



25.6V 230Ah



PRODUCT (200A BMS) MANUAL

Lithium Iron Phosphate (LiFePO₄) Battery

www.litime.com





 Register Warranty



www.litime.com



service@litime.com

PRODUCT OVERVIEW

25.6V 230AH BATTERY

Operating Voltage: 25.6V

Charging Voltage: $28.8V \pm 0.4V$

Recommended Charge Current: 46A (0.2C)

Required Minimum Charge Current (for Heating Function): 15A

Max. Continuous Discharge Current: 200A

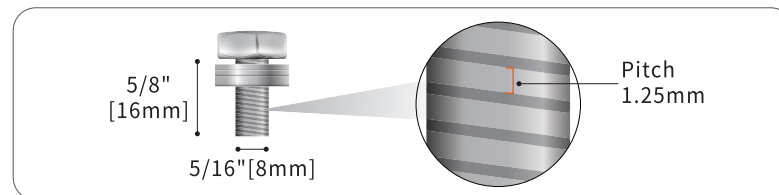
Max. Continuous Output Power: 5120W

ADDITIONAL COMPONENTS

M8-5/8" [16MM] TERMINAL BOLTS

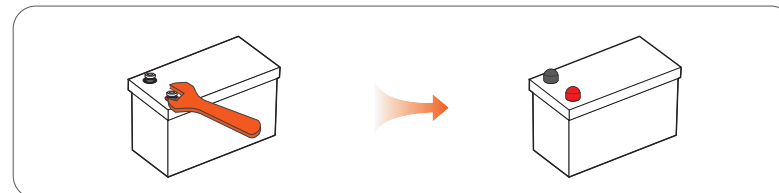
Recommended terminal torque: 106.2 to 123.9 inch · lbs / 12 to 14 N · m.

The terminal bolts are used to secure multiple cable lugs to a single battery terminal. The bolts can be replaced with M8 bolts of other lengths based on actual needs.



INSULATING CAPS FOR BOLTS

Cover the battery with the insulating caps after tightening the bolts. If the cap melts, stop using the battery and reach out to service@litime.com for further analysis.



BATTERY PRE-USE GUIDE

PREPARATION & PROTECTION

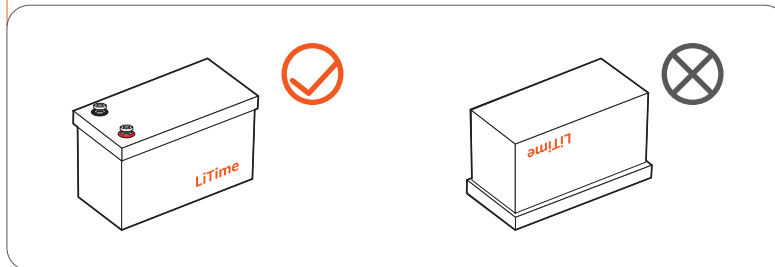
With proper care, the LiTime battery will provide years of trouble-free power. Read this part carefully for more detailed & useful information.

- PLEASE: Carefully read this **product manual** before use.
- After unpacking, wear **insulating gloves** for battery installation and wiring.
- Due to shipping-related regulations, this battery carries about **30%~50% capacity** when shipped.
- Fully charge** the battery before starting to use it.

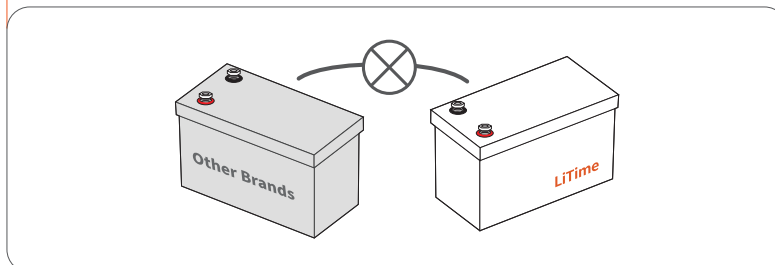
OPERATING PRECAUTIONS

Precautions for battery installation, connection, and storage.

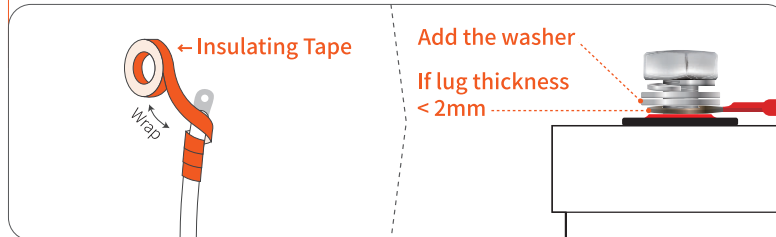
- Install the battery upright with the post bolts facing up, do not mount it upside down. If it's necessary to mount it on its side, reach out to service@litime.com to confirm the correct direction.



- Do not connect batteries from different brands or with different specifications in series or parallel.

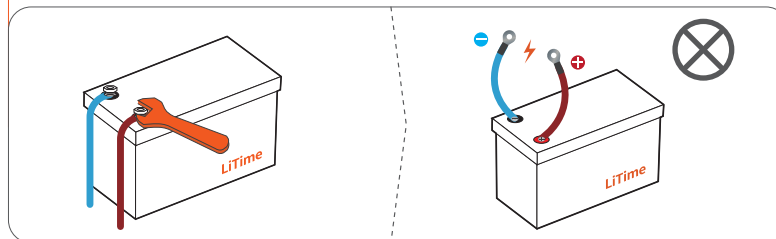


- It is recommended to **wrap** the cable terminals with **insulating tape** during the wiring process.



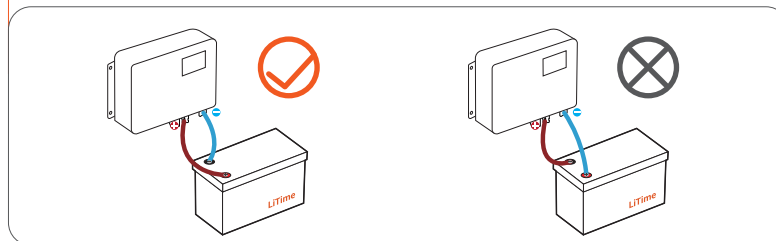
Add the appropriately sized washer if the connected wire lug is thinner than the washer (5/64", 2mm).

- Tightly screw in the post bolts based on the recommended terminal torque. Having loose battery terminals will cause the terminals to build up heat resulting in damage to the battery.



Avoid direct contact between positive and negative terminals of the battery, and avoid contact between metal / conductive objects from both terminals, as those could cause a short circuit and damage.

- Ensure that the battery is properly wired to the device, **do not reverse the positive and negative connections**.



Before connecting the load, make sure the **power supported by the battery** can meet the **power demand of the load**.

For long-term storage, it is advised to store the battery between 10°C to 35°C / 50°F to 95°F at a 50% charge level and ensure a recharge every three months.

24/7 MONITORING VIA LITIME APP

The battery integrated with Bluetooth 5.0, enables accurate and effortless real-time tracking and management of the battery status.

Step 1

Download the LiTime APP and register your account.



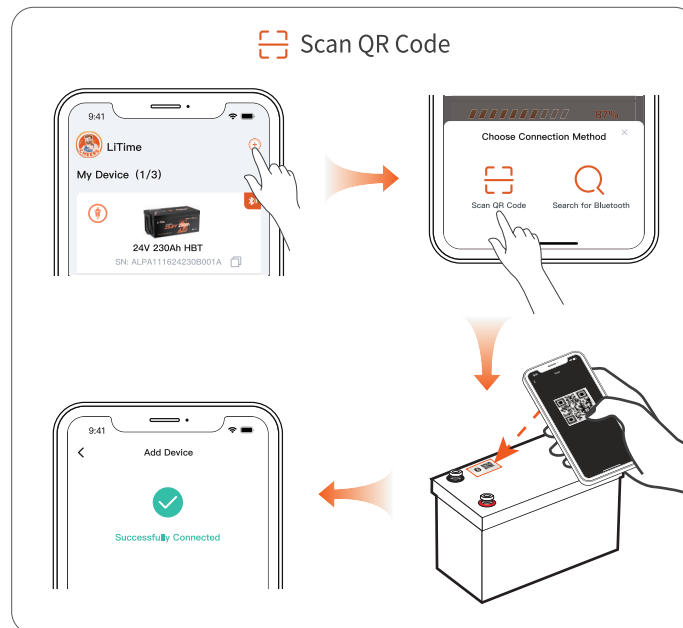
Download on the
App Store

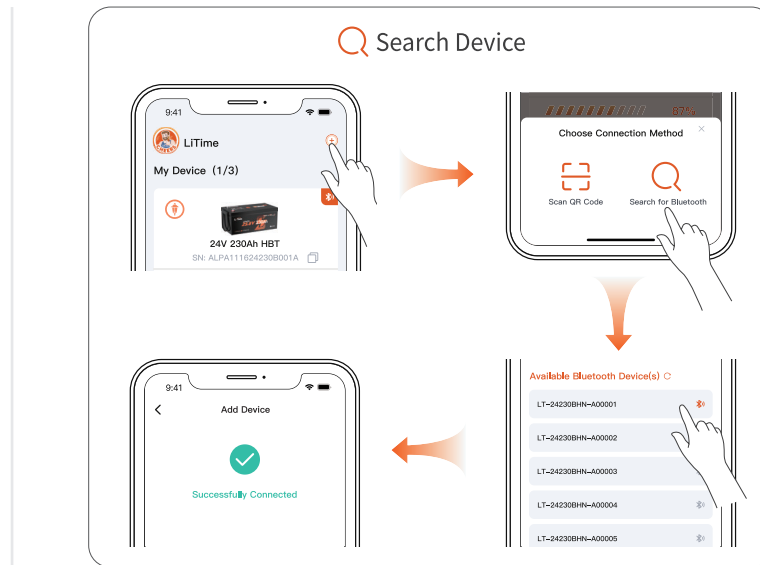
GET IT ON
Google Play



Step 2

Pair the battery with the LiTime APP and effortlessly keep track of the battery's real-time status.





FCC STATEMENT (FCC ID: 2BDSV24230)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

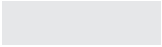
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

RF Exposure Information

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.



IMPORTANT SAFETY INSTRUCTION

Keep the battery away from fire, heat sources, sparks, and hazardous chemicals. Never soak the battery in water.

Maintain Adequate Ventilation and Heat Dissipation

Place the battery in a well-ventilated area with sufficient heat dissipation to prevent overheating and damage.

Size the Battery Cables and Connectors Appropriately

Use high-stranded copper connectors and heavy gauge cables to handle possible battery loads. Make sure to keep identical cable lengths.

Avoid accidents caused by unsuitable connectors or cables that make the connection a heat source during battery operation.

DO NOT puncture, drop, crush, burn, penetrate, shake, or strike the battery.

The battery should be securely fastened during handling to prevent impact or dropping.

It should be safely secured to a solid plane and the cables safely tied to a suitable location to avoid arcing and sparking due to friction.

DO NOT press it by placing heavy stuff on top of it for long periods, which may damage it due to an internal short circuit.

DO NOT open, dismantle, or modify the battery.

DO NOT touch the exposed electrolyte or powder if the battery casing is damaged.

Uncovered electrolyte or powder that has contacted the skin or eyes MUST be flushed out with plenty of clean water immediately. Seek medical attention afterward.

Avoid Short Circuit

Please use circuit breakers, fuses, or disconnects that have been properly sized by certified electricians, licensed installers, or regional code authorities to protect all the electrical equipment in your system. The battery has a built-in battery management system (BMS) that protects the battery cells from over-charge, over-discharge, and over-current, however this alone will not protect your system from severe electrical conditions.

Trained and certified technicians are required for safe and reliable installation. This product manual can only serve as a guideline as it cannot cover all possible scenarios.

Verify Correct Polarity

Please verify the polarity before connecting the wiring. Reverse polarity can and will destroy the battery and other electrical equipment. Use a multimeter to determine proper polarity.

Avoid Exposed Metal Terminals or Connectors

The terminals of this battery are always live. Avoid exposed metal terminals or connectors; DO NOT place tools on the terminals or touch them with bare hands; DO NOT short circuit or use outside of specified electrical ratings.

DO NOT dispose of the battery as household waste. Please use recycling channels in accordance with local, state, and federal regulations.

DO NOT use it as a starting battery.

WARNING

Batteries are potentially dangerous and proper precautions must be taken during operation and maintenance.

Improper use of the battery can lead to battery failure or other potential damage.

Improper configuration, installation, or use of related equipment in the battery system may damage the battery and other related equipment.

Please wear proper personal protective equipment when working on the battery.

Battery installation and maintenance must be performed by trained and certified technicians.

Failure to follow the warnings above can result in potential damage.

If you have any questions or need any help, please feel free to contact us (and leave your contact phone number) at service@litime.com, we will offer phone or email support in 12hrs.



CONTENTS

BATTERY PARAMETERS	page
	01
AUTOMATIC SELF-HEATING FUNCTION	page
	03
HOW DOES IT LOOK LIKE?	03
HOW DOES IT WORK?	03
REGULAR & ENERGY-EFFICIENT HEATING MODES	04
CHARGING METHODS	page
	06
Method I	SOLAR PANEL(S) & CONTROLLER
	06
	Solar Panel
	Controller
	Controller Settings
Method II	BATTERY CHARGER
	07
Method III	ALTERNATOR / GENERATOR
	07
HOW TO ESTIMATE THE BATTERY CAPACITY	page
	08
STATE OF CHARGE (SOC)	08

RECOMMENDED CABLE SIZING	page
	09

SERIES / PARALLEL CONNECTION	page
	10

THE PREMISE OF CONNECTION	10
---------------------------	----

LIMITATION FOR SERIES/PARALLEL CONNECTION	10
---	----

HOW TO CONNECT BATTERIES	11
--------------------------	----

- Step 1 Wear Insulating Gloves
- Step 2 Voltage Balancing Before Connection
- Step 3 Battery-to-Battery Connection
- Step 4 Total Input & Output Connection
- Step 5 Rebalancing Every Six Months
- Wiring Diagram Reference

WHAT TO DO WHEN THE BATTERY STOPS WORKING?	page
	15

BATTERY PARAMETERS

Cell Type	LiFePO ₄
Nominal Voltage	25.6V
Rated Capacity	230Ah
Energy	5888Wh
Internal Resistance	≤40mΩ
Cycle Life	≥4000 times
Battery Management System (BMS) Board	200A
Charge Method	CC/CV
Charge Voltage	28.8±0.4V
Recommended Charge Current	46A (0.2C)
Required Minimum Charge Current for Heating Function ^①	15A
Max. Continuous Charge Current	200A
Max. Continuous Discharge Current	200A
Surge Discharge Current	1000A@1 second

Max. Continuous Output Power	5120W
Dimension	L20.47*W10.55*H8.66 inch
	L520*W268*H220 mm
Housing Material	ABS
Recommended Terminal Torque	106.2 to 123.9 inch·lbs / 12 to 14 N·m
Protection Class	IP65
Temperature Range	Charge: -20°C to 50°C / -4°F to 122°F
	Discharge: -20°C to 60°C / -4°F to 140°F
	Storage: -10°C to 50°C / 14°F to 122°F
Heating Temperature	Charge: -20°C to 5°C / -4°F to 41°F
Approx. Heating Time @15A	50-80mins (From -10°C / 14°F)
	80-120mins (From -20°C / -4°F)
Low Temperature Charging Protection(LTCP) Function ^②	Yes
Resume Charging Temperature Under LTCF	5°C/41°F (Battery Temperature)

① The charge current should be at least 15A to activate the automatic self-heating function.

② This product supports Low Temperature Charging Protection (LTCP), where the BMS stops battery charging when the battery temperature falls below 0°C/32°F and resumes charging when the temperature rises above 5°C/41°F.

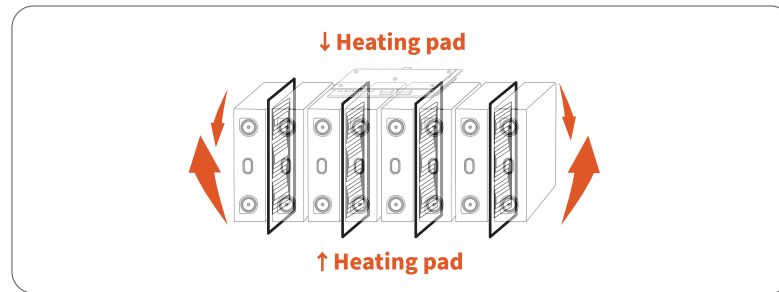
AUTOMATIC SELF-HEATING FUNCTION

The automatic self-heating function will be activated by the BMS when the battery is connected to a charger @ -20°C to 5°C / -4°F to 41°F . The heating will be stopped when the battery temperature has reached the set value, which normally takes approx. 50-80 mins from -10°C / 14°F and approx. 80-120 mins from -20°C / -4°F .

The battery will be normally charged after the heating has been stopped.

HOW DOES IT LOOK LIKE?

Two heating pads are installed on two sides of the battery, providing sufficient heating and more comprehensive protection of your battery.



HOW DOES IT WORK?

Step
1

Connect the battery to the charger.

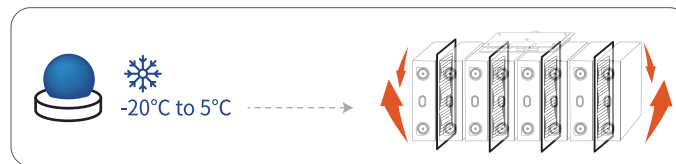
(DC charging voltage: $28.4\text{V}\sim 29.2\text{V}$, DC charging current $\geq 15\text{A}$)

Step
2

The temperature sensors will detect the battery temperature.

(1) When the battery temperature is between -20°C to 5°C / -4°F to 41°F , the BMS will start to heat the battery through the heating pads, and the battery will not be charged during the heating process. And it will continue to Step 3.

Or (2) when the battery temperature is $>5^{\circ}\text{C}$ / 41°F , the battery will be normally charged and the heating function will not be activated.



Step
3

When the battery temperature has reached the set value, the heating will be stopped and the battery will be charged.

(Which normally takes approx. 50-80mins from -10°C / 14°F and approx. 80-120mins from -20°C / -4°F .)

REGULAR & ENERGY-EFFICIENT HEATING MODES

This product supports two heating modes, which can be adjusted through LiTime APP. The specific modes are as following table.

HEATING MODE	POWER SUPPLY	CHARGER CURRENT	BATTERY SOC ^①	HEATING SOURCE/STATUS
Regular (Default)	Charger	$\geq 15A$	/	Charger
		$< 15A$		Not able to start heating ^②
Energy-efficient	Charger+Battery	$\geq 15A$	/	Charger
		$< 15A$	$> 20\%$	Use charger first, battery as supplement
			$\leq 20\%$	Not able to start heating
	Battery	/	$> 20\%$	Battery (Not able to start heating when the battery temperature is below $-20^{\circ}C$ / $-4^{\circ}F$)
			$\leq 20\%$	Not able to start heating

① The 20% Battery State of Charge (SOC) is an estimation, the actual values may exhibit a variance of $\pm 5\%$.

② To turn on the heating function, make sure charger/battery meet the below requirements. Regular Heating Mode: Charger current $\geq 15A$. Energy-efficient Heating Mode: Battery SOC $> 20\%$ or charger current $\geq 15A$.

Energy-efficient Heating Mode

In addition to the power supplied by the charger, this mode supports using the battery's own power to heat the heating pads to maintain the battery temperature (when there is no/not enough external charging power supply and the battery SOC $> 20\%$), thereby improving the heating energy efficiency.

○ Recommended Application

Since it consumes additional battery power, it is only recommended for use in the following situations:

- ① In outdoors with a temperature below -5°C / 23°F , there is a need to save heating time and charge the battery quickly during daylight hours.
Or ② The battery needs to power loads when the outdoor temperature drops below -20°C / -4°F at night. Please preselect this mode and keep the heating status when the battery temperature is above -20°C / -4°F .

Note: It is recommended to switch to the Regular Heating Mode or power off the battery during storing, to avoid abnormal battery capacity caused by the battery repeatedly consuming its own power to heat up.

○ Recommended Charger Current

Depending on the different temperatures, it is recommended to choose different charging currents for fast charging, which can be referred to as follows:

TEMPERATURE	APPROX. CAPACITY CONSUMPTION AT NIGHT ^①	RECOMMENDED CHARGER CURRENT	RECOMMENDED PV POWER	APPROX. CHARGING TIME ^② (REPLENISH CAPACITY CONSUMED AT NIGHT)
-18°C / -0.4°F	18Ah	9A to 18A	520W to 1030W	2 hours to 1 hour
-15°C / 5°F	17Ah	9A to 18A	520W to 1030W	2 hours to 1 hour
-10°C / 14°F	10Ah	10A to 20A	570W to 1130W	1 hour to 0.5 hour
-5°C / 23°F	7Ah	7A to 14A	400W to 800W	1 hour to 0.5 hour

① These data represent the approximate capacity consumed during night (about 9 hours) using only the battery power to maintain battery at 5°C to 10°C / 41°F to 50°F . Before setting Energy-efficient Heating Mode at night, it is recommended to ensure that the battery capacity is at least 20Ah greater than the expected consumption.

② The recommended charging current can replenish the battery capacity consumed by the Energy-efficient Heating Mode at the corresponding time listed. For example, at -18°C / -0.4°F , a charge current of 9A will charge about 18Ah capacity in around 2 hours to replenish the capacity consumed by battery's self-heating process at night.

CHARGING METHODS

SOLAR PANEL(S) & CONTROLLER

Solar Panel

☆ Recommended Power: $\geq 1900W$

- The battery can be fully charged in one day (with effective sunshine 4.5hrs/day) by 1900W solar panels.
- It may take more than one day to fully charge the battery by $\geq 1900W$ solar panels since the duration and intensity of light would be a great factor for their charging efficiency.

Controller

☆ Recommended Charging Current:

46A (0.2C)	The battery will be fully charged in around 5hrs.
115A (0.5C)	The battery will be fully charged in around 2hrs.

☆ Recommended Charging Mode: **24V (29.2V) LI (LiFePO₄)**

Controller Settings

Refer to the below parameters if you need to manually set up your controller. As different types of batteries have different charging modes, **it is recommended to set only the following parameters for LiFePO₄ batteries.** The settings for other types of batteries do not apply to LiFePO₄ batteries except for the following settings.

CHARGING	Charge /Bulk /Boost Voltage	28.8 $\pm$ 0.4V
	Absorption Voltage	28.8 $\pm$ 0.2V
	Over Voltage Disconnect	30V
	Over Voltage Reconnect	28.4V
	Tail Current	4.6A (0.02C)
DIS-CHARGING	Under Voltage Warning	23.2V
	Under Voltage Warning Recover	24.8V
	Low Voltage Disconnect	21.6V
	Low Voltage Reconnect	24V

BATTERY CHARGER

Use 29.2V lithium iron phosphate (LiFePO₄) battery charger to maximize the capacity.

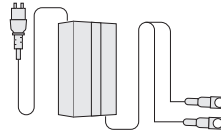
☆ Recommended Charging Voltage: Between 28.4V to 29.2V

☆ Recommended Charging Current:

46A (0.2C)	The battery will be fully charged in around 5hrs.
115A (0.5C)	The battery will be fully charged in around 2hrs.

Tips

- ① It's recommended to disconnect the charger from the battery after fully charging.
- ② It is not recommended to use alligator clips to connect the charger or load to the battery as the contact area is too small and can cause the terminals to melt and damage the battery.



ALTERNATOR / GENERATOR

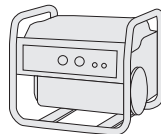
LiTime battery can be charged by an alternator or generator.

If the alternator/generator supports DC output, a DC-to-DC charger needs to be added between the battery and the generator; if the alternator/generator supports AC output, please refer to the recommendations in "Battery Charger" above to add a suitable battery charger between the battery and the generator.

☆ Recommended Charging Voltage: Between 28.4V to 29.2V

☆ Recommended Charging Current:

46A (0.2C)	The battery will be fully charged in around 5hrs.
115A (0.5C)	The battery will be fully charged in around 2hrs.



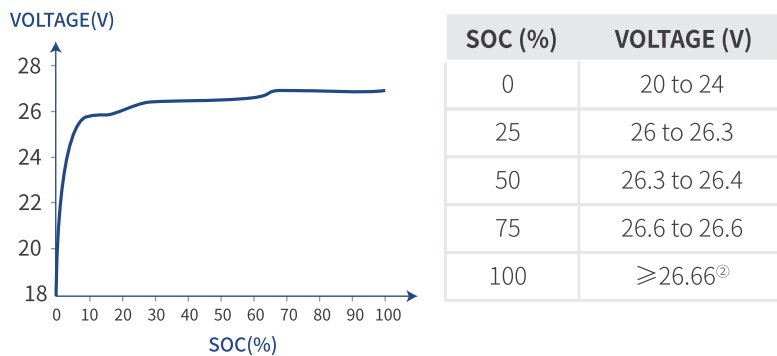
HOW TO ESTIMATE THE BATTERY CAPACITY

STATE OF CHARGE (SOC)

The battery capacity could be roughly estimated by its resting voltage (not charging/discharging voltage).^①

Since the voltage of each battery is slightly different, and the voltage measurement is affected by the measuring instrument, ambient temperature, etc., the following parameters are for reference only. The actual SOC of the battery is based on the discharge capacity under load.

Resting Voltage: The voltage is measured after the battery has been disconnected from the charger and loads with zero current, and left alone for 3 hours.



① Based on the characteristics of LiFePO₄ batteries, the voltage measured by all LiFePO₄ batteries during charging/discharging is not the real voltage of the battery. Therefore, after charging/discharging and disconnecting the battery from the power source, the voltage of the battery will gradually drop/increase to its real voltage.

② After this battery is protected from overcharge, the tested battery voltage (not the real voltage) will be lower than the real voltage. To calculate the SOC (%), add 0.5V to 0.7V to the tested battery voltage.

RECOMMENDED CABLE SIZING

Battery cables should be properly sized to handle the expected load. Refer to the table below for amperage ratings for different sizes of copper cables.

PVC COPPER CABLE SIZE (AWG/mm ²)	AMPACITY (A)
14 (2.08)	20
12 (3.31)	25
10 (5.25)	35
8 (8.36)	50
6 (13.3)	65
4 (21.1)	85
2 (33.6)	115
1 (42.4)	130
1/0 (53.5)	150
2/0 (67.4)	175
4/0 (107)	230

The above values are from NEC Table 310.15(B)16 for copper cables rated at 167°F (75°C) operating at an ambient temperature not exceeding 86°F (30°C). Cables longer than 6 feet (1829 mm) or ambient temperature higher than 86°F (30°C) may require heavier gauges to avoid excessive voltage drops with undersized ones.

SERIES / PARALLEL CONNECTION

THE PREMISE OF CONNECTION

To connect in series or /and parallel, batteries should meet the below conditions:

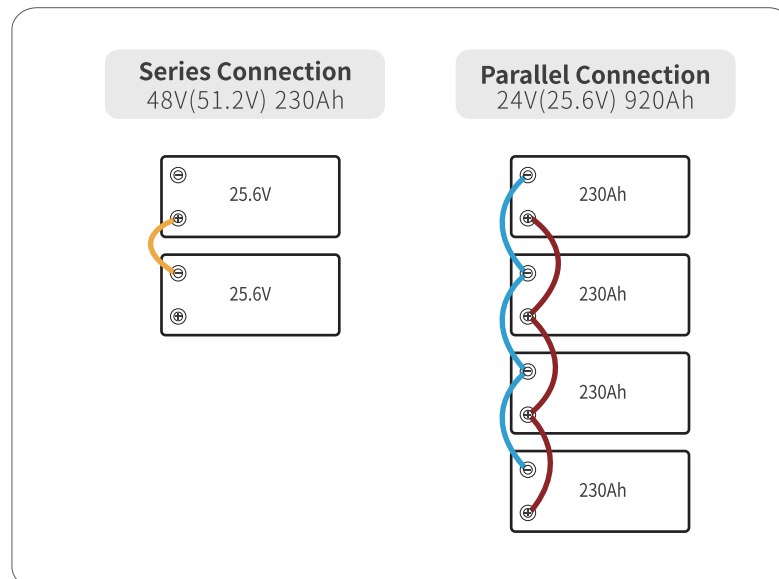
- a. identical batteries with the same battery capacity (Ah) and BMS (A);
- b. from the same brand (as lithium battery from different brands has their special BMS);
- c. purchased in near time (within one month).

LIMITATION FOR SERIES/PARALLEL CONNECTION

Support connecting up to 8 identical batteries for up to:

2 in series as 48V (51.2V) battery system or

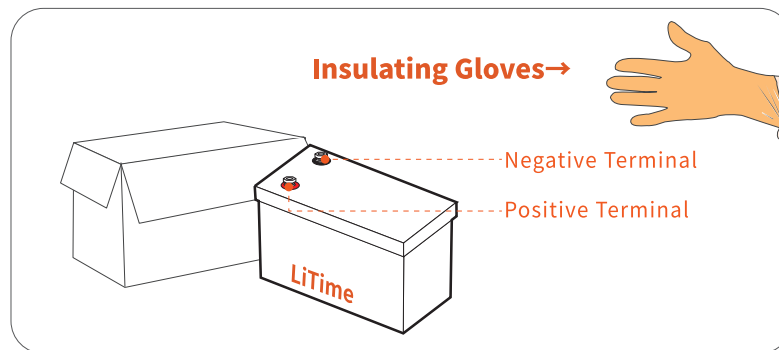
4 in parallel as 920Ah battery system.



HOW TO CONNECT BATTERIES

Step 1 Wear Insulating Gloves

Wear insulating gloves for protection before connecting. Please pay attention to operation safety in the process of connection.

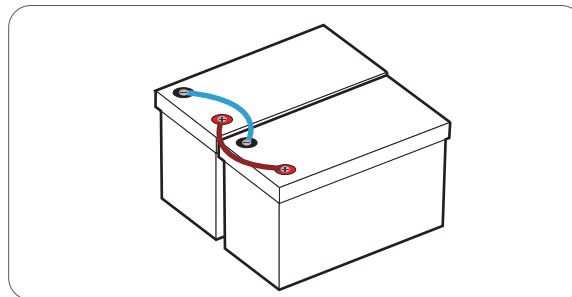


Step 2 Voltage Balancing Before Connection

Below two steps are necessary to reduce the voltage difference between batteries and let the battery system perform the best of it in series or/ and in parallel.

Step 1 Fully charge the batteries separately.
(voltage at rest: $\geq 26.66V$)

Step 2 Connect all of the batteries in parallel, and leave them together for 12~24hrs.

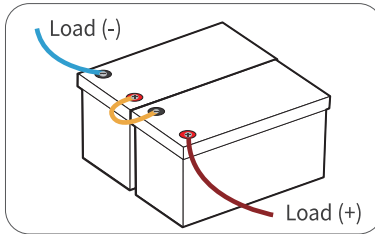


Step 3 They're now ready for the connection.

Step 3 Battery-to-Battery Connection

○ #1 Connect Batteries in Series

+ to **-**



After series connection, the voltage of the battery system will be doubled according to the number of batteries you connect.

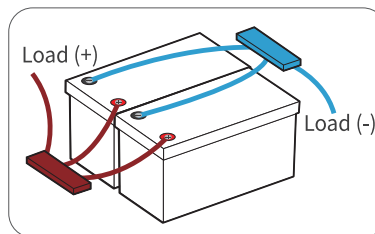
E.g. If two 24V 230Ah batteries are connected in series, the battery system will be 48V (51.2V) 230Ah.

○ #2 Connect Batteries in Parallel

+ to **+**

- to **-**

Refer to Page 13 for total input & output connection



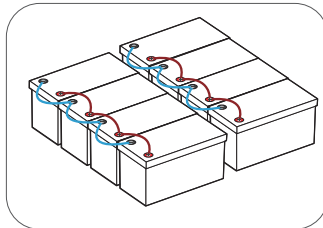
After parallel connection, the capacity of the battery system will be doubled according to the number of batteries you connect.

E.g. If two 24V 230Ah batteries are connected in parallel, the battery system will be 24V (25.6V) 460Ah.

○ #3 Connect Batteries Both in Series & Parallel

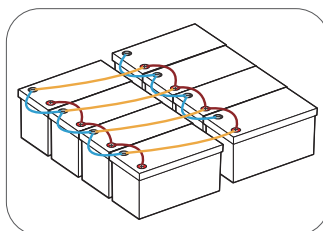
Connect in parallel first, then series.

Step
1



Connect the batteries in parallel.

Step
2

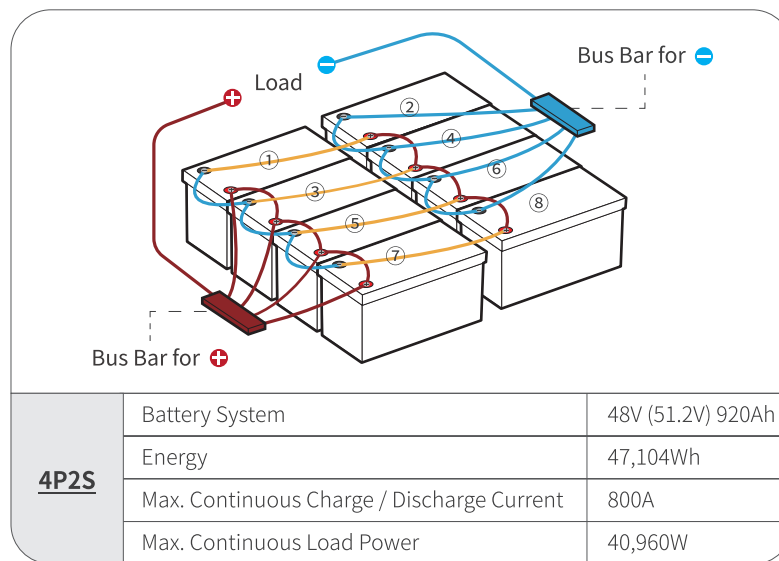


Connect the paralleled battery systems in series.

Step 4 Total Input & Output Connection

Use two **bus bars** (instead of battery terminals) to connect all the positive and negative output/input cables, ensuring that the input & output currents of each battery are balanced. (Not required when connecting batteries only in series.)

It is not recommended to use one terminal as the total positive or negative output/input of the battery system as the connected terminals may heat up or even melt if the total output/input current of the battery system is too high.

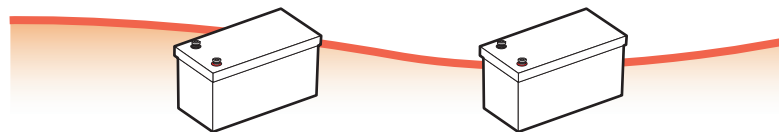


① As $\ominus$ of ① / ③ / ⑤ / ⑦ is connected in series with $\oplus$ of ② / ④ / ⑥ / ⑧, please do not connect $\ominus$ of ① / ③ / ⑤ / ⑦ with $\ominus$ of load or $\oplus$ of ② / ④ / ⑥ / ⑧ with $\oplus$ of load, otherwise the battery system will fail to connect in series.

② Please do not connect in reverse order, which may affect the use of the batteries.

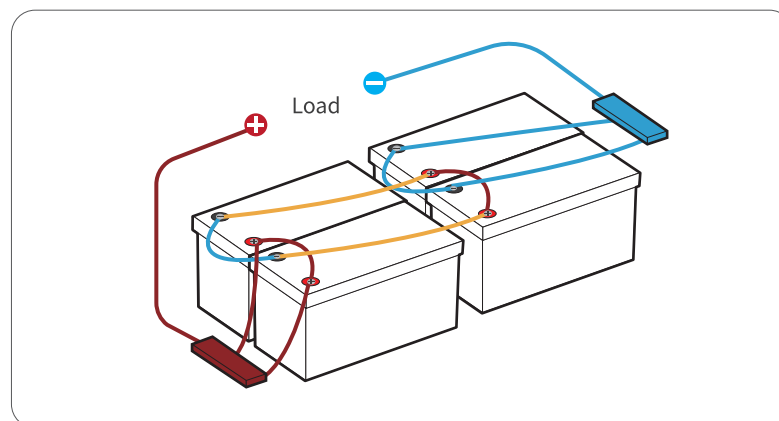
Step 5 Rebalancing Every Six Months

It is recommended to rebalance the battery voltage every six months following Step 2 on Page 11 if you're connecting multiple batteries as a battery system, as there might be voltage differences after six months of the battery system running.

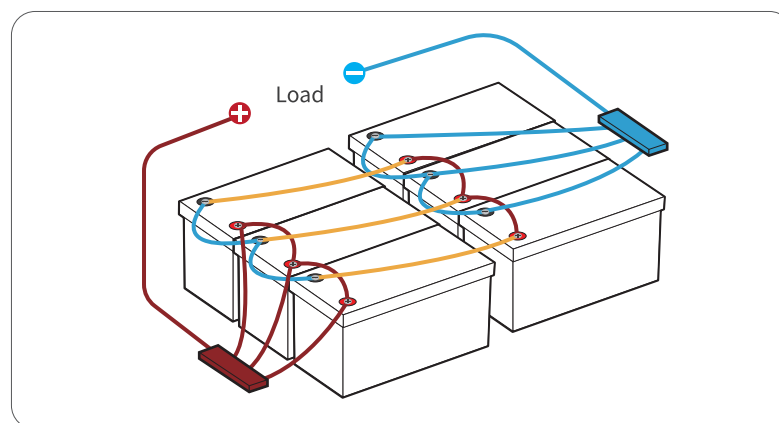


Wiring Diagram Reference

2P2S	Battery System	48V (51.2V) 460Ah
	Energy	23,552Wh
	Max. Continuous Charge / Discharge Current	400A
	Max. Continuous Load Power	20,480W

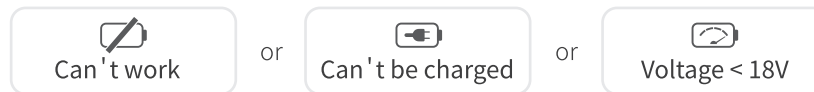


3P2S	Battery System	48V (51.2V) 690Ah
	Energy	35,328Wh
	Max. Continuous Charge / Discharge Current	600A
	Max. Continuous Load Power	30,720W



WHAT TO DO WHEN THE BATTERY STOPS WORKING?

When the battery



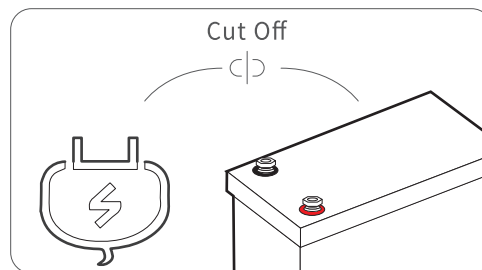
It has 85% chances that BMS has shut it off for protection, and you could try **one of below ways** to activate the battery.

GENERAL STEPS

If the BMS has cut off the battery for protection, follow the below steps to activate it.

Step
1

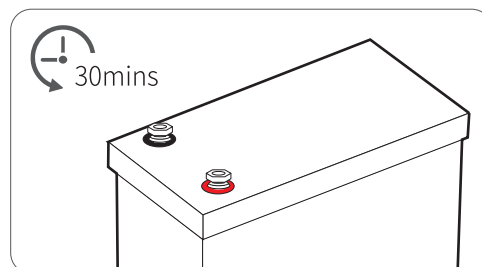
Cut off all the connections from the battery



Step
2

Leave the battery aside for 30mins

Then the battery will automatically recover itself to normal voltage (>20V) and can be used after fully charged.

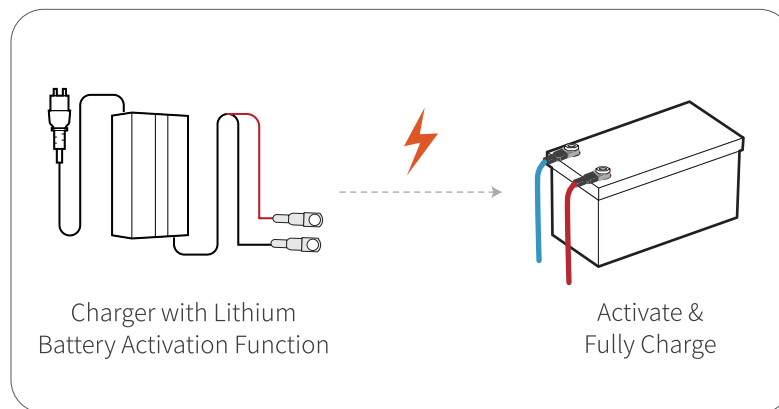


If the battery is unable to recover itself after the above steps, please try activating by **ONE OF BELOW TWO METHODS.**

After activated (voltage > 20V) and fully charged by the normal charging method, it can be used normally.

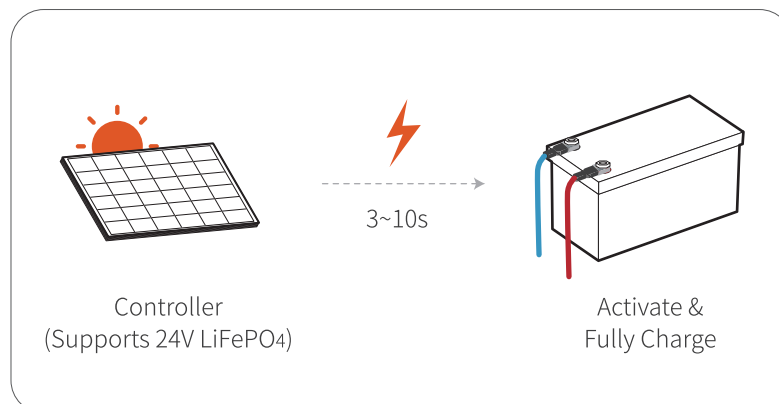
Method ①

Use a charger with lithium battery activation function to fully charge the battery.



Method ②

Connect a controller that supports 24V LiFePO₄ battery charging to charge the battery for 3~10s in sunny daytime.





Shenzhen Litime Technology Co., Ltd