



## **LiFePO<sub>4</sub> battery installation instructions**

---

# 1 Installation

## 1.1 Orientation

Batteries can be installed in an upright position or on their sides but must not be installed upside down.

## 1.2 Short circuit protection

### Single battery installation

The battery must be protected by a fuse or circuit breaker.

### Series connection

Up to four batteries can be series connected.

The string of batteries must be protected by a fuse or circuit breaker.

### Parallel or series parallel connection

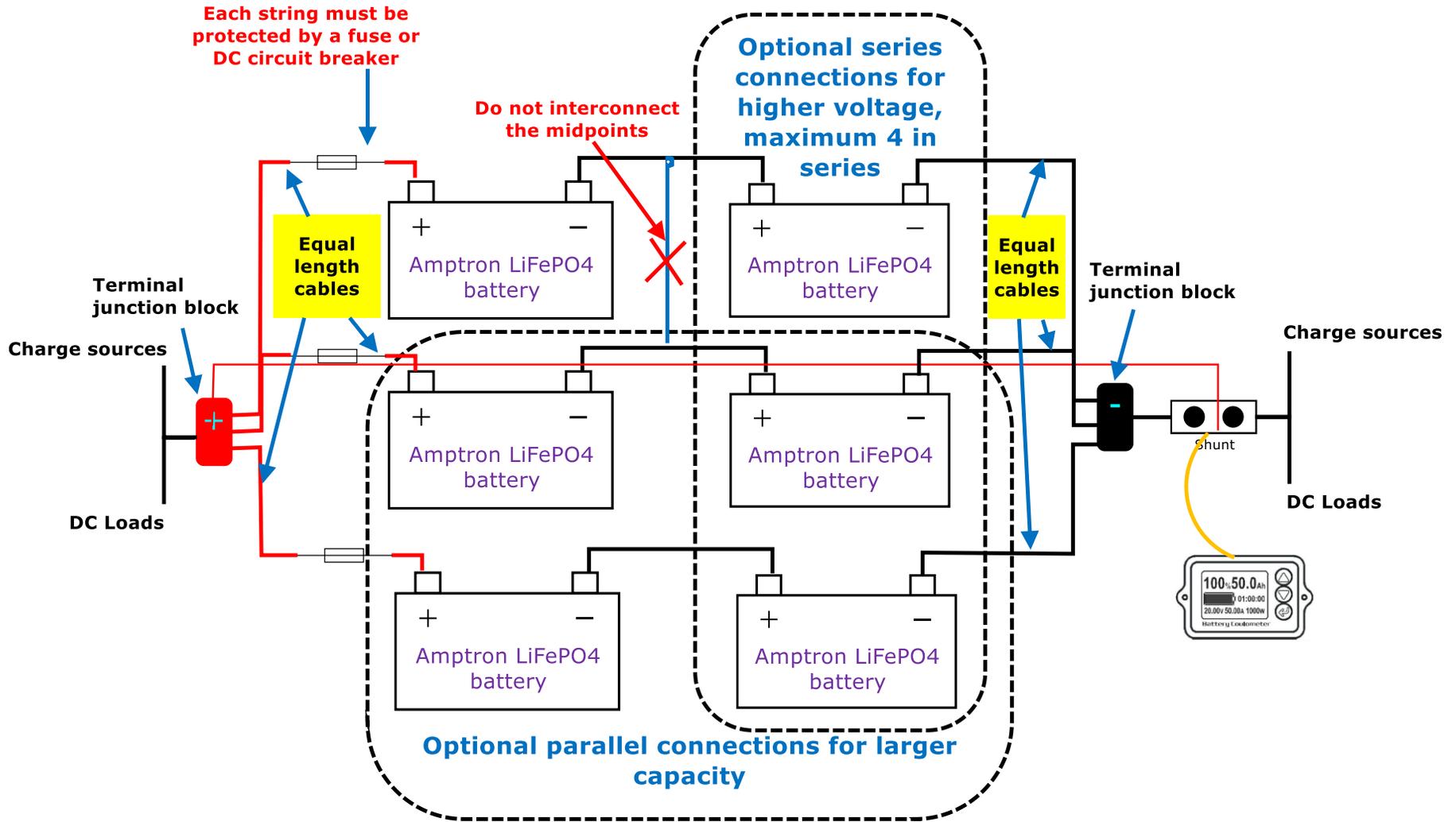
Several batteries or strings of batteries can be parallel connected. However, a maximum of 4 parallel connected batteries or strings of batteries is recommended to be charged by a single charger. For larger sets, it is recommended to use a separate charger for each set of up to 4 batteries or strings of batteries.

**PLEASE NOTE: Each battery or string of batteries must be protected by a fuse – See figure 1.**

## 1.3 Wiring

For more than 2 batteries or strings of batteries in parallel, it is recommended to run equal length battery cables from a common bus bar or terminal junction box in order to minimise imbalances arising across the bank over time - See figure 1.

Figure 1: System example with Coulometer



---

## 2 Charging batteries before first use

The batteries are approximately 50% charged when shipped.

When charging series connected batteries, the voltage of the batteries or cells with the highest initial state of charge will increase when reaching the fully charged state, while other batteries or cells may lag behind. This may result in over voltage on the batteries or cells with the highest initial state of charge, and the charge process will be interrupted by the BMS.

**We recommend to fully charge new batteries first before using them in a series or series-parallel configuration.**

This can best be done by individually charging the batteries with a charger.

Parallel connecting the batteries and simultaneous charging is also possible. In this case every battery must be protected by a fuse and the recommended charge rate is  $C/20$  or less, with  $C$  being the capacity of one of the paralleled batteries.

---

## 3 Operation

### 3.1 Cell Balancing

Each battery consists of internal cells assembled in a series-parallel configuration. The internal cell balancing system will measure the voltage of each cell and divert an increasing part of the charge current when cell voltage exceeds 3.6V, which will balance the cells.

Note: it follows from the above that the batteries must be regularly (recommended at least once every month) charged to at least  $4 \times 3.6\text{V} = 14.4\text{V}$  (for a nominal 12V system. For higher voltage systems, multiply this by the number of multiples of 12V e.g. for a nominal 12V system, multiply by 2) in order to internally balance the cells.