

Kiravans Guide to Campervan Leisure Batteries



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Introduction

Kiravans has years of experience in sourcing, using and selling the materials for building campervans. Before we started the website, we were a campervan rental company with a large fleet of home built vans.

We have worked with various different suppliers and their materials over the past 2 decades to find the batteries that we think do the job well at a reasonable cost. We thought we would share our knowledge with you, to help you with your decision making process.

The Mysterious World of Campervan Electrics

The first thing to say is that Kiravans are not electricians. We know our way around simple van electrics, but we are not qualified to instruct you on the wiring requirements for your van. If you are looking for people who can advise you about the best way to wire your van and all of its electrical accessories then there are lots of YouTube videos out there that will give you much better advice than we can, but ultimately, if you are unsure, you should probably find a qualified electrician who can do it for you.

Leisure batteries are a big subject all on their own. It is possible to get completely lost in the science behind the various battery technologies and how they perform under very specific conditions. We do understand that for many, the world of leisure batteries can be more than a little daunting. The aim of this guide is not to go into the fine detail, but to simplify the terminology to help you get a basic understanding of the different batteries available, so that you can make an informed choice for your purchase. It is primarily aimed at moderate use campers rather than those living year round in their vehicle.

Typical Use:

- Occasional off-grid nights with
- Up to 3-4 weeks of holidays per year, and
- Up to 7 or 8 weekends away between April to October

If you are planning extended off-grid excursions, all of the material is still relevant to you, but you will also need to think more seriously about your solar requirements, energy efficiency and device management. If you are an electrical engineer, the terminology will certainly be oversimplified for you, but you probably don't need this document!

What is a Battery?

In simple terms, a battery is a storage container for some chemicals which create an electrical current when they react with each other. The reaction can be reversed by supplying power to the device, restoring the charge to the battery.

Batteries come in all shapes and sizes and can be produced for very specific purposes depending on the requirements of an electrical device. Some devices require a very small electrical current for a very long time, while others require a much greater current for a shorter time. As such, battery choice should be very much focussed on finding the right tool for the job you need it for.

In a campervan, these requirements can vary depending on how much time you plan to spend off-grid, and which devices you may wish to power in your vehicle. So what should you look for? First you need to understand the terminology.

Terminology

Capacity (Ah)

Batteries have varying capacities and you need to think about how many devices you need to be running and for how long. A typical battery might have a capacity of 100 Ah (Amp hours), but what does this mean?

A battery rated as 100 Ah roughly means that, in theory, it can power a 1 Amp device for 100 hours. The theory is far from the reality though, due to a number of complicating factors as outlined below.

Recharging Cycles

A battery's recharging cycle rating indicates how many times you should be able to discharge/recharge it during its lifetime. This is true for all rechargeable batteries such as those in your mobile phone, wireless headphones, or an electric car. It is important to note however, that not all batteries are the same. Each device is designed for a specific purpose and as a result, they will behave slightly differently.

In the case of campervan leisure batteries, each unit has an expected number of recharge cycles before it will need to be replaced and this can be as little as 30-100 cycles, or as much as 700-5000 cycles for some battery types.

This number is a really important factor in your battery selection. You can find many batteries in the 100-140 Ah range, and they will all provide you roughly the same amount of power output to last you through the night on an off-grid camp. If you need more capacity to last the night, or extended time off-grid, you should buy a battery with greater capacity, or add more batteries to the circuit to meet your consumption requirements. The number of times you can recharge and camp off-grid again will however be limited by the indicated number of cycles available from your chosen battery.

To put it another way, the more you plan to spend life off-grid, the greater the number of cycles you will want your battery to be able to endure before it needs replacing.

Just as the official fuel consumption figures for any vehicle are dependent on your driving style, the specified number of cycles you will get from a battery are heavily dependent on how you use and maintain your battery. This is particularly true in relation to depth of discharge.

Depth of Discharge (DoD)

In a single use battery, such as for children's toys, you discharge the battery fully and hopefully then send it for recycling. A rechargeable battery allows you to put energy back into the unit to restore it and use it again. Rechargeable batteries do not last forever and have a finite number of cycles, but the way you use and recharge the battery can have a significant impact on its lifespan.

The deeper the battery is discharged each time, the fewer number of recycle charges it will accept over the lifespan of the unit. For most leisure batteries on the market, it may only be advisable to discharge **half** of the capacity before recharging. The battery will allow you to discharge the system flat, but the deeper you allow the battery to be discharged the fewer the number of available recharge cycles. It pays to keep your battery charged up as best you can, but you should also be careful not to overcharge it.

Battery Storage

You need to think about where you will store your battery in your vehicle. Space is at a premium in some vehicles, but sometimes, with the right battery, you can store it under the passenger or driver's seat. This may restrict the battery capacity available to you. If you need more, you might need to find space elsewhere.

How Much Battery Power Do I need?

This is a really important question and the answer will largely depend on how much time you want to spend off-grid, and what devices you wish to power. At home, you have a (hopefully) unlimited supply of mains electricity and while you might want to economise on its use with energy prices as they are, if you can afford it you don't usually need to worry about the available supply.

Life is a little different in your van as when you are off-grid you have a finite power supply and you need to carefully manage that supply and when you can recharge it. The following [video](#) provided by the excellent Greg Virgoe, demonstrates how you can quickly estimate your off-grid power consumption.

Greg is very specifically trying to calculate his power needs for being off-grid for a few days at a time and using quite a lot of power in his large van, assisted by solar panels, so don't be put off by that. If you follow his calculations by creating the suggested table you will arrive at a number that works for you, but like him, you may need to compromise on your expectations.

For most summer and weekend campers, you won't spend much time off-grid and will maybe just need to power a few LED lights and a fridge. The calculations are not an exact science as battery performance will decrease with age, condition and temperature.

Device	Qty	Volts	Watts (Voltage x Amps)	Hours Used	Watt Hours (Watts x Hours)	Notes
Fridge	1	12	60	8	480	These are your predictions for the number of off-grid hours when you might use these devices away from the campsite hook-up, and not recharging the battery while driving.
LED Lights	8	12	8	6	48	
Tablet	1	230	6	4	24	
Phones	2	230	6	2	12	
Water Pump	1	12	24	0.5	12	
Total Daily Watt Hours					576	
+ Inefficiency (~20%)					+ 115 = 691Wh	Additional capacity taking account of system inefficiencies.
Conversion to Ah (/12v)					57.6Ah	Usage Per day
Depth of Discharge (~50%) requires a battery with a capacity of:					115Ah	As only around half of the battery capacity is actually available for discharge.

In the illustrative example above, the calculator suggests that we need a battery with a 115Ah capacity, for each day we are off-grid. If we wish to stay longer off-grid, we would want an additional battery for each day, or an alternative means of generating power, such as some driving (using the alternator) or solar panels.

It may be that the only battery that fits conveniently under a seat is 95Ah capacity. You then have to consider whether you can adjust your estimates down to fit the available capacity, or find a different home for a larger battery.

In the example, 80% of the power demand comes from the fridge. Reducing the off-grid running time for the fridge by just a little, will make a significant difference to the power consumption.

Battery Types

Starter Battery (Lead/Acid)

All modern vehicles with an internal combustion engine have one of these. While theoretically, you could use the starter battery to power your entire campervan, there are a number of very good reasons why you really shouldn't.

Starter batteries are specifically designed to provide a high current (to the starter motor), for a short time. Once the engine is running, the alternator can take care of powering the cab heater, radio, lights etc, as well as recharging the battery. Such use requires only a very shallow discharge and quick recharge, enabling a longer lifespan. Starter batteries do not react well to being run flat.

The electrics for the camping part of your van require lower currents over a longer period, so you would be better finding a battery more suited to that need, rather than having your fridge run the starter battery down overnight and being unable to start the vehicle in the morning.

Lead/Acid Leisure Battery

Standard Lead/Acid leisure batteries provide good functionality for a simple campervan electrical setup. They tend to be on the cheaper end of the battery spectrum and are generally low maintenance.

Open (Flooded) vs Sealed (VRLA)

Standard Lead/Acid batteries can appear as open or sealed units. The open units require more maintenance as they must be topped up with distilled water to maintain performance and prevent damage. The sealed (Valve Regulated Lead Acid) units behave much the same way, but as they are sealed, no top up is required and the units are considered maintenance free.

Both types are considered "wet" batteries, and must be stored upright (see Kiravans Battery Bracket) to prevent leaks, and some may require venting due to the release of hydrogen.

These batteries typically allow for 30-200 cycles if operated with discharge no lower than 50% of capacity, but deeper discharges will drastically reduce lifespan.

Optimal Use:

Choose this type of battery mostly for electrical hookup camping with maybe the very occasional off-grid night.

AGM (Absorbent Glass Matting) Leisure Battery

AGM leisure batteries are also lead/acid, but the different internal construction means they are maintenance free, more resistant to vibration, and can be mounted in any orientation. They are more expensive than the standard "wet" lead /acid batteries, but generally provide a much higher number of recharge cycles (ours offer 600 at 50% DoD) and can be a little more forgiving to a slightly deeper discharge, perhaps to 60% of capacity allowing greater opportunity to spend more nights off-grid.

They can be more sensitive to how they are charged, so it is essential to use a charging system that has an AGM setting if you are to get the best lifespan from them.

Optimal Use:

Choose this type of battery for regular off-grid adventures.

Gel Leisure Batteries

Gel leisure batteries are very similar in property to the AGM types. They are also lead/acid in construction, maintenance free and can be stored on their side, giving you more options on where the battery can be located. Their main advantage over AGM is that they offer more cycles, with 500-5000 recharges possible meaning they can offer better value over their lifespan. Ours provides up to 1500 recharge cycles.

These batteries are extremely robust and versatile and produce few fumes and can be used in places without much ventilation. Gel batteries should be charged at lower voltages and you should be careful not to overcharge them as this will reduce performance. Accordingly it is essential to use a charging system that has an AGM setting if you are to get the best lifespan from them.

Optimal Use:

Choose this type of battery for frequent off-grid adventures.

Lithium Leisure Batteries

These batteries are considerably more expensive than the others but have some specific advantages. Their main benefits relate to a much longer lifespan (15+ years), faster charging, and due to a complex integrated battery management system, a much greater number of recharge cycles (up to 5000). Even at deeper discharge levels of 80% they can still offer 2000+ cycles. They do not however perform well in extreme cold.

They are generally intended for industrial use (off-grid catering vans) so for most weekend campers, these batteries are probably not worth the extra cost. If you are considering being off-grid for extended periods, and have electric cooking requirements rather than gas, your additional offgrid energy requirements may well point you in this direction as the extended lifespan can make this option cheaper over the very long term.

The technology is improving all of the time on these batteries as we move to all electric vehicles and the pricing has fallen greatly over the past 10 years. This does not mean it will continue to fall though as greater demand and finite resources may hold the prices steady.

Optimal Use:

Choose this type of battery for high energy usage and frequent off-grid adventures.

Recycling

While Lead/Acid batteries have a shorter life span, they are highly recyclable (99% of the materials can be reused). Currently, this figure is only around 25% for Lithium batteries though it is hoped that this number may double in the coming years.

Kiravans Leisure Batteries

At Kiravans we have searched the multitude of available leisure batteries to identify a few varieties that will handle the most common types of van use outlined above:

Jenox Gold 100Ah Leisure Battery

Type: Lead/Acid

Purpose: Primarily Mains hook-up + Occasional off-grid use

Capacity: 100 Ah

Number of cycles: 100

Dimensions: H: 175mm x W: 175mm x L: 354mm

Warranty: 2 years



This 100Ah battery is maintenance free and will keep your basic electrics running between campsites. There is the same capacity for overnight off-grid camping but the extended number of available charge cycles means that you can do this a little more often within the life of the battery.

This battery will fit underneath the driver's seat of a VW T5/T6 assuming that there is either no swivel fitted, or the swivel is fitted with risers, for instance, the RIB drivers swivels available at Kiravans.

Additional Resources: [Buy Battery](#)

AGM 110Ah Leoch Xtreme AGM

Type: AGM (Absorbent Glass Matting) Lead/Acid

Purpose: Regular off-grid use

Capacity: 110 Ah

Number of cycles: 600 @ 50% DoD

Dimensions: H: 190mm x W: 175mm x L: 353mm

Warranty: 3 years



This maintenance free, dry cell, 110Ah AGM battery has a much greater number of available cycles allowing you significantly more recharge cycles, and therefore off-grid nights. Although the battery is slightly taller, as AGM batteries can be stored on their side, this battery will fit underneath the driver's seat of a VW T5/T6 assuming that there is either no swivel fitted, or the swivel is fitted with risers, for instance, the RIB drivers swivels available at Kiravans.

Note: Please ensure your charging method has a setting for AGM batteries. Please read the section of Battery Charging below for further details.

Additional Resources: [Buy Battery](#)

110 Ah Expedition Plus Lead Carbon Gel Ultra Deep Cycle

Type: Gel Lead/Carbon

Purpose: Regular off-grid use

Capacity: 110 Ah

Number of cycles: 1500 @ 50% DoD / 750 at 80% DoD

Dimensions: H: 222mm x W: 172mm x L: 330mm

Warranty: 5 years



This maintenance free battery has two advantages. The first is that the Gel material allows the battery to be stored on its side, giving you more storage options. The second is that it will allow up to 1500 cycles at 50% DoD, which is excellent for regular off-grid usage. Furthermore, if you don't mind losing half of your recharging cycles, you can still achieve 750 cycles at 80% DoD!

Lead/Carbon batteries like this one can re-charge 4-10 times faster than regular Lead/Acid batteries, making them extremely versatile.

Note: Please ensure your charging method has a setting for Gel batteries. Please read the section of Battery Charging below for further details.

Additional Resources: [Buy Battery](#)

Xplorer Base 100 Ah LITHIUM LiFePO4

Type: Lithium

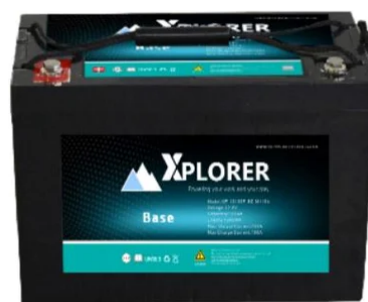
Purpose: Regular off-grid use

Capacity: 100 Ah

Number of cycles: 3000 @ 50% DoD / 1500 at 100% DoD

Dimensions: H: 210mm x W: 168mm x L: 307mm

Warranty: 5 years



This maintenance free battery is perfect for flexible off-grid camping. It will provide up to 3000 cycles at 50% DoD, but even at deeper discharges, you can still achieve 1500 cycles at 100% DoD!

Note: This battery should be stored upright. Please ensure your charging method has a setting for Lithium batteries. Please read the section of Battery Charging below for further details.

Additional Resources: [Buy Battery](#)

Battery Warranty

It is important to note that the Warranty covers premature failure due to manufacturing or material defects only. This sounds like a cop-out, but there are good reasons for this.

Leisure batteries are complicated and have a finite lifespan governed by the conditions under which the battery operates. The vast majority of battery faults are caused by vehicle or charger malfunction, negligence, or incorrect application. As the manufacturer has no control over battery usage, it wouldn't be fair to expect them to cover these areas with their warranty.

If you have been reading this guide closely, you will hopefully by now have a good understanding of the importance of good battery maintenance, and how this can impact on the lifespan of your battery.

You should select your battery carefully according to how you plan to use it, and you should maintain the battery in accordance with the product guidelines. For example, if you are planning regular off-grid camping, choose a battery that is designed for such use.

To achieve best results for your chosen battery, the following maintenance tips are recommended.

Battery Maintenance

Leisure batteries are only as good as their maintenance. If you look after your battery well, you will get good use from it, but if you abuse it, the lifespan can be seriously reduced.

- Be careful not to use the battery beyond its recommended Depth of Discharge (DoD). The output voltage of your battery is the best indicator of the discharge level, and the manual will identify the appropriate voltages for each level.

You can use the battery below the recommended DoD, but the more often you do this, the shorter the lifespan of the battery will be.

**The voltages indicated here are a rough guide. Check your battery's user manual for precise details.*

State of Charge	*Battery Voltage		
	Std Lead /Acid	AGM	Gel
100%	>12.6V	>12.8V	>12.85V
80%	12.5V	12.6V	12.65V
50%	12.1V	12.3V	12.35V
25%	11.7V	12.0V	12.0V
0%	<11.0V	<11.8V	<11.8V

- A battery will lose charge when not in use, so don't let it go flat. Remember to charge the battery monthly to keep it in good condition. If the vehicle is in use, the alternator should be keeping the leisure battery appropriately charged, but you should still check periodically.
- Don't leave a battery flat for any extended period of time as this will cause irreparable damage due to sulphation. Keep the charge topped up wherever possible, but avoid overcharging.
- Overcharging can cause as much damage (due to sulphation) to the battery as leaving a battery in a discharged state.
- Ensure that your battery is fitted securely and that the terminals are fitted tightly. Our Kiravans battery bracket will help with that.

- Where you have two or more leisure batteries in your vehicle, you should replace them all at the same time. If the batteries are all of different ages and condition, the performance of a new battery will be reduced by any fading older battery in the chain. It is also preferable for each battery to be the same type and have the same capacity.
- Please note that the battery warranties indicated by manufacturers really only apply to the integrity of the casing. If your battery is not reaching the anticipated lifespan, the most likely cause is going to be poor maintenance. The manufacturers are unlikely to consider any other cause of failure.

Charging Your Leisure Battery

Managing the charge on your battery is really important when it comes to getting the best from your unit. Batteries are complex, and the different types have slightly different needs and it pays to give them what they want. Typically, there are three ways in which your leisure battery will be recharged.

- Via the vehicle's alternator during driving
- Mains charging - either at home or a campsite hook-up
- Solar panels

Older vehicles (those without Start/Stop technology) will mostly use a Split Charge Relay to manage the charging process via the alternator. This simple device will prioritise charging your starter battery, but when it identifies it is full, it will then divert the available charge to boost your leisure battery. This older technology works, but charging your leisure battery this way is not optimal, and it will not work on newer vehicles with Start/Stop technology, and is not compatible with the requirements of most AGM/Gel or Lithium batteries.

Newer vehicles (those with Start/Stop technology) or those with AGM/Gel or Lithium batteries require a "smart" device to manage the charging of your leisure battery from your starter battery. These devices assess the available charge and charging requirements to deliver the optimal charge. A good device will have settings to handle the different battery types (Lead/Acid / AGM / Gel / Lithium), and an input for solar charging if required. Some even have bluetooth so you can manage the entire process via your phone.

The smart charger (or multi-stage charger) will have various settings to optimise the charging process as required by your specific battery type from whichever source power is available, including solar. The device will cycle through various steps to ensure the best possible life for your battery. This process actually helps clean and recondition your battery, as well as giving it a fast charge when it is low, and a slower charge as it approaches capacity.

Chargers

The charging device you choose should be rated at least at 10% of the rated Ah capacity of the battery and less than 20% of its maximum capacity, to avoid overcharging. So for a 100 Ah battery you should use a charger of at least 10 amps, but less than 20 amps.

Chargers are not 100% efficient, so assuming a half discharged 100Ah battery, a 20A charger would take approximately 2.75 hours to fully charge ($50\text{Ah}/20\text{A} = 2.5$ hours + 10% for inefficiency).

Solar Panels

Solar panels are another world to explore. We do not currently sell solar panels at Kiravans but if you are considering this direction, we strongly recommend our knowledgeable friends at Road Pro (www.roadpro.com).

Ventilation

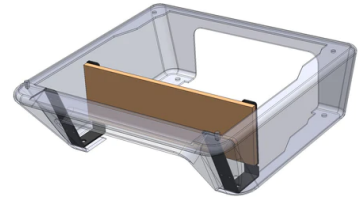
All batteries produce small amounts of hydrogen gas. This gas is the most abundant chemical in the universe and is naturally present (in small quantities) in the air we breathe. It is a colourless, odourless, and tasteless gas, and although it is non-toxic, if you remember back to your school days, it is flammable on its own, more so when mixed in air, and explosive when concentrated with pure oxygen (as used for rocket fuel).

In school experiments you would usually react zinc with sulphuric acid and collect the hydrogen gas as it bubbled through water into an upturned test tube. Placing a flame over the test tube would result in a popping sound as the hydrogen combusted. You should therefore be careful to ensure that your battery is well ventilated to prevent the build up of hydrogen in your vehicle. One well aired battery under an open seat is unlikely to cause too many issues as hydrogen is 14 times lighter than air and will happily disperse quickly into its surroundings, given the chance. If however you have one or more batteries stored away in a closed compartment, it is sensible to attach the gas outlet on the battery to a ventilation tube that relocates the gas to a more ventilated area, probably outside the vehicle.

T5/T6 Battery Accessories

Kiravans Accessory Holder Brackets (VW T5/T6 only)

These useful under seat brackets allow you to mount accessory items on a wooden board under your single driver or passenger seat without drilling into your seat base or floor! Perfect if you want to keep your van in original OEM condition.



Compatible with a single swivel, these are ideal for:

- Battery chargers
- Fuse housings
- Cable management

Choose either a front angled or inside upright wood screwing position to suit your needs.

Additional Resources:

[Buy Bracket](#)

[Watch Video](#)

Kiravans Battery Bracket (VW T5/T6 only)

This is a great solution for securing your battery under the driver's seat. It fits on the inside of your single seat base using the same bolts that hold the seat down.

It works with **Lead Acid** batteries, securely holding the battery upright using the batteries feet, or with **AGM** or **Lithium** batteries where you can fit your battery lying on its side if you prefer. To do this, simply discard the foot clamp piece and use the bar which fits across your seat base. You'll then need to add a strap yourself but we have included a nice handy slot in the bar - have a look at the photos on the website and it'll make sense.



Additional Resources:

[Buy Battery Bracket](#)

[Watch Video](#)

Energy Saving Tips

At home, it is always worth trying to find ways to save energy. It is good for the environment, and good for your pocket. On the road, it is a necessity as you try to stretch out the battery life to get your van from hook-up to hook-up, while protecting the battery lifespan. The following tips are mostly common sense:

Fridges

The fridge is one of the hungriest battery users in your vehicle. Anything you can do to reduce its use will give you extra battery life.

- What are you chilling? Are you trying to keep the items cold, or just stop them from getting warm?
 - Non-perishables don't need the fridge on the coolest setting. Beer and wine will chill nicely in a bucket of cold water or a nearby stream.
- When moving off-grid, switch the fridge temperature from its coldest setting on hook-up, to a warmer setting.
- Chest fridges are more efficient as they retain the cold air when you open them. Fridges with doors let more heat in every time you open the door.
- Where possible such as at the start of your trip, pre-chill items before placing them in the fridge. Freeze a carton of orange juice or a bottle of water and let it defrost in the fridge. It will help your fridge stay cool without too much top up power and will take days to fully defrost, at which point you can drink it.

Heating

Electric heaters are also very power hungry. Use them sparingly or wear a jumper. Consider installing a diesel heater to run from your fuel tank instead.

Electronic Devices

Phones and tablets are generally pretty efficient these days. The batteries last quite well and they don't use up much leisure battery power when you recharge them. That said, try to plan your consumption on these devices by ensuring that they are all fully charged before you disconnect from the hook-up.

The devices often have various additional ways to save power and make them last longer between charges:

- Battery saving mode
- Switch off location and/or bluetooth
- Switch to aeroplane mode between uses
- Power down completely at night

General

When purchasing a new electronic device for your vehicle, take consideration of the relative power requirements of the available options.

Summary

That is a lot of information to take in, but now that you understand the terminology, here is the simple version of what you need to think about when making your battery purchase decision.

Energy Consumption

Calculate how much power draw there is likely to be from the devices you want to use when not hooked up or driving. This will help you identify the capacity of your desired battery, but remember that most batteries perform best when used to only 50% capacity. You will need a battery with approximately double the capacity of your consumption.

Off-grid Frequency

Be realistic about how many nights you are really likely to spend off-grid. This will help you identify how many recharge cycles you are likely to want your battery to cope with. If you are rarely off-grid, then you probably don't need to worry so much about the recharge cycles on your chosen battery.

Battery Storage

Where do you have space to store your battery? Ideally you can find something that fits under one of the front seats, but if it needs to go elsewhere, remember to make sure there is some ventilation.



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