
Don't use a Relay to charge a Litium Battery

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Why can't a Relay be used to charge a Lithium Battery?

The great growth of the market for lithium batteries as a source of energy in leisure vehicles, either newly implemented or by replacing the old GEL or AGM batteries, is at the same time generating a sea of doubts for users in the sense of how these new batteries should be charged and treated.

Queries such as can I replace my GEL battery with a Lithium one without further ado? Does the load relay I already had installed for my new LiFePO4 work for me? They come to us almost daily and there is a great lack of information about it.

Today we want to focus on clarifying one of the biggest doubts...

Can I use a Charging Relay with a Lithium battery?

The answer directly is NO. The use of a split-load relay or a voltage-sensitive relay (VSR) with a lithium battery is not recommended; In fact, we wouldn't recommend these older technologies for charging any deep-cycle (leisure) batteries now, but for lithium batteries it's a particularly bad idea.

Lithium iron phosphate (LiFePO4) batteries, which are the predominant type of lithium battery for leisure applications, require a precise and carefully controlled charging process. A split charge relay or VSR is essentially an electromechanical switch that connects the alternator regulator to the leisure battery, via the vehicle's starter battery, so that it will simply pass current through the leisure battery at whatever voltage the regulator supplies.

Now, firstly, these regulators emit either a fixed voltage (in older alternators) or a highly variable voltage (in the case of newer "smart" alternators), and secondly, there is no compensation for the voltage drop in the wire that carries the current to the leisure battery. Consequently, the voltage that the battery ends up receiving will almost certainly not be what the battery manufacturer recommends.

With this, you can see that when using a split charging relay or VSR, there is no control over the charging voltage in the lithium battery, which means that there is no control over the charging process, which in the best case scenario can reduce the battery life and lead to poor charging and, In the worst case, it could severely damage the battery or worse.

Lithium batteries have a much higher energy density than lead-acid batteries, so uncontrolled charging poses a higher risk of fire, and in the worst-case scenario, a fire in a lithium battery is much more difficult to fight than a lead-acid one.

In short, using a split charge relay or VSR is simply not a safe or viable option for charging a lithium battery. A DC-DC (battery-to-battery) charger also called a "booster" with a dedicated lithium configuration that has the proper voltage and current controls, along with a reliable battery management system (BMS, either integrated into the battery or standalone), are critical to maintaining the longevity and safety of a lithium power system when charging from a vehicle's alternator.