# **VICTRON ESS QUICK SETUP**

First the MPPT, as same settings must be on inverter, under Charging, and in ESS: Note: These settings are for Trojan T105RE batteries.



## Upgrade the inverter firmware to the latest version available:

- 1.1 Register on professional.victronenergy.com for access to all the latest firmware. It is here: <u>Victron Firmware versions</u>
- 1.2 Consult the VE.Bus firmware versions text document on the site to figure out what version of the firmware you need

## OR

Open the front panel and look at the sticker on the main processor inside the inverter, you need the first 4 digits.

You are looking for this: Victron Firmware explained

## 1.3 Just do exactly what VEFlash tells you

It is here: Updating Victron Inverter Firmware

# Notes:

- 1) If the inverter goes "dead", that is good, keep going.
- 2) Don't diddle, click quick Continue button, or the upgrade window passes.
- If you have missed the window, just start again. No problem.
- Each time you upgrade the firmware, the settings are gone, so keep a record.

## Program the inverter:

Using VE Configure <u>Software is here</u> configure the basic inverter values, such as the charge voltages for the batteries. The defaults are almost always good enough for a first try till you know more.

1. Enable the battery monitor and set the battery capacity.

13	General Grid Inverter Charger Virtual switch Assistants	
Muhland UMains 234 V IMains 1.7 A UOut 234 V IOut 234 V IOut 254 V Udc ippe 0.0 V Idc 0A Freq. In 50.1 Hz Freq. In 50.1 Hz	System frequency 50Hz 60Hz Shore limit AC input current limit 50.0 A I Overruled by remote Dynamic current limiter	
Ignore AC 0 aux. relay 0 show VE. Bus monitor	✓ Enable battery monitor         State of charge when Bulk finished         85.0         8 attery capacity         225         Ah         Charge efficiency	

2. Set the grid code to NRS097-2-1 if you are in South Africa. When you do this the first time it won't ask for a password.



3. Go to the Virtual Switch tab and tell it not to use Virtual Switch. This enables the assistants.

We Configure File Port selec	e 3 (MultiGr tion Target	d 24/3000/70-50 S/N: HQ171898F1V ) X Defaults Options Special Help
Hains MultiGrid UMains IMains IDut Ude Ude ripple Ide Freq. Out Freq. In SoC Ignore AC aux. relay	234 V 1.7 A 234 V 1.5 A 25.4 V 0.0 V 0 A 50.0 Hz 50.4 Hz 0 0	General Grid Inverter Charger Virtual switch Assistants Usage Specify virtual switch usage: Do not use VS drive multifunctional (aux.) relay: VS on=open; VS off=close ignore AC input: VS on=ignore; VS off=do not ignore dedicated ignore AC input dedicated ignore AC input dedicated ignore AC input dive aux. relay (VS on=open) + dedicate
show VE.	Bus monitor	22 P

4. Go to the Assistants tab, and click Add Assistant.

Ne Configure	3 (Quattro 24/	i000/120-2x100) — — X
File Port select Cauatro UMains UMains UDut Udc ipple idc Freq. Out Freq. In Ignore AC aux. relay	ion Target De	aults Options Special Help General Grid Inverter Charger Virtual switch Assistants Assistant Configuration Assistant Tools Add assistant
	<u>G</u> et settings	
	Send settings	Used assistants:           Start assistant         Save assistant         Delete assistant           Summary         Load assistant         Delete assistant
Line gj	•	· · · · · · · · · · · · · · · · · · ·

5. Select the **ESS Assistant**.

HE Quattro		General Grid Inverter I	Charger Virtual switch As	sistants	The second se
UMains IMains UOut UOut Udc ripple Idc Freq. Out Freq. Out Ignore AC aux. relay	····¥ ····¥ ····¥ ····¥ ····¥ ····Hz ····Hz	Assistant Configuration Ass Add assistant All assistants Auxiliary input Lithium (non Hub syst Relay Solar / Self-consumpt	tem)  ESS (Energy Std PV Inverter sup Self-consumpt Self-consumpt	rage System) (016C) port (0167) on Hub-1 (0166) on Hub-2 v3 (for xxyy3zz / 4	4xx firmware) (0168)
	<u>G</u> et settings	1	Deprecated	•	11
1118	<u>S</u> end settings	Used assistants: Start assistant	Save assistant	Delete assistant	3
	Kalenda	Summary	Load assistant		

6. Start the ESS Assistant

				aiatanta
Quattro		General Grid Inverter	Sharger   Virtual switch As	oloidi ito
UMain IMain UOut IOut Udc r Idc Freq. Freq. Ignore	ns V s A V A V A Out Hz In Hz s AC elay	Assistant Configuration Ass Assistant Setup Add assistant ESS (Energy Storage Sy	stem)	Ť
	<u>G</u> et settings	Used assistants: (975 bytes	used)	•••••••
((()))	<u>S</u> end settings	Start assistant	Save assistant	Delete assistant
	The second second	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 2014 442 45	

7. Click the >> button after reading what it said ...

We Configu File Port sele	re 3 (Quattro 24/5000/120-2x100) — ection Target Defaults Options Special Help	
Quattro	Welcome → ×	
IMains VOut IOut	Remarks on the Energy Storage System assistant.	
Udc Udc ripp Idc Freq. Ou Freq. In	Production of the Energy Storage System Indicated for India and      Requirements:     This assistant must be placed in all Multis/Quattros of the system.     When combined with assistants which have effect on whether or not the     incoming AC is accepted, such assistants must be loaded in the Multis/Quattros     in phase L1.	Ť
Ignore A aux. rela	<ul> <li>Multi-phase systems must be symmetrical, this implies:         <ul> <li>Each input must 'switch as group' (see YE. Bus System Configurator') (When using VE. Bus Quick. Setup' most conditions are satisfied automatically. Only the Solar power must be balanced per phase.)</li> <li>When PV inverters are connected to the outputs:                 <ul> <li>Each phase should have the same Solar power installed</li> <li>Each phase should have the same number of Multis/Quattros</li> </ul> </li> </ul> </li> </ul>	÷
(( <b>(</b> ))	Note: Whenever the option "PV inverters connected on AC out" is checked, this assistant will regulate the AC output frequency. Changing the "system frequency" on the general page has no effect on the inverter frequency in that case. (It can still have effect on the acceptable frequency range of the transfer switch, see the help file.)	• ssistant
Victron Energ	Cancel << >>	

8. Select the type of battery system



9. Select the **battery capacity**.

ዄ ESS (Energy Storage System)	_	×
Battery capacity Please enter the correct battery capacity.		
The battery capacity of the system is 225 Ah.		
X Cancel <<	>>	

10. Adjust the **Sustained voltages** as you need.

🖫 ESS (Energy Storage System)	—		×
Sustain voltage When batteries are left in a deep discharged state during a prolony severe chance that they will be damaged.	ged period	l, there is a	3
To prevent this, the sustain mechanism will kick in and keep the b voltage by charging them with a small current whenever necessary	atteries at	a minimun	n
For more info, refer to the controlling depth of discharge chapter of manual.	the Energ	gy Storage	
Sustain voltage during the first 24 hours of sustain 23.00 V. Sustain voltage after 24 hours 25.00 V.			
X Cancel	>>		

11. Note the Dynamic cut-off volts, tweaking them to your battery needs. **The defaults are a bit high in some cases.** 

🐿 ESS (Energy Storage S	ystem)				—		×
Dynamic cut This assistant uses so calle That is, the 'DC input low : There will normally be no n Just accept below values s	- <b>off</b> ed dynam shut-dow eed to ac which are	ic cut-off. n' level depend djust the curve already optimi	is on the ba used for thi zed for the	attery di is! selecte	scharge d battery	current.	
In rare cases it might be ac the values below.	lvantage	ous to modify th	ne curve. T	'his can	be done	e by chan	ging
Note: * Because dynamic cut VEConfigure are ignor	-off is use red.	ed, the "DC inp	out low shut	t-down''	related	parameter	sin
Cut off voltage for a dis           0.005 C         =         24.00 V           0.25 C         =         22.50 V           0.7 C         =         21.10 V           2 C         =         20.00 V	charge c / /	surrent of:					
🗙 Cancel		<<			>>		

# 12. Set the Restart offset

ዄ ESS (Energy Storage System)	_		×
Restart offset When inverting is stopped due to low battery, the battery voltage is level before inverting is allowed again. This level is determined as an offset to cut-off(0). (cut-off(0) is the cut-off voltage corresponding with a DC discharge <b>Note:</b> This same value is used as an offset to the cut-off voltage to deter Pre-Alarm indication)	must rise a e of QA.) rmine the l	bove a ce ow bat	rtain
Inverting is allowed again when voltage rises 0.60 V above	cut-off(0).		
🗶 Cancel 🛛 <<	>>		

13. Do you have a Fronius / **PV Inverter**, then set it here, otherwise **No**.

🐿 ESS (Energy Storage System)		_	×
PV Inverters Are there PV inverters connected on the AC	Cout of the Multi/Qu	uattro system?	
No Yes			
X Cancel	~~	>	

14. Check the VEConfig settings



15. Click on Summary.

-980a	VE Configure	3 (Quattro 2	24/5000/120-2×100)	×
File	Port select	ion Target	Defaults Options Special Help	
212	Torrocice	ion narget		
Q	uattro		General Grid Inverter Charger Virtual switch Assistants	
	UMains	···¥	Assistant Configuration Assistant Tools	
	IMains	A	Assistant Setup	<u> </u>
	lOut	Å	Add assistant	
	Udc Udc ripple	····V	ESS (Energy Storage System)	
	Idc	Å		
	Freg. Out Freg. In	Hz Hz		<u> </u>
	SoC			
	Ignore AC aux. relav			
				+
		<u>G</u> et settings		
			Used assistants: (975 butes used)	
		Send settings	Start assistant Save assistant Delete ass	istant
	(A)			
	W		Summary Load assistant	
VIC	ron Energy			- 7
		-	Changes require reset	
			Changes require reset	<b>B</b>
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	In	formation	Changes require reset      K nergy Storage System) (size:916)	
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	In	formation ESS (Er *) *) *) *)	Changes require reset      Changes require reset      K      regy Storage System) (size916)     System uses OP25 or OP2V batteries     The battery capacity of the system is 225 Ah.     Sustain voltage during the first 24 hours of sustain 23.00 V.     Sustain voltage store 24 hours of sustain 23.00 V.	<del>ک</del> <sup>°</sup> ۳
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	In	formation ESS (Er ?) ?) *) *)	Changes require reset      Changes require reset      Changes System) (size:916)     System uses OPzS or OPzV batteries     The battery capacity of the system is 225 Ah.     Sustain voltage after 24 hours 25.00 V.     Sustain voltage after 24 hours 25.00 V.     Cut off voltage for a discharge current of:     0.005 C= 24.00 V     0.25 C= 22.50 V     0.7 C= 21.10 V     2 C= 20.00 V     Inverting is allowed again when voltage rises 0.60 V above cut-off(0).	<del>ک</del> <sup>°</sup> ۳
	In	formation ESS (Er ") ") ") ") ") ")	Changes require reset      Changes require reset      Changes System) (size:916)     System uses OPzS or OPzV batteries     The battery capacity of the system is 225 Ah.     Sustain voltage after 24 hours 25 outsin 23.00 V.     Sustain voltage after 24 hours 25 outsin 23.00 V.     Cut off voltage for a discharge current of:     0.005 C= 24.00 V     0.25 C= 22.50 V     0.7 C= 21.10 V     2 C= 20.00 V     Inverting is allowed again when voltage rises 0.60 V above cut-off(0).     Relevant VEConfigure settings:     - Battery capacity 225 Ah.	<b>Ξ</b> <sup><sup>2</sup>ν</sup>
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	ln I	formation Total s (hidde	Changes require reset      Changes require reset      Changes system) (size:916)     System uses OPzS or OPzV batteries     The battery capacity of the system is 225 Ah.     Sustain voltage after 24 hours 25 ov 0.     Cut off voltage after 24 hours 25 ov 0.     Cut off voltage after 24 hours 25 ov 0.     Cut off voltage after 24 hours 25 ov 0.     Cut off voltage after 24 hours 25 ov 0.     Cut off voltage after 24 hours 25 ov 0.     Cut off voltage after 24 hours 25 ov 0.     Cut off voltage after 24 hours 25 ov 0.     Cut off voltage after 24 hours 25 ov 0.     Cut off voltage after 24 hours 25 ov 0.     Cut off voltage after 24 hours 25 ov 0.     Cot c = 21.10 V     2 C = 20.00 V     Inverting is allowed again when voltage rises 0.60 V above cut-off(0).     Relevant VEConfigure settings:     Battery capacity 225 Ah.     PowerAssist unchecked     Lithium batteries unchecked     Storage mode unchecked     Storage mode unchecked     ize of all assistants including the required     n) system assistants is 975	<u> </u>
	ln I	formation ESS (Er ?) ?) ?) ?) ?) ?) ?) ?) ?) Total s (hidde	Changes require reset      Changes require reset      System uses OP2S or OP2V batteries     The battery capacity of the system is 225 Ah.     Sustain voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Cut off voltage after 24 hours 25 ov 0V.     Relevant VEConfigure settings:     Battery capacity 225 Ah.     PowerAssist unchecked     Lithium batteries unchecked     Storage mode unchecked     Storage mode unchecked     storage mode unchecked     ize of all assistants including the required     in) system assistants is 975	<u> </u>
	In I	formation ESS (Er ?) ?) ?) ?) ?) ?) ?) ?) ?) ?) ?) ?) ?)	Changes require reset      Changes require reset      System uses OP2S or OP2V batteries     The battery capacity of the system is 225 Ah.     Sustain voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Cut off voltage after 24 hours 25 ov 0.V.     Inverting is allowed again when voltage rises 0.60 V above cut-off(0).     Relevant VEConfigure satings:     Battery capacity 225 Ah.     PowerAssist unchecked     Lithium batteries unchecked     Storage mode unchecked     Storage mode unchecked     Storage mode unchecked     ize of all assistants including the required     in) system assistants is 975     OK	

16. Write the settings back the Multi, by clicking Send Settings, to the inverter:

3	General Grid Inverter Charger Virtual switch Assistants
Multiand UMains 234 V IMains 1.7 A UOut 234 V IOut 1.5 A Ude ipple 254 V Ude ipple 0.0 V Ide 0.4 V Freq. In 50.1 Hz	System frequency 60Hz 60Hz Shore limit AC input current limit 50.0 A Ø Overruled by remote
SoC Ignore AC 0 aux. relay 0 show VE.Bus monitor	Enable battery monitor       State of charge when Bulk finished       95.0       8 attery capacity       225       Ah       Charge efficiency       1.00
Send settings	

# Done!!!

Next, tweak the values of ESS on the VenusGX (VGX) / CCGX / RPi Software configuration:

• The Main Menu / Device list:

Device List			13:36
BMV-700	91%	27.05V	21.6A >
MPPT 150/35 - 930w			455W >
Carlo Gavazzi ET112			711W >
MPPT 75/15 - 400w			156W >
MultiGrid 24/3000/70-50			Bulk >
Notifications			>
네 Pages 🗸	<	<b>≣</b> Mer	ıu

ESS Settings, found under Settings on the main menu, then scroll down:

<	Settings	00:11
VRM online portal		>
ESS		>
Energy meters		>
PV inverters		>
Wireless AC sensors		>
Ethernet		>
Pages الد	\$	<b>≡</b> Menu

## **ESS options:**



- 1) Mode of operation
  - Best most efficient way to utilise all panel power, is Optimized with Battery Life.

<	Mode	00:12
Optimized (with BatteryLife)		•
Optimized (without BatteryLife)		0
Keep batteries charged		0
External control		0
$\otimes$		$\bigotimes$

# 2) Grid Meter Installed – like a Carlo Gavazzi ET112

- Best place to have it installed in the main DB board, is directly after the main breaker, that the entire boards power is measured going through it.
- You can use UTP cable to extend the **RS485 to USB interface** cable 5m.

# 3) Phase Compensation

- Enabled or disabled, for single phase systems this setting has no effect can be ignored.
- For 3 phase systems, refer to the manual. NB!

# 4) Minimum SOC (Unless grid fails)

- This is the core setting, to not over discharge the batteries during normal operation.
- 80% is the best setting, you decided.

## 5) Grid Setpoint

- 40watts is good, drop the value to see which one works best for you.
- If you pre-paid is tripping, increase the value.

## 6) Scheduled Charging

- Ideal for ensuring that once a week the batteries are fully charged. Use the day the least AC power is used.
- SOC limit as an example, or disable it, that it charges to 100%.

<	Schedule 1	13:31
Enabled		
Day		Sunday
Start time		06:00
Duration (hh:mm)		05:00
Stop on SOC		$\bigcirc$
SOC limit		95%
Pages <u>الله</u>		<b>≣</b> Menu

# ESS is configured!!!

## General:

Keep a record of your data: Data can be sent here: https://vrm.victronenergy.com/login

FIY, out of interest, here is a list of all the assistants: <u>All Victron Inverter Assistants</u>

# ESS Codes on the screen, bottom center of screen, if any:

#1 and #2 - means the SOC is low,

#3 and #4 - has to do with BMS signals,

**#5** - slow charge,

- #6 user set the max charge power to zero
- **#7** user set the max discharge power to zero.