

12V 100Ah

(100A BMS)

PRODUCT MANUAL

Lithium Iron Phosphate (LiFePO₄) Battery

Shenzhen Ampere Time Technology Co., Ltd



service@amperetime.com



technicalsupport@amperetime.com

PRODUCT OVERVIEW

BATTERY

Combination: 12.8V100Ah

Dimension: L13 * W6.77 * H8.43inch

Plastic Shell Color: Black



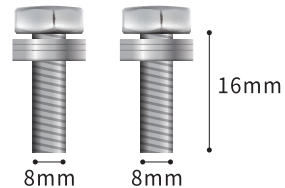
TERMINAL & POST BOLTS

Terminal Size:

M8 (1.25mm Metric Thread)

Post Bolts:

M8 (1.25mm Metric Thread * 16mm Bolt Length)



(The bolts can be replaced with M8 bolts of other lengths based on actual needs.)

GENERAL INFORMATION

Operating Voltage: 12.8V

Charging Voltage: 14.4 $\pm$ 0.2V

Max Continuous Load Power: 1280W

Max Continuous Charge/ Discharge Current: 100A

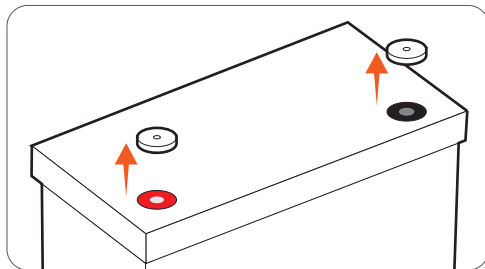
NOTICE BEFORE USING

Step
1

CONTACT US at **service@amperetime.com** to activate the FIVE-YEAR WARRANTY

Step
2

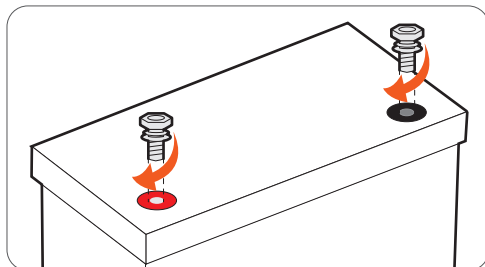
PULL OUT Insulating Plugs



Step
3

TIGHTLY SCREW IN Post Bolts

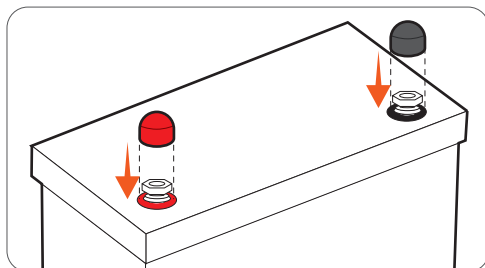
⚠ Please tightly screw in the post bolts. Having loose battery terminals will cause the terminals to build up heat resulting in damage to the battery.



Step
4

PUT ON Insulating Covers

Please put on the insulating covers to avoid metal or conductive objects touching the positive and negative terminals of the battery at the same time, otherwise it is likely to cause a short circuit.



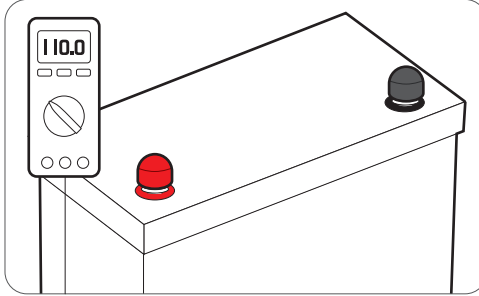


Step
5

TEST The Battery Voltage with Multimeter

≥12V To Step 6

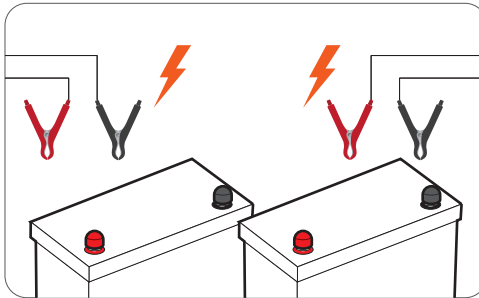
<12V Contact us at service@amperetime.com to help solve the problem.



Step
6

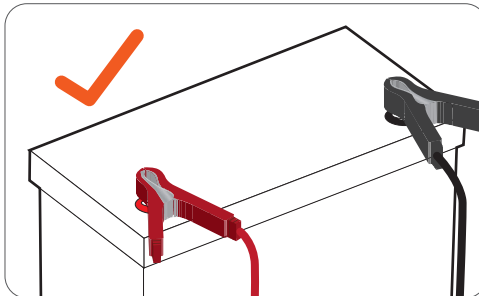
FULLY CHARGE The Battery Separately

(Refer to Page 04 for battery charging methods)



Step
7

CONNECT To Use





CONTENTS

BATTERY PARAMETERS

page

01

THINGS TO KNOW BEFORE USING

page

03

Long Term Storage

03

CHARGING METHODS

page

04

Background
Information

The Voltage When Charging & Discharging

04

Battery Charging Logic

05

LiFePO4 Battery Charging Mode

Lead Acid Battery Charging Mode

Method I

Solar Panel(s) & Controller

07

Solar Panel

Controller

Controller Settings

Method II

Battery Charger

08

Method III

Alternator / Generator

08

HOW TO ESTIMATE THE BATTERY CAPACITY	page
	09
State of Charge (SOC)	09

SERIES / PARALLEL CONNECTION	page
	10
The Premise of Connection	10
Limitation for Series/Parallel Connection	10
How to Connect Batteries	11
Accessory Recommendation	
Step 1 Wear Insulating Gloves	
Step 2 Voltage Balancing Before Connection	
Step 3 Battery-to-Battery Connection	
Step 4 Rebalancing Every Six Months	
Wiring Diagram Reference	
Create Your Unique Wiring Diagram	

INVERTER SETTINGS	page
	21

WHAT TO DO WHEN THE BATTERY STOPS WORKING?	page
	22

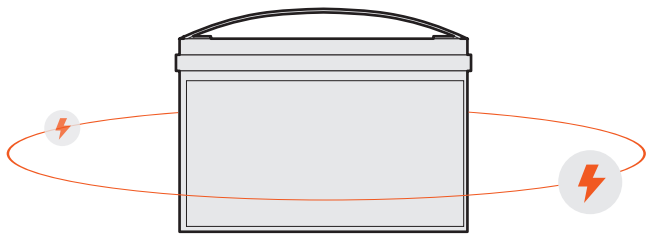
BATTERY-PACK MAIN PARAMETERS

Cell	Prismatic LiFePO4 Battery
Nominal Capacity	100Ah
Usable Capacity	100Ah
Nominal Voltage	12.8V
Energy	1280Wh
Charge Method	CC / CV
Charge Voltage	14.4V±0.2V
Recommend Charge Current	20A (0.2C)

Battery Management System (BMS) Board	100A
Max. Continuous Charge / Discharge Current ^①	100A
Max. Discharge Current 5 Seconds	280A
Max. Continuous Load Power ^②	1280W

- ① The maximum continuous current that the battery can withstand.
- ② The maximum continuous output power that the battery can support.

Cycle Life	≥4000 times
Internal Impedance	≤40mΩ
Battery Pack Case	Acrylonitrile Butadiene Styrene (ABS) Plastic
Protection Class	IP65
Dimension	L13 * W6.77 * H8.43 inch
	L329 * W172 * H214 mm
Temperature Range	Charge: 0°C to 50°C / 32°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



THINGS TO KNOW BEFORE USING

Always **put on the insulating covers** on the post bolts to avoid metal or conductive objects touching the positive and negative terminals of the battery at the same time, otherwise it is likely to cause a short circuit.

Install the battery upright with post bolt facing up, and it could not be mounted upside down. If you need to mount the battery at its side, please contact service@amperetime.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.

This battery is not intended to be used to start any devices, please **DO NOT use it as a starting battery.**

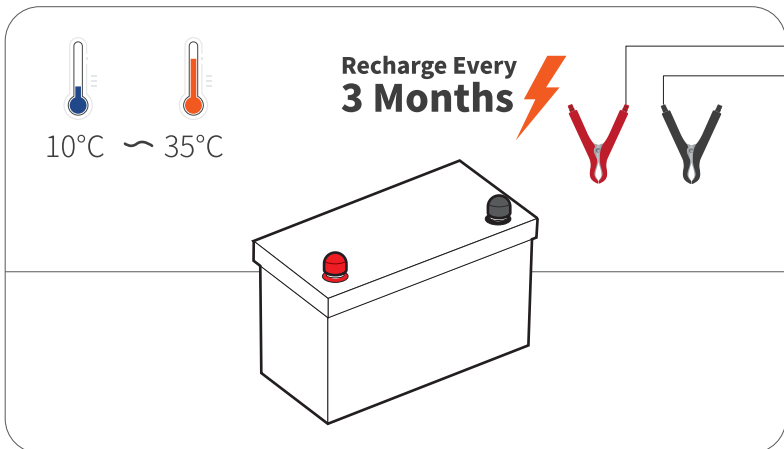
Suggestions for **Long-term Storage**:

○ 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.

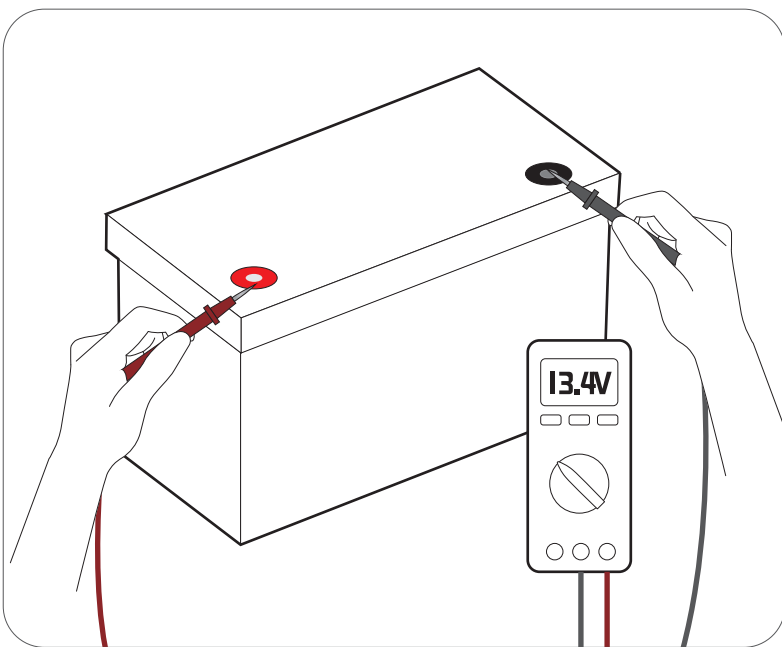


CHARGING METHODS

THE VOLTAGE WHEN CHARGING & DISCHARGING

Based on the characteristics of Lithium Iron Phosphate (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.

If you need to test the real voltage of the battery, please disconnect all the connections to the battery and test its voltage after putting it aside for over 30 mins.



■ Tips When Testing The Battery Voltage by A Multimeter

- ① Put the red probe (+) tightly on the positive terminal (not the post bolts), and the black probe (-) on the negative terminal.
- ② Do not touch the metal part of the probes with your hands during use.

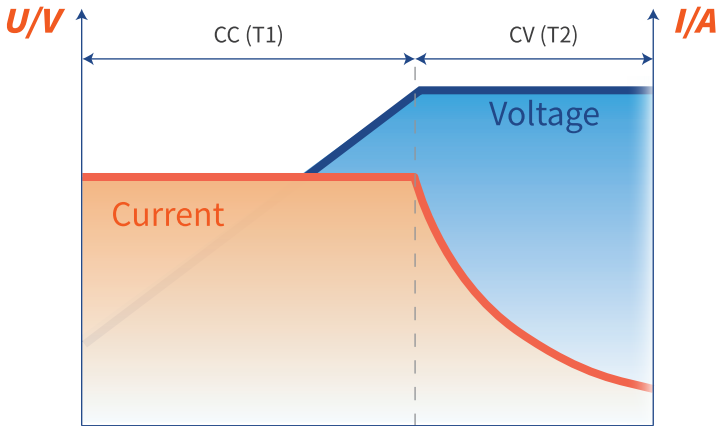
BATTERY CHARGING LOGIC

The material characteristics of the LiFePO₄ battery determine that its charging curve is obviously different from that of a lead-acid battery.

Compared with a lead-acid battery, the LiFePO₄ battery has a simpler charging process and mode. Therefore, it is recommended to select LiFePO₄ for your charging mode.

If LiFePO₄ mode is not available, please refer to the recommended parameters on Page 07~08 for setting.

LiFePO₄ Battery Charging Mode



LiFePO₄ Battery Charging Curve

○ CC (Constant Current) Phase (T1)

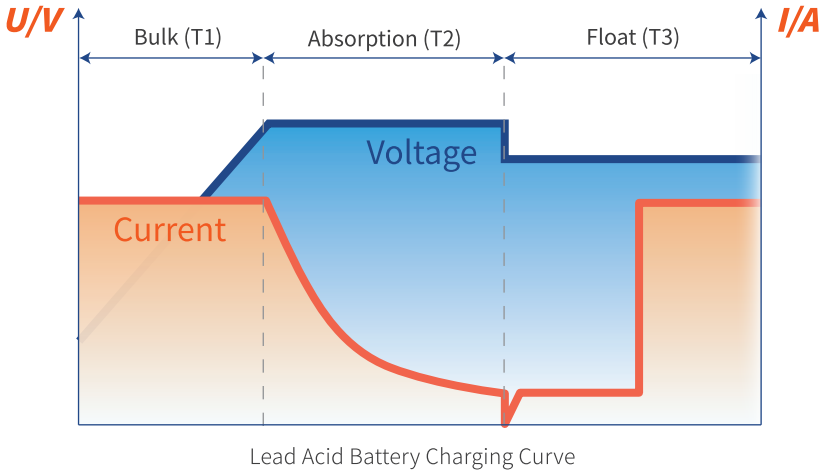
In the beginning, a discharged battery will be charged with a constant current and voltage will be climbing steadily until reaching the constant voltage setpoint which varies for different charging methods.

○ CV (Constant Voltage) Phase (T2)

The battery maintains a constant voltage during this phase while the current gradually decreases to 2A (0.02C) which is also known as tail current^①. At this point, the charging is cut off and the battery is fully charged.

① Tail Current (A) = Battery Capacity * 0.02C. E.g., 100Ah*0.02C= 2A tail current.

Lead Acid Battery Charging Mode



○ Bulk / Boost Phase (T1)

In the beginning, a discharged battery will be charged with maximum current and voltage will be climbing steadily until reaching the absorption voltage setpoint.

(This phase is basically equivalent to the CC phase of LiFePO₄ battery charging.)

○ Absorption Phase (T2)

The battery reaches the absorption voltage setpoint and holds the voltage constant while the current gradually decreases until the battery is becoming full (within 10-20%). Generally, absorption will not exceed 3 hours to prevent overcharging.

(This phase is basically equivalent to the CV phase of LiFePO₄ battery charging.)

○ Float Phase (T3)

After the absorption stage, the voltage of the battery will reduce to the float voltage setpoint and the current will also reduce to a low maintenance mode to prevent the battery from discharging and offsetting any self-discharge. Heavier battery discharge may set the controller back to Bulk/Boost or Absorption to replenish energy lost while energy is available.

(LiFePO₄ battery does not have this charging phase.)

SOLAR PANEL(S) & CONTROLLER

Solar Panel

☆ Recommend Power: $\geq 300\text{W}$

- The battery can be fully charged in one day (with effective sunshine 4.5hrs/day) by 300W solar panels.
- It may take more than one day to fully charge the battery by $\geq 300\text{W}$ solar panels since the duration and intensity of light would be a great factor for their charging efficiency.

Controller

☆ Recommend Charging Current:

20A (0.2C)	The battery will be fully charged in around 5hrs to 100% capacity.
50A (0.5C)	The battery will be fully charged in around 2hrs to around 97% capacity.

☆ Recommend Charging Mode: **12V (14.6V) 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 (refer to Page 05-06), **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	14.4V / 14.6V
	Absorption Voltage	14.4V / 14.6V
	Over Voltage Disconnect	15V
	Over Voltage Reconnect	14.2V
	Tail Current	2A (0.02C)
DIS-CHARGING	Under Voltage Warning	11.6V
	Under Voltage Recover	12V
	Low Voltage Disconnect	10.8V
	Low Voltage Reconnect	12.4V

BATTERY CHARGER

Use 14.6V lithium iron phosphate (LiFePO4) battery charger to maximize the capacity.

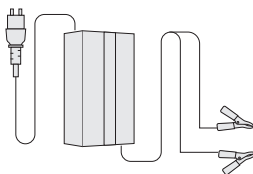
☆ Recommend Charging Voltage: Between 14.2V to 14.6V

☆ Recommend Charging Current:

20A (0.2C)	The battery will be fully charged in around 5hrs to 100% capacity.
50A (0.5C)	The battery will be fully charged in around 2hrs to around 97% capacity.

Tips

- ① Connect the charger to the battery before connecting it to the grid power in case of sparks.
- ② It's recommended to disconnect the charger from the battery after fully charging.



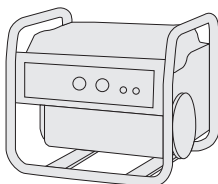
ALTERNATOR / GENERATOR

Ampere Time battery can be charged by an alternator or generator, and it needs to connect a DC to DC charger between the battery and the alternator or generator.

☆ Recommend Charging Voltage: Between 14.2V to 14.6V

☆ Recommend Charging Current:

20A (0.2C)	The battery will be fully charged in around 5hrs to 100% capacity.
50A (0.5C)	The battery will be fully charged in around 2hrs to around 97% capacity.



HOW TO ESTIMATE THE BATTERY CAPACITY

STATE OF CHARGE (SOC)

The battery capacity could be roughly estimated by its rest voltage (not charging/discharging voltage). As there are subtle differences in the voltage of each battery, the below parameters are for reference only.

Rest Voltage: The voltage needs to be tested at rest (with zero current) after 30 mins of disconnecting from the charger & loads.

CAPACITY	CHARGE VOLTAGE
100%	13.5V
99%	13.4V
90%	13.3V
70%	13.2V
40%	13.1V
30%	13.0V
20%	12.9V
10%	12.8V
1%	☆ 10.8V (recommend low voltage disconnect voltage)
0%	9.5V

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).

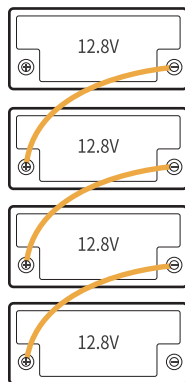
LIMITATION FOR SERIES/PARALLEL CONNECTION

Support connecting up to 4 identical batteries for up to:

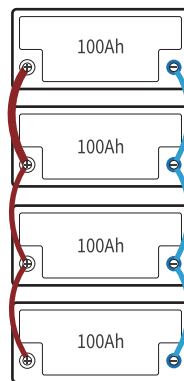
48V (51.2V) 100Ah battery system (when in series)/

12V (12.8V) 400Ah battery system (when in parallel).

Series Connection
48V(51.2V) 100Ah



Parallel Connection
12V(12.8V) 400Ah



HOW TO CONNECT BATTERIES

Accessory Recommendation

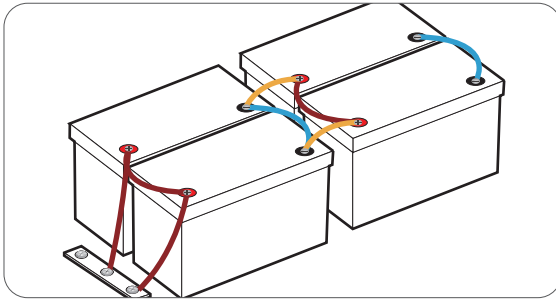
- Battery-to-Battery Connection Cable: 6AWG Copper Cable
- Total Input & Output Connection: Adding two copper bars^① except for the cables.

Step
1

Refer to [Page 14-16](#) to finish your battery-to-battery connection.

Step
2

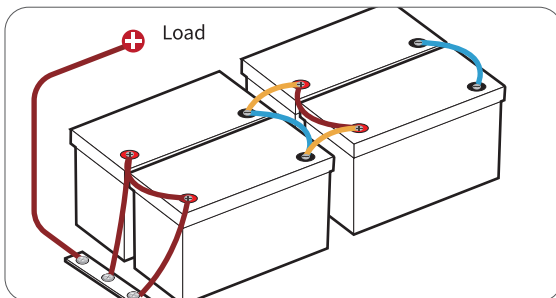
Connect all the positive output cables of the batteries to one copper bar.



(If the positive (+) of the battery is connected to the negative (-) of other batteries (i.e. in series connection), the + cannot be connected to the copper bar, otherwise the battery system will fail to connect in series.)

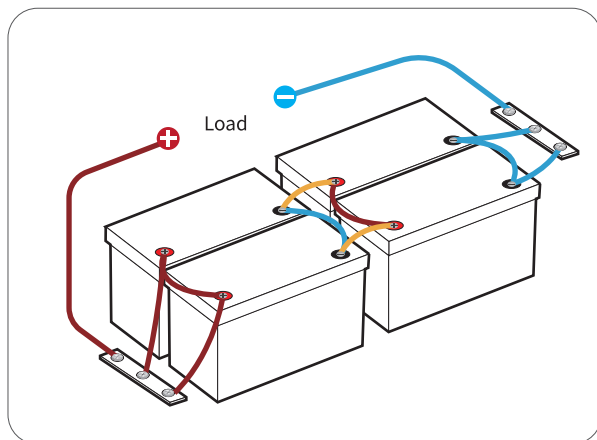
Step
3

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



Step
4

The  of the battery system and load are also connected to another copper bar following the above steps.

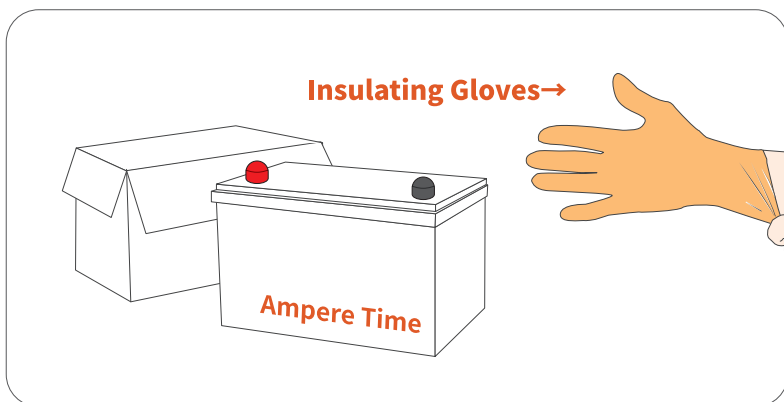


- ① Copper Bar: Flat metal made of copper. It can help ensure the input & output currents of each battery are balanced

Copper is recommended as it has better conductivity, and the conversion efficiency of the input & output currents for the battery will be higher.

| Step1 Wear Insulating Gloves

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

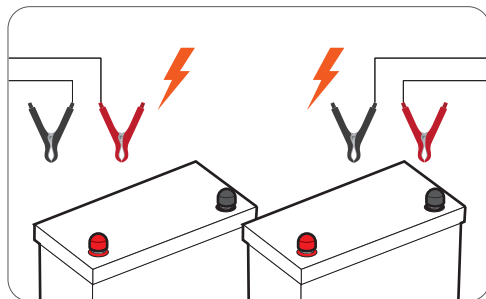


Step2 Voltage Balancing Before Connection

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.

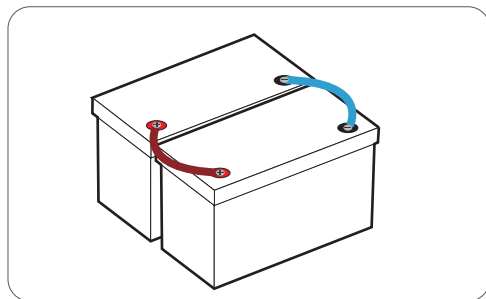
Step
1

Fully charge the batteries separately.
(voltage at rest: $\geq 13.4V$)



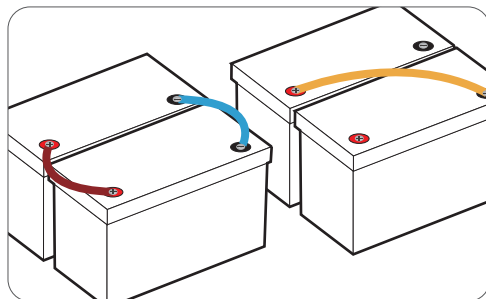
Step
2

Connect the batteries one by one in parallel, and leave them together for 12~24hrs.



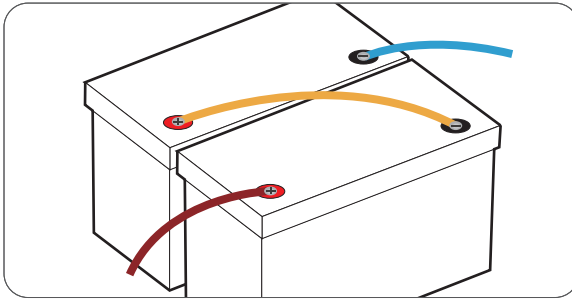
Step
3

They can then be connected in series or parallel.



Step3 Battery-to-Battery Connection

○ #1 Connect Batteries in Series



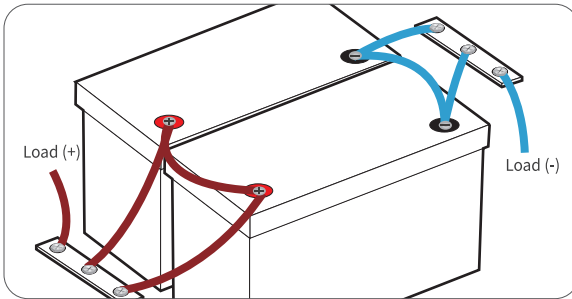
After series connection, the voltage of the battery system will be doubled according to the number of batteries you connect.

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

○ #2 Connect Batteries in Parallel



Refer to Page 11 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.

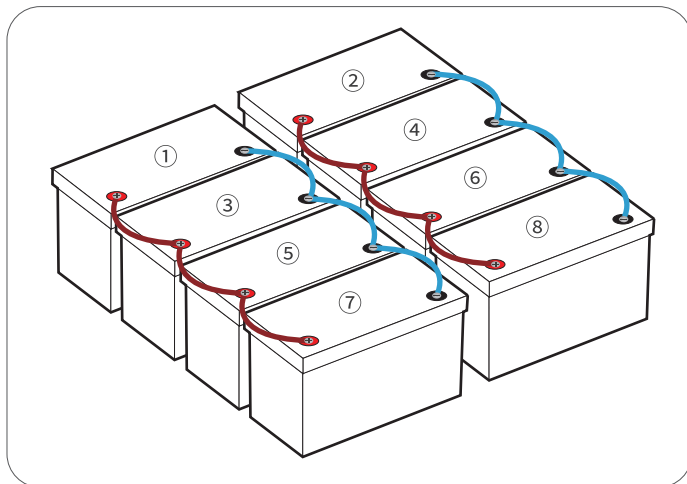
E.g. If two 12V 100Ah batteries are connected in parallel, the battery system will be 12V (12.8V) 200Ah.

○ #3 Connect Batteries Both in Series & Parallel^①

Optimal Connection Method Recommendation

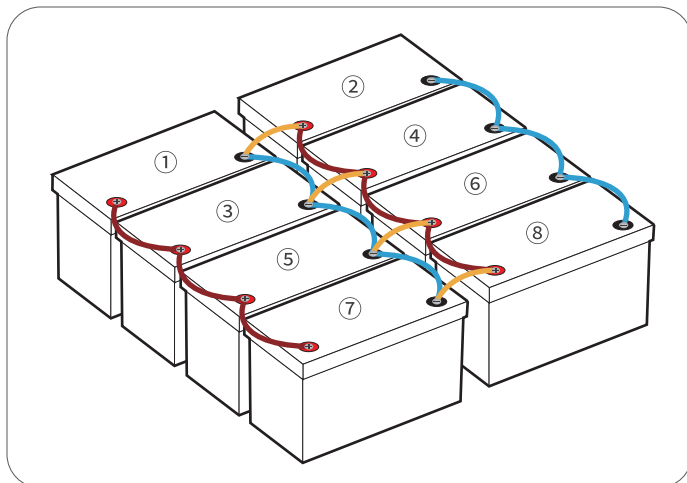
Step
1

Connect the batteries in parallel.



Step
2

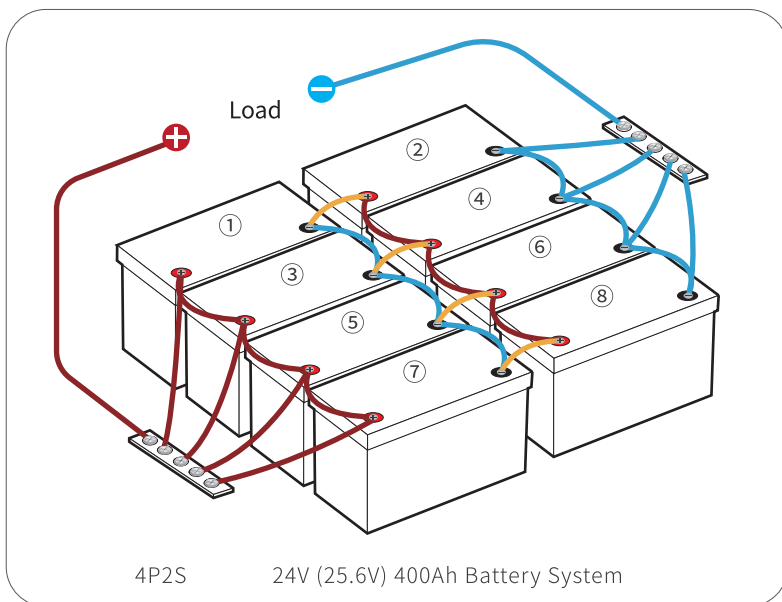
Connect the paralleled battery systems in series.



Step
3

- ① Connect the positive **+** of battery ① / ③ / ⑤ / ⑦ to a copper bar and the **+** of the load to the same copper bar. And then connect the negative **-** of ② / ④ / ⑥ / ⑧ to another copper bar and the **-** of the load to the same copper bar.

Refer to [Page17-19](#) for 2S2P, 2P4S battery system wiring diagram.



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

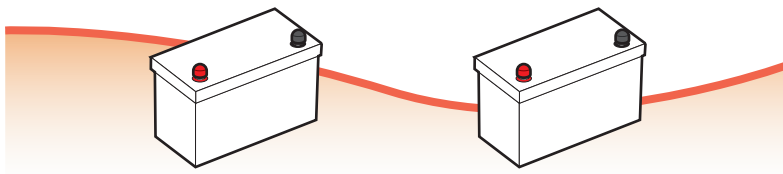
- ① A battery system with both series and parallel connections can be achieved only when the number of batteries is ≥ 4 and even.
- ② To connect as in Step ③ is recommended to ensure that the input & output currents of each battery are balanced to achieve a more stable battery system with greater performance.

It is not recommended to use one cable to connect the + or - of the battery system and the load. If the total output or input current of the battery system is too large, the connected single cable may heat up or even melt.

- ③ Please do not connect in reverse order, which may affect the use of the batteries.

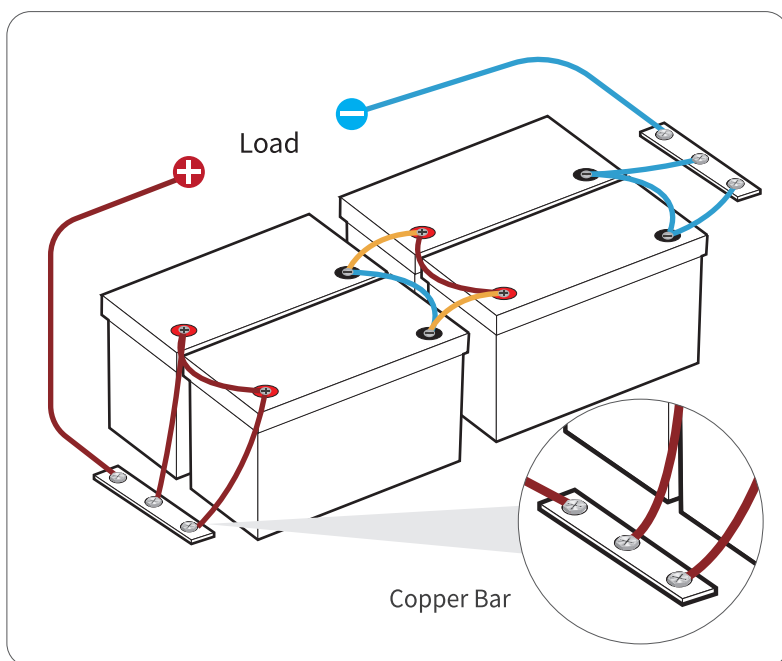
Step 4 Rebalancing Every 6 Months

It is recommended to rebalance the battery voltage every six months following Step 2 on Page 13 if you're connecting multiple batteries as a battery system, as there might be voltage differences after six months of the battery system running.

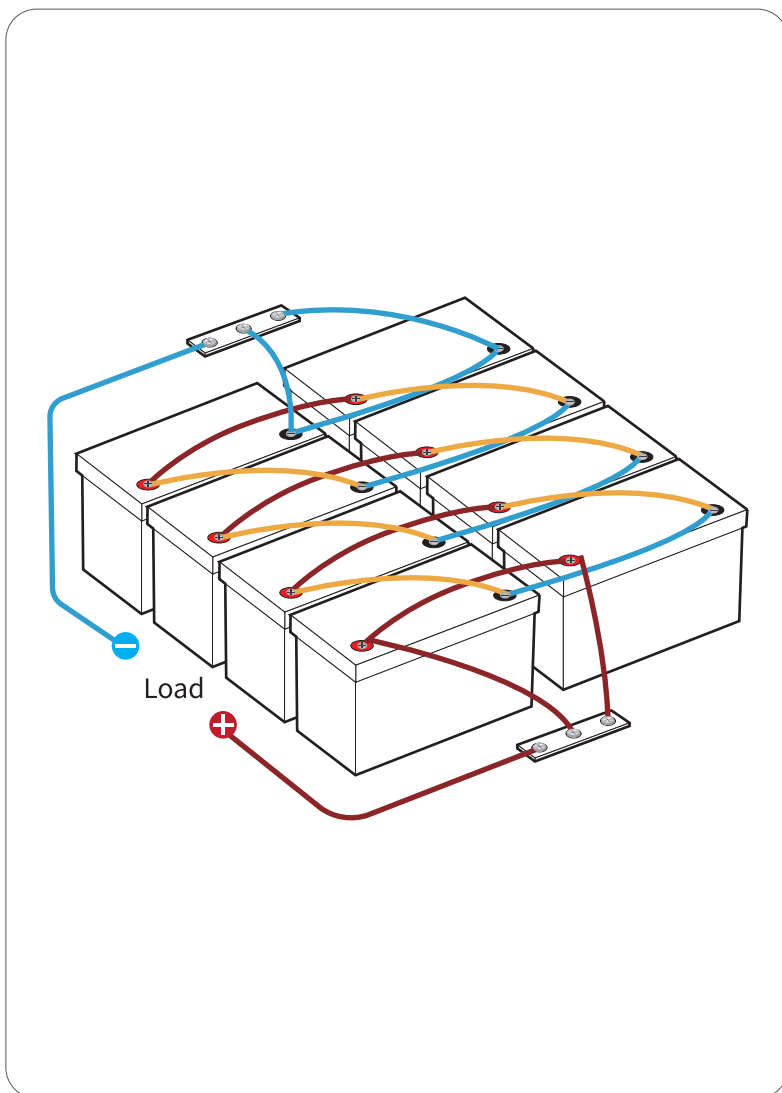


Wiring Diagrams

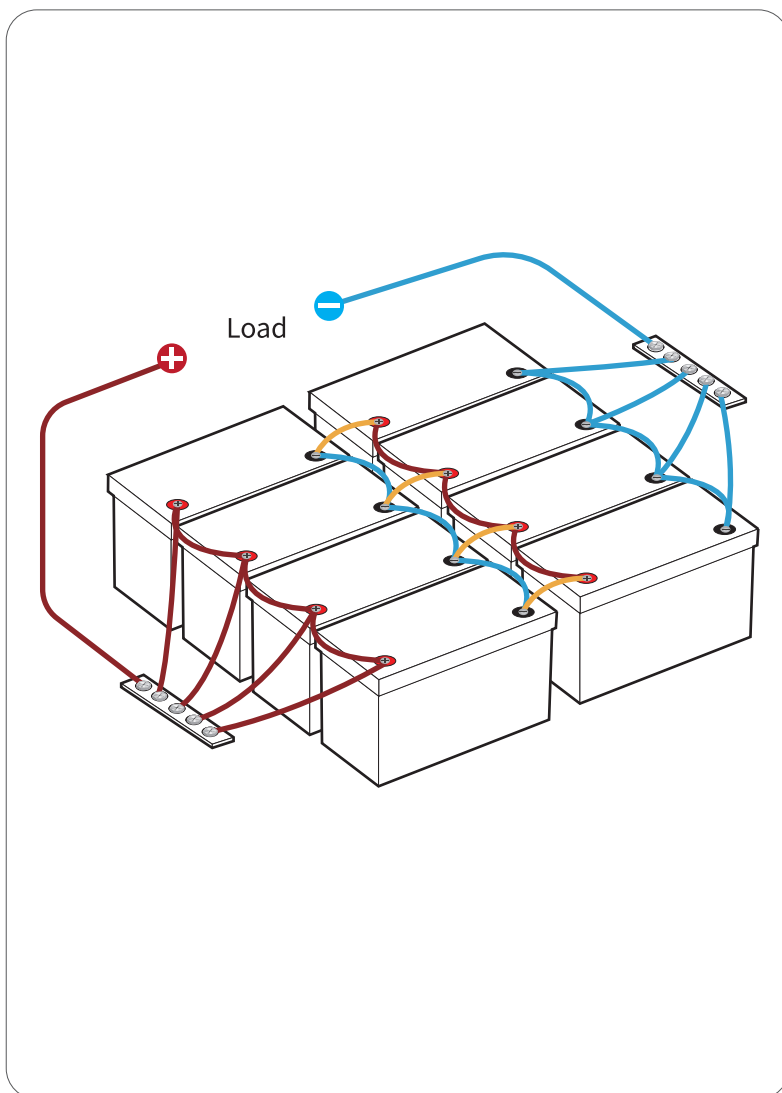
2P2S	Battery System	24V (25.6V) 200Ah
	Energy	5120Wh
	Max. Continuous Charge / Discharge Current	200A
	Max. Continuous Load Power	5120W



2P4S	Battery System	48V (51.2V) 200Ah
	Energy	10,240Wh
	Max. Continuous Charge / Discharge Current	200A
	Max. Continuous Load Power	10,240W



4P2S	Battery System	24V (25.6V) 400Ah
	Energy	10,240Wh
	Max. Continuous Charge / Discharge Current	400A
	Max. Continuous Load Power	10,240W



| Create Your Unique Wiring Diagram

Plan for your connection



Share with us
your innovative ways to connect batteries

INVERTER SETTINGS

METHOD ONE (RECOMMEND)

Select “[12V \(14.6V\) LI \(LiFePO4\) Mode](#)”

METHOD TWO

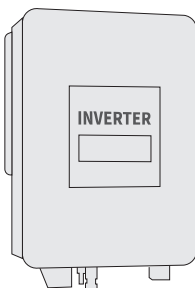
If method one is not available, select “User Mode” to enter values according to below parameters.

CHARGING	Charge Voltage	14.6V
	Over Voltage Disconnect	15V
	Over Voltage Reconnect	14.2V

DIS-CHARGING	Under Voltage Warning	11.6V
	Under Voltage Recover	12V
	Low Voltage Disconnect	10.8V
	Low Voltage Reconnect	12.4V

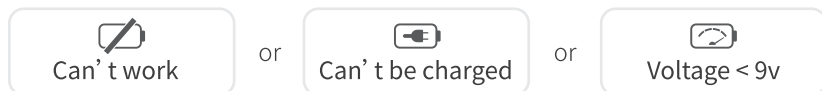
The above setting parameters **apply to common inverters on the market** (such as Victron, Renogy, Growatt, Xantrex, Go Power, Lux Power, etc.). Different brands have slightly different descriptions or naming methods for each parameter. **Please directly set the parameters with the same meaning.**

If the inverter parameters to be set are special or cannot correspond to one of the above items, please contact service@amperetime.com for confirmation.



WHAT TO DO WHEN THE BATTERY STOPS WORKING?

When the battery



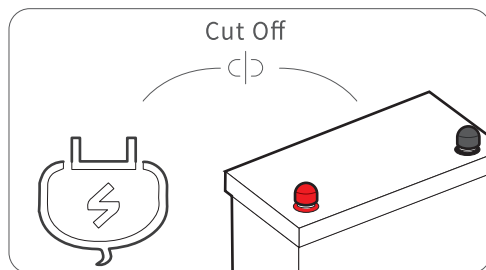
It has 85% chances that BMS has shut it off for protection, and you could try one of below ways to activate the battery.

GENERAL STEPS

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

Step
1

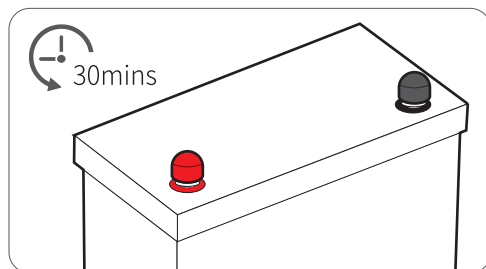
Cut off all the connections from the battery



Step
2

Leave the battery aside for 30mins

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

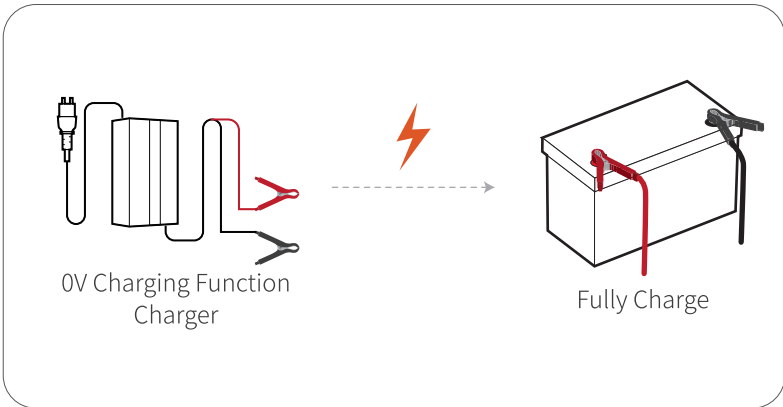


If the battery is unable to recover itself after the above steps, please try activating by **ONE OF BELOW TWO METHODS.**

After activated (voltage > 10V) and fully charged by the normal charging method, it can be used normally.

Method ①

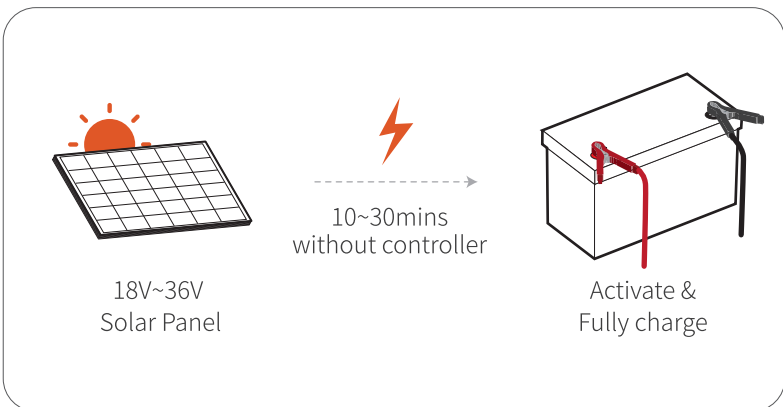
Use a charger with a 0V charging function^① to fully charge the battery.



① The charger can charge the battery starting from 0V.

Method ②

Connect an 18V~36V solar panel directly to charge the battery without a controller for 10~30mins in sunny daytime.



ATTENTION

Caution: Risk of Fire, Explosion or Burns

DO NOT Short circuit

DO NOT Reverse connections from the charger to the battery

DO NOT Disassemble

DO NOT Throw into fire or incinerate

DO NOT Heat above 70°C / 158°F

WARNING

BATTERY DISPOSAL

The electrodes of the waste battery should be wrapped with insulating paper to prevent fire and explosion.

PROHIBITION OF DISASSEMBLY

Never disassemble the cells.

The disassembling may generate an internal short circuit in the cell, which may cause gassing, firing, explosion, or other problems.

The electrolyte is harmful.

Li-Fe battery should not have liquid from electrolyte flowing, but in case the electrolyte comes into contact with the skin, or eyes, physicians shall slush the electrolyte immediately with fresh water and medical advice is to be sought.

PROHIBITION OF DUMPING OF CELLS INTO WATER

Do not soak the battery in which the liquid, like water, seawater and non-alcoholic drinks, fruit juice, coffee or other drinks.

PROHIBITION OF DISASSEMBLY

If any abnormal features of the cells are found such as damages in a plastic envelope of the cell, deformation of the cell package, smelling of an electrolyte, an electrolyte leakage and others, the cells shall never be used anymore.

The cells with a smell of the electrolyte or a leakage shall be placed away from the fire to avoid firing or explosion.

PROHIBITION OF USING IN BELOW PLACES

Do not use the battery in a place with strong static electricity and a strong magnetic field, otherwise, it is easy to damage the battery safety protection device and bring hidden danger.



Ampere Time



www.amperetime.com

Shenzhen Ampere Time Technology Co., Ltd



service@amperetime.com



technicalsupport@amperetime.com