



LiFePO4

**PRODUCT
MANUAL**

Lithium Iron Phosphate Battery

IMPORTANT SAFETY INSTRUCTION

Storage

- Please keep the battery away from heat sources, sparks, flames, and hazardous chemicals.
- Please do not place the battery in a humid environment.
- Maintain adequate ventilation and heat dissipation. Place the battery in a well-ventilated area with sufficient heat dissipation to prevent overheating and damage.
- Please do not disassemble the battery or change the battery structure.
- Please do not puncture, drop, crush, burn, shake or strike the battery. The battery should be securely fastened during transportation to prevent impact or dropping. And the cables safely tied to a suitable location to avoid arcing and sparking due to friction. **DO NOT** place heavy stuff on top of it for long periods, which may damage it due to an internal short circuit.
- Please do not dispose of the battery as household waste. Please use recycling channels in accordance with local, state, and federal regulations.

Installation

- 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 your system.
- 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 in a heat source during battery operation.
- Please tighten all cable connections, as loose cable connections can cause terminal meltdown or fire.
- 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.
- Do not use different batteries, such as batteries from different manufacturers, types, models or service life.
- Small sparks may happen at the connector when connecting work, which will not damage the battery or equipment.
- Battery installation and maintenance must be performed by trained certified technicians. This product manual can only serve as a guideline as it cannot cover all possible scenarios.

Charge and discharge

- Do not use unqualified equipment for charging and discharging, please follow the correct instructions.
- Please do not charge or discharge hot, deformed or leaking batteries in the equipment.
- Do not discharge the battery continuously in case of low capacity.
- It is forbidden to connect the power supply or loads that do not meet the power level to the battery.



DANGER

- Please wear proper personal protective equipment when working on the battery. DO NOT touch metal terminals with bare hands.
- Improper use of the battery can lead to battery failure or other potential damage. It is forbidden to wear watch, bracelet, rings or other conductive objects during operation.
- It is forbidden to place tools or metal objects on the battery. Tools with insulated handle are allowed to use.
- Incorrect configuration, installation, or utilization of associated equipment within the battery system can result in damage to the battery and other interconnected equipment.
- Battery installation and maintenance should only be carried out by technicians who have received proper training and certification.
- 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 if necessary.
- Failure to follow the warnings above can result in potential risks.



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01 THINGS TO KNOW BEFORE USING

- Please ensure proper battery connection. Take care to prevent any metallic or conductive objects from simultaneously contacting the positive and negative terminals of the battery, as this can result in a short circuit. Such an event may lead to potential harm to the charger (device) or physical injury.
- Please install the battery in an upright or 90° position with the post bolt facing upward. It is crucial to avoid mounting the battery upside-down.
- Please securely tighten the post bolts. Loose battery terminals can lead to the accumulation of heat, which may cause damage to the battery. If you come across corroded connectors, it is advisable to clean or replace them. They have the potential to affect the performance and reliability of the installation.
- This battery is not designed for use as a starting battery for any devices. Please DO NOT use it as a starter battery.

Suggestions for Long-term Storage:

Store batteries in a dry, clean, and well-ventilated area. It is recommended to store batteries at a temperature range of 0°C to 35°C / 30°F to 95°F for up to 6 months, ensuring they are periodically recharged. If the storage period exceeds 6 months, recharge the batteries once before further storage.

Storage Temp & Recharge Schedule:

TEMP. RANGE	RECHARGE INTERVAL	RECHARGE PARAMETERS
LESS THAN 20°C/68°F	EVERY 9 MONTHS	A) CONSTANT VOLTAGE 3.5V/CELL, INITIAL CURRENT 0.1C(A), FOR 12HOURS.
20°C~30°C/68°F~86°F	EVERY 6 MONTHS	B) CONSTANT VOLTAGE 3.5V/CELL, INITIAL CURRENT 0.25C(A) FOR 6 HOURS.
30°C~40°C/86°F~104°F	EVERY 3 MONTHS	C) CONSTANT CURRENT 0.1C (A) FOR 12HOURS.

Note: C means Nominal Capacity of the battery.

Capacity:

To enhance the longevity of your battery, it is advisable to store it at a 50% charge level. This optimal charge level during storage helps ensure its prolonged performance and durability.



CAUTION

1. If lithium battery have been stored over 9 months with no use, promptly report the event to the warranty department via the website.
2. Dispose of bulging lithium battery irrespective of how long they have been stored.
3. The storage duration starts from the latest charge time on lithium battery package.
The latest charge time is updated after every charge.
4. If a lithium battery is qualified after charge, mark the latest charge time and the next recharge time on the assigned position. The total storage duration should not exceed the warranty period.

02 CHARGING METHODS

Method 1:

SOLAR PANEL(S) & CONTROLLER

■ Solar Panel

Charging time depends on the power of the solar panel and the duration and intensity of the light.

■ Controller

Recommend Charging Current:

0.2C (Slow Charging) or 0.5C (Fast Charging)

Example: 20A for 12V 100Ah BAT

The battery will reach its full capacity of 100% after approximately 5 hours of charging.

Example: 50A for 12V 100Ah BAT

The battery will reach its full capacity of 97% after approximately 2 hours of charging.

■ Controller Settings

If you need to manually configure your controller, please refer to the parameters provided below.

It is important to note that different battery types require specific charging modes. It is recommended to set only the following parameters for 12V LiFePO4 batteries.

CHARGING	CHARGE /BULK /BOOST VOLTAGE	14.4±0.2V
	ABSORPTION VOLTAGE	14.4±0.2V
	OVER VOLTAGE DISCONNECT	15V
	OVER VOLTAGE RECONNECT	14.2V
	TAIL CURRENT	2A (0.02C)
DIS CHARGING	UNDER VOLTAGE WARNING	11.0V
	UNDER VOLTAGE RECOVER	11.2V
	LOW VOLTAGE DISCONNECT	10.4±0.2V
	LOW VOLTAGE RECONNECT	10.6±0.2V

Method 2:

LITHIUM BATTERY CHARGER

Recommend Charging Voltage: Between 14.2V to 14.6V

Recommend Charging Current:

0.2C (Slow Charging) OR 0.5C (Fast Charging)

Example: 20A for 12V 100Ah BAT

The battery will reach its full capacity of 100% after approximately 5 hours of charging.

Example: 50A for 12V 100Ah BAT

The battery will reach its full capacity of 97% after approximately 2 hours of charging.

Note:

- ① Prior to connecting the charger to the battery, it is important to first connect it to the grid power to avoid the risk of sparks.
- ② It's recommended to disconnect the charger from the battery after fully charging.

Method 3:

ALTERNATOR/GENERATOR

Battery can be charged by an alternator or generator.

■ If the alternator/generator supports DC output, it is necessary to incorporate a DC-to-DC charger between the battery and the power source.

■ If the alternator/generator supports AC output, please follow the recommendations provided in the "Battery Charger" section above to install an appropriate battery charger between the battery and the power source.

3 Ways to Charge



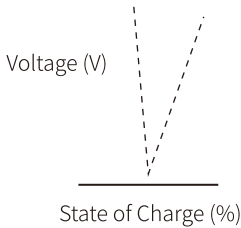
03 HOW TO ESTIMATE THE BATTERY CAPACITY

STATE OF CHARGE(SOC)

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

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.



SOC(%)	VOLTAGE(V)
0	10 TO 12
25	13 TO 13.15
50	13.15 TO 13.2
75	13.3 TO 13.33
100	≥13.33②

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.

04 RECOMMENDED CABLE SIZING

The safe current value of our standard cable connectors for long duration is as follow:

- Cable 70mm², 220A/cable.
- Cable 50mm², 170A/cable.
- Cable 35mm², 130A/cable.

State clearly if working current is higher than above value and we will specify correct connectors for the application.

Note:

Use a torque wrench for adequate tightness of the connection. Recommended torque value is as below. Torque Setting:

ITEM	TERMINAL SIZE	VALUE
1	M5	6.2N*M
1	M6	8.5N*M
2	M8	12.4N*M



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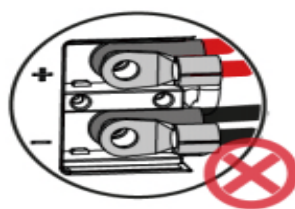
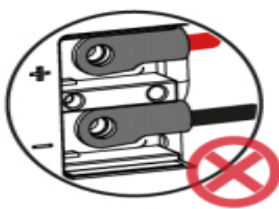
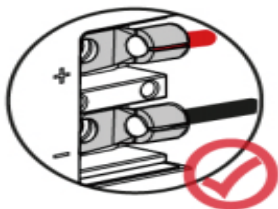
(1) Cable

(2) OT terminal

(3) Heat shrink tubing

(4) Hydraulic pliers

(5) Heat gun



CAUTION

- When installing the power cable, ensure that the protruding part of the OT terminal on the cable must be facing outward.
- Do not connect two or more cables to the positive and negative power ports in inverter or batteries.

05 SERIES/PARALLEL CONNECTION

THE PREMISE OF CONNECTION

For series or parallel connections, batteries must meet the following conditions:

- a. Same battery capacity (Ah) and BMS (A).
- b. Same brand (as each brand has its specific BMS for lithium batteries).
- c. Purchase within a close timeframe (within one month).

LIMITATION FOR SERIES/PARALLEL CONNECTION

- 4 batteries connected in series as a battery system.
- 2 batteries connected in parallel as a battery system.

HOW TO CONNECT BATTERIES

Step1 Wear insulating Gloves

Please wear insulated gloves for protection before connection.

Step2 Voltage Balancing Before Connection

To minimize voltage differentials and allow for optimal performance of series or/and parallel batteries, the following two steps must be taken.

① **Fully charge** the batteries separately .

(voltage at rest: $\geq 13.33V$)

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

③ They' re now ready for the connection.

Step3 Battery-to-Battery Connection

#1 Connect Batteries in Series

When connected in series, the voltage will be doubled depending on the number of batteries you connect.

E.g.If two 12V 100Ah batteries are connected in series, the voltage of the battery system will be 24V (25.6V) 100Ah.

#2 Connect Batteries in Parallel

When connected in parallel, the capacity will be doubled depending on the number of batteries connected in parallel.

#3 Connect Batteries Both in Series & Parallel

Please connect in parallel first, then series.

Step4 Total input & Output Connection

Connect all positive and negative output/input cables with two **copper bars**(in place of battery terminals) to ensure input and output currents are balanced. (Not required when connecting batteries in series only).

It is not recommended to use one terminal as the total positive and negative output/input of the battery system, as it may cause heating or even melting if the total output/input current is too high.

Step5 Rebalancing Every 6 Months

If multiple batteries are connected to a battery system, it is recommended that the battery voltages be rebalanced every six months, as voltage differences may occur after six months of battery system operation.

06 WHAT TO DO WHEN THE BATTERY STOPS WORKING?

If you encounter the situations below:

■ Can't work

■ Can't be charged

■ Voltage < 9v

Can't work or Can't be charged or Voltage < 9v

The Battery Management System (BMS) has shut it off for protection(Sleep Mode), please try one of the below methods to activate the battery.

GENERAL STEPS:

Step1:

Cut off all the connections from the battery.

Step2:

Leave the battery aside for 30mins.

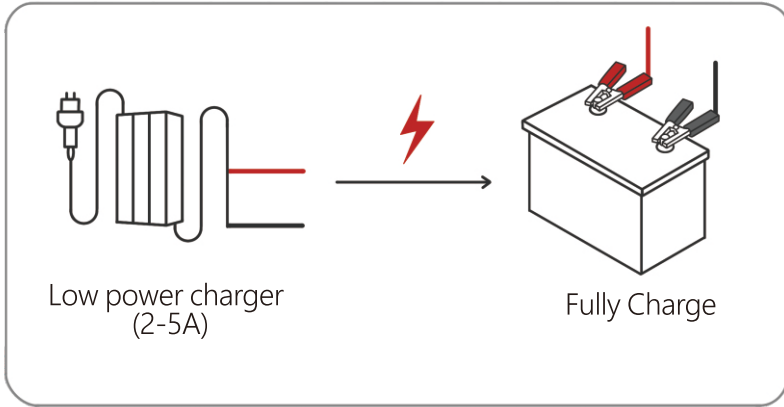
Then the battery will automatically recover itself to normal voltage (>10V) and can be used after fully charged.

If the battery fails to recover on its own:

TRY ONE OF BELOW TWO METHODS:

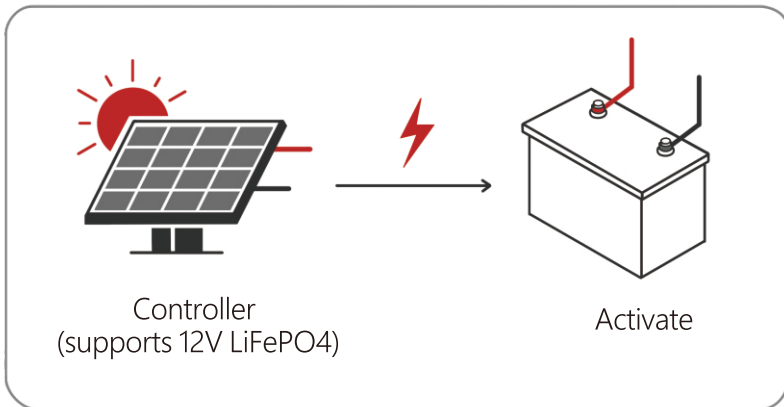
Method 1:

Please use a low power charger (2-5A) to charge the battery for a few minutes to activate BMS.



Method 2:

Use a controller specifically designed for 12V LiFePO4 battery charging to charge the battery for 3 to 10 seconds during sunny daytime.



Battery Specification

Model Name [LifePO4 Battery]	LFP12090
Rated Capacity [Ah]	90
Nominal Voltage [V]	12.8
Nominal Energy [wh]	1152
Cycle Life	≥ 2000 times
Max, Charge [A]	≤ 42
Best Charge Current [A]	≤ 17
Max Cont, Discharge [A]	85
Peak Current [A]	127
Charge Voltage [V]	$14.4V \pm 0.2V$
Terminal Type	M8
Dimensions (L*W*H) [mm]	260*168*209
Dimensions (L*W*H) [in]	10.23*6.62*8.22
Approx, Weight [lb]	11.5
IP Degree	IP65
Housing Material	ABS

Battery Specification

Model Name [LifePO4 Battery]	LFP12120
Rated Capacity [Ah]	120
Nominal Voltage [V]	12.8
Nominal Energy [wh]	1536
Cycle Life	≥2000 times
Max, Charge [A]	≤50
Best Charge Current [A]	≤20
Max Cont, Discharge [A]	100
Peak Current [A]	150
Charge Voltage [V]	14.4V ± 0.2V
Terminal Type	M8
Dimensions (L*W*H) [mm]	330*173*216
Dimensions (L*W*H) [in]	12.99*6.81*8.5
Approx, Weight [lb]	12.5
IP Degree	IP65
Housing Material	ABS

Battery Specification

Model Name [LifePO4 Battery]	LFP12140
Rated Capacity [Ah]	140
Nominal Voltage [V]	12.8
Nominal Energy [wh]	1792
Cycle Life	≥2000 times
Max, Charge [A]	≤60
Best Charge Current [A]	≤24
Max Cont, Discharge [A]	120
Peak Current [A]	180
Charge Voltage [V]	14.4V ± 0.2V
Terminal Type	M8
Dimensions (L*W*H) [mm]	330*173*216
Dimensions (L*W*H) [in]	12.99*6.81*8.5
Approx, Weight [lb]	13
IP Degree	IP65
Housing Material	ABS

Battery Specification

Model Name [LifePO4 Battery]	LFP12170
Rated Capacity [Ah]	170
Nominal Voltage [V]	12.8
Nominal Energy [wh]	2176
Cycle Life	≥ 2000 times
Max, Charge [A]	≤ 75
Best Charge Current [A]	≤ 30
Max Cont, Discharge [A]	150
Peak Current [A]	225
Charge Voltage [V]	$14.4V \pm 0.2V$
Terminal Type	M8
Dimensions (L*W*H) [mm]	502*186*243
Dimensions (L*W*H) [in]	19.76*7.32*9.56
Approx, Weight [lb]	16
IP Degree	IP65
Housing Material	ABS

Battery Specification

Model Name [LifePO4 Battery]	LFP12250
Rated Capacity [Ah]	250
Nominal Voltage [V]	12.8
Nominal Energy [wh]	3200
Cycle Life	≥ 2000 times
Max, Charge [A]	≤ 115
Best Charge Current [A]	≤ 46
Max Cont, Discharge [A]	230
Peak Current [A]	345
Charge Voltage [V]	$14.4V \pm 0.2V$
Terminal Type	M8
Dimensions (L*W*H) [mm]	522*242*220
Dimensions (L*W*H) [in]	20.5*9.53*8.67
Approx, Weight [lb]	24
IP Degree	IP65
Housing Material	ABS

Battery Specification

Model Name [LifePO4 Battery]	LFP12330
Rated Capacity [Ah]	330
Nominal Voltage [V]	12.8
Nominal Energy [wh]	4224
Cycle Life	≥ 2000 times
Max, Charge [A]	≤ 150
Best Charge Current [A]	≤ 60
Max Cont, Discharge [A]	300
Peak Current [A]	450
Charge Voltage [V]	$14.4V \pm 0.2V$
Terminal Type	M8
Dimensions (L*W*H) [mm]	520*269*220
Dimensions (L*W*H) [in]	20.47*10.59*8.66
Approx, Weight [lb]	27
IP Degree	IP65
Housing Material	ABS

Battery Specification

Model Name [LifePO4 Battery]	LFP-FT-12120
Rated Capacity [Ah]	120
Nominal Voltage [V]	12.8
Nominal Energy [wh]	1536
Cycle Life	≥ 2000 times
Max, Charge [A]	≤ 50
Best Charge Current [A]	≤ 20
Max Cont, Discharge [A]	100
Peak Current [A]	150
Charge Voltage [V]	$14.4V \pm 0.2V$
Terminal Type	M8
Dimensions (L*W*H) [mm]	395*110*286
Dimensions (L*W*H) [in]	15.55*4.33*11.25
Approx, Weight [lb]	12.5
IP Degree	IP65
Housing Material	ABS

Battery Specification

Model Name [LifePO4 Battery]	LFP-FT-12170
Rated Capacity [Ah]	170
Nominal Voltage [V]	12.8
Nominal Energy [wh]	2176
Cycle Life	≥ 2000 times
Max, Charge [A]	≤ 75
Best Charge Current [A]	≤ 30
Max Cont, Discharge [A]	150
Peak Current [A]	225
Charge Voltage [V]	$14.4V \pm 0.2V$
Terminal Type	M8
Dimensions (L*W*H) [mm]	395*110*286
Dimensions (L*W*H) [in]	15.55*4.33*11.25
Approx, Weight [lb]	16.6
IP Degree	IP65
Housing Material	ABS