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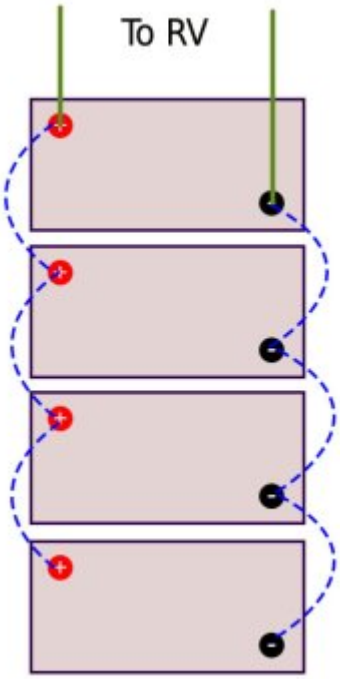
How to interconnect multiple batteries

When connecting multiple batteries in parallel, it’s essential to consider the interconnect resistance between them. This resistance can affect the overall performance and lifespan of your battery system.

The ohm rating of a 3/0 battery cable can vary depending on the application and the manufacturer. However, as a general rule, a 3/0 AWG (American Wire Gauge) cable typically has a resistance of ~0.012 ohms per foot.

Method 1

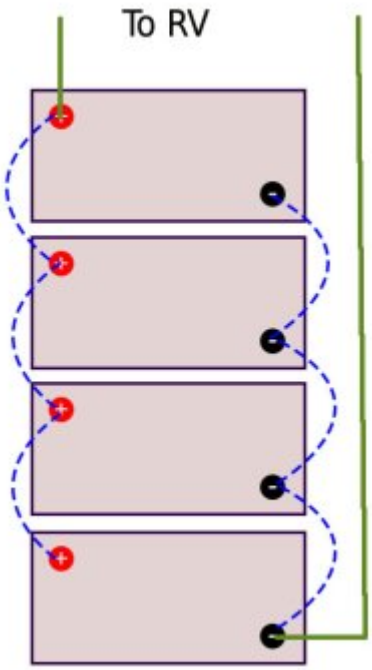


In this (not recommended) method, the connections to the main installation are all taken from one end.

Typically the batteries are linked together with 3/0 battery (welding) cable. 3/0 copper cable has a resistance of ~0.012 Ohms per foot so an 8inch length between each battery will have a resistance of 0.008 Ohms. Add onto this the 0.0002 Ohms for each connection interface (i.e. cable to crimp, crimp to battery post etc.) and we find that the resistance between each battery post is around 0.009 Ohms.

The power coming from the last battery only has to travel through the main connection leads. The power from the next battery up has to travel through the same main connection leads but in addition also has to travel through the 2 interconnecting leads to the next battery. The next battery up has to go through 4 sets of interconnecting leads and so on. So in this wiring, the top battery will be providing much less current than the bottom battery, almost 1/2 as much due to the resistance increases of getting to each battery.

Method 2

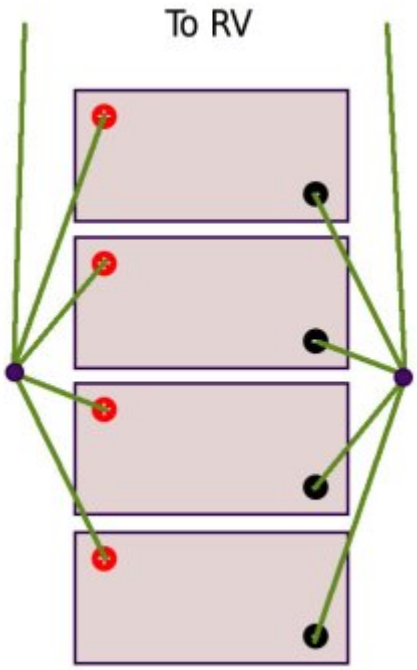


All that has changed in this this method is that the main feeds to the rest of the installation are taken from diagonally opposite posts.

It is simple to achieve but the difference in the results are enormous for such a simple change. It does not matter which lead (positive or negative) is moved, what is important is they pull from opposite ends. This results in a more consistent resistance from load to each battery, with the two end batteries providing the most current (amps) and the two middle batteries ~10% less.

Although not perfectly balanced for loading (or charging) this is acceptable in many cases.

Method 3



This may look more complicated, but its simple to achieve. It does requires two extra interconnects links and two buss bars or terminal posts

It is important that all wires are the **same** length (NOTE: the image fails in this regard) in order to maintain equal resistance between each battery and the load. Once all cables are the same length, the amp draw from each battery will be the same. When using sensitive / expensive or high numbers of batteries, this extra effort will be worthwhile.

Continued Reading:
What is the best method of connecting multiple batteries
Start Battery Wiring Modification
How to correctly interconnect multiple batteries to form one larger bank.