



**victron energy**  
BLUE POWER

ENGLISH

# Cerbo GX Manual

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## 1. Introduction

### 1.1. What is the Cerbo GX?

The Cerbo GX sits at the heart of your energy installation. All the other system-components - such as inverter/chargers, solar chargers, and batteries - are connected to it. The Cerbo GX ensures that they all work in harmony.

There is an optional touch screen accessory for the Cerbo GX called the [GX Touch](#).

Monitoring of the system can be done either with the Cerbo GX in front of you - or from anywhere in the world using an internet connection and the [VRM Portal](#).

The Cerbo GX also provides [Remote firmware updates](#) and allows settings to be Changed Remotely.

The Cerbo GX is part of the [GX product family](#). GX products are Victron's state-of-the-art monitoring solution that run our Venus OS operating system.

All the information in this manual refers to the latest software. Your device will update itself to the latest version automatically. Check our blog posts to see that your device has the latest firmware: <https://www.victronenergy.com/blog/category/firmware-software/>

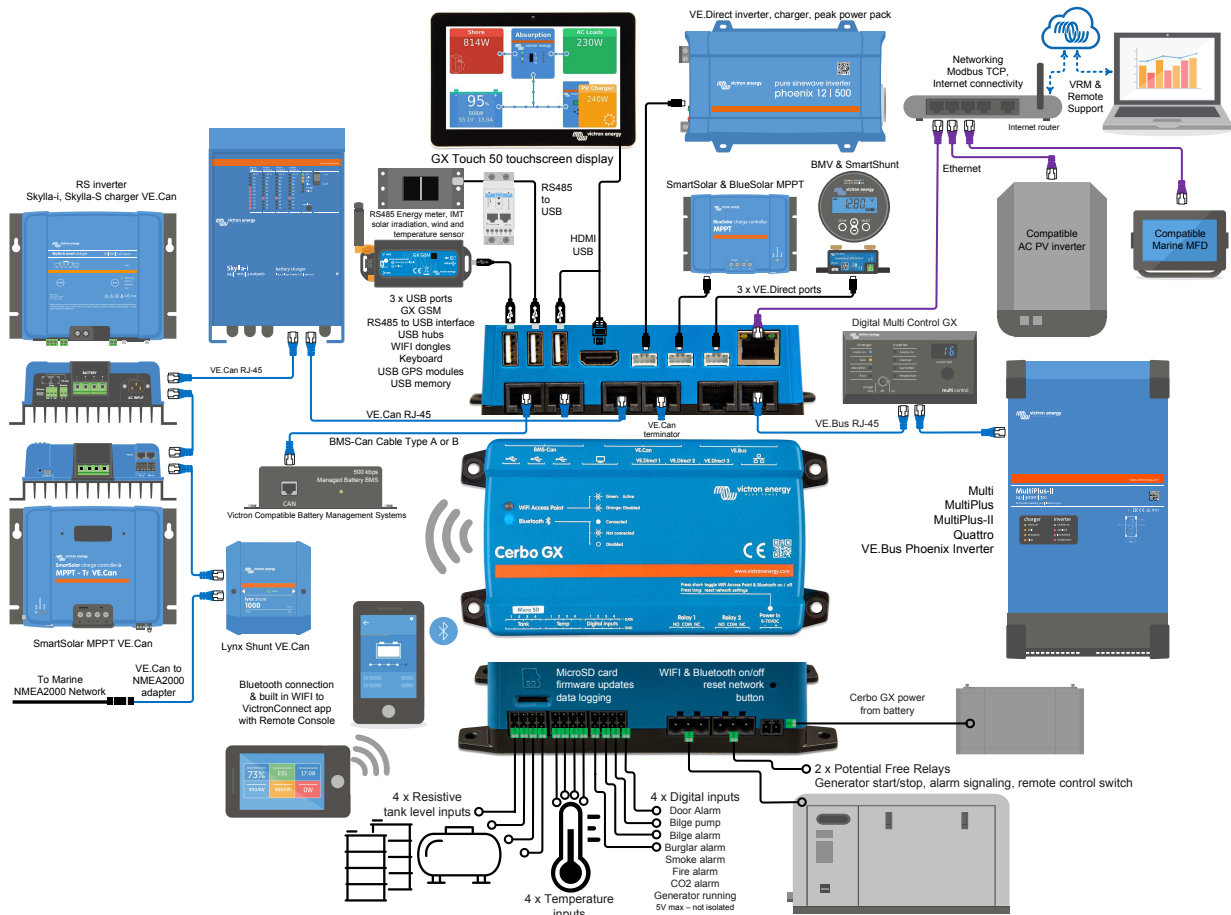
### 1.2. Whats in the box?

- Cerbo GX device
- Power cable with inline fuse and M8 terminal eyes for battery or DC busbar-attachment.
- VE.Can terminators (2 pcs)
- Terminal Blocks for all the connectors on each side.



## 2. Installation

### 2.1. Overview of connections



### 2.2. Power

The device is powered by using the *Power in V+* connector. It accepts 8 to 70 V DC. The device will not power itself from any of the other connections (eg network). Be sure to use a 1A slow blow fuse.

#### Powering in systems with VE.Bus BMS

When the Cerbo GX is used in an installation with a VE.Bus BMS, connect the *Power in V+* on the Cerbo GX to the terminal labelled '*Load disconnect*' on the VE.Bus BMS. Connect both negative leads to the negative stub of a common Battery.

#### A Cautionary word about Powering from the AC-out terminal of a VE.Bus Inverter, Multi or Quattro:

If you power the Cerbo GX from an AC adaptor connected to the AC-out port of any VE.Bus product (Inverter, Multi or Quattro), then a deadlock will occur after the VE.Bus products are powered-down for any reason (after any operational fault or during a black start). The VE.Bus devices will not boot-up until the Cerbo GX has power ...but the Cerbo GX will not boot-up until *it* has power. This deadlock can be rectified by briefly unplugging the Cerbo GX VE.Bus cable at which point you will observe the VE.Bus products will immediately begin to boot-up.

Or a modification can be done to the RJ45 cabling. See [FAQ Q20 \[56\]](#) for more information about this.

#### Isolation

Because the Cerbo GX is connected to many different products, please ensure that proper care is taken with isolation to prevent ground loops. In 99% of installations this will not be a problem.

- The VE.Bus ports are isolated

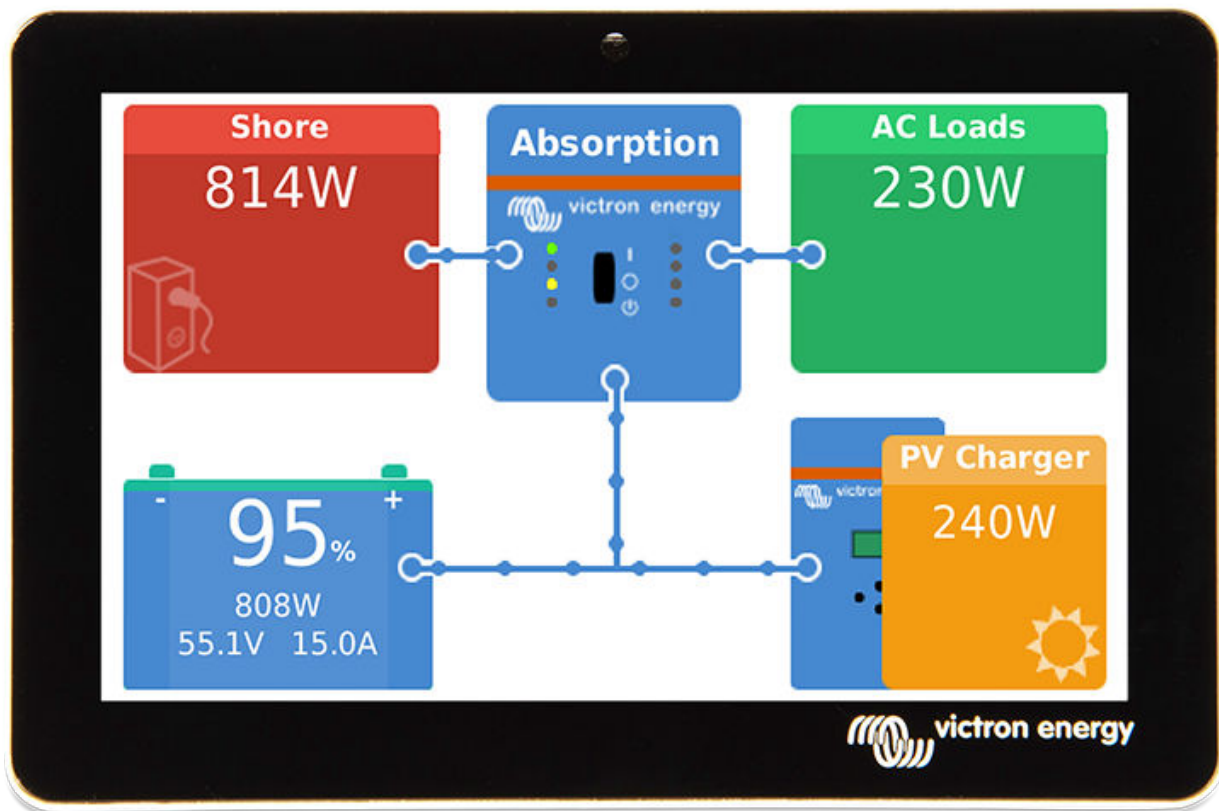
- The VE.Direct ports are isolated
- The VE.Can ports are not isolated.
- The USB ports are not isolated. Connecting a Wi-Fi Dongle or GPS Dongle will not create a problem as it is not connected to another power supply. Even though there will be ground loop when you mount a separately-powered USB hub, during extensive testing we have not found that it caused any issues.
- The Ethernet port is isolated, except for the shield: use unshielded UTP cables for the Ethernet network

#### Extending USB ports by use of a self-powered USB hub

Although the number of USB ports can be extended by using a hub, there is a limit to the amount of power that the *onboard USB port* can provide. When extending the number of USB ports, we recommend you always use *powered* USB hubs. And to minimize the chance of issues, be sure to use good-quality USB hubs. As Victron also offers a VE.Direct to USB adapter, you can use this arrangement to increase the number of VE.Direct devices you can connect to your system, [please see this document](#) for the limit of how many devices can be attached to various different GX devices.

### 2.3. GX Touch Screen

The optional touch screen accessory is connected via HDMI and USB cable and plugs that are supplied as part of the screen.



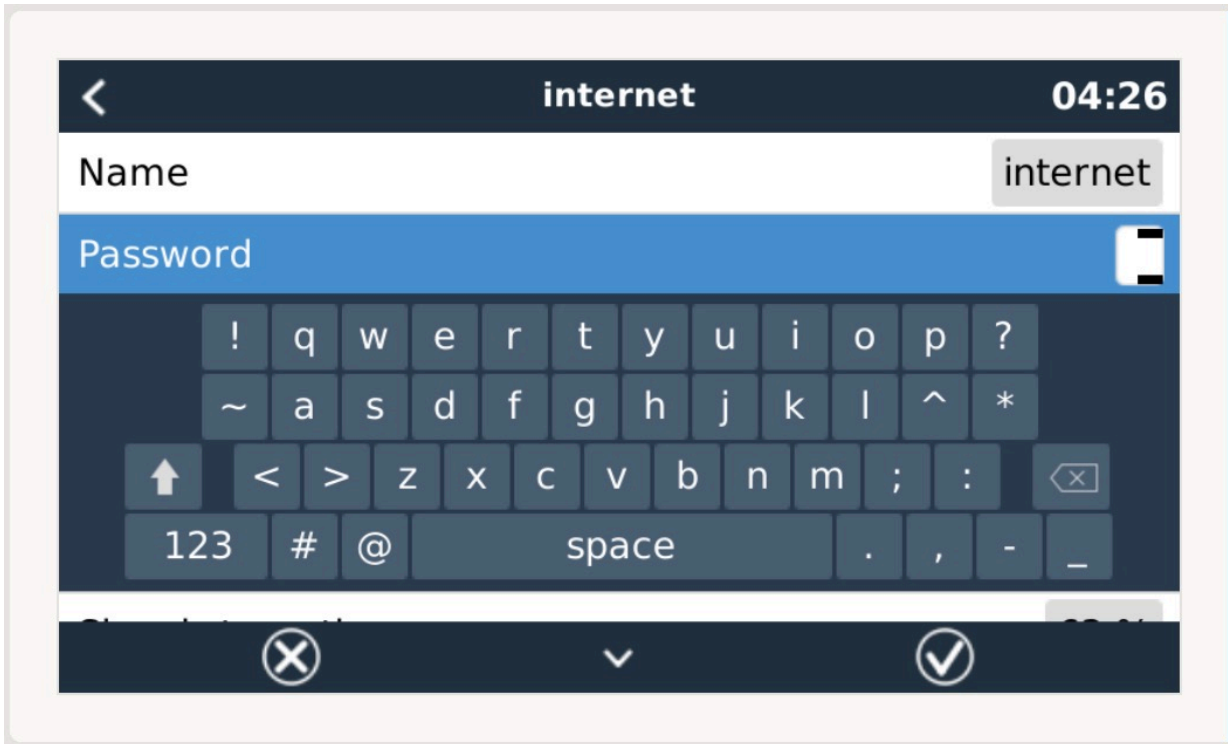
The ports to connect these plugs are located on the top of the Cerbo GX. See [Overview of connections diagram](#). [5]

No configuration is required. When the screen is connected, the device will automatically display the GX overview and menu controls.

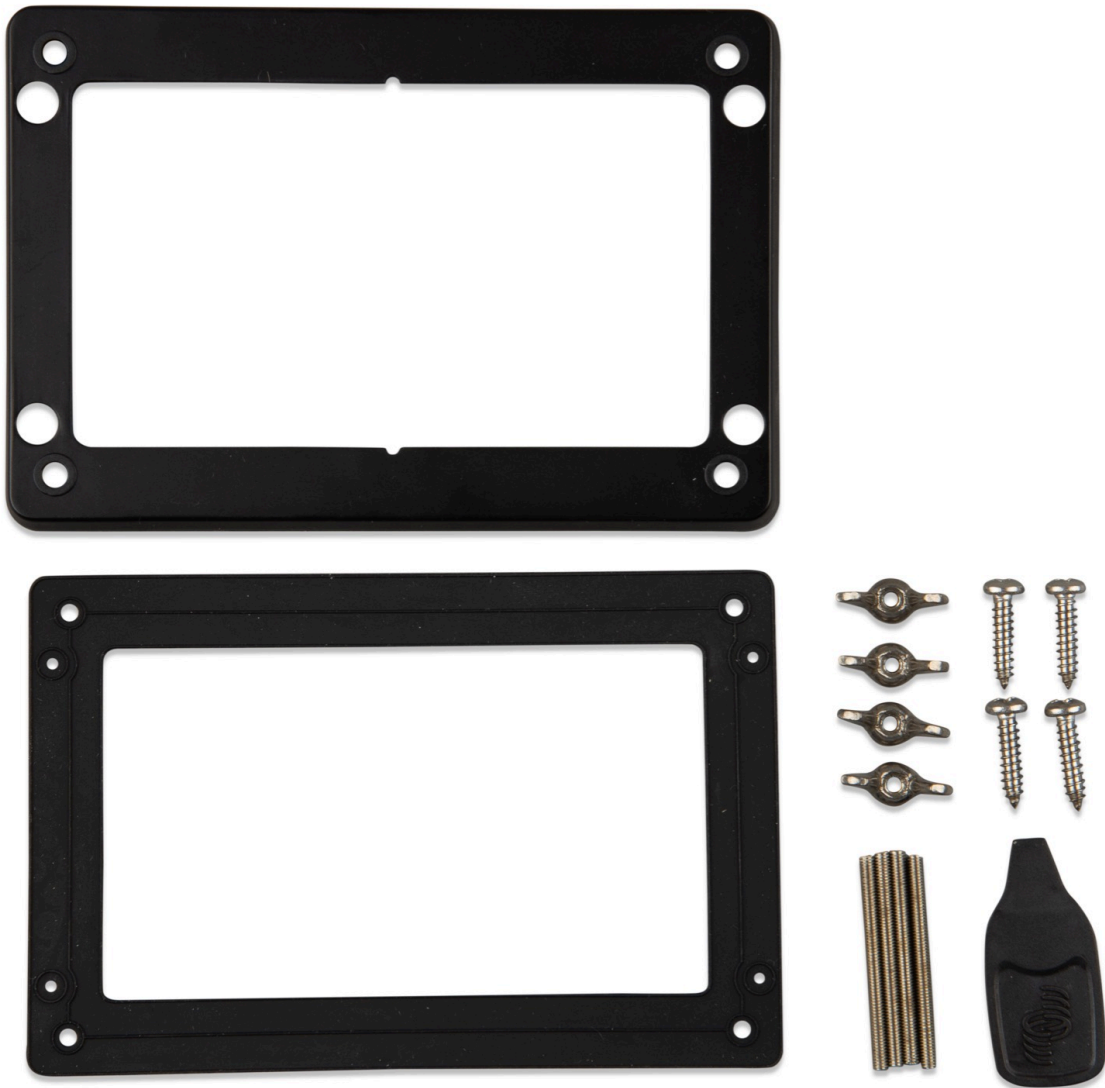
Display options are available in the Settings - Display and Language menu. You can set a time before the display turns off, or enable adaptive brightness.

The screen is controlled by a finger tip. You can swipe to scroll up and down through the menus, and tap to make selections.

Text and number input is entered via an onscreen keyboard -



It is possible to mount the GX Touch in several different ways, using the included bracket frames.



## 2.4. Connecting Victron products

### 2.4.1. Multis/Quattros/Inverters (VE.Bus products)

In order to keep this document short we are going to refer to all Multis, Quattros and Inverters as *VE.Bus* products.

The earliest version of the VE.Bus devices which can be connected to the Cerbo GX is 19xx111 or 20xx111, which were released in 2007. VE.Bus firmware 26xxxxx and 27xxxxx are also supported ...but 18xxxxx is not.

Note that it is not possible to use the Remote On/Off (header on the VE.Bus control PCB) in combination with a Cerbo GX. There should be wire between the left and middle terminal, as it is when shipped from the factory. In case a wired switch that disables the system is required, use the [Safety Switch Assistant](#).

#### **Single VE.Bus products**

To connect a single VE.Bus product, connect it to one of the VE.Bus sockets on the back of the Cerbo GX. Both sockets are identical, use either one. Use a standard RJ45 UTP cable, see our [pricelist](#).

#### **Parallel, split- and three-phase VE.Bus systems**

To connect multiple VE.Bus products, configured as a parallel, split-phase or three phase VE.Bus system, connect either the first or the last VE.Bus product in the chain to either one of the VE.Bus sockets on the back of the Cerbo GX. Use a standard RJ45 UTP cable, see our [pricelist](#).

#### **VE.Bus systems with Lithium batteries and a VE.Bus BMS**



- Connect the Cerbo GX to the socket labelled 'MultiPlus/Quattro', or to one of the Multis/Quattros in the system. Do not connect it to the *Remote panel* socket on the VE.Bus BMS.
- Note that it will not be possible to control the On/Off/Charger Only switch. This option is automatically disabled in the Cerbo GX menu when a VE.Bus BMS is used. The only way to control a Multi or Quattro when used with a VE.Bus BMS is to add a Digital Multi Control to the system. Setting the input current limit is possible in systems with a VE.Bus BMS.
- Combining MultiPlus/Quattro with a VE.Bus BMS and a Digital Multi Control is possible. Simply connect the Digital Multi Control to the RJ-45 socket on the VE.Bus BMS labelled *Remote panel*.
- To allow auto-power-down in the Cerbo GX in case of a low battery, make sure the Cerbo GX is powered via the VE.Bus BMS: connect *Power in V+* on the Cerbo GX to *Load disconnect* on the VE.Bus BMS. And connect both negative leads to the negative stub of a common Battery.

#### **Combining the Cerbo GX with a Digital Multi Control**

It is possible to connect both a Cerbo GX and a Digital Multi control to a VE.Bus system. The ability to switch the product On, Off or set it to Charger Only via the Cerbo GX will be disabled. The same applies to the input current limit: when there is a Digital Multi Control in the system, the input current limit which is set at that control panel will be the master-setting, and changing it on the Cerbo GX will not be possible.

#### **Connecting multiple VE.Bus systems to a single Cerbo GX**

Only one VE.Bus system can be connected to the VE.Bus ports on the back of the Cerbo GX. The professional way to monitor more systems is to add a second Cerbo GX

If you do require to connect more than one system to the same Cerbo GX, use an MK3-USB. Functionality will be limited:

- Only the system connected to the built-in VE.Bus ports is used to generate the data on the Overview pages.
- All connected systems will be visible on the Device-list
- All connected systems will be taken into account for Energy consumption and distribution calculations (kWh graphs on VRM)
- Only the system connected to the built-in VE.Bus ports is used for the Generator start/stop logic
- In case of an ESS system, only the system connected to the built-in VE.Bus ports is used in the ESS mechanisms. The other one is displayed in the device list only.

Alternatively the VE.Bus to VE.Can interface (ASS030520105) can be used. Add one for each additional system. Note that we advise against it; this interface is a deprecated product. Make sure that the VE.Can network is terminated and powered. For powering the VE.Can network, see Q17 in our [data communication whitepaper](#).

#### **2.4.2. Battery Monitor BMV-700 series; and MPPTs with a VE.Direct port**

Either one or two compatible products can be connected directly to the Cerbo GX using a standard [VE.Direct cable](#). There are two types of VE.Direct cable available:

1. Straight VE.Direct cables, ASS030530xxx
2. VE.Direct cables with an angled connector on one end. These are designed to minimize the required depth behind a panel, ASS030531xxx

VE.Direct cables have a maximum length of 10 metres. It is not possible to extend them. If longer lengths are required, use a VE.Direct to USB adapter with an active USB extension cable.

It is also possible to use the VE.Direct to VE.Can interface, but note that this only works for BMV700 and BMV702. Not for the BMV712, MPPT solar chargers and Inverters with a VE.Direct port. See next paragraph for more information on that VE.Can interface.

#### **Connecting more than two devices to your Cerbo GX using VE.Direct**

First of all, note that the maximum of VE.Direct devices that can be connected, regardless of the interface is limited. How they are connected, either direct, via USB or via CAN, does not change the maximum. See [here](#) for the maximum connected device limits. Select the correct GX device for the number of connected devices required by the system.

- Option 1: Use the [VE.Direct to USB interface](#). The Cerbo GX has built-in USB ports (see [Overview of Connections \[5\]](#)). Use a USB-hub when additional USB ports are required.
- Option 2: The BMV700 and BMV702 can also be connected using the [VE.Direct to VE.Can interface](#). Note that the BMV712, MPPTs and VEDirect Inverters cannot be connected using this canbus interface as it does not translate the data into canbus messages. When using the VE.Direct to VE.Can interface, make sure that the VE.Can network is terminated, and also powered. For powering the VE.Can network, see Q17 in our [data communication whitepaper](#).

#### **Notes about older VE.Direct MPPTs**

- An MPPT 70/15 needs to be from year/week 1308 or later. Earlier 70/15s are not compatible with the Cerbo GX, and unfortunately upgrading the MPPT firmware will not help. To find the year/week number of your model, look for the serial number which is printed on a label on its back. For example number HQ1309DER4F means 2013, week 09.

#### **2.4.3. Skylla-i, Lynx Shunt VE.Can, Lynx Ion + Shunt and MPPTs with a VE.Can port**

To connect a product with a VE.Can port, use a standard [RJ45 UTP cable](#). (Available with straight and elbow connectors)

Don't forget to terminate the VE.Can network at both ends using a [VE.Can terminator](#). A bag with two terminators is supplied with each VE.Can product. They are also [available separately](#).

Other notes:

1. In order to work with the Cerbo GX an MPPT 150/70 needs run firmware v2.00 or newer.
2. You can combine a Skylla-i control panel with a Cerbo GX.
3. You can combine a Ion Control panel with a Cerbo GX.
4. The Skylla-i, Lynx Shunt VE.Can, Lynx Ion + Shunt and the MPPTs with a VE.Can port all power the VE.Can network ...so it won't be necessary to power the VE.Can network separately in these circumstances. All the protocol converters - for example the VE.Bus to VE.Can interface; and the BMV to VE.Can interface, do not power the VE.Can network.

#### 2.4.4. BMV-600 series

Connect the BMV-600 using the VE.Direct to BMV-60xS cable. (ASS0305322xx)

#### 2.4.5. DC Link box

Connect the [DC Link box](#), using the RJ-12 cable supplied. Then connect the BMV-700 to the Cerbo GX - see connecting BMV-700 for more instructions.

#### 2.4.6. VE.Can Resistive Tank Sender Adapter

See its [page and manual on our website](#) for details about the Adapter.

To connect a product with a VE.Can port, use a [standard RJ45 UTP](#) cable.

Don't forget to terminate the VE.Can network on both ends using a [VE.Can terminator](#). A bag with two terminators is supplied with each VE.Can product. They are also [available separately](#) (ASS030700000). (Available with straight or elbow connectors.)

Make sure that the canbus is powered, see the [Power chapter in the Tank Sender Adapter manual](#) for details.

## 2.5. NMEA Tank senders from other manufacturers

A tank sender must meet the following requirements to be visible on the Cerbo GX:

- Transmit the NMEA2000 Fluid Level PGN, 127505
- The NMEA2000 device class needs to be 'General', 80
- The NMEA2000 function needs to be 'Transducer', 190

Since v2.17 the following functions are accepted as well:

- The NMEA2000 device class 'General', 80 and function 'Sensor', 170
- The NMEA2000 device class 'Sensors', 75 and function 'Fluid Level', 150

A single function reporting multiple Fluid Levels is currently not supported.

For some tank senders it is also possible to configure the capacity and the fluid type from the Cerbo GX - for example the Maretron TLA100. This facility may be available with other senders made by other manufacturers - it's well-worth trying.

To connect an NMEA2000 network to the VE.Can port on the Cerbo GX, use a [VE.Can to NMEA2000 cable](#).

Alternatively, instead of a VE.Can to NMEA200, you can use a 3802 cable from Oceanic Systems: <https://osukl.com/ve-can-adapter/>. The difference is that it lends itself well to connecting a single NMEA-2000 device into a VE.Can network. It's also able to power a lower voltage NMEA-2000 network directly from a 48V Victron system.

## 2.6. Connecting a PV Inverter

Measuring the output of a PV Inverter will provide the user with an overview of both actual power balance and the energy distribution. Note that these measurements are only used to display information. They are not needed, nor used, by the installation for its performance. Besides monitoring, the GX device can also curtail some types and brands of PV Inverters, ie. reduce their output power. This is used, and required, for the [ESS Zero feed-in feature](#).

### Direct connections

Type	Zero feed-in	Details
Fronius	Yes	LAN Connection, see <a href="#">GX - GX - Fronius manual</a>
SMA	No	LAN Connection, see <a href="#">GX - GX - SMA manual</a>
SolarEdge	No	LAN Connection, see <a href="#">GX - SolarEdge manual</a>
ABB	Yes	LAN Connection, see <a href="#">GX - ABB manual</a>

**Using a meter** For PV Inverters that cannot be interfaced digitally, a meter can be used:

Type	Zero feed-in	Details
<a href="#">AC Current Sensor</a>	No	Connected to inverter/charger analog input. Lowest cost - least accurate. <a href="#">Energy Meter</a>
<a href="#">Energy Meter</a>	No	Wired to the Cerbo GX, or connected wirelessly using our Zigbee to USB/RS485 interfaces. See the <a href="#">Energy Meters start page</a>
Wireless AC sensors	No	See the <a href="#">Wireless AC Sensor manual</a> - Discontinued

## 2.7. Connecting a USB GPS

Use a GPS to track remote vehicles or boats and, optionally, get an alarm when they leave a designated area (geofencing). It is also possible to download a gps-tracks.kml file which can be opened with Navlink and Google Earth for example.

Victron does not sell USB-GPS, but the Cerbo GX will support third-party GPS modules which use the NMEA0183 command-set - almost all do. It can communicate at both 4800 and 38400 baud rates. Plug the unit into either of the two USB sockets ...connection may take a few minutes, but the Cerbo GX will automatically recognize the GPS. The unit's location will automatically be sent to the VRM online portal and its position shown on the map.

The Cerbo GX has been tested for compatibility with:

- Globalsat BU353-W SiRF STAR III 4800 baud
- Globalsat ND100 SiRF STAR III 38400 baud
- Globalsat BU353S4 SiRF STAR IV 4800 baud
- Globalsat MR350 + BR305US SiRF STAR III 4800 baud

## 2.8. Connecting a Fischer Panda Generator

See [GX - Fischer Panda generators](#).

## 2.9. Connecting NMEA-2000 tank senders

A third party NMEA2000 tank sender must meet the following requirements to be visible on the GX Device:

- Transmit the NMEA2000 Fluid Level PGN, 127505
- The NMEA2000 device class needs to be either General (80) in combination with function code Transducer (190), or Sensor (170). Or, the NMEA2000 device class needs to be Sensors (75), in combination with function Fluid Level (150).

A single function reporting multiple Fluid Levels is currently not supported.

For some tank senders it is also possible to configure the capacity and the fluid type on the GX Device - for example the Maretron TLA100. This facility may be available with other senders made by other manufacturers - it's well-worth trying.

To connect an NMEA2000 network to the VE.Can port on the Cerbo GX, use a [VE.Can to NMEA2000 cable](#).

Alternatively, instead of a VE.Can to NMEA2000, you can use a 3802 cable from Oceanic Systems: <https://osukl.com/ve-can-adaptor/>. The difference is that it lends itself well to connecting a single NMEA-2000 device into a VE.Can network. It's also able to power a lower voltage NMEA-2000 network directly from a 48V Victron system.

Tested NMEA2000 tank senders:

- Maretron TLA100
- Navico Fluid Level Sensor Fuel-0 PK, partno. 000-11518-001. Note that this sender requires a 12V powered NMEA2000 network; it breaks when connected to a 24V-powered NMEA2000 network. And note that you need a Navico display to configure the Capacity, Fluid type, and other parameters of the sensor.

Most likely others work as well. If you know of one working well, please edit this page -or- get in touch with us on [Community -> Modifications](#).

## 2.10. Connecting IMT Solar Irradiance, Temperature and wind sensors

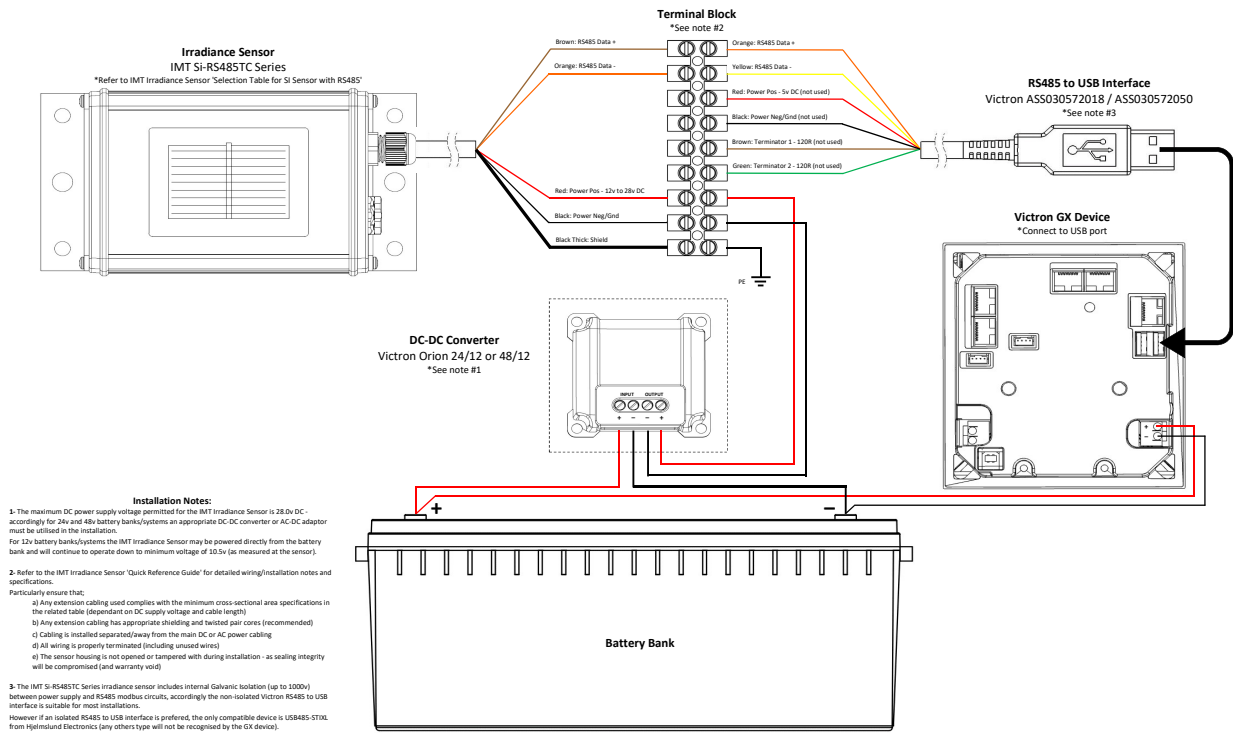
### Compatibility and wiring

The compatible types are the [Si-RS485TC Series](#). The optional wind and temperature sensor are also supported.

The sensor is connected using RS485 wiring, and requires [our USB to RS485 accessory cable](#).

Follow this diagram for the connection of the Sensor to the GX device's USB port, via the RS-485 to USB interface.

### IMT Irradiance Sensor - Victron Installation Guide



Rev 5 - 20/01/20

#### Installation Notes:

- BEWARE!** The maximum DC power supply voltage permitted for the IMT Irradiance Sensor is 28.0v DC - accordingly for 24v and 48v battery banks/systems an appropriate DC-DC converter or AC-DC adaptor **MUST** be utilised in the installation, eg a [nonisolated 24V to 24V DCDC Converter](#), or [isolated 48V to 24V DCDC Converter](#), with its input in parallel to the GX Device, and output connected to Si-Sensor. For 12v battery banks/systems the IMT Irradiance Sensor may be powered directly from the battery bank and will continue to operate down to minimum voltage of 10.5v (as measured at the sensor).
- Refer to the IMT Irradiance Sensor 'Quick Reference Guide' for detailed wiring/installation notes and specifications. Particularly ensure that;
  - Any extension cabling used complies with the minimum cross-sectional area specifications in the related table (dependant on DC supply voltage and cable length)
  - Any extension cabling has appropriate shielding and twisted pair cores (recommended)
  - Cabling is installed separated/away from the main DC or AC power cabling
  - All wiring is properly terminated (including unused wires)
  - The sensor housing is not opened or tampered with during installation - as sealing integrity will be compromised (and warranty void)

#### Wire connections

Si-Sensor	RS 485 interface	Signal	Note
Black	Black	Minus	Connect to GX Device minus as well.
Brown	Orange	RS485 Data A +	
Orange	Yellow	RS485 Data B -	
Black (thick)		Ground	Ground
Red		Power positive (12/24V)	Connect to either battery or output of DCDC Converter

Make sure all unused wires of the RS485 USB interface are terminated in an isolated manner. The data sheet for the [RS485 to USB adapter](#) is here.

#### Isolated RS485 to USB Adapters

The IMT Si-RS485TC Series irradiance sensor includes internal Galvanic Isolation (up to 1000v) between power supply and RS485 modbus circuits, accordingly the non-isolated Victron RS485 to USB interface is suitable for most installations. However if an isolated RS485 to USB interface is preferred (eg positive ground systems), the only compatible device is USB485-STIXL from [Hjelmslund Electronics](#) - Don't use any others, any others type will not be recognised by the GX device.

#### Configuration of the sensor

Normally, the Sensor should work out of the box. In case it does not, for example when the sensor has previously been used in another system, then:

1. Download the Si-MODBUS-Configuration software tool from the IMT website.
2. Configure the following settings: Modbus Address - 3, Baud Rate: 9600, Data Format: 8N1 (10 Bit): which are all the default settings as when shipped by IMT.

For more support on configuring the IMT sensor, [please contact IMT](#).

**Connecting only an IMT temperature sensor**

Both RS485-MB single temperature sensors of IMT are compatible too.

The Tm-RS485-MB will be visible as the 'Cell temperature'.

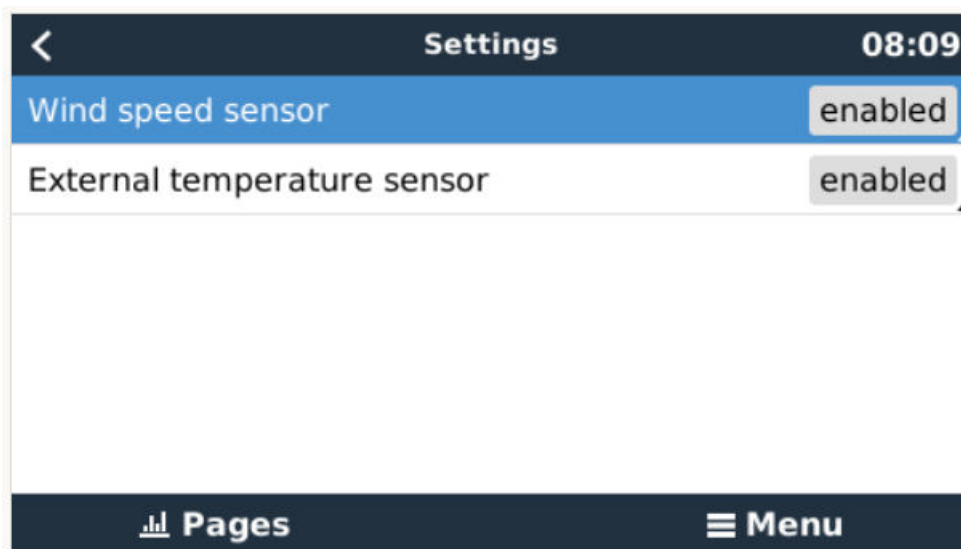
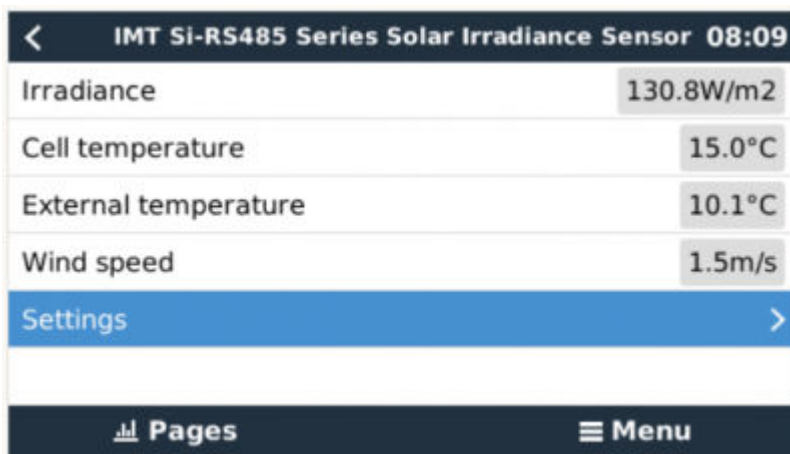
The Ta-ext-RS485-MB will be visible as the 'External or ambient temperature'

**Connecting multiple IMT sensors**

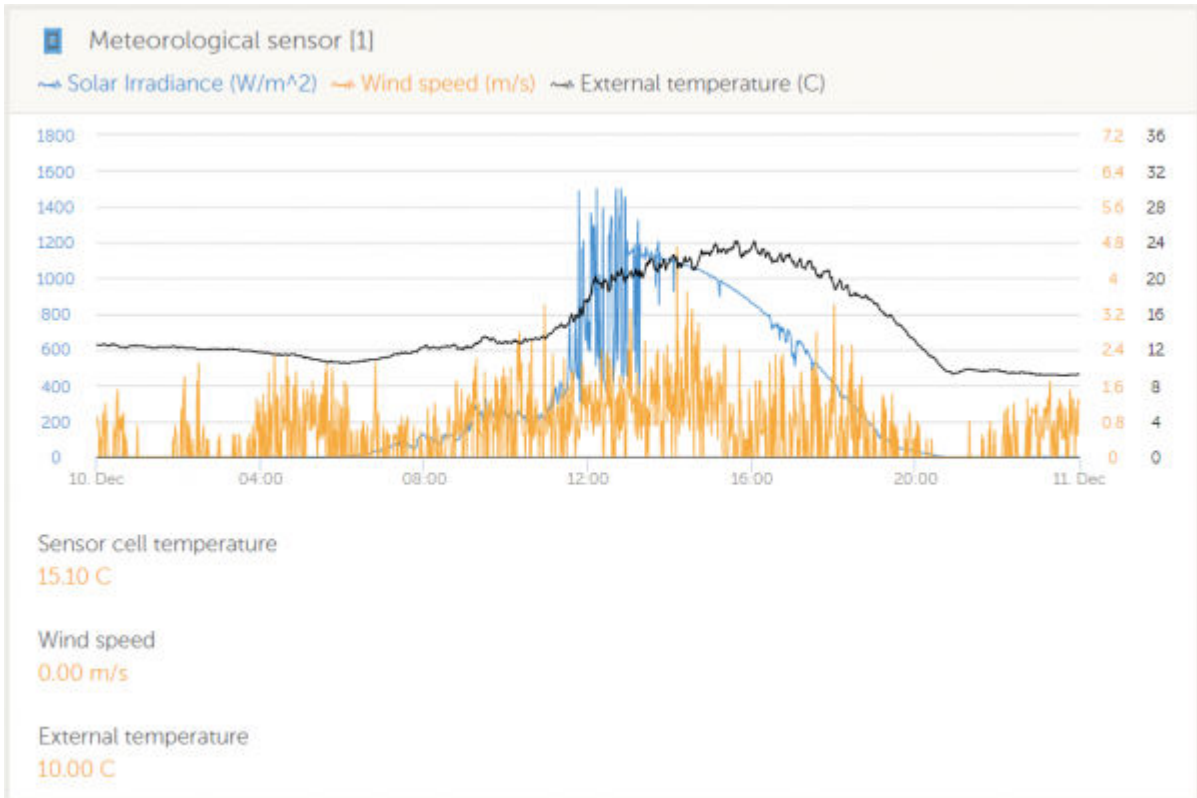
It's possible to connect multiple IMT sensors. A separate USB to RS485 converter cable is required for each sensor.

You can't combine multiple Si-Sensor RS485 sensors on one bus, our software supports only one. To use multiple sensors, you will also need to add multiple USB to RS485 converters.

**Usage**



This picture shows how its visualised on VRM:



## 3. Internet connectivity

Connect the Cerbo GX to the internet to get all the advantages of the [VRM Portal](#). The Cerbo GX sends data from all connected products to the VRM portal - from where you can monitor energy usage, view the current status of connected products, configure [email alarms](#) and download data in CSV and Excel formats.

To monitor this data from your smartphone or tablet download the [iOS](#) or [Android VRM App](#).

In addition to remote monitoring, an active internet connection allows the Cerbo GX to regularly check for a new firmware versions - which will be automatically downloaded and installed.

There are several ways to connect a Cerbo GX to the internet:

- Run a network cable between a router and the Cerbo GX Ethernet LAN port
- Connect to the router wirelessly using WiFi
- Via the mobile (cellular) network, using the [GX GSM - a cellular USB modem](#) or, with a 3G or 4G router.
- USB Tethering on a mobile phone

This video explains how to connect LAN, WiFi and a GX GSM:

<https://www.youtube.com/embed/645QrB7bmvY>

### 3.1. Ethernet LAN port

When you connect an ethernet cable between a router and Cerbo GX, the Settings -> Ethernet page of your Cerbo GX will confirm connection.

Ethernet	
State	Connected
MAC address	90:59:AF:6A:16:EB
IP configuration	Automatic
IP address	192.168.003.167
Netmask	255.255.255.000
Gateway	192.168.003.001

### 3.2. Wi-Fi

The Cerbo GX includes built in Wi-Fi. It is also possible to connect a supported external USB Wi-Fi dongle (to increase wireless range outside of a cabinet for example).

Using Wi-Fi it is possible to connect to WEP, WPA and WPA2 secured networks. There are four supported USB Wi-Fi dongles. Two of them are also available from stock at Victron Energy:

- Partno. BPP900100200 - Cerbo GX WiFi module simple (Nano USB), small, low cost.
- Partno. BPP900200300 - [Asus USB-N14](#), slightly higher cost and also better reception than the Nano USB. Supported since software version 2.23.

WiFi modules that are no longer available, but still supported, are:

- Partno. BPP900200100 - [Startech USB300WN2X2D](#)
- Partno. BPP900100100 - [Zyxel NWD2105](#)

- Partno. BPP900200200 - [Gembird WNP-UA-002](#), slightly higher cost and also better reception.

Although other Wi-Fi dongles may work, they have not been tested and we do not offer support for other dongles.

The Wi-Fi menu shows the available networks. When a network is selected, it is possible to fill in the password (if the password is not already known) to connect to the network. Setting up via WPS (Wi-Fi Protected Setup) is not supported.

When the Cerbo GX finds multiple Wi-Fi networks of which the password is known, the strongest network is selected automatically. When the signal of the connected network becomes too weak, it will automatically switch to a stronger network - if it knows the password of that network.

### 3.3. GX GSM

Please see the [GX GSM Manual](#).

### 3.4. Mobile (cellular) network using a 3G or 4G router

To connect the Cerbo GX to a mobile (cellular) network, such as a 3G or 4G network, use a cellular router. Connect the Cerbo GX to that router with either a LAN cable or the router's Wi-Fi network.

Make sure you use a router that is designed for unattended setups. Do not use low cost consumer-grade routers intended for business or leisure travel. A more expensive professional router will quickly pay for itself, and you won't have wasted journeys simply to perform a re-set. Examples of such professional routers are the [H685 4G LTE from Proroute](#), as well as the [Industrial 4G router range from Pepwave](#).

More information in [this blogpost](#).

Note that the Cerbo GX does not support USB 3G/4G dongles, other than the GX GSM available from Victron.

### 3.5. USB tethering using a mobile phone

This is a useful facility when it works - but don't rely on it because it has not proved very dependable. Consult the internet for instructions about tethering for your phone and its particular operating system. We have heard of it working on:

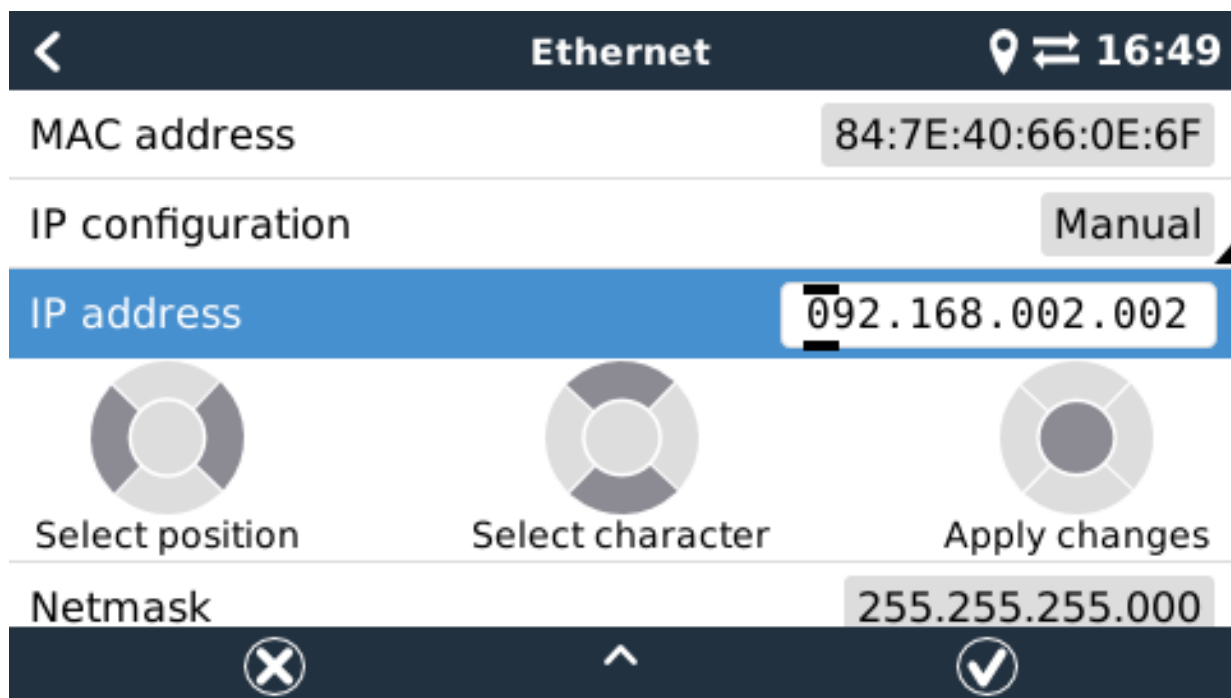
- Samsung Galaxy S4

...but not on:

- iPhone 5s with iOS 8.1.1

### 3.6. IP Configuration

Almost no installations will need the IP address configuration to be inserted manually as most systems support automatic IP configuration (DHCP) - and that is also the Cerbo GX default setting. If you do need to configure the address manually, select the following template:



Complete details of IP requirements, as well as used port numbers will be found in the [VRM FAQ - ports and connections used by the Cerbo GX](#).



### 3.7. Connecting both Ethernet and Wi-Fi (failover)

It is possible to connect the Cerbo GX to both Ethernet and Wi-Fi. In this case, the Cerbo GX will try to determine which interface provides an active internet connection and then use that interface. When both have an active internet connection, the Ethernet connection is used. The Cerbo GX will automatically check again for active internet connections when something changes on the interfaces.

### 3.8. Minimize internet traffic

In situations where internet traffic is expensive, for example a satellite uplink or with roaming GSM/cellular charges, you may want to minimize the internet traffic. The steps to take are:

- Disable auto-update
- Do not enable remote support
- Reduce the Logging interval to a very low frequency. Note that state changes (charging → inverting, or bulk→float) and also alarms will cause extra messages to be sent

To find out how much data allowance you need to buy the best way is to let the system run for a couple of days and monitor the internet RX and TX counters in your 3G or 4G router. Or even better, some mobile companies will report the data used via a website.

The amount of data used is also very dependent on the system:

More products connected to the Cerbo GX will generate more data.

- A state change (from inverter to charger for example) will trigger a data transmission, so a system with very frequent state changes will also tend to generate more data. This is especially true in certain Hub-1 and Hub-2 systems.

We recommend setting-up your data plan in such a way as to avoid costly 'excess' charges. Make sure you put a cap on your data usage; or use a pre-paid plan.

One customer - burdened with global costs of between twenty cents and several euros per mb of data - invented a clever solution: Using a VPN he modified the IP to route ALL traffic to and from the GX device via his VPN. Using a firewall at the VPN server allows him to control traffic according to time, connection type, place and destinations. Although this is beyond the scope of this manual it works, and - with the help of a Linux and networking expert - it can work for you.

### 3.9. More information about setting up an internet connection and VRM

- [Setting up a VRM account](#)
- [VRM Portal alarms and monitoring](#)
- [VRM Portal - Frequently asked questions](#)

## 4. Accessing a GX device with Remote Console

It is possible to access the GX device without using a display, or physical buttons, with either a smartphone, tablet or computer.

This access is called Remote Console. In GX devices with a display, or buttons, this Remote Console feature is disabled by default and will need to be enabled. GX devices without a display have Remote Console enabled by default.

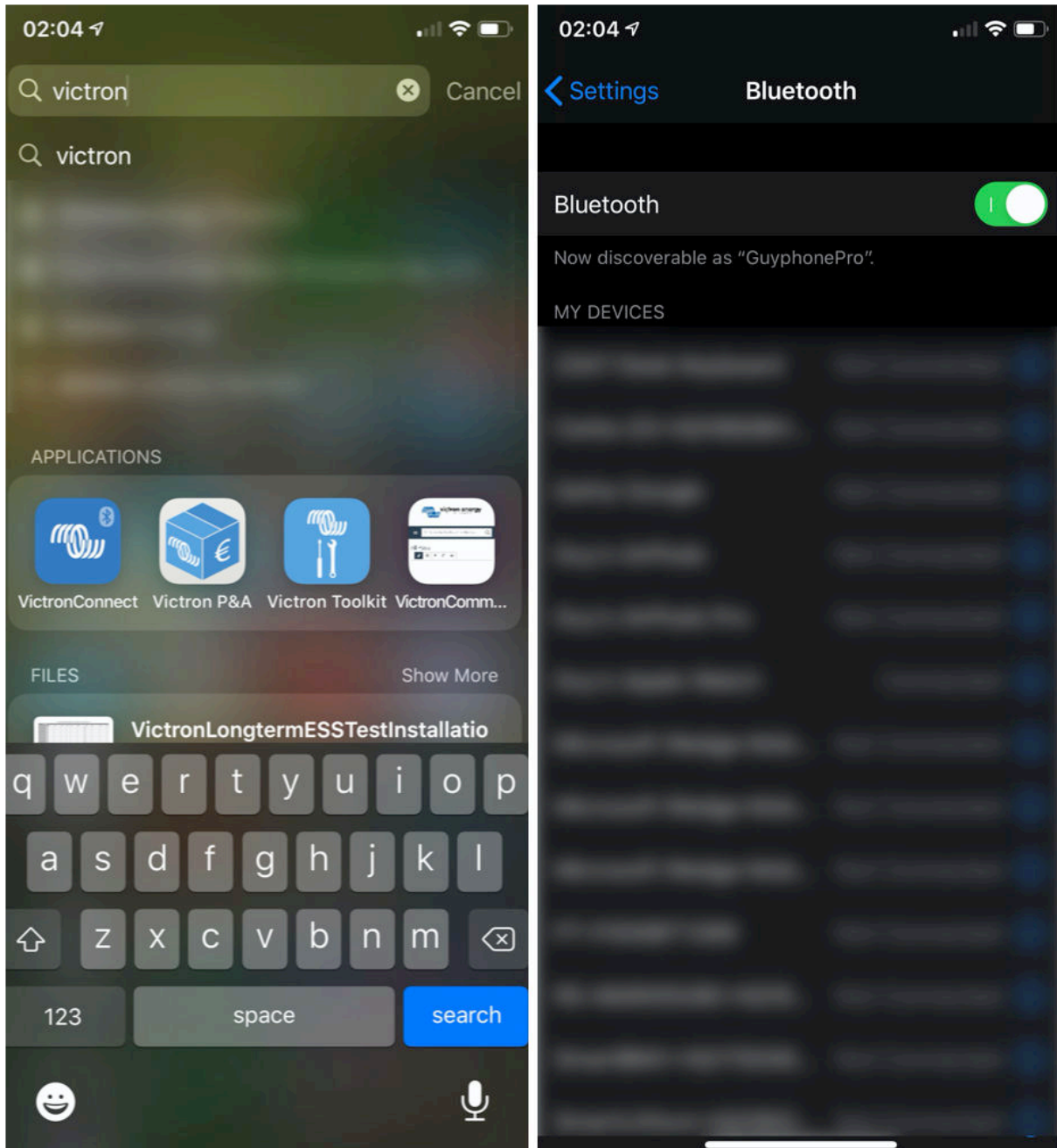
There are several ways to access the Remote Console:

- Using VictronConnect via Bluetooth
- By using the built-in WiFi Access Point
- Via the local LAN/WiFi network
- Through the online VRM Portal, which requires internet

### 4.1. Using VictronConnect via Bluetooth

If you are just getting started for the first time with VictronConnect, you may wish to begin with the [VictronConnect manual](#).

Load the [latest version of the VictronConnect app](#) onto your [bluetooth compatible device](#) (phone or laptop), and make sure that bluetooth is enabled.



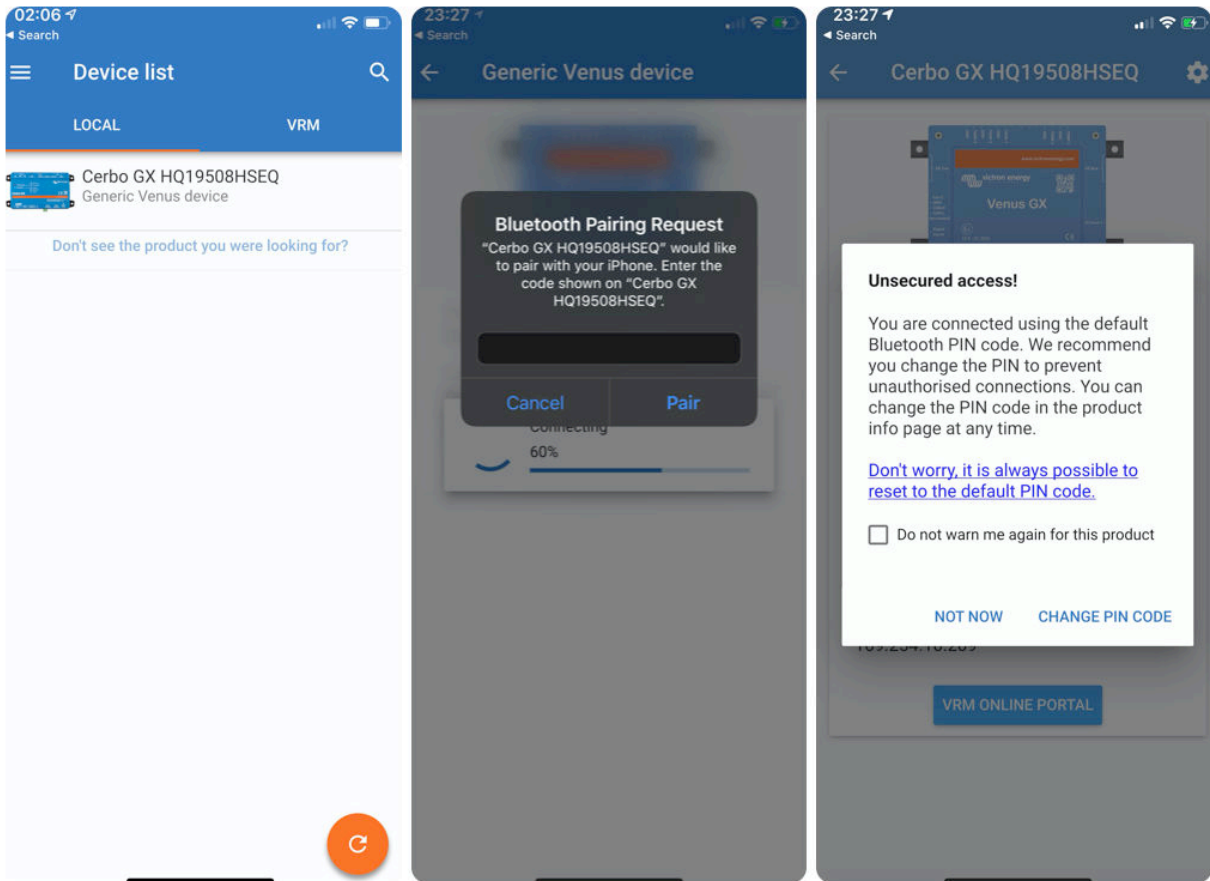
Make sure that the Cerbo GX is powered on, and the Bluetooth LED is blinking.

Open the VictronConnect App within 10 meters of the Cerbo GX and wait for nearby devices to be discovered.

Once discovered, Click or Tap on the Cerbo GX.

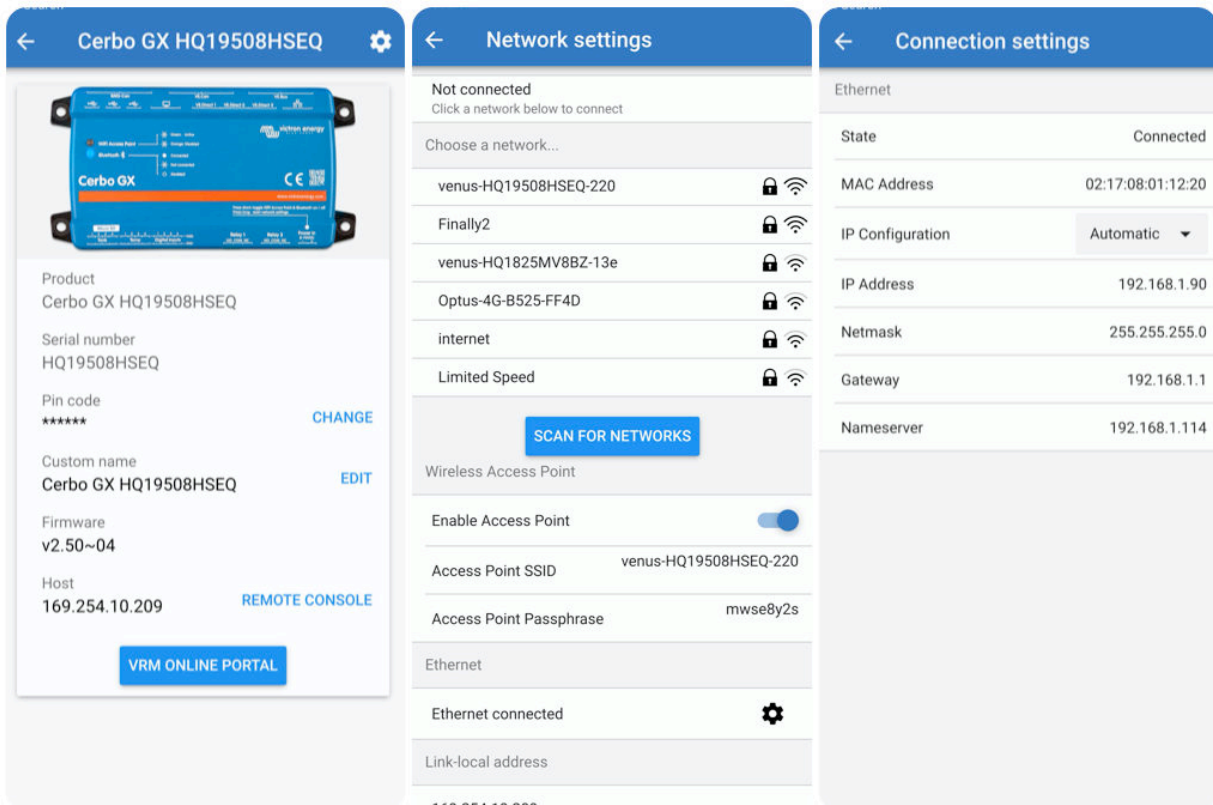
On first connection you will be asked to enter a bluetooth PIN code - the default PIN is 000000

You will then be asked to change this insecure default PIN code to a more secure unique code. Please set your unique code, and then put it in a safe place for passwords in case you forget.



From the main device screen it is possible to change the networking settings, view the system on VRM, or open the Remote Console.

Network settings for the Cerbo GX are set in the Cog menu.



## 4.2. Accessing via the built-in WiFi Access Point

This method requires the VictronConnect App to be installed on your smartphone, tablet or laptop.

Steps:

1. Make sure you are no further than a few metres away from the Cerbo GX
2. Go to the WiFi settings on your phone / tablet / laptop.
3. After searching, the Cerbo GX will show up in the list, as Venus-HQ1940DEF4-3b6. Where HQ... is the serial number as printed on the side of the box.
4. Connect to WiFi using the 'WiFi key' which you will find printed on the side of the box ...and also on a card in the plastic bag. Keep that in a safe place. Open Victron
5. Connect, it will start scanning the WiFi network automatically.
6. Once found, select the GX device from the list.
7. Open the Remote Console

Notes:

- If you cannot use VictronConnect, you can use a web browser and navigate to the IP address <http://172.24.24.1> or <http://venus.local>
- For added security it is possible to disable the WiFi Access Point. See Settings → Wi-Fi → Create access point. See below chapter explaining the Push button for how to restore access in case ever necessary.

### Instruction video

Step by step instruction video on how to connect to a GX device using the [VictronConnect App](#).

<https://www.youtube.com/embed/aKJMXxRikG0>

### Detailed instruction video

This second video was made before VictronConnect got the feature to find a device on a network. All the explanations in the video regarding IP Addressing can be ignored, and use VictronConnect as in above video instead.

[https://www.youtube.com/embed/ptYV\\_JEcaMU](https://www.youtube.com/embed/ptYV_JEcaMU)

## 4.3. Accessing Remote Console via the local LAN/WiFi Network

This section explains how to connected to Remote Console when the Cerbo GX is connected to the local computer network, with either an Ethernet cable, or having it configured to connect to a local WiFi network.

This method does not require an internet connection. Just a local computer network is sufficient.

Once connected, connect to the GX Device by running the [VictronConnect App](#) on a phone, tablet or laptop. Note that will need to be connected to the same computer network as the Cerbo GX.

This video shows how it is done

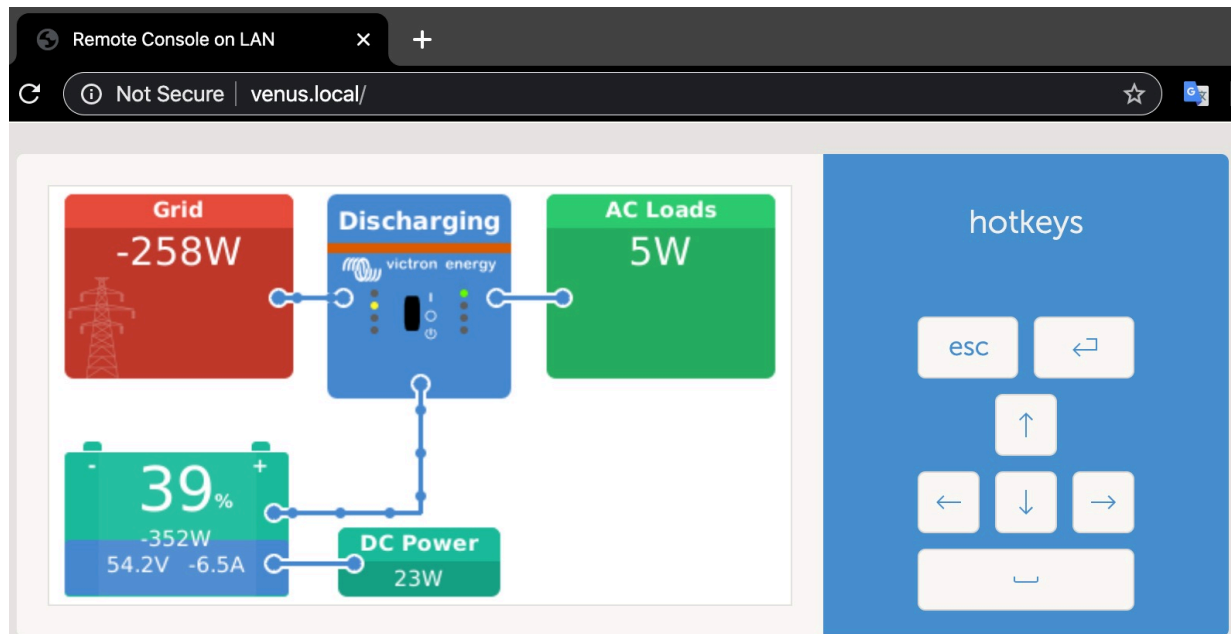
<https://www.youtube.com/embed/aKJMXxRikG0>

### 4.3.1. Alternative methods to find the IP Address for Remote Console

In case VictronConnect can't be used, here are a few other methods to find the Cerbo GX, ie. its IP Address.

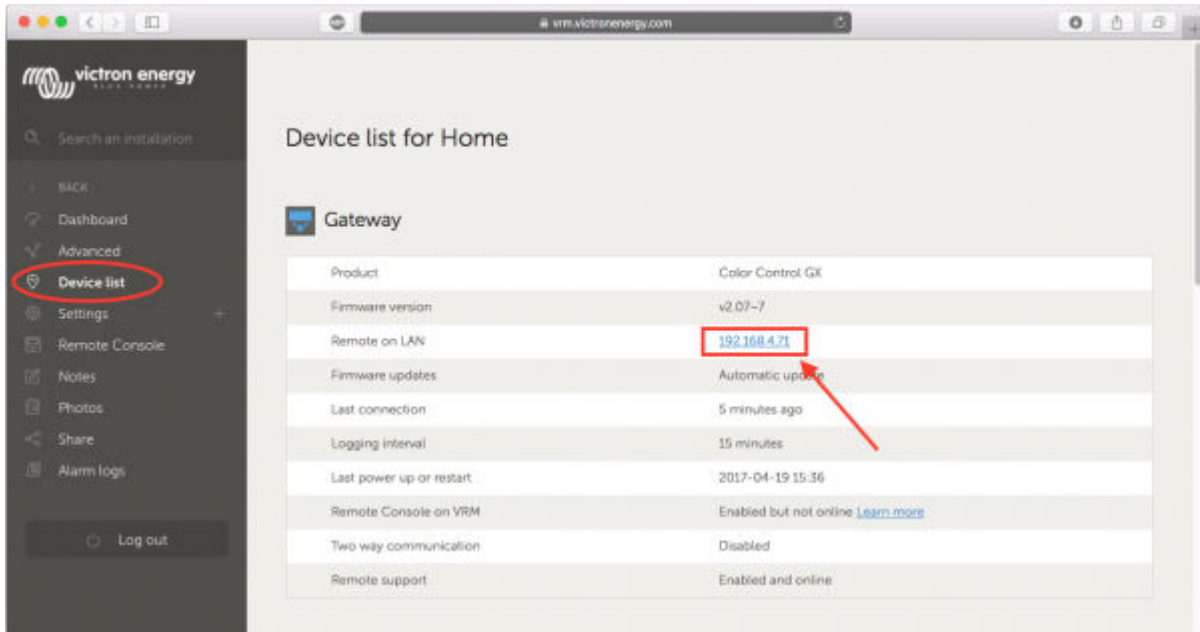
#### Link Local Address - Venus.local

When the Remote Console on LAN setting is enabled. A direct connection (via network cable without a router or DHCP server) is possible. You can access the GX device by typing `venus.local` or `http://venus.local` into a web browser, or in VictronConnect when connected to the same network. Only Enable this function on trusted networks or direct connections. Make sure you have disabled the password check, or set a password first.



#### IP Address on VRM

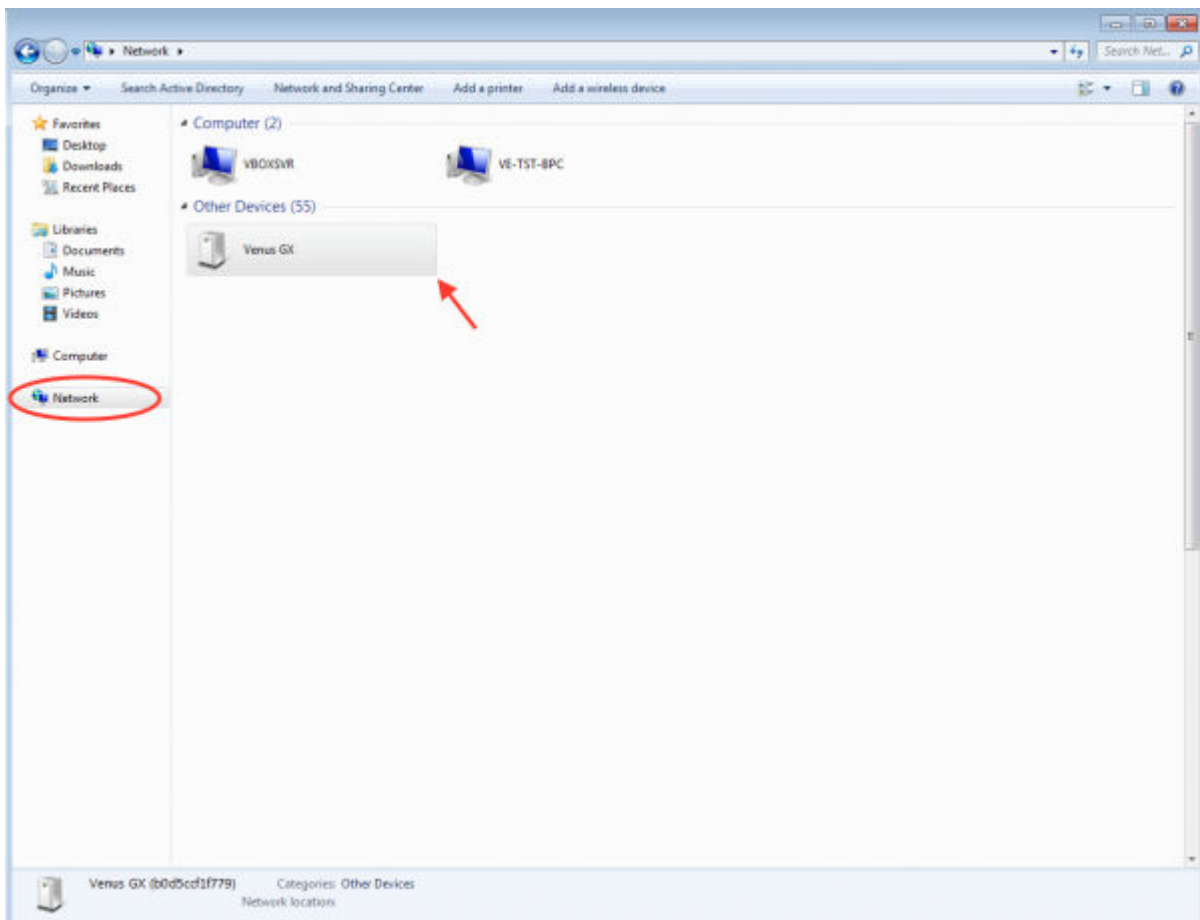
On the VRM Portal, you'll find the IP address on the Device List page of the installation. Note that this does require the Cerbo GX to be connected to the internet.



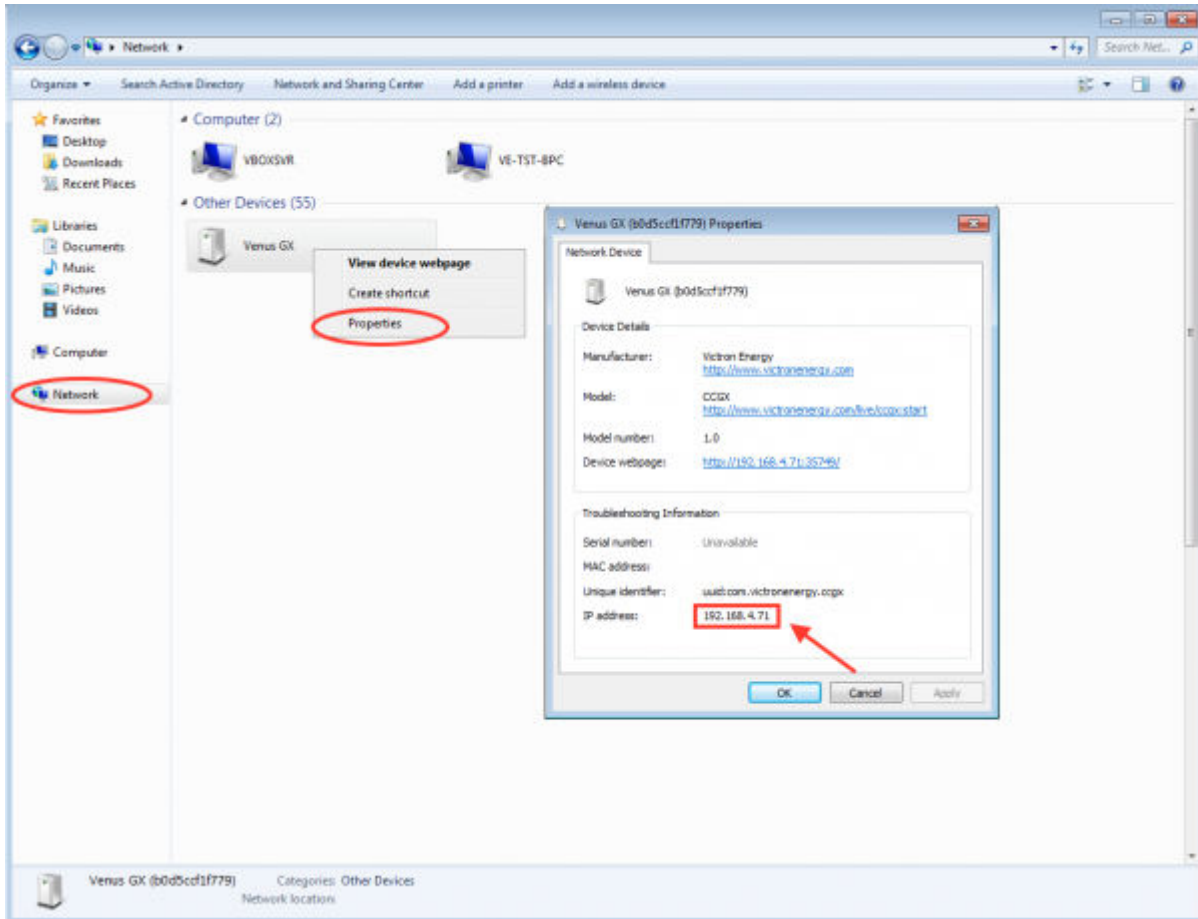
### Network (on Microsoft Windows)

In a local network, for example at home, you can also find the Cerbo GX in the Windows 'Network' overview:

Double-clicking the icon will open up Remote Console on LAN.



Open the 'Properties' window to see the IP address.



This uses Universal plug-and-play broadcast technology.

#### 4.4. Accessing via VRM

This method requires a working internet connection, both on your phone/tablet/laptop as well as for the Cerbo GX. For a new install, this means that it needs to be connected by Ethernet cable.

Step by step instructions:

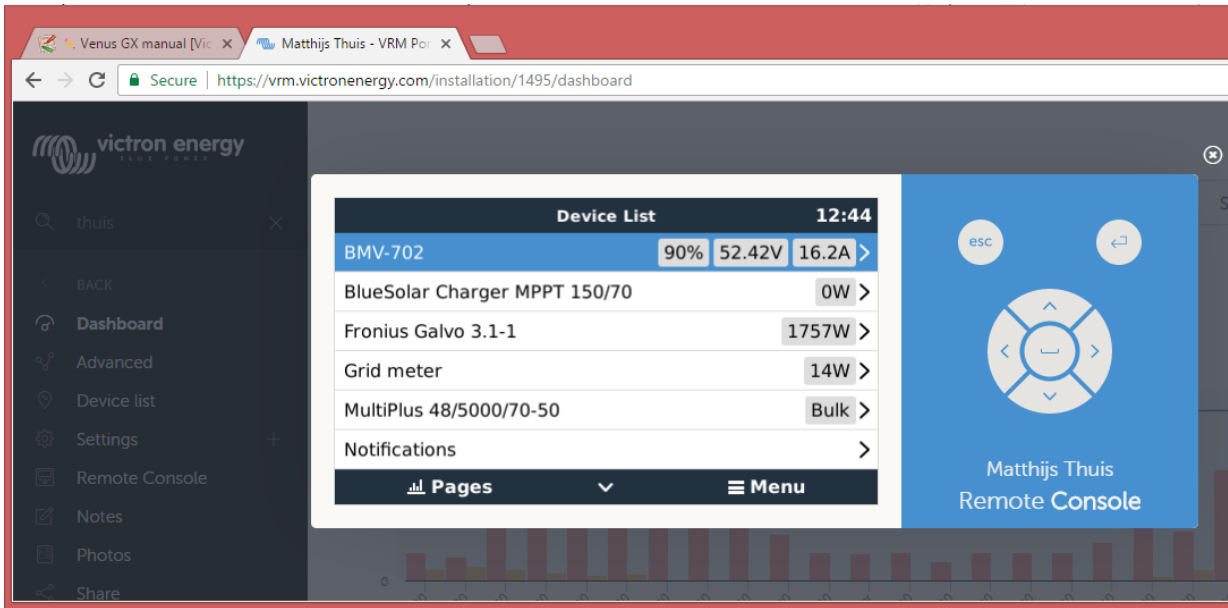
First, connect the Cerbo GX to the internet by plugging it into a working Ethernet network which has a DHCP server, as most networks do, and which is connected to the internet. The Cerbo GX will immediately connect to VRM.

Now, go to the VRM Portal, <https://vrn.victronenergy.com/>, and follow the instructions to add the device. More information about this is available in the [VRM Manual](#).

Then once visible on VRM, click the 'Remote Console' link to open the window. Which will look like below screenshot.

More information about 'Remote Console' on VRM is explained in the [Cerbo GX Manual](#), [VRM Remote Console chapter](#).





## 5. Configuration

### 5.1. Menu structure and configurable parameters

After completing the installation and setting up the internet connection (if required), go through the menu from top to bottom to configure the Cerbo GX:

Item	Default	Description
<b>General</b>		
Access level	User and installer	Set this to 'User' to prevent accidental and unwanted changes to the configuration.
Remote support	Off	Enable this to allow Victron engineers to access your system in case there is a problem.
Reboot?		Reboots the GX device
Audible alarm	On	When there is an alarm on the Cerbo GX or a connected product, the Cerbo GX will beep - unless this setting is set to 'Off'.
Demo mode	Off	Turn 'On' to demonstrate product and installation features to a client or at an exhibition. This simulation mode will allow better understanding without (yet) changing any settings.
<b>Firmware</b>		
Firmware Version	x.xx	Displays the currently installed firmware version
Online updates: Auto update	Check only	If this is Enabled, the GX device will check with the server to see if there is a new version available. It is possible to set to disable, or update automatically
Online updates: Update to	Latest release	Use the default setting unless you want to participate in test versions. End-user systems should certainly be set to 'Latest release'.
Install firmware from SD/USB		Use this menu to install a new version from a microSD card or USB stick. Insert the card or stick that holds the new firmware .swu file.
Stored backup firmware		With this feature you can go back to the previously installed firmware version.
<b>Date &amp; time</b>		
Date/Time local	Automatic from internet	When connected to the internet, time will be automatically synchronised regardless of this setting. Toggle the setting Manually input the time where no internet connection is present.
Change time zone	Select the correct time zone.	
<b>Remote console</b>		
Disable password check	Password authentication not required for remote console access.	
Enable password check	Choose password to allow remote console access.	
Enable on VRM	No	Enabling on VRM will allow connection to the Cerbo GX from anywhere via the VRM portal. <a href="#">Trouble shooting Remote Console on VRM</a>
Enable on LAN	No	Enabling will allow direct connection to the Cerbo GX by typing its IP address or Venus.local into a web browser, or in VictronConnect when connected to the same network. Only Enable this function on trusted networks. Disable password check, or set password first
<b>System setup</b>		
AC input 1	Generator	Select Generator or Grid. (We will shortly be adding the setting 'Shore power' instead of grid.)
AC input 2	Grid	Same choices as above.
Monitor for grid failure	Disabled	Monitors for loss of AC-input, and triggers an Alarm if detected. Alarm is cleared when the AC-input is reconnected.
Battery monitor	Automatic	Select the SOC source. This function is useful where there is more than one BMV. <a href="#">More details.</a>
Has DC system	No	Enable this for boats, vehicles and installations with DC loads and chargers - in addition to Multi and MPPT chargers. This won't be applicable to most off-grid installations; and any discrepancy between the DC current measured by the Multi, and by the BMV, will be attributed to a 'DC system'. This may be power-in from an alternator, or power-out from a pump, for example.  A positive value indicates consumption. A negative value indicates charging, for example by an alternator.  Note that the value shown will always be an approximation, and is affected by the variation in sample rate between elements of the system.
Marine MFD App Configuration	Not set	Set up what batteries you want to see on the MFD, and by what name.
<b>DVCC</b>		
DVCC	No	
Limit Charge Current	No	
SVS - Shared voltage sense		
STS - Shared temperature sense		
Temperature sensor		
SCS - Shared current sense		
<b>Display &amp; language</b>		
Brightness	Configure the brightness between 0 and 100%	
Display off time	Set time-to-off between 10s / 30s - 1m / 10m /30m - or never	

Item	Default	Description
Show mobile overview	No	Enable this to show the mobile overview page which is designed for Marine and Remote Vehicle applications. This overview gives direct access to the AC Current limit as well as the <i>On/Off/Charger-only</i> settings and pump control. Also shows up to four tank levels.
Language	English	Choose between English, Dutch, Chinese, German, Spanish, French, Italian, Swedish, Turkish and Arabic.
<b>VRM online portal</b>		
Logging enabled	Enabled	
VRM Portal ID		
Log interval	15 minutes	Set to anything between 1 minute and 1 day. Choose longer times on systems with an unreliable connection. Note that this setting does not affect reporting problems and state changes (bulk → absorption) to the VRM Portal. These events initiate an immediate transmission of all parameters.
Use secure connection (HTTPS)		
Last contact		
Connection error		
Reboot device when no contact		
Storage location		
Rest of parameters	See section 5.3, Datalogging to VRM, for more details	
<b>Wireless AC Sensors</b>		
Select the position for each AC sensor (PV Inverter on AC-input 1, 2 or on AC-output). <a href="#">More information about the Wireless AC sensors.</a>		
<b>Energy meters</b>		
Configure the Energy meters, used for one of three things:		
Measure the output of a PV Inverter		
Measure and regulate a <a href="#">Hub-4 system</a>		
Measure and regulate a <a href="#">ESS system</a>		
Measure the output of an AC Generator.		
<b>ESS</b>		
Configure Energy storage system (ESS) <a href="#">ESS system</a> .		
<b>PV inverters</b>		
Inverters		
Find PV inverters		
Detected IP addresses		
Add IP address manually		
Automatic scanning		
<b>Wireless AC sensors</b>		
<b>Ethernet</b>		
Select the configuration type (DHCP vs. manual configuration) and IP settings.		
<b>Wi-Fi</b>		
Manage wireless networks and IP settings.		
<b>GSM modem</b>		
<b>GPS</b>		
GPS information		Status, Latitude, Longitude, Speed, Course, Altitude, Number of satellites
Format	Select the format in which to show the Latitude and Longitude.	
Speed unit	km/h	Choose between km/h, meters per second, miles per hour, or knots.
Device		
<b>Generator start/stop</b>		
Configure generator autostart settings and conditions. <a href="#">GX - Generator auto start/stop</a>		
<b>Tank pump</b>		
Configure automatic starting and stopping of pump based on tank level(sender) information. <a href="#">Pump auto start/stop with Color Control GX</a>		
<b>Relay</b>		
Function	Alarm relay	Select the relay function. Possible functions are 'Alarm relay', 'Generator start/stop', 'Tank pump' and 'None' (disabled).
Polarity	Normally open	Select the polarity of the relay on the back of the Cerbo GX. 'Normally open' or 'Normally closed'. (Note that setting it to normally closed increases the Cerbo GX power draw.)
<b>Services</b>		
ModbusTCP	Off	This setting enables the ModbusTCP service. More information about ModbusTCP in this document: <a href="https://www.victronenergy.com/upload/documents/Whitepaper-Data-communication-with-Victron-Energy-products_EN.pdf">https://www.victronenergy.com/upload/documents/Whitepaper-Data-communication-with-Victron-Energy-products_EN.pdf</a>
MQTT on LAN (SSL)	On	
MQTT on LAN (Plaintext)	Off	
VRM two-way communication	No	Enable remote configuration and firmware updates. <a href="#">VE Power Setup manual</a>
Bluetooth	On	

Item	Default	Description
CAN-bus		CAN-bus profile, Send data to VE.Can, Unique device number for VE.Can, Check unique numbers
<b>I/O</b>		
Analog inputs	On	Available tank level sensors On/Off, Available Temperature sensors On/Off
Digital inputs	Off	Available Digital inputs Off, Door alarm, Bilge pump, Bilge alarm, Burglar alarm, Smoke alarm, Fire alarm, CO2 alarm, Generator

When using a VE.Bus system, it is possible to configure the severity of problems on the VE.Bus system that should cause a notification to show up on the Cerbo GX (and make it beep):

- Disabled: The Cerbo GX will never beep or show a notification
- Alarm only: The Cerbo GX will only beep and show a notification when the VE.Bus system switched off in an alarm condition.
- Enabled (default): The Cerbo GX will beep and show a notification

When all done, don't forget to change the access level to user when required.

## 5.2. Battery State of Charge (SOC)

### 5.2.1. Which device should I use for SOC calculation?

There are three products types that calculate State Of Charge (SOC). The Cerbo GX itself does not calculate SOC, it only retrieves it from the connected devices.

The three products that calculate SOC are:

1. Battery Monitors, such as the BMVs, the Lynx Shunt, or the Lynx Ion BMS
2. Multi and Quattro inverter/chargers
3. Batteries with built-in battery monitor and a (mostly BMS-Can) connection to the Cerbo GX.

#### When to use what?

If you have a battery with build-in battery monitor, such as a BYD or Freedomwon battery; its easy. Use that.

If not, then the options depend on the type of system:

1. If the MultiPlus or Quattro inverter/charger is the only source of charge to the batteries and the only draw then it can function as a basic battery monitor because it counts what went in and counts what comes out. No need for a dedicated battery such as the BMV.
2. If the systems consists of an inverter/charger, MPPTs and a [GX device](#), then there is still no need to add a dedicated battery monitor.
3. For any other system types, such as a boat or vehicle with DC lights and other loads, a dedicated battery monitor will be required.

### 5.2.2. The different solutions explained in detail

#### (A) Battery and Multi or Quattro (a typical backup system)

No battery monitor is required: the Multi or Quattro is the only product connected to the battery and has full control over all charge and discharge currents. Therefore it can calculate the correct SOC itself.

Configuration:

1. Enable and configure the Battery Monitor in VEConfigure.
2. In the Cerbo GX, in Settings → System setup, verify the selected Battery Monitor. It should be set to the Multi or Quattro.

#### (B) Battery with Multi or Quattro and MPPT Solar Chargers -ALSO- An EasySolar with Cerbo GX built-in

No battery monitor is required, as long as all MPPT Solar Chargers are Victron products and are connected to the Cerbo GX. The Cerbo GX will continuously read the actual charge current from all solar chargers, and send the total to the Multi (or Quattro) which then uses that information in its SOC calculations.

Configuration:

1. Enable and configure the Battery Monitor in VEConfigure.
2. On the Cerbo GX, in Settings → System setup, verify the selected Battery Monitor. It should be the Multi or Quattro.
3. In the same menu, verify that the option 'Use solar charger current to improve VE.Bus SOC' is enabled. Note that this is not a setting - it just an indicator of an automatic process.

Note that this feature requires recent firmware versions in both the Multis or Quattros (402 minimum), and the Cerbo GX (v2.06 minimum).

#### (C) Batteries with a built-in battery monitor

In cases where the system includes a battery which has a built-in battery monitor and SOC calculation - such as many of the batteries listed [here](#) - a dedicated battery monitor is not required.

Configuration:

1. Connect the battery communications cable to the Cerbo GX according to the instructions.
2. In the Cerbo GX, in Settings → System setup, verify that the selected Battery Monitor is the battery.

Note that the Battery Monitor setting in VEConfigure3 is irrelevant. For systems like this, changing this setting will have no effect on the charge or any other parameters in this type of system.

#### (D) Other system types

When there are more chargers, or loads, connected to the battery than just the Multi or MPPT Solar Chargers, a dedicated Battery Monitor will be required. Examples are:

- House loads in Marine or Vehicle system.
- PWM Solar Chargers
- AC chargers, such as Skylla-is, Phoenix chargers, non Victron chargers, etc.
- Alternators
- DC-DC chargers
- Wind turbines
- Hydro turbines

In case a battery with built-in monitor is used, such as explained in (C), then that is the dedicated battery Monitor. Refer to section (C).

Otherwise, install a BMV or Lynx Shunt VE.Can.

Configuration:

1. Configure the battery monitor as per its documentation.
2. In the Cerbo GX, in Settings → System setup, verify the selected Battery Monitor.
3. It should be the BMV or Lynx Shunt Battery Monitor.
4. Finished.

Note that the Battery Monitor setting in VEConfigure3 is irrelevant. For systems like this, changing this setting will have no effect on the charge - or any other parameters - in this type of system.

### 5.2.3. Notes on SOC

- Note that this is all about showing an accurate state of charge to the user, rather than being required for an efficient system. The SOC percentage is not used for battery charging. It is, however, required when a generator needs to be started and stopped automatically based on battery SOC.

More information:

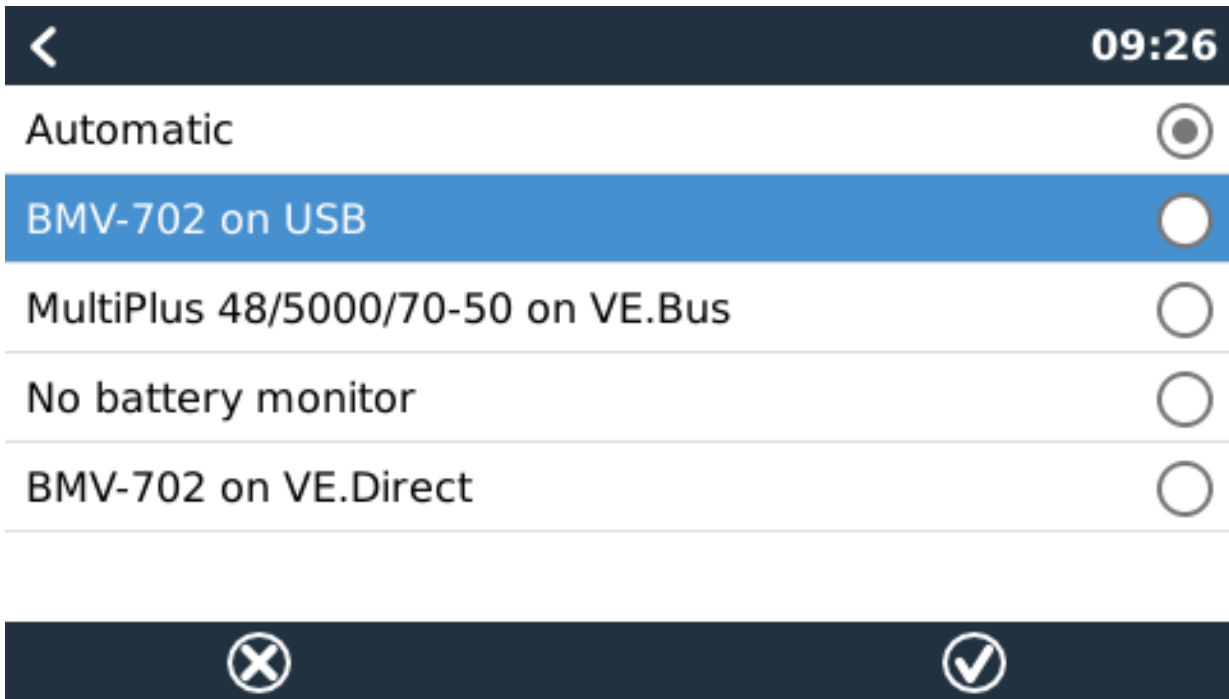
[VRM Portal FAQ - difference between BMV SOC and VE.Bus SOC](#)

See [Configurable Parameters Section \[26\]](#) on Battery Monitor selection and Has DC System.

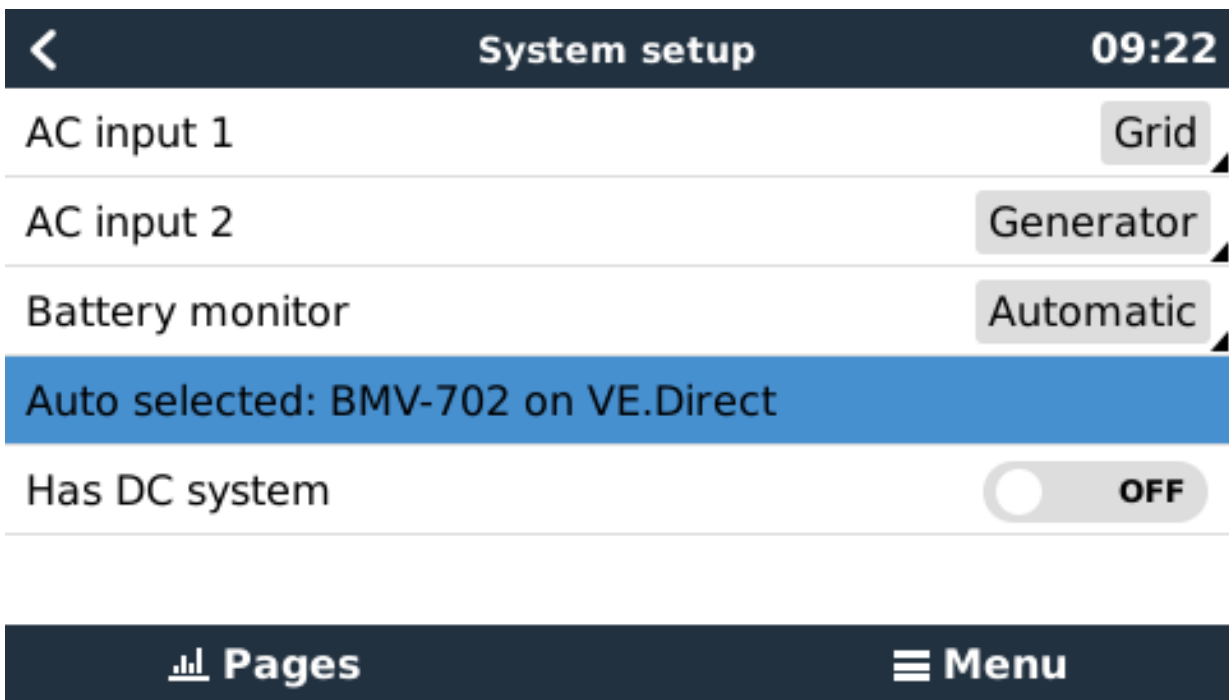
### 5.2.4. Selecting SOC source

(Settings → System Setup → Battery monitor)

In the image below you can see a range of selectable choices for the SOC values which are shown in the main Overview screen. Choose the source you want to see on the main Overview screen of your Cerbo GX.



In the image above we have chosen the Automatic setting. When automatic is selected the System setup screen will be as shown in the image below.



The 'Automatic' function uses the following logic:

1. When available, it will use a dedicated Battery Monitor, such as the BMV or a Lynx Shunt, or a battery with built-in battery monitor.
2. When there is more than one of those connected, it will use a random one - although you can select one manually.
3. when there is no dedicated Battery Monitor, it will use the VE.Bus SOC.

When should I use the 'No battery monitor' option?:

Use that in systems where:

1. there is a Multi or Quattro installed
2. no BMV or other battery monitor is installed

3. the system has other DC loads, or other chargers, connected to the same battery, which are not connected to the Cerbo GX.

A short explanation: the VE.Bus SOC as determined by the Multi or Quattro will be incorrect in above situation. As it will not take the discharge and charge currents by those other DC Loads, and also unmonitored chargers, into account.

### 5.2.5. Details on VE.Bus SOC

- While the Inverter/Charger is in bulk, the SOC will not rise above the value as set in VEConfigure3 for the “State of charge when Bulk finished” parameter on the General tab; default 85%. In a system with Solar chargers, make sure that the Absorption voltage as configured in the MPPT is slightly above the same setting in the inverter/charger. The latter needs to recognize that the battery voltage has reached the absorption level. If it doesn't, the SOC will be stuck at the earlier mentioned End-of-bulk percentage, default 85%.

## 5.3. Customize the logo on the Boat & Motorhome page

It is possible to use a custom logo onto the Boat & Motorhome page.

Type the following address into the web browser of a device connected to the same network. Using this address as a template: <http://venus.local/logo.php> or [http://\[ip-here\]/logo.php](http://[ip-here]/logo.php) (inserting your device's IP address between the square brackets). The IP address can be found by going to Settings -> Ethernet or Wifi. Once the page is loaded, Choose an image file from your device. Re-boot the GX device.

## 6. Updating GX Firmware

### 6.1. Via internet or with microSD-card/USB-stick

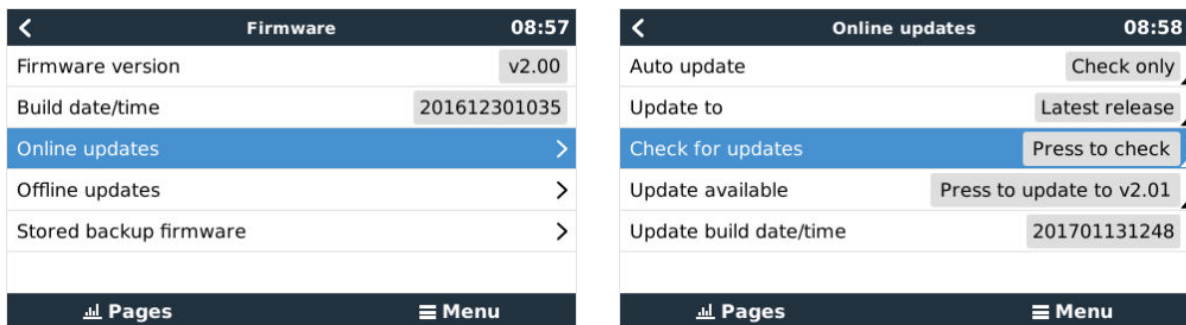
There are two ways to update the firmware:

1. Update it via the internet, either manually or let it check for new updates every day
2. Update it from a microSD-card or USB-stick

### 6.2. Direct download from the internet

Direct download from the internet

To update from the internet, navigate to: **Settings**→**Firmware**→**Online updates**.



### 6.3. microSD-card or USB-stick

Updating with a microSD-card or USB-stick is called 'Offline updating'. Use it when updating a device that is not connected to the internet.

#### Step 1. Download

Get the latest swu file:

- [venus-swu-beaglebone.swu](#)

Note that the same files, and the change log, is available on [Victron Professional](#). That also features a dropbox connection, so you can always have the latest file available on your laptop.

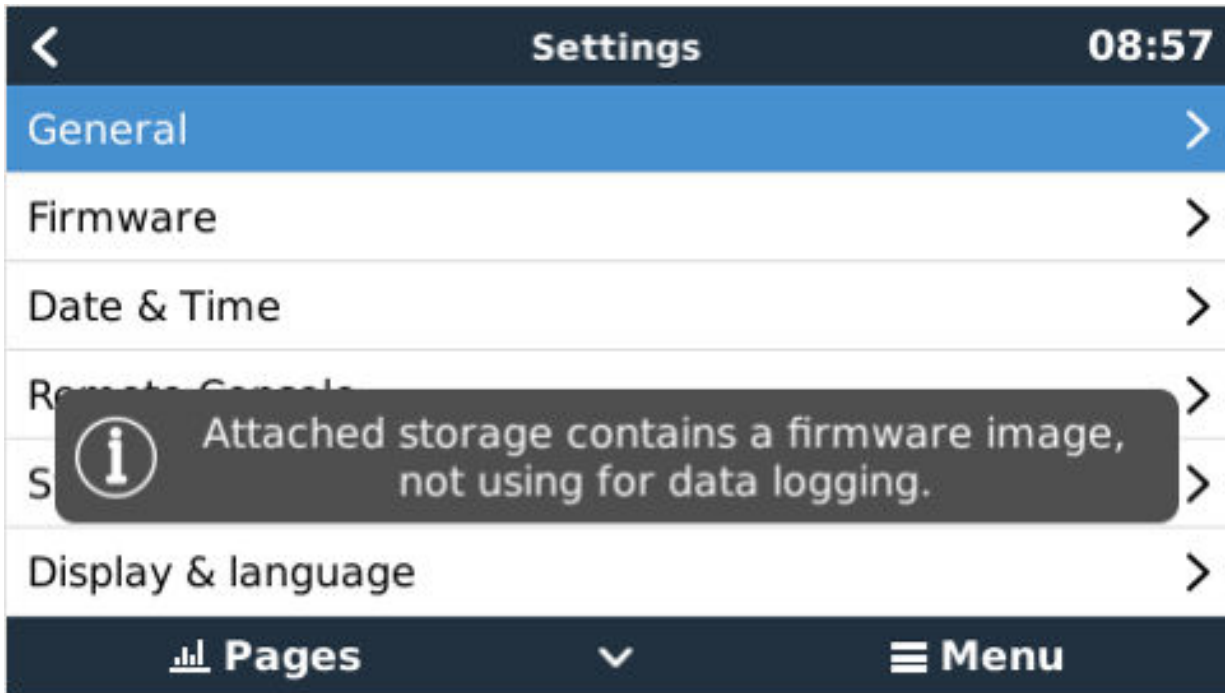
#### Step 2. Install on a microSD card or usb stick

Store the file in the root folder of a USB-stick or microSD-card.

#### Step 3. Insert the device

Note that you will see a warning "Not using media for storing logs". That warning can safely be ignored.



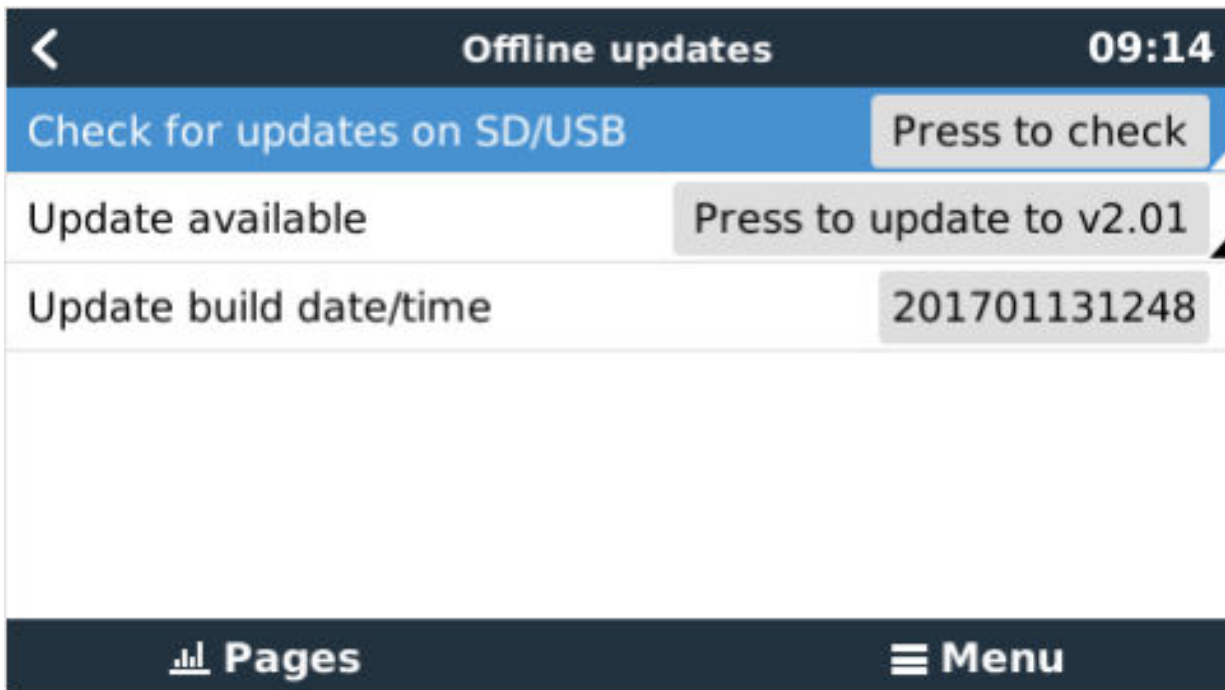


**Step 4. Initiate the update**

Navigate to **Settings** → **Firmware** → **Offline updates**.

Press Check for updates

If the firmware in the microSD-card or USB-stick is newer than the running one, "Update available" item will appear, press it to start the update process.



**6.4. Changelog**

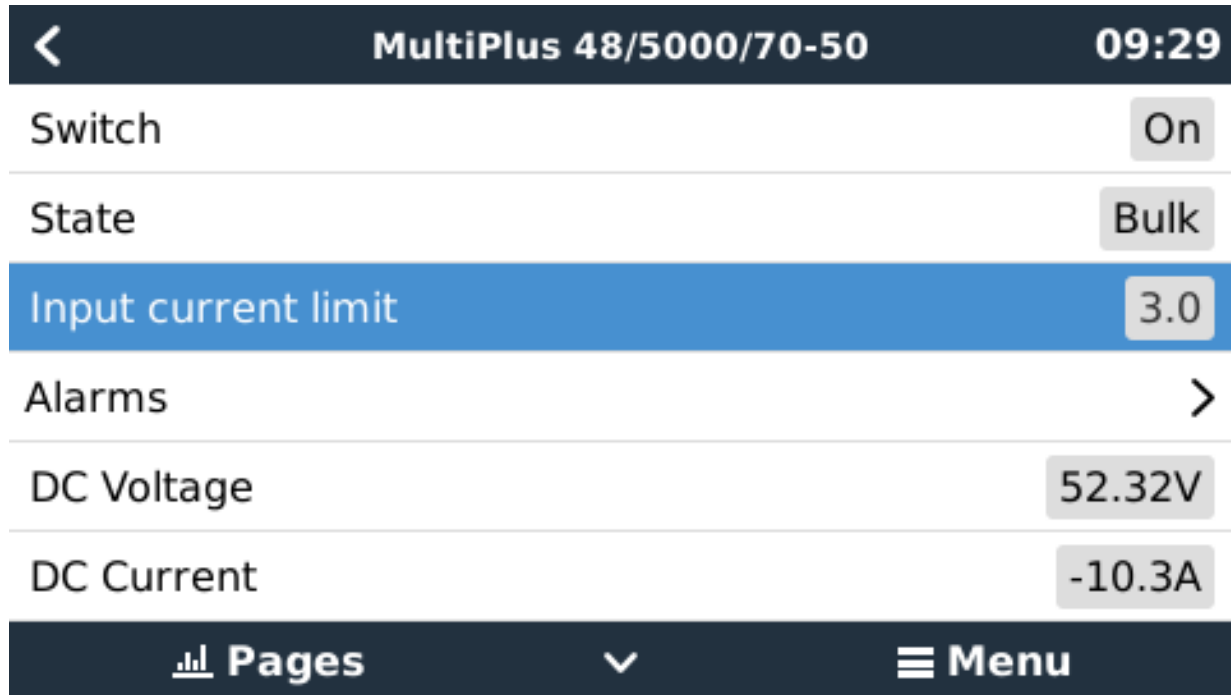
The change log is available in [Victron Professional](#), under Firmware, Venus OS.

## 7. VE.Bus Inverter/charger monitoring

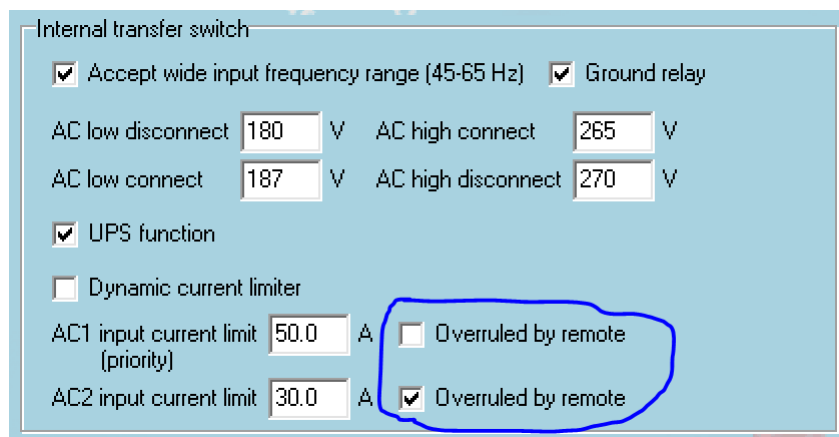
### 7.1. Input current-limiter setting

'Overruled by remote' setting in VEConfigure

This chapter explains the implications of enabling or disabling user control of the input current-limiter setting, as seen here in the menu:



The limit as set by the user in the Cerbo GX will be applied to all inputs where 'Overruled by remote', configured with VictronConnect or VEConfigure, is enabled:



Using the example of a boat with two AC inputs and a Quattro where:

1. A Genset capable of delivering 50A is connected to input 1;
2. Shore power is connected to input 2. (Available power depends on the rating of the harbour power-supply.)

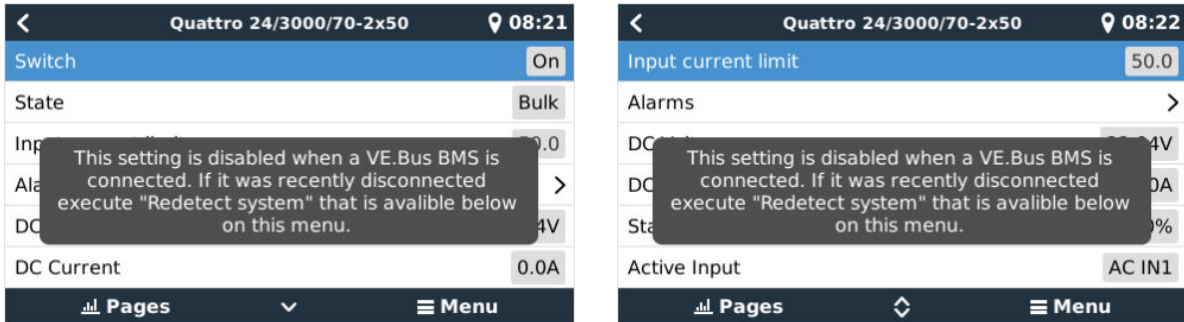
Configure the system exactly as in above VEConfigure screenshot. Input 1 has priority over input 2, therefore the system will automatically connect to the genset whenever it is running. The fixed input current limit of 50A will be applied. And when the genset is not available, and mains is available on input 2, the Quattro will use the input current limit as configured in the Cerbo GX.

Two more examples: (In both cases if you disable 'Overrule by remote', setting a current limit in the Cerbo GX will have no effect. And if you enable 'Overrule by remote' for both inputs, the current limit set in the Cerbo GX will be applied to both inputs.)

**Systems where it is not possible to control the input current limit**

It is not possible to control the input current limit in certain installations. In these cases, the Cerbo GX menu will not allow changing the setting:

1. Installations with a VE.Bus BMS
2. Installations with a Digital Multi Control (or its predecessors)



Also the on/off/charger only switch in the Cerbo GX will be disabled in the case.

In installation with a VE.Bus BMS, use the rocker switch instead - or add a Digital Multi Control to the installation.

**Minimum input current limit values**

When PowerAssist is enabled in VEConfigure, there is a minimum input current limit. The actual limit differs for each model.

After setting the input current to a value below the limit, it will automatically be increased again to the limit.

Note that it is still possible to set the input current limit to 0. When set to 0, the system will be in passthrough (charger disabled).

**Parallel and three phase systems**

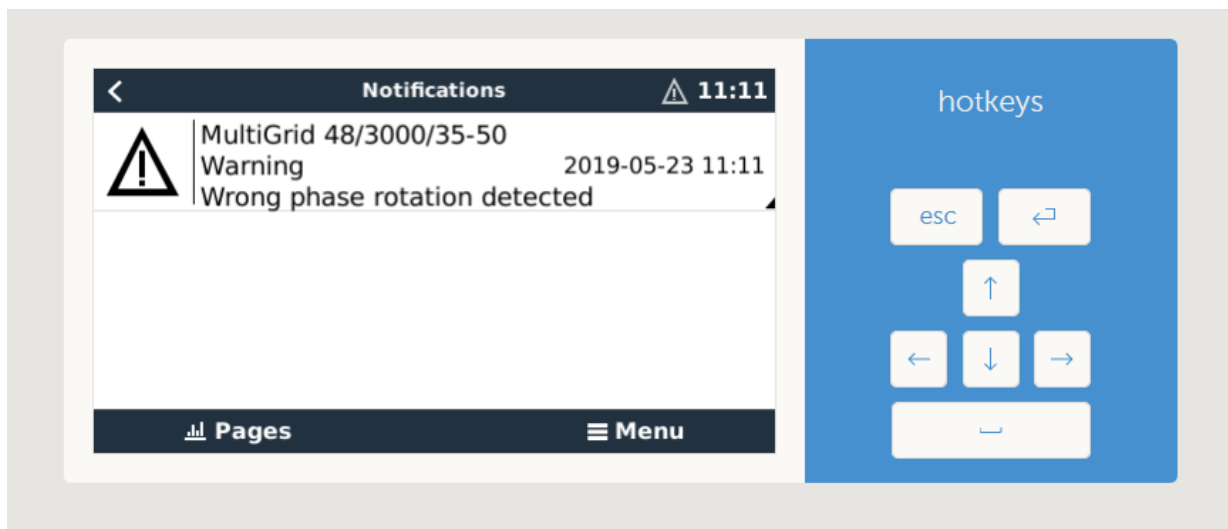
The configured AC input current limit is the total limit per phase.

**7.2. Phase rotation warning**

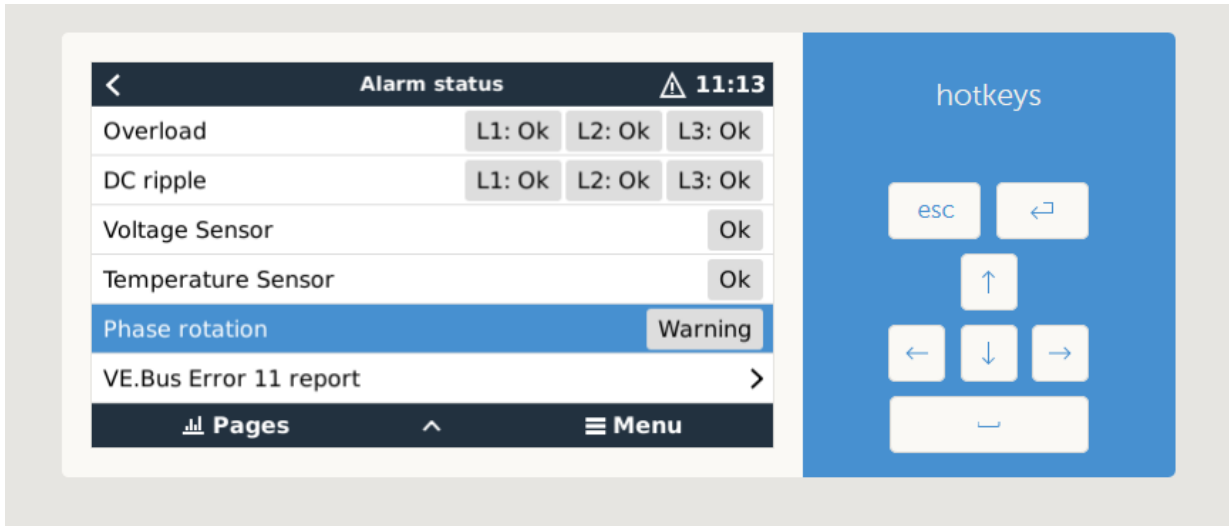
The AC supply, either Generator or Grid, to a three phase inverter/charger system needs to be in the correct rotation, also known as sequence. If not, then the Inverter/chargers will not accept the AC supply and remain in Inverter mode.

The Phase rotation warning will be raised in such case. To resolve the issue, change the wiring on the AC input: swap either one of the phases, effectively changing the rotation from L3 → L2 → L1 to L1 → L2 → L3. Or reprogram the Multis and modify the phase assigned to match the wiring.

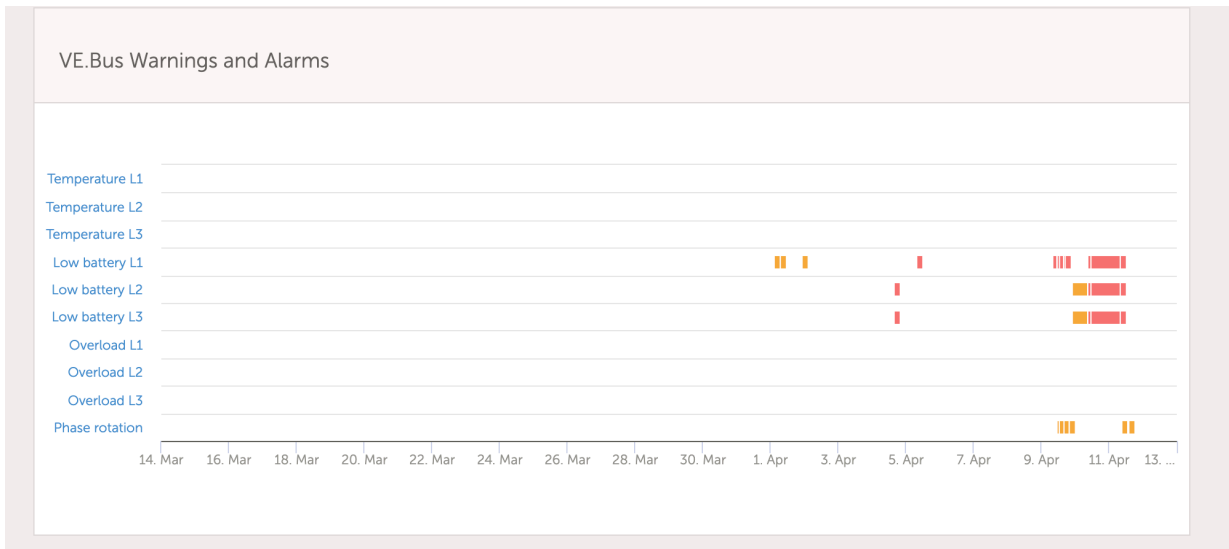
On the GX device itself, the warning will be popup as a notification on the GUI:



Also, it is visible in the menus:



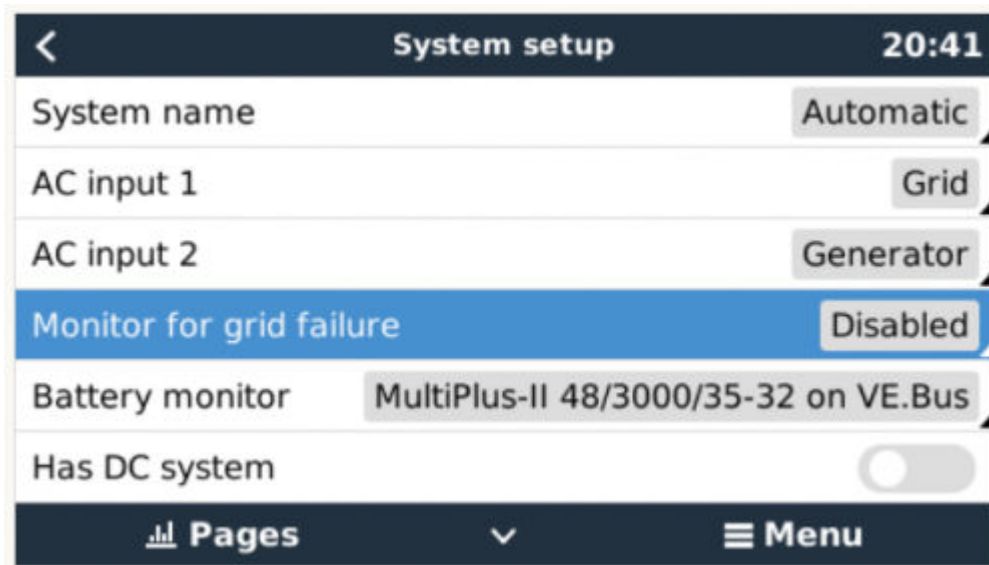
And on the VRM Portal, it is visible on the VE.Bus Alarms & warnings widget on the Advanced page:



And also it will be listed in the Alarm Log on VRM, and an email will be sent; using the [VRM Alarm Monitoring system](#).

### 7.3. Grid failure monitoring

When this feature is enabled, an alarm is raised when the system hasn't been connected to the AC input configured to be Grid or Shore for more than 5 seconds.



The alarm shows as a Notification in the GUI, and as an alarm on the VRM Portal, and is available on ModbusTCP / MQTT.

Recommend to use for backup systems. But also for yachts or vehicles on shore power.

Note that this settings monitors that the system is connected to grid/shore. Generator monitoring is already available as part of the Generator start/stop function and not part of this.

Do not use this feature in systems that use the Ignore AC Input settings in our inverter/chargers: when the system ignores the AC input, ie runs in island mode, as intended, even though grid is available, it will report a grid failure.

## 7.4. Advanced menu

### Equalisation

Starts equalisation. See Multi or Quattro documentation for details.

### Redetect system

Redetects the type of inverter/charger and its features & configuration. Use this feature when, for example, a VE.Bus BMS used to be part of a system, and is no longer.

### System reset

Restarts the inverter/charger when it has stopped retrying. For example after a (very) heavy overload; or three overloads in a row.

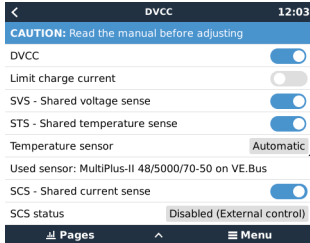
### ESS Relay test

Shows the status of the ESS Relay test. Only relevant when its an ESS system. See Q9 in the [ESS Manual FAQ](#) for details

# 8. DVCC - Distributed Voltage and Current Control

## 8.1. Introduction and features

Enabling DVCC changes a GX device from a passive monitor into an active controller. The available features and effects of enabling DVCC depend on the type of battery used. The effect also depends on the installed Victron components and their configuration.



**Example 1 - Managed CAN-bus batteries** For example, in systems with an Managed CAN-bus BMS battery connected, the GX receives a Charge Voltage Limit (CVL), Charge Current Limit (CCL), Discharge Current Limit (DCL) from that battery and relays that to the connected inverter/chargers and solar chargers. These then disable their internal charge algorithms and simply do what they're told by the battery. There is no need to set-up charge voltages or choose the charge algorithm type.

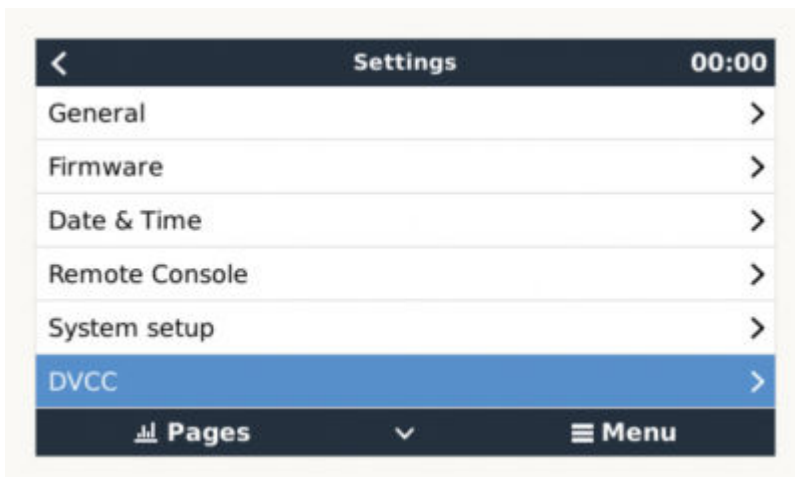
**Example 2 - Lead batteries** For systems with lead batteries, DVCC offers features such as a configurable system wide charge current limit, where the GX device actively limits the inverter/charger in case the solar chargers are already charging at full power. As well as shared temperature sense (STS) and shared current sense (SCS).

This table shows the recommend settings for different battery types:

	Lead (AGM, Gel, OPzS, ...)	VE.Bus Lithium	Freedom-won	BYD	Pylontech	BMZ	MG Electronics
Auto-config	No	No	Yes	Yes	Yes	Yes	Yes
System charge current	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Should you enable SVS?	Yes	No	Yes	No	No	No	No
Should you enable STS?	Yes	No	No	No	No	No	No
Charge Control Method	-	-	Dynamic	Fixed	Fixed	Fixed	Dynamic
Wire ATC & ATD?	n.a.	Yes	No	No	No	No	No

Carefully study the following chapters to fully understand DVCC for a particular system.

To enable or disable DVCC, see Settings → DVCC in the menus:



## 8.2. DVCC Requirements

### Battery compatibility

For CAN-bus connected batteries, check the relevant page on the Battery Compatibility manual to see if enabling DVCC has been tested with your battery-type and is supported. If DVCC is not mentioned in notes relating to your battery, do not enable DVCC.

For Gel, AGM, OPzS and other lead batteries, DVCC can be used without any problem. The same is true for Victron Energy lithium batteries with the VE.Bus BMS, the Lynx Ion + Shunt BMS or the Lynx Ion BMS. DVCC is the preferred operating mode for Redflow ZBM2/ZCell batteries using the Redflow CANBus BMS.

### Firmware versions

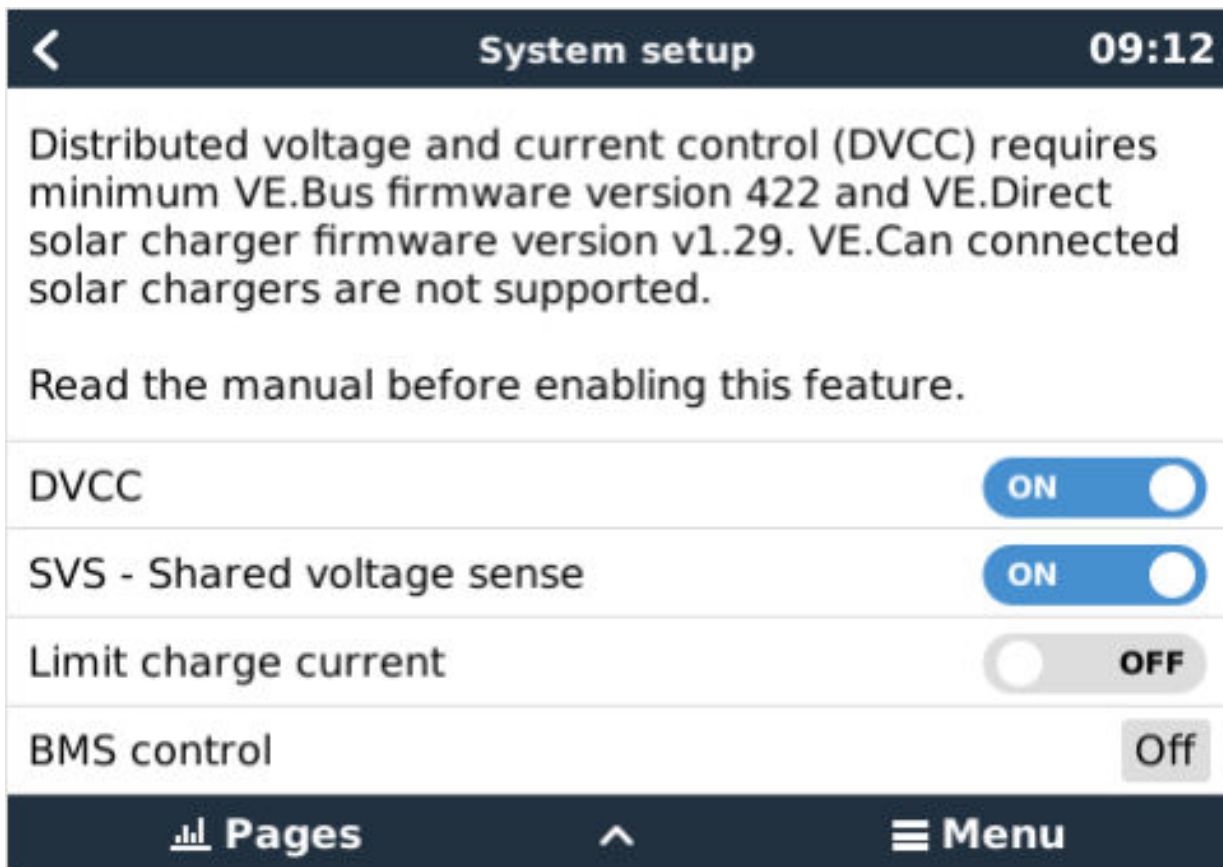
Do not use DVCC in cases where these requirements are not met. In all cases we recommend to install the latest available firmware during commissioning. Once running well, there is no need to pro-actively update firmware without reason. In case of difficulty, the first action is to update firmware.

Required minimum firmware versions:

- Multi/Quattro: 422
- MultiGrid: 424
- Cerbo GX/ Cerbo GX: v2.12
- VE.Direct MPPTs: v1.29
- VE.Can MPPT Solar Chargers cannot be used: they do not yet support the new control mechanisms.
- Lynx Ion + Shunt: v2.04
- Lynx BMS: v1.09

From Venus firmware v2.40, there will be a warning message 'Error #48 - DVCC with incompatible firmware' when one of the devices has an incompatible firmware while using DVCC.

In case of an ESS System, the ESS Assistant needs to be version 164 or later (Released in November 2017).



## 8.3. DVCC effects on the charge algorithm

Our inverter/chargers and MPPT Solar Chargers use their own internal charge algorithm when in stand-alone mode. This means that they determine how long to remain in Absorption, when to switch to Float, when to switch back to Bulk, or Storage. And in those various phases they use the configured parameters in VictronConnect and VEConfigure.

In certain systems, the internal charge algorithm is disabled, and the charger is then working with an externally controlled charge voltage target.

This guide explains the different possibilities:

Selection guide			Resulting charge algorithm	
System type	Battery type	DVCC	Inverter/charger	MPPT Solar Charger
ESS Assistant	Intelligent battery	DVCC on	Battery	Battery
		DVCC off	Don't do this; better enable DVCC	
Standard	Normal battery	DVCC on	Internal	Inverter/charger
		DVCC off	Internal	Inverter/charger
	Intelligent battery	DVCC on	Battery	Battery
		DVCC off	Don't do this; better enable DVCC	
Normal battery	DVCC on	Internal	Internal	
	DVCC off	Internal	Internal	

**Internal**

The internal charge algorithm (bulk → absorption → float → re-bulk), and the configured charge voltages are active.

Inverter/charger indicated charge state: bulk, absorption, float, and-so-forth.

MPPT indicated charge state: bulk, absorption, float and-so-forth. (firmware version v1.42 onwards. Earlier versions have a bug that make the MPPT say “Ext. Control” when it is only being current limited; its internal charge algorithm still active.

**Inverter/charger (applies to MPPTs only)**

The MPPTs internal charge algorithm is disabled; instead it's being controlled by a charge voltage setpoint coming from the inverter/charger.

MPPT indicated charge state: Ext. control.

**Battery**

The internal charge algorithm is disabled; and instead, the device is being controlled by the battery.

Inverter/charger indicated charge state: Bulk when in current controlled mode, Absorption when in voltage controlled mode. Never Float; even though currents might be low / battery might be full.

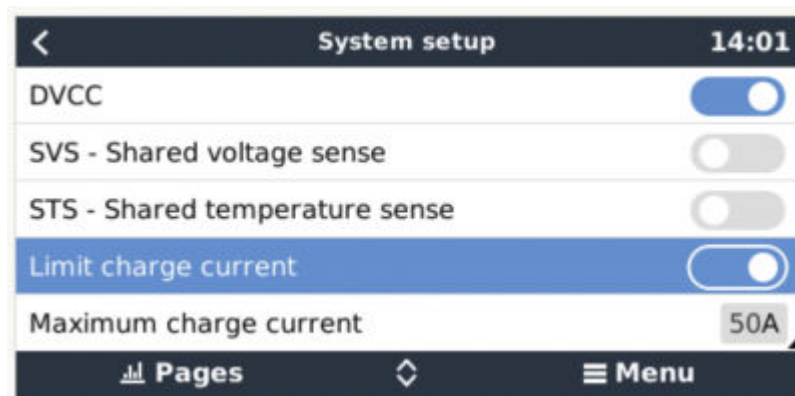
MPPT indicated charge state: Ext. control.

**8.4. DVCC features for all systems**

These features apply to all types of systems when DVCC is enabled: with or without ESS Assistant, and with lead or other normal batteries as well as when an intelligent CAN-bus BMS connected battery is installed:

**8.4.1. Limit charge current**

This is a user-configurable maximum charge current setting. It works across the whole system. MPPT Solar Chargers are automatically prioritized over the mains/generator.



This setting is available in the “Settings → “System Setup” menu on the GX device.



Particulars:

- 1) If a CANBUS-BMS is connected and the BMS requests a maximum charge current that is different from the user-configurable setting, the lower of the two will be used.
- 2) This mechanism only works for Victron inverterchargers and Solar chargers. Other chargers, such as Skylla-i's are not controlled and also their charge current is not taken into account. The same applies for devices that are not connected to the GX device, such as an alternator. Worded differently: the total charge current of the inverterchargers and all MPPTs will be controlled, nothing else. Any other sources will be extra charge current, unaccounted for. Even when installing a BMV or other battery monitor.
- 3) DC Loads are not accounted for. Even when a BMV or other battery monitor is installed. For example, with a configured maximum charge current of 50 Amps, and DC Loads drawing 20 Amps, the battery will be charged with 30 Amps. Not with the full allowed 50 Amps.
- 4) Current drawn from the system by the invertercharger is compensated for. For example, if 10A is drawn to power AC loads, and the limit is 50A, the system will allow the solar chargers to charge with a maximum of 60 Amps.
- 5) In all situations, the maximum charge limit configured in a device itself, ie. the Charge current limit set with VictronConnect or VEConfigure for the Solar chargers or Inverterchargers will still be in effect. An example to illustrate this: in case there is only an Invertercharger in the system, and in VEConfigure is charge current is configured to 50 Amps. And on the GX Device, a limit of 100A is configured, then the working limit will be 50 Amps.

#### 8.4.2. Shared Voltage Sense (SVS)

Works with VE.Bus devices and VE.Direct Solar Chargers.

The system automatically selects the best available voltage measurement. It will use the voltage from the BMS or a BMV battery monitor, if possible, otherwise it will use the battery voltage reported by the VE.Bus system.

The voltage displayed on the GUI reflects the same voltage measurement.

Shared Voltage Sense (SVS) is by default enabled when DVCC is enabled. It can be disabled with a switch in the Settings → System Setup menu.

#### 8.4.3. Shared Temperature Sense (STS)

Select the temperature sensor to use; and the GX device will send the measured battery temperature to the Invertercharger system as well as all connected Solar Chargers.

Selectable sources for the battery temperature are:

- BMV-702 battery monitor
- BMV-712 battery monitor
- Lynx Shunt VE.Can battery monitors
- Temperature inputs on a Cerbo GX (and same for other GX devices that have a temperature input)
- Multi/Quattro invertercharger
- Solar Chargers (if fitted with a temperature sensor)

#### 8.4.4. Shared Current Sense (SCS)

This feature forwards the battery current, as measured by a battery monitor connected to the GX device, to all connected solar chargers.

The solar chargers can be configured to use the battery current for its tail current mechanism that ends absorption when the current is below the configured threshold. For more information about that, refer to Solar charger documentation.

This feature only applies to systems that are not ESS, and/or don't have a managed battery, since in both of those cases the MPPT is already externally controlled.

Requires MPPT solar charger firmware v1.47 or newer.

### 8.5. DVCC Features when using CAN-bus BMS Battery

This chapter applies to all systems where an intelligent battery BMS is installed, and connected via CAN-bus. Note that this does not include the Victron VE.Bus BMS.

Such intelligent BMS sends four parameters to the GX device:

1. Charge voltage limit (CVL): the maximum charge voltage that the battery currently accepts.
2. Charge current limit (CCL): the maximum charge current requested by the battery.
3. Discharge current limit (DCL): the maximum discharge current as requested by the battery.

For all three parameters, some types of batteries transmit dynamic values. For example they determine the maximum charge voltage based on cell voltages, state of charge, or for example temperature. Other makes and brands use a fixed value.

Here is the page in the menus showing the parameters:

Parameters		12:51
Charge Voltage Limit (CVL)		57.7V
Charge Current Limit (CCL)		103.4A
Discharge Current Limit (DCL)		19.9A
Low Voltage Disconnect (always ignored)		--

For such batteries, there is no need to wire allow-to-charge and allow-to-discharge connections to the AUX inputs on a Multi or a Quattro.

When inverting, ie in Island mode, Multis and Quattros will shut down when the max discharge current is zero. They will automatically start again as soon as either AC mains returns, or when the BMS increases the max discharge current again.

See previous chapter, "Limit charge current", the user setting, for details about how the Maximum charge current is used, how it prioritises solar and more.

All above means that setting up charge voltages or charge profiles in VEConfigure or VictronConnect is not necessary, and will also have no effect. The Multis, Quattros and MPPT Solar Chargers will charge with the voltage as received via CAN-bus from the battery.

## 8.6. DVCC for systems with the ESS Assistant

- The ESS Keep batteries charged mode works properly. It does not without DVCC.
- A fixed solar offset of 0.4V is used instead of a variable 2V. (values for 48V systems, divide by 4 for 12V). Note that this solar offset is only applied when ESS-mode is set to Optimized in combination with the Feed-in excess solar charger power-setting enabled, or when ESS-mode is set to Keep batteries charged.
- Add Auto-recharge feature for the ESS Modes Optimized and Optimized (with BatteryLife). The system will automatically recharge the battery (from the grid) when the SOC drops 5% or more below the value of 'Minimum SOC' in the ESS menu. Recharge stops when it reaches the Minimum SOC.
- ESS improved state display: In addition to the charger states (Bulk/Absorption/Float), additional Discharging and Sustain modes were added. In addition it also shows reasons for the state it is in:
  - #1: Low SOC: discharge disabled
  - #2: BatteryLife is active
  - #3: Charging disabled by BMS
  - #4: Discharging disabled by BMS
  - #5: Slow Charge in progress (part of BatteryLife, see above)
  - #6: User configured a charge limit of zero.
  - #7: User configured a discharge limit of zero.

## 9. VRM Portal

### 9.1. VRM Portal Introduction

When connected to the internet, a GX device can be used in combination with the [Victron Remote Management \(VRM\) portal](#), which enables:

- Easy remote access to all statistics and systems status online
- Remote Console on VRM: access and configure your system as if you were standing besides it
- Remote Firmware updates of connected Solar Chargers and other Victron products.
- Use of the [VRM App for iOS and Android](#).

See [Internet Connectivity chapter \[15\]](#) for how to connect the device to the internet.

### 9.2. Registering on VRM

Instructions are in the [VRM Portal Getting Started document](#).

Note that any system will need to first have been able to successfully send data to the VRM Portal. As long as there has been no successful connection, it will not be possible to register the system to your VRM user account. In such case, refer to below Troubleshooting section 5.7.

Note that any system will need to first have been able to successfully send data to the VRM Portal. As long as there has been no successful connection, it will not be possible to register the system to your VRM user account. In such case, refer to below Troubleshooting section 5.7.

### 9.3. Datalogging to VRM

Data-logs are transmitted to the VRM Portal over the Internet, if it's available. All related settings are available in the VRM Online Portal menu:



The transmission of the data logs has been designed to work also on bad internet connections. Lines of up to 70% permanent packet loss are still sufficient to get the data out, even if delayed in some cases.

#### Adding an external storage device

When unable to transmit the logs, then the GX device will store them to non-volatile storage (ie. data is not lost on a power loss or reboot).

The GX device has a buffer to store a couple of days worth of logs internally. To extend this period, insert a microSD card or USB stick. You can see the internal storage status in the settings.

Note that, when inserting such storage device, any internally stored logs will automatically be transferred to the inserted stick: no data is lost.

With or without an external storage device inserted, the GX Device will always keep trying to connect to the portal and transmit all backlogged logs. That means that even with months worth of backlog, once it re-acquires an Internet connection, all of the backlog is sent out. The data is sent in a compressed manner: sending a lot of backlogged data will use considerably less bandwidth than sending the data with a continuously available internet connection.

#### Storage device requirements

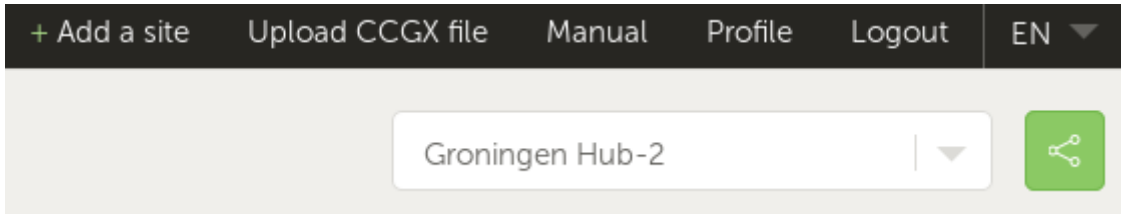
- MicroSD cards or USB flash drives must be formatted as FAT12, FAT16 or FAT32 file systems - and not exFAT or NTFS.
- SD and SDHC type microSD cards of 32 GB capacity and smaller are sold containing FAT12, FAT16 or FAT32. They can be used without a problem, unless they are subsequently re-formatted to a different file system.

- SDXC type microSD cards which have greater than 32 GB capacity are often formatted with exFAT, and therefore cannot be used with the Cerbo GX without reformatting and possibly re-partitioning.

### Manually transferring datalogs to VRM

For devices permanently without Internet, it is possible to take the data out, and then upload it manually from a laptop.

1. go to Settings → VRM Portal, and click Eject the storage. Make sure to never just remove the SD-card/USB-stick, this can lead to corruption and data loss.
2. now, remove the storage device and insert it into a computer or laptop that is connected to the internet.
3. open a webbrowser, and navigate to the [VRM Portal](#).
4. Login, and then click the 'Upload GX file' option, and follow instructions:



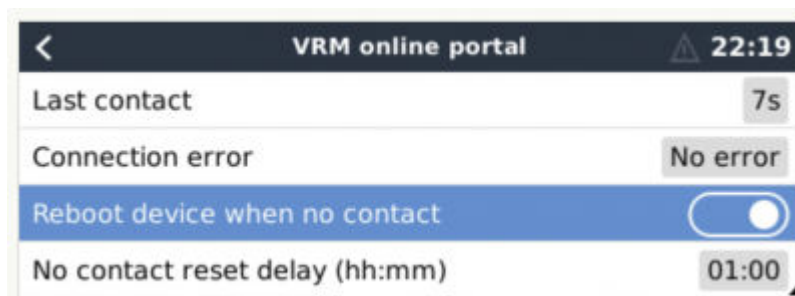
5. Remove the file from the storage device, and then it re-insert it into the GX Device. Note that uploading the same data twice does not cause any problems; but still it is better not to do that.

With a log interval of once per minute, the required storage space roughly amounts to about 25 MB per month, depending on the number of connected products. So with a 1 GB microSD card, you can store about 3 years of backlog. In other words, any microSD card or USB stick should be sufficient to store the 6 months of data which VRM retains.

When the storage device is full, no more data will be logged.

If multiple storage devices are inserted, the GX device will store the data on the one inserted first. When that is removed, it will not use the other one. Instead, it will create an internal backlog buffer. Only inserting a new one will make it switch to using external storage again.

### Network watchdog: auto-reboot



This feature, disabled by default, makes the GX device automatically reboot itself in case it has not been able to connect to the VRM Portal.

Please be careful with enabling this feature on ESS systems: when grid connection is lost, and the GX device reboots, the system can lose power when rebooting takes too long (when grid is present, the Multi's or Quattro's will enter passthru).

## 9.4. Trouble shooting data logging

This chapter explains what to do when the GX Device cannot transmit data to the VRM Portal.

The communication required to send logs to the VRM Portal is:

1. Working DNS
2. Proper IP address
3. Working internet connection
4. Outbound http(s) connection to <http://ccgxlogging.victronenergy.com> on port 80 and 443. Note that should never be an issue, unless on very specialized company networks.

Note that the Cerbo GX does not support a proxy setup. For more details on the required networking, see [here](#).

### Step 1: Update the GX Device to the latest available firmware

[GX Device firmware update instructions](#)

### Step 2: Verify the network and internet connection

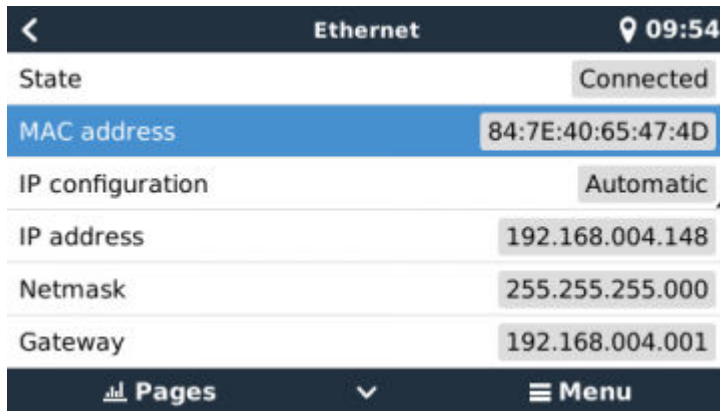
In the menu Settings → Ethernet or Settings → Wi-Fi, check the following:

1. State must be 'Connected'
2. There must be an IP address, that does not start with 169.
3. There must be a gateway
4. There must be DNS servers

For a GX GSM, see the Troubleshooting guide in the GX GSM Menu.

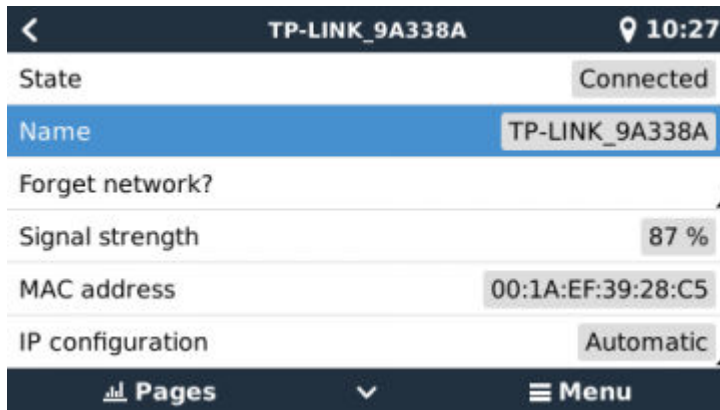
In case the IP address starts with 169, check whether your network has a DHCP server running. 99% of all networks have a DHCP server running and it is enabled by default on all well-known ADSL, cable and 3G routers. If there is no DHCP server running, then configure the ip address manually.

**Ethernet**



When using Ethernet and State shows 'Unplugged', verify that the Ethernet network cable is not faulty: try another one. The two lights at the back of the Cerbo GX, where the Ethernet RJ45 cable plugs in, should be lit or blinking. Two dead lights indicate a connection problem.

**WiFi**

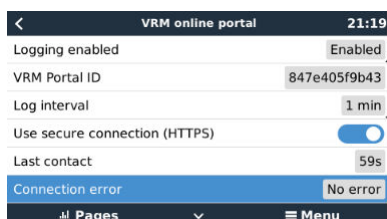


When using Wi-Fi and the menu shows 'No Wi-Fi adapter connected' check the USB connection to the Wi-Fi dongle. Try to remove the dongle and insert it again.

When using Wi-Fi and the State shows 'Failure', it might be that the Wi-Fi password is incorrect. Press 'Forget network' and try to connect again with the correct password.

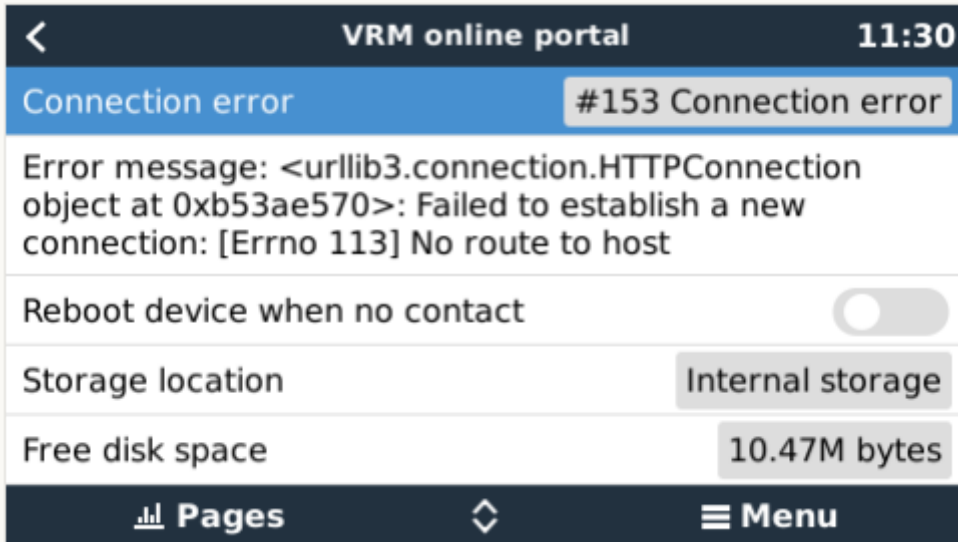
**Step 3. Verify VRM Portal Connectivity**

Navigate to Settings → VRM online portal, and check the Connection error status:

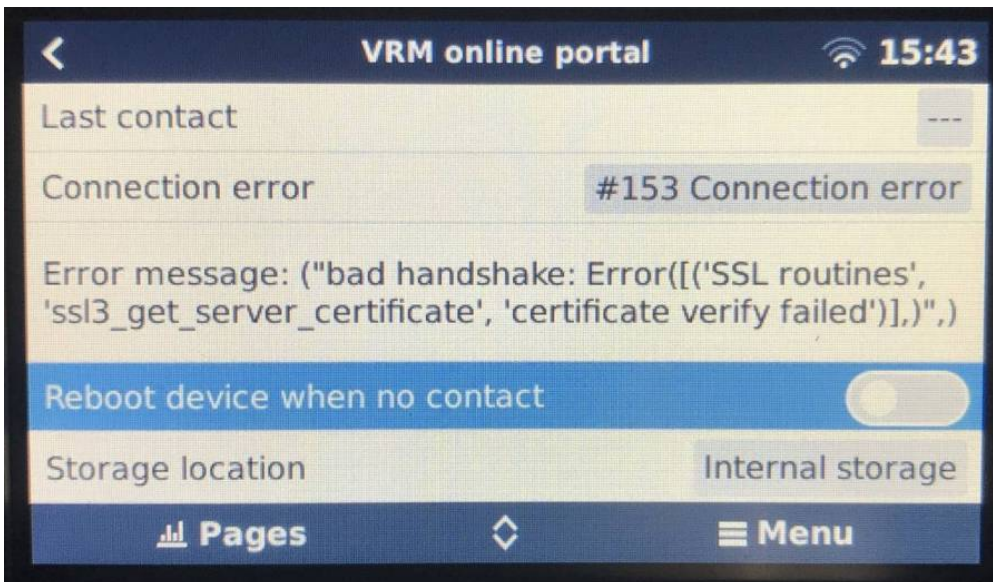


If a Connection error is shown, the Cerbo GX is not able to contact the VRM database. The connection error will show an error code that indicates the nature of the connectivity problem. Also, details of the error message are shown, to facilitate on site IT experts to diagnose the problem.

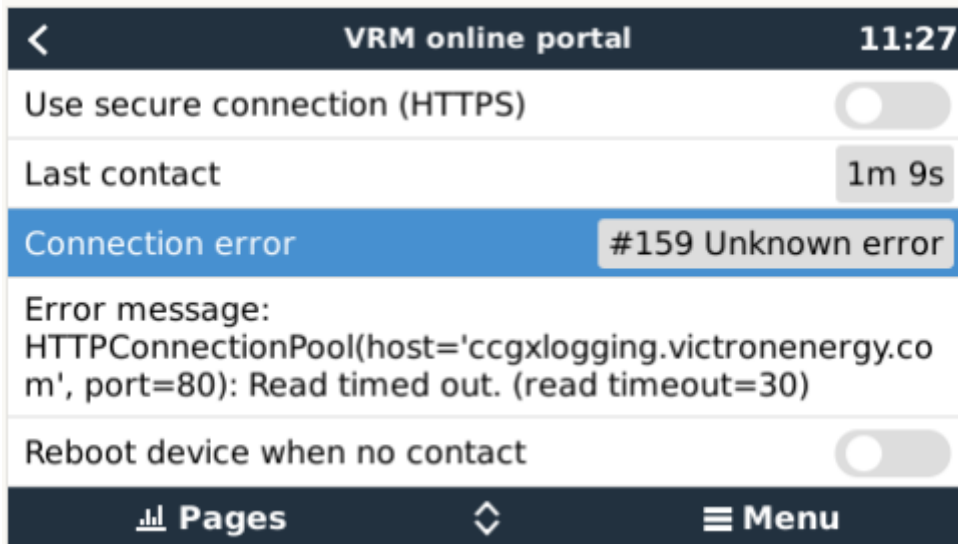
- Error #150 Unexpected response text: A connection succeeded, but the result was incorrect. This might indicate that a transparent proxy is hijacking the connection. Examples include a WiFi login page or a cellular providers payment page.
- Error #151 Unexpected HTTP Response: A connection succeeded, but the response did not indicate a successful HTTP result code (normally 200). This might indicate that a transparent proxy is hijacking the connection. See #150 above for examples.
- Error #152 Connection time-out: this could indicate a poor quality internet connection, or a restrictive firewall.
- Error #153 Connection error: this could indicate a routing problem. For details, check the shown error message:



- Error #153 Connection problem, and then specifically an SSL related issue, such as in below screenshot: check the date and time setting of the Gx Device, and also the time zone. And check that your router is not showing a special disclaimer, login or acceptance page, like often seen in airports, hotels and other public wifi.



- Error #154 DNS Failure: Make sure that a valid DNS server is configured in the Ethernet or WiFi menu. Typically this is assigned automatically by a DHCP server in a network.
- Error #155 Routing error: VRM is unreachable. This error occurs if an ICMP error is received indicating that no route exists to the VRM server. Make sure your DHCP server assigns a working default route, or that the gateway is correctly configured for static configurations.
- Error #159 Unknown error: this is a catch-all error for errors that cannot be directly categorised. In such cases the Error message will provide information about the problem.



Check 'Last contact'. If this shows dashes, the GX device has not been able to contact the VRM Portal since power up. If it shows a time, but still an error is shown, then the GX device has been able to send data, but has since lost contact.

The 'Buffered items' indicates the number of logs that it has stored to send later. If this is larger than 0, it means that the Cerbo GX can not connect to the VRM Portal. All data is sent using the First in First out principle: the VRM Portal will only show the most up to date information after all old data has been sent.

## 9.5. Analysing data offline, without VRM

In certain cases, for example for very remote sites where there is no internet available, it can be useful to be able to analyse the data without first having to upload it to the VRM Portal.

1. Install VictronConnect on a Windows or Apple laptop
2. Insert the storage device containing the log file(s) in Victron
3. Connect, use the GX Log Converter feature to convert them to Excel sheets.

## 9.6. Remote Console on VRM - Trouble shooting

Follow these steps to trouble shoot Remote Console on VRM

1. Make sure that Logging to the VRM portal works, see chapter 5.4. Without this; Remote Console on VRM will not work.
2. After enabling the Remote Console feature, make sure to set (or disable) the password.
3. Also make sure to restart the Cerbo GX after setting (or disabling) the password.
4. Make sure to update the Cerbo GX to the latest firmware version. The last stability improvement for Remote Console was made in version v2.30.
5. After the restart, check the Remote Console on VRM status shows online or a port number. In case it says offline, or port number 0, the Cerbo GX was unable to connect to the Remote Console server. This is normally caused by a (company) firewall, blocking the connection. The solution is then to configure an exception rules in the firewall.
6. -Verify that your web browser, on which you're using VRM, can access both of below URLs. Click both of the links, to check them. *Note that seeing an Error means that all is OK.* The good error is 'Error response, Error code 405, Method Not Allowed'. If you get a timeout or another (browser) error, there may be a firewall blocking the connection. <https://vncrelay.victronenergy.com> & <https://vncrelay2.victronenergy.com/>

### Technical background

To have Remote Console on VRM working, your web browser and the GX Device need to have a connection between them. This connection is designed such that it doesn't need any special configuration or opening up of firewalls in almost all situations. The 0.1% of situations where it doesn't work out of the box are, for example, large corporate networks with special security, or long range expensive satellite or radio supported networks, such as seen in rural areas of Africa and other remote areas.

When Remote Console on VRM is enabled, the GX Device will open and maintain a connection to any of the servers pointed to by [supporthosts.victronenergy.com](https://supporthosts.victronenergy.com). Which currently resolves to two IP addresses (84.22.107.120 and 84.22.108.49), and likely more in the future. The technology used is SSH, and it will try to connect using port 22, 80 and 443, only one of them needs to work. The reason for it to try all three is that on most networks at least one of them will be allowed by the local firewall.

Once connected to one of the supporthost servers, that reverse SSH tunnel is waiting to be connected from someone needing the connection. Which can be your browser, or a Victron engineer since this same technology is used for the Remote Support functionality; for more information see above.

When using Remote Console on VRM, the browser will connect to either [vncrelay.victronenergy.com](https://vncrelay.victronenergy.com), or [vncrelay2.victronenergy.com](https://vncrelay2.victronenergy.com), using websockets on port 443. For more details of used connections by the GX Device, see Q15 of the FAQ.



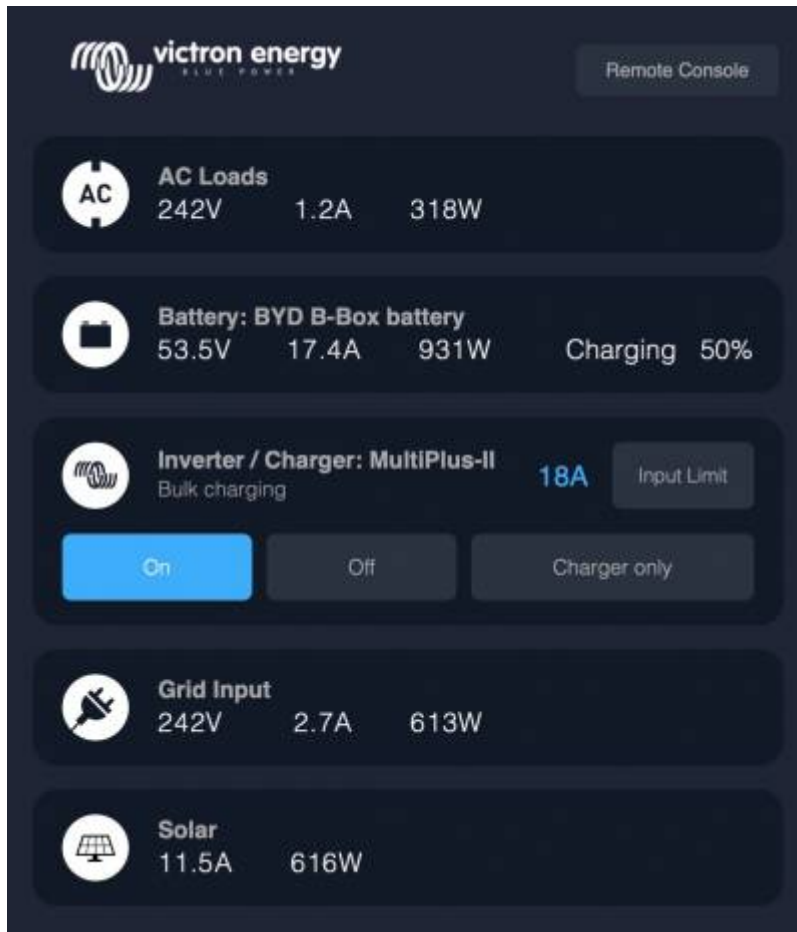
## 10. Marine MFD integration by App

### 10.1. Introduction & requirements

A Glass Bridge is a MFD (Multi-Functional Display) that integrates a boat's systems and navigation status into a large screen or screens at the helm of the vessel, so doing away with multiple gauges, brackets and wiring complications.

A Victron system can be easily integrated into that, as shown in this video:

<https://www.youtube.com/watch?v=RWdEQfYZKEs>



Functionalities:

- Monitor shore power and generator status.
- Monitor battery status for one or more batteries. By using the voltage of for example battery chargers, it can also visualise secondary batteries such as Generator starter batteries.
- Monitor the power conversion equipment: chargers, inverters, inverter/chargers.
- Monitor solar production from an MPPT Solar Charger.
- Monitor AC loads, and DC loads.
- Control shore power input current limit.
- Control the inverter/charger: switch it off, on, or set it to charger-only.
- Optionally open the Victron Remote Console panel; allowing access to further parameters.

Victron equipment compatibility:

- All Victron inverter/chargers: From a 500VA single phase device up to a large 180kVA three phase-system, including Multis, Quattros, 230VAC and 120VAC models.
- Battery Monitors: BMV-700, BMV-702, BMV-712 and newer, Lynx Shunt VE.Can, Lynx Ion BMS.
- All Victron MPPT Solar Charge Controllers

Required components:

- Battery system.
- Victron inverter/charger.
- Victron Battery monitor.
- Network cable connection between MFD and GX device (directly, or via network router)
- UTP network cable.

## 10.2. Compatible MFDs and instructions

[Instructions for Garmin MFDs](#)

[Instructions for Navico MFDs \(Simrad, B&D, Lowrance\)](#)

[Instructions for Raymarine](#)

Furuno: support on Furuno MFDs is in the pipeline. There is no expected date of availability.

## 11. Marine MFD integration by NMEA 2000

Since Venus OS v2.40, our GX Devices feature an NMEA 2000-out function. This section will be expanded later, for now read [the v2.40 blogpost](#).

Use our [VE.Can to NMEA2000 micro-C male cable](#) to connect the GX Device to the NMEA 2000 network, hereafter referred to as N2K for brevity.

Compared to the integration using the App, as explained in the previous chapter, integration via N2K offers a more customisable configuration. This being at the cost of more hassle in doing such configuration, as well as making sure all PGNs and fields therein are supported and compatible between the Victron system and the MFD.

## 12. Error Codes

### Different origins of errors

On your GX device, some error codes shown will be from the GX device itself, in that case see below list. But since its the system control panel, it also shows error codes from the connected devices.

- Multi and Quattro inverter/chargers: [VE.Bus Error Codes](#)
- MPPT Solar Chargers: [MPPT Solar Charger Error Codes](#)

### GX Error #47 - Data partition issue

The internal storage in the GX Device is most likely broken: causing it to loose its configuration.

Contact your dealer or installer; see [www.victronenergy.com/support](http://www.victronenergy.com/support)

### GX Error #48 - DVCC with incompatible firmware

This error is raised when the DVCC feature is enabled whilst not all devices in the system are updated to recent enough firmware. More information about DVCC and minimal required firmware versions in chapter 4 of this manual.

#### Note for systems with BYD, MG Energy Systems, and Victron Lynx Ion BMS batteries:

Since Venus OS v2.40, released in December 2019, the DVCC feature is automatically switched on in case the systems detects one of mentioned battery/BMS types connected. In systems that require DVCC to be enabled by the battery manufacturers, it is now no longer possible to switch DVCC off.

This creates an issue for systems installed and commissioned a long time ago, before DVCC was available, and they may not have the other necessary components or firmware to work correctly with it enabled.

The solution is to:

1. Disable automatic updates; Settings → Firmware → Online updates.
2. Roll back to v2.33; See Settings, Firmware and then Stored backup firmware.
3. Make sure that DVCC is disabled again.

Please do consult your installer, to check if the battery system is managed with two wire control (an earlier alternative control method to DVCC) or not:

If there is no charge- and discharge- wiring between BMS, inverter/chargers and charge controllers, then DVCC is required for above mentioned battery brands, and this also has certain minimum firmware requirements for connected Inverter/chargers and Solar charge controllers.

Whats new since Venus OS v2.40 is (a) that it automatically enables DVCC when it sees the above mentioned battery types, and (b) that when DVCC is enabled, it checks the connected devices for the minimum firmware, and raises Error #48 in case the firmware of one or more connected devices is too old.

## 13. FAQ

### 13.1. Cerbo GX FAQ

#### Q1: I cannot switch my Multi/Quattro system on or off

To solve the problem, first find out how the system is connected, and then follow the right step by step instruction below. There are two ways to connect a Multi/Quattro system to a Cerbo GX. In most systems they will be connected directly to the VE.Bus port on the back of the Cerbo GX. And, option two, in some systems they are connected to the Cerbo GX using a [VE.Bus to VE.Can interface](#).

#### Step by step instructions when connected to VE.Bus port on the Cerbo GX

1. Update the Color Control to the latest available version. See our blog posts in the <https://www.victronenergy.com/blog/category/firmware-software/>.
2. Do you have a Digital Multi Control or VE.Bus BMS in the system? In that case it is normal that on/off is disabled. See also the VE.Bus related notes in the [Cerbo GX manual](#)
3. In case you have had a Digital Multi Control or VE.Bus BMS connected to your system, the Color Control remembers it and even when those accessories have been removed the On/off switch will still be disabled. To clear the memory, execute a Re-detect system, the option is in the Multi or Quattro section of the Cerbo GX menu.
4. For parallel/three phase systems consisting of more than 5 units: depending on temperature and other circumstances, it might not be possible to switch a system back on after switching it off with the Cerbo GX. As a work around you'll need to unplug the VE.Bus cable from the back of the Cerbo GX. And plug it back in after starting the VE.Bus system. The real resolution is to install the "Cerbo GX dongle for large VE.Bus systems", partnumber BPP900300100. For details, read its [connection instruction](#).

#### Step by step instructions when connected to Cerbo GX via VE.Can.

1. Update the Color Control to the latest available version. See our blog posts in the firmware category.
2. Update the VE.Bus to VE.Can interface to the latest version. The easiest way to do that is by using Remote firmware update: having a special piece of hardware, the CANUSB, is then not necessary.
3. Do you have a Digital Multi Control or VE.Bus BMS in the system? In that case it is normal that on/off is disabled. See also the VE.Bus related notes in the Cerbo GX manual
4. In case you have had a Digital Multi Control or VE.Bus BMS connected to your system, and it is now no longer connected, the Canbus interface remembers it. Therefore, even after those accessories have been removed, the On/off switch will still be disabled. Clearing this memory is unfortunately not possible yourself, please contact us so we can help you.

### 13.2. Q2: Do I need a BMV to see proper battery state of charge?

Moved [here](#).

### 13.3. Q3: I have no internet, where can I insert a sim-card?

There is no 3G modem in the GX Device, and therefore also no slot for a sim-card. Go to a local store and buy a 3G router with Ethernet ports. More information in the blog post link below and particularly in the comments section, as more users try differing equipment:

<https://www.victronenergy.com/blog/2014/03/09/off-grid-color-control-gx-to-vm-portal-connectivity/>

Note that it is not possible to use a VGR2 or VER for this. Also it will not be possible in the foreseeable future.

### 13.4. Q4: Can I connect both a GX Device and a VGR2/VER to a Multi/Inverter/Quattro?

No. Also, instead of this combination, we recommend to use the Cerbo GX, and add a 3G or similar mobile router. See [Internet connectivity \[15\]](#).

### 13.5. Q5: Can I connect multiple Color Controls to a Multi/Inverter/Quattro?

No.

### 13.6. Q6: I see incorrect current (amps) or power readings on my Cerbo GX

Examples are:

- I know that a load is drawing 40W from the Multi, but the Cerbo GX shows 10W or even 0W.
- I see that the Multi is supplying a load with 2000W, while in inverter mode, but from the battery only 1850W is being taken. Is those 150W coming out of nowhere?

The general answer is: the Multi and Quattros are not measurement instruments, they are inverter/chargers, and the measurements shown are a best effort delivery.

In more detail, there are several causes for measurement inaccuracies:

1. Part of the power taken from a battery by the inverter is being lost in the inverter, converted into heat: efficiency losses.
2. The Multi does not really measure the power being drawn from the battery. It measures the current at the output of the inverter, and then makes an assumption of the power being drawn from the battery.
3. Watts vs VA: depending on the Multi/Quattro firmware version and also the Cerbo GX firmware version, you are either looking at VAs (the result of calculating AC voltage \* AC current) or looking at a Watts measurement. To see WATTS on the Cerbo GX, update your Cerbo GX to the latest version (v1.21 or newer). Also make sure the firmware version in your Multi supports Watts readout, minimum versions are xxxx154, xxxx205 and xxxx300.
4. Multis/Quattros connected to the Cerbo GX via a VE.Bus to VE.Can interface will always reports VAs, not (yet) Watts.
5. If a current sensor assistant is loaded in a Multi/Quattro and no sensor is connected it will return invalid power / kWh values.
6. If a current sensor assistant is loaded in a Multi/Quattro make sure the position is set correctly and the scale match with the dipperswitches on the sensor itself.
7. A current sensor assistant measures and reports VAs, not Watts.

Notes for systems with multiple units in parallel:

1. Cerbo GX version prior to v1.20 use the power and current reported by the master of a phase and multiplied that by the number of devices in that phase. Since version v1.20 the values of all device is summed per phase and hence should be more accurate.
2. This revealed a bug for in the firmware of the multi when running in parallel. Ccgx v1.21 workarounds this, by falling back to the original behavior when it sees an affected firmware version. For better readings the multi's should be updated. The bug has been fixed in VE.Bus firmware version xxxx159, xxxx209, xxxx306. That firmware was released on February 17th 2015.
3. Multi firmware versions since 26xx207 / xxxx300 can also freeze the Power values at a certain moment in time.

Tips to prevent measurement problems:

1. Do not connect VEConfigure while the Cerbo GX is connected
2. VE.Bus is not a 100% plug and play system: if you disconnect the Cerbo GX from one Multi, and very quickly connect it to another, it can result it wrong values. To make sure that this is not the case, use the 'redetect system' option in the Multi/Quattro menu on the Cerbo GX.

### **13.7. Q7: There is a menu entry named "Multi" instead of the VE.Bus product name**

A VE.Bus system can be completely turned off, including its communication. If you turn a VE.Bus system off, and thereafter reset the Cerbo GX, the Cerbo GX cannot obtain the detailed product name and shows "Multi" instead.

To get the proper name again, go into the Multi menu on the Cerbo GX and set the Switch menu entry to On or in case a Digital Multi Control is present, set the physical switch to On. Note that when there is a BMS, above procedure only works when within battery working voltages.

### **13.8. Q8: There is a menu entry named "Multi", while there is no Inverter, Multi or Quattro connected**

If a Cerbo GX ever saw a VE.Bus BMS or Digital Multi Control (DMC), it will remember them, until 'Redetect system' is started from the Cerbo GX menu. After a minute, restart the Cerbo GX: Settings → General → Reboot.

### **13.9. Q9: When I type the ip-address of the Color Control into my browser, I see a web page mentioning Hiawatha?**

Our plan is to at least run a website where you can change settings and see the current status. If all works out as we would like to, there might come be a fully functional version of the online VRM Portal running locally on the Cerbo GX. This allows people without an internet connection, or an intermittent internet connection to have the same features and functionality.

### **13.10. Q10: I have multiple Solar chargers MPPT 150/70 running in parallel. From which one will I see the relay status in the Cerbo GX menu?**

From a random one.

### **13.11. Q11: How long should an automatic update take?**

The size of the download typically is around 90MB. After download it will install the files which can take up to 5 minutes.

### **13.12. Q12: I have a VGR with IO Extender, how can I replace this with a Cerbo GX?**

It is not yet possible to replace the IO Extender functionality.

### **13.13. Q13: Can I use Remote VEConfigure, as I was doing with the VGR2?**

Yes, see [VE Power Setup manual](#)

### 13.14. Q14: The Blue Power Panel could be powered through the VE.Net network, can I also do that with a Cerbo GX?

No, a Cerbo GX always needs to be powered itself.

### 13.15. Q15: What type of networking is used by the Cerbo GX (TCP and UDP ports)?

Basics:

- The Cerbo GX needs to get a valid IP address from a DHCP server, including a working DNS server and gateway, or a static IP configuration.
- DNS port 53 UDP and TCP
- NTP (time sync) UDP port 123

VRM Portal:

- Data to the VRM Portal is sent via HTTP POST and GET requests to <http://ccglogging.victronenergy.com> on port 80. Sensitive data is sent using HTTPS on port 443 to the same host.

Firmware updates:

- The Cerbo GX connects to <http://updates.victronenergy.com/> on port 443.

Remote support (default disabled):

- When enabled, an outbound SSH connection to [supporthost.victronenergy.com](http://supporthost.victronenergy.com) is maintained. The Cerbo GX will try to connect on port 22, 80 and 443, and the first that works is maintained.
- Enabling Remote Support also enables the sshd daemon, listening for incoming SSH requests on port 22. See next FAQ entry for more information about the Remote Support functionality.

Two way communication (Remote VEConfig and Remote Firmware updates):

- Pre-v2.20: Uses HTTPS (port 443) to the Pubnub servers
- v2.20 and later: connects to [mqtt-rpc.victronenergy.com](http://mqtt-rpc.victronenergy.com) on port 443

MQTT (default disabled):

- When enabled, a local MQTT broker is started, which accepts TCP connections on port 1883. The Cerbo GX will also try to connect to the victron MQTT cloud server ([mqtt.victronenergy.com](http://mqtt.victronenergy.com)) using SSL on port 8883.

Remote Console on VRM (default disabled):

- Remote Console on VRM uses the same reverse ssh tunnel as is used for Remote Support: outbound connection to [supporthosts.victronenergy.com](http://supporthosts.victronenergy.com) on port 22, 80 or 443. No port forwarding in routers is necessary to use Remote Console on VRM. Note that [supporthosts.victronenergy.com](http://supporthosts.victronenergy.com) resolves to multiple IP addresses: 84.22.108.49 and 84.22.107.120.
- See [here](#) to trouble shoot Remote Console on VRM.

Remote Console on LAN (default disabled):

- Remote Console on LAN requires port 80 (small website hosted on local hiawatha webserver on Cerbo GX). And also requires port 81, which is the listening port for the websocket tunnel to VNC.

Modbus TCP (default disabled):

- ModbusTCP server uses port 502

### 13.16. Q16: What is the functionality behind the menu item Remote support (SSH), in the Ethernet menu?

When enabled, the Color Control will open a SSH connection to our secure server, with a reverse tunnel back to the Color Control. Through this tunnel, Victron engineers can login to your Cerbo GX and perform remote support. This works when the Cerbo GX is installed on an internet connection. The connection will even work when installed behind a firewall. The SSH connection will be outbound, to port 80, 22 or 443 at [supporthost.victronenergy.com](http://supporthost.victronenergy.com). Remote support function is by default disabled.

### 13.17. Q17: I don't see support for VE.Net products in the list, is that still coming?

No.

### 13.18. Q18: What is the data usage of the Cerbo GX?

Data usage depends heavily on amount of connected products, and behavior and usage of those products. The measurements below are an indication only, and taken from a system with one Cerbo GX, one Multi, one BMV and one MPPT. Log interval set to 15 minutes. If you are on an expensive data-plan, do make some fail-safe.

Data consumption per month:

- VRM logging: 15MB download, 45MB upload
- Remote support: 22MB download, 40MB upload
- Update checks: 8MB download, 0.3MB upload (This does not include the update itself)
- 2 way communication: 26MB download, 48MB upload

Mentioned megabytes do not include the download of a Color Control firmware update. Firmware updates of 60MB are not uncommon.

### 13.19. Q19: How many AC Current Sensors can I connect in one VE.Bus system?

The current maximum is 9 sensors (since Cerbo GX v1.31). Note that each need to be configured separately with an assistant in the Multi or Quattro to which it is wired.

### 13.20. Q20: Issues with Multi not starting when Cerbo GX is connected / Caution when powering the Cerbo GX from the AC-out terminal of a VE.Bus Inverter, Multi or Quattro

Make sure that the GX device and MultiPlus is running the latest firmware version.

If you power the Cerbo GX from an AC adaptor connected to the AC-out port of any VE.Bus product (Inverter, Multi or Quattro), then a deadlock can occur after the VE.Bus products are powered-down for any reason (after any operational fault or during a black start). The VE.Bus devices will not boot-up until the Cerbo GX has power ...but the Cerbo GX will not boot-up until it has power. See FAQ for more information about this.

This deadlock can be rectified by briefly unplugging the Cerbo GX VE.Bus cable at which point you will observe the VE.Bus products will immediately begin to boot-up.

This deadlock can be avoided in two ways:

- Power the Cerbo GX from the battery; or
- Cut pin 7 in the VE.Bus cable connected to the Cerbo GX

Cutting/Removing pin 7 of the VE.Bus cable to the Cerbo GX (brown/white according to standard RJ45 ethernet cable colour coding) allows the VE.Bus products to start up without waiting for the Cerbo GX to boot up first.

Note that when using a Redflow ZBM2/ZCell battery, pin 7 should be cut even if the Cerbo GX is DC powered, to avoid the same deadlock at times when the Redflow battery cluster is at 0% SoC.





The disadvantage of cutting pin 7 is that switching the VE.Bus device off will be less effective: although it will stop charging and inverting, it will still be in standby mode and therefore drawing more current from the battery than if pin 7 had been left in place. Typically this is only relevant in Marine or Automotive systems where it's normal to regularly switch the VE.Bus device off. For those types of systems we recommend that you do not cut pin 7, but simply power the Cerbo GX from the battery.

### 13.21. Q21: I love Linux, programming, Victron and the Cerbo GX. Can I do more?

Yes you can! We intend to release almost all code as open source, but we are not that far yet. What we can offer today is that many parts of the software are in script or other non-compiled languages, such as Python and QML, and therefore available on your Cerbo GX and easy to change. Root password and more information is available [here](#).

### 13.22. Q22: How do I change the logo

Type the following address into the web browser of a device connected to the same network. Using this address as a template: [http://\[ip-here\]/logo.php](http://[ip-here]/logo.php) (inserting your device's IP address between the square brackets). The IP address can be found by going to Settings &gt; Ethernet or Wifi. Once the page is loaded, Choose an image file from your device. Re-boot the [GX device](#).

### 13.23. Q23: Multi restarts all the time (after every 10sec)

Please check the remote switch connection on the Multi control PCB. There should be a wire bridge between the left and middle terminal. The Cerbo GX switches a line which enables the power of the Multi control board. After 10 seconds this line is released and the Multi should take over from there. When the remote switch connection is not wired the Multi is unable to take over it's own supply. The Cerbo GX will retry, the Multi will boot and after 10 seconds stop, and so on.

### 13.24. Q24: What is Error #42?

If the GX Device shows an Error 42 - Hardware fault. In that case, the flash storage on the device is corrupt. As a result, settings will not be saved (rebooting resets back to default) and other problems will rise.

This error is not recoverable in the field or by repair departments. Contact your dealer for a replacement.

Firmware versions until v2.30 did not report the error. Since v2.30; its visible on the device itself (in the GUI) and on the VRM Portal.

### **13.25. GPL Note**

The software included in this product contains copyrighted software that is licensed under the GPL. You may obtain the Corresponding Source code from us for a period of three years after our last shipment of this product.

## 14. More information

- [GX - Generator auto start/stop](#)
- [GX - Using Fischer Panda Generators](#)
- [Remote VEConfigure and remote firmware updates](#)
- [VRM Portal documentation and troubleshooting](#)
- [GX GSM cellular modem](#)