

**48V 50Ah-2U-19 inches LFP Lithium**



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## 1. Scope

This document describes the Product Specification of the Lithium-ion rechargeable battery supplied by Hunterhex (Hongkong) Hunterhex International Ltd.

## 2. Standard

YD/T 2344.1-2011

YD/T 5040-2005

QZTT 2217.3-2016

QZTT 2218.3-2016

## 3. Specifications

### 1. Battery Specification

No.	Items	Specification	Note
1	Nominal voltage	48V	
2	Open Circuit Voltage	48V~51V	
3	Nominal capacity	50Ah	Based on 0.2C discharge current
	Minimum capacity	50Ah	
4	Initial impedance	$\leq 45 \text{ m}\Omega$	AC 1KHz after standard Charge
5	Charge voltage	54V	
6	Discharge cut-off voltage	40.5V	
7	Standard charge current	10A	0.2C
8	Max. charge current	50A	1C
9	Current limit	10A	
10	Standard discharge current	10A	0.2C
11	Max. discharge current	50A	
12	Operating temperature	0°C ~ +45°C	Charge

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	Operating Temperature	-20°C~+55°C	Discharge
13	weight	32kg	
14	Dimension	W*H*D≤486*133*430	

### 3.2 Common Performance

No	Items	Testing method and determinant standard
1	Charge Performance	The standard charge mode: under the temperature of 23±2°C, charge the battery with the current of 0.2C until the voltage reaches up to 54V, then charge with constant voltage until the charge current ≤0.02C, then stop charging.
2	Discharge Performance	When connecting with load, the battery can supply power. Charge the battery with standard charge mode, then rest for 0.5h, then discharge with 0.2C until the voltage is 40.5V, and the discharge time is required ≥5h.
3	High Temperature Characteristics	Standard charge the battery, then put the battery into the constant temperature and humidity oven with 55±2°C, then discharge with 1C to 40.5V. The discharge time is required ≥4.5h (90%) and the battery should no deformation and smoking.
4	Low Temperature Characteristics	Standard charge the battery, then put the battery into the constant temperature and humidity oven with -20±2°C, then discharge with 1C to 40.5V. The discharge time is required ≥2.5h (50%) and the battery should no deformation and smoking.
5	Cycle Performance	Under the temperature of 23±2°C, charge the battery with 0.2C, when the voltage reaches up to 54V charge with constant voltage until the charge current ≤0.02C, then stop charging, then rest for 0.5h, then discharge with 0.2C to 40.5V. Cycle with the above mode, the test shall be terminated when Discharging Capacity < 80% of Initial Capacity in three consecutive cycles. The cycle life is required ≥2500 times.
6	Charged Storage Characteristics	Charge the battery with 0.2C, then shift to charge with constant voltage until the voltage reaches up to 54V, when the charge current ≤0.02C stop charging; rest under the temperature of 23±2 °C for 28 days then discharge with 0.2C to 40.5V. The discharge time is required ≥1.8h (90%).

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	Electric Time	$\geq 1.8h$ (90%) 。
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### 3.3 Safety Performance

No	Items	Testing method and determinant standard
1	Short Circuit	After charge batteries, place at $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ for 1h. Short the battery, the external circuit resistance should be less than $100\text{m}\Omega$ , When the battery module temperature down to about $10^{\circ}\text{C}$ below its peak when the end of the experiment. No explosion, No fire .
2	Vibration Test	When charges fully, the fixed cell to will vibrate the table between $10\text{Hz}\sim 50\text{Hz}$ , the vibration tour will be $0.8\text{mm}$ . The cell will vibrate in each XYZ axis 100mins. No leakage, Capacity recovery rate 90% (standby 3hours) .No explosion, No fire .
3	Over-discharge test	Charge the battery. Place at $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ for 1h, then discharge in $0.2\text{C}$ current at same temperature until some cell's voltage is $0\text{V}$ (if there are electronic protection circuit, remove it temporarily).No explosion, No explosion, No explosion, No fire .
4	Over-charge test	Charge at 2 times the nominal voltage, charge the battery with $2\text{C}$ current, and finish the experiment when the battery temperature reaches the stable state or reduces to the ambient temperature. No explosion, No fire .

#### 4. product circuit diagram

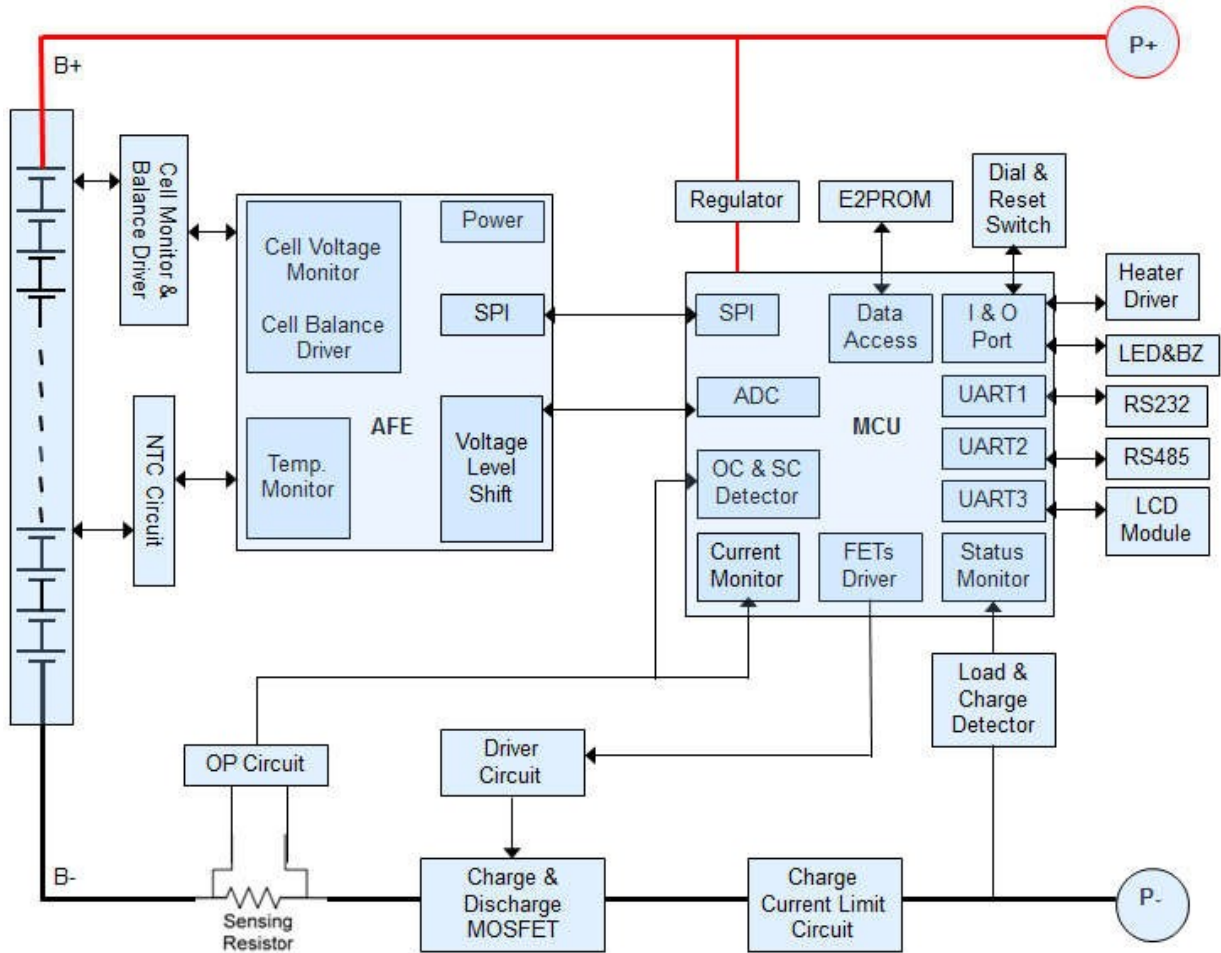


figure 1/ 1

#### 5. BMS electrical Characteristic

No.	Item	Default Parameters	Adjustable	Remark
1	Single Over-charge Protection	Single Over-charge Alarm Voltage	3600mV	Yes
		Single Over-charge Protection Voltage	3650mV	Yes
		Single Over-charge Protection Delay	1.0S	Yes
	Single Over-charge Protection Release	Single Over-charge Protection Release Voltage	3340mV	Yes
	Protection Release	Capacity Release	SOC<96%	Yes

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		Discharge Release	Discharge current > 1A		
2	Single Over-discharge Protection	Single Over-discharge Alarm Voltage	2900mV	Yes	If the over-charge protection fails to recover after 30s, the low-power mode will be entered.
		Single Over-discharge Protection Voltage	2500mV	Yes	
		Single Over-discharge Protection Delay	1.0S	Yes	
	Single Over-discharge Protection Release	Single Over-discharge Protection Release Voltage	2900mV	Yes	
		Release when charging	Activate by connecting charger		
3	Pack Over-charge Protection	Over-charge Alarm Voltage	52.5V	Yes	
		Over-charge Protection Voltage	54V	Yes	
		Over-charge Protection Delay	1.0S	Yes	
	Pack Over-charge Protection Release	Over-charge Protection Release Voltage	50.6V	Yes	
		Capacity Release	SOC<96%	Yes	
		Discharge Release	> 1A		
4	Pack Over-discharge Protection	Over-discharge Alarm Voltage	40.3V	Yes	If the over-discharge protection fails to recover after 30s, the low-power mode will be entered.
		Over-discharge Protection Voltage	37.5V	Yes	
		Over-discharge Protection Delay	1.0S	Yes	
	Pack Over-discharge Protection Release	Over-discharge Protection Release Voltage	40.3V	Yes	
		Release when charging	Activate by connecting charger		
5	Over-current Charging Protection	Over-current Charging Alarm Current	40A	Yes	Appearing 10 times in a row will lock the state and won't be automatically released
		Over-current Charging Protection Current	50A	Yes	
		Over-current Charging Protection Delay	1.0S	Yes	
	Over-current Charging Protection Release	Automatic Release	Automatic Release after 1min		
		Discharge Release	Discharge Current > 1A		

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6	Over-current Discharging Protection 1	Over-current Discharging Alarm Current 1	50A	Yes	Appearing 10 times in a row will lock the state and won't be automatically released
		Over-current Discharging Protection Current 1	55A	Yes	
		Over-current Discharging Protection Delay 1	1.0S	Yes	
	Over-current Discharging Protection Release 1	Automatic Release	Automatic Release after 1min		
		Charge Release	Charge Current > 1A		
7	Over-current Discharging Protection 2	Over-current Discharging Protection Current 2	$\geq 90A$	Yes	Appearing 10 times in a row will lock the state and won't be automatically released
		Over-current Discharging Protection Delay 2	$\leq 100mS$	Yes	
	Over-current Discharging Protection Release 2	Automatic Release	Automatic Release after 1min		
		Charge Release	Charge Current > 1A		
		Short-circuit Protection Delay	$\leq 300 \mu S$		
8	Short-circuit Protection	Short-circuit Protection Release	Release during charging		
			Disconnect the load will release automatically		
9	MOS High Temperature Protection	MOS Alarm Temperature	65°C	Yes	
		MOS Protection Temperature	85°C	Yes	
		MOS Temperature Protection Release	80°C	Yes	
10	Cell Temperature Protection	Low Temperature Charging Alarm Temperature	5°C	Yes	
		Low Temperature Charging Protection Temperature	0°C	Yes	
		Low Temperature Charging Protection Release	0°C	Yes	
		High Temperature Charging Alarm Temperature	45°C	Yes	
		High Temperature Charging Protection Temperature	50°C	Yes	

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		High Temperature Charging Protection Release	35°C	Yes	
		Low Temperature Discharging Alarm Temperature	-15°C	Yes	
		Low Temperature Discharging Protection	-20°C	Yes	
		Low Temperature Discharging Protection Release	-8°C	Yes	
		High Temperature Discharging Alarm Temperature	65°C	Yes	
		High Temperature Discharging Protection	70°C	Yes	
		High Temperature Discharging Protection Release	45°C	Yes	
11	Environment Temperature Alarm	Low Environment Temperature Alarm Temperature	-8°C	Yes	
		Low Environment Temperature Protection	-20°C	Yes	
		Low Environment Temperature Protection Release	0°C	Yes	
		High Environment Temperature Alarm Temperature	60°C	Yes	
		High Environment Temperature Protection	70°C	Yes	
		High Environment Temperature Protection Release	40°C	Yes	
12	Current Consumption	Self-consumption Current	≤30mA With Display Screen		
			≤20mA Without Display Screen		
		Low-power Mode Current	≤100 μ A		
13	Balancing Function	Balancing Cut-in Voltage	3400mV	Yes	
		Differential Pressure	50mV	Yes	
14	Default Capacity	Low Capacity Alarm	SOC<30%	Yes	No alarm during Charging
		SOC	35AH	Yes	
		Full Capacity	50AH	Yes	

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## 6. Configuration



figure3/3

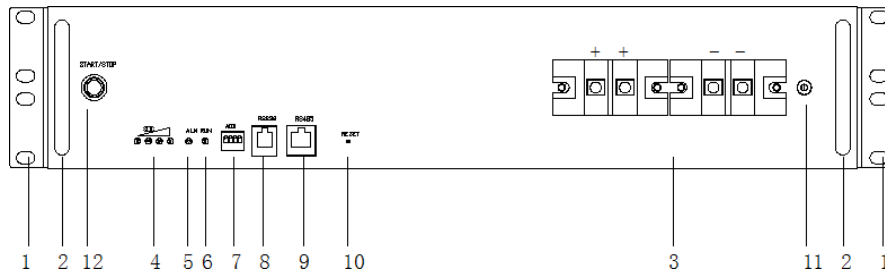


Figure4/ 4

1—Lug: it is recommended to be installed in the 19-inch standard cabinet for product installation and fixation.

2—Handle: easy to handle, move and install.


3—Wiring row: 4P (2P positive 2P negative) power supply interface, using pole pole type wiring, the terminals are insulated by thermoplastic polyester (PBT) insulation sheets, and the front is protected by transparent polycarbonate (PC) insulation protective cover.



4—Power light: four green LED lights display the current power of the lithium battery pack

5—Alarm light: red LED light, off under normal circumstances, on under failure.

6—Operation light: green light, it is often bright when product runs.

7—Address switch: 4 bit binary dial code switch is used to set address allocation in extended application, from left to right: 1, 2, 3, 4. Dial code 1 is the lowest bit, 4 is the highest bit. In the multi-machine parallel communication operation, it is necessary to configure the dialing address of each PACK first. Dialing code adopts

BCD code format, address 0 is defined as  (black dot is OFF state, blank is ON state, the same below),

address 1 is defined as , address 2 is defined as , other addresses and so on.

8—RS232: Uplink communication port. When uploading data, RS232 communication mode, data content including system parameters, system status and warning information, generally adopt the rate of 9600bps.

RS232:

9—RS485: Cascade communication port. RS485 communication mode is adopted in product cascade.

RS485:

10—Power (On/off) and reset buttons: the specific definition requirements of the three functions of on/off and reset buttons are shown in the table below

- (1) On/Activate button: When BMS is in sleep mode, press this button for 3s, the BMS will be activated, and the LED indicator will be lit successively, and then the BMS will go into the normal working state
- (2) Off/Sleep button (optional): When BMS is in standby or working state, after pressing this button for 3s,

BMS stops work, and the LED indicator will be lit successively and then into sleep mode.

(3) Reset button: When BMS is in standby or working state, after pressing this button for 6s, BMS will be reset and the internal data will be restored to the factory setting

11—Grounding hole

12—Switch: long press On/long press Off

## 7. Battery Pack Function

	Item	Control Operation	
1	Monitoring Information	Pack Voltage, Single Voltage, Charging Current, Discharging Current, Temperature, Working Mode, Alarm Information	
2	Protect Function 保护功能	Protection	Protection Release
		Pack/Single Over-voltage Protection	Release when achieve protection voltage
		Pack/Single Under-voltage Protection	If the over-discharge protection fails to recover after 30s, the low-power mode will be entered.
		Over-current Protection during Charging/Discharging	Automatic Release after 1min; Appearing 10 times in a row will lock the state and won't be automatically released 1min
		Temperature Protection	The temperature reaches the recovery value
		Short-circuit Protection	Release during charging; Disconnect the load will release automatically
3	Fault Detection	With fault warning function, the upper computer can view the corresponding fault display. Detecting faults including heating film fault, analog sampling fault, temperature NTC failure, cell fault etc..	
4	Communication	The battery pack communicates with the upper computer through RS232, and RS485 is cascaded and connected for communication	
5	Sleep Mode	In order to reduce the power consumption of the whole system, the system has sleep function. When the following situation occurs, the system will enter sleep mode.	

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		<p>1) Over-discharge protection is not restored to the over-discharge release voltage for 10S.</p> <p>2) The duration of standby state without charge and discharge reaches 24 hours.</p> <p>3) Operate the compound key switch according to the operation rules.</p>
6	Wake-up	<p>For convenient use, the system provides a variety of different ways to wake up. The system only can be awakened by the charging signal if it enters sleep mode due to over-discharge protection.</p> <p>1) Charge to wake up</p> <p>2) Wake up by communication</p> <p>3) Press the button to wake up</p> <p>4)It will automatically wake up. If sleeping by over-discharge protection, it will automatically wake up every 4 hours and start discharging MOS for 3 seconds.If the external power can charge the battery pack, then exit the sleep mode and enter the charging mode.Otherwise, continue into sleep mode</p>
7	Balancing	Charging equalization function
8	Intermittent charge	Start charging when the battery pack capacity is below 95%.
9	Charging Current Limiting	With charging current limiting function. The charging current limiting maximum 10 1 A.
10	Intelligent Communication	The upper computer software can check battery parameters, set protection parameters, and support multi-machines cascade communication. The main PACK uniformly uploads the collected data from PACK to the upper computer for display. When setting protection parameters, the operation is only valid for the host.
11	History Data Store	The protection board has the function of historical storage. When the protection board appears or clears the alarm, protection and failure, the protection board will automatically save the current battery parameters.It can store more than 300 pieces of information. When the information is full, it will cover the information

		with the longest date one by one. The upper computer can read the corresponding historical records and convert them into Excel to protect data
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## 8. Test Requirement

### 1. Standard test condition

- Battery Pack to be tested should be new battery pack within one month after shipment from our factory and the battery pack should not be cycled more than five times before the test. Unless otherwise specified, test and measurement should be done under these conditions:

Temperature : 15°C~25°C

Relative Humidity : 45%~85%RH

Atmospheric Pressure : 86kPa~106kPa

### 2. measuring equipment implementation requirements

- Dimension Measurement Instrument: 0.01mm。

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

- Battery test system should have current accuracy within  $\pm 0.1\%$ , voltage accuracy within  $\pm 0.5\%$  & time accuracy within  $\pm 0.1\%$ .

- Temperature measurement accuracy of instruments should be within 0.5°C.

- Voltmeter: Standard class specified in national standard or more sensitive class, with internal impedance not less than 10

K $\Omega$ .

- Ammeter: 0.01 $\Omega$ 。

Standard class specified in national standard or more sensitive class. Total resistance including ammeter and wire is less than 0.01 $\Omega$ .

- Impedance shall be measured by a sinusoidal alternating current method (AC 1kHz LCR). Resistance is not a constant value according to the change of temperature and state of charge and related to lead length and capacity.

- All test equipment and measuring instruments should be passed inspection of calibration organization.

### 8.3 Appearance Test Standard

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

## 9. Storage and Shipment Requirement

Item		Criteria
Storage temperature	Short period (less than 1 month)	-10°C~45°C
	Medium period (less than 3 month)	-10°C~35°C
	Long period (more than 3 month)	0°C~30°C
Relative Humidity		≤75% RH
State of Charge		40%~60%

Battery pack must be charged every three months when long term storage, please charge the battery pack with standard charging current for 0.5h~1h to keep 40%~60% state of charge.

## 10. Warning and Caution

1)

Do not connect the battery pack's positive (+) and negative (-) poles reversed to charger or load, Do not connect the battery pack to charger's input power source (AC powersupply).

2)

Do not let the battery pack's terminals (+ and -) contact with unnecessary wire or any metal or stored them together, that may cause the battery pack short-circuit.

3)

Do not drive a nail in battery pack, hit the battery pack with a hammer, stamp on or throw the battery pack.

4)

Do not disassemble or alter the batteries' outside structure.

5)

Do not use the battery pack under blazing sun, otherwise may cause battery pack overheating then catch fire or disable.

6)

Do not put the battery pack into fire or heat the battery pack; do not store the battery pack in high temperature environment

7)

Do not submerge the battery pack in water or get wet in the rain, keep the battery in shady and cool place when stored.

8)

Do not charge the battery continuously over 24 hour.

9)

When charging or discharging the battery pack, if you find any abnormal smell or noise, you must stop the charging or discharging at once, and contact the factory.

10)

When using the battery pack out of range of 0~50°C, the capacity may decrease, that doesn't mean the battery pack was failure.

## **11. Product liability**

Consumers must comply with the requirements of the specifications strictly using the battery. Due to misuse may cause the battery overheating, fire or explosion, for no operation in accordance with the specification as a result of any accident, Hunterhex Internation Ltd & Hunterhex AB will not take any responsibility.

## **12. Contact information**

If you have any questions regarding the cell, please contact the following address:

Email: [info@hunterhex.com](mailto:info@hunterhex.com) / [sales@hunterhex.com](mailto:sales@hunterhex.com)

Tel: +46 763 391 6550