

PROBLEM Description:

In the ESS System, when there is a stable situation with exceeding energy - Bulk Charging is working well – but as soon as the batteries are sufficiently charged to switch to absorption, the Multiplus is flapping between absorption and inverter (discharge) mode in intervals of 10sec to 1 minute and with amplitudes up to +/- 10 Amps. I would expect a stable absorption mode with constant voltage and decreasing current for the configured absorption time of 2 hours – but no negative current at all.

ON AC side there is no device with fast changing power consumption which could cause this situation.

Battery measurement is done with a smart shunt and on the CX device Smart Shunt is shown as “auto selected”.

If the BMS is expected as a root cause: The BMS of the LIFEP04 Batterie is not communicating with the Victron System and the BMS is not showing errors and has no disconnects in the loggings. Even when the BMS was bridged, the problem did not disappear - see elimination test on #3.

Content of this document:

1: I have done some measurements on a sunny day on 2021-21-31

#2: measurements bulk mode and no exceed energy on 2022-01-14

3: I have done some elimination tests on 2022-01-14

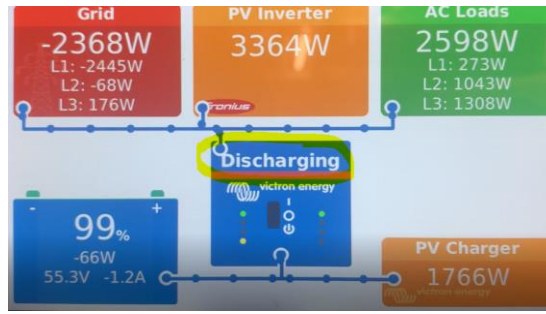
(disconnect MPPT, disconnect BMS, disconnect Fronius Inverter, disconnect Multiplus).

4: System Parameters

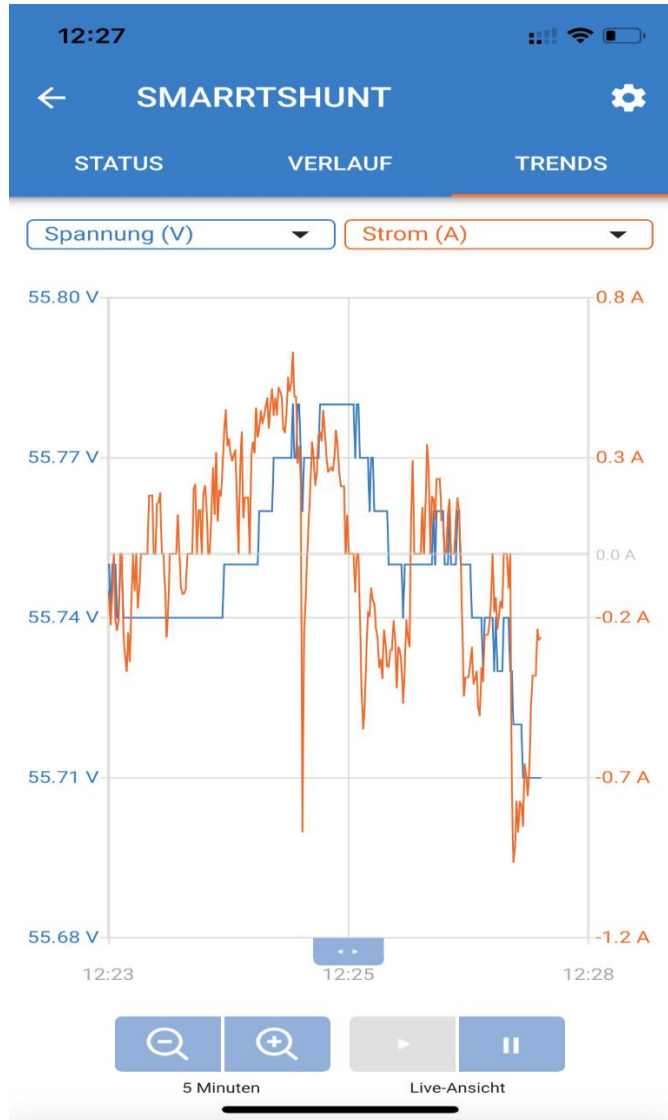
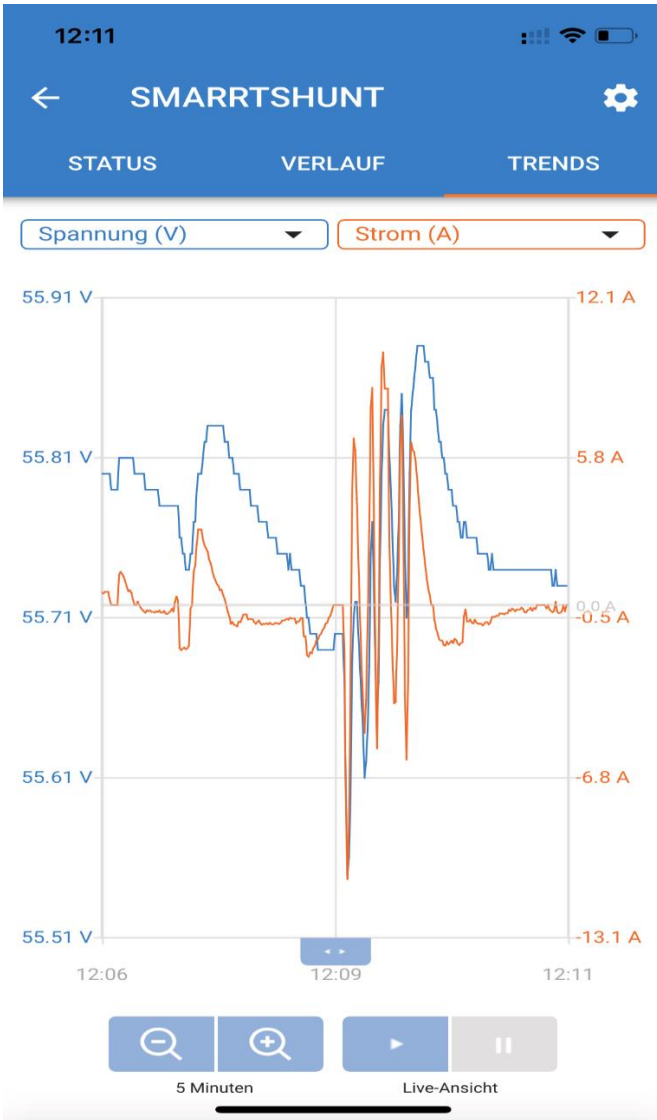
1. Measurements on 2021-12-31



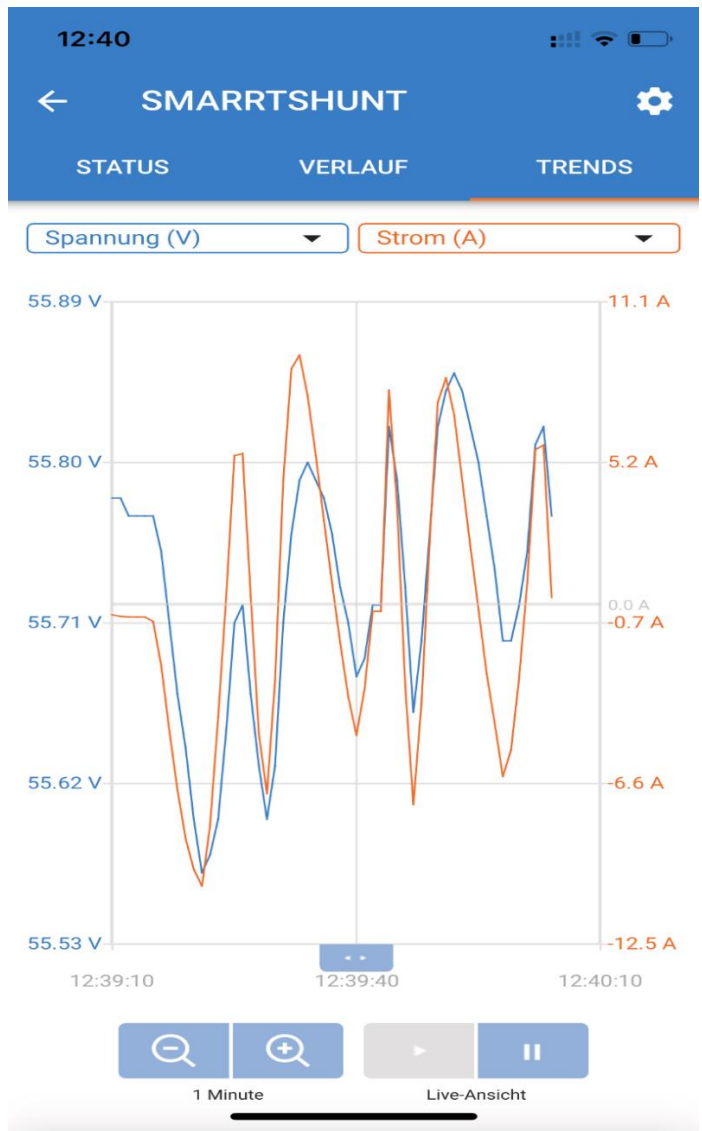
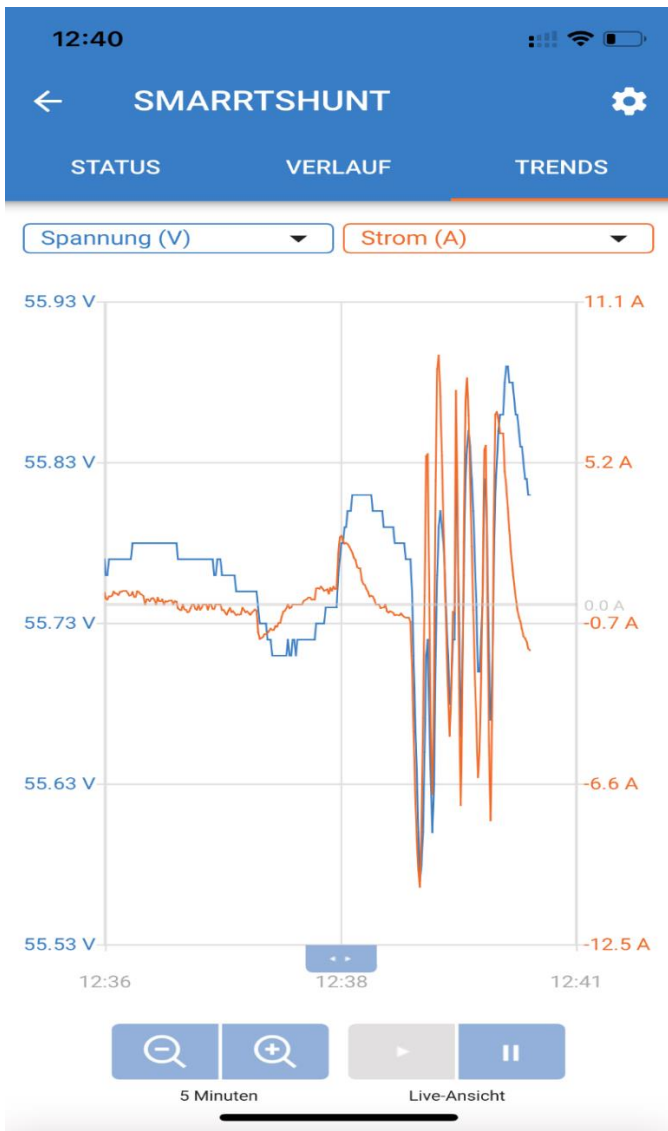
31.12.21 12:12



27.12.21 15:00 – Exceeding Energy – but Discharging!

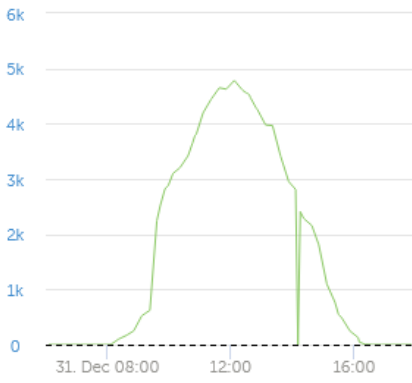


Amplitude and frequency of this behaviour is not constant – sometime current is in the range between + 1 Amp and – 1 Amp, sometime current is flapping between + 10A and – 10 A in a 10 sec interval – (see 12:39 – 12:40).



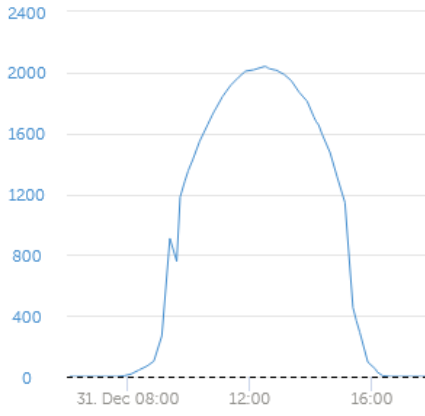
PV Inverter Yield - FRONIUS GEN24 [20]

L1 Power (W) L2 Power (W)
L3 Power (W) Total

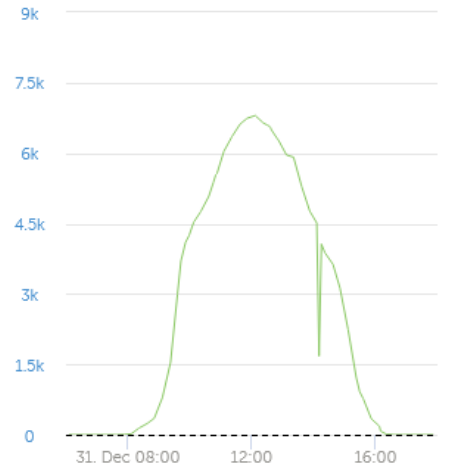


Solar Charger PV Yield - PV 48V 3500Wp [279]

Battery watts (W)

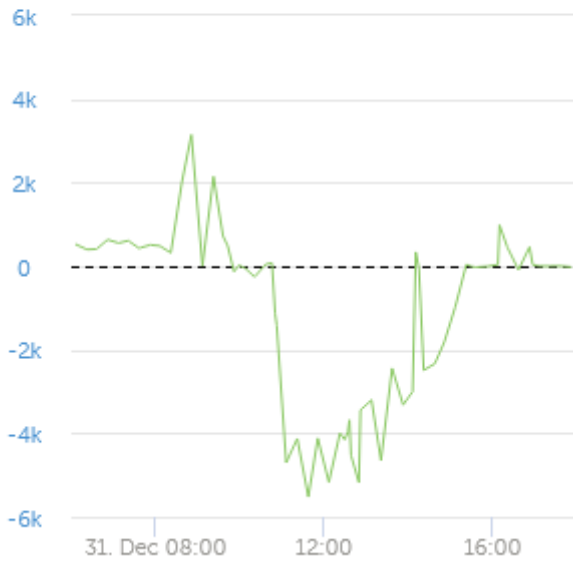


System - PV Yield



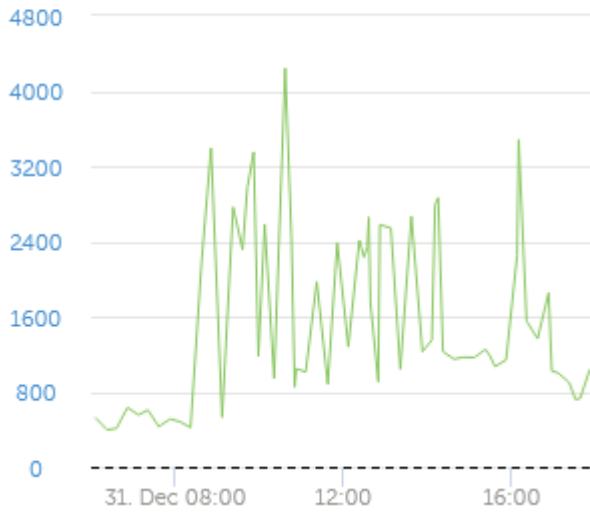
System - Grid

Grid L1 (W) Grid L2 (W)
Grid L3 (W) Total



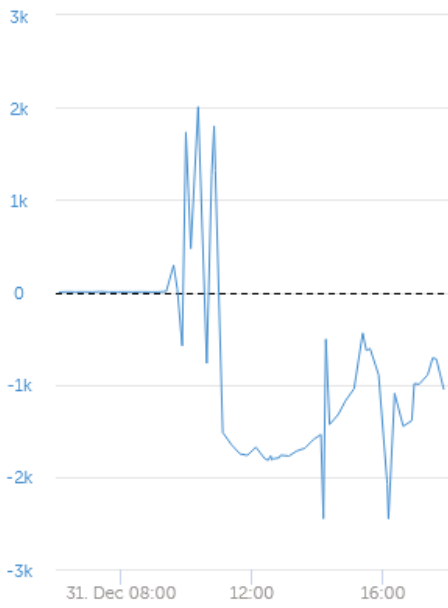
System - AC Consumption

AC Consumption L1 (W)
AC Consumption L2 (W)
AC Consumption L3 (W) Total



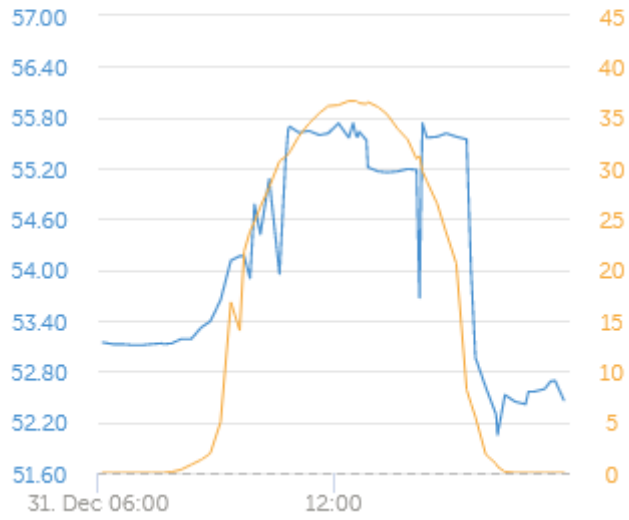
AC Input Power [276]

↔ Input power 1 (W) ↔ Input power 2 (W)
↔ Input power 3 (W) ↔ Total

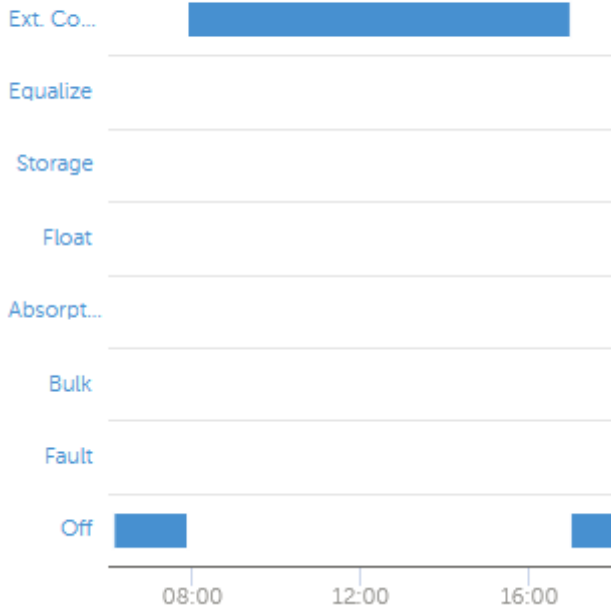


Solar Charger Battery Voltage and Current - PV 48V 3500Wp [279]

↔ Voltage (V) ↔ Current (A)

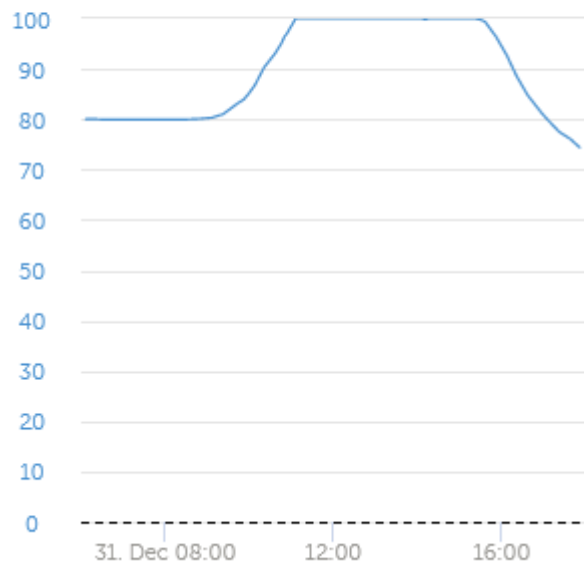


MPPT State - PV 48V 3500Wp [279]



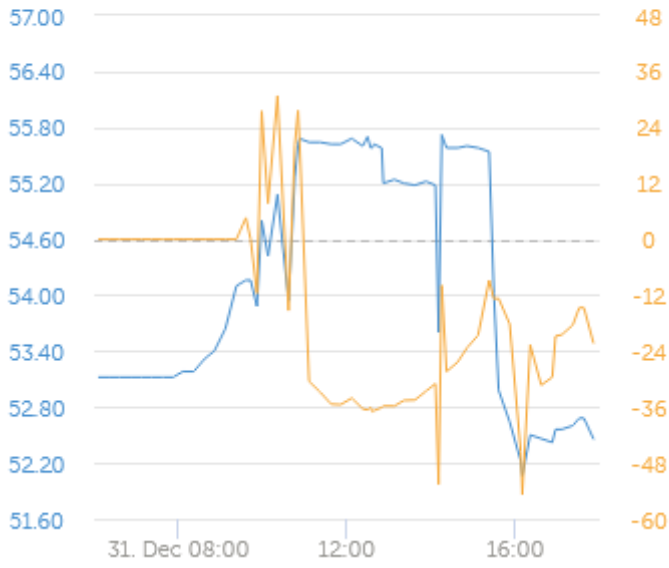
Battery SOC (State Of Charge) - SMARTRSHUNT [279]

↔ State of charge (%)



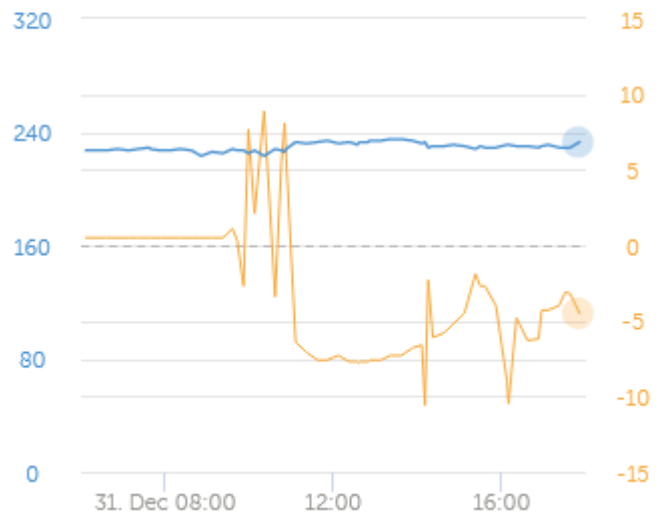
VE.Bus DC Voltage And Current [276]

Voltage (V) Current (A)



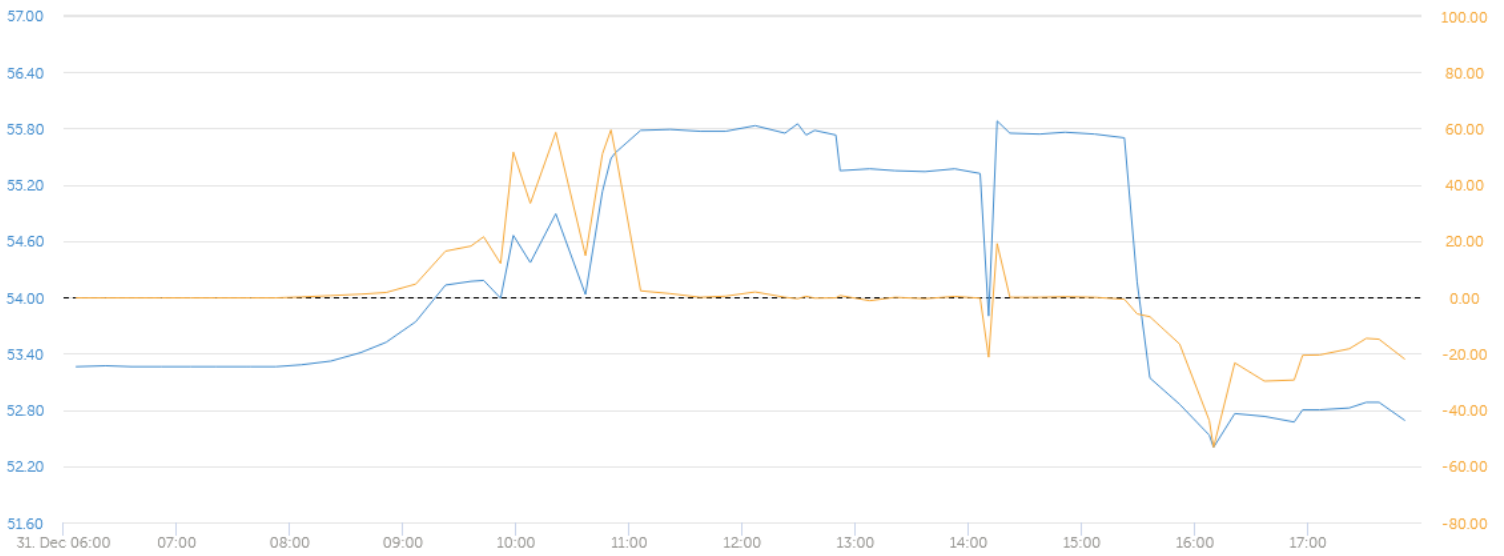
AC Input Voltage And Current [276]

Input voltage phase 1 (V)
Input current phase 1 (A)



Battery Voltage and Current - SMARTSHUNT [279]

Voltage (V) Current (A)

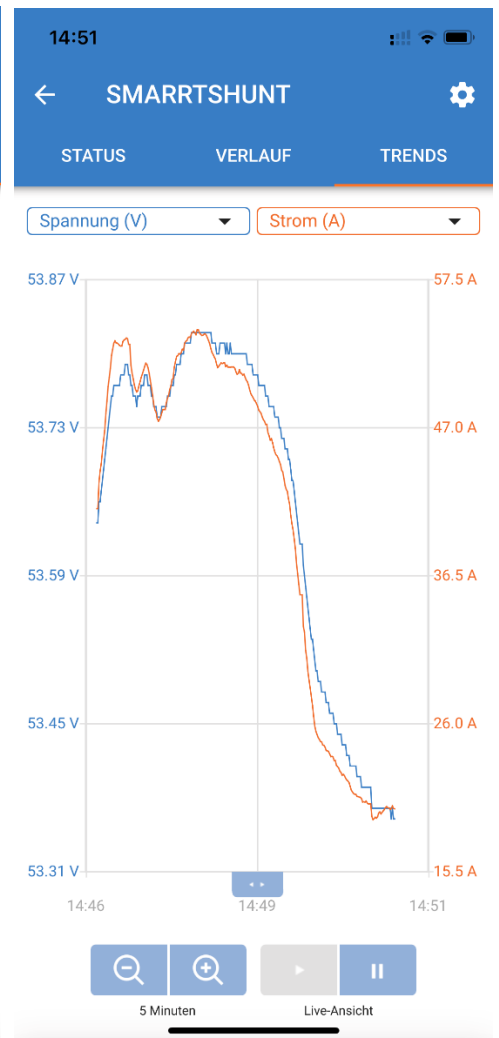
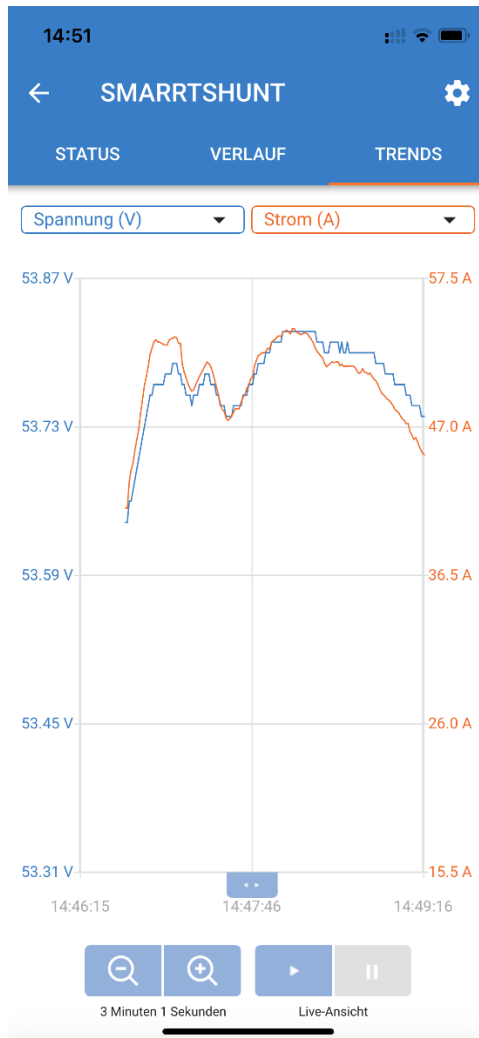
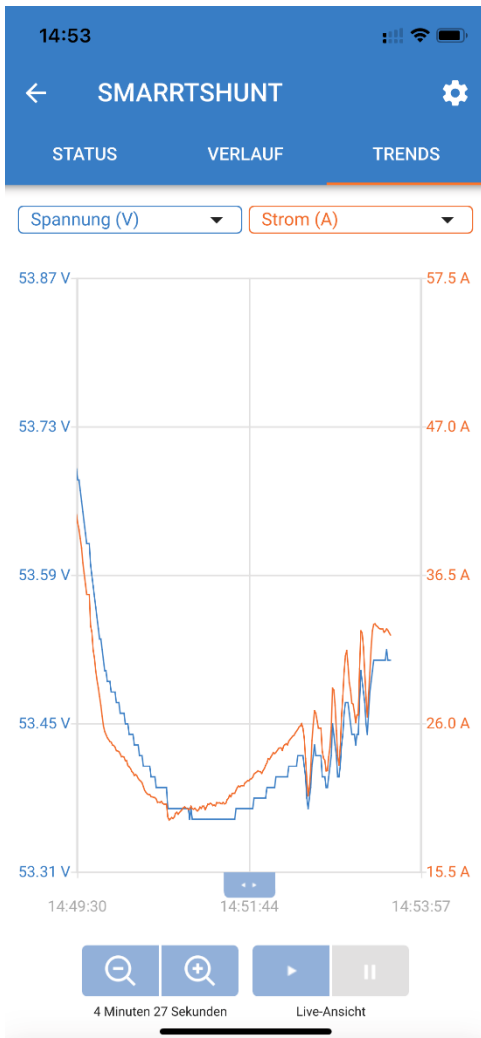
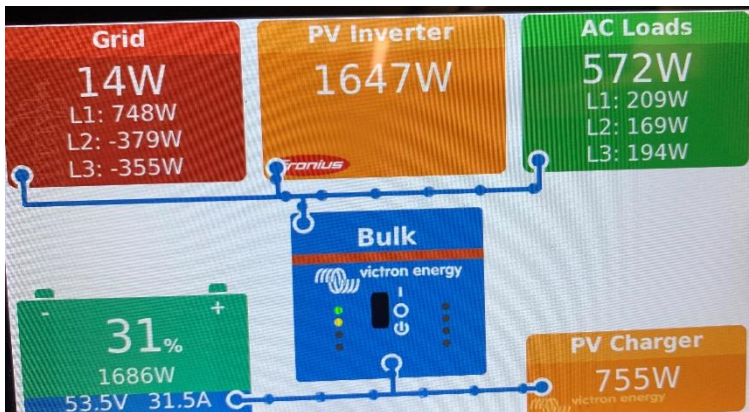


2. Tests on 2022 – 01 – 14

In this situation there was no exceed energy – ESS had to regulate according to the gridpoint.

Bulk charging worked well even when PV production was changing because of cloudy weather and changing AC loads.

2022-01-14 14:50:



3. Tests on 2022 – 01 – 14

Process of elimination:

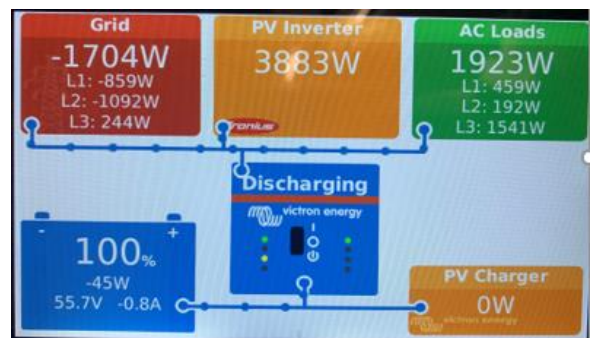
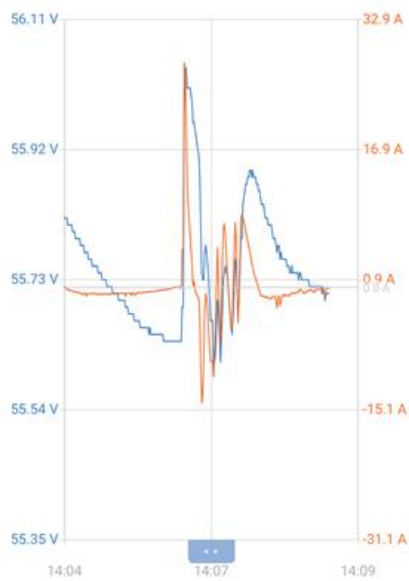
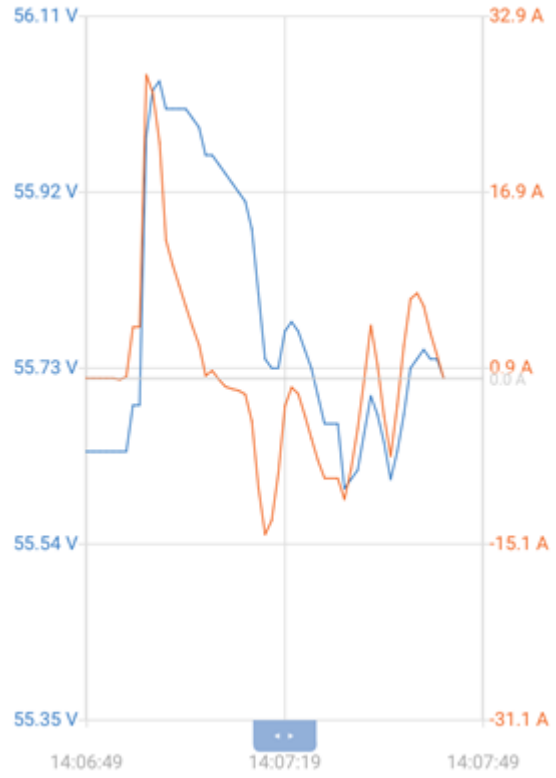
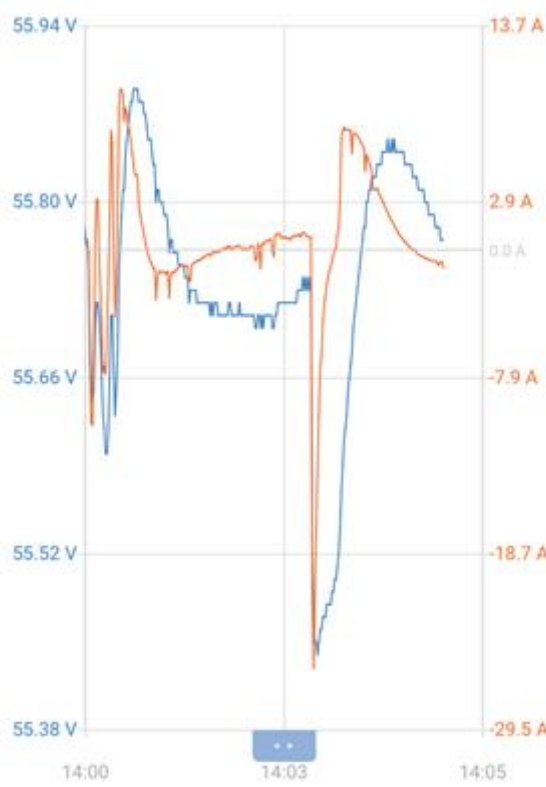
(Test was done 30 min after reaching first time absorption mode – and a stable situation with exceeding energy).

a. Bridging BMS at 14:01 → no change in behaviour

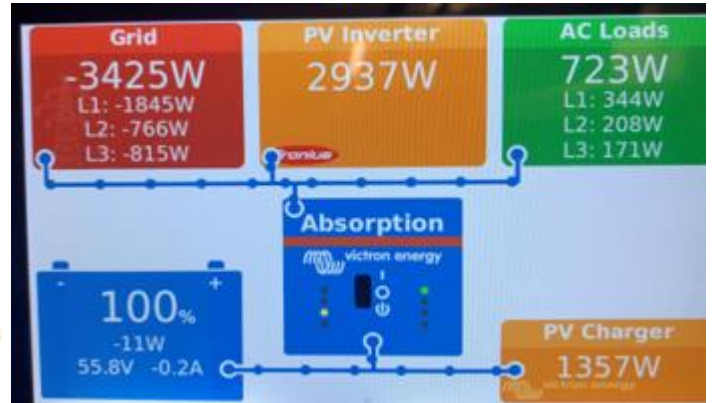


b. Disconnect MPPT von 14:03 – 14:07

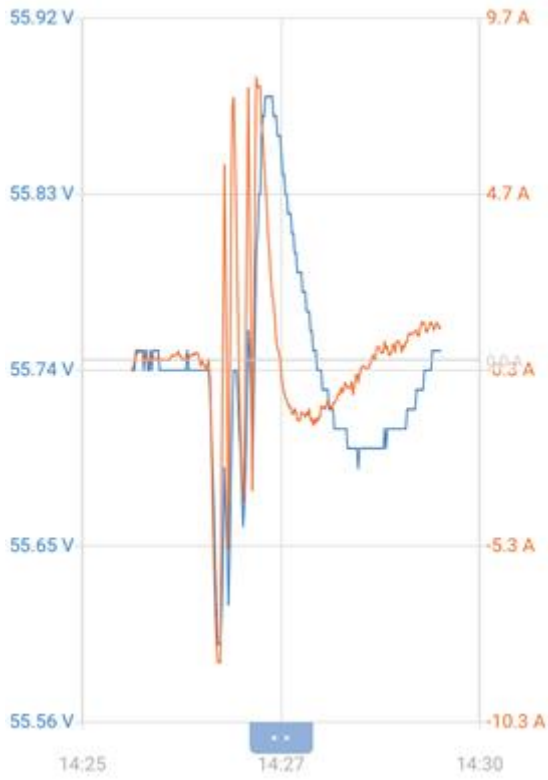
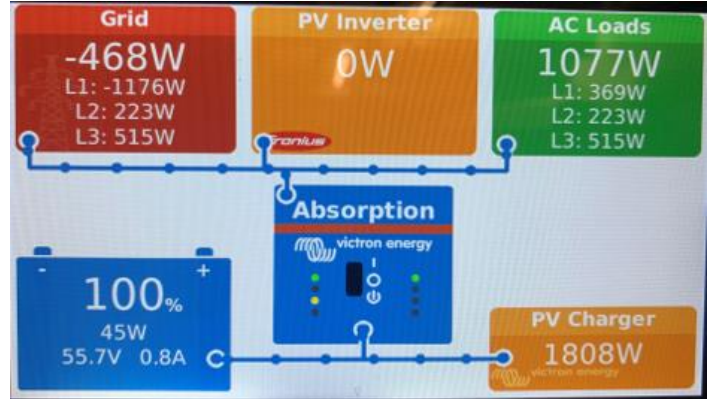
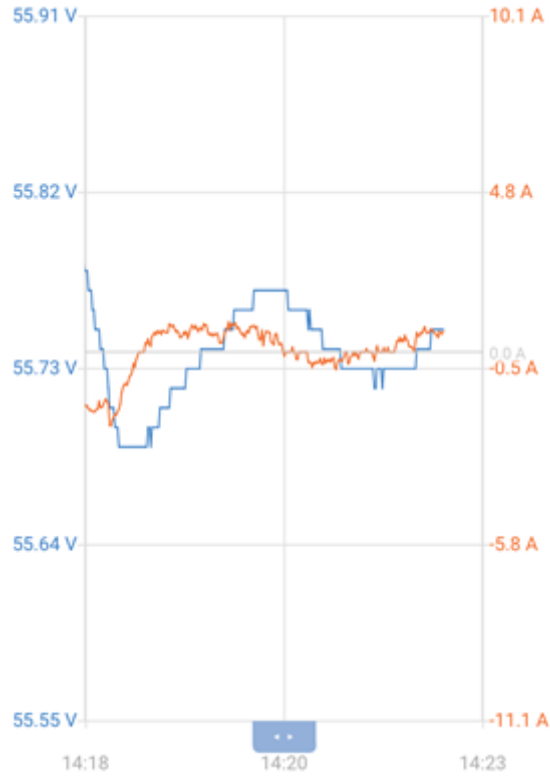
→ no change in behaviour



c. Change of interval and amplitude at 14:16 – reason unknown (AC load did not change at that time):



d. Switch off Fronius PV Inverter 14:18 – 14:30 – no change in behaviour

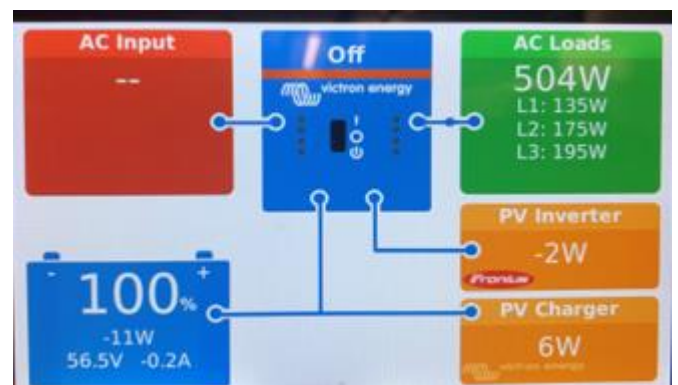
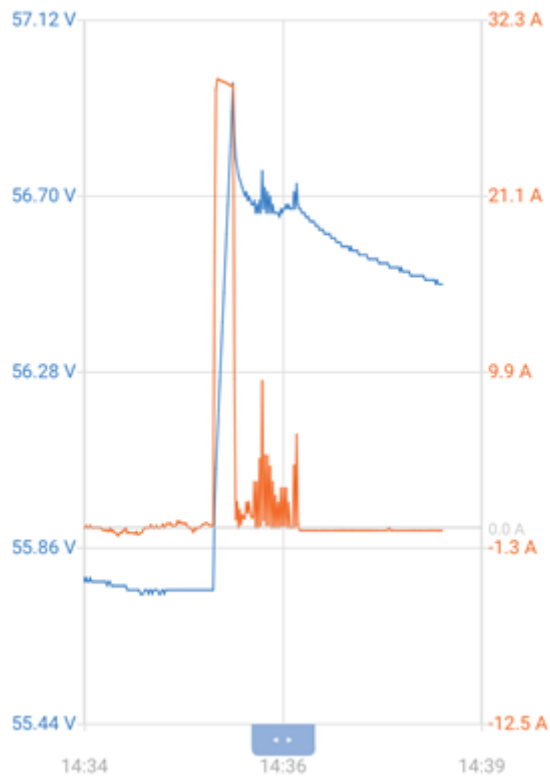


e. Switch off MULTIPLUS 14:35 -14:40

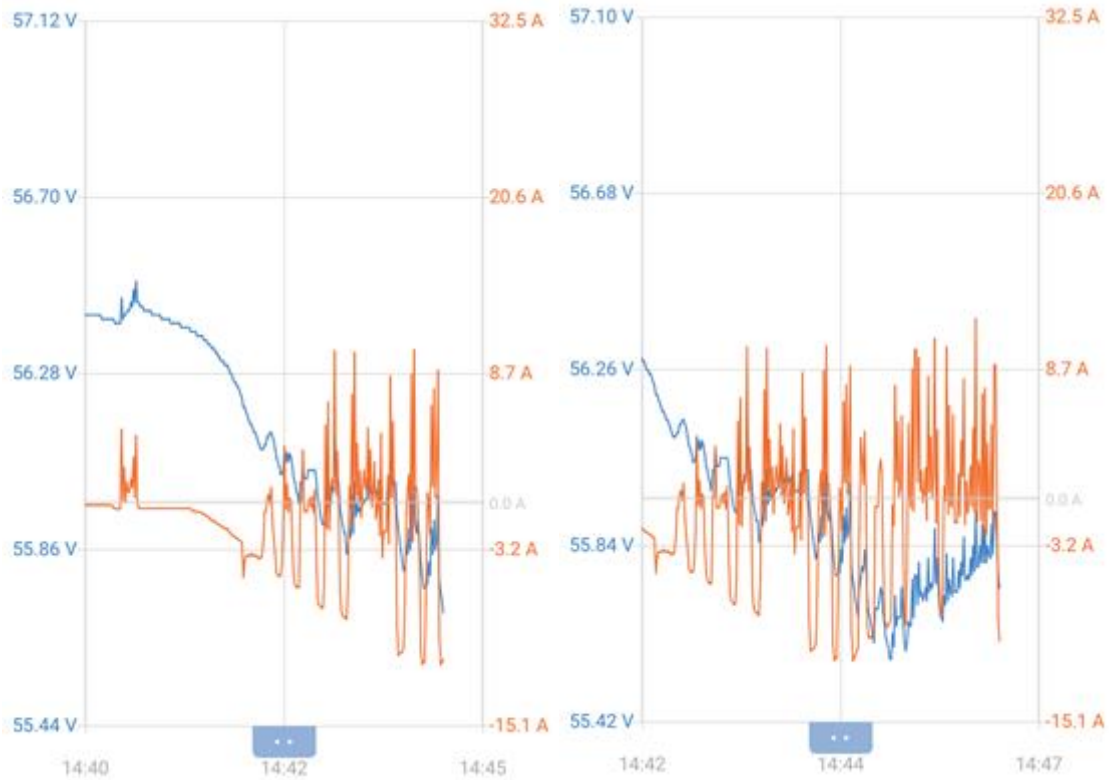
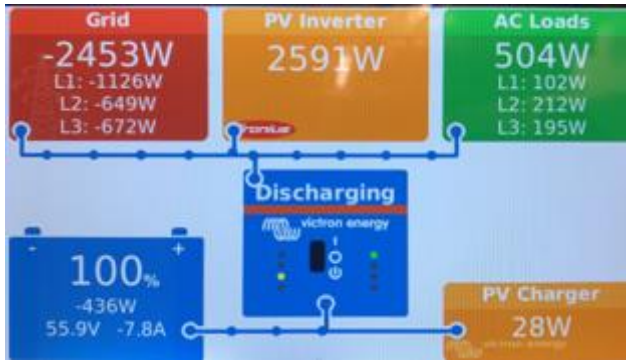
For unknown reason DC voltage rises by 1 Volt

In this situation the MPPT was no longer in „external control mode“ and in consequence of the deactivated multiplus the MPPT was regulating down the power.

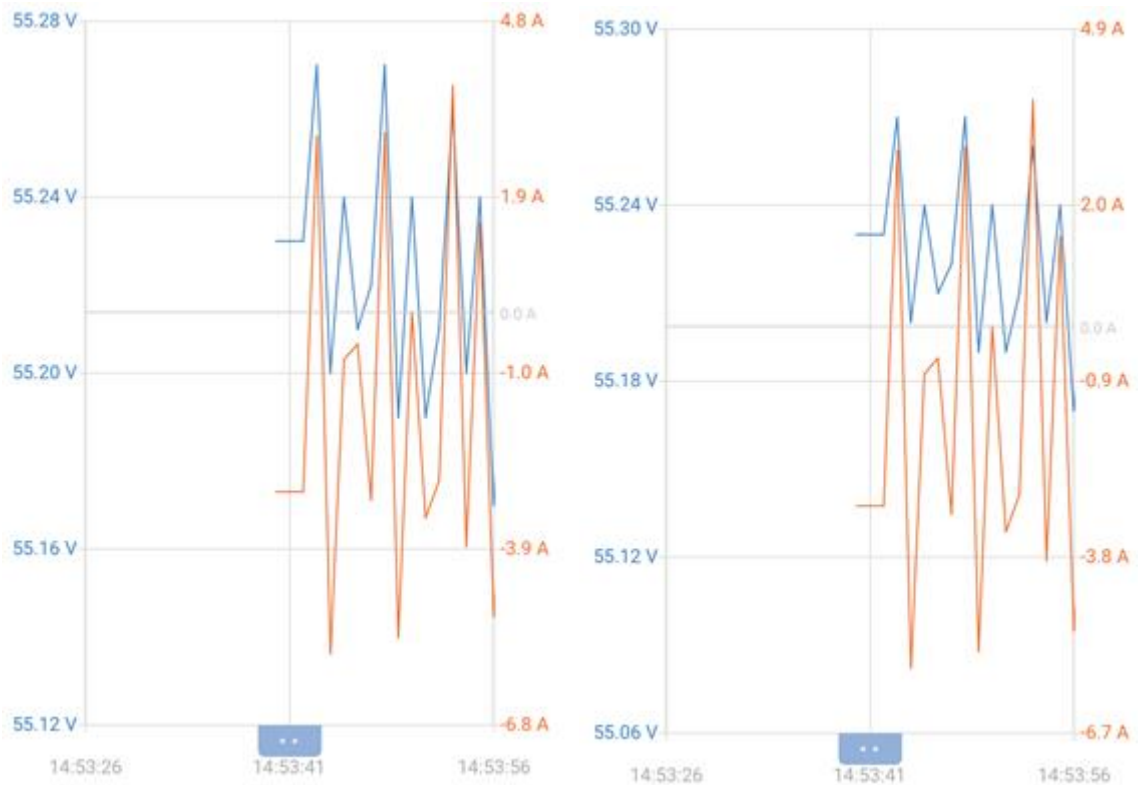
The absorption voltage in the settings of the MPPT is identical to the ESS settings of the Multiplus, which is relevant when MPPT is in external control mode.



f. After switching on Multiplus again – strong flapping of DC voltage/ current



at 14:53 deactivate MPPT Charge and reactivate → still flapping but smaller amplitudes.



g.

4. Systemconfiguration

Battery LIFEPO4 16S 280 AH with DALY BMS

Daly BMS is not communicating with Victron – DALY would disconnect in case of threshold exceeded for Cell Voltage min / max.

Multplus II 48/3000 35-32 with ESS mode enabled - only AC input connected

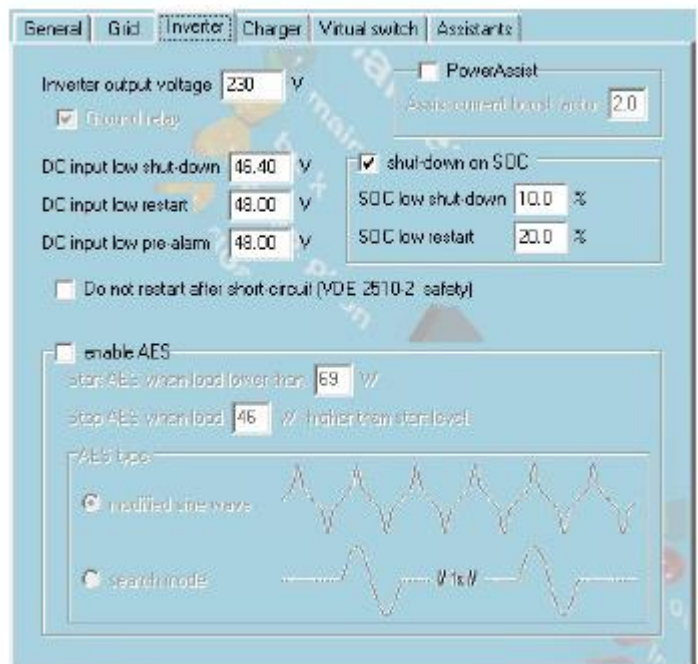
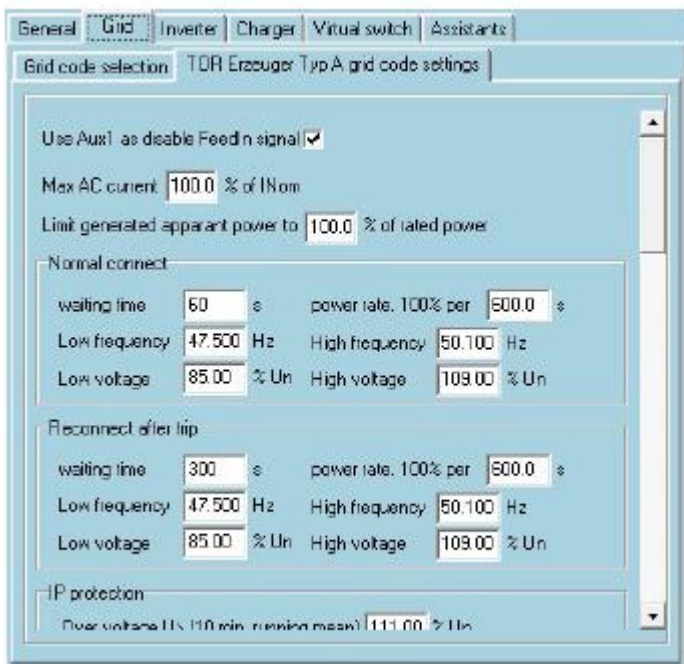
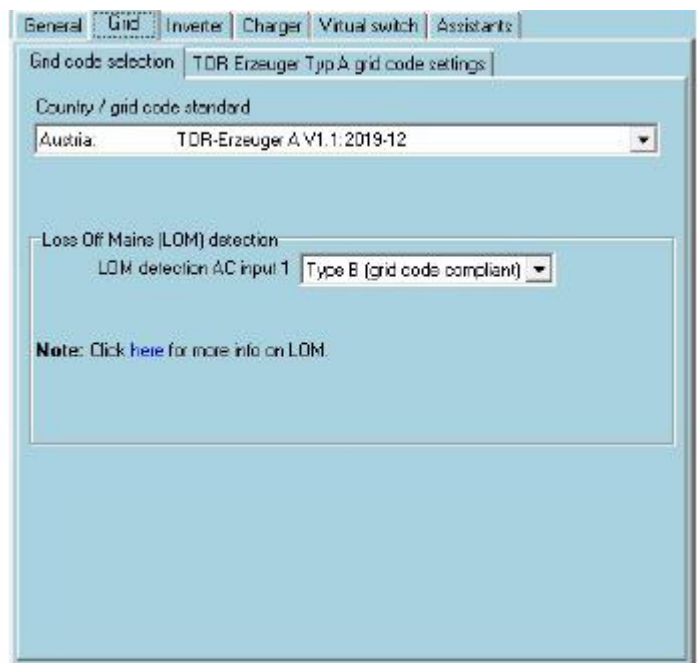
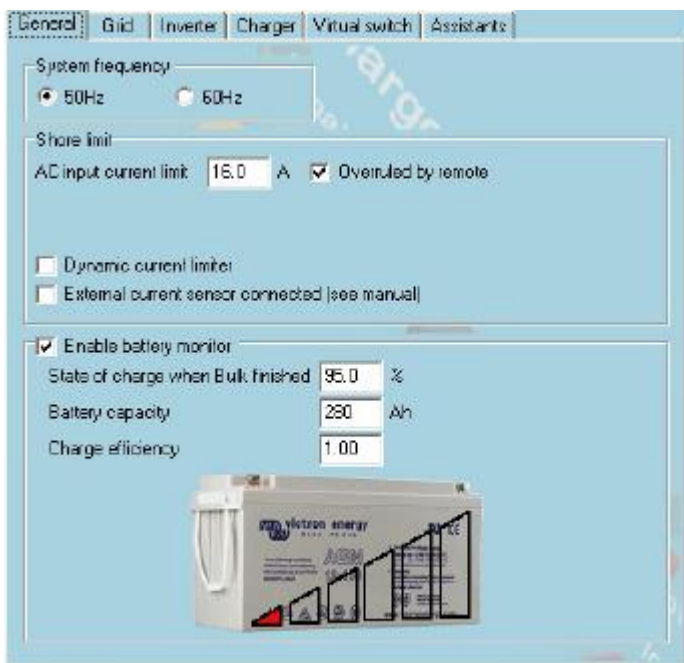
Fronius Symo Gen24 8 kw 3 phase AC connected with 9 kwp Solar Panels

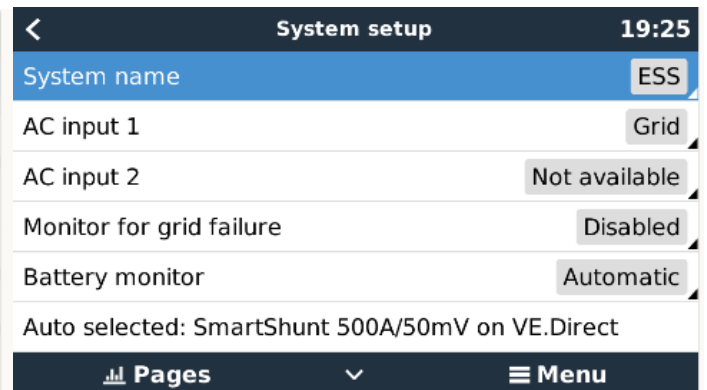
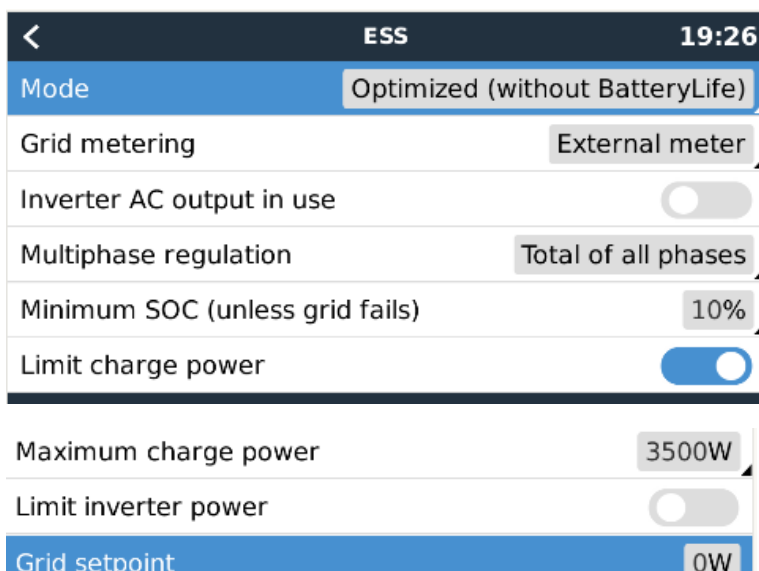
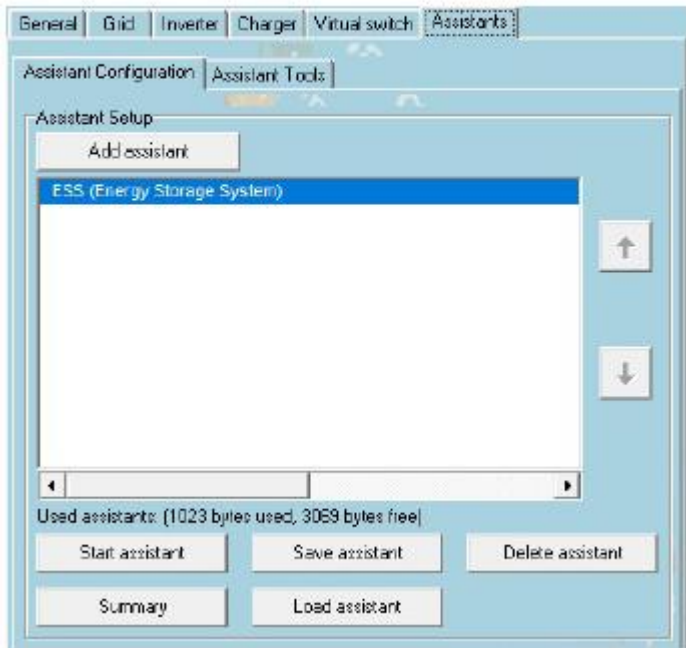
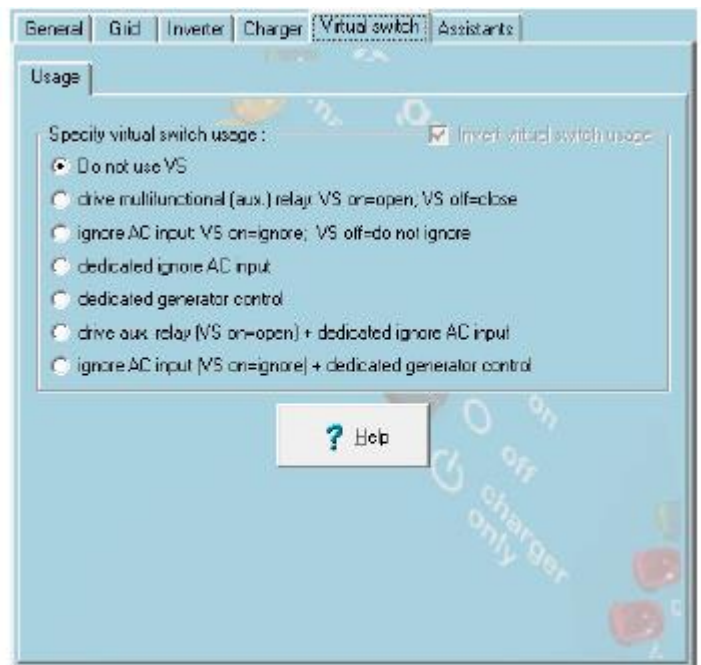
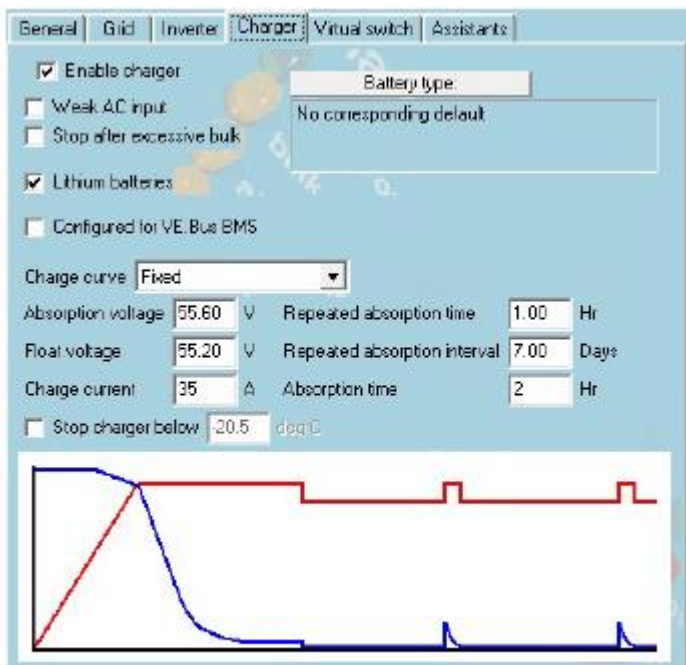
Victron Smartmeter for measurement of Grid Power

Cerbo CX Device

Battery shunt BMV 500 A

Victron MPPT 150/70 with Solar Panels 3,5 kwp





Batteriemonitor

← Batterieeinstellungen	
Batteriekapazität	280Ah
Spannung wenn Aufgeladen	54.2V
Entladungsboden	50%
Schweifstrom	3.00%
Zeit f. Ladezustandserkennung	3m
Peukert-Exponent	1.03
Ladewirkungsgrad	99%
Strom Schwellwert	0.10A
Durchschnittliche Restlaufzeit	3m
Batterie startet synchronisiert <input checked="" type="checkbox"/> Ladezustand nach Zurücksetzen ist 100%	
Ladezustand Manuelles Einstellen des aktuellen Ladezustandes	76.6%
SOC auf 100% synchronisieren	SYNCHRONISIEREN
Nullstromkalibrierung	KALIBRIERE

MPPT Solar Charger

← Einstellungen	
Batteriespannung	48V
Max Ladestrom	70A
Ladegerät aktiviert	<input checked="" type="checkbox"/>
Batterievoreinstellung	Benutzerdefiniert
Expertenmodus	<input checked="" type="checkbox"/>
Ladespannungen	
Absorptionsspannung	55.60V
Erhaltungsspannung	55.00V
Ausgleichsspannung	Deaktiviert
Bulk	
Re-Bulk-Spannungsoffset	0.40V
Absorption	
Absorptionsdauer	Fest
Absorptionszeit	2h 0m
Schweifstrom	0.1A
Ausgleichung	

Ausgleichung	
Ausgleichsstrom in Prozent	0%
Automatischer Zellenausgleich	Deaktiviert
Ausgleichsstoppmode	Automatisch, an Spannung
Maximale Ausgleichsdauer	0m
Manueller Zellenausgleich	JETZT STARTEN
Spannungskompensation	
Temperaturkompensation	Deaktiviert
Batteriegrenzwerte	
Abschalten bei niedriger Temperatur	5°C

← Lastausgang	
Betriebsmodu	BatteryLife
Only "Always on" and "Always off" modes take effect instantly, the other modes have a two minute delay.	