

LiFePO4 Battery Specification

MODEL:FSD-PO5KW

SPEC.:51.2V 100AH

1.Declaration

This manual contains the detailed performance of lithium iron phosphate battery pack. Please read this manual carefully before operation and comply with relevant industrial safety regulations. Our company shall not be liable for any injury caused by improper operation or non-compliance with the manual.

This document is subject to change without notice due to product version upgrade or other reasons. Unless otherwise agreed, this document is intended only as a guide, and all statements and recommendations do not constitute any explicit warranty.

2.Product Specification (产品技术规格)

Table 1 (表 1)

No.(序号)	Item (项目)	Parameter(参数)		Remark (备注)
1	Nominal Voltage (标称电压)	51.2V		Single battery 单节 3.2V 16 Series
2	Rated Capacity (额定容量)	Typical (标称容量)	0.5C 102Ah	Standard discharge (0.5C) after Standard charge (0.5C) (0.5C 标准充电后 0.5C 标准放 电)
		Minimum (最小容量)	100Ah	
3	Rated weight (重量)	45KG		
4	Charging Voltage (充电电压)	58.4V		
5	Charging Mode (充电方式)	C.C/C.V. (恒流/恒压方式)		Constant Current /Constant Voltage (恒流/恒压)
6	Voltage at end of Discharge (放电终止电压)	40V		Discharge Cut-off Voltage (放电截止电压)
7	Rated Charge Current (额定充电电流)	$\leq 50A$		
8	Maximum Continuous Charge Current (最大持续充电电流)	$\leq 105A$		
9	Internal Impedance (内阻)	$< 100m\Omega$		
10	Rated Discharge Current (额定放电电流)	$\leq 100A$		
11	Maximum Continuous Discharge Current (最大持续放电电流)	$\leq 105A$		
12	Overcharge Voltage (过充电保护电压)	$3.7 \pm 0.05V$ (Adjustable 可调)		Single series voltage 单串电压
13	Over Discharge Cut Off Voltage (过放电保护电压)	$2.5 \pm 0.01V$ (Adjustable 可调)		Single series voltage 单串电压

Continuous the table 1 (续 表 1)

13	Over Current (过流保护)	Discharge overcurrent value: ≥ 110A 放电过流值: ≥ 110A	
14	Short Circuit (短路保护)	Detection condition (保护条件)	Exterior short circuit (外部电路短路)
		Release condition (保护解除条件)	Cut short circuit (断开短路电路)
15	Operating Consumption Current (工作消耗电流)	≤ 30mA (Max)	
16	Equalizing opening differential pressure (均衡开启压差)	30mV (Adjustable 可调)	
17	Bleed Start Point (均衡开启电压)	3.5V (Adjustable 可调)	
18	Operation Temperature Range (工作温度范围)	Charge (充电): 0~55℃	60±25%R.H. Bare Cell (电池储存湿度范围)
		Discharge (放电): -20~55℃	
19	Storage Temperature Range (储存温度范围)	Less than 1 year: -20~25℃ (小于一年:-20~25℃)	60±25%R.H. at the shipment state (出货状态时的湿度范围)
		less than 3 months: -20~40℃ (小于 3 个月:-20~40℃)	
		Less than 7 day: -20~65℃ (小于 7 天:-20~65℃)	
20	Cells (电芯)	国轩 IFP50160116A-102Ah	
21	Connection Type (组合方式)	16S1P	
22	Shipping voltage (出货电压)	52V-54V	

3.Battery Configuration 电池组组成

No. 编号	Item 项目	Type 类型	Qty 数量
1	Cell 电芯	国轩 IFP50160116A-102Ah	16PCS
2	PCM 保护板	BMS-48100-RS485-CAN	1PCS
3	Plastic casing 外壳	Sheet Metal	1PCS

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 $23\pm3^{\circ}\text{C}$ and relative humidity of 45~85%. If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature $15\sim30^{\circ}\text{C}$ and humidity 25~85%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 $23\pm3^{\circ}\text{C}$ ，相对湿度 45~85%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 $15\sim30^{\circ}\text{C}$ ，相对湿度 25~85%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 $10\text{k}\Omega/\text{V}$ 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 $10\text{k}\Omega/\text{V}$ 。

3.2.3 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 0.01Ω .

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 。

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 Standard Charge : Test procedure and its criteria are referred as follows:

标准充电：测试过程及标准如下：

0.2C =20A

Charging shall consist of charging at a 0.2C constant current rate until the cell reaches 54.75V. The cell shall then be charged at constant voltage of 52.5Volts while tapering the charge current. Charging shall be terminated when the charging current has tapered to 0.02 C. Charge time: Approx 6-8 h, The cell shall demonstrate no permanent degradation when charged between 0°C and 45°C .

电池先 0.2C 恒流充至 58.4V，当充电电流逐渐减小时再以 56V 恒压充至电流减小到 0.02C，充电时间大约为 6-8 个小时。在 $0^{\circ}\text{C}\sim45^{\circ}\text{C}$ 内充电电池应没有永久损害。

3.3.2 Standard Discharge （标准放电）

0.2C =20A

Cells shall be discharged at a constant current of 0.2C to 40V volts @ $23^{\circ}\pm3^{\circ}\text{C}$

电池以 0.2 C 恒流放电至 40V@ $23^{\circ}\pm3^{\circ}\text{C}$

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

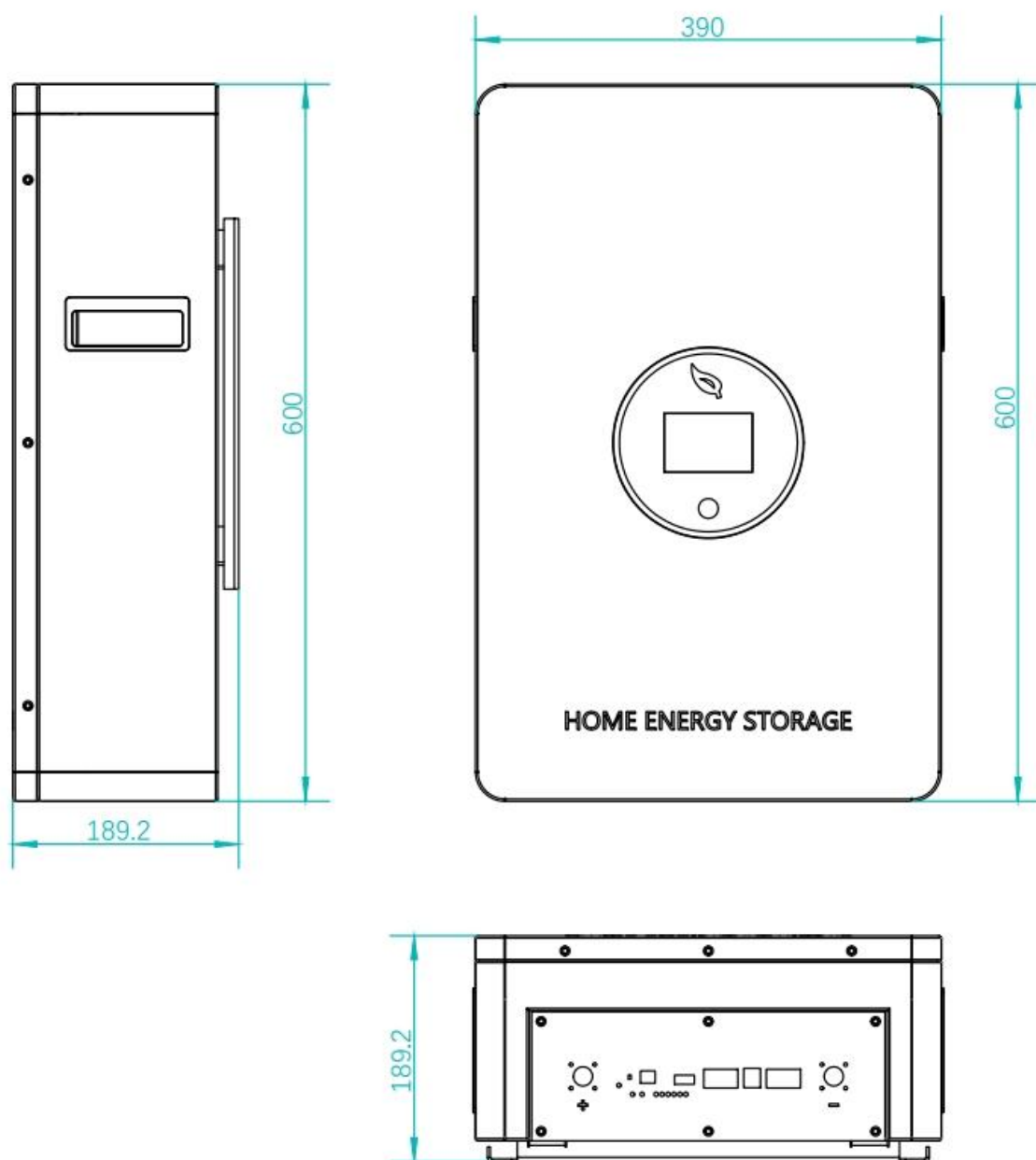
如果没有特别说明，电池充放电间隔时间为 30 分。

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 Appearance 参考外观图



3.6 指示灯（indicator light）

各功能对应的指示灯示意图（Schematic diagram of indicator light corresponding to each function）

表（1）指示灯工作状态（Working status of indicator）

Status	Normal/Alarm/Protection	ON/OFF			Battery Level Indicator LED						Note
		●	●	●	●	●	●	●	●	●	
Shutdown	Sleep	Off	Off	Off	Off	Off	Off	Off	Off	Off	All LEDs are turned off
Standby	Normal	Steady On	Blinks Once	Off	Based on Battery Level Indication						Standby State
	Alarm	Steady On	Blinks Once	Blinks Three Times							Module Low Voltage
Charging	Normal	Steady On	Steady On	Off	Battery Level Indication (Highest Battery Level LED Blinks Twice)						Highest Battery Level LED Blinking (Flash Twice), Overcharge Alarm ALM Not Blinking
	Alarm	Steady On	Steady On	Blinks Three Times							
	Overcharge Protection	Steady On	Steady On	Off	Steady On	Steady On	Steady On	Steady On	Steady On	Steady On	If there is no mains power, the indicator light is in standby state
	Temperature, Overcurrent, Failure Protection	Steady On	Off	Steady On	Off	Off	Off	Off	Off	Off	Stop Charging
Discharging	Normal	Steady On	Blinks Three Times	Off	Battery Level Indication						
	Alarm	Steady On	Blinks Three Times	Blinks Three Times							
	Undervoltage Protection	Steady On	Off	Off	Off	Off	Off	Off	Off	Off	Stop Discharging
	Temperature, Overcurrent, Short Circuit, Reverse Connection, Failure Protection	Steady On	Off	Steady On	Off	Off	Off	Off	Off	Off	Stop Discharging
Failure		Steady On	Off	Steady On	Off	Off	Off	Off	Off	Off	Stop Charging and Discharging

表（2）容量指示说明（Capacity indication）

Status	Charging						Discharging					
	L6	L5	L4	L3	L2	L1	L6	L5	L4	L3	L2	L1
Capacity Indicator Light	●	●	●	●	●	●	●	●	●	●	●	●

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16 series lithium iron phosphate home energy storage

Battery Level (%)	0 ~ 16.7%	Off	Off	Off	Off	Off	Blinks Twice	Off	Off	Off	Off	Off	Steady On
	16.7 ~ 33.3%	Off	Off	Off	Off	Blinks Twice	Steady On	Off	Off	Off	Off	Steady On	Steady On
	33.3 ~ 50%	Off	Off	Off	Blinks Twice	Steady On	Steady On	Off	Off	Off	Steady On	Steady On	Steady On
	50 ~ 66.7%	Off	Off	Blinks Twice	Steady On	Steady On	Steady On	Off	Off	Steady On	Steady On	Steady On	Steady On
	66.7 ~ 83.4%	Off	Blinks Twice	Steady On	Steady On	Steady On	Steady On	Off	Steady On	Steady On	Steady On	Steady On	Steady On
	83.4 ~ 100%	Blinks Twice	Steady On	Steady On	Steady On	Steady On	Steady On	Steady On	Steady On	Steady On	Steady On	Steady On	Steady On
Operational Indicator Light ●		Steady On						Flashing (Flashes 3 times)					

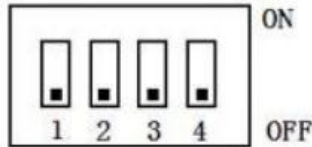
表（3）LED 闪动说明（LED flashing instructions）

Flashing Pattern	On	Off
Blinks Once	0.25S	3.75S
Blinks Twice	0.5S	0.5S
Blinks Three times	0.5S	1.5S

3.7 电池组并联（Parallel connection of batteries）

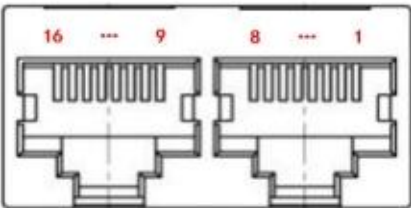
将电池组的正极与正极并联，负极与负极并联，通讯拨码如下图所示：(Connect the positive terminal of the battery pack in parallel with the positive terminal and the negative terminal in parallel with the negative terminal with the communication dial code as shown below.)

When using battery packs in parallel, different packs can be distinguished by hardware addresses. The hardware address of each pack in the entire battery stack is unique. The hardware address can be set sequentially through the DIP switches on the board. The definition of the switches is as follows:

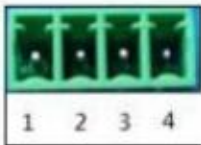


Address	DIP Switch Position				Description
	#1	#2	#3	#4	
0	OFF	OFF	OFF	OFF	No Cascading, Standalone Use
1	ON	OFF	OFF	OFF	Set as Pack1 (Main)
2	OFF	ON	OFF	OFF	Set as Pack2
3	ON	ON	OFF	OFF	Set as Pack3
4	OFF	OFF	ON	OFF	Set as Pack4
5	ON	OFF	ON	OFF	Set as Pack5
6	OFF	ON	ON	OFF	Set as Pack6
7	ON	ON	ON	OFF	Set as Pack7
8	OFF	OFF	OFF	ON	Set as Pack8
9	ON	OFF	OFF	ON	Set as Pack9
10	OFF	ON	OFF	ON	Set as Pack10
11	ON	ON	OFF	ON	Set as Pack11
12	OFF	OFF	ON	ON	Set as Pack12
13	ON	OFF	ON	ON	Set as Pack13
14	OFF	ON	ON	ON	Set as Pack14
15	ON	ON	ON	ON	Set as Pack15

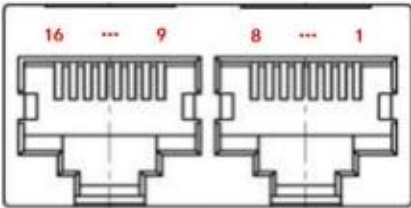
3.8: 接口定义 (Interface definition)



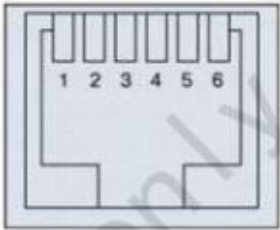
CAN & RS485



Dry Contact



RS485 Parallel Interface



RS232

RS232--Using a 6P6C Vertical RJ11 Socket	
RJ11 Pin	Note
1、2、6	NC
3	TX (Signal)
4	RX (Signal)
5	GND

CAN--Using a 8P8C Vertical RJ45 Socket		RS485--Using a 8P8C Vertical RJ45 Socket	
RJ45 Pin	Note	RJ45 Pin	Note
1、8	RS485-B1	9、16	RS485-B1
2、7	RS485-A1	10、15	RS485-A1
3、6	GND	11、14	GND
4	CANL	12	CANL
5	CANH	13	CANH

AN

RS485--Using a 8P8C Vertical RJ45 Socket		RS485--Using a 8P8C Vertical RJ45 Socket	
RJ45 Pin	Note	RJ45 Pin	Note
1、8	RS485-B	9、16	RS485-B
2、7	RS485-A	10、15	RS485-A
3、6	GND	11、14、	GND
4	Automatic DIP Switch Input IN_DP+	12	Automatic DIP Switch Output ON_DP+
5	Automatic DIP Switch Input IN_DP-	13	Automatic DIP Switch Output ON_DP-

4. Warning(谨慎使用)

To ensure proper use of the battery please read the manual carefully before using it.

(为确保正确使用电池，使用前请仔细阅读本细则)

. Handling (电池操作)

- Do not expose to, dispose of the battery in fire. (不要靠近和放置电池于火中)
- Do not put the battery in a charger or equipment with wrong terminals connected. (在充电器或设备仪器中不要把电池接错电极)
- Avoid shorting the battery (避免电池短路)
- Avoid excessive physical shock or vibration. (避免电池过多的物理撞击和震动)
- Do not disassemble or deform the battery. (不要解剖和使电池变形)
- Do not immerse in water. (不要把电池浸泡在水中)
- Do not use the battery mixed with other different make, type, or model batteries. (不要和其它不同类型的电池混和使用)
- Keep out of the reach of children. (放置电池于儿童不易接触的地方)

. charge and discharge (充电和放电)

- Battery must be charged in appropriate charger only. (电池必须用适当的充电器充电)
- Never use a modified or damaged charger. (不要使用改装或损坏的充电器)
- Do not leave battery in charger over 24 hours. (不要把电池放置于充电器超过 24 小时)

. storage(储存)

- Store the battery in a cool, dry and well-ventilated area. (应把电池置于凉爽、干燥及通风良好的区域)

. disposal (电池处理)

- Regulations vary for different countries. Dispose of in accordance with local regulations. (电池处理要符合当地的规定)

5 .Battery operation instruction (电池工作指南)

5.1 Charging (充电)

Charging current: Cannot surpass the biggest charging current which in this specification book stipulated.

(充电电流：不能超过规格书上规定的最大充电电流)

Charging voltage: Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

(充电电压：不能超过规格书上规定的最大充电电压)

Charge temperature: The battery must carry on the charge in the ambient temperature scope which this specification book stipulated.

(充电温度：电池充电必须在规格书规定环境温度范围内)

Uses the constant electric current and the constant voltage way charge, the prohibition reverse charges. If the battery positive electrode and the cathode meet instead, can damage the battery. (使用持续电流和电压方式进行充电，禁止反向充电，否则会损害电池)

5.2 Discharging current (放电电流)

The discharging current does not have to surpass this specification book stipulation the biggest discharging current, the oversized electric current electric discharge can cause the battery capacity play to reduce and to cause the battery heat.

(不要超过本规格书上规定的最大放电电流，太大的电流放电会导致容量变小及使电池发热)

5.3 Electric discharge temperature（放电温度）

The battery discharge must carry on in the ambient temperature scope which this specification book stipulated.

（电池放电必须在本规格书规定的环境温度范围）

5.4 Over-discharges（过放电）

After the short time excessively discharges charges immediately cannot affect the use, but the long time excessively discharges can cause the battery the performance, battery function losing. The battery long-term has not used, has the possibility to be able to be at because of its automatic flash over characteristic certain excessively discharges the condition, for prevented excessively discharges the occurrence, the battery should maintain the certain electric quantity.

（在短时间过放电后立即充电不会影响电池的使用，但如果是长时间过放电会导致电池性能及电池功能丧失。电池长时间不使用，可能会有因它本身自动产生的电弧特性而必然的过放电情形，为防止电池过放电，电池应该保持一定的电量）

5.5 Storing the Batteries（储存电池）

The battery should store in the product specification book stipulation temperature range. If has surpasses above for six months the long time storage, suggested you should carry on additional charge to the battery.（电池应该储存在本产品规格书中规定温度范围。如果储存时间超过六个月，建议对电池进行额外充电。）

6. Period of Warranty（保质期）

The period of warranty is 3 years from the date of shipment. ZBPOWER guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customers abuse and misuse.

（保质期从出货之日起三年。如果是制造过程的缺陷而不是用户错用滥用造成的，本公司确保更换）

7. 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.

（电池是利用化学反应产生电量，电池性能会随时间变差，即使电池长时间储存而不使用。另外，各种各样的使用方法，像充电、放电及环境温度，等等不能在本规格书规定的范围时的情形，会减小电池的期望寿命，或者会使仪器设备由于电池漏液而损坏。即使充电正确，电池长时间不能再充电，那就要更换电池了。）

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

（注意：任何本产品规格书未包含的其它条款，应由双方协议确定。）

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