How to Configure a Battery Bank

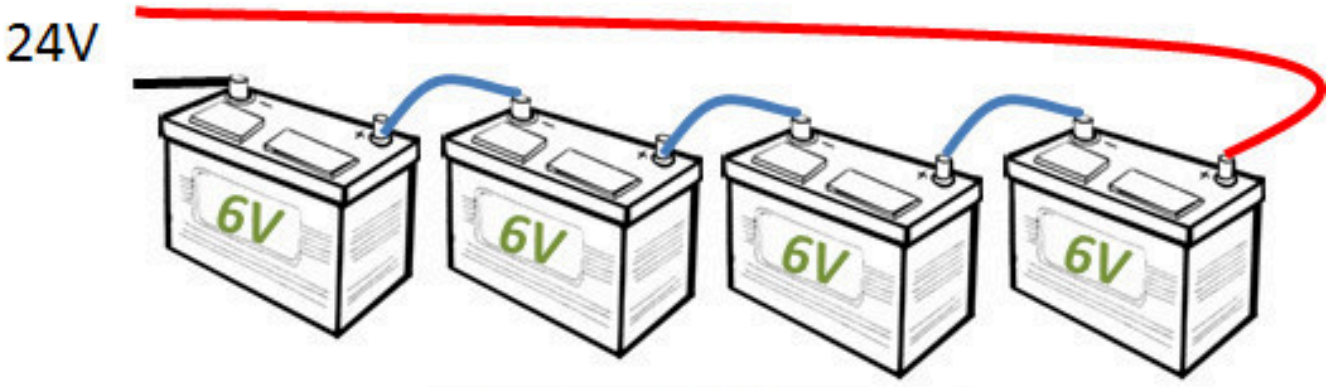
Batteries store electrical energy in the form of a charge. For most off-grid PV systems the battery bank is configured as 12 volts or 24 volts.

Batteries used for such systems are usually made up of either:

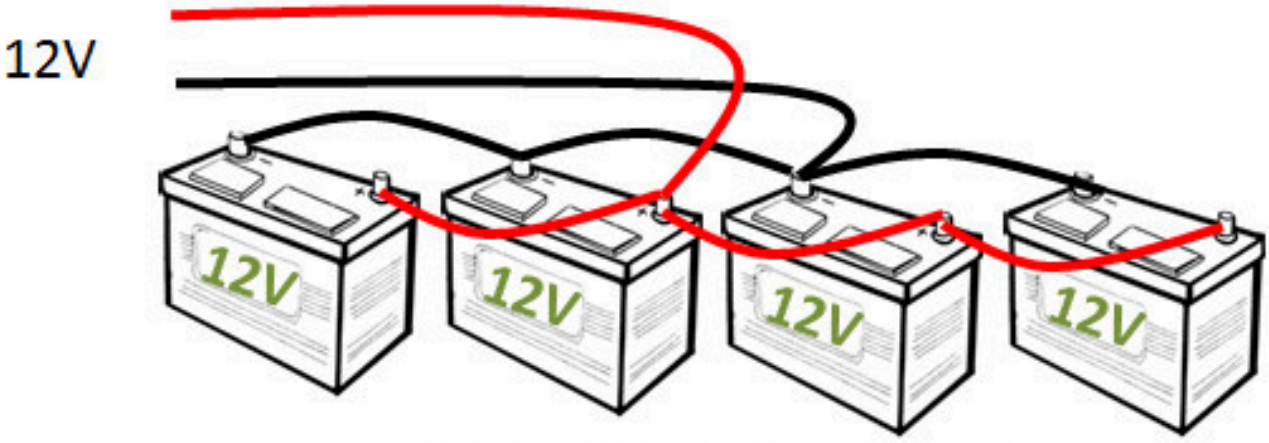
• 6 volt lead-acid batteries, common in electric golf cart applications
• 12 volt lead-acid batteries, such as deep-cycle/marine batteries

It’s important that all the batteries be of the same type and condition if possible. This improves both the safety and performance of the battery bank.

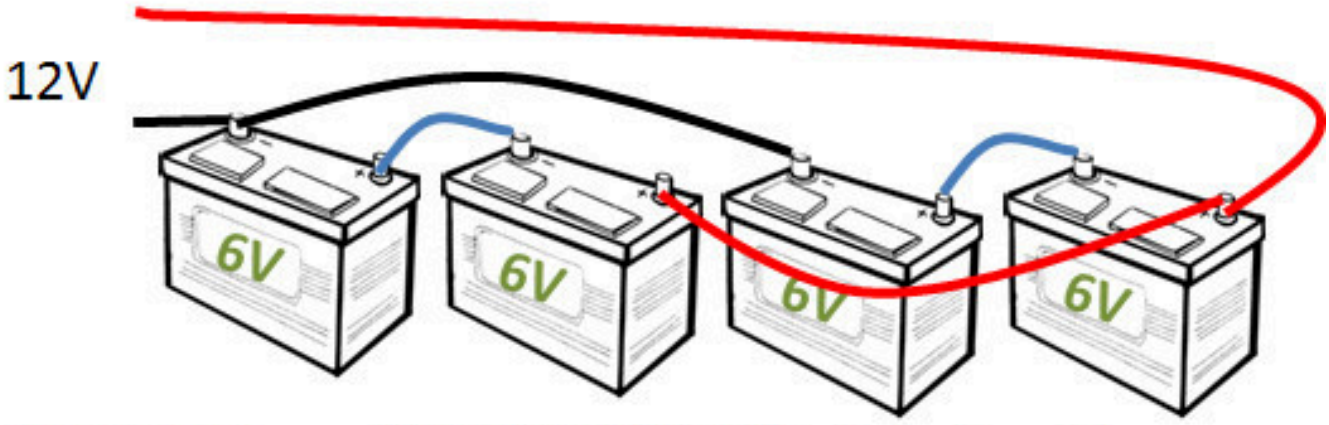
Battery banks are also configured with series, parallel, or a series/parallel connections to achieve the desired battery bank voltage, such as 12V or 24V.



24 Volt BATTERY BANK - Series



12 Volt BATTERY BANK - Parallel



12 Volt BATTERY BANK – Series/Parallel

Series connections

Series connections involve connecting the POSITIVE (+) connection of one battery to the NEGATIVE (-) connection of the next battery. The NEGATIVE (-) of the first battery and the POSITIVE (+) of the last battery in the string are used for the connections to your charge controller and/or DC-to-AC inverter.

Parallel connections

Parallel connections involve connecting the POSITIVE (+) connection of one battery to the POSITIVE (+)

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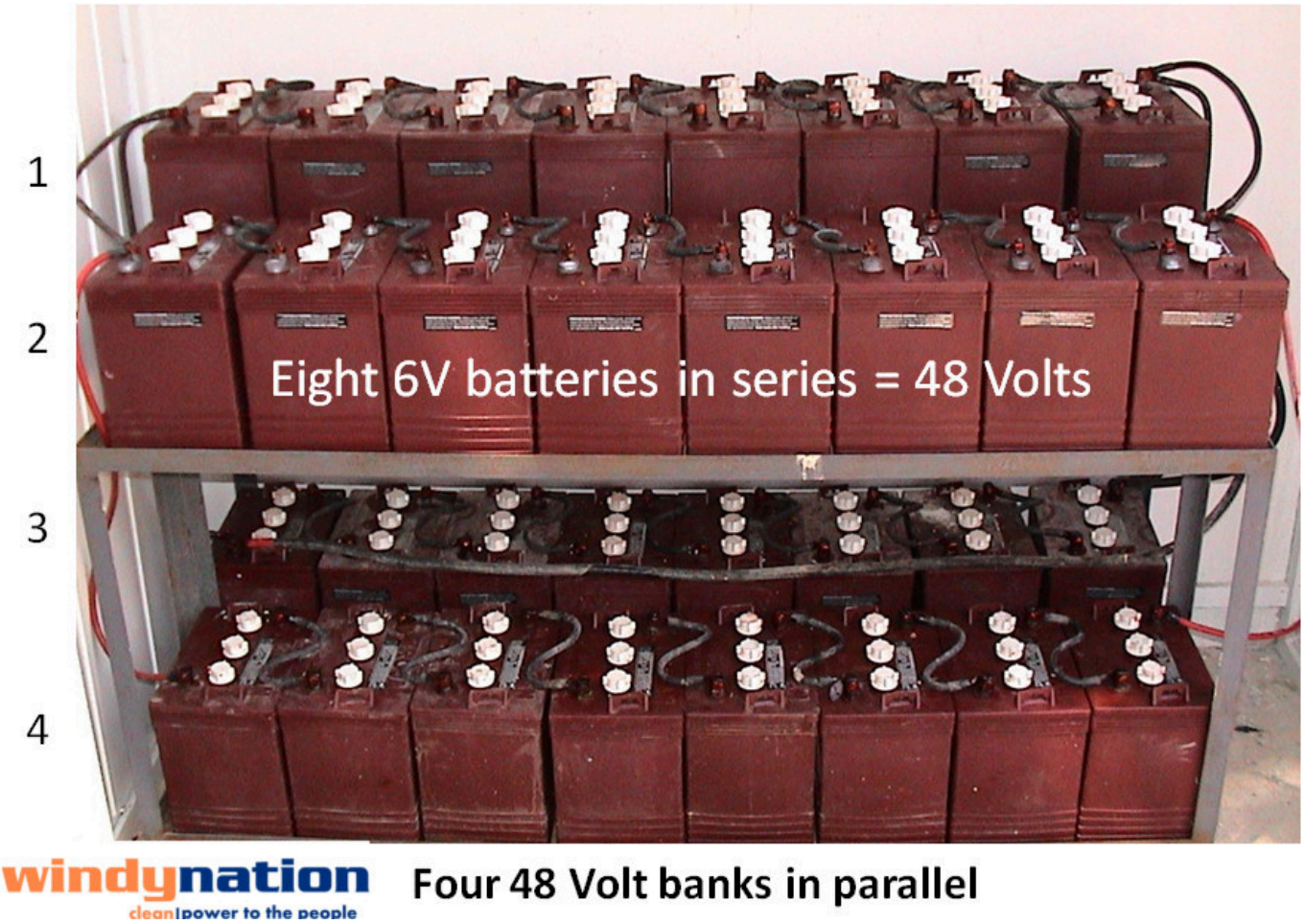
connection of the next battery. The same goes for the negative side; NEGATIVE (-) of the first battery connects to the NEGATIVE (-) of the next battery. You can connect the POSITIVE (+) of your charge controller and/or DC-to-AC inverter to any POSITIVE (+) point in the battery bank, though it is best to make this connection in the middle of the set of batteries rather than from one end (as shown). Same goes for the negative side; connect the NEGATIVE (-) of your charge controller and/or DC-to-AC inverter to any NEGATIVE (-) point in the battery bank, though a point in the middle is best.

By making the system connection in the middle of the battery bank, the charging and discharging cycles are done in a balanced way. If the system connections are made on the ends, then more charge will flow into the first battery and less flow into the last battery. When discharging, the first battery will discharge first and the last battery in line will discharge last. This is not good for the life of a battery bank.

Series/Parallel connections

In some cases, several batteries need to be connected in a series set to achieve the desired system voltage, and then placed in parallel with an identical serial set. This is very typical when 6-volt batteries are used. Much like in the parallel-only case, the connection to the system is ideally done at the center of the battery bank so that charging and discharging is done in a balanced way.

Large battery banks



Shown above is a typical 48V battery bank made up of a series/parallel connection of 6-volt batteries.

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