

Charging Lithium Batteries with Lead Acid Chargers

Charging a RELiON or ALLiON lithium battery (i.e. LiFePO₄) is not significantly different to charging any other type of battery. These batteries require a similar Boost and Absorb (also known as constant current and constant voltage) approach to charging as used with lead acid batteries. This is not really surprising as these batteries have been designed as a drop in replacement for deep cycle lead acid batteries.

What *is* different is the voltage profile required to charge them correctly. Lead acid batteries are more forgiving when it comes to voltage variations whereas lithium charge voltages are more critical. This is why lithium batteries have an integrated BMS to manage their voltage and keep them in the correct operating range.

When it comes to charging voltages, the RELiON and ALLiON products differ slightly:

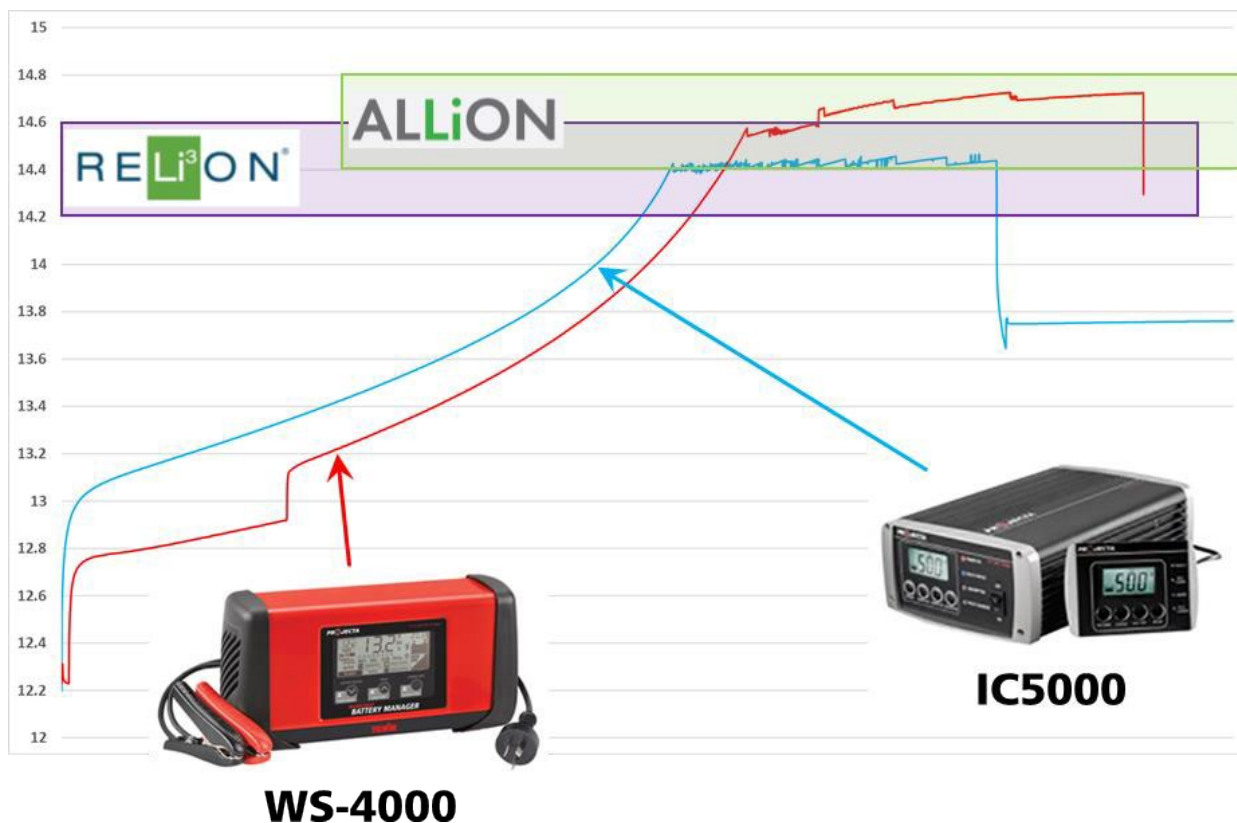
	Min. Voltage	Max. Voltage
RELiON	14.2V	14.6V
ALLiON	14.4V	14.8V

Wherever possible, a lithium battery should be charged using a charger with a lithium profile however there is an alternative.

The nominal charge voltage for an AGM battery is 14.1-14.4V, which means that using a lead acid battery charger set to use the AGM setting will work correctly in most cases. A good example of this is the Projecta IntelliCharge series. These chargers have a maximum charge voltage of 14.4V for AGM and will charge a 12V lithium battery without issue.

Another charger used in some of our branches is the Projecta WS-4000. This is the red charger which Projecta source from TELWIN. There have been a couple of instances where staff have used a WS-4000 to charge a RELiON battery and it has ended when the BMS has isolated the battery. After monitoring this charger it was found that it charges AGM batteries at 14.7V. This higher charge voltage will trigger the RELiON over voltage protection before it is fully charged, resulting in a partially charged battery.

The following graph shows the charge profile of the two chargers being discussed here. The charge voltage range for both Allion (green band) and RELiON (purple band) have also been added. You can clearly see that the IntelliCharge voltage is OK for both battery brands however the WS-4000 voltage is too high for the RELiON product and will trigger the BMS into voltage protection when it exceeds 14.6V.



When selling a lithium battery, it is important that you discuss battery charging with the Customer. In most instances using a lead acid charger set to AGM will work fine however explaining the voltage limits will help them understand what is required. Providing them with a copy of the Product Data Sheet for the battery they have purchased is a good way to ensure the Customer is aware of the battery specifications for charging and discharging.

Lithium batteries are always shipped at or below 30% SoC, so we must charge the battery before supplying it to a Customer.