

DPA SOLAR

Help Sheet & FAQ for new Victron Users

V10- April 2023



victron energy
BLUE POWER



DPA Solar

DPA's Help Sheet & FAQ for New Victron Users V9

- Note 1: [Victron's website](#) is a well laid out resource of manuals and information
- Note 2: Do not attempt to sell or install equipment without reading manuals
- Note 3: Read this document before calling DPA Solar for programming assistance

Introduction

This guide has been prepared by DPA Solar to assist qualified off grid installers new to Victron and adds a few pieces of wisdom picked up that may come in handy. We suggest you quickly scan this document before coming back to open the Victron links and watch selected videos etc. This guide uses information from Victron's website and does not replace the need to access key Victron materials and manuals which are updated regularly, so please use this live document (with useful links). This is a quick reference guide only so please refer to actual Victron guides for confirmation because Victron manuals will always be more up to date.

Feedback on this guide is welcomed as we are keen to fix errors/omissions and include updates. Send your feedback to support@dpasolar.com.au

Terminology

- ON GRID: or ESS, (Energy Storage System) refers to ON GRID applications with batteries.
- OFF GRID: This is often referred to as Micro Grid (MG). For Australia use MG50 in Fronius for 50 Hz.
- Assistants – small applications that can be enabled in the Multi/Quattro – see below
- Shore – because Victron equipment was developed in a marine environment, shore means grid.
- VE.Bus - when two or more Multi's are connected, this is a VE.Bus system and an RJ45 cable, (e.g CAT5) is used .
- Venus device – Any device which runs the Venus OS such as Color Control GX (CCGX), Venus GX, others coming.
- Multi – is the short name for all inverter-chargers, whether the model is a MultiPlus, a Quattro, or an Easy Solar.
- DVCC- Distributed Voltage and Current Control ([details in the link](#)).
- "AS PER ANY BATTERY MANUFACTURES REQUIREMENTS."
- LBCO- LOW BATTERY CUT OFF

Passwords

- Victron reminds you that there is a manual link on each of the products' specific pages.
- For a password to de-select a country code if needed and contact DPA Solar for the password.
- Passwords for Victron smartphone apps (iPhone or Galaxy) set up are sometimes on screen or try 000000 (6 zeros), and VictronConnect is ZZZ upper or lower case.

- The Fronius default WiFi password is 12345678 and other passwords has been reported from the field is **73887**.

What are Assistants?

‘Assistants’ are little applications that run inside a VE.Bus Multi/Quattro. They are needed for AC coupling, grid-connect ESS systems and for advanced configuration which can replace external PLC (Programmable Logic Controller) control of load shedding, optimising use of solar energy, opening, closing, locking relays and more. Look at these links for more information: [here](#) and [here](#). Victron reminds you that there is a manual link on each of the products’ specific pages and if needed. Instructions on how to use each Assistant are contained within the Assistant itself and should be read carefully

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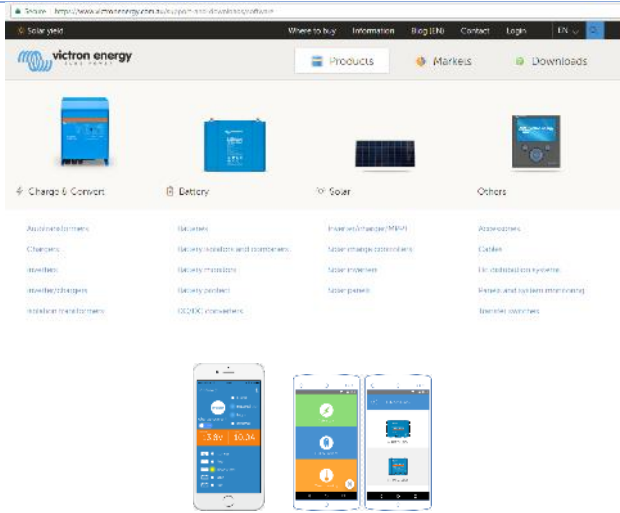
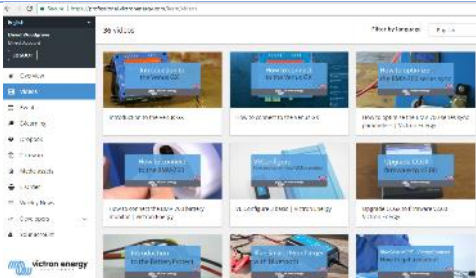
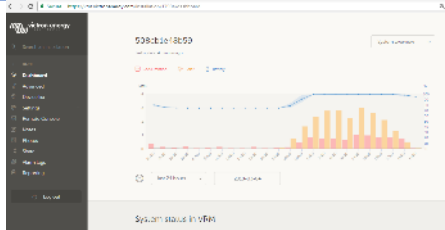

1 COMMISSIONING - STEPS & SEQUENCE

This is DPA's suggested sequence for programming equipment for a Victron install. It is recommended that installers do most of this in the workshop before taking the gear to site. These notes assume the reader is a trained electrician who would follow all the relevant AS/NZS standards, safety methods and has completed battery training and off grid courses.

- A. In your workshop** – connect DC cables, comms etc and check each item can be powered up. Have all the kit on the bench, or build the system on the black builder's board.
- B. GX devices** - If there is a GX device, eg -Color Control or Cerbo, or Multiplus-II GX,
 - Connect all cables and check all items appear on the Device List
 - Set up VRM remote monitoring as per steps in the VRM section below.
 - If an Easy-II GX or Multi-II GX see section 4.2 (Page#) in doc below for Video etc.
 - Link device to the internet via modem etc to get ready to set up the VRM monitoring section 4.2 (Page #)
 - Set generator start/stop parameters.
 - Ensure BYD/Pylontech or other managed battery is communicating and on device list.
 - Enable DVCC* if appropriate and set Max charge current.
- C. Programming the MPPTs** – see section below on Programming MPPTs.
 - Pair with Victron connect app on your smart phone and update firmware.
 - Set battery charging parameters, absorption, float, charge current, etc.
- D. Programming the Multiplus** – see summarized section below:
 - Connect with MK3 to laptop, VictronConnect or VE Config, it is recommended to always start with checking for firmware update.
 - Set specific battery charging parameters, LBCO, battery monitor settings
 - Set site specific settings, generator settings,
 - Set up Assistants, PV Support etc for frequency shifting AC coupled PV inverters
- E. AC Coupled Inverters** - Set up the Fronius AC coupled inverter – Set to MG50 if off grid.
- F. At Site** – complete final settings and installation. Check all commissioning steps
- G. 12 Month Maintenance Plan** – see section 9 (Page#) below and sell this to the homeowner

2 Victron Resources – one page summary

Resource documents for all major inverter brands can be found on DPA's website / resources tab.

<p>WEBSITE – Victronenergy.com.au</p> 	<p>Use the .com.au site</p> <p>Or you can use simple Google searches</p> <p>Sitemap is at the bottom of the webpage:</p> <ul style="list-style-type: none"> Products - All product lists - data Downloads take you to: <ul style="list-style-type: none"> -Software/etc/etc -Manuals/Guides – Q & A pages -White papers on tech topics -VE Configure/VE Flash/VE Bus Configure etc -VE Power – remotely update VE Config settings - System schematics Great tech info FAQ's <p>See list at Downloads tab at the main website</p> <ul style="list-style-type: none"> - Victron Connect – Bluetooth dongle/MPPTs, chargers - Victron Toolkit – shows LED combinations
<p>Victron Professional</p> 	<p>Create login & password –register,note your p'word</p> <ul style="list-style-type: none"> Firmware Dropbox – firmware E-Learning Centre – maximising life of lead-acid Videos – links to YouTube instructional videos Media Assets E-ordering News – product updates
<p>VRM Victron Remote Monitoring</p> 	<p>Create login & password –register, note your p'word</p> <ul style="list-style-type: none"> Access data from all your sites See live data Control via Remote Monitoring Use widgets to display detailed info
<p>Victron Community</p> 	<p>Question and Answer site</p> <p>View discussions or enter your own questions</p>

3 Design – things to consider when you're starting out.

Installers must still read the manuals for each Victron product available on product pages. All the resources below are found at either Victron Professional, VRM Victron Remote Monitoring or their main website VictronEnergy.

DPA recommends you check local electrical regulations and seek approval of your design from your electrician and inspectors before confirming design and pricing to your customers. This may avoid non-compliant design issues post install.

Detailed information can be found here (most of these are on Victron's' Downloads tab):

- Victron's easy to use manuals are [Here](#) and more in the [Downloads](#) tab.
- Victron's MPPT Calculator Excel [LINK](#) Sheet
- Victron's software tools are [Here](#)

Victron strongly advises all installers register on [Victron Professional](#) as "installer", then you get full benefits and are notified of training events, as well as having access to videos, firmware etc and updates to your drop-box. There is no substitute for actual training!

One VE Direct Bluetooth smart dongle for your toolbox to program MPPT's. Part no.: ASS030536011 IN-V-VEDirect Victron. \$62 ex



Or, for computers and Android phones with USB OTG, use a VE.Direct to -USB interface

For your installs you will need to supply yourself OR you can buy the bottom two items from us,

- A WIFI dongle or WIFI connector if you need to connect to Fronius or internet without a cable.
- One std CAT 5 cable to connect the Color Control (CCGX) to the MultiPlus and to plug into the Mk3 for programming



AND GSM LTE 4G-SA (AU/NZ) – a new [GSM Modem](#) - Video, Needs a Mini-SIM format card.

3.1 M.E.N. Considerations -

Error Codes shown by flashing LEDS on Multi related to MEN issues is typically Error 11 see link for codes https://www.victronenergy.com/live/ve.bus:ve.bus_error_codes

3.2 Sizing an Inverter

See this video for sizing inverters and overload

<https://www.youtube.com/watch?v=4SxtGlX0x5w>

Video tips – single phase motors can take 6 time power rating to start it up. Allow for this in sizing

VIDEOS – TUTORIALS <https://professional.victronenergy.com/learn/videos>

3.3 Energy Meters or Current Meter

If your grid-connect site needs a Victron Energy Meter (ET112 or ET340 etc) you will need a way of connecting it to the Color Control (CCGX). Read the Energy Meter guide which shows the two options: either 1. Via a USB to RS485 cable connection which you will need to purchase separately from the Meter, or 2. With two Zigbee units which come with cables that connect to the ET meter and to the color control. For the MultiPlus-II, a lower cost Current Meter can be purchased.

Set up energy meters as per the manual [.pdf Link here](#)

4 Set up sequence

4.1 WORKSHOP SET UP

In your workshop, either on your bench, or on a pre-built board (photo below) check then connect up the DC cables and battery bank, and power each item up to check if its operational and can be programmed. AC input can be used for Multiplus/Quattros if batt bank is not available.



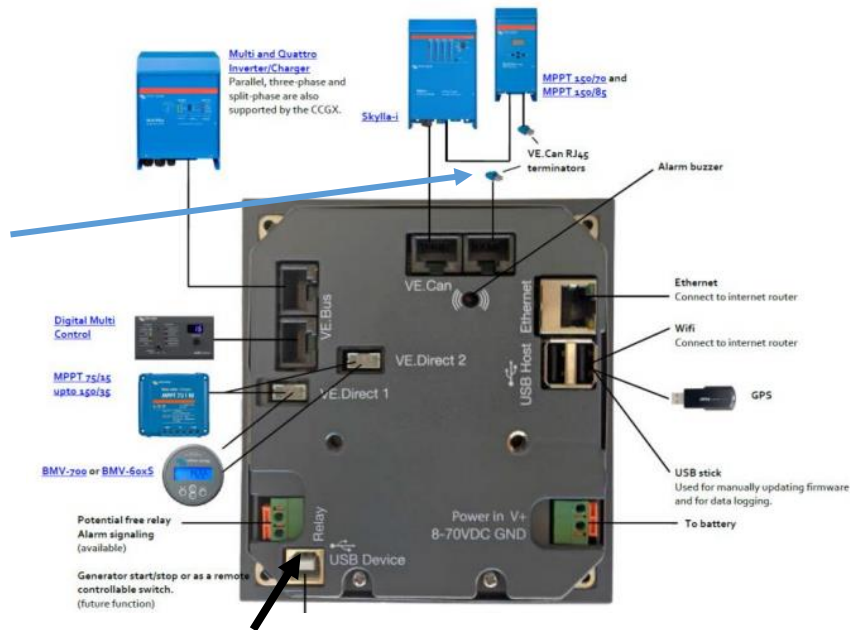
4.2 GX DEVICE – COLOR CONTROL GX / CERBO GX, etc

Images below will help to work out which cables need to be ordered when using the CCGX.



View of rear of the Color Control CGGX

Supply these RJ 45 cables yourself, use industrial quality or buy from DPA, high quality in various lengths



DO NOT USE USB DEVICE PORT

CERBO GX - The Cerbo GX and Touch displays can also be used as an alternative to the Color Control GX



CABLES TO ORDER	Part no	HOW MANY DO YOU NEED?
VE –VE Direct (only 2 ports available) 	IN-V-VED1.8 ASS030531218	 Purchase one cable if you buy a BMV Battery Monitor.  Purchase one cable for each MPPT you buy (note: the CCGX can only take two of these cables)
VE to USB (dual port will only fit one) 	IN-V-VEDUSB ASS030530010	If you have three of the above (BMV and MPPT's), you can buy one VE to USB cables for the third unit.
USB HUB 	Supply yourself if needed	Once you have more than three of the above items (BMV's or MPPT's) you will then need to supply your own powered USB Hub, and buy extra VE to USB cables from DPA.
USB Extension cable 0.3m with right Angle plug. Two can fit in back of CCGX	ASS060000100	

Updating Firmware from older than V2: if it is an earlier version, you will need a micro SD card to update the firmware to the latest version. If it has V2.0 firmware updates can be done over the internet once it is online. **Note – on the CCGX in settings, set update firmware to AUTO if you want auto updates.** If older than V2.0, this video will show you how to update firmware with a Micro SD card in the CCGX [Here](#)

Set the generator start stop parameters. (Set Relay to Generator first)

VRM Victron Remote Monitoring

VRM offers detailed site data analysis from the comfort of your office. If the site has no internet connection but has 3G coverage, read section 1.6.3 and 1.6.4 of the CCGX Manual [LINK](#) here. In December 2018, Victron released the GX GSM unit for victron \$265 ex. GST that may suit some sites. See below for normal internet connection.

STEP 1.0 - CREATE A VRM ACCOUNT

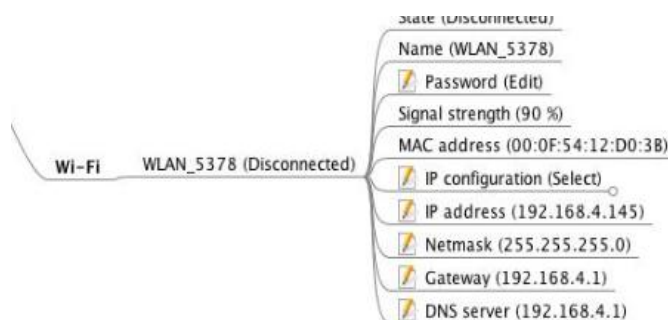
The first section of this guide has links to Victron resource page in the first section of this document has a link to VRM – go to that webpage and create an installer account.

STEP 2.0 – CONNECT THE COLOR CONTROL TO AN INTERNET ROUTER

Either use a cable from the CCGX Ethernet port to your web router, or via one of the USB ports with a wifi connection.

Wifi Connection (if using WIFI)

Go to WIFI menu in the color control and select WIFI and it will scan WIFI and you enter password



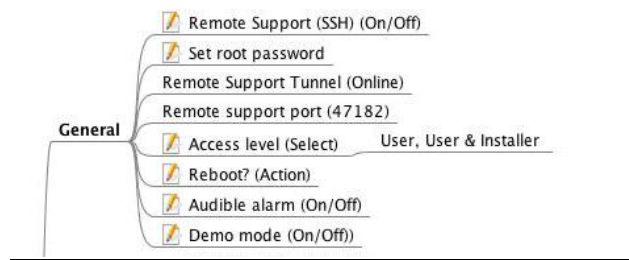
STEP 3.0 - COLOR CONTROL SETTINGS – BELOW

This is a link to the color control menu structure. You could set this as a favourite on your laptop because it's very useful.

[https://www.victronenergy.com/live/ media/ccgx:menustructure_ccgx.jpeg](https://www.victronenergy.com/live/media/ccgx:menustructure_ccgx.jpeg)

The color control manual [HERE](#) has instructions on how to set up the color control but below is a snip for all of the main 5 settings in the sequence to set up VRM, as you scroll down the color control menus.

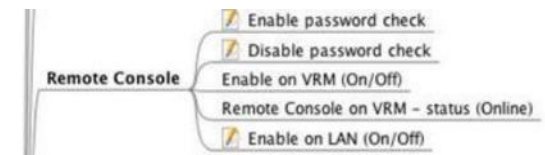
REMOTE SUPPORT – Turn Remote Support ON , (below)



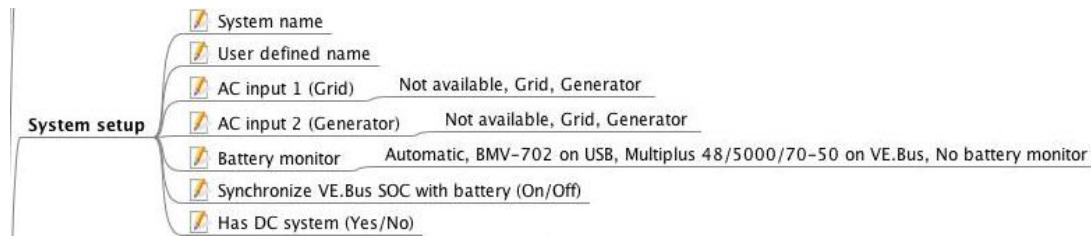
ENABLE VRM - ON (below)

DISABLE PASSWORD CHECK (this will ask you to reboot the CCGX once completed. Do this in the General Menu last.

REMOTE CONSOLE ON VRM - ON



SYSTEM NAME – you can set up a system name once VRM is live. (below)

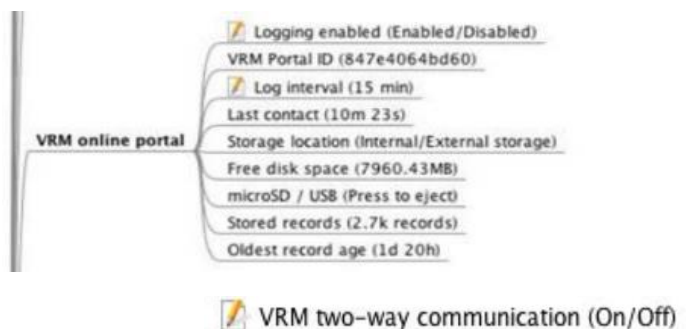


LOG ENABLED - Enable (below)

VRM PORTAL ID – Make a note of the VRM portal ID – or take a photo on your phone. Either this digit string or your site name will appear on VRM. You can always rename each site on VRM at first log in or at Settings/General

LOG INTERVAL - Interval – 15 mins is ok but 1 min is better if you want granularity

VRM TWO WAY COMMUNICATION - ON_ with newer firmware this is in this menu.



Open VRM on your laptop and enter the site Portal ID, you should be able to see the information from the site. You can change the name of the site at VRM on first log in or later under Settings/General

Venus GX

The Venus GX is a lower cost version of the CCGX, has extra features.

See these videos from Victron Professional library: Basic intro [here](#)

How to connect [here](#)

MULTIPLUS-II GX OR EASYSOLAR-II GX

Two options to set up the GX settings:

1. [4. Accessing the GX device](#)
2. Watch this video, if selecting VRM option, you will need to have VRM installed on your phone <https://youtu.be/aKJMXxRikG0> You need to find the QR Code under the Multi GX .

4.1. Accessing via the built-in WiFi Access Point

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

Steps to Connect Automatically via the QR Code:

1. Locate the QR code sticker on the side of the VGX
2. Scan the QR code using your phone's camera function, or a QR code scanning app.
3. If supported by your phone, this will prompt you to connect you to the WiFi Access point.
4. Once connected, open VictronConnect
5. Select the GX device from the list
6. Open the Remote Console

Steps to Manually Connect:

1. Stand as close as possible from the Venus GX, and no further than a few meters away.
2. Go to the WiFi settings on your phone / tablet / laptop.
3. After searching, the Venus 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.
5. Open VictronConnect, 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.



4.3 PROGRAMMING MPPT's, BMV's

MPPT's, BMV Battery Monitors and other VE.Direct devices

VictronConnect is a smart phone/Android APP. Download to [VICTRONCONNECT](#) your phone to configure, monitor and diagnose all products that have Bluetooth capability or even built-in, (these have "Smart" in their name, e.g. Blue Smart MPPT 250/100). VictronConnect will also update firmware automatically. Link: [here](#) and Video.

PIN CODE is 000000 (6 times zero)

For Bluetooth compatible units without built-in Bluetooth, you will need a victron dongle cables for programming charge controllers with the VE direct port. When connected to your phone, allow firmware upgrades when prompted. These may take several minutes. ENSURE YOU UPDATE FIRMWARE WHEN YOU INSTALL NEW EQUIPMENT

BMV Battery Monitors

Watch the two videos to show how to install and set up the BMV700 or BMV702 [here](#)
<https://www.youtube.com/watch?v=4ReljfO3k6M> Best video for settings for accurate SoC

- BMV 700 - single input for voltage only
- BMV 702 - two inputs, one for voltage one spare for midpoint v or battery temp -need to buy temp sensor
- BMV 712 - same as 702 but with inbuilt Victronh

4.4 PREPARATION BEFORE PROGRAMMING Multi's & Quattro's

Why do I need to update the firmware? (Note: You can now update firmware easily with VictronConnect on your laptop!!)

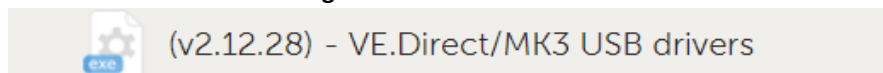
Inverter-chargers can be configured and installed in standard or 3-phase/parallel systems. It is good practice to update firmware to the latest version before programming. Victron

recommends you update firmware of the Color Control as it is software based and features are added regularly.

Multis/Quattros, (inverter/chargers), Easy Solar (inverter/charger + MPPT solar chargers) etc.

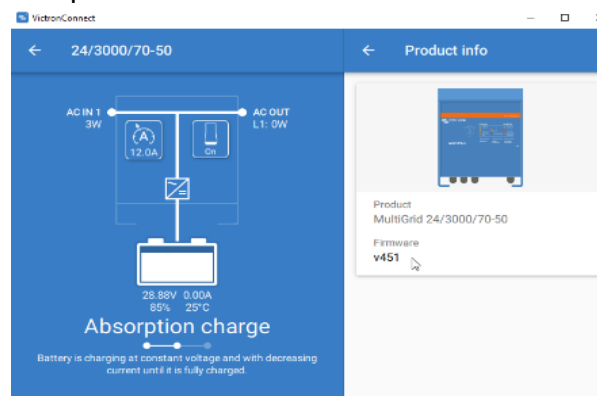
Download the easy-to-read User Manuals/Documentation for each software tool – see link below. Installers should download [Victron Configuration Tools](#) software programs on their laptop/PC. It is highly recommended that you program your systems in your workshop (not at site) with internet access so that drivers for your computer for the Mk3 interface cable/unit can also be installed automatically.

NOTE: you may need to go to the [MK3 driver download link](#) in the [Victron downloads tab](#) if you have trouble using the MK3 for the first time.

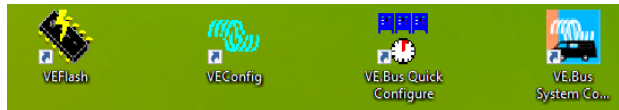


VICTRON CONNECT – for your laptop / tab / product info/ firmware – update firmware – its that easy! Ask DPA for the Password

Previously when updating firmware, the VE FLASH software was required which took many steps. You can now just use the MK3 and download VictronConnect for your laptop. Follow the steps to update the firmware. This saves around 20 minutes.



When you download [‘VE Configuration Tools’](#) software and Victron Connect it will include the items below



- VE Flash - no longer needed, use VictronConnect for firmware updates.
- VE Configure 3 - is for programming **single inverters** [Link To Manual here](#) (for Assistants)
- VE.Bus Quick Configure - is for programming **up to 3 inverters**
- VE.Bus System Configurator - is for programming **more than 3 inverters**

Below are videos and manuals for the software tools and for setting up configuration on inverters. ALWAYS REFER TO PRODCUT MANUALS

To try out the Configure software with no equipment, you can 'Select Fake Targets' under the Port Selection tab and practice with the software). Right click on a setting to see the relevant help page. We also recommended you become familiar with single unit systems before attempting multiple unit (VE.Bus) systems.

Multiplus and Quattro's

- [Video \(short\) VE Configure3](#) you can also now use VictronConnect for most basic setting (not Assistants)
- [Video \(long\) explaining a range of Victron installations.](#) Covers Energy storage ESS with and w/o meter
- [Manual VE Configure:](#)
- [Manual VE Quick Configure:](#)

Battery specs – obtain the charging details, absorption, float, Ah etc details from the manufacturer's specifications.

4.5 PROGRAMMING MULTIS & QUATTROS

Generator

- For Generator Start-Stop Assistant – follow the instructions this [link](#). And for more [reading](#):
- As per P15 of the user manual, if there are issues with the generator syncing, a common fix is to turn off the UPS setting in VE Configure under Grid tab.
- When setting country code, if off-grid – don't select a country. See Password section above if needed.
- See this [FAQ](#) if you're having issues with the gen set connecting

Battery Charging and SOC through BMV

You must read the battery manufactures manual and specifications because THIS IS CRITICAL to program the correct settings so your battery is charged and discharged correctly. No matter which batteries you're using you must ask the supply company for specific install guides for that brand and chemistry of battery.

- Video for accurate SoC on BMV [here](#)
- Video Basic set up for BMV [here](#)

Conduct all normal testing and commissioning as per off-grid procedures before leaving site.

EASYSOLAR & MULTIs – Improved SOC reading.

1.0 Problem Description

Several installers have reported that with a non-managed battery, they experienced the state of charge only coming up to a certain level (85% in one case) and never showing a higher SoC.

All other parts of the system appears to be operating normally.

2.0 Root Cause

The root cause is this: The VE.BUS SoC (i.e. SOC as measured by the Multi) is synchronised not at 100%, but at the end of the bulk phase. The level is set under the battery monitor tab in VE Configure, default is 85%.

In order to increase SoC beyond that level the Multi must “know” that bulk has been reached, which it knows from the voltage measured at its terminals. (voltage drop in cables can be the reason different voltages are read at different locations)

1. When an AC generator connected to the Multi is the charge source, this happens automatically
2. When an MPPT is the charge source, there are two requirements:
 - (a) There is a Venus device in the system. The setting “Use solar charger current to improve VE.Bus SOC” will default to ON.
 - (b) The absorption voltage (i.e. at end of the bulk phase) at the Multi terminals is equal or slightly higher than the absorption voltage set in the Multi

3.0 Three of the many possible solutions

A – When there is no Venus device, install a Battery Monitor BMV

B – Where there is a Venus device either:

1. Install a Battery Monitor. When connected to the Venus device, the setting “Synchronise VE.Bus SOC with Battery” will default to ON.
2. Or, Adjust the absorption settings in the MPPT and/or the Multi so the absorption voltage from the MPPT, as measured by the Multi terminals is slightly higher than the Multi absorption setting.

As a rough guide for a 48V system, setting 1V higher in the MPPT and 1V lower in the Multi should be sufficient. Whether less or more will depend on the cable losses in the system and whether or not voltage sensing is used to compensate for wiring losses. The only way to know for sure is to measure voltage at the Multi terminals when the MPPT is in absorption. (feedback from one installer was 0.2 of a volt difference was enough for that config).

C – If voltage sensing is used on the Multi or the MPPT, then a smaller differential will be required. On both, it will be smaller again.

With a (*compatible 150*) Smart Solar MPPT, voltage sensing is done with the [Smart Temp/Volt Sense](#).

With a Multi, voltage sensing can be done either with two wires to the V-sense input of the Multi OR a VE.Bus Smart Dongle

An untested work around would be to run two wires directly from the MPPT output to the V-sense input of the Multi. In that case, there is no compensation for actual losses to the battery

NOTE: Once the changes are made and if the SoC increases correctly above the 85% BUT does not go all the way to 100%, increase the 85% to a higher level. Generally, a fast charge rate requires a lower setting and a slow charge rate requires a higher setting.

4.6 SETTING UP FRONIUS & AC COUPLED PV INVERTERS

AC Coupling

For off grid – If you are AC coupling Fronius or other approved Inverters then read manual [here](#) which covers MG50 firmware:

- See this link for [PV Inverter Support](#) which will describe how to install this Assistant
- To link Fronius AC couple to CCGX and set up look at the [Victron Fronius CCGX](#) manual. It MUST be set up correctly!
- The Fronius default WiFi password is 12345678 and video at [link](#)
- Fronius firmware upgrade how to video at this [link](#) from the people at Gold Coast Solar Power Solutions
- Check [here](#) for minimum firmware eg Fronius Primo (1~, 3 kW up to 8.2 kW) → Software *fro27140.upd* or higher

Connection to the router at the site can be hard wired or plug in a USB WiFi dongle into the CCGX and go to Settings, WiFi and set it to link to the Fronius. In the settings in the Fronius inverter – after language and country settings (Aust), you need to set MG50 (microgrid 50Hz) for off-grid. You may need to contact Fronius tech support (above) to ask for a password to get to this setting. (or try the one in the password section above).

In Fronius GEN24 devices with software version 1.14 or higher, the Solar API interface is not activated by default and must be activated if required (e.g. integration of a GX device). The setting for this can be found on the user interface of the Fronius inverter under "Communication" - "Solar API". This used to be a physical toggle switch, and is still described as such in the Victron Fronius integration documentation.

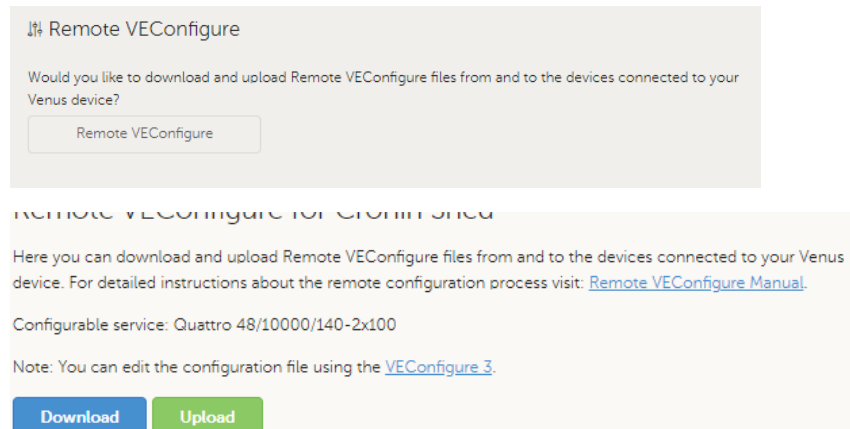
5 FINE TUNING

After the system is commissioned and operating, there will be settings that need to be fine-tuned. Watch the system operate on VRM over the period of a few days to ensure it is operating as expected. You can make changes remotely on VRM through the Color Control or via Remote VE Config. See below.

6 VRM VICTRON REMOTE MONITORING - CONFIGURE SETTINGS

Remote VE Config changes was done with VE Power (down loadable from main website/downloads tab), but is now much more easily done via VRM portal.

[MANUAL](#) Pathway – VRM website portal / select site / Device list / Remote VE Configure



7 FAULT CODES AND NOTIFICATIONS

There are three main places you need to use to identify the LED codes on the front panel of MultiPlus and Quattros, and work out what the codes mean.

- **Fault Codes on Multi LED's** – Download Victron Tools App to your phone. Scroll through the 20 or so options
- **Multi User Manual** – Section 3.4 and 7.0 and 7.3.2
- **Error Codes on CCGX notifications and LED's**
https://www.victronenergy.com/live/ve.bus:ve.bus_error_codes

Review user manuals for processes to clear faults and interpret fault and OK codes.

Solar Charge Controller NOTE: Only use verified MC4 connectors. Non-certified connectors will cause connection faults.

8 FLICKERING HOUSE LIGHTS – TROUBLE SHOOTING

While reported flicker is reasonably rare, DPA have sought feedback from our network, prepared and sequenced the notes below. Please let us know if you have found items not on this list for us to add.

First quick things to check could include:

- Disconnect generator/grid, turn off all loads & PV to see if this removes flickering. Reconnect sequentially to identify potential cause.
- Check for any loose active, neutral or MEN connections in sub-boards or other connections.

- AC coupling – ensure all frequency ramping settings are correct – contact suppliers. Fronius have a firmware upgrade to their inverters to overcome flickering in off grid situations. If you have another brand of AC coupled inverter contact the supplier re settings or firmware upgrades.
- Photocopiers and laser printers with PWM heating elements can cause flickering.
- DC Ripple from battery bank, faulty household wiring, or loads (see section 10.2)

8.1 TROUBLE SHOOTING STEPS

TEST LIGHTS DIRECTLY CONNECTED TO THE MULTI

1. Take a test light(s) to site as part of your tool kit: LED/Fluro/incandescent, or if you don't have a test light, potentially take a light from the site, possibly even one that has been experiencing the flickering problem, then:
2. Safely attach the light directly to the output of the Quattro
3. Disconnect grid/generator, turn off all loads, perhaps even disconnect them if necessary,
4. Switch the test lamp on and see if it flickers. (OR, if necessary, connect one of the lighting circuits that has been flickering directly, to the quattro)
5. If the flickering occurs when connected directly to the Quattro, check other items as per the section below.
6. In a case with another inverter/charger brand, length and size of cable between the switchboard and inverter/charger was found to contribute to light flicker after considerable trouble shooting steps.

8.2 FURTHER TROUBLE SHOOTING DETAILS IF NEEDED:

MPPTS and AC Coupled Solar

- Check all pv wiring, settings, DVCC is on or off for appropriate battery types
- Check firmware is up to date on all devices
- For DVCC, ensure firmware on Multi and CCGX is up to date
- For AC coupled solar, ensure frequency shifting settings are correct, AC inverter is set to microgrid. Fronius has a firmware update to overcome flicker. If you have other brands of AC coupled solar inverter, contact the supplier to see if they have equivalent firmware updates.

BATTERY BANK – DC RIPPLE (this is a 50 or 100hz ripple on the dc side which will cause issues)

- Check for DC ripple shown on VE Configure (LHS window in ve-configure)
- Check for loose battery connections. Have correct crimping tools have been used?
- Check for failed battery cells (load test, check individual battery voltages)
- Check if battery cables are appropriately sized

Is the battery bank too small for the loads which may cause DC ripple. [AC ripple in a DC system](#)

VE CONFIGURE AND CCGX SETTINGS

- Install most current firmware on Multi and all other devices.
- Ensure all settings are correct.

- If necessary, try reducing back to default settings, carefully remove and re-install assistants and run basic light circuit while reinstalling settings/assistants.
- Check all CCGX setting such as DVCC

VICTRON COMMUNITY and other sites for new suggestions

- Check community.victron website forum for Q&A. Use search words including: flicker, flickering, flashing, strobing, pulsing or other words that could describe the oscillation.
- Check Victron Professional and other inverter sites with a word search.
- Contact your paid industry member or other networks such as SEIA in your state for their recommendations.

9 MAINTENANCE – possible items to include in 12 month site visit

Some suppliers of off-grid equipment recommend installers do a 12 monthly site inspection to check for a range of items that ensure the system will operate over the warranty period. Some installers sell this service to the homeowner and link this as a condition of warranty, similar to the need to have a new car serviced by a qualified person to maintain warranty.

DPA does not prescribe exact items to check but the list below has been suggested by some suppliers.

General before and at site:

- Review inverter data logs on site or remotely , (Victron VRM, Outback Optics, Schneider Insight, Selectronic Select Live etc) and confirm battery has been cycling between agreed SoC limits, charge and discharge rates etc
- Check for evidence of rodent or pest invasion which can cause shorting or cable damage
- Check for excess dust around the inverter which can cause damage to FETs and PCB shorts when mineral dust becomes moist. Inverters should not be located in high dust areas if fans move air through the device. Check for water ingress in the equipment area from leaks or other sources.
- Check battery terminals are torqued to the recommended setting if there is vibration or movement etc
- Check battery terminals and cables are in good condition and no signs of corrosion
- Check battery casing is in good condition. Check there is no damage from insects, vermin or water damage.
- Shut down inverter, isolate batteries and check battery resting voltage on all batteries. All battery voltage readings should be the same, or for 48v batteries within +/- 0.4 volts
- Check each string of panels is at expected voltage.
- Check roof mounted DC isolators for water ingress.

- If battery bank was sized for agreed loads, check if large unexpected loads have been added, extensions to home, extra out buildings. Review appropriateness of battery bank capacity and or generator fuel use if energy use has increased. If there is no auto start generator, discuss the advantages of this.
- The new battery standard may require a check list or risk assessment. If this comes into practice, potentially use this check list to check with the homeowner for items such as storing fuels near inverters/batteries in sheds.

10 VICTRON.COMMUNITY

Victron has set up this [site](#) for users and installers to post questions and to be a repository of information FAQ's etc. A number of people answer these questions including Victorn tech staff, Matthijs (director) and other experts, as well as hobbyists so take care when reading answers.

Use the search window and Topic headings. If you create a question, follow the instructions on the RHS, and take care to use an existing Topic rather than creating new ones . Keep your Question Title short and descriptive such as Multiplus and Fronius.. When you see 'Space' select 'Questions and Answers'. You will normally see a response in 24 hrs. However we recommend not to post questions till you have used the site regularly to look at previously posted questions. Its been running since 2018 so most questions have been asked and there is a lot of answers and feedback. You need to register and you will get emails when your question is answered

11 PROGRAMMING PARALLEL AND THREE PHASE INSTALLS

First, read Parallel and Three Phase VE Bus manual. This manual is with the others under Multi at the Manuals page [Here](#) so you can see where they are kept, but it's good practice to be familiar with overall site rather than relying on these links. Here is a [link](#) to 3 phase guides with notes on potential AC cabling issues. It's good practice to familiarise yourself with the Victron site and try not to be too reliant on this doc.

This manual has all the wisdom, what settings for L1 Master and settings for Master of each phase, etc.

[Parallel, split- and three phase VE.Bus systems \[Victron Energy\]](#)

To re-cap the manual above is critical to read all the way through and has some good notes under the Configuration heading for what VE config settings need to be on:

1. Master of L1, settings
2. Master of each phase.
3. All units- for when you have more than 3 Multi's

Warning (notes from Victron's manual above)

Do not underestimate the complexity of making such large systems. We do not support untrained and/or inexperienced installers working on these size systems.

Before installing system of 60kVA or larger, first install and get experience with smaller systems. Start with single phase single unit, then for example 30 or 60kVA.

Or hire an installer that does have experience with these large systems, for both the design and the commissioning.

DPA also recommends you check local regulations and get approval from your electrician and inspectors before confirming design and pricing to avoid non-compliant design issues after install.

STEP 1. FIRMWARE UPDATE

Firmware update – can be done easily with VictronConfigure but for very old Multis, you may need to use VE FLASH and follow the steps in this video link [video](#) – ‘you must update each multi separately’ mentioned at end.

STEP 2. CONFIGURE

To configure where you want each multi in the ‘array’ read and follow the tutorials on:

- VE Quick Configure - 2 or 3 Multi’s or
- VE Bus System Configurator- more than 3 Multi’s

STEP 3 – SETTINGS- OPTIMISING

- ESS Set up - - watch Matthijs - [long video](#) and ESS manual [LINK](#)
- Export limiting (long video of Matthijs). – Color Control settings – Limit feed in of Fronius

Remember – this help sheet does not replace the use of manuals and other information on the Victron Energy website.

PV Support Assistant MUST be on ALL Multis.

Three Phase MULTIGRID wiring diagram from the MULTI GRID Manual – Appendix D

STEP 4 – TROUBLE SHOOTING (to send LED fault sequences, use table at bottom)

If you suspect phase rotation problems - a word of caution about rotating the phases. What we DON’T want is incorrect phase alignment between masters and slave multi’s.

The addresses are remembered in VE.Bus.Configurator and swapping the Victron units will require:

- 1, resetting EVERYTHING to stand alone units.
2. Re-programming the entire system with VE. Bus Configurator, take careful note of which Victron is which.

Thanks to Victron, installers, suppliers and those in our network who
contributed to the above.

END
