)

1、 电池系统长×宽×高=626mm*442mm*270mm (见图 II)

battery system length x width x height =626mm*442mm*270mm (II)

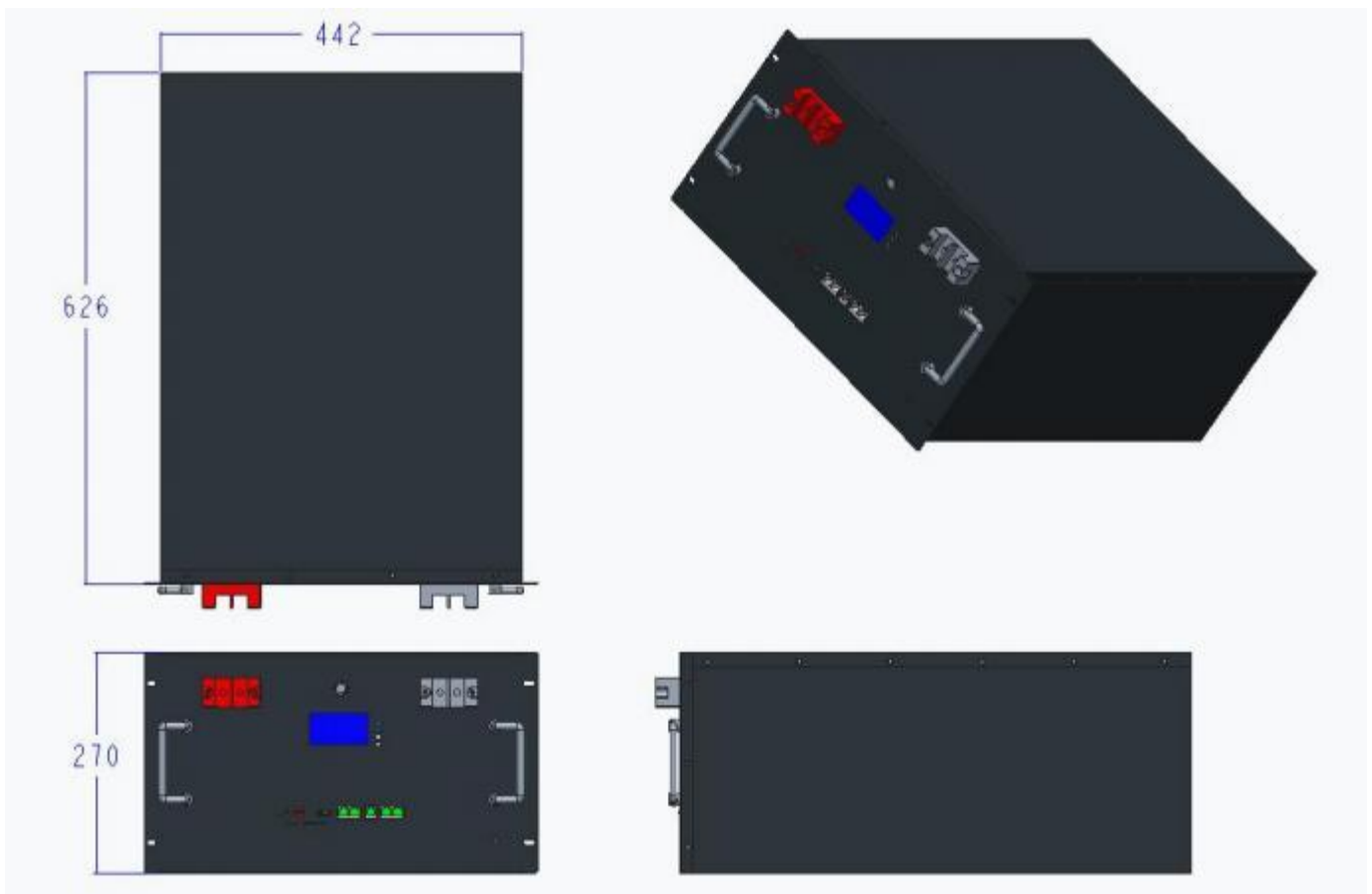


图 II
see figure II