Manual EN

VE.Bus to NMEA 2000 interface
VE.Bus to VE.Can interface

1 Introduction

1.1 VE.Bus compatibility

The minimal version of the VE.Bus devices connected is 19xx111 or 20xx111, released in 2007.

It is not possible to combine the VE.Bus to NMEA2000 interface with one of the following products in a VE.Bus system:

- VE.Net to VE.Bus Converter
- Blue Power Panel 2
- Blue Power Panel GX
- Victron Global Remote or Ethernet Remote

Combining with the Digital Multi Control, VE.Bus Multi Control or Phoenix Inverter Control is possible. Note in that case it is not possible to switch the VE.Bus device on or off. Also it is not possible to control the shore current limit when one of these other control panels is connected.

1.2 NMEA 2000 Canbus

The National Marine Electronics Association (http://www.nmea.org/) defines standardized protocols in order to facilitate interconnection of digital equipment on boats. NMEA 2000 is an application level CAN-bus protocol based on the J1939. Products of different manufacturers can be connected to a shared network cable making the data commonly available for displaying, control and other functions available on the network.

Note: this product can also be used to integrate a VE.Bus system into another type of Canbus network, which is not purely NMEA2000.

1.3 Installation

Connection to NMEA 2000

NMEA 2000 requires a single backbone where products must connect to with drop cables. The VE.Net to NMEA 2000 drop cable is equipped with a Micro-C (M12) male connector for this purpose, intended to be connected to a corresponding T-connector in the backbone. Refer to a NMEA 2000 cable supplier for details about the NMEA 2000 network cabling and required network topology.

This product requires a network power supply. This product will therefore not function without power on the canbus!

The NMEA 2000 backbone must be terminated with resistors at both ends. The network will not function properly without them!

1.4 Sent / received NMEA 2000 messages

NMEA 2000 defines several messages. Messages are identified by their parameter group number (PGN). A textual description of the message is publically available on the NMEA 2000 website (http://www.nmea.org/). Detailed specification of the protocol and message definition or part thereof can be ordered online on the NMEA 2000 website. NMEA 2000 is based on and compatible with SAE J1939. This interface product sends the AC status message as defined in J1939-75. The specification of these messages can be bought on the SAE website (http://www.sae.org/). The messages sent must be interpreted in combination with the function sending the data.

The interface has one function, “153 Inverter”, when connected to a Victron Inverter. When connected to a Multi or Quattro, the interface has two functions. The additional function is the “154 AC Input” monitor. Charger Status messages will be sent by the Inverter function. Both functions have their own network address.

To function properly, NMEA 2000 data consumers like generic displays, need to be able to make a distinction between the same AC PGNs based on the network address. Depending on the function belonging to that network address the need to interpret it as either Inverter Input or Inverter Output. Displays not being capable of doing so will regard the data as belonging to the mains (utility). The Inverter Output is then interpreted as utility #0 and Inverter Input as utility #1. These default instance numbers can be changed by a network configuration tool if necessary.

The following messages are accepted by the product for both functions:

PGN	PGN(hex)	Name
59904	0xEA00	ISO Request
60928	0xEE00	ISO Address Claim
65240	0xFED8	ISO Commanded Address
126208	0x1ED00	NMEA - Request group function
126208	0x1EE00	Receive/Transmit PGN's group function
126996	0x1F014	Product Information
126998	0x1F016	Configuration Information
126208	0x1ED00	NMEA - Request group function

Message sent by the ‘Inverter’ Function:

PGN	Hex	Name
65007	0xFDEF	AC Output - Phase C, Apparent Power
65008	0xFDF0	AC Output - Phase C, L-N Voltage, Current, Frequency
65010	0xFDF2	AC Output - Phase B, Apparent Power
65011	0xFDF3	AC Output - Phase B, L-N Voltage, Current, Frequency
65013	0xFDF5	AC Output - Phase A, Apparent Power
65014	0xFDF6	AC Output - Phase A, L-N Voltage, Current, Frequency
65016	0xFDF8	AC Output - Apparent Power of all phase
65017	0xFDF9	AC Output - average, L-N Voltage, Current, Frequency
127507	0x1F213	Charger Status
127508	0x1F214	Battery Status
127509	0x1F215	Inverter Status
127501	0x1F20D	Binary Status Report

The Charger Status is only sent if the connected VE.Bus device is an Inverter / Charger and not an Inverter only device. Phase information is only sent if the VE.Bus equipped system has multiple phases. The default transmission rate for the AC PGNs is 1500ms.

The VE.Bus system state is translated to the NMEA 2000 charger / inverter state according to the following table:

VE.Bus System State	NMEA 2000 Charger State	NMEA 2000 Inverter State
Off	*Disabled*	*Disabled*
Passthru	*Not Charging*	*Passthru*
Bulk	*Bulk*	*Passthru*
(repeated) Absorption	*Absorption*	*Passthru*
Float	*Float*	*Passthru*
Storage	*Float*	*Passthru*
Inverting / Assisting	*Not Charging*	*Invert*
Fault	*Fault*	*Fault*

1.5 Binary states

The alarm and relay states are reported by the Binary Status Report message (127501). Device on the NMEA 2000 bus can use these states to react upon. The table below describes the meaning of the reported binary states when turned on. When the condition is not met “Off” is sent. “Unknown/Unavailable” is sent for unknown or reserved fields. The Binary Status Report is sent once per 6 seconds by default; it is directly sent when a value changed.

Signal	Meaning
Bank Instance	Instance of the message; adjustable, default value 0
Status 1	Not used, report as “Unavailable”
Status 2	Not used, report as “Unavailable”
Status 3	Not used, report as “Unavailable”
Status 4	Not used, report as “Unavailable”
Status 5	Low Battery warning
Status 6	Low Battery alarm
Status 7	Temperature warning
Status 8	Temperature alarm
Status 9	Overload warning
Status 10	Overload alarm
Status 11	Ripple warning
Status 12	Ripple alarm
Status 13-29	Not used, report as “Unavailable”

1.6 Imitating the multi / PMC look

The LED state of the multi can be used to easily imitate the front of the multi itself. This is only for graphical purposes. Do not interpret the LED status to get the state of the device, since LED behaviour might be subject to change and combinations of LEDs have different meanings. Use the state fields themselves for these purposes. This is for GUI / user interfaces only.

Literal Led status of a multi (127501)	
Bank Instance	Instance of the message; adjustable, default value 1
Status 1	Led Mains On
Status 2	Led Mains Blink
Status 3	Led Absorption On
Status 4	Led Absorption Blink
Status 5	Led Bulk On
Status 6	Led Bulk Blink
Status 7	Led Float On
Status 8	Led Float Blink
Status 9	Led Inverter On
Status 10	Led Inverter Blink
Status 11	Led Overload On
Status 12	Led Overload Blink
Status 13	Led Low Battery On
Status 14	Led Low Battery Blink
Status 15	Led Temperature On
Status 16	Led Temperature Blink
Status 17-29	Not used, report as “Unavailable”

The state of an individual led can be extracted from the combined.

Blink	On	Nibble	
Off	Off	0x0000	The LED is off
Off	On	0x0001	The LED is on
On	Off	0x0100	The LED is blinking
On	On	0x0101	The LED is blinking in opposite sense as normal blinking. When LEDs of state 0x0100 are off LED in this state are on and vice versa.
Error Unavailable	Error Unavailable	other	Led state is not available

This message is not sent by default. Setting bit 8 in the remote control VREG 0x0202 will enable these messages. The message is broadcasted every 8 seconds, and it is also sent immediately when a LED state changed. The message is also sent directly after setting bit 8.

See explanation and examples further down in the document on how to set bit 8 in register 0x0202.

1.7 Data message sent by the ‘AC Input’ Function

PGN	Hex	Name
65007	0xFDEF	AC Input - Phase C, Apparent Power
65008	0xFDF0	AC Input - Phase C, L-N Voltage, Current, Frequency
65010	0xFDF2	AC Input - Phase B, Apparent Power
65011	0xFDF3	AC Input - Phase B, L-N Voltage, Current, Frequency
65013	0xFDF5	AC Input - Phase A, Apparent Power
65014	0xFDF6	AC Input - Phase A, L-N Voltage, Current, Frequency
65016	0xFDF8	AC Input - Apparent Power of all phase
65017	0xFDF9	AC Input - average, L-N Voltage, Current, Frequency

1.8 Altering message transmission / instances

The transmission rate and priority of these messages can be changed by using the appropriate NMEA 2000 Request Group Function (126208), a Complex Request, Complex Command and Complex write respectively. The transmission settings should only be changed with care, since data consumers might anticipate in the data arriving in certain intervals.

1.9 Other settings

NMEA 2000 requires a method for changing some fields in the NAME. The Device Function Instance and System Instance of the VE.Bus to NMEA 2000 drop cable can be altered by a Complex Command.

The Installation Description, field 1 and field 2 in the Configuration Information can be set to any desired text (for example location, purpose of the battery etc) by a Complex Command.

The used network address can be changed by a CMDA message sent as BAM. Since address assignment is handled automatically within NMEA 2000, manually setting the source addresses is normally not needed.

2 Victron Energy proprietary message format: VREG's

Not all values reported by the VE.Bus products can be sent with standard NMEA 2000 PGN's. These values are available by the proprietary message 61184 (0xEF00) to the broadcast address 61439 (0xEFFF).

See the document "VE.Can registers - public.docx" for detailed information and examples.

3 Troubleshooting

How to make sure that there is communication between the VE.Bus to NMEA2000 interface and the VE.Bus device(s).

1. Disconnect the interface completely. Both the VE.Bus end and the canbus end need to be disconnected to reset it.
2. Turn the VE.Bus device (ie Multi or Quattro) on, and wait for it to power up and start inverting or charging.
3. Connect the interface to the VE.Bus device. The VE.Bus device should switch off.
4. Power the interface on the canbus end. Make sure to only power it, and do not connect any display or other canbus device to the canbus.
5. The VE.Bus to NMEA2000 interface will now start up in ‘monitoring’ mode, and will instruct the VE.Bus device to switch on after a little while.
6. Wait for the VE.Bus device to switch on.

4 Specifications

	VE.Bus to NMEA 2000 interface	VE.Bus to VE.Can interface
Network type	**NMEA 2000 Canbus**	
Network requirements	**In conformance with NMEA 2000. Details are available from NMEA 2000 network suppliers.**	
Network connector	**Micro-C / M12 / DeviceNet male.**	**2x RJ45 Socket**
Canbus supply voltage range	**7 - 70VDC**	
Canbus current draw – typical	**20 mA at 12VDC**	
NMEA2000 Load Equivalent Nr.	**1**	
Operating temp. range	**-20 – +50°C**	
ENCLOSURE		
Measurements body (w x h)	**70 x 50 x 20mm**	
Weight	**100 gram**	

5 Notes

Distributor:

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