

Battery Maintenance

Always fully charge a new battery with mains or solar charger before discharging any power from it!

5 Main Points for Maintaining Your Battery:

- Always try to keep your battery above 50% State of Charge (SoC) under normal use
- Do not leave batteries deeply discharged (80% or more) for any length of time
- Keep the batteries in a cool, dry place if possible - colder/hotter batteries degrade quicker
- When storing for one month or longer, make sure the battery is fully charged and check regularly
- Get a [Battery Monitor](#) to check battery voltage and exact State of Charge

Lead-acid batteries come in various types, that offer different performance characteristics for a variety of applications. It is important to choose the correct battery, for your application, but we will concentrate on leisure batteries for solar applications.

Battery life is described in 'cycles': one full cycle is a single discharge and charge cycle, say from 100% down to 50% and back up to 100% SoC. Most solar applications will see a single cycle per day but this depends on the owner's loads and usage. Lead-acid batteries should not be left in a discharged state for long periods of time, and ideally should be stored at full charge. The batteries will self-discharge by about 5% per month if left unattended, so they should be monitored and kept charged - a small solar panel is a great way to do this!

As a general rule, lead-acid batteries should not be discharged below 50%. If discharged further, it will reduce the number of cycles the battery will be able to perform. Discharging further still will make it very difficult to recharge at all. A battery regularly discharged by 70% will not offer the same performance level and usable capacity as a battery only regularly discharged by 30% over the same period of time. So a balance must be struck between the regularly used capacity and the overall expected longevity of the batteries.

A 12V battery is actually 12V nominal. This means at full charge the battery will sit at anywhere between 13.5V and 14.5V. Battery voltage decreases as the capacity is drawn off, and the battery is approximately 50% discharged at around 11.5-12V (depending on age and type). Below this the voltage begins to drop off much more quickly and the lead plates begin to sulphate which causes damage. So discharging the battery much below 12V is not recommended.

For charging, three voltages are of importance:

- **Bulk** - the main charge phase, allowing as much current as possible up to around 85% capacity
- **Absorption** - the next stage that kicks in at a higher fixed voltage, designed to stir the electrolyte and top off the charge
- **Float** - a stage with no current, a fixed voltage, and at this point the battery is at full charge, without overcharging or self-discharging.

If the battery is regularly allowed to get below 10V then put it on a **recovery charge**. This is a low current charge for a long period of time at absorption voltage. Some chargers have a specific mode for this. It won't bring the battery back to new, but it'll help. Best thing is to not let the battery drop below 11V.

Car and vehicle starter batteries are generally not suitable for cycling and providing/storing power, as they're designed to provide a huge current surge to start the engine and be charged at fixed voltage from the alternator, but not to store large amounts of power and provide a constant supply. Deep cycle batteries are just lead-acid batteries that have a better cycle performance life and depth than starter and general purpose leisure batteries.



Battery Types Available from Midsummer Energy

Maintenance Free (Sealed)

Simple maintenance free leisure batteries, more or less the same as what are used on motorhomes/caravans and some small boats, are the most common on the market. They are not actually 'sealed' and should be kept upright else they can leak through their vent valves. Life expectancy is typically 2-3 years under normal use.

We supply [Shield Marine maintenance free leisure batteries](#) - 1 year manufacturer warranty

Flooded

Standard flooded batteries must be kept upright so the electrolyte (acid) doesn't spill out. These have removable caps and can be topped up with de-ionised water if the electrolyte level gets too low, which can happen under very warm operating conditions. Maintaining them in this way is recommended to get the best performance life and is necessary for the guarantee. If maintained properly the life of these batteries can range from 3-4 years all the way up to 7-10 years for higher end, larger capacity units.

Our [Crown and Rolls flooded batteries](#) are perfect for deep cycling solar applications.

(Crown - 1 year warranty; Rolls - 7 year manufacturer's warranty)

AGM

AGM batteries offer superior cycle depth to other lead-acid batteries. Discharging by 70-80% will have a less detrimental effect on the cycle life compared to regular lead-acid batteries, however they will still last longer if only discharged by 50% for example. Because these batteries have the electrolyte suspended in a fibreglass matt and are sealed they can be installed on their side if needs be making them useful for tight spaces.

[Victron and Rolls AGM batteries](#) are perfect for remote power supplies where maintenance is near impossible.

(Victron - 2 year manufacturer warranty; Rolls AGM - 2 or 5 year warranty)

Gel

The performance of gel batteries is very similar to AGM and are suitable for similar applications.

[Haze gel batteries](#) are good value and offer great performance for small off-grid systems such as shed lighting.

Lithium-Ion

More rugged, lighter and efficient than lead-acid batteries - they also allow more charging flexibility too. This maintenance guide does not cover these, as the performance characteristics from fluctuating temperature and excellent cycling performance means they can be treated slightly differently to standard lead-acid.

[Victron LiFePO4](#) are the lithium batteries that we keep in stock - 2 year manufacturer warranty.