ACES Energy CAN Guide



Nederlandse versie beschikbaar op https://aces-energy.nl/downloads-links/

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No.	Revision	Description	Author	Check	Date
1	1.0	1.0 release	MvM	JD	26-1-24
2	1.1	Addition of batteries with internal supply	MvM	JD	13-8-25

Practical can guide

ACES CAN batteries can be divided into two categories. Batteries without internal CAN bus supply and batteries with internal CAN bus supply. **The batteries without an internal CAN bus supply are most common and can be recognized by a CAN module with 2 male 5-pin M8 connectors. Batteries with an internal CAN bus supply have an additional M8 3-pin connector.**

The following section will explain how to connect the CAN bus batteries.

Each battery is delivered with an M8F-M8F CAN cable and an M8F 120Ω termination resistor.

The CAN bus on ACES batteries can be used for two purposes:

1. Enabling data transfer
2. Switching the power on/off of the battery poles.

To enable communication via CAN bus, the battery requires an external 12V-24V power source. When the power is supplied to the CAN bus, the battery will also “turn on”, which means that the power is applied on the poles. It is important to note:

- **The external supply must be turned off when the battery is not in use.** This allows the battery to enter sleep mode, reducing energy loss.
- **Master-slave configuration is determined during “turn on” of the battery.** It is important that everything is connected to the CAN-network before turning on the power supply.
    - Without correct configuration, the master-slave configuration will not be set correctly and the data readout from the batteries will be incorrect.
    - If the master-slave configuration was not done correctly, the system can be rebooted by removing the power supply for at least 10 seconds.
- The power supply should be fused to protect the system against possible short-circuits.
    - Preferred fuse size is 3A when using the external power.
- The maximum current that can be drawn from the internal power supply is 1A. Use a 1.5A fuse when using the internal power supply.

There are 2 options for supplying the power to CAN bus:

1. **Combination of a DC-DC converter and a 12V lead-acid battery:**
    - When the power is not supplied to the CAN bus, the battery is in off state. There will be no power on the poles. When the 12V from the lead-acid battery is supplied to the CAN bus, the battery will also turn on.

2. **Using internal power supply (batteries with 3 pins modules only):**
    - Batteries with 3 CAN connectors are supplied with and additional cable for the 3-pin connector, which is used to turn the internal supply on and off. By shorting both wires of this cable, the internal supply is activated. It is important to connect the wires to an (ignition) switch or a button, to make sure that the 12V can also be disconnected and the battery can enter sleep mode to reduce energy consumption.

Important:

Only using a DC-DC converter connected straight on the battery poles is not viable. When the battery is in the off state, no voltage is present on the poles. As a result, the DC-DC converter cannot power the CAN bus to turn the battery on.

Example: Connecting to a Victron Cerbo GX

In setups like the Victron Cerbo GX, the (separately sold) cable is split into:

- Separate wires for the 12V-24V power supply.
- An **RJ45 connector** for data transfer.

The ACES batteries will be automatically recognized by the Cerbo GX.

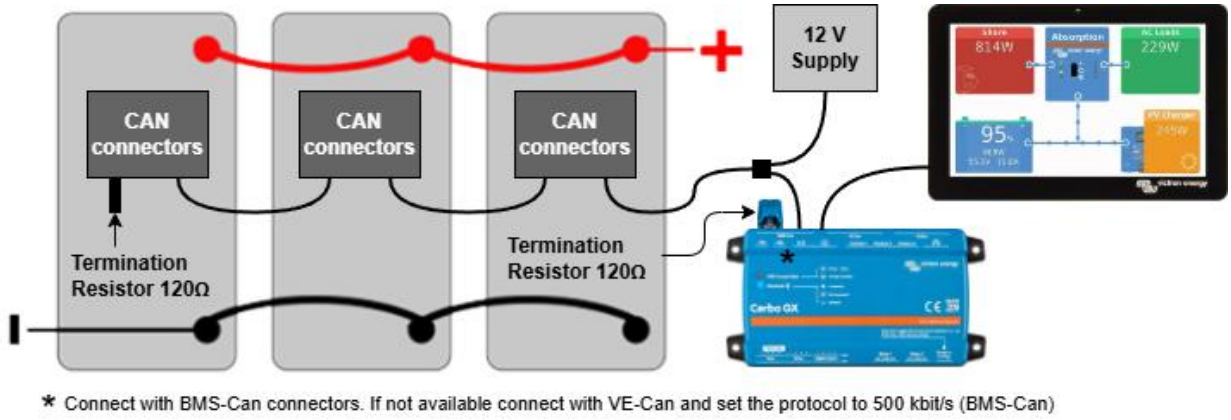


Fig. 1: Example connection of 3 parallel batteries with a Victron Cerbo GX and Victron GX touch 50

CAN system with batteries with internal supply

The batteries with 3 connectors CAN bus modules have an internal power supply. This power supply can supply a maximum current of 1A.

One of the M8 connectors only contains 3 pins. The additional M8 3-pin to 2 tinned leads cable, which is included with the battery, can be connected to an unpowered (ignition) switch. The CAN bus power will be turned on when the switch is closed.

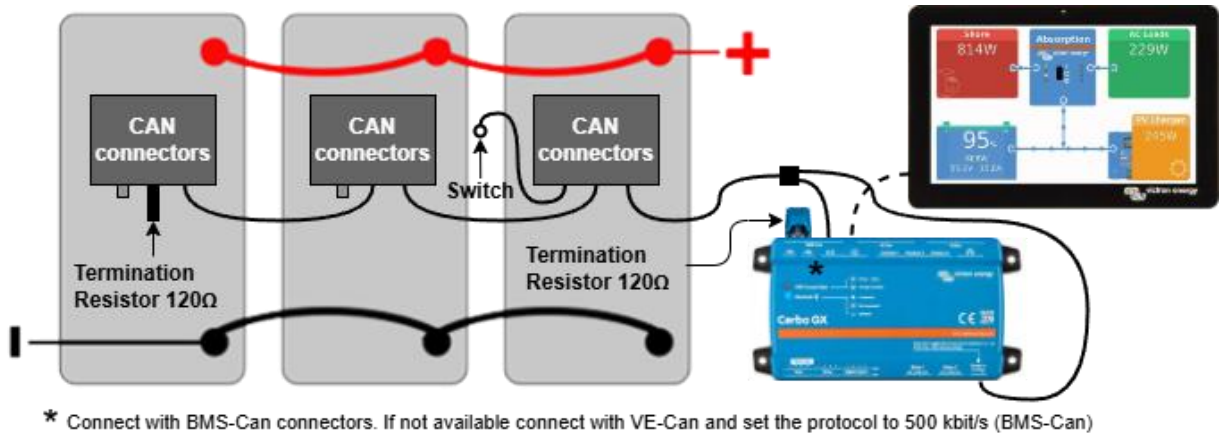


Fig. 2: Example connection of 3 parallel batteries with a Victron Cerbo GX and Victron GX touch 50

Batteries with an internal supply operate identically to batteries without an internal supply. They can also be used in the same setup as batteries without this supply. Where they differ is that they can also be used in a standalone setup without external DCDC converter or 12V battery.

The internal supply can also be used to deliver power to the a Victron device like the Cerbo GX given in the example above. As long as the total power draw is below 1A. The wire going to the supply is then supposed to be connected to the input of the Victron Cerbo. When multiple batteries are connected, it is still sufficient to only switch the supply of 1 battery, since the can modules have low power consumption. It is however still possible to switch on multiple supplies to reduce temperature inside the battery case.

Termination Resistors

Termination resistors are essential for a stable CAN bus connection. They prevent signal reflections by being placed at **both ends** of the bus.

Connection Setup:

- **Middle of the CAN bus:** Only CAN bus cables should be connected to the battery. The termination resistor should not be connected.
- **At the ends of the bus:** One CAN bus cable and one termination resistor should be connected to the battery to properly terminate the bus.
    - When using splitters this means that some ports may need to be left unpopulated

ACES Battery Tips

- Both CAN connectors on ACES batteries are identical, so either one can be used for connection or termination.
- **At the ends of the bus**, connect a CAN bus cable and termination resistor.
- **In the middle**, only connect the CAN bus cables, without the termination resistor.
- Ensure that there are **Only 2 resistors in a complete CAN network**

This ensures a stable and efficient CAN bus network.

Protocols and how to change them

The total list of currently available protocols is:

- Victron-VE (Default: 500 kbits/s (a.k.a. BMS-CAN))
    - Adapter cable M8 to RJ45+supply required (not included with battery)
- NMEA2000
    - Adapter cable M8 to M12 required (not included with battery)
- ACES protocol
- Waterworld

HFP Batteries with button

The ON/OFF switch on your ACES Battery controls its operational state. The state of the battery can also be seen from the LED indicator as described below. The operational modes of the battery are Bluetooth mode and a combined CAN-Bluetooth mode.

Switching the Battery ON/OFF

- **Turn ON:**
  - Press and hold the switch for more than 1 second.
  - The LED indicator will light up, indicating the battery is on.
  - If 12V is not applied to CANbus, the battery enters Bluetooth Mode.
  - If 12V is applied to CANbus, the battery enters CANbus-Bluetooth Mode.
- **Turn OFF:**
  - Press and hold the switch for more than 1 second.
  - The LED indicator will turn off, indicating the battery is off.
  - The battery is in a charging-only state, and both Bluetooth and CANbus (if applicable) are inactive.

Switching from CANbus-Bluetooth Mode to Bluetooth Only Mode

- **Switch to Bluetooth Only Mode:**
  - Remove the 12V from the CANbus.
  - Press and hold the switch for more than 5 seconds.
  - The LED indicator will flash, signalingthe mode change.
  - The battery will then turn off.
  - Turn the battery on again by pressing and holding the switch for more than 1 second to enter Bluetooth Only Mode.

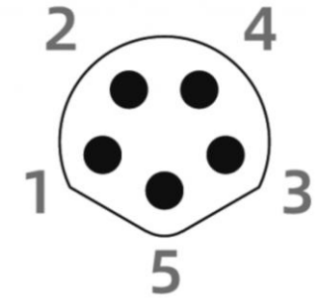
Switching between CANbus protocols

- **Switch to Victron Protocol (DEFAULT), NMEA or ACES Energy:**
  - Remove the 12V from the CANbus.
  - Press and hold the switch for more than 5 seconds.
  - The LED indicator will flash, signalling the protocol change.
    - Victron Energy Protocol: The LED will flash three times.
    - NMEA Protocol: The LED will four times.
    - ACES Energy Protocol: The LED will five once.
  - The battery will then turn off.
  - Turn the battery on again by pressing and holding the switch for more than 1 second to enter Bluetooth Only Mode. If 12V is applied on the CANbus then battery enters CANbus-Bluetooth Mode with the selected CANbus protocol.

Batteries without button

Batteries without button can only be set to another CAN protocol by communicating this to the battery via the CAN port. For advanced users, a guide on setting specific protocols and baud rates can be made available.

Pin layout ACES batteries



M8-5P

Pin	CAN
1	Shield
2	+12V
3	GND
4	CAN-H
5	CAN-L