

48V Stack Module Lithium Energy Storage Battery

USER INSTRUCTION

1. Introduction

1.1 Important Safety Instructions



Danger!

- Please do not put the battery into water or fire, in case of explosion or any other situation that might endanger your life.
- Please connect wires properly while installation, do not reverse connect. To avoid short circuit, please do not connect positive and negative poles with conductor on the same device.
- Please avoid any form of damage to battery, especially stab, hit, trample or strike.



Danger!

- Please shut off the power completely when removing the device or reconnecting wires during the daily use or it could cause the danger of electric shock.
- Please use dry powder extinguisher to put out the flame when encountering a fire hazard, liquid extinguisher could result in the risk of explosion.
- For your safety, please do not arbitrarily dismantle any component in any circumstances. The maintenance must be implemented by authorized technical personnel or our company's technical support. Device breakdown due to unauthorized operation will not be covered under warranty.



Caution!

- Our products have been strictly inspected before shipment. Please contact us if you find any abnormal phenomena such as device outer case bulging.
- The product shall be grounded properly before use in order to ensure your safety.
- To assure the proper use please make sure parameters among the relevant device are compatible and matched.
- Please do not mixed-use batteries from different manufacturers, different types and models, as well as old and new together.



Caution!

- Ambient and storage method could impact the product life span, please comply with the operation environment instruction to ensure device works in proper condition.
- For long-term storage, the battery should be recharged once every 6 months, and the amount of electric charge shall exceed 80% of the rated capacity.
- Please charge the battery in 18 hours after it fully discharged or over-discharging protection mode is activated.
- Formula of theoretical standby time: $T=C/I$ (T is standby time, C is battery capacity, I is total current of all loads).

1.2 Brief Introduction

Stack model lithium iron phosphate battery system is a standard battery system unit, customers can choose a certain number of stack module according to their needs, by connecting parallel to form a larger capacity battery pack, to meet the user's long-term power supply needs. The product is especially suitable for energy storage applications with high operating temperatures, limited installation space, long power backup time and long service life.

1.3 Product Properties

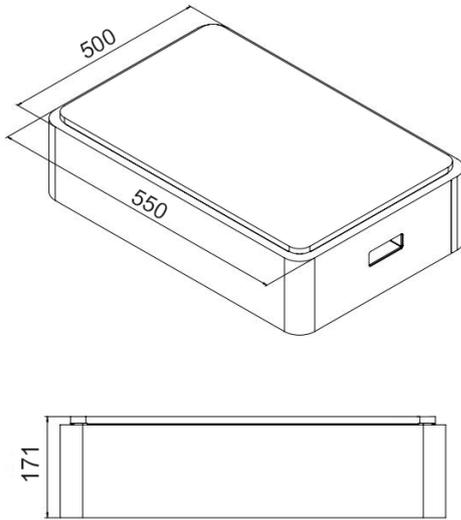
Stack module energy storage product's positive electrode materials are lithium iron phosphate, battery cells are managed effectively by BMS with better performance, the system's features as below:

- The whole module is non-toxic, non-polluting and environmentally friendly;
- Cathode material is made from LiFePO_4 with safety performance and long cycle life
- Battery management system with better performance, possesses protection function like over-discharge, over-charge, over-current, abnormal temperature.
- Self-management on charging and discharging, Single core balancing function.
- Intelligent design configures integrated inspection module.
- Flexible configuration, multiple battery modules can be in parallel for expanding capacity and power.
- Flexible configurations allow parallel of multi battery for longer standby time.
- Self-ventilation with lower system noise.
- Less battery self-discharge, then recharging period can be up to 6 months during the storage.
- No memory effect so that battery can be charged and discharged shallowly.
- With wide range of temperature for working environment, $-20^\circ\text{C} \sim +55^\circ\text{C}$, circulation span and discharging performance are well under high temperature.

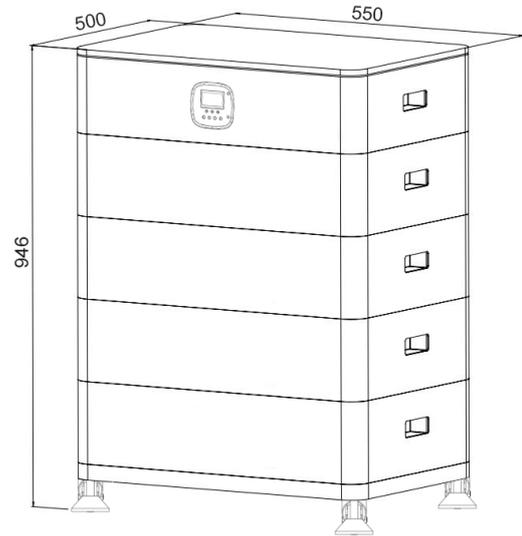
2. Product Specification

2.1 Size and Weight

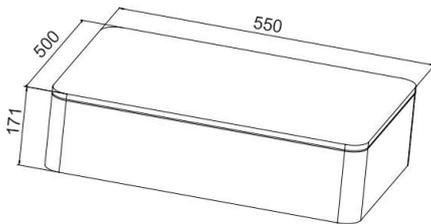
Stack Module



Module Cluster



Control Box Module (optional)



5KW Power Inverter Module (optional)

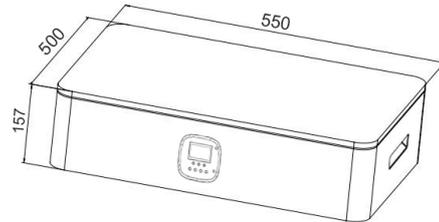


Table 2-1 Stack Module Device size(with control box module, without inverter module)

Product	Nominal Voltage	Nominal Capacity	Dimension
Stack Module*2	48V	9.6Kwh	550*500*618
Stack Module*3	48V	14.4Kwh	550*500*789
Stack Module*4	48V	19.2Kwh	550*500*960
Stack Module*5	48V	24Kwh	550*500*1131
Stack Module*6	48V	28.8Kwh	550*500*1302
Stack Module*7	48V	33.6Kwh	550*500*1473
Stack Module*8	48V	38.4Kwh	550*500*1644

2.2 Performance Parameter

Table 2-2 performance parameter

Basic Parameters	Stack module	Stack module *2	Stack module *3	Stack module *4	Stack module *5	Stack module *6	Stack module *7	Stack module *8
Nominal Voltage (V)	48							
Nominal Capacity (WH)	4800*N							
Usable Capacity (WH)	4800*N							
Discharge Voltage (V)	37.5V							
Charge Voltage (V)	54.75V							
Recommend Charge/Discharge Current (A)	20A/20A							
Max.Charge/Discharge Current(A)	50A/100A							
Peak Charge/Discharge Current(A)	120(15S)							
Communicaiton	RS485/RS232/CAN							
Working Temperature	0°C~50°C Charge -10°C ~50°C Discharge							
Shelf Temperature	-20°C~60°C							
Certification	CE/FCC/UN38.3/MSDS							
Design Life	10 years+							

2.3 Equipment Interface Instruction

This section details the front and back interface functions of the stack pack

Product Front Interface

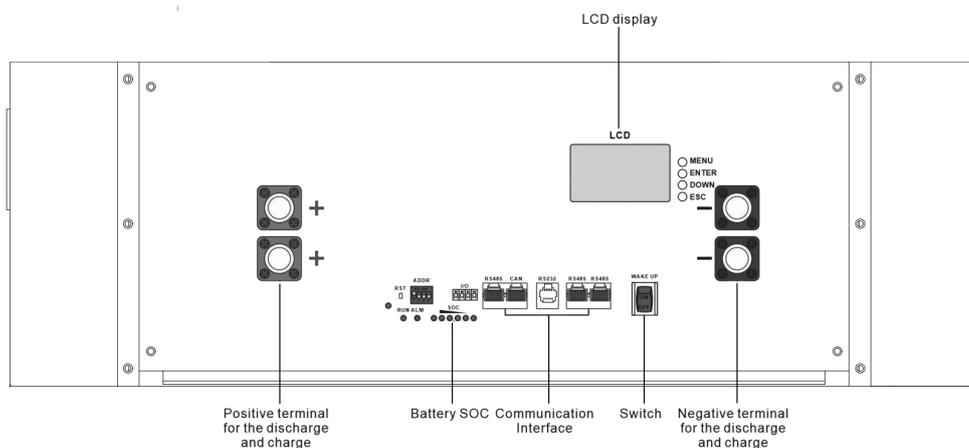
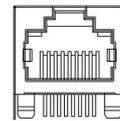
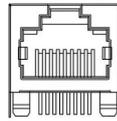
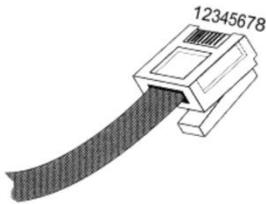


Table 2-3 Interface Definition

Item	Name	Definition
1	Power Terminal	For battery pack connect in parallel&connect with inverter
	Positive Output	DC + To Inverter
	Negative Output	DC - To Inverter
2	Screen	Show battery information
3	Switch	Power on/off the battery
4	Ground Point	Ground Point
5	RS485-1/CAN Communication Port	Communication to inverter
6	RS485-2 Communication Port	Communication between battery cluster

2.3.1 CAN/485/RS232 interface definition



RS485-1/CAN	RS485-2
Communication to inverter	Communication between battery cluster

	PIN position	Color	Definition
RS485/CAN	PIN1	Orange/White	485B1
	PIN2	Orange	485A1
	PIN3	Green/White	GND
	PIN4	Blue	CANH
	PIN5	Blue/White	CANL
	PIN6	Green	GND
	PIN7	Brown/White	485A2
	PIN8	Brown	485B2

Power Inverter technical parameters (optional)

Parallel mode	
Permitted parallel number	1~6
AC mode	
Rated input voltage	220/230Vac
Input voltage range	(170Vac~280Vac) $\pm 2\%$ (90Vac-280Vac) $\pm 2\%$
Frequency	50Hz/ 60Hz (Auto detection)
Frequency Range	47 \pm 0.3Hz ~ 55 \pm 0.3Hz (50Hz); 57 \pm 0.3Hz ~ 65 \pm 0.3Hz (60Hz);
Overload/short circuit protection	Circuit breaker
Efficiency	>95%
Conversion time (bypass and inverter)	10ms (typical)
AC reverse protection	Available
Maximum bypass overload current	40A
Inverter mode	
Output voltage waveform	Pure sine wave
Rated output power (VA)	5500
Rated output power (W)	5500
Power factor	1
Rated output voltage (Vac)	230Vac
Output voltage error	$\pm 5\%$
Output frequency range (Hz)	50Hz \pm 0.3Hz 60Hz \pm 0.3Hz
Maximum Efficiency	>92%
Overload protection	(102% < load <125%) $\pm 10\%$: report error and turn off the output after 5 minutes; (125% < load < 150%) $\pm 10\%$: report error and turn off the output after 10 seconds; Load >150% $\pm 10\%$: report error and turn off the output after 5 seconds
Peak power	11000VA
Loaded motor capability	4HP

Rated battery input voltage	48V (Minimum starting voltage 44V)
Battery voltage range	Undervoltage alarm/shutdown voltage/overvoltage alarm /overvoltage recovery... settable on LCD screen)
Power saving mode self-consumption	Load≤50W
AC charging	
Battery type	Lead acid or lithium battery
Maximum charge current(can be set)	0-60A
Charge current error	± 3Adc
Charge voltage range	40 –58Vdc
Short circuit protection	Circuit breaker and blown fuse
Circuit breaker specifications	40A
Overcharge protection	Alarm and turn off charging after 1 minute
PV charging	
Maximum PV open circuit voltage	500Vdc
PV operating voltage range	120-500Vdc
MPPT voltage range	120-450Vdc
Battery voltage range	40-60Vdc
Maximum PV input power	6000W
Maximum PV input current	22A
PV charging current range (can be set)	0-80A
Charging short circuit protection	Blown fuse
Wiring protection	Reverse polarity protection
Hybrid charging Max charger current specifications (AC charger+PV charger)	
Max charger current(can be set)	0-80A

2.4 Battery Management System(BMS)

2.4.1 BMS Protection and Alarm

Over Voltage Alarm/Protection in Charging:

When total voltage or any battery cell voltage reaches the rated alarm value during charging stage, the alarm light will flash. When reaches the rated protection value, the alarm light will on, battery will stop charge. After total voltage or all cell voltage back to rated range, the protection is over

Low Voltage Protection in Discharging:

Battery system will stop supply power to the outside, when any battery cell voltage or total voltage is lower than the rated protection value during discharging, the over-discharging protection is activated. When the voltage of each cell back to rated return range, the protection is over.

Over Current Protection in Charging:

When the charge current $> 50A$, BMS will stop output, after current lower than 50A, will start automatically.

Over Current Protection in Discharging:

When the discharge current is higher than 100A, BMS will stop output, after current lower than 100A, will start automatically.

Low/Over temperature protection in charging:

When battery's temperature is beyond range of $-5\text{ }^{\circ}\text{C} \sim +55\text{ }^{\circ}\text{C}$ during charging, temperature protection is activated, device stops charging.

The protection is over when temperature back to rated working range.

Low/Over temperature protection in discharging:

When battery's temperature is beyond range of $-20\text{ }^{\circ}\text{C} \sim +55\text{ }^{\circ}\text{C}$ during discharging, temperature protection is activated, device stops supplying power to the outside.

The protection is over when temperature back to rated working range.

Short Circuit Protection:

When the battery is activated from the shutdown state, if a short circuit occurs, the system starts short-circuit protection for 60 seconds.

Self-Shutdown:

When device connects no external loads and power supply and no external communication for over 72 hours, device will dormant standby automatically.

3. Installation and Configuration

3.1 Preparation for installation

3.1.1 Safety Requirement

This system can only be installed by personnel who have been trained in the power supply system and have sufficient knowledge of the power system.

The safety regulations and local safety regulations listed below should always be followed during the installation.

- All circuits connected to this power system with an external voltage of less than 51.2V must meet the SELV requirements defined in the IEC60950 standard.
- If operating within the power system cabinet, make sure the power system is not charged. Battery devices should also be switched off.
- Distribution cable wiring should be reasonable and has the protective measures to avoid touching these cables while operating power equipment.
- when installing the battery system, must wear the protective items below:

		
The isolation gloves	Safety goggles	Safety shoes

3.1.2 Environmental requirements

Working temperature: $-20^{\circ}\text{C} \sim +55^{\circ}\text{C}$

Charging temperature range is $0^{\circ}\text{C} \sim +55^{\circ}\text{C}$,

Discharging temperature range is $-20^{\circ}\text{C} \sim +55^{\circ}\text{C}$

Storage temperature: $-10^{\circ}\text{C} \sim +35^{\circ}\text{C}$

Relative humidity: 5% ~ 85%RH

Elevation: no more than 4000m

Operating environment: Indoor installation, sites avoid the sun and no wind, no conductive dust and corrosive gas.

And the following conditions are met:

- Installation location should be away from the sea to avoid brine and high humidity environment.
- The ground for product arrangement shall be flat and level.
- No flammable explosive materials near the installation site.
- The optimal ambient temperature is $15^{\circ}\text{C} \sim 30^{\circ}\text{C}$
- Keep away from dust and messy zones

3.1.3 Tools and data

Tools and meters that may be used are shown in table 3-1.

Table 3-1 Tool instrument

NAME	
Screwdriver (Slotted、Phillips)	Multimeter
Torque wrench	Clamp current meter
Diagonal pliers	Insulation tape
Pointed nose pliers	Temperature meter
Pliers to hold the wire	Anti-static bracelet
Stripping pliers	Cable tie
Electric drill	Tape measure

3.1.4 Technical preparation

Electrical interface check

Devices that can be connected directly to the battery can be user equipment, power supplies, or other power supplies.

- Confirm whether the user's PV power generation equipment, power supply or other power supply equipment has a DC output interface, and measure whether the DC power output voltage meets the voltage range requirements in Table 2-2.
- Confirm that the maximum discharge current capability of the DC power interface of the user's photovoltaic power generation equipment, power supply or other power supply equipment should be higher than the maximum charging current of the products used in Table 2-2.

If the maximum discharge capacity of the DC power interface of the user's photovoltaic power generation equipment is less than the maximum charging current of the products used in Table 2-2, the DC power interface of the user's photovoltaic power generation equipment shall have a current limiting function to ensure the normal operation of the user's equipment.

- Verify that the maximum operating current of the battery-powered user equipment (inverter DC input) should be less than the maximum discharge current of the products used in Table 2-2.

The security check

- Firefighting equipment should be provided near the product, such as portable dry powder fire extinguisher.
- Automatic fire fighting system shall be provided for the case where necessary.
- No flammable, explosive and other dangerous materials are placed beside the battery.

3.1.5 Unpacking inspection

- When the equipment arrives at the installation site, loading and unloading should be carried out according to the rules and regulations, to prevent from being exposed to sun and rain.
- Before unpacking, the total number of packages shall be indicated according to the shipping list attached to each package, and the case shall be checked for good condition.
- In the process of unpacking, handle with care and protect the surface coating of the object.
- Open the package, the installation personnel should read the technical documents, verify the list, according to the configuration table and packing list, ensure objects are complete and intact, if the internal packing is damaged, should be examined and recorded in detail.

3.2 Battery parameter settings on the inverter

If your inverter do not have communication function with battery pack, please set inverter follow next data.

Max Charging(Bulk) Voltage: 54V

Absorption Voltage: 53V

Float Voltage: 52.5V

Shut Down(cut off) Voltage: 46V

Shut Down(cut off) SOC: 20%

Restart Voltage: 48V

Max Charge Current: 50A

Max Discharge Current: 100A

4. Analysis and treatment of common faults

No.	Fault phenomenon	Reason analysis	Solution
1	The indicator does not respond after the power on Total voltage lower than 40V Check the total voltage	Total voltage lower than 40V	Check the total voltage
2	No DC output	Battery data status is abnormal. Battery gets into over-discharged protection	Read the battery information on the monitor.
3	The DC power supply time is too short	Battery capacity become smaller	Storage battery replacement or add more modules
4	The battery can't be fully charged to 100%	Charging voltage is too low	Adjust charging voltage at 57V
5	The power cable sparks once power on and ALM light RED	Power connection short-circuit	Turn off the battery, check the cause of the short circuit
6	Communication fault	The DIP setting of the host is wrong/ the battery type of the inverter is wrong/ Communication cable used incorrectly/The communication cable is incorrectly connected at the battery communication port or the inverter communication port/The battery firmware version is too low to support the inverter	Check these possible causes one by one

If you need any technical help or have any question, please contact the dealer in time.