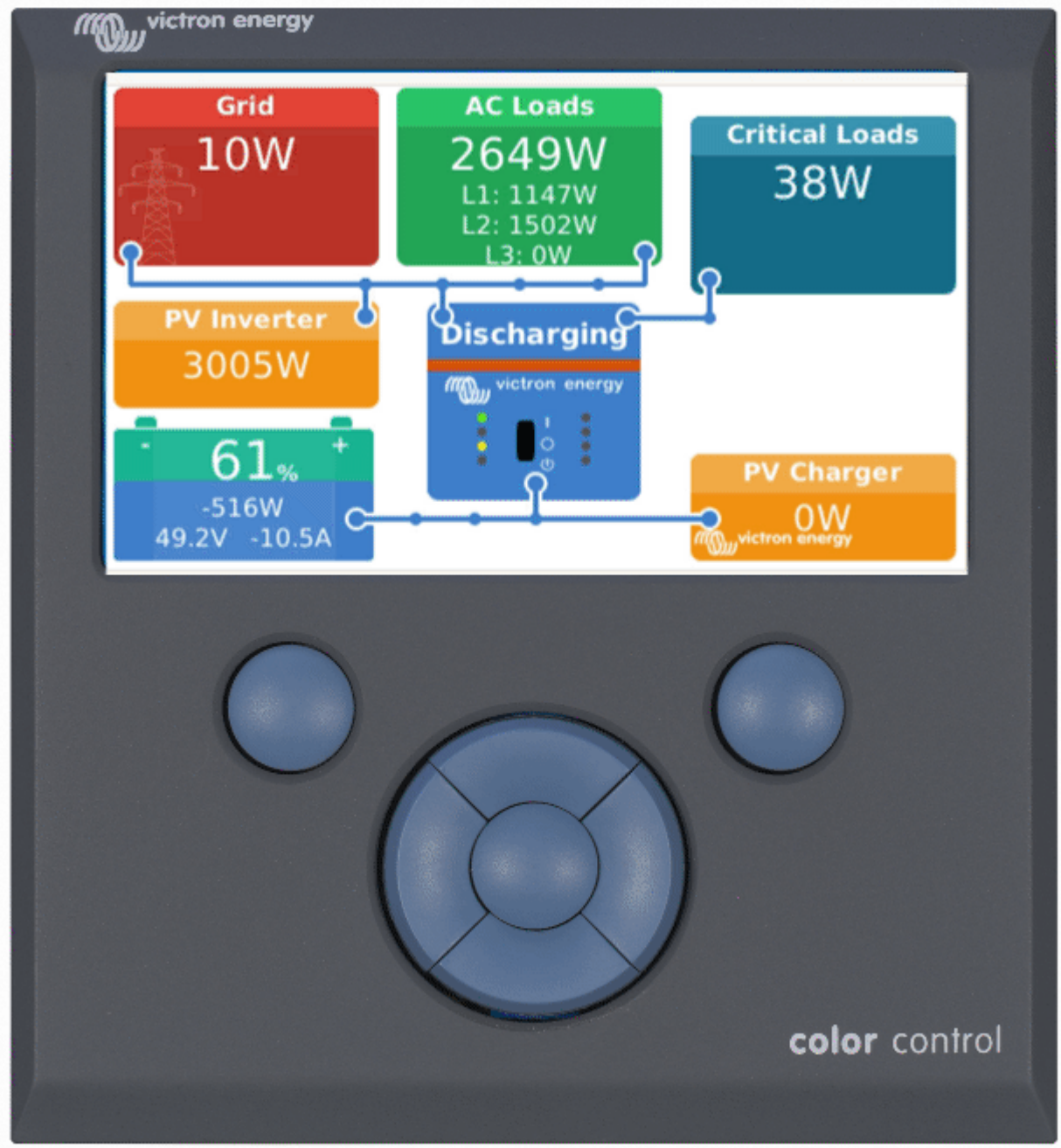
Color Control GX manual



The Color Control GX (CCGX) 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 CCGX ensures that they all work in harmony.

Monitoring can be done either with the CCGX in front of you - or from anywhere in the world using an internet connection and the VRM Website

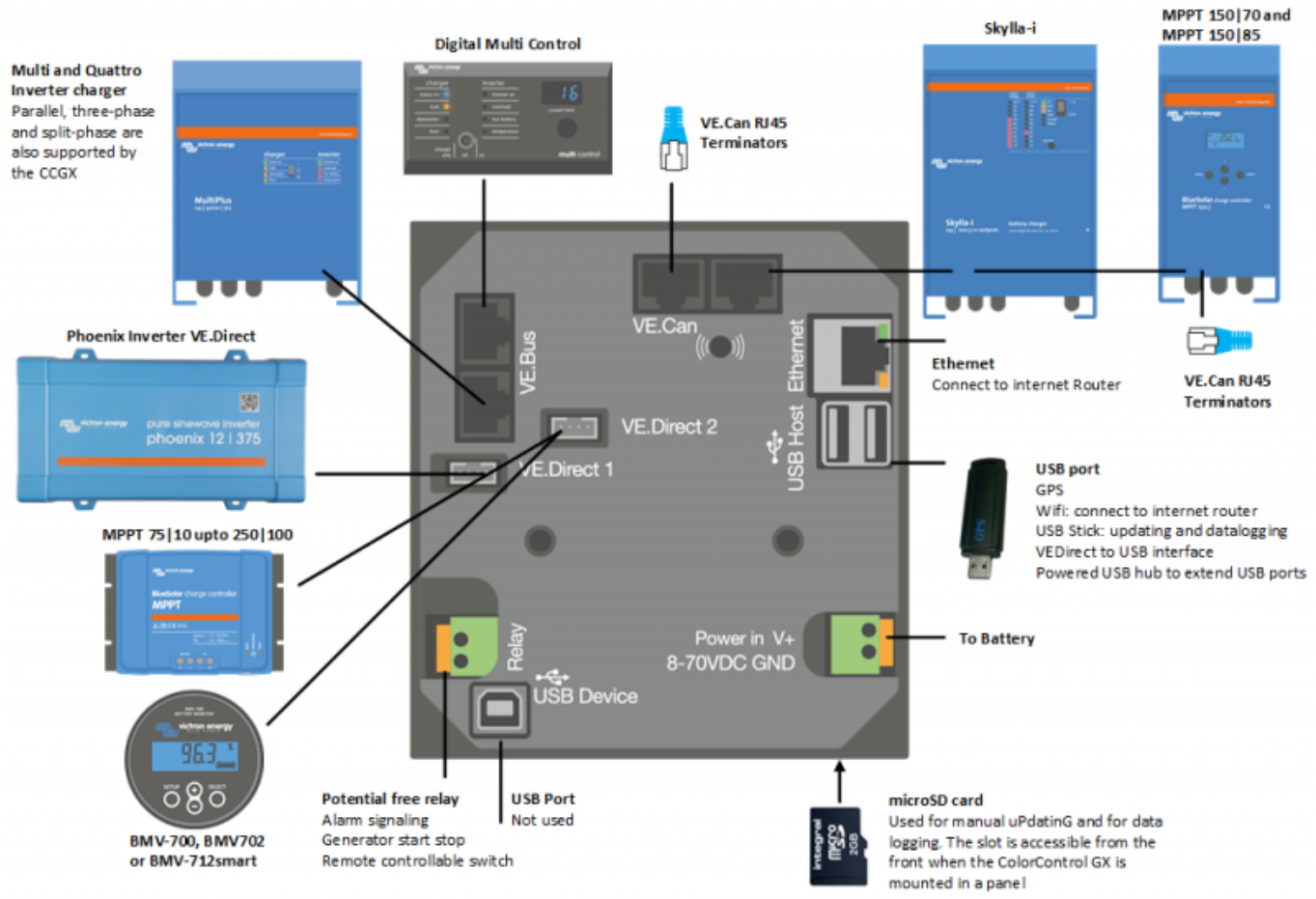
The CCGX also provides Remote firmware updates and even allows the settings to be Changed Remotely.

The Color Control GX is part of the GX product family. GX products are Victron's state-of-the-art monitoring solution that run our VENUS 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. Installation

1.1 Overview of connections



1.2 Snap-on ferrite beads for class B EMI compliance

In order to reduce Electromagnetic emissions in compliance with class B EMI you should place the provided snap-on ferrite beads around every connection cable as close as possible to the Color Control.

HQ1700 and later

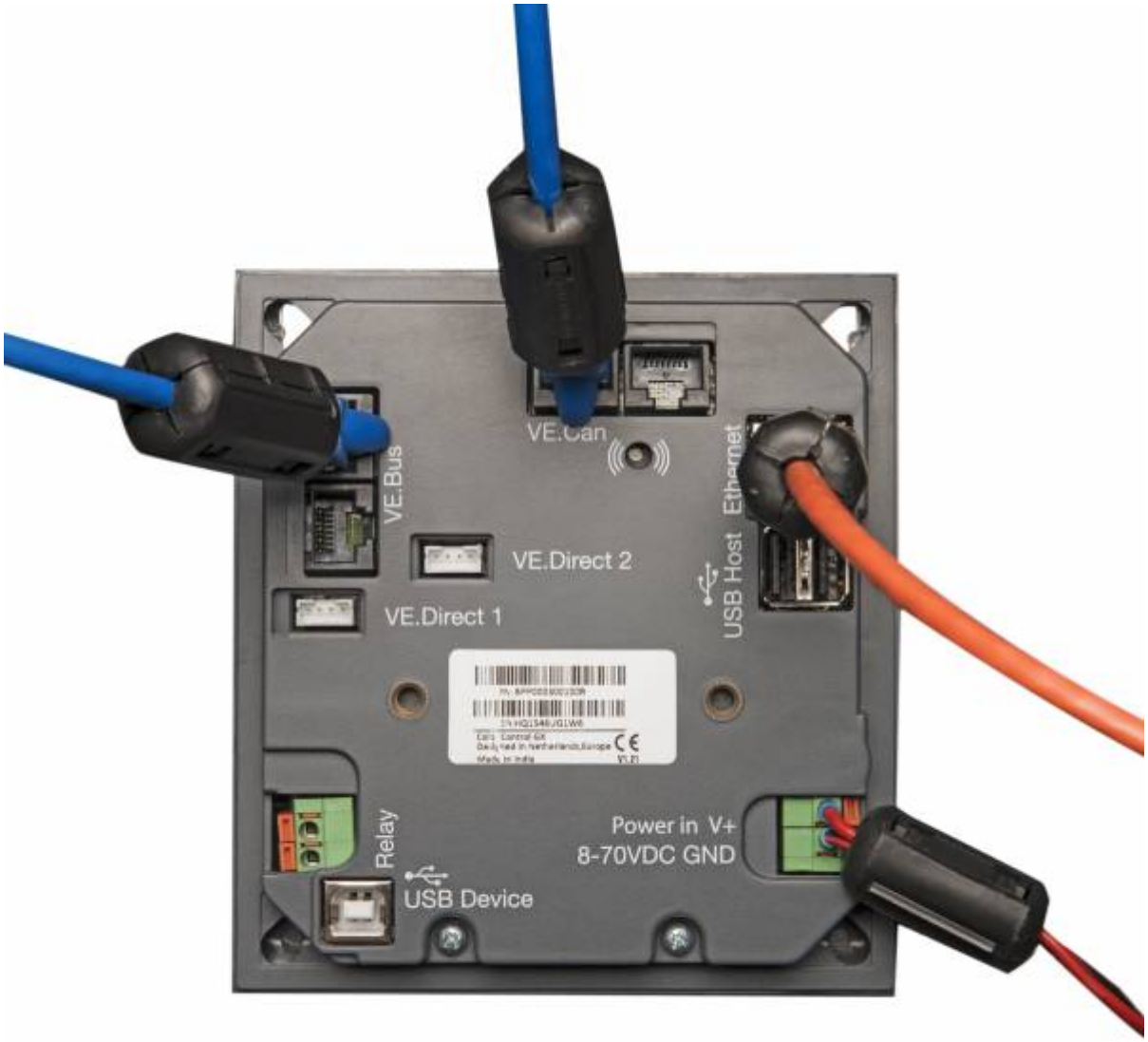
For serial numbers HQ1700 and later, mount a single snap-on ferrite bead (supplied with the unit)

around the power lea



HQ1654 and earlier

For serial numbers HQ1654 and earlier, mount the snap-on ferrite beads as below:



1.3 Power

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

Powering in systems with VE.Bus BMS

When the CCGX is used in an installation with a VE.Bus BMS, connect the *Power in V+* on the CCGX 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 CCGX 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 CCGX has power …but the CCGX will not boot-up until *it* has power. This deadlock can be rectified by briefly unplugging the CCGX 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 Q21 for more information about this.

Isolation

Because the CCGX 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 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 Venus-Devices.

1.4 Connecting Victron products

1.4.1 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 CCGX 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 CCGX. 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 CCGX. 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 CCGX. Use a standard RJ45 UTP cable, see our pricelist.

Systems consisting of five or more VE.Bus products, connected to a CCGX with serial number HQ1628 or earlier require the 'CCGX dongle for large VE.Bus systems (Product Number: BPP900300100).

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

- Connect the CCGX 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, nor to change the input current limit with the CCGX: these options are automatically disabled in the CCGX 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.
- 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 CCGX in case of a low battery, make sure the CCGX is powered via the VE.Bus BMS: connect *Power in V+* on the CCGX to *Load disconnect* on the VE.Bus BMS. And connect both negative leads to the negative stub of a common Battery.

Combining the CCGX with a Digital Multi Control

It is possible to connect both a CCGX 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 CCGX 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 CCGX will not be possible.

Connecting multiple VE.Bus systems to a single CCGX

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

If you do require to connect more than one system to the same CCGX, 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
- The CCGX will not send proper data to VRM any more. The Venus GX does send information of both systems to VRM: its therefor better to use a Venus GX for systems like this.
- 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.

1.4.2 Battery Monitor BMV-700 series; and MPPTs with a VE.Direct port

Either one or two compatible products can be connected directly on the back of the CCGX 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 the VE.Direct to VE.Can interface. 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 CCGX using VE.Direct

First of all, note that the maximum of VE.Direct devices that can be connected is 5 for the CCGX. How they are connected, so direct, via USB or via CAN, does not change the maximum. See here for the Venus GX, Octo GX, and other limits.

- Option 1: Use the VE.Direct to USB interface. The CCGX has two USB ports. Use a USB-hub when more than two 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

- The MPPTs need to run firmware version v1.09 or later. See the Victron Professional website https://professional.victronenergy.com/ to obtain files and for update instructions.
- An MPPT 70/15 needs to be from year/week 1308 or later. Earlier 70/15s are not compatible with the CCGX, 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 HQ**1309**DER4F means 2013, week 09.

1.4.3 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 CCGX an MPPT 150/70 needs run firmware v2.00 or newer.
2. You can combine a Skylla-i control panel with a CCGX.
3. You can combine a Ion Control panel with a CCGX.
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.

1.4.4 BMV-600 series

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

1.4.5 DC Link box

Connect the DC Link box, using the RJ-12 cable supplied. Then connect the BMV-700 to the CCGX - see **1.2.2** above for instructions.

1.2.6 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.

1.4.7 NMEA Tank senders from other manufacturers

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

- 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 CCGX - 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 CCGX, 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-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.

1.5 Measuring PV Inverter output

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.

There are several ways to get the system to show the output of a PV Inverter:

1. An AC Current Sensor, wired to the analog inputs of a Multi or Quattro provides the information at the lowest cost - though it is the least accurate. AC Current Sensor Manual.
2. Fronius PV Inverters can be read digitally via the local LAN. See the CCGX / Fronius manual.
3. SMA PV Inverters can be read digitally via the local LAN. See the CCGX / SMA manual.
4. Using a Victron Energy Meter, either wired to the CCGX, or connected wirelessly using our Zigbee to USB/RS485 interfaces. See the energy-meters.
5. By using Wireless AC sensors. See the Wireless AC Sensor manual.

1.6 Internet connectivity

Connect the CCGX to the internet to get all the advantages of the VRM Portal. The CCGX 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 CCGX to regularly check for a new firmware versions - which will be automatically downloaded and installed.

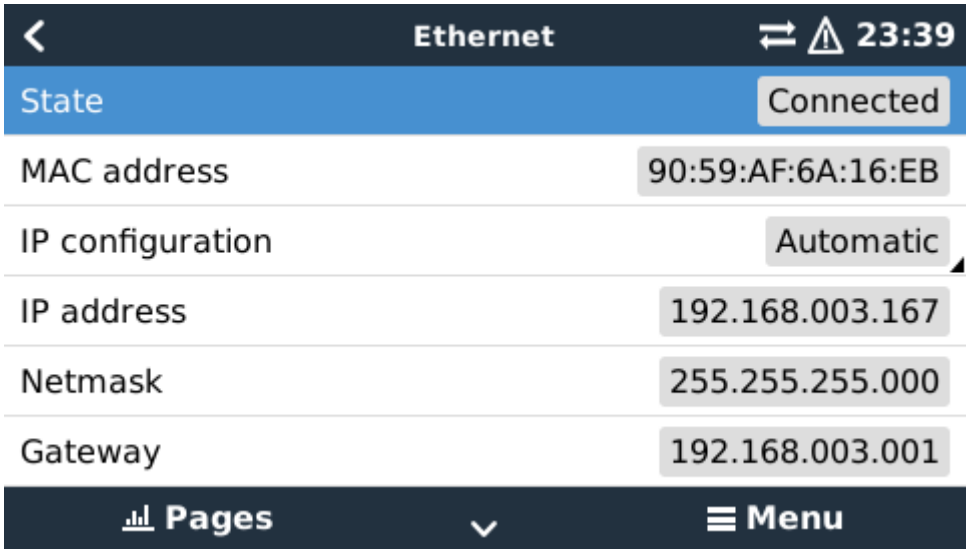
There are several ways to connect a CCGX to the internet:

- Run a network cable between a router and the CCGX Ethernet LAN port
- Connect to a router wirelessly using a USB Wi-Fi dongle plugged into the CCGX
- Via the mobile (cellular) network, using a 3G or 4G router
- GX GSM - a cellular USB modem
- USB Tethering on a mobile phone

The chapters below describe these options in detail.

1.6.1 Ethernet LAN port

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



1.6.2 Wi-Fi USB dongle

Using a Wi-Fi dongle 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:

- CCGX WiFi module simple (Nano USB), small, low cost. Victron part number BPP900100200
- Gembird WNP-UA-002, slightly higher cost and also better reception. Victron part number: BPP900200200
- Startech USB300WN2X2D
- Zyxel NWD2105

New model coming early 2019: Asus USB-N14, slightly higher cost and also better reception. Victron part number: BPP900200300. Requires a firmware version not released yet.

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 CCGX 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.

1.6.3 Mobile (cellular) network using a 3G or 4G router

To connect the CCGX to a mobile (cellular) network, such as a 3G or 4G network, use a cellular router.

Connect the CCGX 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 CCGX does not support USB 3G/4G dongles.

1.6.4 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:

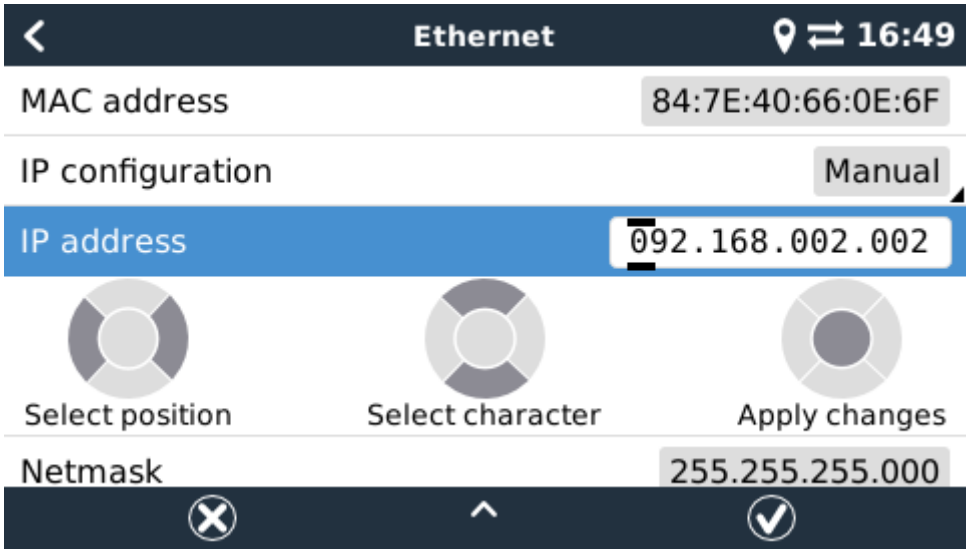
- Samsung Galaxy S4

...but not on:

- iPhone 5s with iOS 8.1.1

1.6.5 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 CCGX 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 CCGX.

1.6.6 Connecting both Ethernet and Wi-Fi (failover)

It is possible to connect the CCGX to both Ethernet and Wi-Fi. In this case, the CCGX 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 CCGX will automatically check again for active internet connections when something changes on the interfaces.

1.6.7 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 CCGX 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.

Note that CCGX versions prior to v1.18 will check for software updates daily even when auto-update is switched off. This was changed in v1.18. Disabling auto-update also disables the check - saving a lot of data.

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 CCGX 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.

1.6.8 More information about setting up an internet connection and VRM

- Setting up a VRM account
- Trouble shooting connectivity between the CCGX and the VRM Portal
- VRM Portal alarms and monitoring
- VRM Portal - Frequently asked questions

1.7 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 CCGX 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 CCGX 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 CCGX 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

1.8 Connecting a Fischer Panda Generator

See GX - Fischer Panda generators.

2 Configuration

2.1 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 CCGX:

Item	Default	Description
General		
Remote support	Off	Enable this to allow Victron engineers to access your system in case there is a problem.
Access level	User and installer	Set this to 'User' to prevent accidental and unwanted changes to the configuration.
Audible alarm	On	When there is an alarm on the CCGX or a connected product, the CCGX 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.
Firmware		
Online updates: Auto update	Check and update	We recommend the factory default. A reason to disable it would be to eliminate the risk of a firmware update causing problems.
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'.
Offline updates		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.
Date & time		
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.	

Item	Default	Description
Remote console		
Disable password check	Password authentication not required for remote consul access.	
Enable password check	Choose password to allow remote console access.	
Enable on VRM	No	Enabling on VRM will allow connection to the CCGX from anywhere via the VRM portal. Trouble shooting Remote Console on VRM
Enable on LAN	No	Enabling will allow direct connection to the CCGX by typing it's IP address into a web browser. Only Enable this function on trusted networks.
System setup		
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.
Battery monitor	Automatic	Select the SOC source. This function is useful where there is more than one BMV. More details.
Synchronize VE.Bus SOC with battery		Continuously copies the SOC from the battery monitor to the VE.Bus system. This feature is automatically enabled when the active SOC source is not a VE.Bus device, and there is no Hub-2 Assistant configured. The purpose of this is to be able to use the BMV SOC to trigger some Multi or Quattro features - such as Genset start/stop. Multis and Quattro's don't use the SOC for any other purpose. More information
Use solar charger current to improve VE.Bus SOC		Send the total charge current from all connected Solar chargers to the VE.Bus device to improve its SOC computations. This feature is automatically active when 'Synchronize VE.Bus SOC with battery' is not active. Requires Multi Firmware version >= 402. More information
Solar charger voltage control		Use the 'charge voltage' information provided by the VE.Bus device to control the amount of power fed from solar chargers back to the grid. Active if the ESS or Hub-1 assistant is present. (See also: '*Feed-in excess solar charger power*' in the ESS settings.)
Solar charger current control		Limit the charge current of the connected solar chargers if a CAN.bus BMS is present - using the *maximum charge current* information provided by the BMS.
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.
Display & language		
Brightness	Configure the brightness between 0 and 100%	
Display off time	Set time-to-off between 10s / 30s - 1m / 10m /30m - or never	
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 *On/Off/Charger-only* 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.
VRM online portal		
Log to	Internet	Choose between *no logging*, *logging via the internet* directly to the VRM Portal, and *logging to a microSD card or USB flash drive*. See chapter 2.2 below for more information.
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.
Wireless AC Sensors		
Select the position for each AC sensor (PV Inverter on AC-input 1, 2 or on AC-output). More information about the Wireless AC sensors.		
Energy meters		
Configure the Energy meters, used for one of three things: Measure the output of a PV Inverter Measure and regulate a Hub-4 system Measure and regulate a ESS system Measure the output of an AC Generator.		
ESS		
Configure Energy storage system (ESS) ESS system.		
Hub-4		
Configure Hub-4 system Hub-4 system.		
Ethernet		
Select the configuration type (DHCP vs. manual configuration) and IP settings.		
Wi-Fi		
Manage wireless networks and IP settings.		
GPS		
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.
Generator start/stop		

Item	Default	Description
Configure generator autostart settings and conditions. generator_start_stop		
Tank pump		
Configure automatic starting and stopping of pump based on tank level(sender) information. Pump auto start/stop with Color Control GX		
Relay		
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 CCGX. 'Normally open' or 'Normally closed'. (Note that setting it to normally closed increases the CCGX power draw.)
Services		
ModbusTCP	Off	This setting enables the ModbusTCP service. More information about ModbusTCP in this document: https://www.victronenergy.com/upload/documents/Whitepaper-Data-communication-with-Victron-Energy-products_EN.pdf
VRM two-way communication	No	Enable remote configuration and firmware updates. VE Power Setup manual

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 CCGX (and make it beep):

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

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

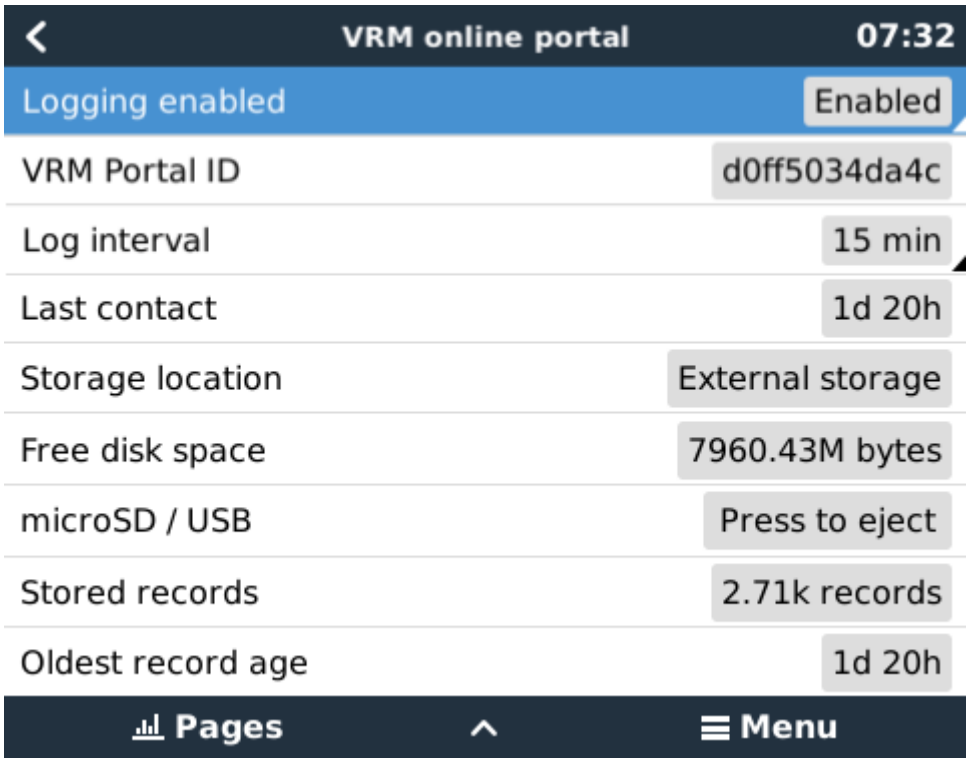
Click the thumbnail below to see the complete menu-tree:



2.2 Logging data for the VRM portal

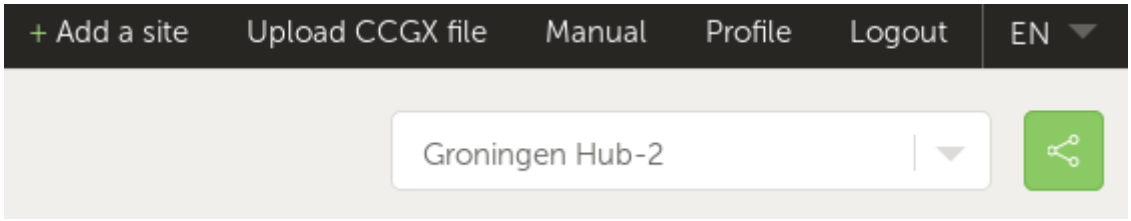
The CCGX can be used in combination with the Victron Remote Management (VRM) portal: The CCGX monitors all products connected to it and the VRM portal makes the statistics easily accessible.

Since version 1.40, dealing with an absent or intermittent internet connection has changed. Data is sent out via the Internet if it's available, and will fall back to non-volatile storage when there is a (temporary) Internet outage. The built-in non-volatile storage can contain 48 hours worth of data. To extend this period, one can insert an microSD card or USB stick, and the CCGX will automatically transfer any data that may reside on the internal storage to it, and will start using this external memory as backlog buffer. You can see that it's active in the settings menu:



When using this external memory, it will still make use of an active internet connection to send its backlog. That means that even with months worth of backlog, once the CCGX re-acquires an Internet connection, all of the backlog is sent out. And because of an enhanced algorithm, this takes considerably less time and traffic than before.

When a CCGX is permanently without Internet, one can choose to upload the backlog buffer manually. The first step is to use the GUI (Graphical User Interface) to eject the storage (don't just remove the SD-card/USB-stick). The storage device can then be removed from the CCGX and inserted into a computer or laptop, the data file on it can be uploaded on the VRM Portal with the 'Upload CCGX File' option:



It's important to know that when the microSD card or USB stick is re-inserted, the existing buffer - including its data - is used again. This allows for removing the microSD card temporarily for whatever reason, **but this also means that when the data file has been uploaded to VRM, it needs to be renamed or cleared from the microSD card / USB stick before re-inserting**, otherwise the data will be transmitted again, sooner or later, on-line or off-line.

Because of the aforementioned improvement in sending of backlog data, the data logging is also highly resillient to bad internet connections. Lines of up to 70% permenant packet loss are still sufficient to get the data out, albeit somewhat delayed.

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. This is due to the nature of Sqlite files. Removing data from the Sqlite database doesn't free-up usable disk space; and because of internal fragmentation, it doesn't guarantee more data storage.

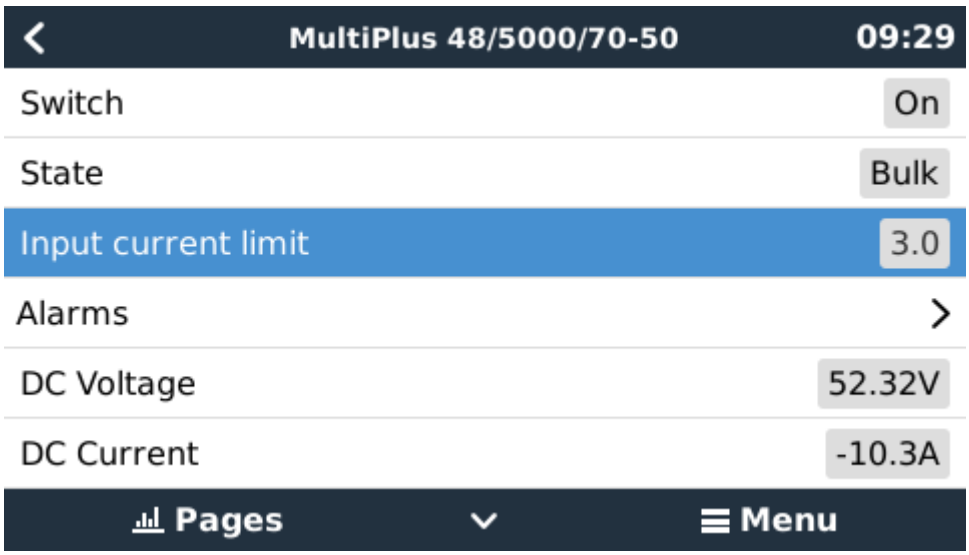
If both a microSD card and a USB flash drive are connected to the CCGX, then data is logged to the one that was inserted first. If one is removed, the CCGX will not try to write to the other, but will create an internal backlog buffer until a new storage medium is inserted when it will use that storage medium.

- 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 CCGX without reformatting and possibly re-partitioning.

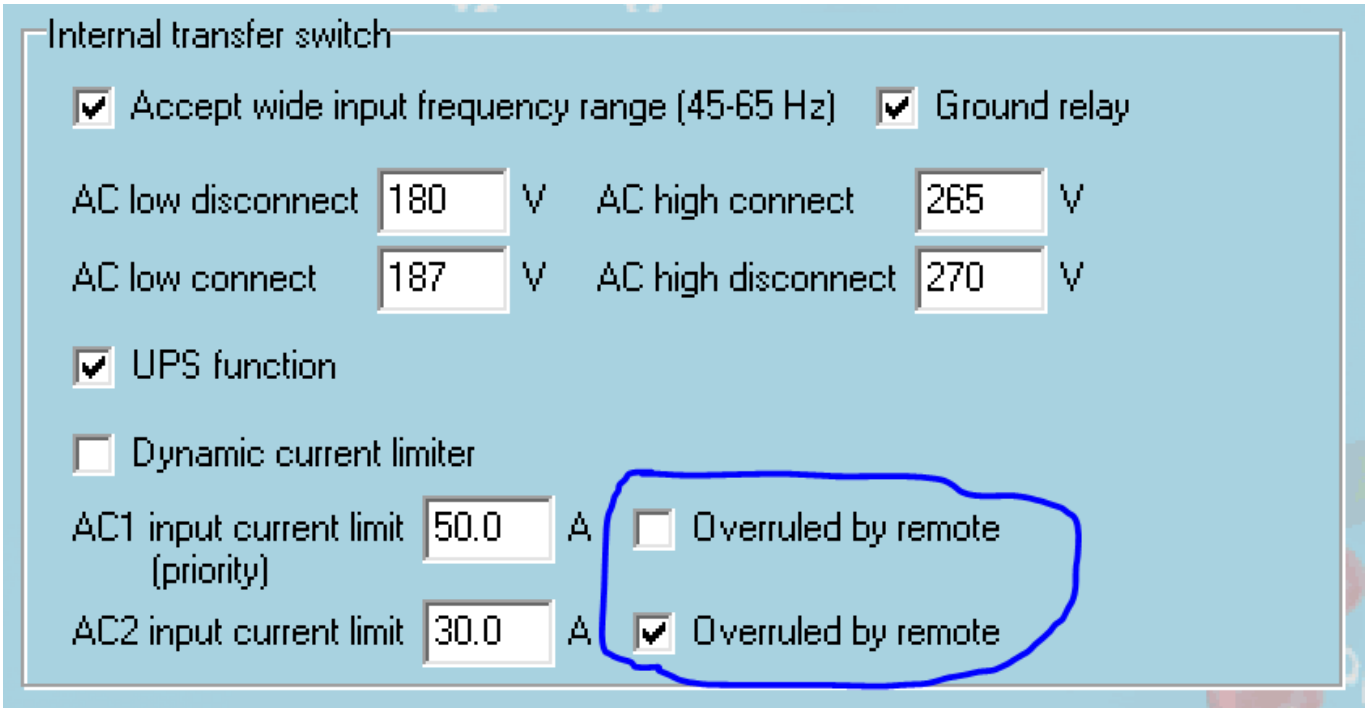
2.3 Using the Multi and Quattro input current-limiter setting

'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 CCGX will be applied to all inputs where 'Overruled by remote', configured with 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.)

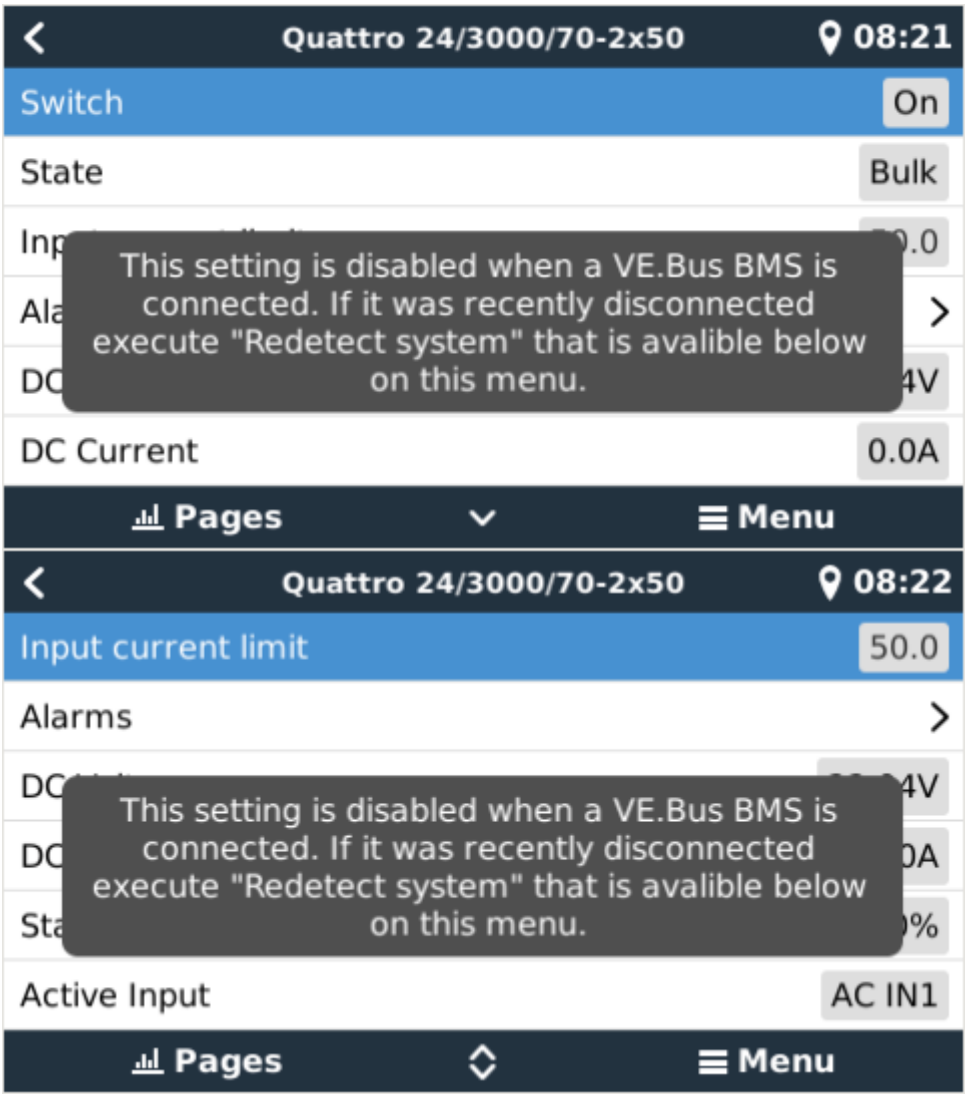
Configure the system exactly as in above VEConfigure screenshot. Input 1 has priority over input 2, therefore the system will automatically connect to the genset whenever it is running. The fixed input current limit of 50A will be applied. And when the genset is not available, and mains is available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

Two more examples: (In both cases if you *disable* 'Overrule by remote', setting a current limit in the CCGX will have no effect. And if you *enable* 'Overrule by remote' for both inputs, the current limit set in the CCGX 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 CCGX 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 CCGX 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 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 input limit is the total limit *per phase*.

2.4 Battery State of Charge (SOC)

2.4.1 Which device should I use for SOC calculation?

There are three products types that calculate State Of Charge (SOC). The CCGX 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 CAN bus) connection to the CCGX.

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 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.

If the systems consists of an inverter/charger, MPPTs and a Venus-device, then there is still no need to add a dedicated battery monitor.

For any other system types, such as a boat or vehicle with DC lights and other loads, a dedicated battery monitor will be required.

2.4.2 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 CCGX, 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 CCGX built-in

No battery monitor is required, as long as all MPPT Solar Chargers are *Victron* products and are connected to the CCGX. The CCGX 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 CCGX, 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 CCGX (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 CCGX according to the instructions.
2. In the CCGX, 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

Configuration:

1. Configure all BMV parameters (see BMV documentation)
2. In the CCGX, in Settings → System setup, verify the selected Battery Monitor. It should be the BMV Battery Monitor.

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.

2.4.3 Notes

- 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.
- For hub-2 installations we recommend you do **not** add a BMV to the system as it will only confuse the user when there are two SOCs with different readings being displayed.

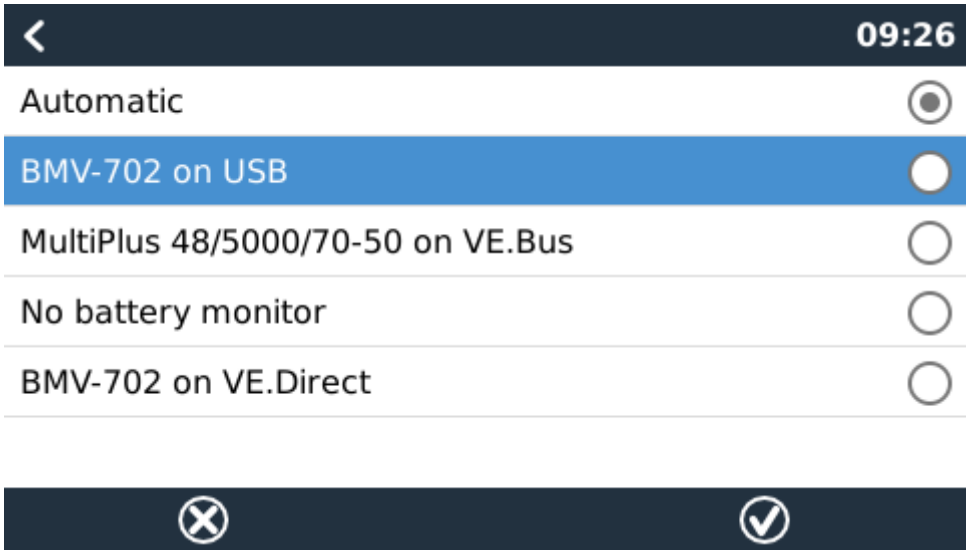
More information:

- VRM Portal FAQ - difference between BMV SOC and VE.Bus SOC
- CCGX Manual - configurable parameters. See Battery Monitor selection and Has DC System.

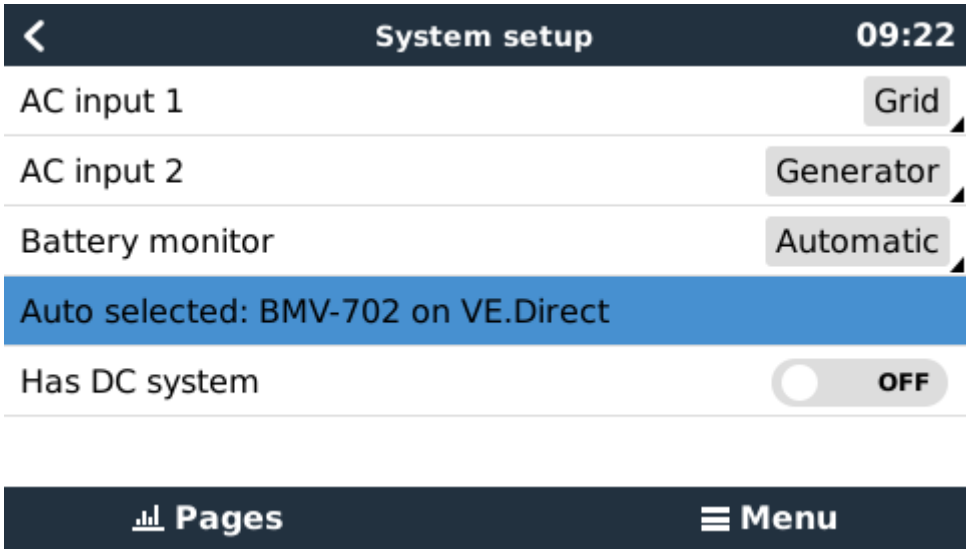
2.4.4 Selecting SOC source

(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 CCGX.



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 CCGX.

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.

2.4.5 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%.

2.5 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://[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 VENUS device.

3 DVCC - Distributed Voltage and Current Control

3.1 Introduction and requirements

With DVCC enabled, the Venus-device takes a more central role in the Victron system, improving and changing system behaviour. DVCC allows you to set a maximum charge current setting that applies to the whole system.

For example, an Off-grid system with MPPTs, Multis and a diesel generator. The MPPTs are sized and configured such that they charge the battery with the maximum allowed charge current. If the genset starts while there are no AC loads, with DVCC enabled, the Multi will be limited and prioritise the

MPPTs. Without DVCC, the Multi would also start charging with its maximum configured charge current.

This system is also used to apply the various charge and discharge current limits for various CAN-bus BMS connected batteries.

Enabling and disabling DVCC:

- Go to Settings → System Setup

Required minimum firmware versions:

- Multi/Quattro: 422
- CCGX / Venus 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

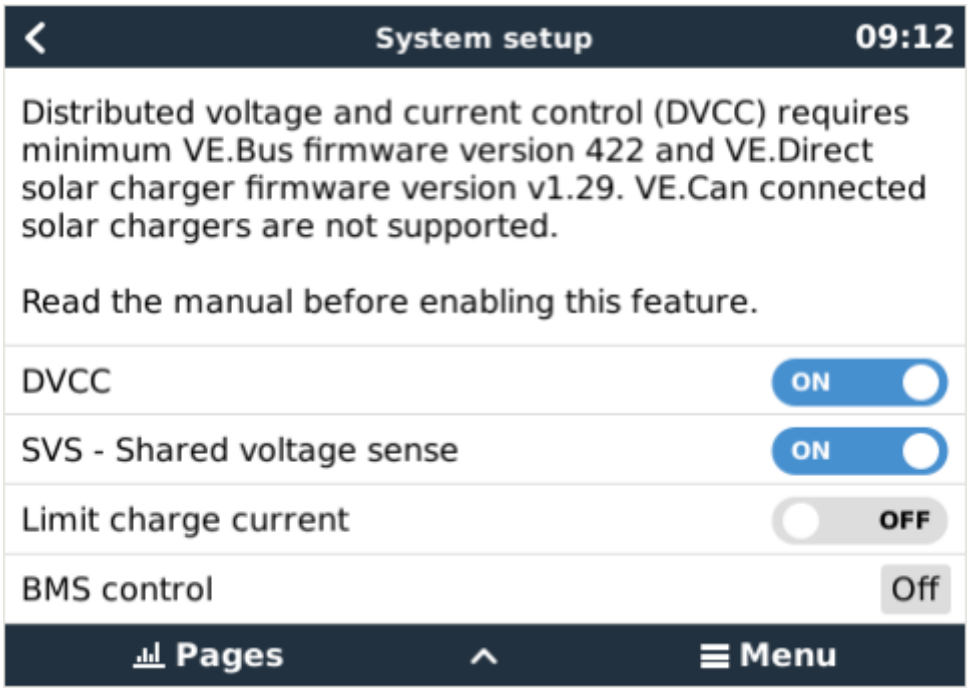
In case of an ESS System, the ESS Assistant needs to be version 164 or later (Released in November 2017).

In case of installing a MultiGrid 48/3000 the firmware needs to be version 424 or later.

Do not use DVCC in cases where these requirements are not met.

Important: Where batteries are connected via CAN-bus, check the relevant page on the Battery Compatibility manual to see if enabling DVCC has been tested with your battery-type, and is OK. 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.



3.2 Generic features

Below features apply to all types of systems when DVCC is enabled: Offgrid, Backup, ESS, marine and others. And applies to all types of batteries: lead batteries as well as lithium batteries, both with and without a CAN-bus BMS connected to the Victron system.

- A user-configurable maximum charge current setting. It works across the whole system. MPPTs are automatically prioritized over the mains/generator. In case 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. This setting is available in the “Settings → “System Setup” menu on the Venus-device.
- Shared voltage sense (SVS) for 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.

3.3 Features for systems using a CAN-bus BMS systems

These features apply to all types of systems (ESS and not ESS), that have a CAN-bus BMS connected battery.

- CAN-bus BMS control is no longer tied into ESS. It now works for other systems as well, including Off-grid and plain backup systems. It is not longer necessary to wire allow-to-charge and allow-to-discharge connections to the AUX inputs on a Multi or a Quattro.
- VE.Direct MPPT Solar Chargers are now also controlled with the max charge current, just like Multis and Quattros already were.
- 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

BMS increases the max discharge current again.
- New for Off-grid systems only (for ESS systems this was already happening): setting up charge voltages in VEConfigure is no longer necessary: the Multis, Quattros and also MPPT Solar Chargers will charge with the voltage as received via CAN-bus from the battery.

3.4 Features for ESS

- Fix keep batteries charged.
- Change the solar offset from a variable 2V to a fixed 0.4V. These values are for 48V systems, divide by 4 for 12V. This fixes over voltage warnings and shut-downs as seen on several systems with CAN-bus BMSes. Note that this solar offset is only used by the system 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: SOC is low
  - #2: BatteryLife is active
  - #3: BMS disabled charging
  - #4: BMS disabled discharge
  - #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.

4 More information resources

- CCGX Genset start/stop
- CCGX Frequently asked questions
- CCGX Firmware upgrade to v2.00 or later
- CCGX Manually updating firmware
- CCGX Remote VEConfigure and remote firmware updates
- CCGX Datasheet
- CCGX & Fischer Panda generators
- VRM Portal
- VRM Portal - trouble shooting Remote Console
- Venus OS - Beta testing
- Open source

DISQUS

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