

Contents

The cells.....	1
When 100% State of Charge isn't	1
VIBRATION: Checking for loose cables	3
Checking for loose battery terminals	4
Keep objects off the battery	4
Iron ore dust.....	5
Cleaning solar panels.....	5

**WARNING**

All batteries store high current. Be careful not to short across the terminals with anything, including jewellery such as rings, wrist watches, and necklaces, tools etc. You can wrap insulation tape around a ring if you can't remove it, or around the exposed area of a spanner, socket etc.

The cells

The cells that make up your T1 Lithium battery are closed cells and do **not** require topping up with water or any other fluid.

The cells must operate or be stored in the **upright position** with the terminals facing upwards at all times.

When 100% State of Charge isn't

One of the wonderful things about lithium is that it is not necessary to bring your battery back to 100% every day. As long as you're more or less replacing the power you use and you're not getting too low in battery capacity, state of charge or voltage, you can continue this way for quite a while.

But, the problem with *not* getting back to 100% is that your Victron battery monitor will slowly get out of whack. This is not a problem with your battery, it is a problem with the Victron battery monitor. We still use this battery monitor because it is the best we've found for our system.



Caring for your system

But over time, if you haven't reach true 100% SOC, the Victron BMV battery monitor will tell you that you have a certain percentage of charge left, but when you try to use it, the system shuts down or your inverter screams at you and refuses to run.

If this happens, take a look at the Junsu and see what the voltage is in each cell.

Your T1 Lithium control system will isolate your battery, or it will stop charging your battery, within the following ranges:

Reading from	Measuring	High	Action	Low	Action
Junsu	Cell voltage	3.6V	Stop all charging	2.8V	Warning beep
Junsu	Battery voltage	14.4V	Stop all charging	11.8V	Warning beep
Victron	SOC			20%	Warning alarm and flashing of the Victron BMV screen
				5%	Isolate the battery
Victron	Voltage	14.4V	Warning alarm and flashing	12.2V	Warning alarm and flashing
		14.6V	Stop all charging	11.6V	Isolate the battery

If you've been having extended poor solar and the battery doesn't get the chance to reach a true 100% SOC and stay there for a while (anywhere up to several hours), the SOC reading on the Victron battery monitor will gradually become out of synch with true 100%.

The upshot of this is that roughly once a month, your battery needs to take in as much charge as the control system will allow. That may be whilst plugged into mains charging, a really good solar day, or driving and charging from a DC to DC charger.

True 100% SOC is reached when the Victron BMV or Smart Shunt says 100% SOC AND all the cell voltages are above 3.45V.



VIBRATION: Checking for loose cables

There isn't a road on the planet that doesn't cause some vibration in a vehicle. In a caravan being towed behind a vehicle, that vibration is amplified. Travel in the Australian outback (or even a lot of roads less than a highway) and the vibration problem gets worse.

From time to time, particularly after a rough road trip, it is important to inspect your cabling and any connection that could possibly vibrate loose.

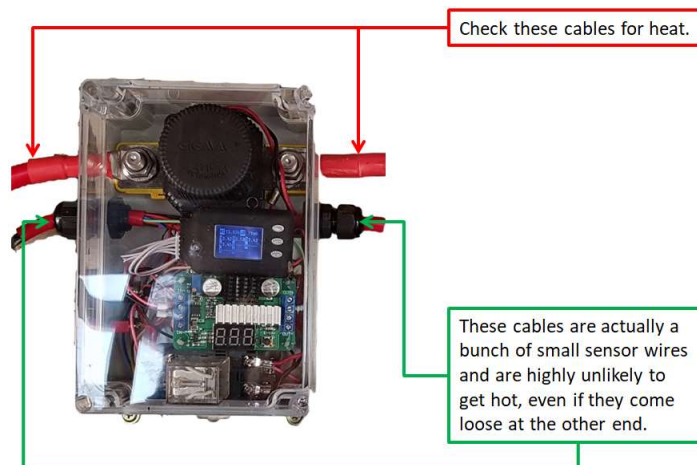


Make sure you don't have a watch or any jewellery on when touching any part of your system, and touch only one thing at a time.

You can touch a finger onto the insulated part of the cable and feel for a high temperature (higher than other cables) or you could use an infrared thermometer.

Check the cabling going into and out of these items:

- Inverter
- Mains charger
- DC to DC charger
- The T1 Lithium control box
- Shunt
- Fuses



Checking cables at the T1 Lithium control box

Touch the large cables that join each battery pack. Large cable is meant to carry large current, and these are the cables that are going to cause the most damage if they are loose or damaged.



You're feeling for heat: build-up of heat is an indicator that a connection is coming loose. It's an unavoidable consequence of shaking a house on wheels over long distances.

How hot is hot? You're looking for a cable that is hotter than others of the same thickness, that is too hot to hold your finger on for more than a few seconds or that gets hotter as you move towards either end of the cable. Tighten the connection at the hot end, being careful not to lay a tool between any bolts or connectors.



An infrared thermometer is an excellent tool to measure temperature if you're at all nervous about touching electrical cables or battery terminals (see below). It's also handy for measuring the temperature of your axles, tyres etc, not to mention the roast lamb on the camp fire.

Checking for loose battery terminals

The same principle of feeling or testing for heat applies to loose battery terminals. Remove the clear cover and touch each **individual** terminal on the top of the battery, **one at a time**.

IMPORTANT:

- **Do not touch more than one terminal at a time.**
- **Do not lean on the vehicle that the battery is installed in, or use the vehicle to support yourself while you touch the terminals.**
- **Do not have anything else in your hand when you do this.**
- **Do not wear any jewellery while you do it.**

Keep objects off the battery

We supply a well-anchored lid for your battery, but it is removable. It is therefore not impossible for it to become dislodged, particularly if another object has pushed at the lid. Keep all items clear of the battery and control system, particularly metal items such as camping chairs, stoves etc.

If anything comes into contact with the battery terminals or the shunt, the **danger of an electrical short is high**.

If anything dislodges a control wire or fuse, your system may shut down or your control box may be unable to isolate the battery or charging if required, resulting in a dead battery from over discharge or a dead battery from over charge.



Iron ore dust

There are many roads in Australia where the dust you gather in your RV is rich in iron ore. Iron conducts electricity, particularly if it gets wet. If there is enough iron ore on your battery, you can get a dead short between the battery terminals. Don't worry, you won't get an explosion or a fire with a T1 Lithium battery constructed from Winston Thundersky LiFePO₄ cells (we can't vouch for other lithium batteries, sorry), but you WILL get a dead battery. If this dead short occurs, *it is not a slow process* – it will suddenly happen (maybe to only one cell – it all depends on the amount of dust and luck) and there is no way to undo the damage. If you have this problem, we can replace an individual cell if required, but **we** would need to do this.

So if you're travelling these types of road, check once in a while for this build up or red dust. Heck, check for any build-up of any dust! Sweep it off with a **plastic** broom or vacuum it up with a **plastic** nozzle.

Cleaning solar panels

Not much to say here – if your panels are dirty, they won't work very well. If they're very dirty, they probably won't work at all.

A squirt with a hose will give you a quick fix. A squirt and a broom may be necessary, in which case you could add a little detergent or truck wash.

If you have the time and the inclination, you can polish your panels with some No. 2 cut & polish for the first big clean and a wash and repolish with some good-quality wax car polish, then repeat every 6 to 12 months thereafter. This will make a simple hose down much more effective for a few future washes.



All documentation is available on our web site:
<http://www.t1lithium.com.au/downloads.html>