

USING CHARGERS AND INVERTERS



CHARGERS

There is some confusion about what type of charger can be used when charging your Invicta LiFePO₄ lithium battery. Many people assume that a charger used for a traditional lead acid battery will do the job on a lithium battery as well. And that assumption to a point is correct, however, it is not the best option.

Let's delve a bit deeper, shall we?

Lithium batteries are made up of multiple internal sealed cells and a battery management system that controls and monitors these cells. Electronic controls are generally called a BMS (Battery Management System). The BMS manages the cells during the charging process, unlike a lead-acid battery where the battery is 'seen' as one cell. LiFePO₄ batteries require an appropriate charge for maximum battery life. Generally speaking, a constant current will flow until the battery reaches 90-95% of its state of charge (SOC). Once that point is reached, the current will reduce, while the voltage

will do the opposite, rising to a cut off voltage of a theoretical 16.8V (but in reality around 14.7V).

A charging profile is a reference to the way voltage and current vary during a full charge of a battery, and it does differ depending on the type of battery, because they are functionally dissimilar and constructed in different ways. For example, a LiFePO₄ battery has voltage around 13.3-13.4V at full charge. At 20% capacity, a lead acid battery will have a voltage around 11.8V, whereas a lithium battery will hold its voltage at approximately 13V. Without getting too technical, the LiFePO₄ battery has a much smaller voltage tolerance and, because of that, the 'trickle' charge of the deep-cycle battery does not apply. And that means a LiFePO₄ battery can be charged faster while minimising the risk of overcharging.

In discharge cycle, or when powering a load, a chemical reaction takes place that causes electrons to flow between the

positive and negative electrodes via the battery electrolyte. A charger reverses that chemical reaction, thus, recharging the battery. A typical charging voltage for a 12V battery varies between 12.9V and 14.1V. While a constant voltage and current will charge a battery quickly, it's considerably better for a deep-cycle battery's health if a 'trickle' charge is used over a longer period of time. Multi-stage chargers are considered best for this purpose. To enjoy a more reliable power source when camping, you need a dedicated lithium battery charger to ensure you maintain an economical battery life and get the best out of your lithium battery.

INVERTERS

An inverter is a device that changes direct current (DC) to alternating current (AC), and is necessary in RVs and campers to convert 12V DC into 240V AC, in order to use household electrical appliances, such as kettles, hairdryers, coffee machines and microwaves. When using an inverter, the run time of an inverter powered by batteries is totally dependent on the battery power, and the amount of being drawn from the inverter. The more equipment using the inverter will decrease its run time.

It is important to match the right size inverter with the right size battery. There is little point in using a 5KW inverter alongside a 100 or 125 Amp/h as the battery will run down too quickly and go into sleep mode. For a 100 or 125 Amp/h lithium battery, depending on the devices that you are running while touring, we recommend using a 1200W inverter for a 12V battery. This will equate to one hour run time at full capacity. Of course, if you're paralleling batteries, you'll get an extended run time.

In short, not all chargers and inverters are created equal. Our recommendation is to be ever mindful of the appliances that you're using, and for how long you're running them, and your inverter and charger will look after all your power needs while off-road.