energy solutions	PRODUCT SPECIFICATIN	DOC NO: MSL-R-071R00 REV: A/00 ECN: 00

LiFePo4 Battery Specification

MODEL: POWERUP-B48LPI5 (51.2V 100AH)

Registered	Checked	Approved

Client confirmation	Customer signature	
	Date	
	Client stamp	

	PRODUCT SPECIFICATIN	DOC NO:MSL-R-071R00 REV: A/00 ECN: 00

Modified Record

Revision	Date	Modified Content	Principle
V00			

	PRODUCT SPECIFICATIN	DOC NO:MSL-R-071R00 REV: A/00 ECN: 00

Table of Contents

1. GENERAL INFORMATION..... 4

2. DESCRIPTION AND MODEL..... 4

2.1 cell characteristic..... 5

2.2 Battery Specification（@ 25±5℃）..... 5

2.4 Physical Picture..... 7

3. BMS/PCM PARAMETERS..... 11

4. TEST CONDITION..... 12

5. PERFORMANCE STANDARDS FOR BATTERY PACKS..... 12

5.1 Electrochemical performance..... 12

5.2 Safety performance..... 13

6. PRODUCT PACKAGING REQUIREMENTS..... 15

6.1 The sketch, sizes, color of marking should match GB/T191-2000 requests..... 15

6.2 Package：..... 15

7. TRANSPORT & STORE..... 15

7.1 Transport..... 15

7.2 Storage..... 15

8. WARNING & TIPS..... 15

8.1 Warning..... 15

8.2 Tips..... 16

1. General Information

This spec describes the performance, technical characteristics, warning and caution of the battery pack.

2. Description and Model

This product is a new type of backup power supply for the development of high-tech products, with integration, miniaturization, light, intelligent, standardized, environmental protection and other characteristics, can be widely used in indoor distribution stations, integrated base stations, marginal stations, ETC, distributed power supply and other fields.

This product's manufacturing standard reference YDB032-2009 communication backup type lithium ion battery pack, YDT - 2011-2344.1 the communication lithium iron phosphate battery part 1: integrated battery "YDT, 1051-2010" communication board (stand) power system total technical requirements ", YDT - 2005-1363.3 the communication board (station) power supply, air conditioning and environment centralized monitoring management system "of the relevant standards.

Adopted by the high safety performance, lithium battery cathode material for lithium iron phosphate, high safety, high stability, high cycle life, high specific energy, specific power, low temperature performance is superior, but large current charge and discharge, and many other advantages, at the same time, using suitable for communication demand special high performance battery management system (BMS), with the charge, over discharge, short circuit, over-current (load), temperature, flow, total pressure protection, charging under the secondary electricity, balanced and various protective functions, and provides the bluetooth 、CAN 、RS485 communication interface and the upper machine to realize remote monitoring, can be connected to the base station power environmental monitoring systems,Intelligent software anti-theft design，Ensure the life of lithium battery and reduce the daily maintenance work.

Standard design, suitable for installation in 19-inch standard cabinet, low operating environment requirements (can be in -20 ~ 60℃, humidity < 95% normal work), small size, light weight, easy installation, simple maintenance in the later stage, can save considerable upfront investment and maintenance costs in the later stage.

	PRODUCT SPECIFICATIN	DOC NO:MSL-R-071R00 REV: A/00 ECN: 00

2.1 cell characteristic

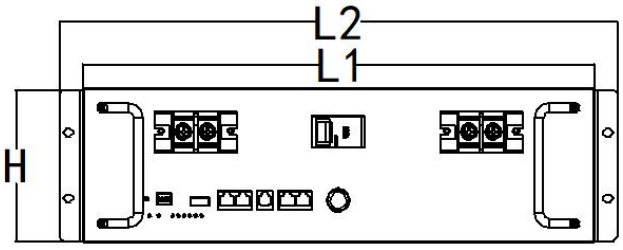
N.O	Item	Spec
1	Nominal Capacity	100Ah
3	Nominal Voltage	3.2V
4	Max Charging voltage	3.65V
5	Discharge ending voltage	2.5V
6	Standard discharge current	0.5C
7	Max charge current	1.0C
8	Standard discharge current	1.0C
9	Max discharge current	2.0C ＜120S
10	Operation temperature	Charge: 0℃~60℃
		Discharge: -20℃~60℃
11	Storage temperature and time	one year: -20~25℃
		3 months : -20~45℃
		1 months : -20~60℃
12	Humidity range	0~90%RH (Non-condensing)
13	AC impedance	≤0.4mΩ (AC Impedance, 1000 Hz)
14	Cell dimension	thickness: 48±0.5mm
		width: 173.9±0.8mm
		height: 121.4±0.8mm
15	Weight	about 2.3±0.05kg
16	Cycled Capacity	Within 3000 Cycles, 0.5C charge and discharge

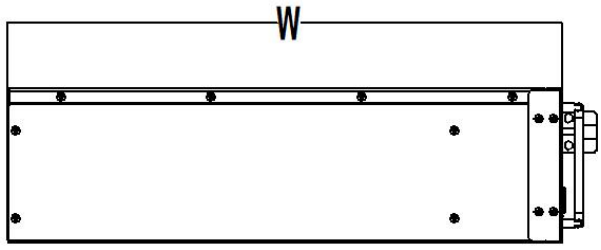
2.2 Battery Specification（@ 25±5℃）

N.O	Items	Specification
2.1	Normal capacity	100.0Ah
2.2	Nominal energy	5120Wh
2.3	Nominal voltage	51.2V
2.4	Internal resistance	≤40mΩ @1kHz AC
2.5	Normal charge voltage	57.6V
2.6	Standard charging method	20.0A
2.7	Maximum continuous charging current	50.0A
2.8	Standard discharging method	50.0A
2.9	Maximum continuous discharge current	100.0A
2.10	End of discharge voltage	44.0V
2.11	Communication mode	RS485/RS232
2.12	Cycle Life	≥4000 cycles (0.2C charge,0.2C discharge) 70%DOD

2.13	Guarantee period		3year
2.14	Designed life		10year
2.15	Operation temperature	Charge	0~50℃
		Discharge	-10~60℃
2.16	Shipment voltage		≥51.2V
2.17	Charge retention and capacity recovery capability		Standard charge the battery, and then put aside at room temperature for 28d or 55 ℃ for 7d, Charge retention rate≥90%, Recovery rate of charge ≥90
2.18	Size		Length 482.6±1 mm
			Width 480±1 mm
			Height 133±1 mm
2.19	Weight		About:43.89Kg

2.3 Product appearance and size



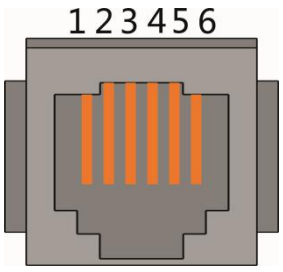


L2(mm)	L1(mm)	W(mm)	H(mm)
482.6	442	480	132.5

2.4 Physical Picture

2.5 Interface

2.51 RS232 interface:

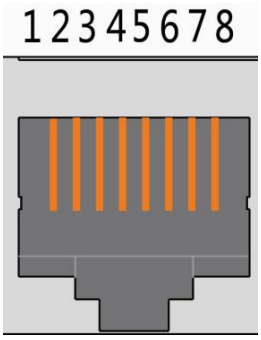


(RJ11)Port

Interface	Definition	
	PIN 1	NC(Blank)
	PIN 2	NC(Blank)

	PIN 3	TX The protection board send datas (The pins for computer data receiving)
	PIN 4	RX The protection board send datas (The pins for computer data sending)
	PIN 5	GND
	PIN 6	NC(Blank)

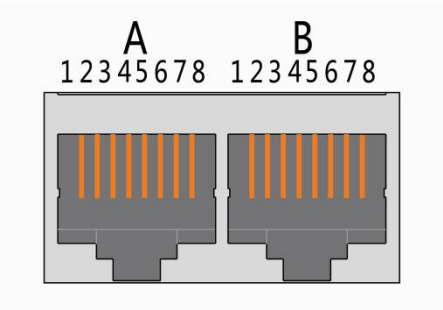
2.52 CAN Communication Definition:



(Double RJ45) Port

接口	Definition	
CAN interface	PIN 1	NC(Blank)
	PIN 2	NC(Blank)
	PIN 3	NC(Blank)
	PIN 4	CANL
	PIN 5	CANH
	PIN 6	NC(Blank)
	PIN 7	GND
	PIN 8	NC(Blank)

2.53 RS485 interface:

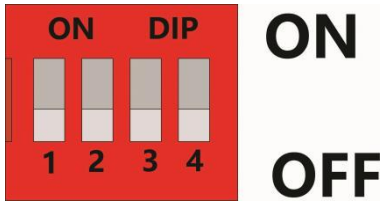


(Double RJ45) interface

接口	Definition	Definition

485 Communication Port Definition	Part A RS-485-2 Interface	PIN 1	RS485-B2	Part B RS-485-2 Interface	PIN 1	RS485-B2
		PIN 2	RS485-A2		PIN 2	RS485-A2
		PIN 3	RS485-GND		PIN 3	RS485-GND
		PIN 4	NC(Blank)		PIN 4	NC(Blank)
		PIN 5	NC(Blank)		PIN 5	NC(Blank)
		PIN 6	RS485-GND		PIN 6	RS485-GND
		PIN 7	RS485-A2		PIN 7	RS485-A2
		PIN 8	RS485-B2		PIN 8	RS485-B2

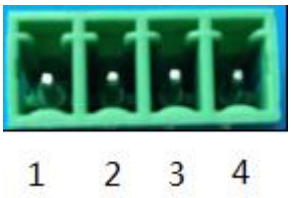
2.54 Address DIP Switch:



DIP Switch (SW1 Interface)

Number	DIP Switch Position			
	#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

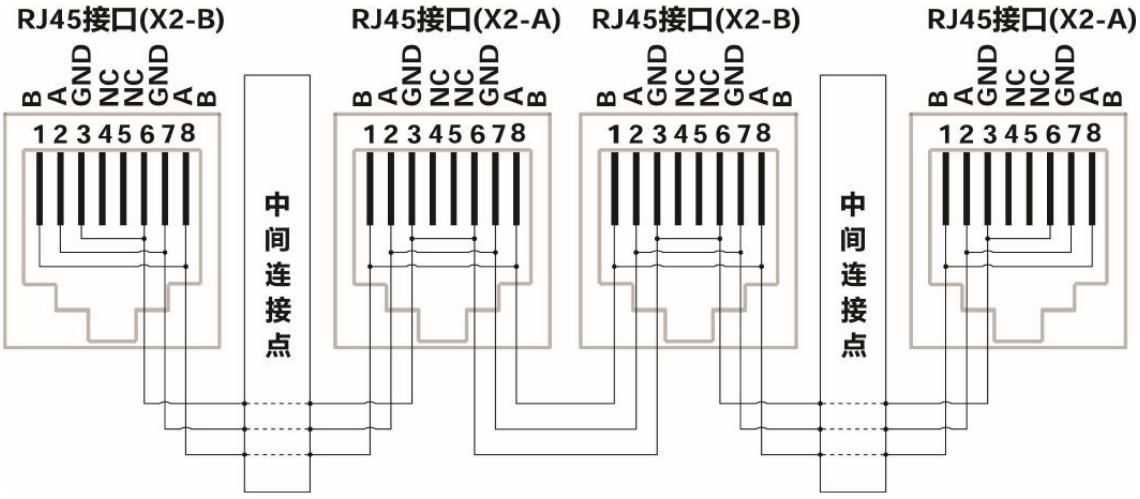
2.55 Dey contact:



(1) dey contact 1: alarm。dey contact 2: alarm and protection
(2) The maximum capacity of dry contact is 30 V / 1 A.

2.56 Parallel interface:

BMS battery packs communicate in parallel via RS485 bus, and can also communicate with devices with RS485 bus, while RS232 interface realizes communication with PC or other intelligent terminals. Any battery pack information in parallel with host-computer interaction RS485 bus, multi-machine parallel bus interface See the picture below.

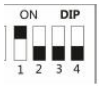


RS485 parallel connection diagram

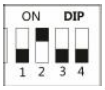
When performing multi-machine parallel communication operation, you need to configure the DIP of each PACK first. The DIP adopts BCD code format,

Address 1 is defined as 

(Black dot is OFF state, blank is ON state, the same below),

the definition of address 2 is 

,

Address 3 is defined as 

, Other addresses can be deduced by analogy.

3. BMS/PCM parameters

No.	Project	Details	Guideline (The set value is subject to the actual set value)
1	overcharge protection	Single cell overcharge alarm voltage	3.6±0.02V
		overall overcharge alarm voltage	57.6±0.5V
		single cell overcharge detection voltage	3.65±0.02V
		overall overcharge alarm voltage	58.4±0.5V
2	over-discharge protection	Single cell over discharge alarm voltage	2.8±0.02V
		overall over discharge alarm voltage	44.8±0.5V
		over discharge detection voltage	2.5±0.02V
		overall discharge detection voltage	40.0±0.5V
3	over current protection	charge over current alarm current	105.0A±0.5A
		Discharge over current alarm current 1	105.0A±0.5A
		Discharge over current protection current 1	110.0A±0.5A
		Discharge over current detection delay time 1	1S
		Discharge over current protection current 2	150.0A±0.5A
		Discharge over current detection delay time 2	500.0ms
		Charging over current protection current	110.0A
		Charge over current detection delay time	1S
		Charge over current protection release conditions	Delayed recovery
4	short circuit protection	Protection conditions	External circuit short circuit
		Detection delay time	⩽1mS
		Protection release conditions	Load disconnect If the short circuit is triggered multiple times, the lock is in the protection state. After the user needs to check the external circuit, reset resets the BMS to release the protection

5	temperature protection	Charging high temperature protection conditions	65℃
		Charging low temperature protection conditions	-5℃
		Discharging high temperature protection conditions	65℃
		Discharging low temperature protection conditions	-20℃
6	charge balance	Balanced opening voltage	3.45V±0.02V
		Balanced opening pressure difference	50mV
		Balance current	85mA±20mA
7	continuous current	Maximum continuous charge and discharge current	100.0A
8	charging current limit	Need to be turned on for parallel use	20A±1A
9	communication	RS232/RS485	The default baud rate is 9600bit/S
10	power consumption	Current consumption during circuit operation	⩽45mA
		Sleep mode current consumption	⩽100μA

4. Test Condition

Unless otherwise specified, all tests are carried out under the following conditions (standard test conditions):

Ambient temperature: (If the ambient temperature is lower than 20℃, the battery pack should be left standing at ⩾20℃ for more than 5 hours before testing)

environment humidity: 30%~80%

Atmospheric pressure: 86kpa~106kpa

Standard charge and discharge of battery pack

Standard charging: charge the battery pack with a 0.5C current constant current and constant voltage to a cut-off voltage of 57.6V and a cut-off current of 0.02C (2.0A);

Standard discharge: discharge the battery pack at a constant current of 1.0C to a cut-off voltage of 44.0V;

5. Performance standards for battery packs

5.1 Electrochemical performance

	PRODUCT SPECIFICATIN	DOC NO:MSL-R-071R00 REV: A/00 ECN: 00

NO.	Item	Standard	Testing method
1	Discharge characteristics	0.2C≥100% 1 C ≥90%	After standard charged, rest for 30min and then discharge at 0.2Cand 1.0C to the end-off discharge voltage respectively. . Capacity (Ah) can be calculated by Discharging current and discharging time, and expressed as the percentage of nominal capacity. (Cycled by 3 times, when one of the three reaches the standard, it will meet the standard.)
2	Normal Storage Performance	Residual capacity≥ nominal capacity*80% Recovery capacity≥ nominal	Stored for 28 days after standard charge, discharge at 0.2C to the end-off discharge voltage, then test the residual capacity. Test the recovery capacity at 0.2C, if one of the three cycles can reach the standard, it represents the battery has reached the standard.
3	Cycle life	capacity≥ nominal capacity *70%	Conduct 0.2C charge/0.2C discharge for 4000 continuous cycles, and then test capacity.
4	Storage Performance	Recovery capacity≥ nominal capacity*95%	Stored for 1 hour after standard charge, discharge at 0.2C for 2 hours, store the battery for 90 days at 20℃±5 ℃ .Stored for 1hour after standard charge, then discharge at 0.2C, at least 5 cycles, one of the 5 cycles reaches the standard means the battery has reached the standard.

5.2 Safety performance

NO.	Item	Standard	Testing method
1	Over-charge performance	No exploding, No fire The highest temperature <150℃	When the battery pack is charged standard ,0.3 C is charged with a constant current constant voltage source, and the constant current is charged to 5 V to constant voltage charge until the cutoff current reaches 0 A or the surface temperature is less than 10℃ below the ambient temperature. Finish the test.
2	Over-discharge performance	No exploding, No fire	Store the battery at 20℃±5℃ after standard charge, discharge at 0.2C till the voltage reaches 0V.

3	Short-circuit performance in normal temperature	No exploding, No fire The highest temperature <150℃	After standard charged, keep the battery pack in explosion-proof box and connect positive and negative to short-circuit(the total impedance should not be over than 50mΩ), stop the testing when the temperature of the battery reduces 10 ℃ compare with the top one 。check the temperature and appearance of the battery.
4	Thermal Shock safe performance	No exploding, No fire	After standard charged. put the battery to hot-box, and connect with thermocouple, the temperature from (5 ℃±2 ℃) /min to 150 ℃±2 ℃. And keep warm 30 Min. check the temperature and appearance of the battery.

5.3 Environmental Characteristic

NO.	Item	Requirement	Testing Instruction
1	Vibration Test	The battery shall not rupture, smoke, explode or leak. Battery electric voltage ⩾48V	battery will be vibrated 30 minutes in three mutually perpendicular directions and changing frequency between 10 to 55Hz. The rate of scanning frequency is from 10 Hz to 55Hz with the rate of 1Hz per min. Vibration frequency: 10-30Hz amplitude: 0.38mm vibration frequency: 30-55Hz: amplitude: 0.19mm
2	Constant Temperature/ Humidity Test	Appearance of the battery shall not rust, smoke or explode. Discharge Capacity ⩾80%	Keep the battery at 40±2℃ and 90%-95%RH for 48 hrs after complete charge. After the test, keep the battery at 20±5℃ for 2 hrs. Discharge at 10A constant current discharge to the termination voltage.
3	High Temperature Performance Test	Appearance of the battery shall not rust, smoke or explode Discharge Capacity >90%	Keep the battery at a hot oven with 55±2℃ for 2 hrs, then measure the capacity with constant discharge current 0.5C to discharge protection point after complete charge. After the test, keep the battery at 20±5℃ for 2 hrs.
4	Low Temperature Performance Test	Appearance of the battery shall not rust, smoke or explode Discharge Capacity >55%	Keep the battery at -20±2℃ for 16-24 hrs, then measure the capacity with constant discharge current 0.5C to discharge protection point after complete charge. After the test, keep the battery at 20±5℃ for 2 hrs.

6. Product packaging requirements

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

6.1.1Model and specification of product;

6.1.2Quantity;

6.1.3Measure up marking;

6.1.4Manufacturing date

6.1.5Other markings (color.etc).

6.1.6scratch, flaw, crack, and leakage are not allowed.

6.2 Package：

6.3 Sealing box, packing belt, batch matching stack board guard angle, layer height in line with the outer carton load-bearing requirements.

7. Transport & Store

7.1 Transport

No fall down, no pile up over 6 layers, and keep face up.

7.2 Storage

The battery need to be charged every 6 months if out of use.

8. Warning & Tips

Please read and follow the handling instructions before use. Improper use may cause heat, fire, rupture, damage or capacity deterioration of the battery.FTBT is not responsible for any accidents caused by the usage without following our handling instructions.

8.1 Warning

* Battery must be far away from heat source, high voltage, and no exposed in sunshine for long time.
* Never throw the battery into water or fire;
* Never reverse two electrodes when use the battery;
* Never connect the positive and negative of battery with metal;
* Never knock, throw or trample the battery;

* Never disassemble the battery without manufacturer's permission and guidance.

* Never use mixed with other type of battery;

8.2 Tips

* Keep the battery against high temperature. Otherwise it will cause battery heat, get into fire or lose some function and reduce the life.

* When battery run out of power, please charge your battery timely (≤15day).

* Please use the matched or suggested charger for this battery.

* If battery emit peculiar smell, heating, distortion or appear any abnormity, please stop using.

* If the battery leaks and get into the eyes or skin, do not wipe, instead, rinse it with clean water and see doctor immediately.

* Please keep the battery far away from children or pets.

* It is strictly prohibited any serials connections between the battery packs. Any requirements on serials connection, please contact FTBT for details.

* It is strictly prohibited any parallel between the battery packs. Any requirements on parallel connection, please contact FTBT for details.