

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 (8.35)	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:

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

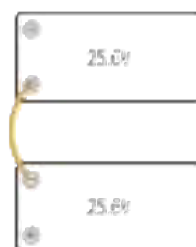
LIMITATION FOR SERIES/PARALLEL CONNECTION

Support connecting up to 8 identical batteries for up to:

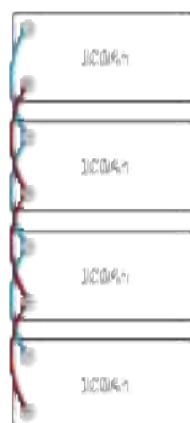
2 in series as 48V (51.2V) battery system/

4 in parallel as 400Ah battery system.

Series Connection
48V(51.2V) 100Ah



Parallel Connection
24V(25.5V) 400Ah



HOW TO CONNECT BATTERIES

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

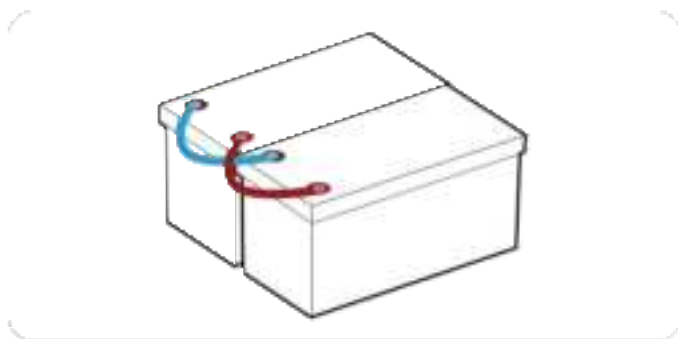
Below two steps are necessary to reduce the voltage difference between batteries and let the battery system perform the best of it in series or/and in parallel.

Step
1

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

Step
2

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



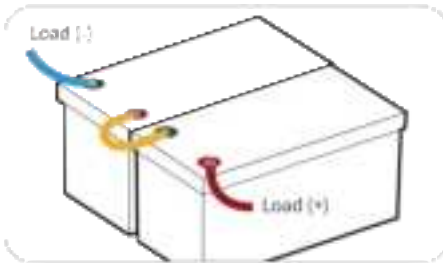
Step
3

They're now ready for the connection.

I Step3 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.

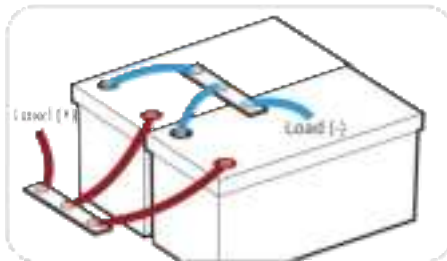
E.g. If two 24V 100Ah batteries are connected in series, the battery system will be 48V (51.2V) 100Ah.

○ #2 Connect Batteries in Parallel

+ to **+**

- to **-**

Refer to Page 11 for total input & output connection



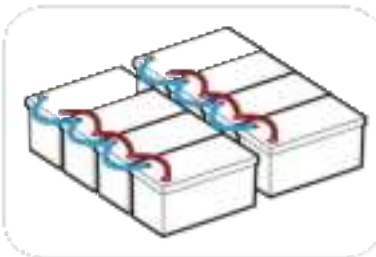
After parallel connection, the **capacity** of the battery system will be doubled according to the number of batteries you connect.

E.g. If two 24V 100Ah batteries are connected in parallel, the battery system will be 24V (25.6V) 200Ah.

○ #3 Connect Batteries Both in Series & Parallel ⁰⁰

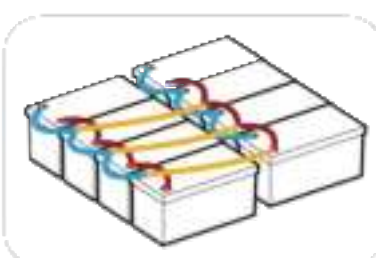
Connect in parallel first, then series.

Step
1



Connect the batteries in **parallel**.

Step
2

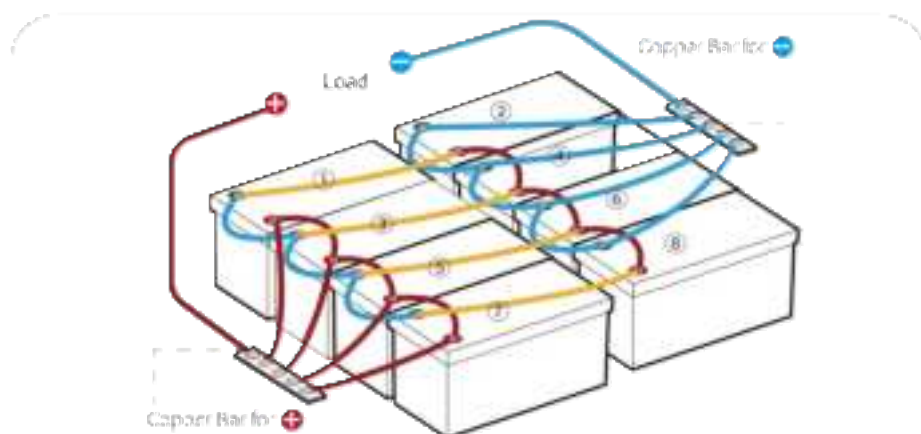


Connect the paralleled battery systems in **series**.

Step4 Total Input & Output Connection

Use two **copper 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.



4P2S	Battery System	48V ($\pm 1.2V$), 400Ah
	Energy	20,450Wh
	Max. Continuous Charge / Discharge Current	400A
	Max. Continuous Load Power	20,450W

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.

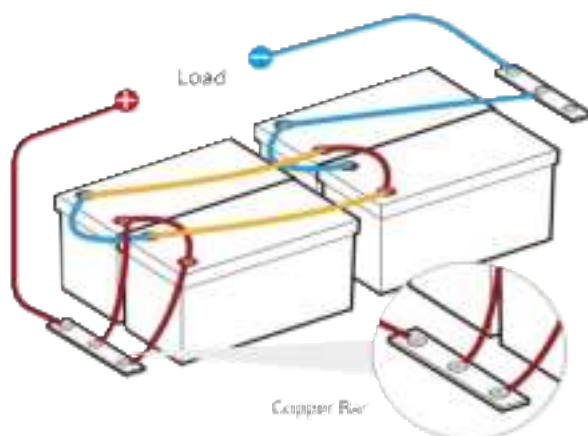
Step 5 Rebalancing Every 6 Months

It is recommended to rebalance the battery voltage every six months following Step 2 on Page 9 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

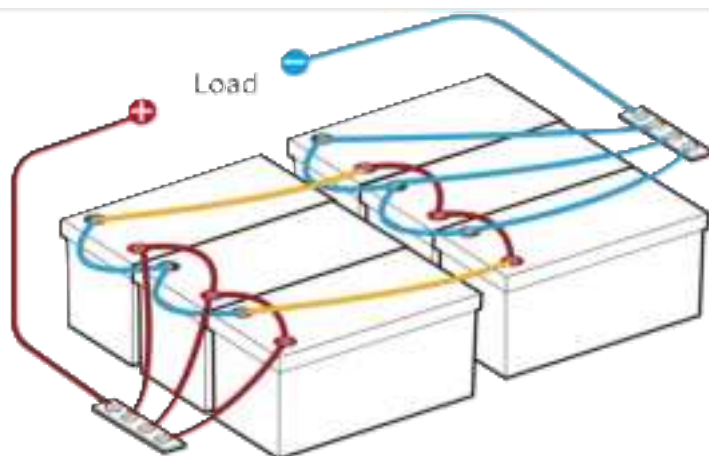
2P2S

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



3P2S

Battery System	48V (51.2V) 300Ah
Energy	15,360Wh
Max. Continuous Charge / Discharge Current	300A
Max. Continuous Load Power	15,360W



WHAT TO DO WHEN THE BATTERY STOPS WORKING?

When the battery



Can't work

or



Can't be charged

or



Voltage < 18v

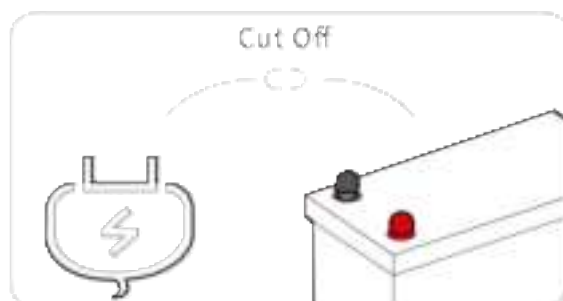
It has 85% chances that BMS has shut it off for protection, and you could try one of below ways to activate the battery.

GENERAL STEPS

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

Step
1

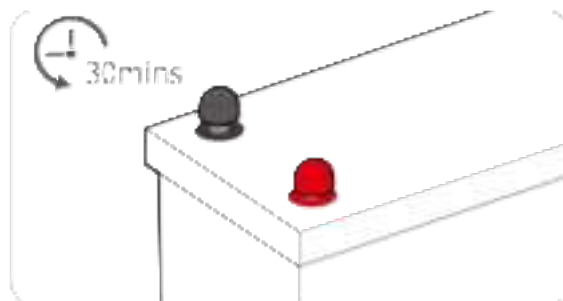
Cut off all the connections from the battery



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

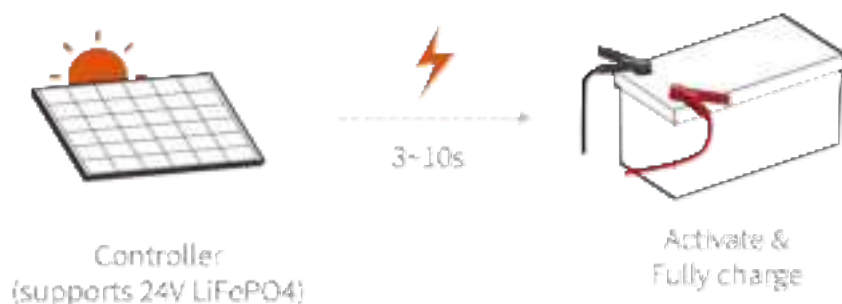
Use a charger with a 0V charging function ① to fully charge the battery.



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

Method ②

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



Li Time

Originate from Ampere Time

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