Victron Energy & Voltsmile Batteries

This page tells you how to set up a Victron Energy system with Voltsmile lithium iron phosphate (LiFePO4) batteries.

Voltsmile batteries communicate with the Victron GX device over BMS-Can. The battery BMS sends these values to the GX device:

- Charge Voltage Limit (CVL)
- Charge Current Limit (CCL)
- Discharge Current Limit (DCL)
- State of Charge (SOC)
- Highest and lowest cell voltages
- Temperature

The GX device sends these limits to all connected Victron inverter/chargers and solar chargers through DVCC.

1. Supported battery models

These Voltsmile models are for use in Victron systems. All models are 16S LiFePO4 packs.

Model	Energy capacity (kWh)	Nominal voltage	Nominal capacity (Ah)
V10 RPC	5.12	51.2 V	100
V10	5.12	51.2 V	100
V10+	5.12	51.2 V	100
W1	10.24	51.2 V	200
W1+	10.24	51.2 V	200
W2	10.24	51.2 V	200
W01	5.12	51.2 V	100
W02	10.24	51.2 V	200
S1	5.12 per module	51.2 V	100
E1	5.12 per module	51.2 V	100
S16	16.07	51.2 V	314
Monolith	5.12 (4.61 usable)	51.2 V	100

The BMS sends the charge and discharge current limits to the GX device over BMS-Can. Refer to the Voltsmile datasheet for the maximum currents of each model.

2. Victron device compatibility

Voltsmile batteries are compatible with these Victron products when you connect the battery through BMS-Can to a supported GX device:

- **GX devices:** Cerbo GX, Cerbo-S GX, Ekrano GX.
- **Inverter/chargers:** 48 V models of the VE.Bus MultiPlus, MultiPlus-II, Quattro and Quattro-II, and the RS range. For minimum firmware, refer to section 3.
    - The EasySolar-II GX and the MultiPlus-II GX have an integrated GX device. They do not need a separate GX device.
- **Solar chargers:** SmartSolar and BlueSolar MPPT.
- **Remote monitoring:** VRM Portal (SOC, cell voltages, temperatures, alarms).

Important: Only **48 V** Victron inverter/charger models are compatible with Voltsmile 16S batteries. 12 V and 24 V models are not supported.

3. Minimum firmware

Always install the latest firmware on all devices during commissioning.

Device	Minimum firmware version	Notes
Voltsmile BMS	**31144-1.14-H**	For BMS `P16S100A-MH31144-20A` (MH31144 platform)
Victron GX device (Venus OS)	**v3.80**	Cerbo GX, Cerbo-S GX, Ekrano GX

4. Hardware requirements

To connect Voltsmile batteries to a Victron system, you need:

1. A compatible Victron GX device. Refer to section 2.
2. A **VE.Can to CAN-bus BMS cable Type A** (Victron part number `ASS030710018`). This cable converts the pinout between the GX device BMS-Can port and the Voltsmile battery CAN connector.

Voltsmile batteries have **built-in CAN-bus termination**. Do not install an external terminator at the battery end.

Tip: The Voltsmile CAN connection needs a GX port set to **CAN-bus BMS (500 kbit/s)**.

- **Dual-CAN GX devices (Cerbo GX, Ekrano GX):** the BMS-Can port (500 kbit/s) is a different bus from VE.Can (250 kbit/s). Do not connect the Voltsmile battery to the bus that has the Victron VE.Can devices.
- **Single-CAN GX devices (Cerbo-S GX):** the device has one CAN port only. When you set it to CAN-bus BMS (500 kbit/s) for the Voltsmile battery, you cannot use it for VE.Can (250 kbit/s) devices. Plan the system for this.

5. CAN bus wiring

Parameter	Value
Baud rate	500 kbit/s

Parameter	Value
Termination	VE.Can terminator at the GX end. No external terminator at the battery end.
Cable	VE.Can to CAN-bus BMS **Type A** (ASS030710018)

6. GX device configuration

6.1 Select the CAN-bus profile

On the GX device, go to **Settings → Services → [BMS-Can port] → CAN-bus profile**.

Select **CAN-bus BMS (500 kbit/s)**.

6.2 Set the battery monitor

Go to **Settings → System setup → Battery monitor**.

Make sure that the Voltsmile battery is the selected battery monitor. The GX device then uses the SOC, voltage and current from the BMS.

7. DVCC settings

DVCC (Distributed Voltage and Current Control) sends the charge and discharge limits from the BMS to the connected Victron devices. DVCC **must** be on for Voltsmile batteries.

Venus OS sets these DVCC settings automatically when it detects a Voltsmile battery on BMS-Can:

DVCC setting	Value	Enforcement
DVCC	**ON**	Forced ON
SVS - Shared Voltage Sense	**OFF**	Forced OFF
SCS - Shared Current Sense	User setting	Not enforced
STS - Shared Temperature Sense	User setting	Not enforced

For a full explanation of each setting and how it works with a CAN-bus BMS, refer to the Victron DVCC manual.

8. Charge and discharge limits

The Voltsmile BMS sends CVL, CCL and DCL to the GX device over BMS-Can. The GX device sends these values to all connected inverter/chargers and solar chargers through DVCC.

During normal charge, the BMS sets CVL to **57.6 V**. When the battery is near full, the BMS decreases CVL to control the end of charge.

The BMS also decreases CCL when the cell temperature or the cell voltage is outside the normal

range. Refer to section 9.3.

9. BMS protection thresholds

The Voltsmile BMS has its own protection, independent of the Victron system. In normal DVCC operation, Victron devices obey the CVL, CCL and DCL from the BMS and do not reach these thresholds. The thresholds are an additional safety layer.

Over-voltage protection is based on **individual cell voltages**.

9.1 Voltage protection

Parameter	Cell	Pack	Behaviour
Over-voltage protection	3.65 V	58.4 V	The charge MOSFET switches off
Over-discharge recovery	above 2.95 V	above 44.8 V	The battery recovers automatically. Refer to section 11.3.

Hardware cut-off. The BMS protects the battery with a charge/discharge **MOSFET disconnect**. A CAN keepalive timeout also disconnects the MOSFETs. Refer to section 11.2.

9.2 Alarm and warning thresholds

These are pack-level values.

Condition	Level	Trigger	Release
Low pack voltage	Warning	below 46.4 V	above 46.4 V
Low pack voltage	Alarm	below 43.2 V	above 44.8 V
High pack voltage	Warning	above 57.6 V	below 57.6 V
High pack voltage	Alarm	above 58.4 V	below 54.4 V
High temperature	Warning	above 55 °C	below 55 °C
High temperature	Alarm	above 60 °C	below 55 °C
High charge current	Warning	above 105 A	below 105 A
High charge current	Alarm	above 110 A	below 105 A
High discharge current	Warning	above 105 A	below 105 A
High discharge current	Alarm	above 110 A	below 105 A

57.6 V = 3.60 V/cell. 58.4 V = 3.65 V/cell. 54.4 V = 3.40 V/cell.

9.3 Temperature limits

Condition	Behaviour
Charge, at or below 0 °C	Charge is stopped (CCL = 0 A)
Charge, above 12 °C and below 40 °C	Full charge current
Charge, above 0 °C and below 55 °C, outside the 12 - 40 °C band	Charge current is decreased
Charge, at or above 55 °C	Charge is stopped (CCL = 0 A)

Condition	Behaviour
Discharge	High-temperature alarm at 60 °C

The BMS also decreases the charge current when the cell voltage is outside its normal range.

9.4 Overcharge protection

When a cell reaches 3.65 V (pack 58.4 V):

1. The **charge MOSFET switches off**.
2. The BMS sends a **High cell voltage alarm** to the GX device.

10. Passive cell balancing

The BMS uses **passive** balancing (resistive dissipation).

Parameter	Value
Method	Passive (resistive dissipation)
Start condition	During charge, when the highest cell voltage is more than **3.40 V**
Start delta	**30 mV** between cells
CAN behaviour during balancing	**No alarm.** The BMS continues to report normally over BMS-Can.

11. Auto recovery and black start

11.1 Keepalive message

The GX device sends a keepalive message (`0x305`) to the battery. The Voltsmile BMS has a 15-minute timeout for this message.

11.2 Keepalive loss

- If the BMS does not receive the keepalive for **15 minutes**, it **disconnects the charge/discharge MOSFETs**.
- To restore normal operation after this timeout, push the **built-in switch on the battery pack**. This case needs manual action.

11.3 Over-discharge recovery

After a full discharge, the battery **recovers automatically**, with no manual action, when both of these conditions are true:

- The single cell voltage is **more than 2.95 V**.
- The total pack voltage is **more than 44.8 V**.

When AC or PV charge increases the pack above these levels, the BMS connects again automatically.

Note: For off-grid systems, install some DC-coupled PV to support black start recovery. If no PV or AC source is available when the BMS shuts down, the battery cannot recover until a charge source is available.

12. Cell identification in the GX device

The Voltsmile BMS reports the **highest** and **lowest** cell voltages to the GX device and to VRM. The Victron interface shows these two cells only.

The BMS identifies each cell as `module::cell`.

Identifier	Meaning
`1::16`	Module 1, cell 16

13. Inverter/charger and MPPT settings

Important: When DVCC is on, the system compares the BMS limits with the settings in VEConfigure or VictronConnect. The system always uses the more conservative value:

- **Charge voltage:** the lower value applies. If the BMS CVL is lower than the charger setting, the CVL applies. If the charger setting is lower than the CVL, the charger setting applies.
- **Discharge shut-down:** the higher voltage applies. If the inverter low-voltage shut-down setting is higher than the BMS limit, the inverter stops at its own setting.

LiFePO4 batteries do not need a conventional bulk, absorption and float cycle. When DVCC is on, the BMS limits the charge voltage through CVL.

14. Troubleshooting

The battery does not show on the GX device

1. Make sure that **CAN-bus BMS (500 kbit/s)** is selected. Go to **Settings → Services → [CAN port] → CAN-bus profile**.
2. Restart the GX device.
3. Make sure that the cable is a **Type A** VE.Can to CAN-bus BMS cable (`ASS030710018`). Make sure that it is fully engaged at both ends. The GX device cannot detect the battery through a site-made cable with CAN-H and CAN-L swapped. Refer to section 4.
4. Make sure that the Voltsmile BMS firmware is at or above the minimum version. Refer to section 3.
5. Make sure that the battery is on and the BMS is active. Examine the built-in switch. Refer to the next item.

The battery is off after CAN or keepalive loss (manual restart)

1. If the GX device did not send the 0x305 keepalive for **15 minutes**, the BMS disconnected the MOSFETs.
2. Push the **built-in switch on the battery pack** to restore operation.
3. Repair the CAN communication fault (cable, CAN-bus profile, GX power) so that the keepalive starts again.

DVCC warnings or unexpected charge behaviour

1. Go to **Settings → DVCC**. Make sure that **DVCC is ON** and **SVS is OFF**.
2. Make sure that the Voltsmile battery is the battery monitor. Go to **Settings → System setup → Battery monitor**.
3. Make sure that no other monitor (for example a SmartShunt) is the primary battery monitor.

The battery does not recover after a full discharge

1. Make sure that at least one AC or PV charge source is connected and active.
2. The battery recovers automatically when the single cell voltage is **more than 2.95 V** and the pack voltage is **more than 44.8 V**. Refer to section 11.3. Let the charge start.
3. If recovery does not start, examine whether a **keepalive timeout** occurred. Refer to section 11.2. That case needs a manual restart.

Charge stops or CCL decreases in hot or cold conditions

1. The BMS decreases CCL based on temperature and cell voltage. Refer to section 9.3. Charge stops (CCL = 0 A) at or below 0 °C and at or above 55 °C.
2. This is normal protection. It is not a fault. For full charge current, the cell temperature must be between 12 °C and 40 °C.

Balancing does not start

1. Passive balancing operates only **during charge**, when the highest cell is more than **3.40 V**. Refer to section 10. Balancing does not operate at rest or at low SOC.

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