

MultiPlus-II external transfer switch manual

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Revision 3

2024-06-20

Introduction

This manual explains how to install and configure a system using an external contactor (transfer switch) instead of the Multiplus-II built-in relays.

Using an external transfer switch reduces wiring costs and installation time.

This solution is intended for generator-based systems only and cannot be used with grid-tied systems as it is not certified for such use.

Requirements and compatibility

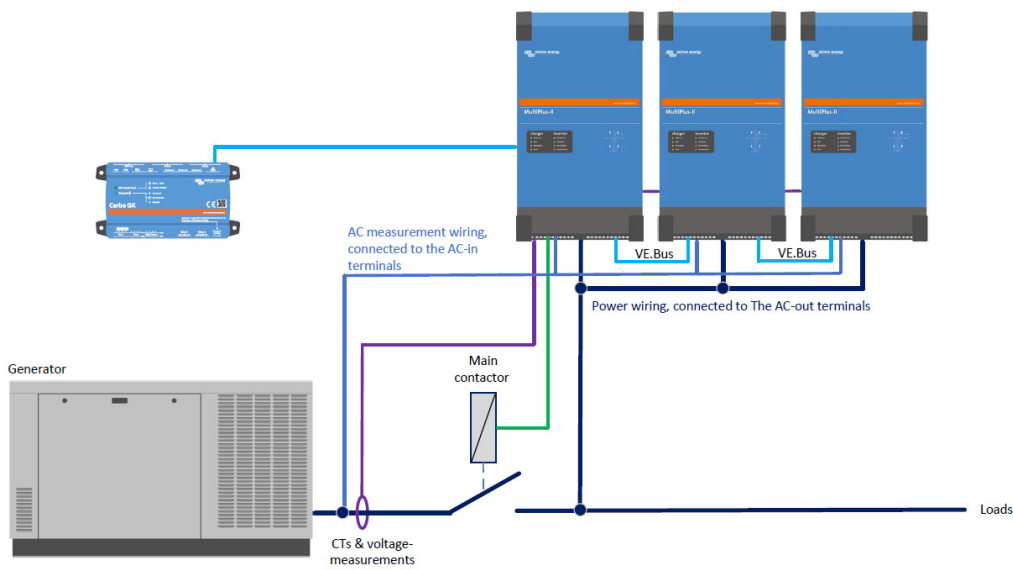
- Compatible with all MultiPlus-II models rated 5000VA and above.
- Maximum number of units is 12, 4 per phase. Maximum systems size is this 180kVA.
- Only one AC input source is supported
- Current transformer and contactor rating of 100A or 400A.
- Requires application-specific VE.Bus firmware, version S99.

Additional hardware requirements

1. **High current 4 pole contactor:** The external transfer switch.
2. **Ground relay:** High current single pole relay.
3. **Relay Rated for 230V with 24V Coil:** A relay with these specifications is necessary for controlling the ground relay. The 24V coil allows it to be activated by the lower voltage control circuit inside the MultiPlus-II.
4. **Victron Current Transformer:** This component measures the current in a circuit and is essential for monitoring and managing power usage accurately.
5. **1.5 mm² wire and four-pole circuit breaker:** This ensures that the whole circuit is protected.

See the installation chapter for details.

Single line diagram



See the appendix for the full-size connection diagrams.

Warnings

Parallel and Multiphase systems are complex. We do not support or recommend that untrained and/or inexperienced installers work on these size systems.

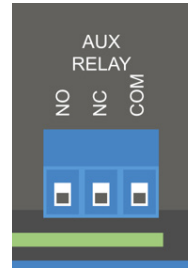
Double-check the wiring before the system's initial power-up. Wiring mistakes can damage the MultiPlus-II units.

Installation

External transfer switch

Use a Schneider LC1G3304 TeSys Giga, 4-pole (4NO), AC-1 $\leq 440V$ 440A contactor

Connect the coil directly to the NO and COM terminals of the MultiPlus-II "AUX RELAY" of the L1 phase master unit.



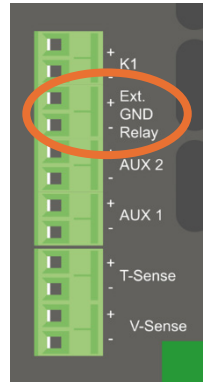
Do not use a different contactor, as closing and opening times differ per brand and model.

Ground relay

The ground relay drive signal is supplied by the MultiPlus-II "Ext GND Relay" terminals of the L1 phase master unit.

The "Ext GND Relay" output signal is limited to 24V / 200mA, so an extra relay with a 24V coil that switches the actual ground relay must be installed.

The ground relay rating must match the total inverter power of the system.



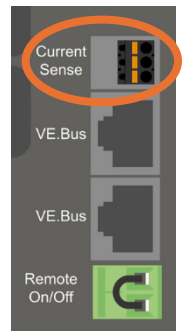
Current transformers

Connect the current transformers for L1, L2, and L3 to the "Current Sense" inputs on the respective phase master MultiPlus-II units.

Remove the wire bridge between the INT and COM terminals. Connect the red sensor wire to the EXT terminal and the white sensor wire to the COM terminal. Ensure the wire direction through the current sensor follows the arrow pointing towards the Multi.

To prevent signal interference, avoid routing current sensor wiring parallel and close to AC power wiring. This applies to all signal wires, including the VE.Bus cables.

Note that the higher rating of 400A sensors reduces current sense resolution, especially at low currents.



Compatible current transformers:

- CRT12xxxx Current Transformer 100A:50mA for MultiPlus-II Wire-end (available in 1.5 and 20m cable length)
- CTR140050100 Current Transformer 400A:50mA for MultiPlus-II (10m) Wire-end (the current sensor wiring can be extended up to 20m using 0.75mm² wire)
- CRT11xxxx Current Transformer 100A:50mA for MultiPlus-II Jack connector (for older MultiPlus-II units, available in 1.5 or 20m length)

For further details: <https://www.victronenergy.com/meters-and-sensors/current-transformer-for-multiplus-ii>.

AC Wiring

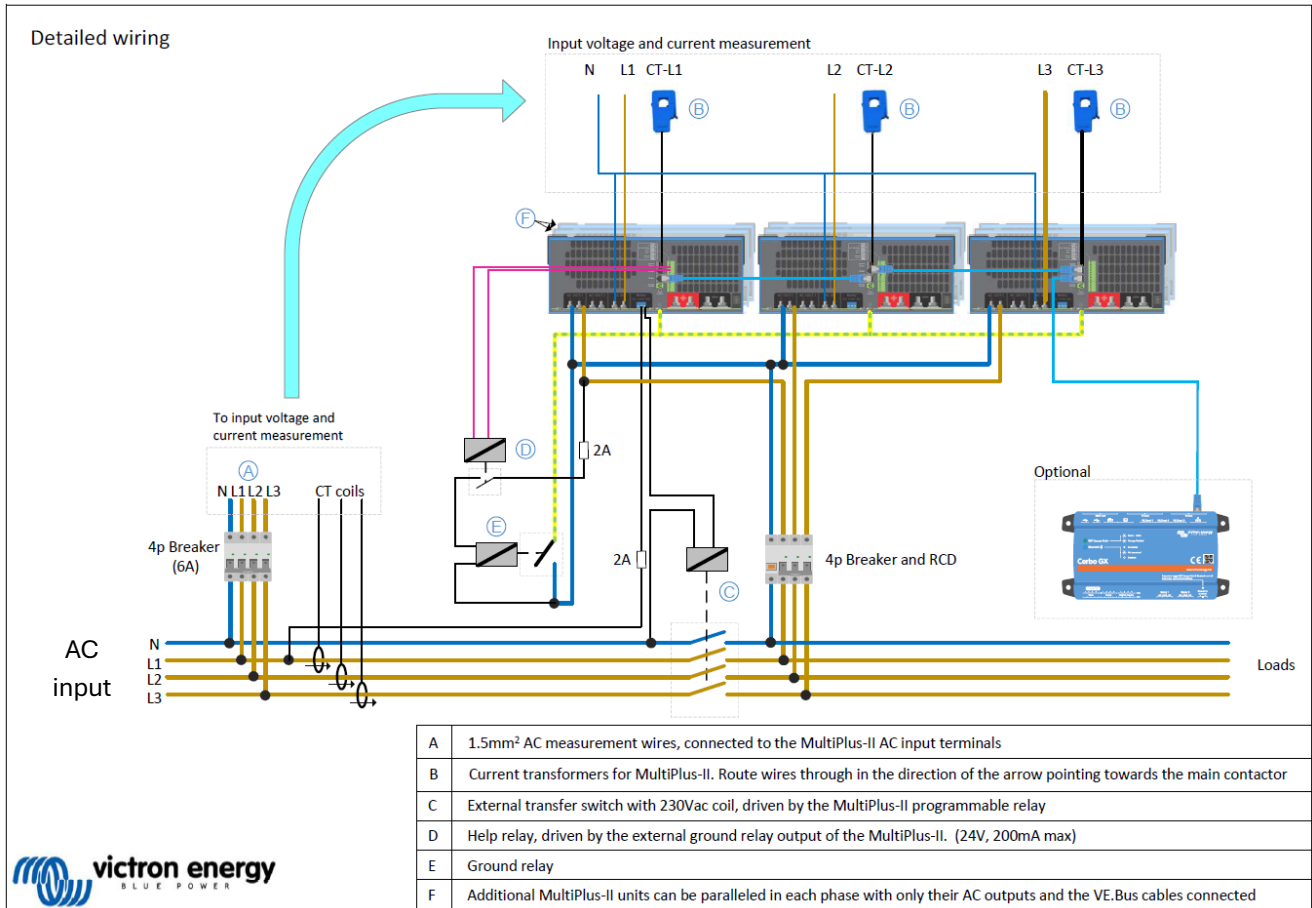
In this application, inverter current flows through the AC outputs of the MultiPlus-II units, so the external transfer contactor wiring diameter must be appropriately sized and symmetrical.

Protect the AC output wiring with a circuit breaker suitable for the expected load and wire gauge. Fuse both line and neutral wiring.

The wiring to the AC inputs of the phase masters acts as measuring/sense wires. Since the Multi firmware will not drive its internal back-feed relay, these wires can be relatively thin, such as 1.5mm². Fuse the line and neutral wires using 6A four-pole circuit breaker.

Leave the AC inputs on slave units unconnected.

Wiring diagram



(See full size diagrams in the appendix)

Configuration

Install S99 VE.Bus firmware

The external transfer switch application requires special VE.Bus firmware, identified by the ".S99" subversion number.

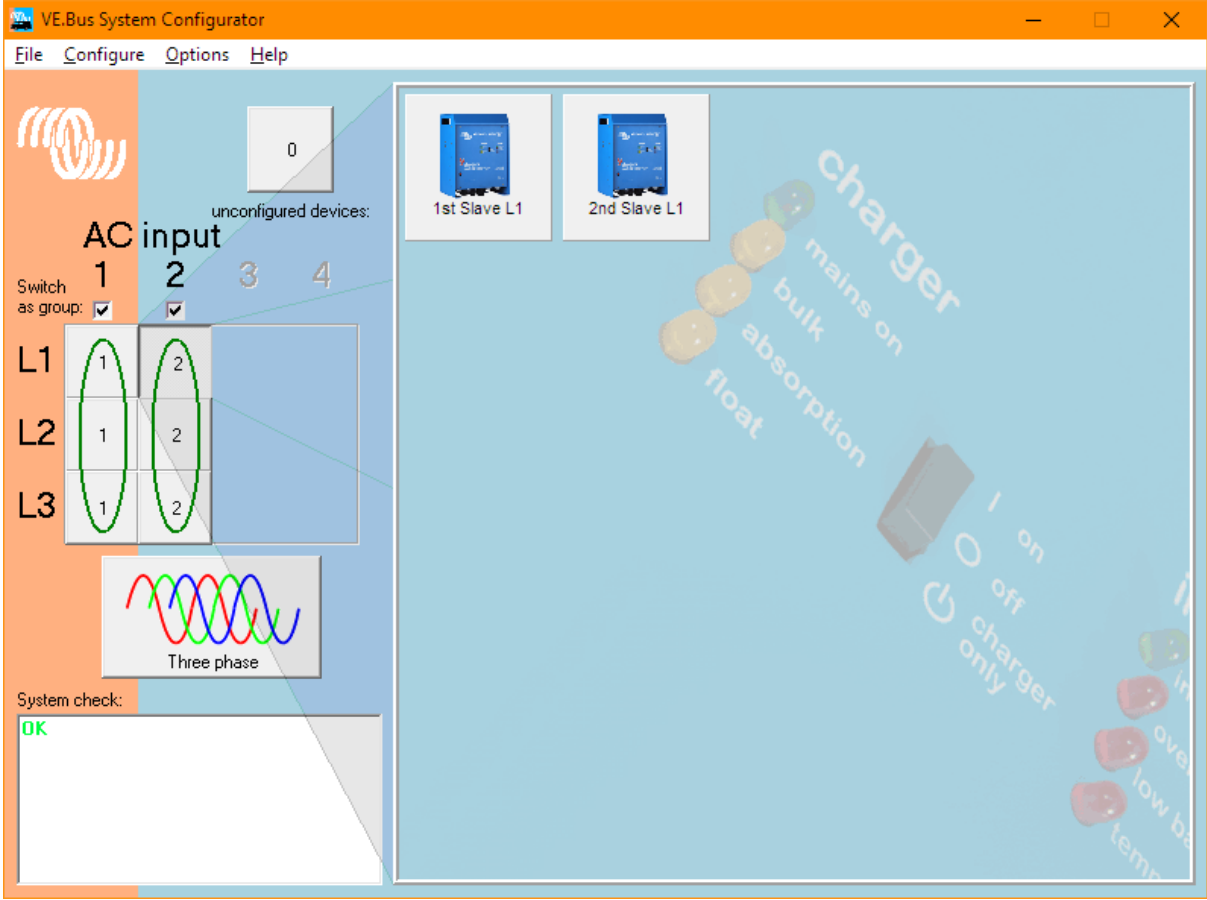
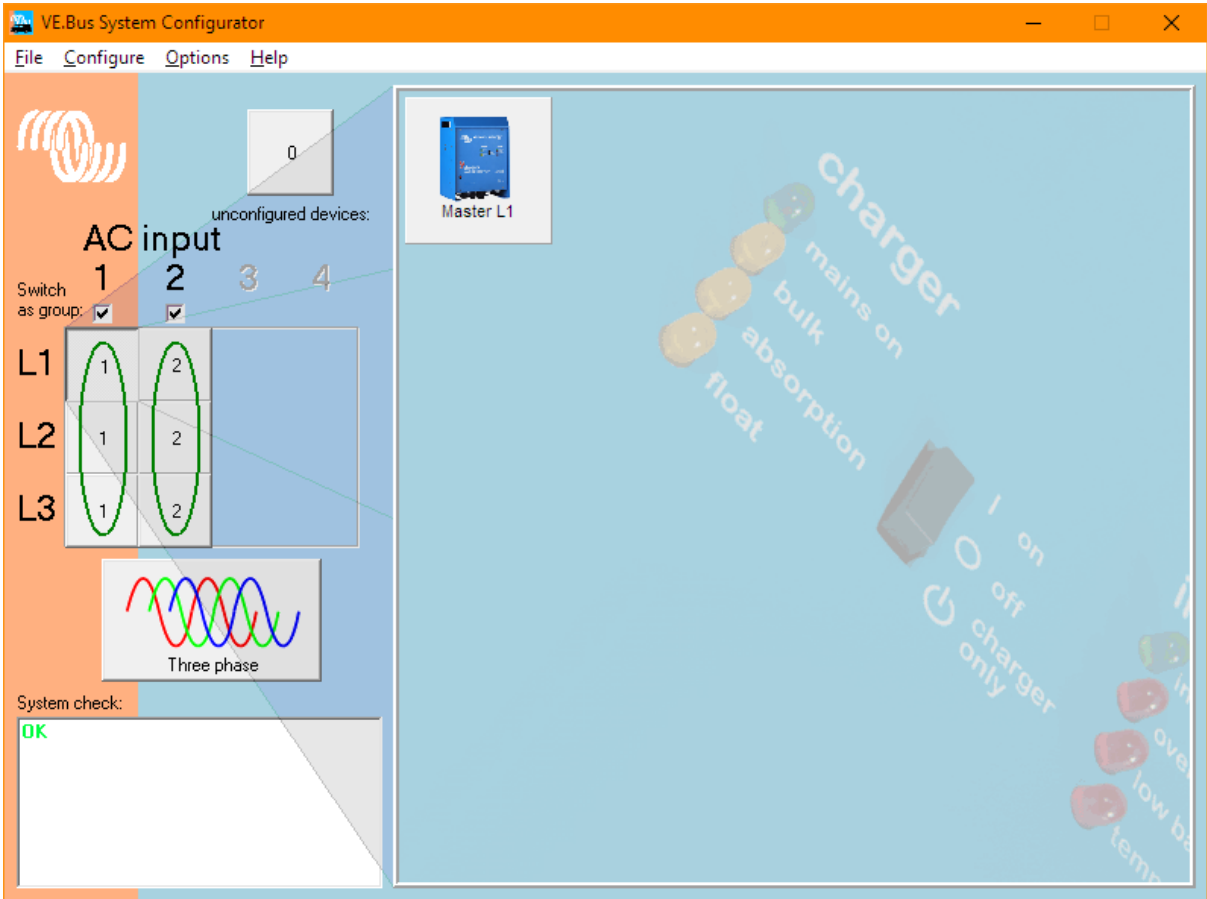
Download the xxxyy.S99.vff file from <https://professional.victronenergy.com/>

Install it using VEFash, the VictronConnect app, or via the VRM Portal. Make sure to select the xxxyy.S99.vff file.

Note: never update or upgrade systems with "External transfer switch" firmware using standard VE.Bus firmware, as this will cause the system to connect to the AC input and likely trigger the current protection on that measurement-only circuit.

VE.Bus System Configurator

Use the "VE.Bus System Configurator" to set up the system. Configure all phase masters in AC input group 1 and all slaves in AC input group 2, as illustrated in the following screenshots.

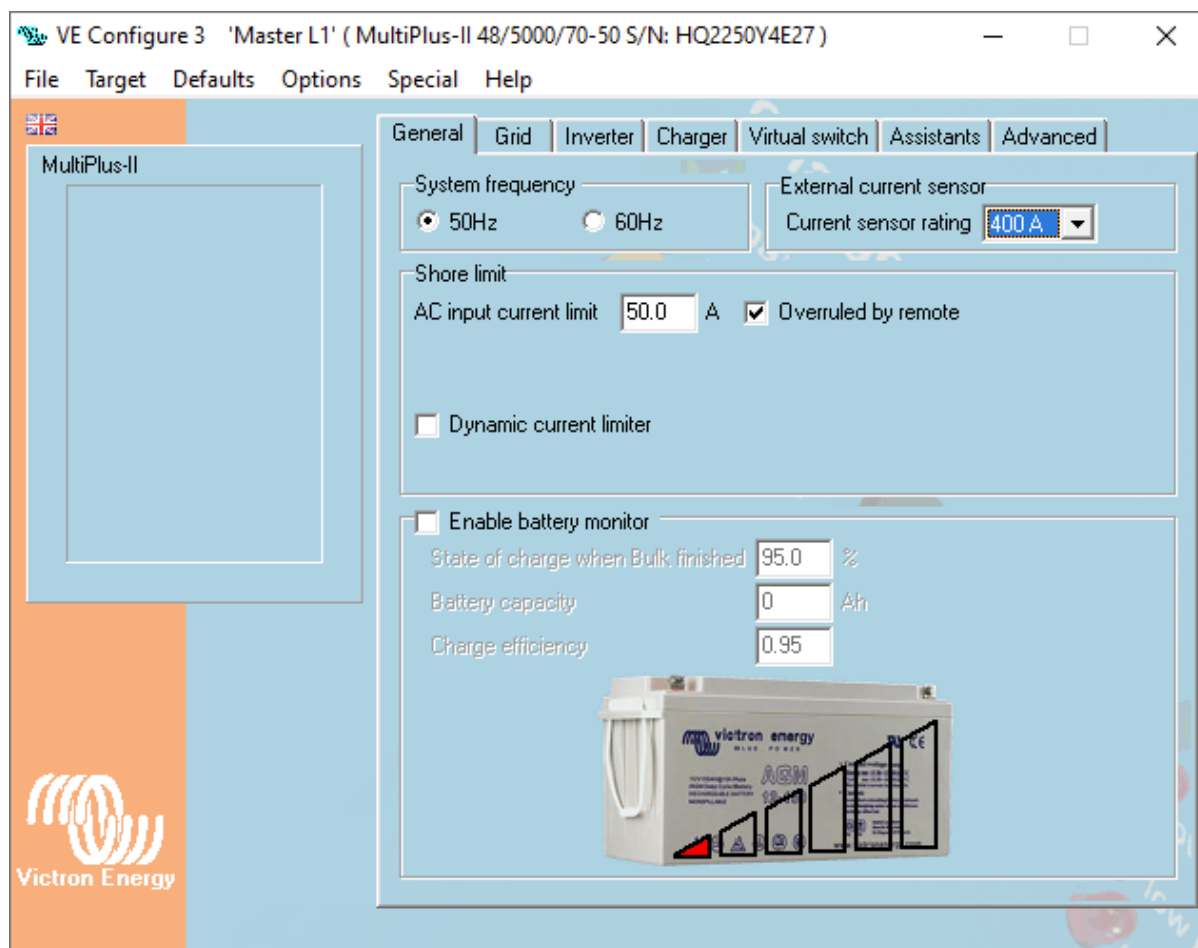


VE Configure

Use "VEConfigure" to select the correct current sensor rating for the L1, L2, and L3 phase masters (keep the sensor rating in the slaves at 100A).

With the correct "S99" firmware version, this setting is located in the "General" tab, as shown below. Currently, 100A and 400A current sensors are supported.

For all connected MultiPlus-II units, configure the grid codes in the "Grid" tab to be the same. Select "None" as the grid code.



Venus OS

If a GX device is used, it should be updated to Venus OS version 3.33 or later.

Troubleshooting

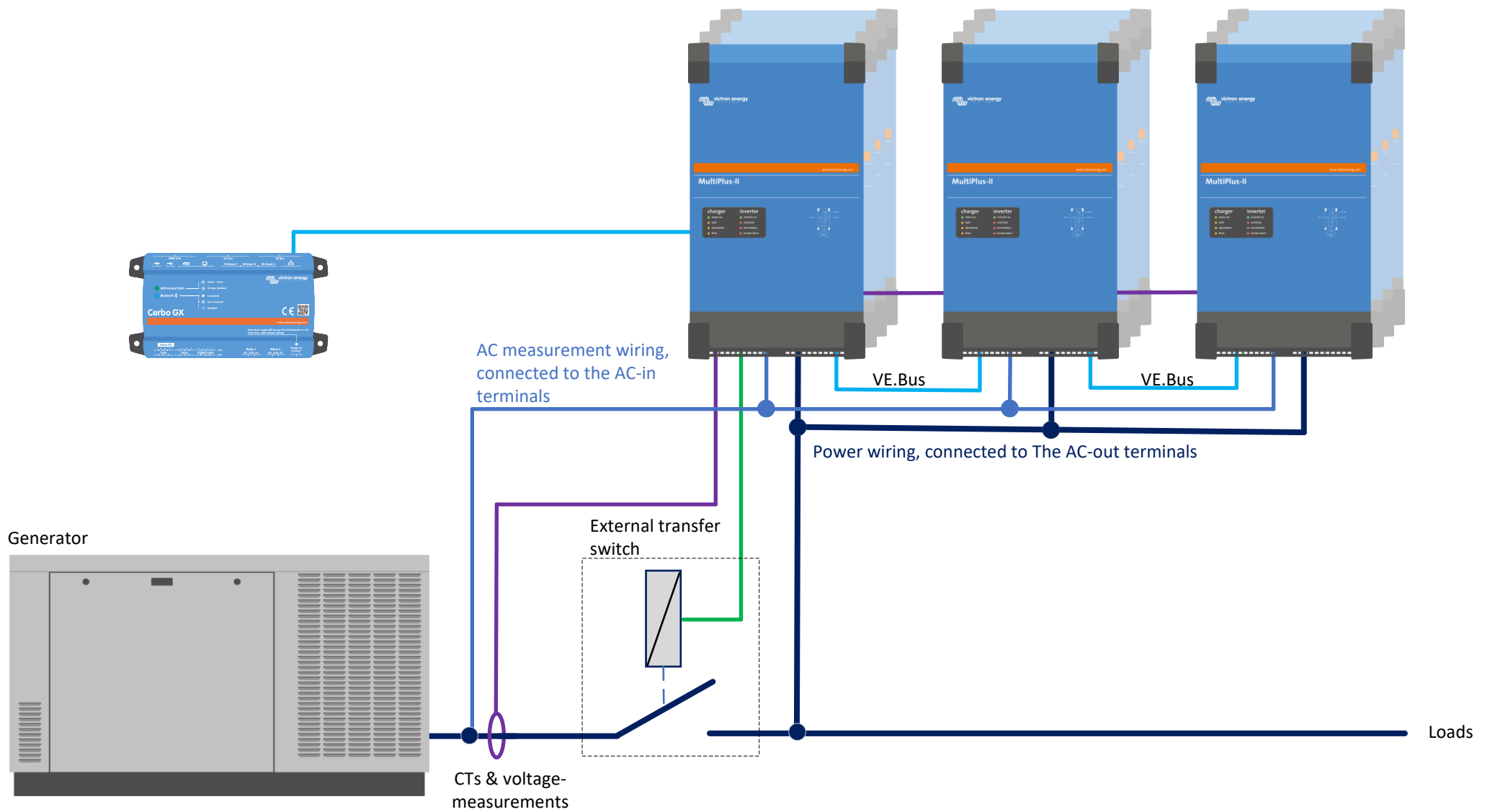
If the system exhibits strange behavior, check the following:

- Ensure the orientation of the current transformers is correct; the arrow on the CT should align with the direction of the arrow in the drawing: points from generator to the contactor.
- Verify the location of the current sensors: L1 should connect to the L1 unit, L2 to the L2 unit, and so on.
- Ensure the current sensor wires are not routed too close to AC or signal wires.

Known issues:

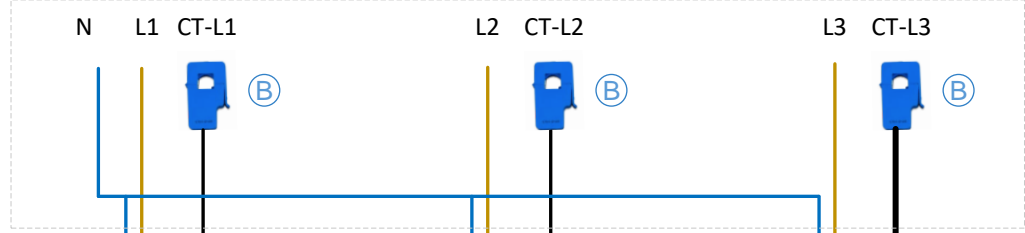
- The VRM kWh counters may show incorrect readings; this will be fixed in an upcoming version of Venus OS.
- The VictronConnect app cannot be used for system configuration and current sensor settings. Use VE.Configure and VE.Bus System Configurator instead.

External transfer switch conceptual diagram

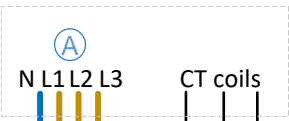


Detailed wiring

Input voltage and current measurement

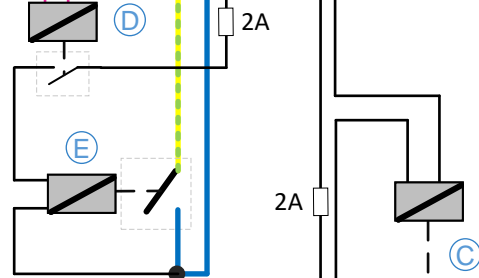


To input voltage and current measurement



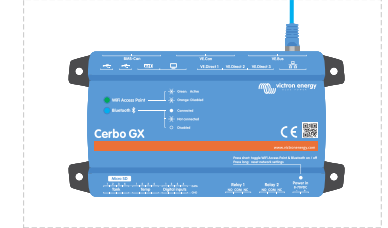
4p Breaker (6A)

Generator
N
L1
L2
L3



4p Breaker and RCD

Optional



Loads

A	1.5mm ² AC measurement wires, connected to the MultiPlus-II AC input terminals
B	Current transformers for MultiPlus-II. Route wires through in the direction of the arrow pointing towards the main contactor
C	External transfer switch with 230Vac coil, driven by the MultiPlus-II programmable relay
D	Help relay, driven by the external ground relay output of the MultiPlus-II. (24V, 200mA max)
E	Ground relay
F	Additional MultiPlus-II units can be paralleled in each phase with only their AC outputs and the VE.Bus cables connected