EV Power Australia

EVH12VxxAh Battery Instructions

Including Smart Phone Bluetooth App

For Batteries Purchased after 1 August 2020.

Introduction :

Thanks for choosing the EV Power Lithium battery. These instructions will help you to treat it well so it lasts many years. EVH series batteries have a full internal battery management system (BMS) with a proprietary Bluetooth App for mobile phones.

Battery Connection :

This battery is designed as a drop-in replacement for a lead acid battery of similar dimensions and capacity. Be careful to make sure the positive lead is connected to the red terminal and the negative lead is connected to the black terminal.

It is strongly recommended to use a Marine Circuit Breaker (100A) on the output of the battery. When storing your van, this breaker can be disconnected to ensure there are no loads on the battery that might accidentally drain it flat.

Battery Charging:

If there is no Lithium setting on your charger or solar MPPT then it should be set for charging Gel or AGM type sealed Lead Acid batteries. **Do not put it on the Flooded Lead Acid setting.** The following settings are a guide for charge parameters:

- Bulk Charge Voltage – 14.2-14.4V
- Absorption Voltage – same as Bulk Voltage
- Max Absorption Time – 20 minutes (or as short as possible)
- Temperature Compensation – OFF
- Equalisation Function – OFF
- Float Voltage – 13.6-13.8V (if charger has a Lithium setting Float may be automatically disabled)
- Restart Bulk Stage – when voltage falls below 12.5V or each night.
- Max Charge Current (from all sources) – 80A (for 120Ah battery)
- Max Discharge (1hr) - 120A (for 120Ah battery)
- Load Disconnect (some MPPTs have this function) – 12.0V

Battery Monitoring:

If external monitoring instruments are used in addition to the Bluetooth App. there are some main functions to set up:

- Peukerts Exponent – 1.00
- Charge Efficiency - 98%

Storing the Battery :

Generally speaking Lithium batteries like to be used regularly. Regular charge and discharge cycles keep the batteries active and healthy. **Prolonged (weeks) charging at 100% State of Charge (SOC) is not recommended.**

Care needs to be exercised when storing batteries in case equipment is accidentally left switched on, or in case the charger malfunctions or is inadvertently unplugged (a common human failure mode). If the batteries are left idle for any period the BMS electronics still consumes a small amount of power continuously. This will cause State of Charge may reduce until eventually the battery runs flat through self discharge.
It is very important to recharge the battery fully at regular intervals. It can be hard to recover if it has been left flat for an extended period.

While the battery has internal software and hardware protections against over-discharge, it is recommended to avoid this situation if at all possible.

When storing batteries more than two weeks between use:

1) Fully charge the battery then give it a slight discharge for a few minutes.
   A 12V EVH Battery must get past 14.0V to be considered fully charged.
2) Switch off all loads and chargers, including solar chargers. If there is a main isolator or circuit breaker then switch that off.

3) Mark on your calendar to repeat the process **EVERY MONTH**.
4) Goto Step 1.

If storing batteries for periods longer than 1 month, in addition to the previous instructions, disconnect the positive (red) terminal on each battery.

NOTE: We presently recommend recharging **each month** due to the self discharge characteristic caused by the Bluetooth Monitoring System.

Apple iPhone App :

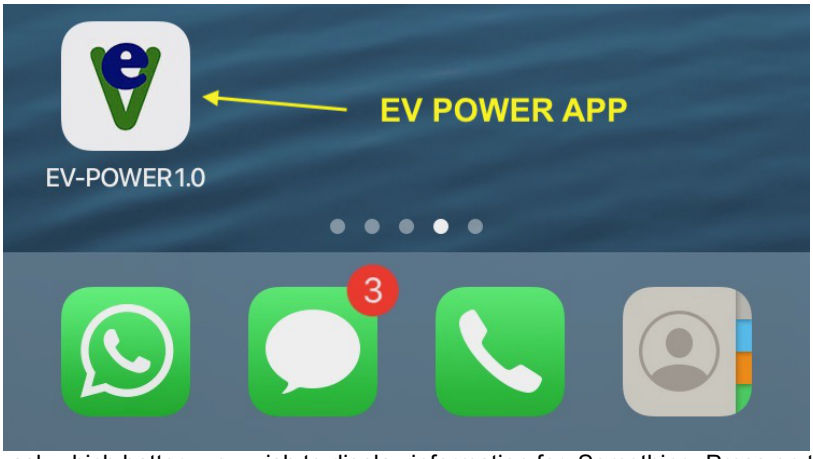
Go to the App Store and search on “EVPOWER 1.0”. Find and install the EVPOWER 1.0 Smart Battery App. Use exactly that search term.
When using this app, please make sure mobile bluetooth is enabled in Settings.

Android Phone App:

Google Play Store: "EV Power 1.0" --- no need to follow the below instructions.

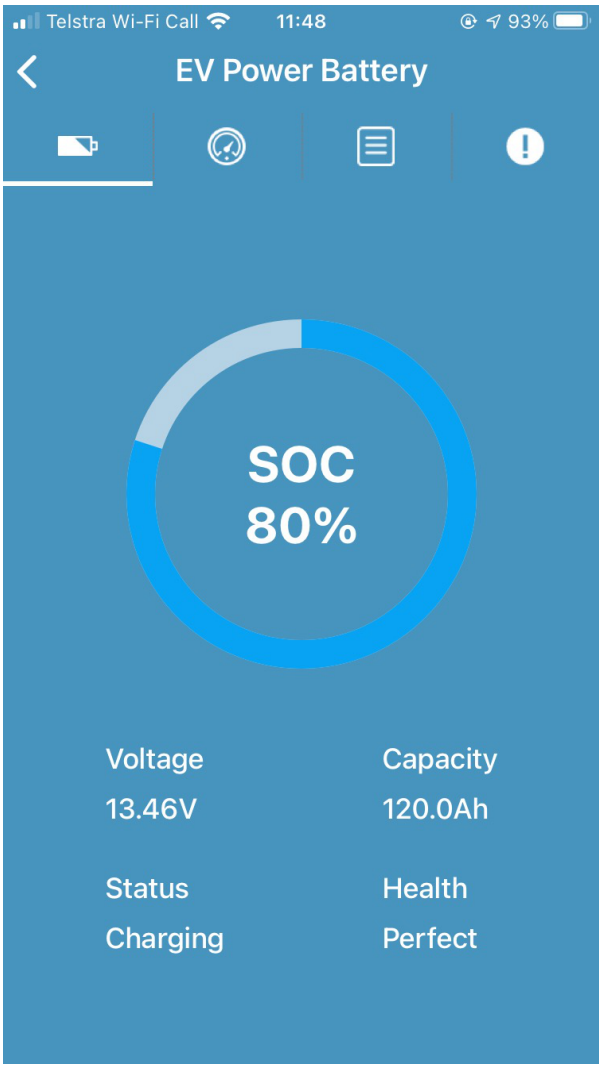
~~1) Go to the Google Play Store to download the Android App: https://play.google.com/store/apps/details?id=com.bluetooth.evpower.lithiumforandroid~~
~~2) Use a USB cable to connect your computer and mobile, then transfer this APK file from computer to phone, then install the app.~~
3)When using this app, please make sure mobile bluetooth is enabled.

Once the app is installed on your phone, open it. Make sure to open bluetooth on phone settings and allow the app read location. Then the app can search bluetooth signal from the batteries.

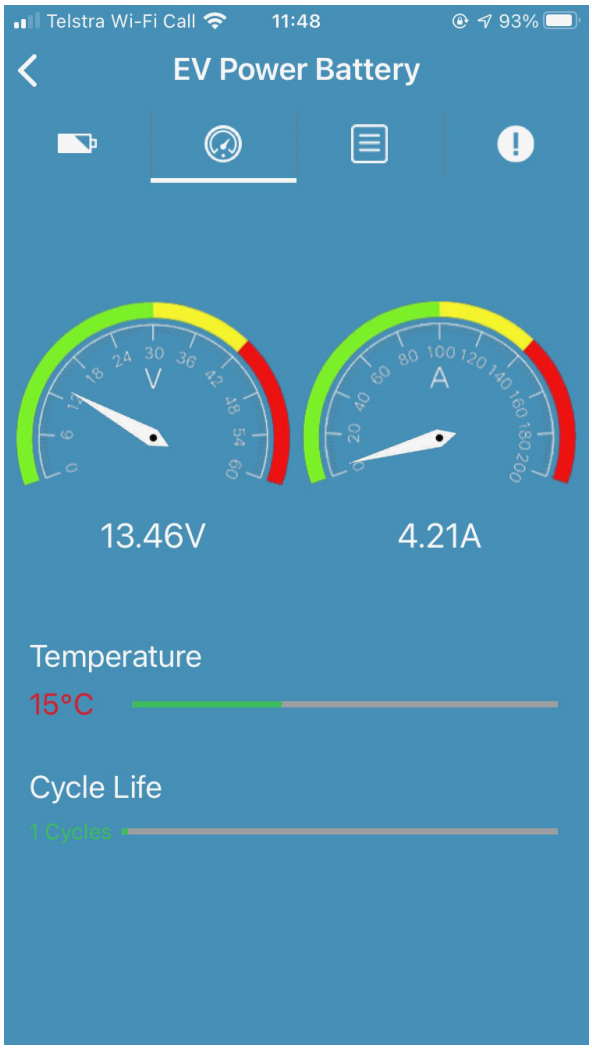


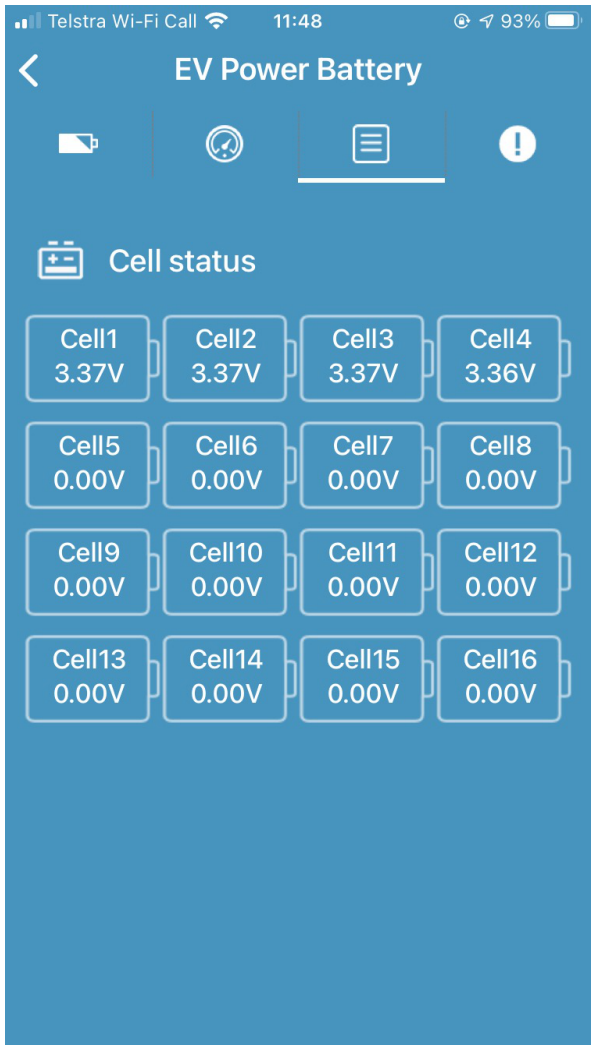
The app should then ask which battery you wish to display information for. Something. Press on the serial number for the battery you want to display information for to make the connection.


Telstra Wi-Fi Call
11:48
93%
Lithium Battery List
NAME EVH-12V120Ah
Mac ID D8:45:16:92:F3:BD
-80db
SCANNING


Telstra Wi-Fi Call
11:48
93%
EV Power Battery
SOC
80%
Voltage
13.46V
Capacity
120.0Ah
Status
Charging
Health
Perfect

Examples of Information Screens:





SOC is the percentage State of Charge, a measure of the amount of energy the battery contains. There are other screens that can be selected from the top menu. Note the instructions.

Notes on Over-discharge

1) The BMS has a shutdown function. If the battery is over-discharged the internal BMS will disconnect the cells internally from being further discharged. At the battery terminals this will register as a LOW VOLTAGE (<1.0V). This does not mean the actual cells are at that voltage, just the BMS has disconnected them from the output. Charging will see the battery voltage immediately rise to normal levels.
2) Over-discharge until the BMS shuts off the battery will result in the Bluetooth function being unavailable until the battery regains some charge.
3) Some modern “smart” chargers will not charge a battery until they see a voltage on the battery terminals. In other words they will not charge an over-discharged EVH battery. Make sure that you have a plan B in this event to get some charge into the battery. Once the terminal voltage rises to ~12V the “smart” chargers will charge normally.

BMS Checking the Bluetooth Without Charging the Battery

It is important to note that the SOC% is an **ESTIMATION** only. It can drift over time if the battery is not used or is not fully charged (>14.0V) regularly. This is particularly so if the Bluetooth is regularly used to wake up and check the state of the battery. It may read 100% when the battery is nearly empty. The remedy is to make sure to fully charge (>14.0V) occasionally so the SOC can synchronise to 100%.

BMS Sleep Mode

If there is no load on the battery for 2 hours the BMS will go into hibernation mode. It will lower the output voltage to around 9V. This preserves your battery when it is not in use.

So if you have a device such as a fridge that switches off for a period then requires voltage to switch back on, you need to have a small load on the battery continuously to keep the BMS awake.

Charging at Low Temperatures

Temperatures below 0°C reduce the speed of the chemical reactions in the battery and can cause reduced ability to deliver high currents and also reduce battery life if a charge is forced. It is best to keep the battery above 0°C if possible. Charging will be disabled by the BMS if the temperature goes below -5°C.

Charging a Flat Battery

If the battery has been allowed to run flat, usually due to incorrect storage or very long storage without recharging, it will no longer connect to the Bluetooth app. It may also register a low voltage at the terminals (<2V) if measured with a multimeter. This is usually because the BMS has cut off the output to protect the battery. Recharge the battery immediately. The BMS will allow charge but not further discharge.
Note that many “smart” chargers require to “see” a voltage on the battery before they will start charging, so sometimes they will not start to charge. In this case a simpler charger is required to start the charging process, then you can charge normally.
Sometimes a simple 9V battery can be used to restart the BMS so that a smart charger can then be used. Make sure to connect positive to positive so the polarity is correct.
DO NOT connect a flat EVH12V battery directly to a charged Lead Acid battery. The internal electronics may be damaged.

Over-current Protection

The battery internal BMS has over-current protection that will shut the battery output off if there is an instantaneous short circuit or a larger current draw over a few seconds than what the battery can deliver safely.

If you are using a device that has large capacitors on the DC input then there will be a sudden rush of current when it is first connected to a battery. Such devices can include DC/AC 240V inverters, some chargers and MPPTs. This can sometimes cause the internal BMS to shut down due to an over-current error.

The battery can be verified ok by connecting a simple light globe and check it switches on.

Connecting Batteries to Inverters

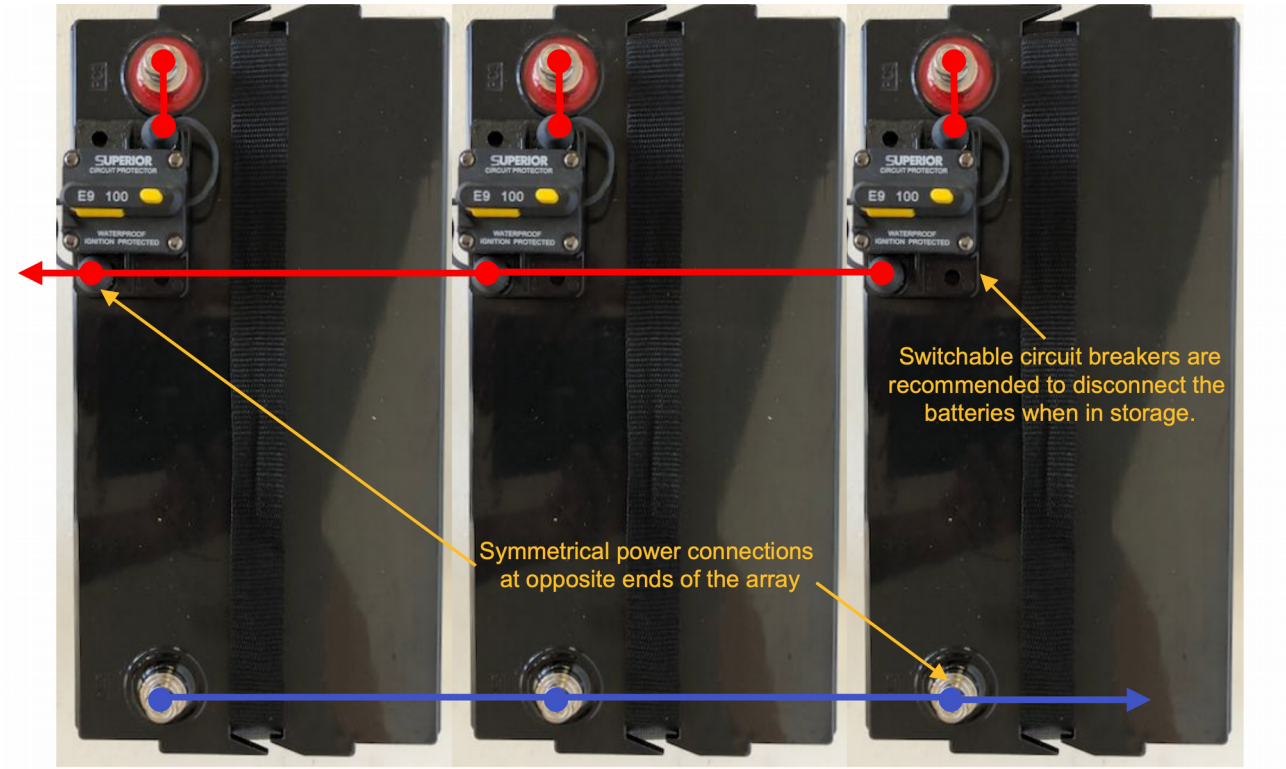
An inverter converts battery power into 240V mains power so you can run things like computers, TV, electric kettles, microwave ovens etc. They can cause a particular issue when connecting to a battery because they have internal components called capacitors that, when first connected, act for an instant like a direct SHORT CIRCUIT across the battery terminals. The internal BMS has short circuit protection so will shut down the battery output for a period. It will recover automatically. Patience required here. The larger the inverter the more likely this is to occur.

If your inverter is causing the battery to shut down then you need a precharge circuit. It can be as simple as a small momentary push button with a 33 Ohm 5 Watt resistor (or a small 12V light globe) connected from the battery + terminal to the input + of your device. Press the button for a few seconds then immediately switch on the battery to your normal load. This will pre-charge the capacitors and prevent a sudden current surge when the battery is connected. A momentary pushbutton switch can be connected in line with the globe to facilitate regular pre-charge.

Connecting Batteries in Parallel for more Amphours

EVH12VxxxAH batteries may be connected together up to four units in **parallel.** This means connecting positive to positive and negative to negative to increase the Ah capacity but not the 12V voltage.

1) Make sure both batteries are fully charged individually before connecting together. Connecting batteries at different states of charge will cause large currents to flow between them and activate over-current protection shutdown.
2) **Keep the cable lengths the same to all the batteries.** Using different cable lengths will cause one battery to work harder than the rest. Making a symetrical cable arrangement will ensure even discharge.
3) It is strongly recommended to install a 100A marine circuit breaker (e.g https://www.ev-power.com.au/product/fus-cb100a/) on each battery positive terminal. This way the batteries can be manually isolated from each other when in storage.



Parallel Battery Connection for increased Amphour Capacity at 12V

Connecting Batteries in Series for Higher Voltages

EVH12V120AH batteries may be connected together up to four units (52V max) in **Series.** That is connecting positive of one battery to negative on the next, etc. This will increase the voltage but not the capacity. This is sometimes required for running 24V, 36V or 48V electric trolling motors and the like.

1) Make sure all batteries are fully charged individually before connecting together. Batteries at different states of charge will cause shutdown before the full capacity is reached on discharge or charge and may damage the internal BMS circuitry.
2) Always charge together as a set. Never charge individual batteries in a string separately.
3) Do not tap off one battery to get 12V for driving auxiliary devices. Use a DC-DC down converter.
4) Use only a LiFePO4 battery charger of the correct voltage. Multiply the 12V values recommended to calculate what that is. Lead Acid battery chargers are unsuitable for 24-48V battery packs.