

Automatic
Self-Heating 

Li Time

16V 100Ah

Smart  **BLUETOOTH 5.0** **X**  **Marine Electronics** **X**  **Group 27** and More

PRODUCT (100A BMS) **MANUAL**

Lithium Iron Phosphate (LiFePO₄) Battery

www.litime.com



PRODUCT OVERVIEW

16V 100AH BATTERY

Operating Voltage: 16V

Charging Voltage: $18V \pm 0.25V$

Recommended Charge Current: 20A (0.2C)

Required Minimum Charge Current (for Heating Function): 10A

Max. Continuous Discharge Current: 100A

Max. Continuous Output Power: 1600W

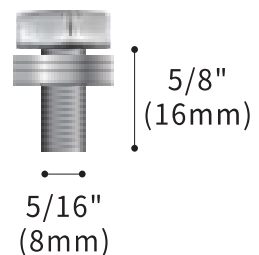


ADDITIONAL COMPONENTS

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.

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

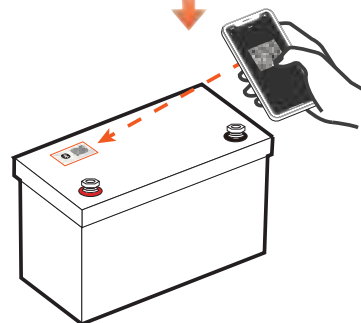
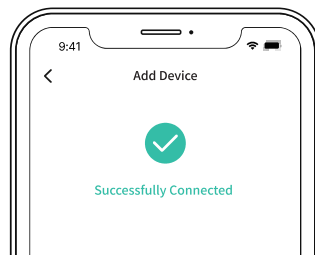
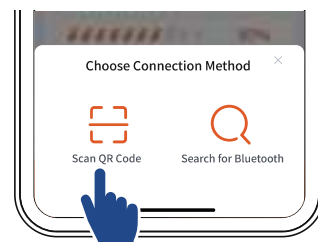
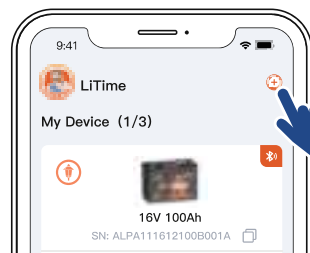
GET IT ON
Google Play

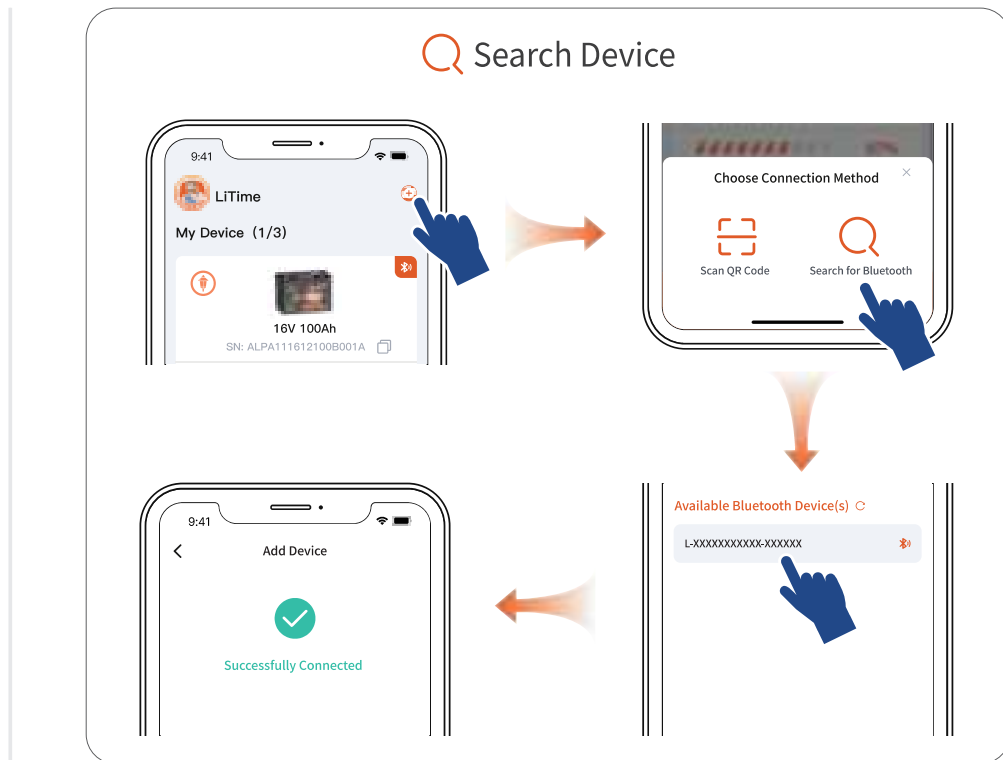


Step
2

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

 Scan QR Code





FCC STATEMENT (FCC ID:2BDSV16100)

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

■ Please keep the battery away from heat sources, sparks, flames, and hazardous chemicals.

■ **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.

■ **Please tighten all cable connections, as loose cable connections can cause terminal meltdown or fire.**

■ **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 immerse the battery in water whether the battery is in use or on standby.**

■ **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.

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.



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BATTERY PARAMETERS

| | |
|---|---------------------|
| Cell Type | LiFePO ₄ |
| Nominal Voltage | 16V |
| Rated Capacity | 100Ah |
| Energy | 1600Wh |
| Internal Resistance | ≤40mΩ |
| Cycle Life | ≥4000 times |
| Battery Management System (BMS) Board | 100A |
| Charge Method | CC/CV |
| Charge Voltage | 18.0±0.25V |
| Recommended Charge Current | 20A (0.2C) |
| Required Minimum Charge Current for Heating Function ^① | 10A |
| Max. Continuous Charge Current | 100A |
| Max. Continuous Discharge Current | 100A |
| Surge Discharge Current | 500A@1 second |

| | |
|---|--|
| Max. Continuous Output Power | 1600W |
| Dimension | L12.13*W6.69*H8.31 inch |
| | L308*W170*H211 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 @10A | 70-90mins (From -10°C / 14°F) |
| | 100-150mins (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 greater than 10A 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.

IDENTIFICATION OF PARTS

ON/OFF SWITCH

For a Single Battery

| Function | Operation |
|------------------------|-----------------------------|
| Power On | Short Press ^② |
| Power Off ^① | Press and Hold ^③ |

① The battery will also be powered off when there is no external power supply (no charger connected to the battery) or the voltage is below 12.5V.

② Short press: the button is pressed and held for 1s to 2s and then released.

③ Press and hold: the button is pressed and held for 3s to 5s and then released.

For Battery Banks in Parallel (Power cables connected correctly)

In a powered-off parallel battery system, short press the button on one of the batteries or connect a suitable charging device to the system to turn on the power for the entire battery system.

In a power-on parallel battery system, press and hold the buttons on each battery in the parallel bank sequentially to turn off the whole battery system.

LED INDICATOR

| LED Status | Battery Status |
|-----------------------------------|--|
| Always on Green | Normal (Stand by, charging or discharging) |
| Flashes Green | Battery SOC<20% (Recommend charging the battery, stop flashing when SOC>25%) |
| Alternately Flashes Red and Green | In Protection Status (Over temperature, low temperature, short-circuit, over-current, low-voltage) |
| Always on Red | BMS / Cell Failure ^① |

①BMS or cell failure of the battery, please contact us at service@litime.com for further assistance.

AUTOMATIC SELF-HEATING FUNCTION

The automatic self-heating function will be activated by the BMS when the battery is connected to a charger or the battery SOC is above 20% @ -20°C to 5°C / -4°F to 41°F depending on the selected heating mode. The heating will be stopped when the battery temperature has reached the set value, which normally takes approx. 70-90mins from -10°C / 14°F and approx. 100-150mins from -20°C / -4°F.

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.

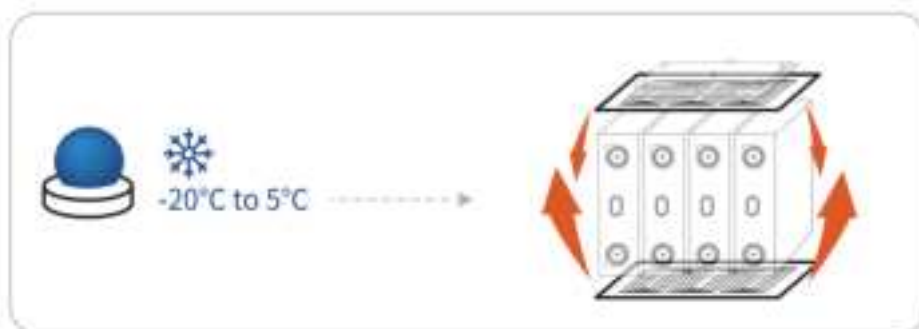
HOW DOES IT WORK?

Step
1

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 control the battery to start heating the battery through the heating pads once it meets the heating requirement, and the battery will not be charged during the heating process. And it will continue to Step 2.

Or (2) when the battery temperature is >5°C / 41°F, the battery will be normally charged and the heating function will not be activated.



Step
2

The battery will be normally charged when the battery temperature is above 5°C / 41°F, the heating will be stopped when the battery temperature is above 10°C / 50°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 | $\geq 10A$ | / | Charger |
| | | $< 10A$ | | Not able to start heating ^② |
| Energy-efficient | Charger+Battery | $\geq 10A$ | / | Charger |
| | | $< 10A$ | $> 20\%$ | 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 $\geq 10A$. Energy-efficient Heating Mode: Battery SOC $> 20\%$ or charger current $\geq 10A$.

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 | 35Ah | 18A to 36A | 270W to 550W | 2 hours to 1 hour |
| -15°C / 5°F | 34Ah | 18A to 36A | 270W to 550W | 2 hours to 1 hour |
| -10°C / 14°F | 26Ah | 13A to 26A | 400W to 800W | 1 hour to 0.5 hour |
| -5°C / 23°F | 17Ah | 10A to 18A | 270W to 550W | 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 18A will charge about 35Ah capacity in around 2 hours to replenish the capacity consumed by battery's self-heating process at night.

THINGS TO KNOW BEFORE USING

■ When using the battery, please be careful to **avoid metal or conductive objects touching the positive and negative poles of the battery at the same time**, otherwise it may cause a short circuit.

■ Install the battery upright with post bolt facing up, and top side of the battery could not be mounted upside down. If you need to mount the battery at its side, please contact service@litime.com to confirm the direction.

■ **Tightly screw in the post bolts.** Having loose battery terminals will cause the terminals to build up heat resulting in damage to the battery.

■ **DO NOT use it as a starting battery.**

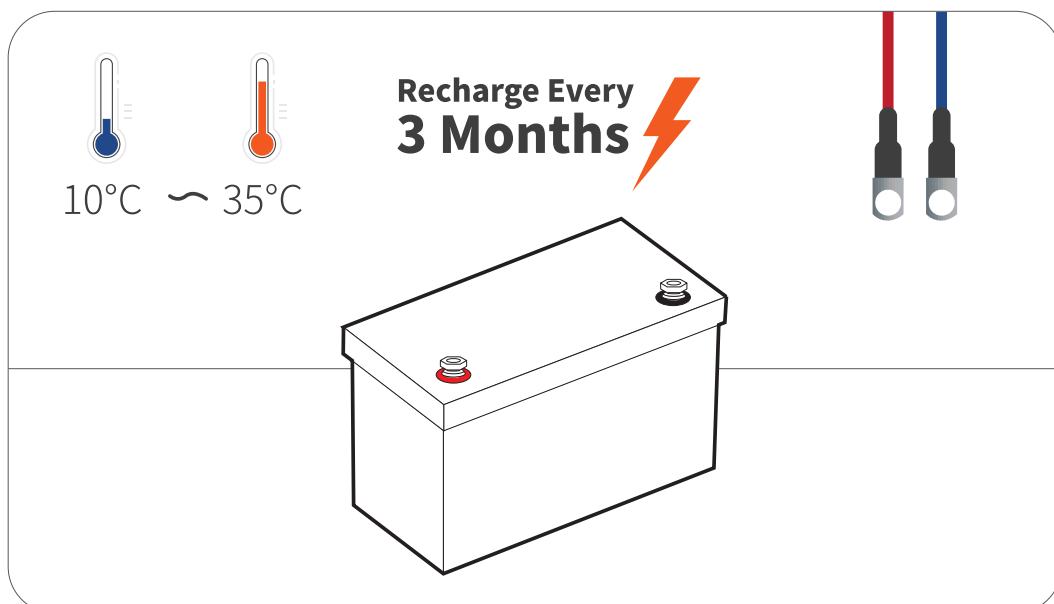
■ Suggestions for **Long-term Storage**:

○ Temperature

The battery can be operated at a temperature of -20°C to 60°C / -4°F to 140°F, and a temperature between [10°C to 35°C / 50°F to 95°F](#) is ideal for long-term storage. Store in a fireproof container and away from children.

○ Capacity

For a longer-lasting product, it is best to store your battery [at a 50% charge level](#) and recharge every three months if it is not going to be used for a long time.



CHARGING METHODS

SOLAR PANEL(S) & CONTROLLER

Solar Panel

☆ Recommended Power: $\geq 500W$

- The battery can be fully charged in one day (with effective sunshine 4.5hrs/day) by 500W solar panels.
- It may take more than one day to fully charge the battery by $\geq 500W$ solar panels since the duration and intensity of light would be a great factor for their charging efficiency.

Controller

☆ Recommended Charging Current:

| | |
|------------|---|
| 20A (0.2C) | The battery will be fully charged in around 5hrs. |
| 50A (0.5C) | The battery will be fully charged in around 2hrs. |

☆ Recommended Charging Mode: **User**

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 | 18.0 \pm 0.25V |
| | Absorption Voltage | 18.0 \pm 0.25V |
| | Over Voltage Disconnect | 18.75V |
| | Over Voltage Reconnect | 17.75V |
| | Tail Current | 2A (0.02C) |
| DIS-CHARGING | Under Voltage Warning | 14.5V |
| | Under Voltage Warning Recover | 15.5V |
| | Low Voltage Disconnect | 13.5V |
| | Low Voltage Reconnect | 15V |

BATTERY CHARGER

Use 18.25V lithium iron phosphate (LiFePO₄) battery charger to maximize the capacity.

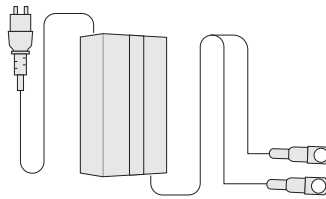
☆ Recommended Charging Voltage: Between 17.75V to 18.25V

☆ Recommended Charging Current:

| | |
|------------|---|
| 20A (0.2C) | The battery will be fully charged in around 5hrs. |
| 50A (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

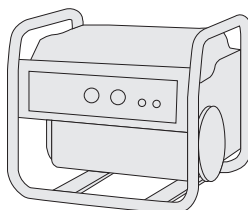
LiTime battery can be charged by an alternator or generator.

If the alternator/generator supports 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 17.75V to 18.25V

☆ Recommended Charging Current:

| | |
|------------|---|
| 20A (0.2C) | The battery will be fully charged in around 5hrs. |
| 50A (0.5C) | The battery will be fully charged in around 2hrs. |



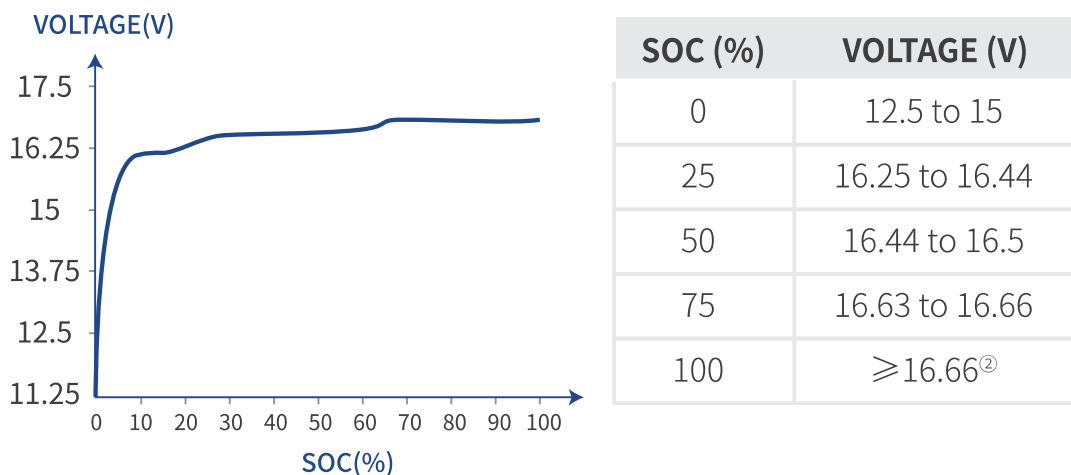
HOW TO ESTIMATE THE BATTERY CAPACITY

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.

PARALLEL CONNECTION

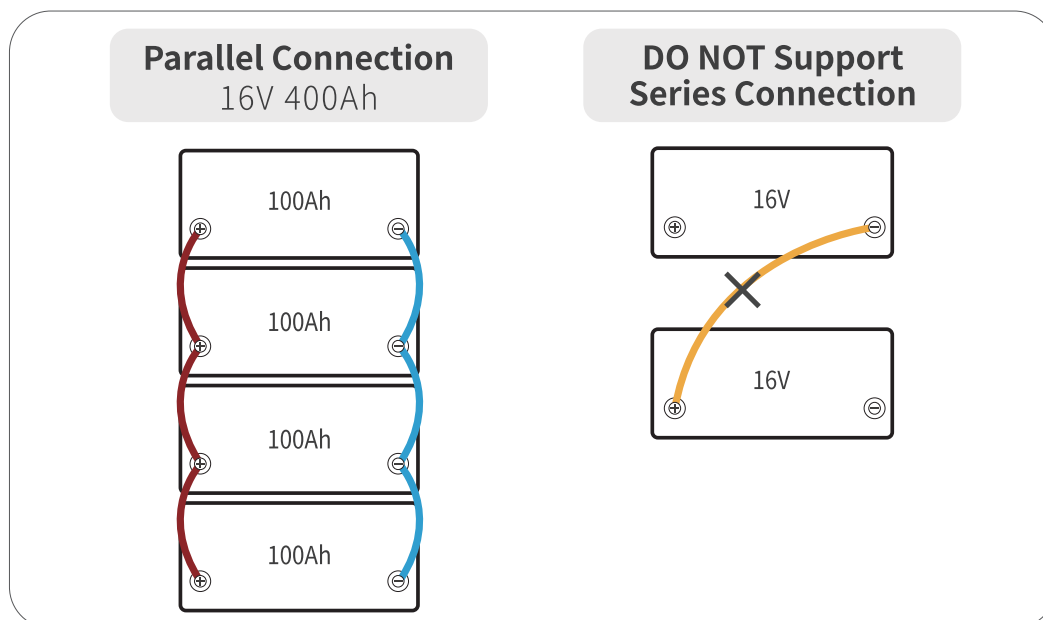
THE PREMISE OF CONNECTION

To connect in 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

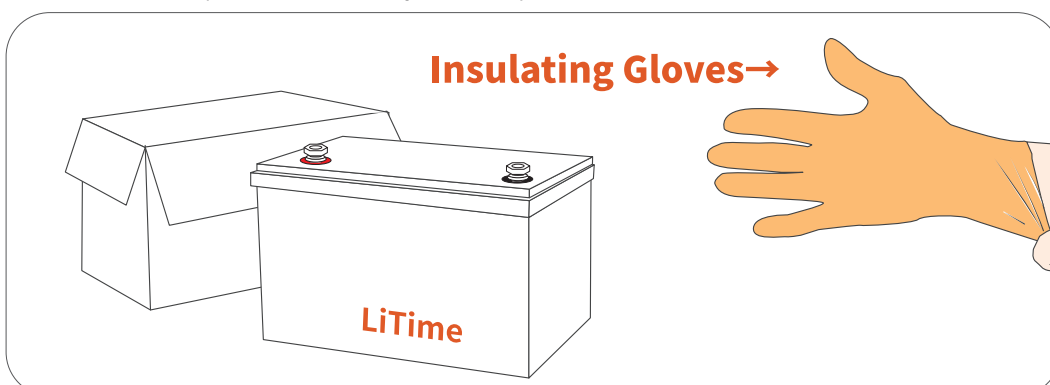
Support connecting up to 4 identical batteries in parallel for up to: 16V 400Ah battery system.



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 parallel.

Step
1

Fully charge the batteries separately.

(voltage at rest: $\geq 16.66V$)

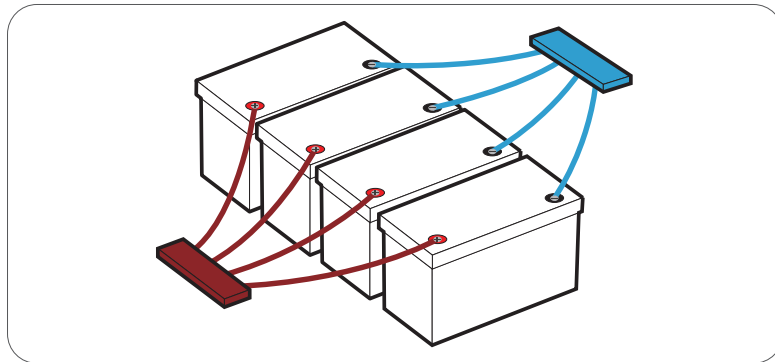
Step
2

Connect all the positive and negative output cables of the batteries to bus bars^① separately.

Connect Batteries in Parallel

+ to **+**

- to **-**



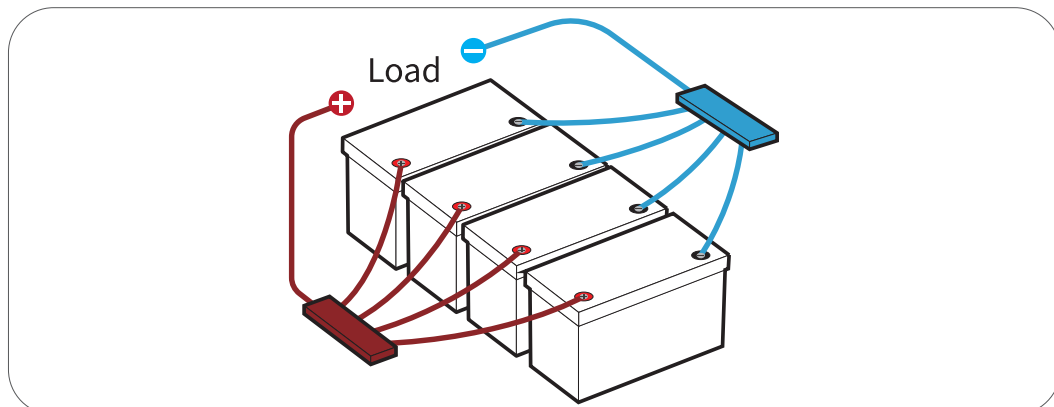
①Bus Bar: It can help ensure the input & output currents of each battery are balanced and improve the conversion efficiency of the input & output currents for the battery.

Step
3

Leave them together for 12-24hrs until the battery voltages have been balanced, the paralleled battery system can be connected to the load.

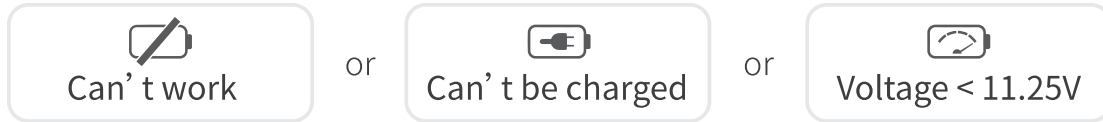
Step 3 Complete the System Connection

Connect the **+** and **-** of the load to the bus bars. The cable gauge used in this step should be able to support the total input & output current of the entire battery system.



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 (>12.5V) and can be used after being fully charged.

If the battery is unable to recover itself after the above steps, please try activating by **THE BELOW METHOD.**

After being activated (voltage >12.5V) and fully charged by the normal charging method, it can be used normally.

Activation Method

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

