Lithionics Battery NMEA2000 Module Guide Rev.A

NMEA2000 is a CAN based communication protocol originated in the Marine market, similar to how RV-C protocol was developed in the RV market. Both protocols are based on underlying SAE J1939 automotive industry protocol, which defines PGN messages and 29 bit addressing scheme. Theoretically these 2 protocols can coexist on the same CAN backbone network, as they use the same 250kbs baud rate, but industry's certification organizations like RVIA and NMEA do not officially allow mixing 2 protocols on the same network.

Since Lithionics uses RV-C protocol for its integrated IonBus communications, adding NMEA2000 messages to the IonBus network would prevent some customers from certifying their systems with NMEA. There is also a small risk of compatibility issues if customer's NMEA devices would interfere with IonBus functionality, causing problems with Lithionics BMS functions.

The best solution is to add a 2nd CAN interface, physically and electrically isolated from the main IonBus CAN interface and allow NMEA2000 messages only on this new CAN interface, so it can be connected to customer's NMEA2000 backbone separately from Lithionics IonBus network.

NMEA2000 add-on board was developed, which can be installed inside the NeverDie V9 External BMS as an optional feature. Once installed, the BMS firmware automatically detects it and starts sending NMEA2000 messages to this CAN interface.

External connector is a standard M12 male 5pin used in NMEA2000 systems, which can be connected using standard off the shelf NMEA2000 drop cables.

Supported NMEA2000 messages

NOTE: NMEA2000 is a closed source licensed protocol, so we cannot publicly document all message details like we do with RV-C protocol, which is open source. Lithionics has purchased a NMEA2000 license, so we have internal documentation for these messages, but only brief descriptions can be published for public access.

BMS firmware v9.0.03 implemented following battery related PGNs. NMEA uses decimal format for PGN numbers, as opposed to hexadecimal in RV-C environment.

- 127506 (DC Detailed status)
- 127508 (Battery status)
- 127513 (Battery Config status)
- 126996 (Product information)

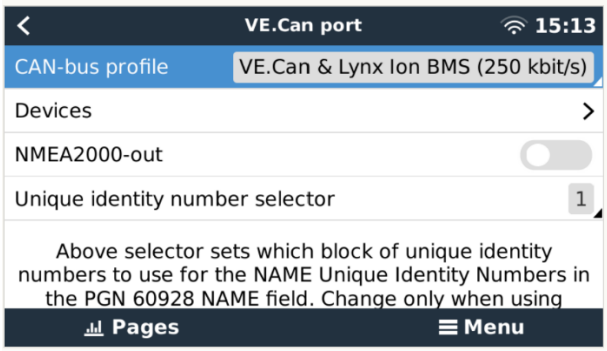
As in any J1939 protocol each node must have a unique Source Address. Since we use default starting address 70 for the RV-C side, we selected default starting address 80 for the NMEA2000 side. In large systems with multiple BMSs where BATID value is incremented and CANSA value is incremented, the Source Address for NMEA interface will be automatically incremented shifting the CANSA value by 10. For example, if CANSA is set to 71, then NMEA's SA will be 81.

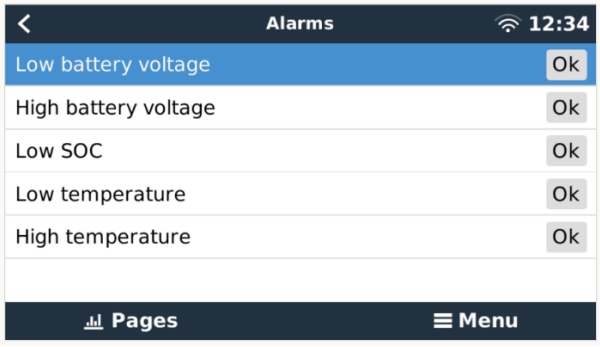
In some PGNs there is also a reference to battery Instance, which in RV-C protocol starts with 1, which is the value of BATID parameter. In NMEA2000 instances for house batteries are often incremented to higher numbers to avoid any potential conflicts. We chose default instance 11, which is incremented by shifting BATID value by 10.

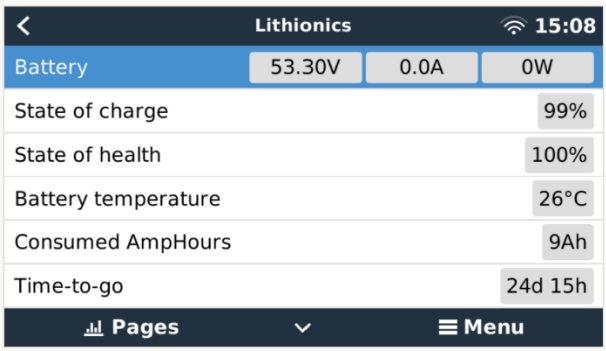
Victron integration over NMEA2000

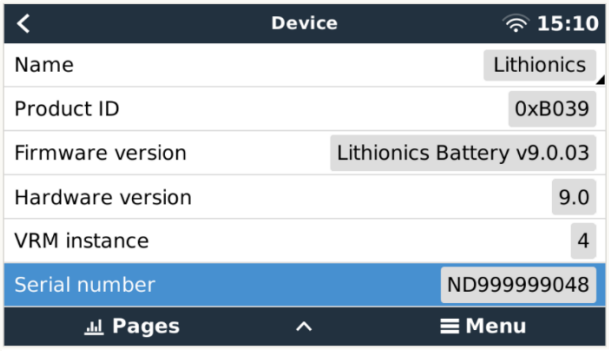
Victron Cerbo GX system supports Lithionics BMS integration over RV-C or NMEA2000 protocols, but you must select one of them as Cerbo GX has only one VE.Can port. Both protocols support battery data, such as SOC, Voltage, Current and Temperature, as well as charge control feature called DVCC. However, NMEA2000 has additional benefits over RV-C as it supports extra data fields like Firmware Version, Serial Number, Discharge Current Limit. The DCL feature allows Inverter to stop consuming battery power when battery is low, before BMS completely disconnects battery power, so direct DC loads can continue to operate while lower priority AC loads are turned off.

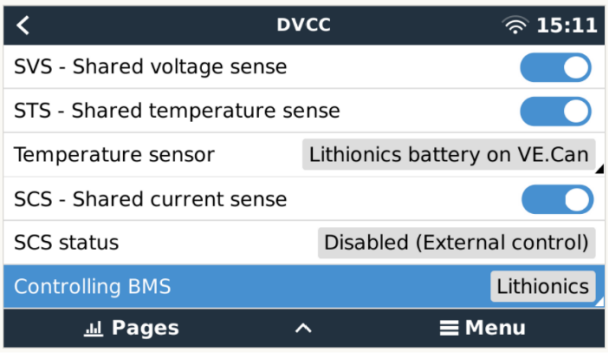
When configuring Cerbo GX for NMEA2000, select CAN protocol called **VE.Can & Lynx Ion BMS**, which is based on NMEA2000 with some proprietary Victron messages added to it. Screenshots below demonstrate Lithionics integration over NMEA2000.

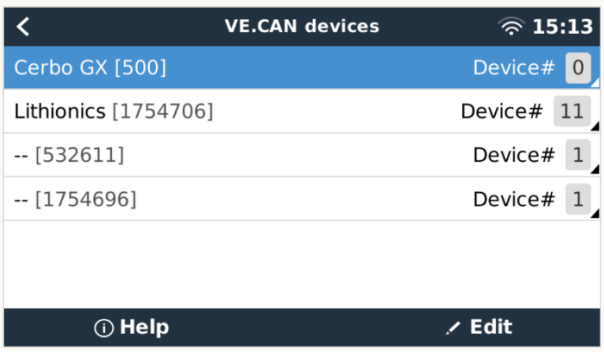












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