



Multi and Quattro - Assistant programming

Online training

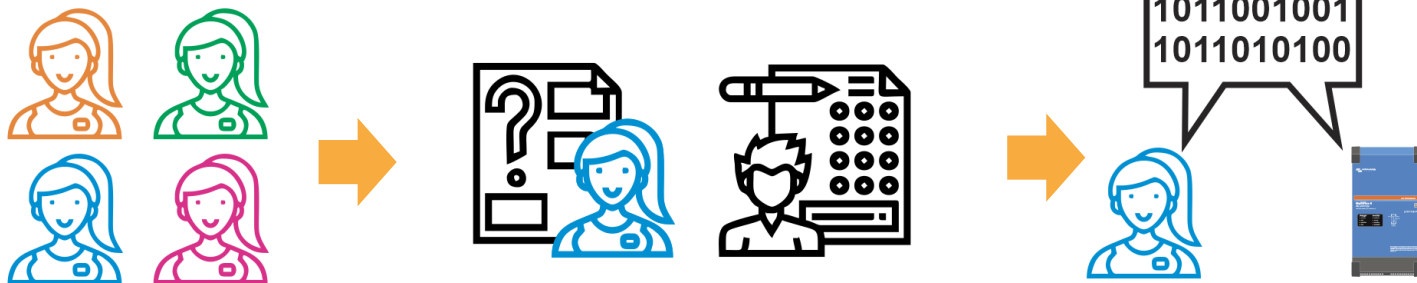
08/04/2020

# What are assistants?

An assistant is a part of VEConfigure.

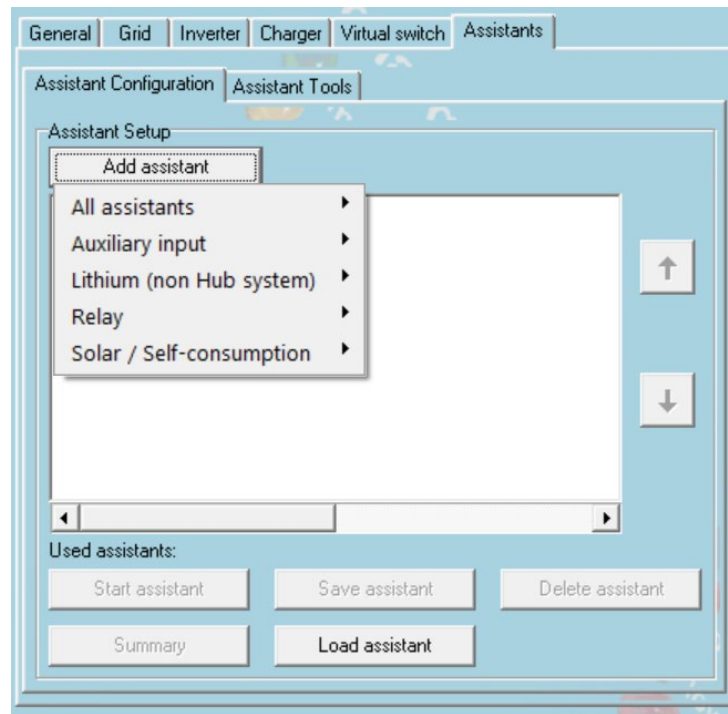
It assists you in programming a Multi or Quattro for a specific task, this is how:

- You chose the appropriate assistant
- The assistant asks some questions
- You answer these questions
- The assistant will program the Multi accordingly




# What can assistants do?

- Program an auxiliary input
- Program for lithium batteries
- Program a relay
- Program for AC PV solar or ESS



# Some notes

- When using assistants, the virtual switch cannot be used
- Assistants get updated or features are added every now and then, This is why they have a version number
- Each assistant has an intro text with an explanation, and sometimes a link to more information
- For assistant manuals also see:  
<https://www.victronenergy.com/live/assistants:start>

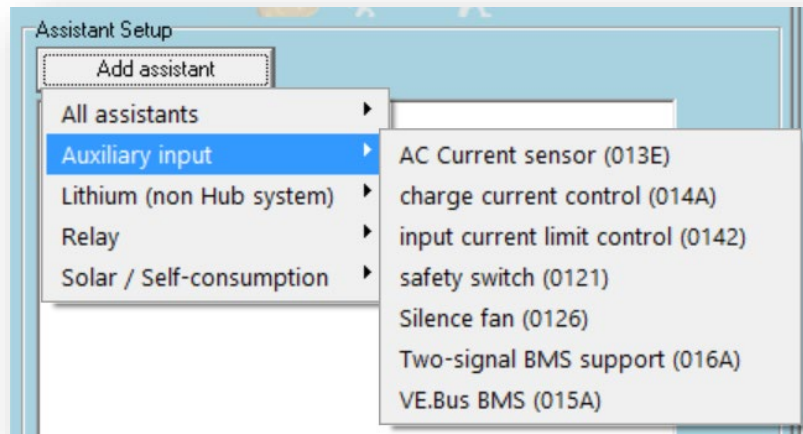


general flag user (013F)  
generator start and stop (015E)  
programmable relay (012C)  
relay locker (0104)

# Auxiliary and Lithium assistants

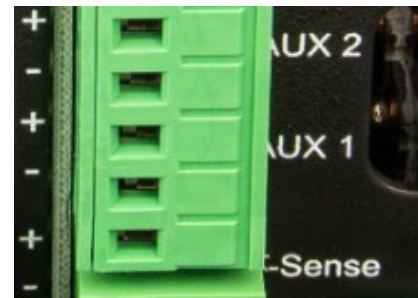
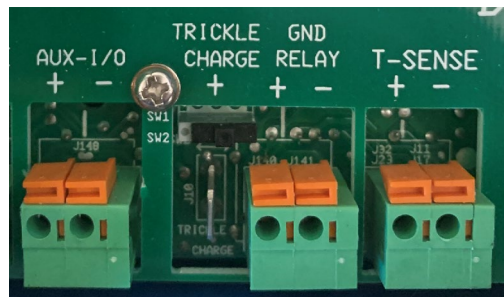
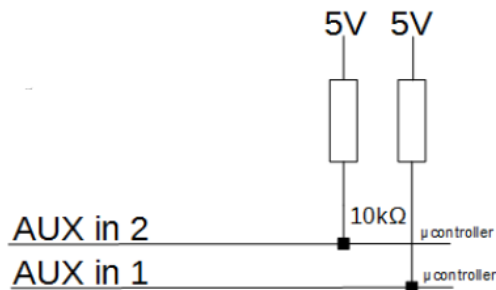
# Auxiliary and Lithium assistants

- AC current sensor
- Safety switch
- Charge current control
- Input limit control
- Silence fan
- Lithium VE.Bus BMS support
- Lithium Two-signal BMS support



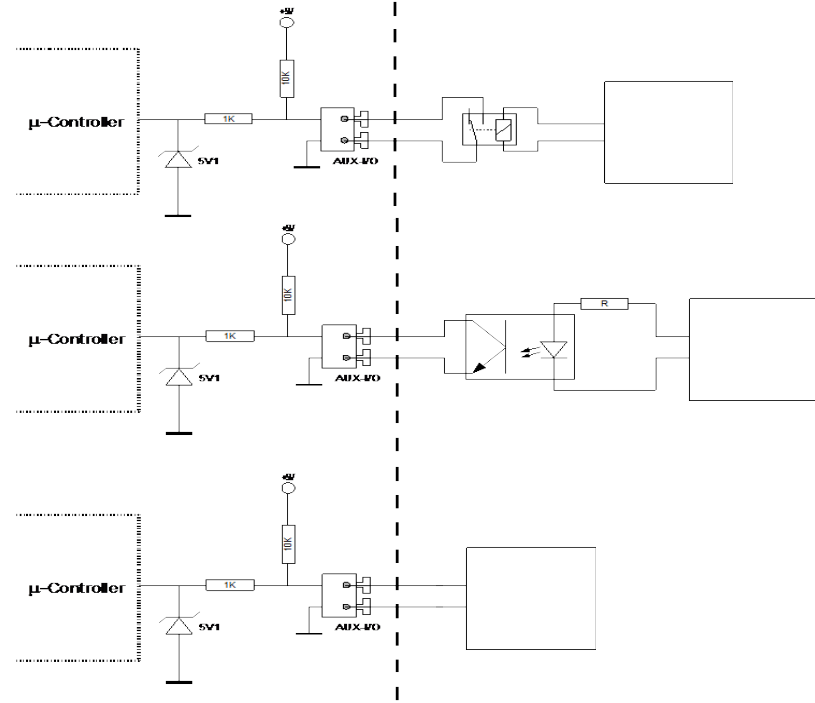
# Aux port and Temperature port

- These are both ports that receive and read a input signal
- The input can be a voltage (0-5V), a resistance or an open or closed contact
- If the temperature sensor is not used (like is the case with lithium batteries) it too can be used as AUX port
- Small Multis only have a T-sense port, larger units have a T-sense and 1 or more Aux ports



# Usage examples Aux port

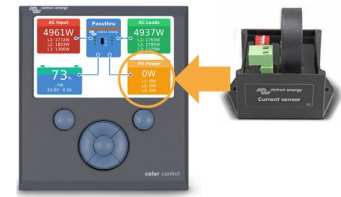
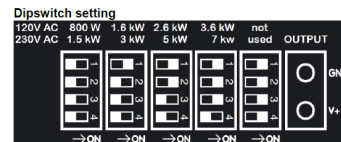
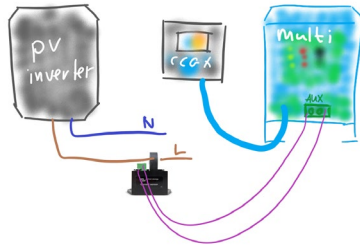
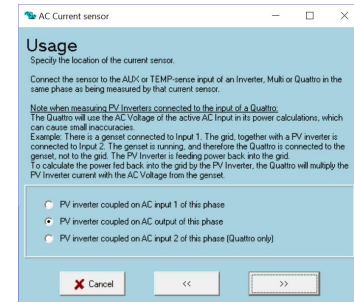
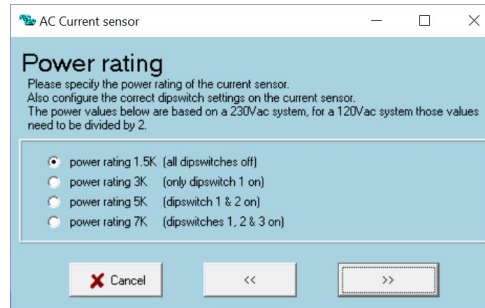
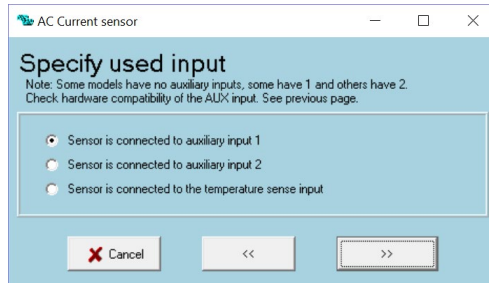
- With a relay
- With an optocoupler
- With a voltage signal (max 5V)
- Or with a resistance signal





# AC Current sensor Assistant

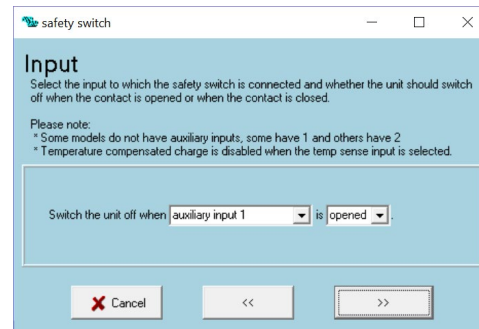
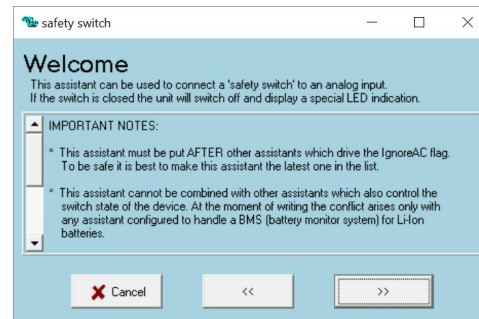
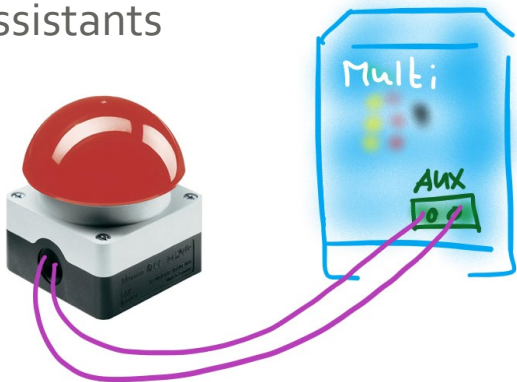
Use to display the current from a PV inverter on a GX device



# Safety switch Assistant

Use to switch off the AC output when an external switch is pressed

- Note that this assistant might conflict with lithium assistants



# Charge current control Assistant

Use to change the charge current depending on:

- Which AC input is used
- Or status of AUX port

charge current control

### Select

Select how the charge current should be changed.

Please note:  
\* Some models have no auxiliary inputs, some have 1 and others have 2  
\* Temperature compensated charge is disabled when the temp sense input is selected.

- ☒ Change the charge current based on voltage on auxiliary input 1  
The signal should be connected to THIS Multi/Quattro.
- ☐ Change the charge current based on voltage on auxiliary input 2  
The signal should be connected to THIS Multi/Quattro.
- ☐ Change the charge current based on voltage on temp sense input  
The signal should be connected to THIS Multi/Quattro.
- ☐ Specify a fixed charge current value

Cancel << >>

charge current control

### DC charge current regulation

Specify how the DC charge current is regulated depending on the (approximate) voltage measured on the selected input on this device.

(Note: The analog inputs do have an internal pull-up. So if one needs to switch between 2 charge currents one can simply connect a relay and specify the voltage levels below at approx 2V.)

Set DC charge current to  A when voltage is lower than  V.

Set DC charge current to  A when voltage is higher than  V.

Regulate the DC charge current linearly between these values when the voltage is between the specified voltages.

Cancel << >>

charge current control

### When to change the DC charge current?

Change the DC charge current .

Cancel << >>

charge current control

### Disable charger

Would you like to disable the charger if the DC charge current should be zero?

Explanation:  
Normally, a small DC current will remain when charger stays enabled. Disabling the charger will make the charge current really zero.

☐ Disable the charger when charge current should be zero.

Cancel << >>

# Input current limit control Assistant

Use to limit the AC input current limit under these circumstances:

- The frequency of the 1140 interface: The available AC power depends on the rpm in variable speed generator, flywheel generator or water turbine.
- The voltage of the AUX port: for example below 3Vdc 10Aac input and above 3Vdc is 16Aac

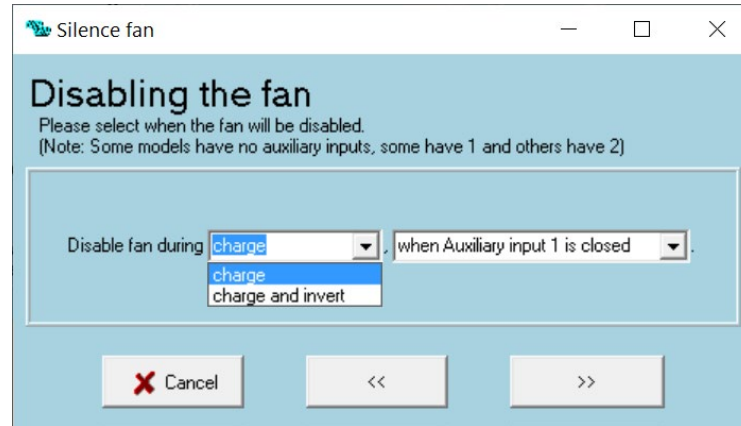
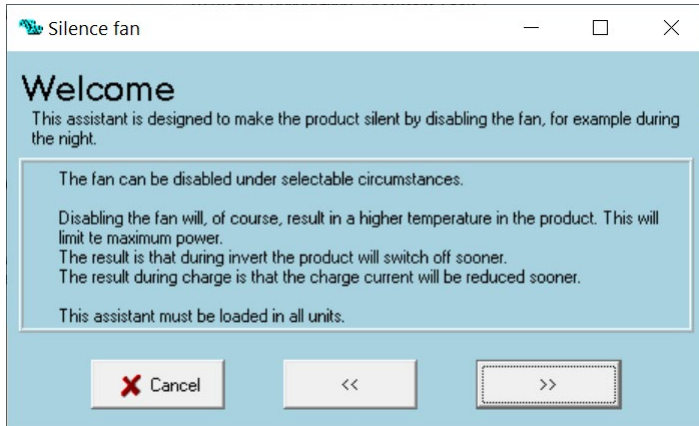
The screenshots show the following steps in the 'input current limit control' assistant:

- AC input selection:** A window titled 'input current limit control' with the subtitle 'AC input selection'. It asks 'Specify on which AC input this assistant works' and has three radio button options: 'regulate AC1 input current limit' (selected), 'regulate AC2 input current limit', and 'regulate AC1 & AC2 input current limits'. There are 'Cancel' and '<<' buttons.
- Select input:** A window titled 'input current limit control' with the subtitle 'Select input'. It asks 'Select the signal used to regulate the input current limit.' It includes a 'Please note' section with two bullet points: '\* Some models have no auxiliary inputs, some have 1 and others have 2' and '\* Temperature compensated charge is disabled when the temp sense input is selected.' There are four radio button options: 'Regulate the input current based on frequency measured by the 1140-interface' (selected), 'Regulate the input current based on voltage on auxiliary input 1', 'Regulate the input current based on voltage on auxiliary input 2', and 'Regulate the input current based on voltage on temp sense input'. There are 'Cancel', '<<', and '>>' buttons.
- Input current limit regulation (frequency):** A window titled 'input current limit control' with the subtitle 'Input current limit regulation'. It asks 'Specify how the input current limit is regulated depending on the frequency measured by the 1140-interface.' It has two input fields: 'Set input current limit to 3.0 A when frequency is lower than 20.00 Hz' and 'Set input current limit to 10.0 A when frequency is higher than 200.00 Hz'. It includes a note: 'Regulate the input current limit linearly between these values when the frequency is between the specified frequencies.' There are 'Cancel', '<<', and '>>' buttons.
- Remote generator select:** A window titled 'input current limit control' with the subtitle 'Remote generator select'. It asks 'Specify whether or not you want to use the remote panel generator select option.' It has two radio button options: 'Do not use remote panel's generator select option' (selected) and 'Use the remote panel's generator select option'. It includes a note: '(When you are using a Multi (not a Quattro) in combination with a remote panel for regulating the input limit you will probably want to select this option. Refer to the manual of the remote panel for more info about this "generator" feature.)'. There are 'Cancel', '<<', and '>>' buttons.



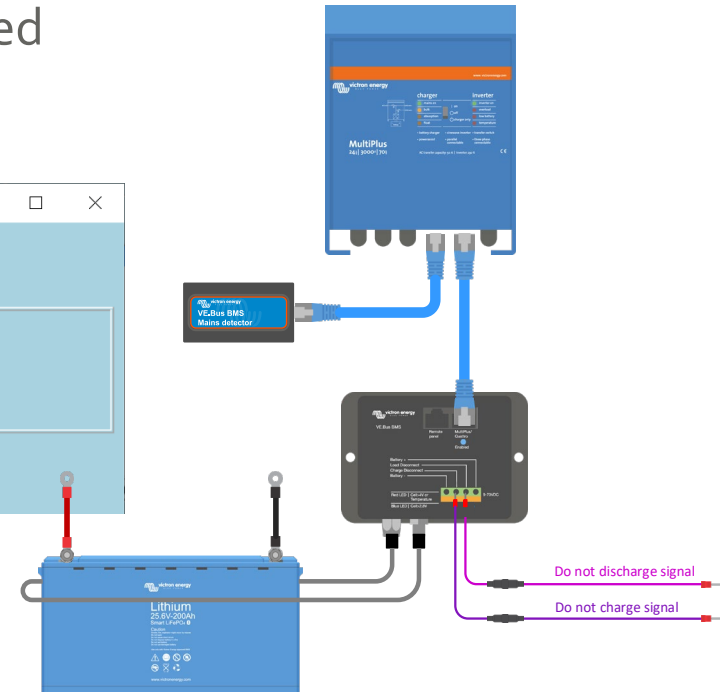
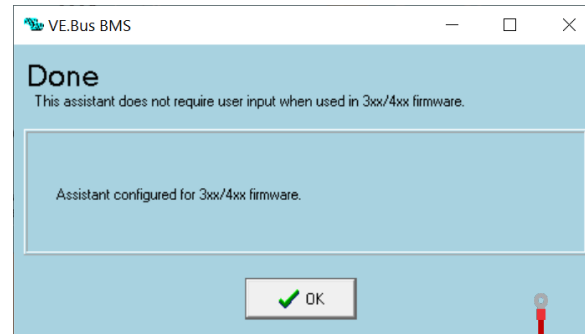
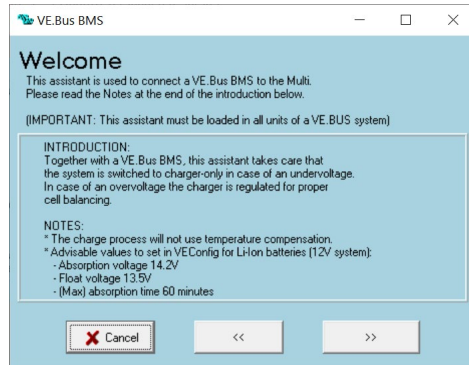
# Silence Fan

Use to silence the fan in the Multi under selectable circumstances



# VE.Bus BMS Assistant

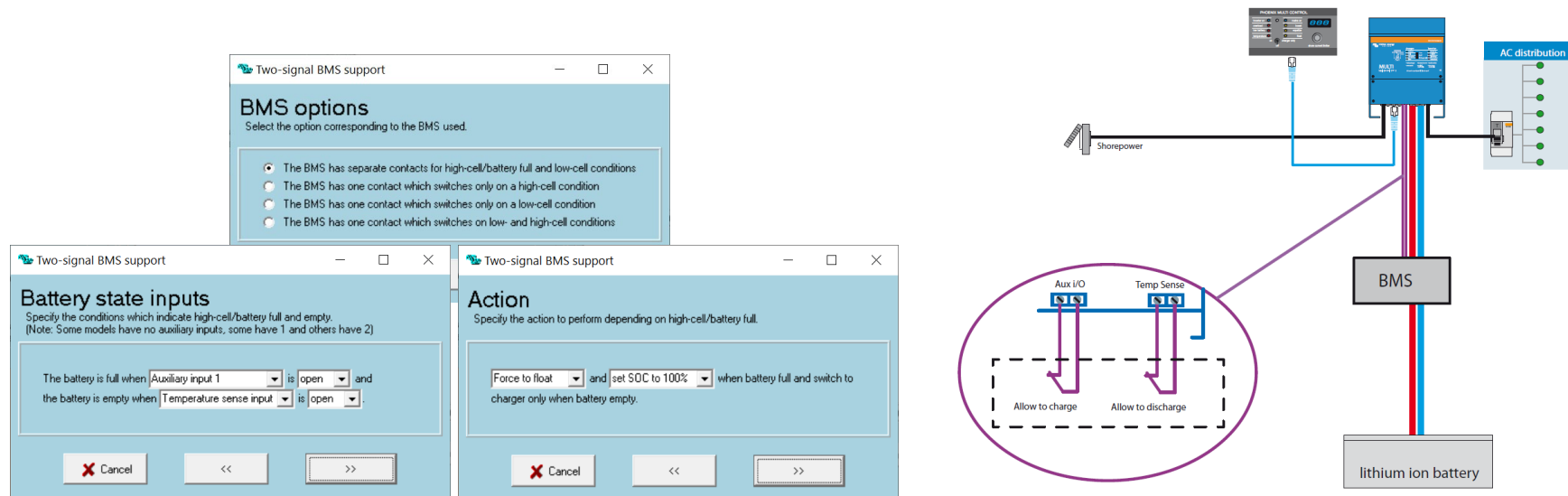
Use to tell Multi that a VE.Bus BMS is connected



# Two wire BMS support

Use to for two signal lithium BMS

- The AUX or Temp sense ports are used to communicate with the BMS

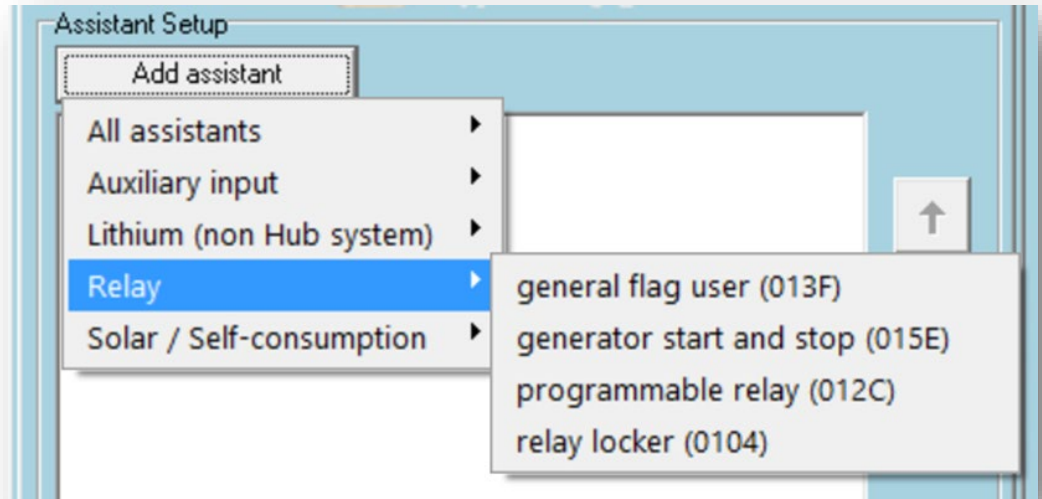


# Relay Assistants



# Relay assistants

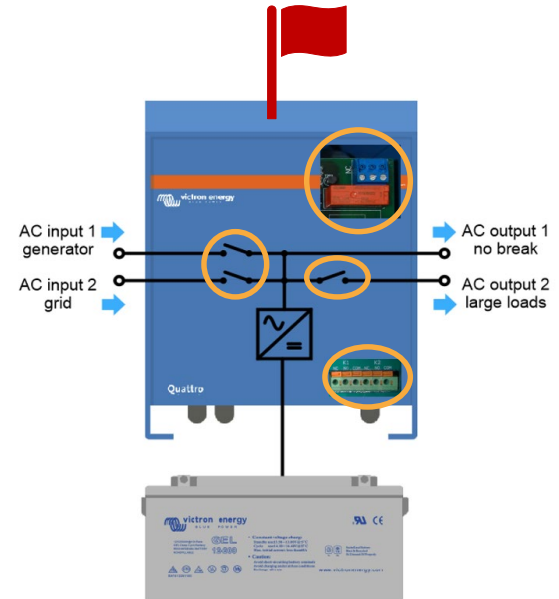
- Programmable relay
- Relay locker
- General flag user
- Generator start and stop



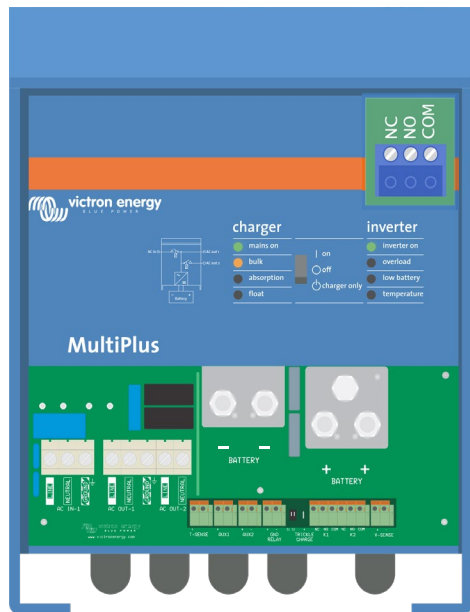
# Relay assistants

These assistants drive a relay, an open collector or a software flag:

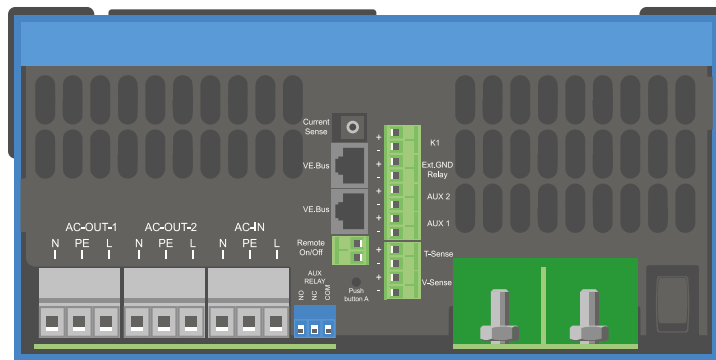
- Programmable relay
- K relays or open collector
- AC2 output relay
- AC input relays via the Flag



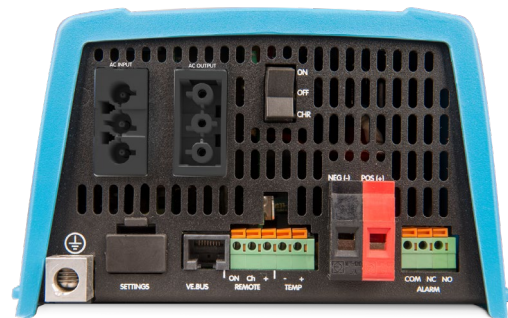
# Location of relays and ports



MultiPlus and Quattro



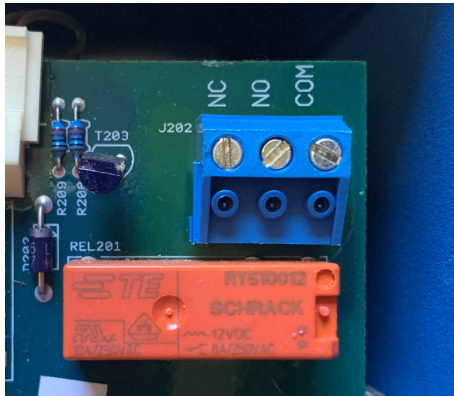
MultiPlus II



Small MultiPlus

# Programmable relay

- A relay acts as a switch, It makes and breaks a contact
- It is activated by a signal from the Multi

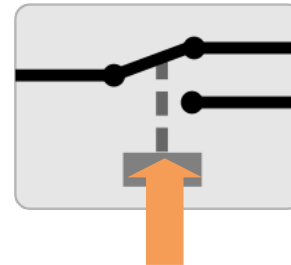


MultiPlus + Quattro



MultiPlus II

C=Common

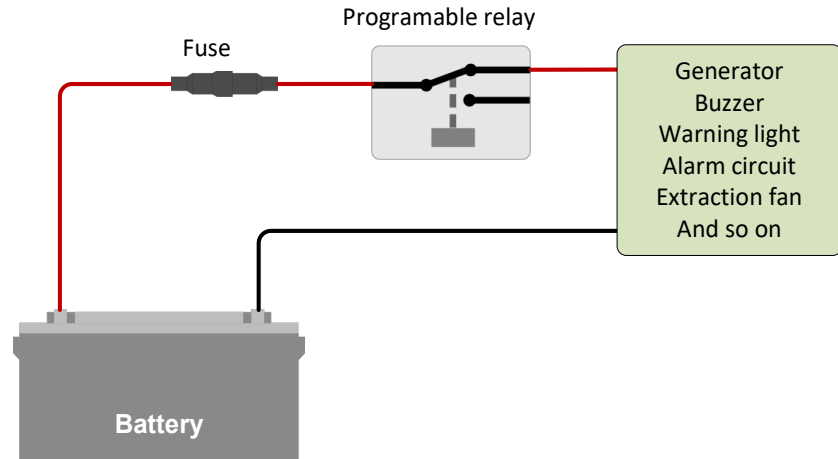
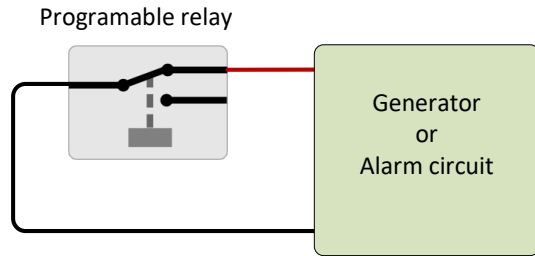


NC = Normally Closed

NO = Normally Open

Relay is driven  
by logic from  
Multi CPU

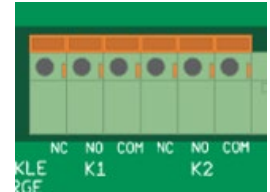
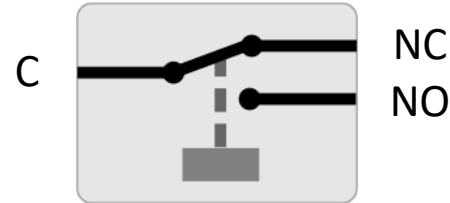
# Usage examples



# Secondary K relays

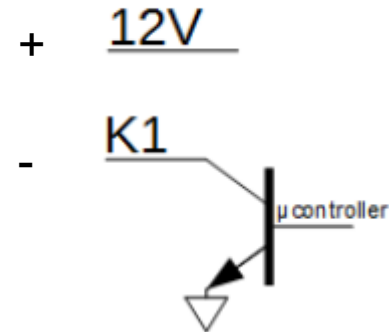
MultiPlus en Quattro:

- Relay: Like the programable relay

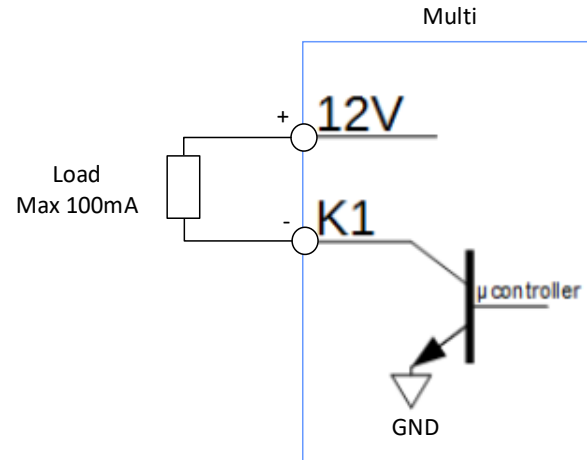
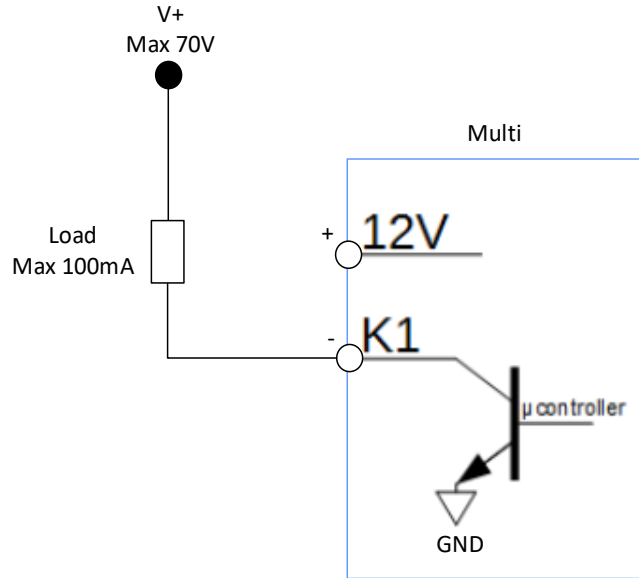


MultiPlusII

- Open collector
- + 12V 100mA supply
- open collector 70V 100mA



# Usage example open collector



# AC input and AC output

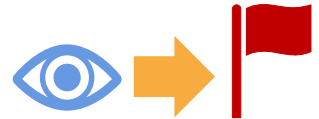




# General flag

- This is a software marker
- It is used to relay a message from one location to another location

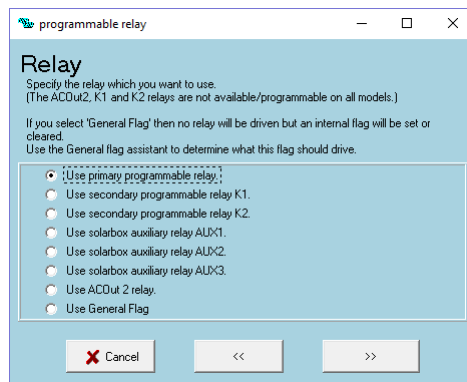
- One process raises the flag
- And the other process performs an action when it sees that the flag is up
- We use the flag for driving the AC inputs or AES mode
- The relay assistant drives the status of the AC inputs or AES mode via the general flag.



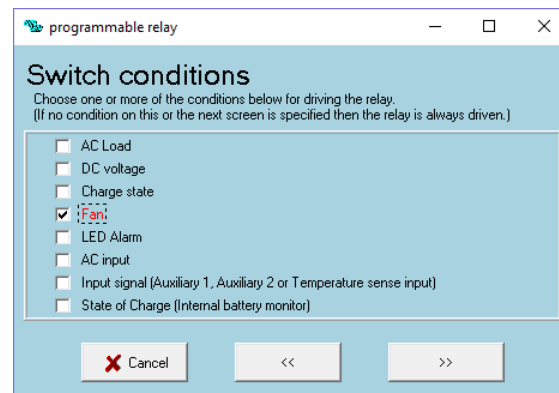
# Programmable relay Assistant

Use to drive to drive these relays:

- Programmable relay
- K relays
- ACout2 relay
- General flag



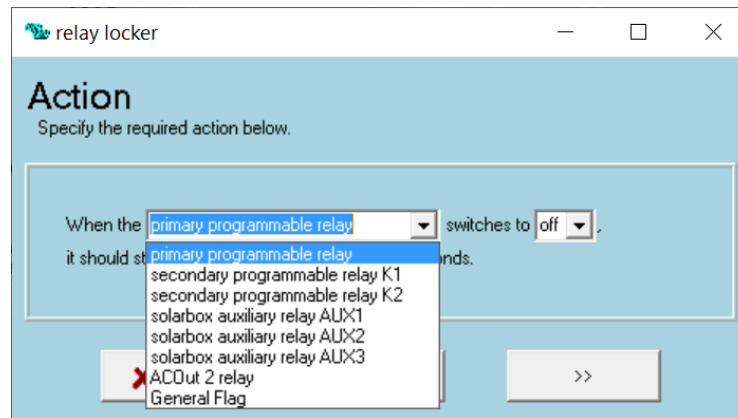
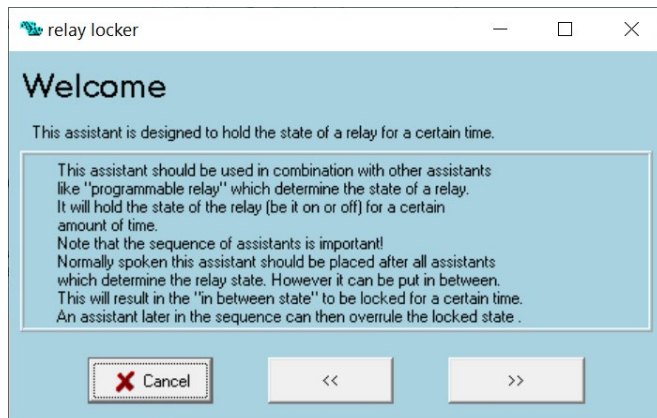
Using these parameters:



Note: two assistants are needed, one to turn relay on and another to turn relay off

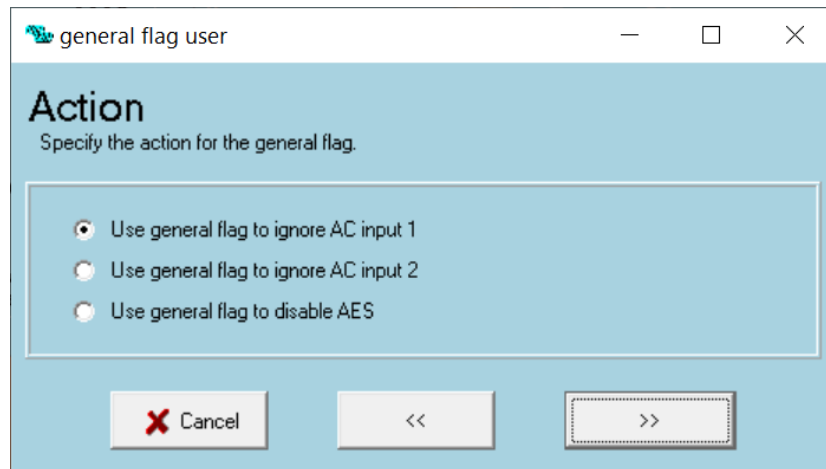
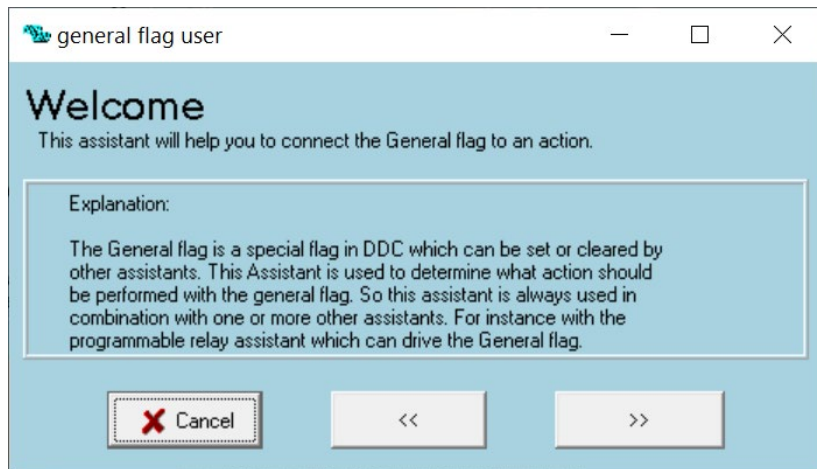
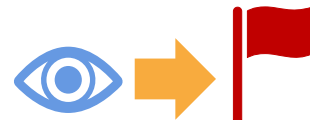
# Relay locker Assistant

Use to hold the state of a relay for a certain time



# General flag user

Is needed to connect one or more assistant(s) to a flagged action



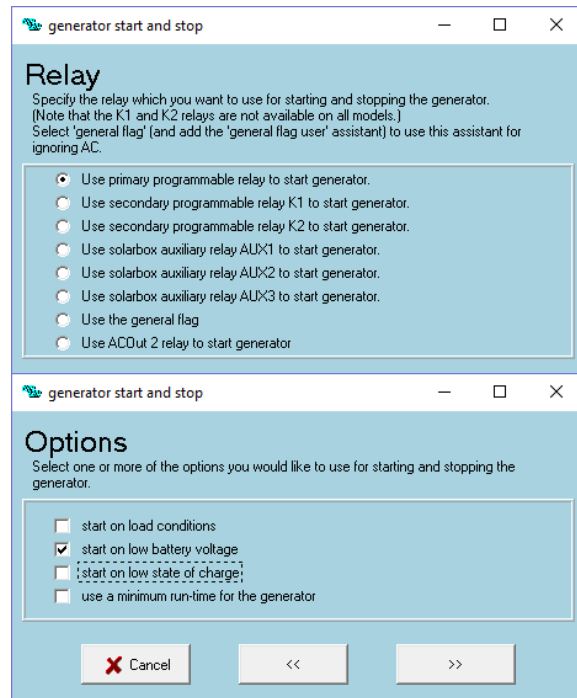
# Generator start and stop Assistant

This assistant is used for starting a generator

**Note:** if the system has an GX device consider using its generator relay instead

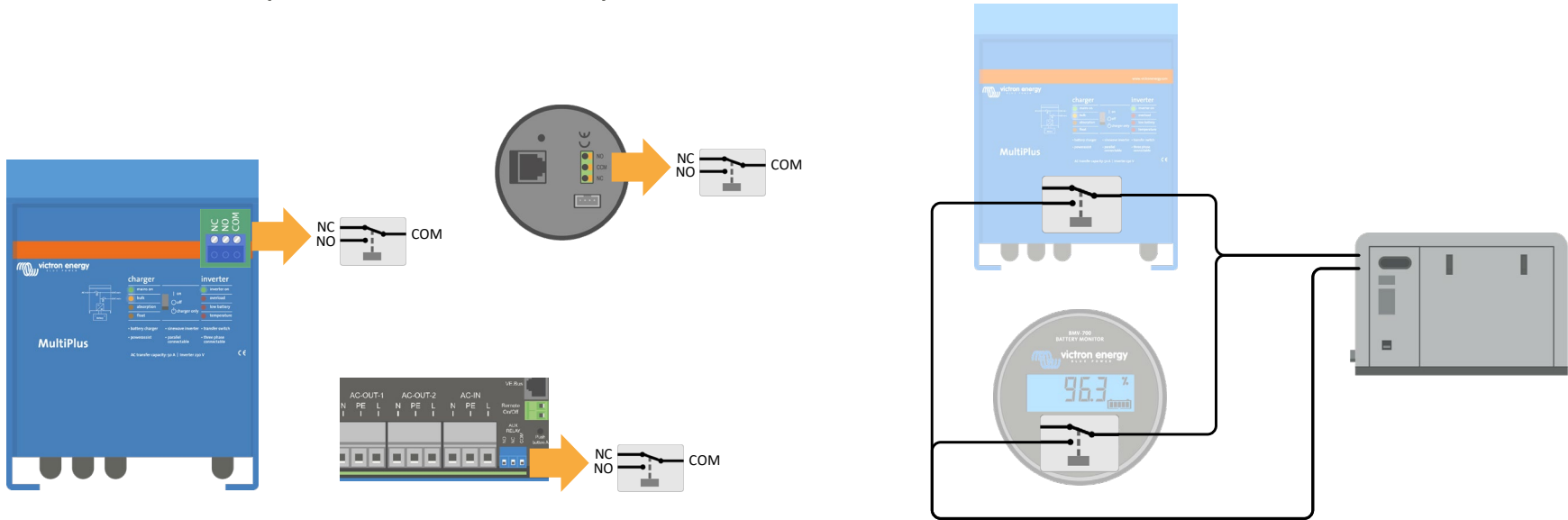
Generator assistant can also be used for:

- Selectively letting grid in.
- To turn on a dump load once the batteries are full
- To turn of a grid feed inverter connected to output 2 of a Quattro
- To drive a contactor to turn a grid feed inverter off



# Generator start stop using both BMV and Multi

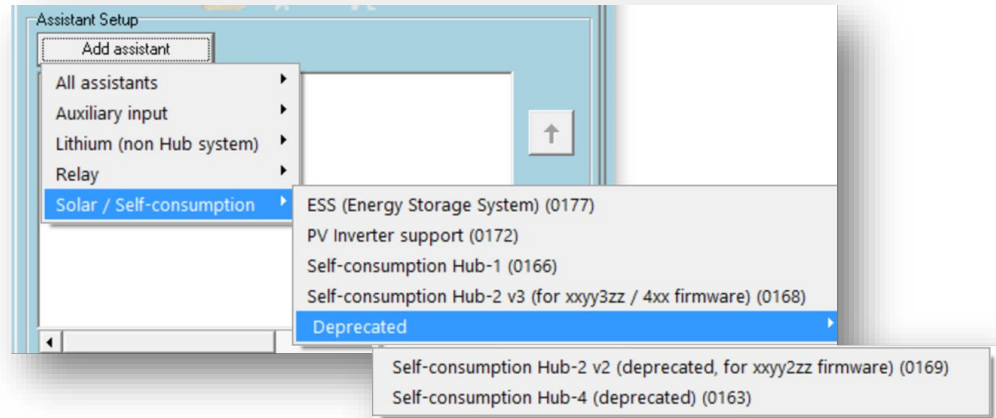
- The inverter/charger and BMV relays can be used together to start/stop a generator
- Wire the open contacts (NO) in parallel to each other



# Solar assistants

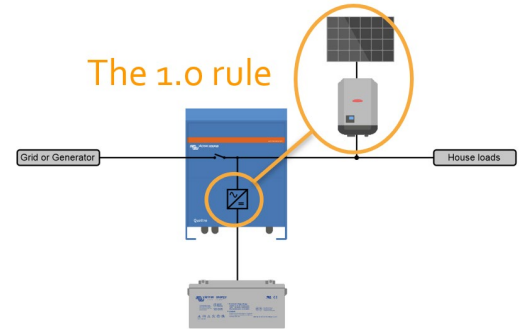
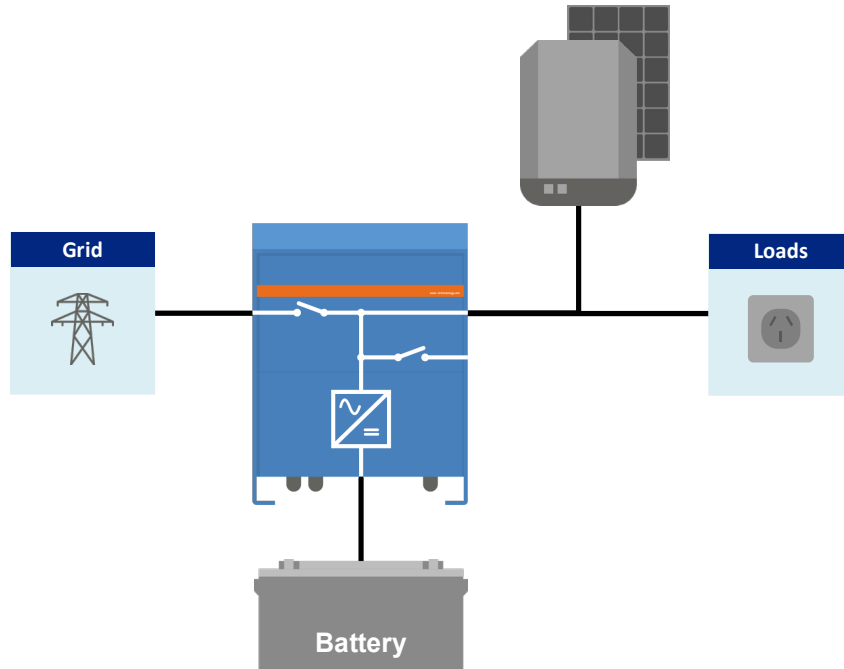
# Solar assistants

- PV inverter support
- ESS (Energy Storage System)
- Hubs for older units





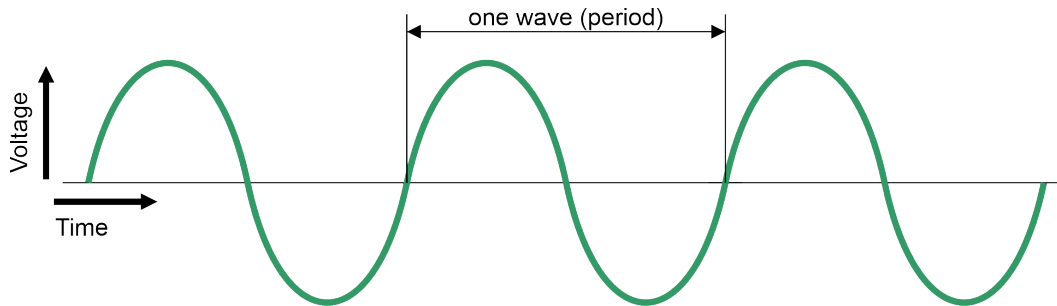
# AC coupled PV inverter



The power rating of the PV inverter (or array) must not be more than the power rating of the Multi or Quattro

# What is frequency?

Frequency (Hz) is the number of waves (periods) per second



50Hz is 50 periods per second - One period is  $1/50 = 20\text{ms}$

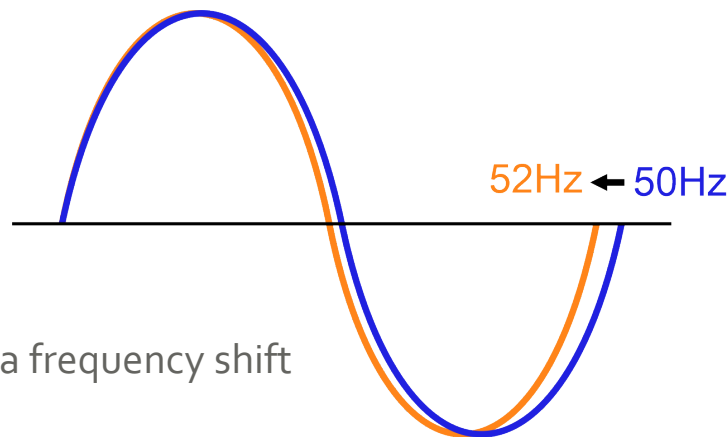
Make period time  ms (=  Hz)

52 Hz is 52 periods per second - One period is  $1/52 = 19.2308\text{ ms}$

Make period time  ms (=  Hz)

# What is frequency shift

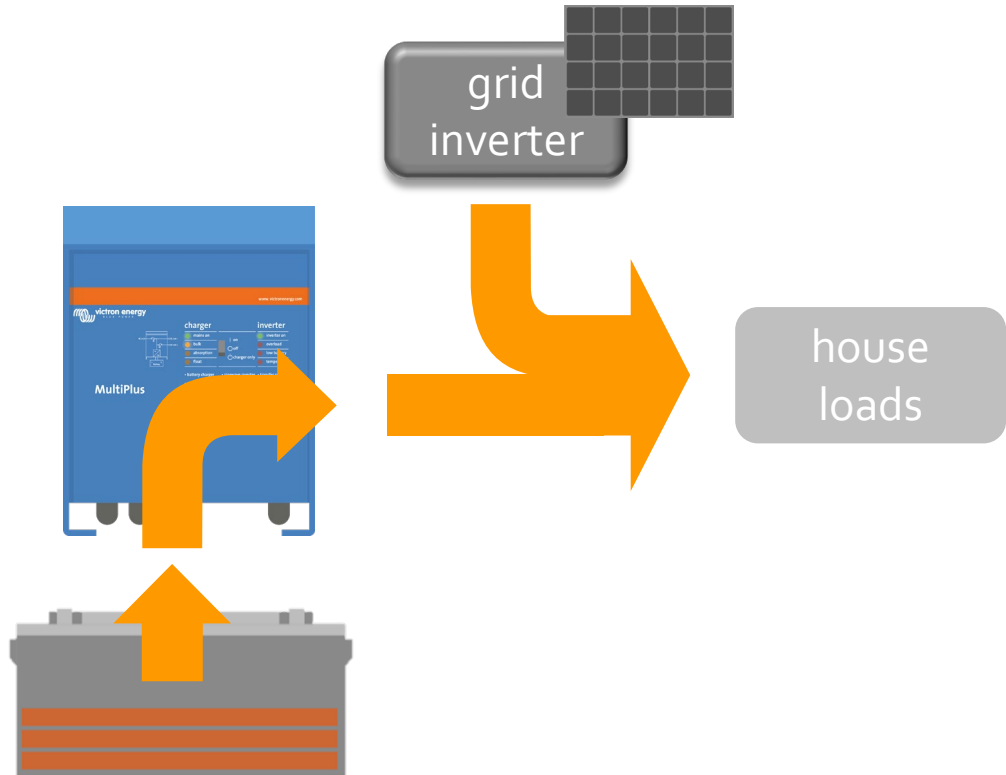
- Frequency shift is a change in frequency, going from a lower to a higher or back from high to low. For example from 50Hz to 52Hz and back to 50 Hz
- This is used to communicate with PV inverters



- The PV inverter needs to be able to listen and act on a frequency shift
- All 4777 rated PV inverters have it build in
- Older style PV inverters might not

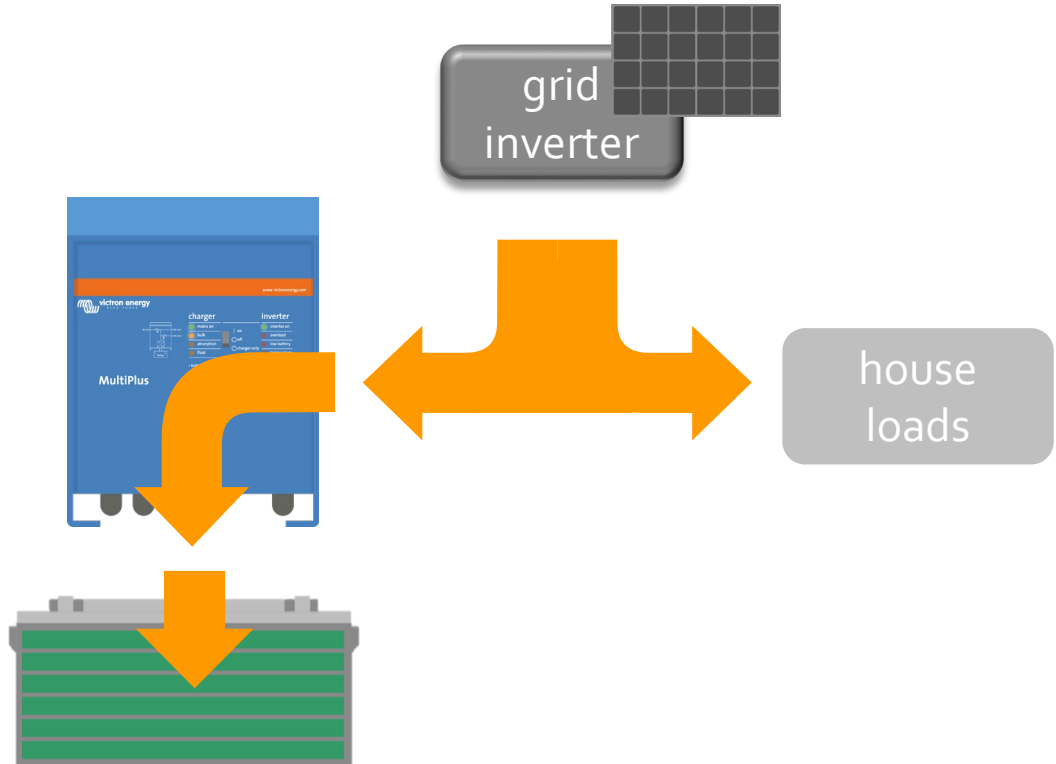
# Frequency shift explained

- The grid inverter and the Multi are both supplying the house loads



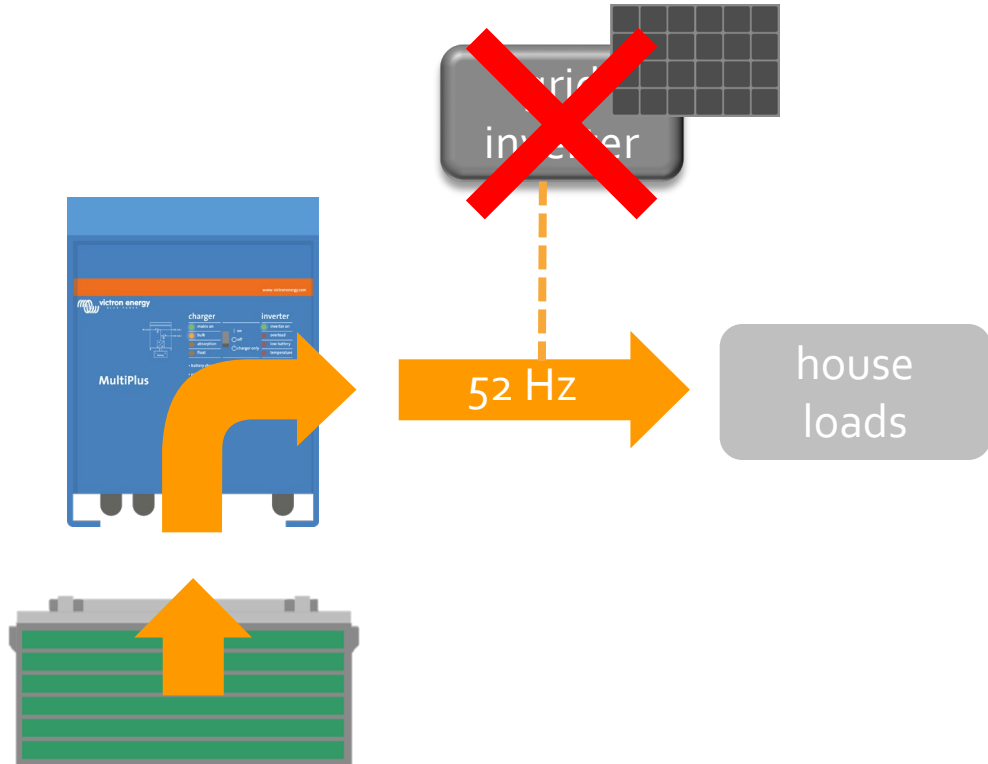
# Frequency shift explained

- When the grid inverter supply exceeds the house loads the batteries will be charged



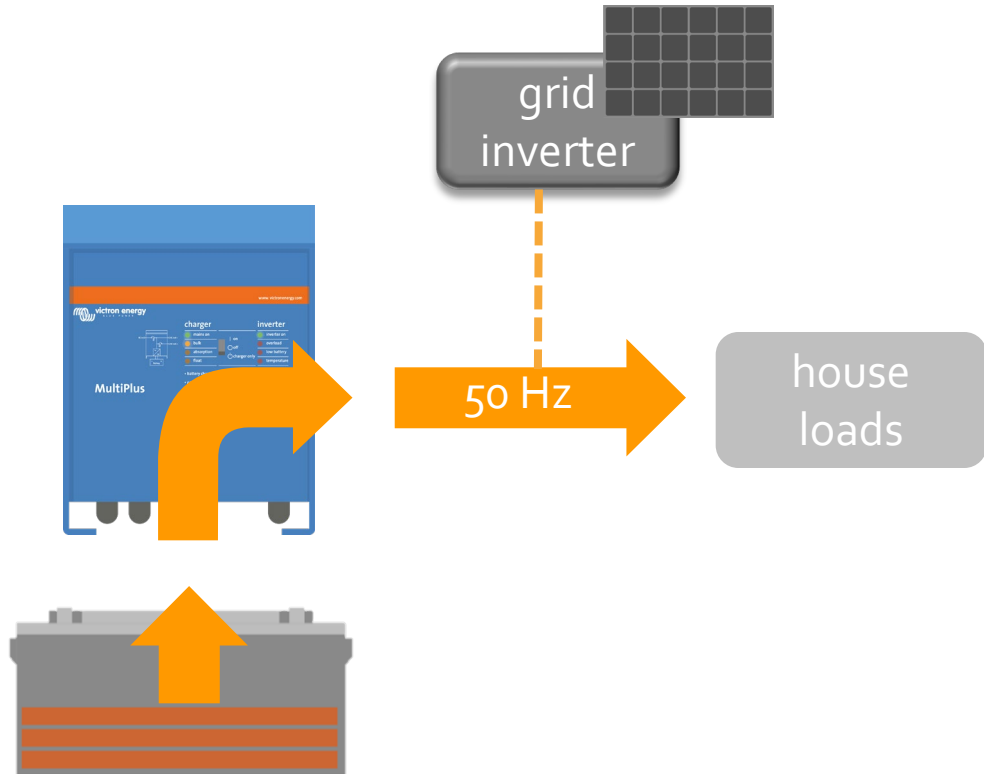
# Frequency shift explained

- When the battery is full the Multi changes its output frequency
- The grid feed inverter turns off when it detects a frequency change



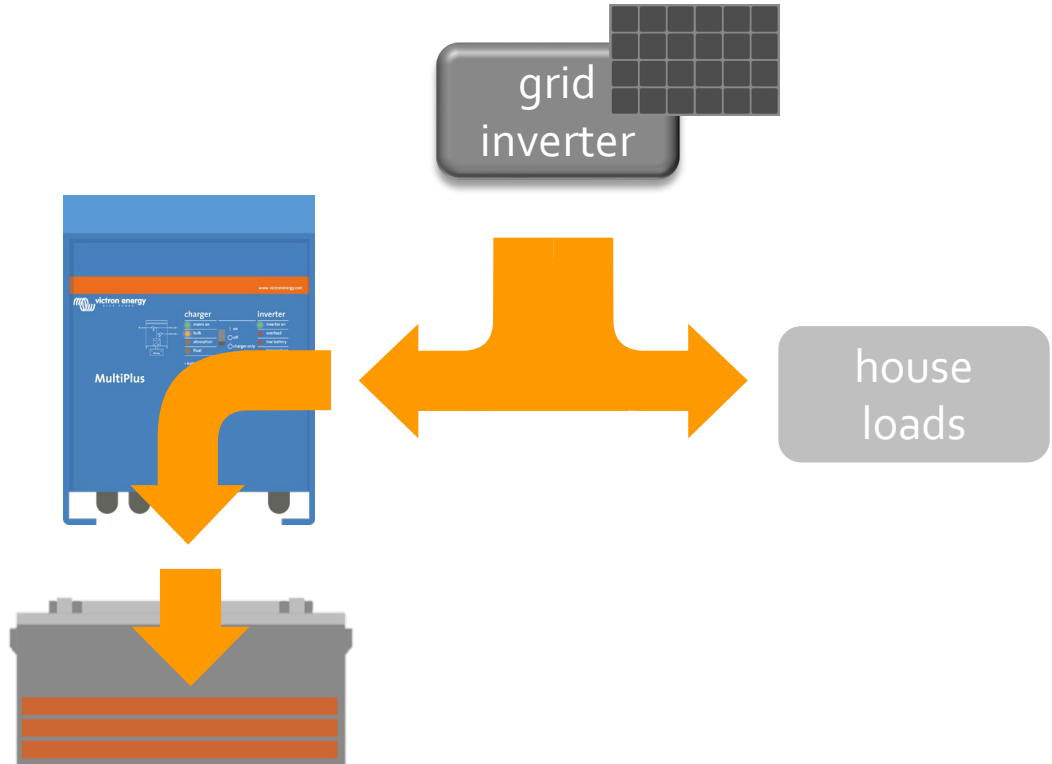
# Frequency shift explained

- Once the batteries empty again the Multi changes its output frequency back to 50Hz
- The grid feed inverter turns back on



# Frequency shift explained

- Once the grid feed inverter has turned back on the house loads will be fed from solar power
- Now the batteries will be charged again

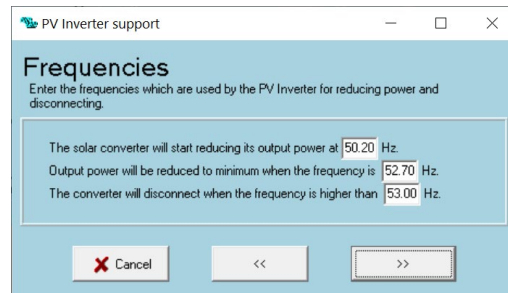




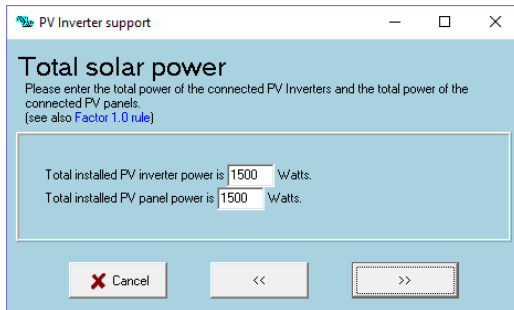
# PV inverter Assistant

Use to turn the PV inverter off and on via a frequency shift depending on battery voltage

- Always check if the PV inverter can switch on or off based on a frequency shift
- Battery overcharge will occur if this system is set up incorrectly
- The Factor 1:0 rule: Do not install more KW solar than the KW rating of the Multi or Quattro



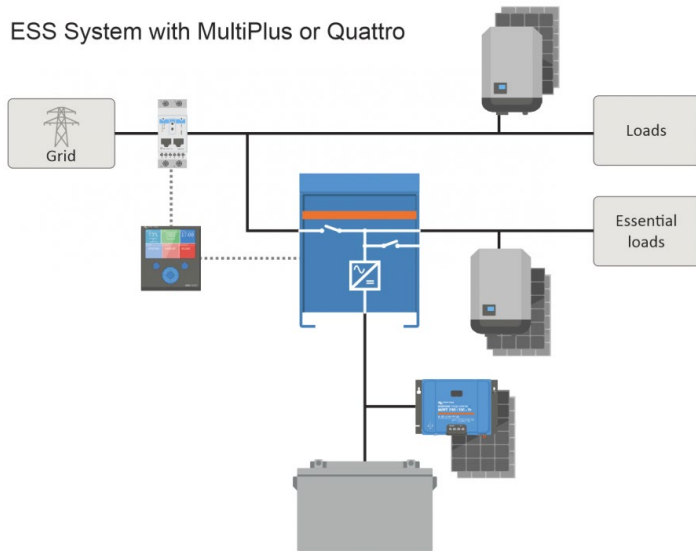
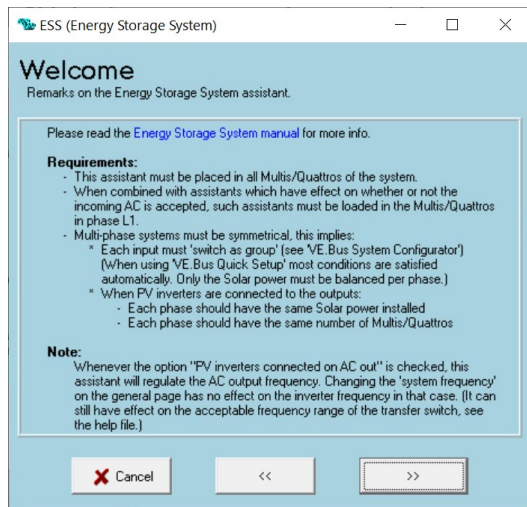
The screenshot shows the 'Frequencies' window of the 'PV Inverter support' application. The window has a title bar with the application name and standard window controls. The main content area is light blue and contains the following text: 'Enter the frequencies which are used by the PV Inverter for reducing power and disconnecting.' Below this, there are three lines of text with input fields: 'The solar converter will start reducing its output power at 50.20 Hz.', 'Output power will be reduced to minimum when the frequency is 52.70 Hz.', and 'The converter will disconnect when the frequency is higher than 53.00 Hz.' At the bottom of the window, there are three buttons: a 'Cancel' button with a red 'X' icon, and two navigation buttons labeled '<<' and '>>'.



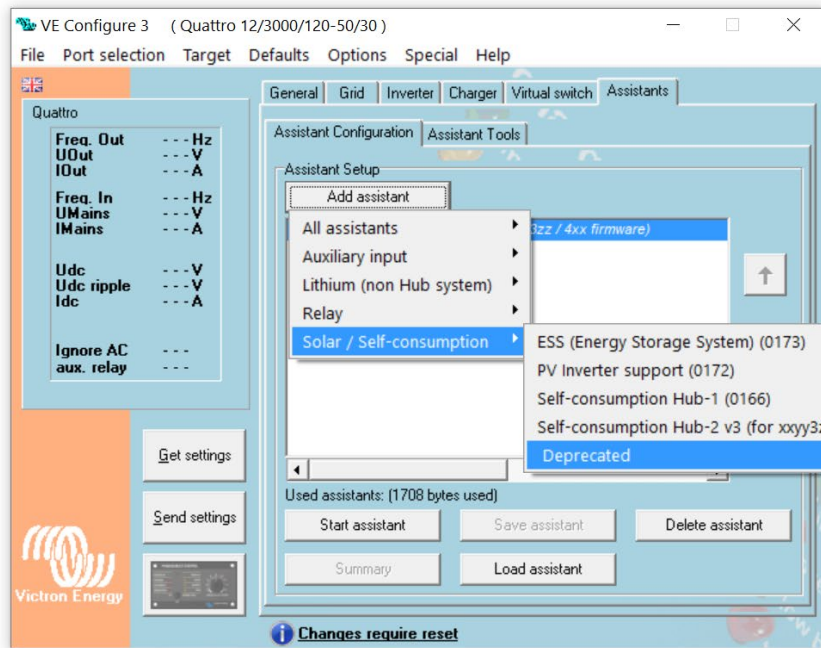
The screenshot shows the 'Total solar power' window of the 'PV Inverter support' application. The window has a title bar with the application name and standard window controls. The main content area is light blue and contains the following text: 'Please enter the total power of the connected PV Inverters and the total power of the connected PV panels. (see also [Factor 1.0 rule](#))'. Below this, there are two lines of text with input fields: 'Total installed PV inverter power is 1500 Watts.' and 'Total installed PV panel power is 1500 Watts.' At the bottom of the window, there are three buttons: a 'Cancel' button with a red 'X' icon, and two navigation buttons labeled '<<' and '>>'.

# ESS (Energy Storage System) assistant

Assistant and GX device programming needed and grid feed needs to be enabled  
See [ESS quick start guide](#) on our website. If you can't find the link just "google" it.



# Self consumption Hub assistants



- Only for old systems
- **Some are deprecated**
- Consider using ESS or ignore AC



Energy. Anytime. Anywhere.