

MultiPlus Generator FAQ

What to do when a MultiPlus, or Quattro, does not accept generator power

Power supply from a generator is typically more variable than a power supply from shore or the main grid. The MultiPlus is sensitive to this and will reject power that is outside of its programmed settings causing the unit to not connect, synchronise or charge.

Selecting a Generator

Some generators are more suitable than others for use with inverter/chargers, please talk to your local Victron Dealer before purchasing a generator and they may be able to advise you on locally available units that have been tested and are known to be good.

For example; some things to look for when selecting a generator is a high quality alternator and AVR (auto voltage regulation).

AVR equipped generators will audibly struggle and eventually stall when overloaded, signalling there is an issue. They are also better able to cope with a brief high current load which would overload an inverter based generator.

Inverter based generators have a characteristic where the motor continues to run even if the unit has electronically overloaded and no longer delivering power. It may appear that the generator is operating and the system is charging when it isn't. These units are also more easily overloaded by surge loads, as they are electronically limited rather than mechanically.

Make sure that the generator, inverter/charger and regional area frequency and voltage all match. Eg 230V / 50hz. Do not mix and match frequencies and voltages, or parts from different regions.

Generator Sizing

It is possible to overload generators with the power demanded by the Multi's charger. The following generator sizings are indicative of those sizes are appropriate for the charging potential of the various multis. It is still possible to overload these generator sizings with large loads, and flat batteries using the PowerAssist function, so they should be treated as safe minimums to eliminate this as a potential cause of issues. A bigger generator is usually better.

Inverter/Charger Size	Recommended Generator Size	240V AC Input Current Limit
800VA	2 kVa	5A
1200VA	2.5 kVa	7A
1600VA	3 kVa	10A
3000VA	5 kVa	16A
5000VA	8 kVa	25A

If your generator is smaller than the recommended size for your inverter/charger, you will definitely need to adjust the settings on the inverter/charger and reduce the AC input current limit, and/or a DC charge current limit to prevent overloading the generator.

Operation

It is important to note that the inverter/charger may take a minute or more to synchronise (though it can be much quicker). Treat the equipment with patience if the settings are thought to be correct.

Some generators will alter their voltage or frequency when loads change. This can be significant if the generator goes from no-load to full-load quickly. It can help to have a small 'stabilising' resistive load such as a 75W light globe smooth out this start up voltage/frequency variation.

If the generator is operating smoothly, but it still will not charge the system you may need to make some adjustments in the MultiPlus software via VEConfigure.

Software Changes

The settings which you should attempt first are 'Disable UPS mode' and 'Enable Dynamic Current limiting'. These compromise features, but maintain the quality of the power supply.

If the generator will still not synchronise or disconnects, try turning on the setting for Weak AC. This will compromise efficiency.

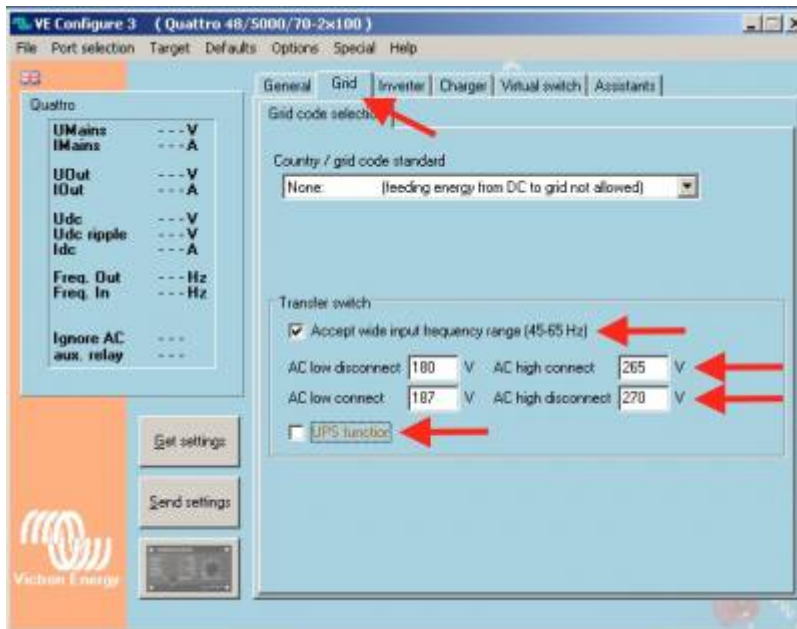
Lastly, adjusting the settings for Voltage and Frequency windows. These are higher risk to your appliances, they should only be used cautiously when it is confirmed that the loads will tolerate the out of specification power supply. This should be done by a competent technician with the aid of a multimeter and only opened so far as to allow for safe functionality.

Electrical current will go through the MultiPlus only if it meets the programmed minimal quality requirements; in that way the MultiPlus protects the electrical supply of delicate equipment.

Warning: changing these settings will allow to feed-through current that may be of insufficient quality for the electrical requirements of your equipment.

For information on VE-Configure and how to get started, please see this [VE Configure Software page](#), or contact your [local Victron dealer](#).

1. In the “Grid” tab of VE-Configure:



1.1 Wave shape quality

UPS Function: (default = enabled)

When the sine wave is of good quality, the Inverter of the MultiPlus will hook up on it, thus allowing a synchronised and fast transfer when the generator stops.

Many generators have more or less ill-shaped sine waves, in particular during sudden load changes. In these situations, the MultiPlus will disconnect frequently or not connect at all. The UPS function must then be deactivated. The drawback is a slightly longer transfer time.

1.2 Frequency stability

Accept wide input frequency range (45-65Hz): The MultiPlus accepts frequencies from 45 to 65Hz (default = enabled). If the generator is extremely stable and if that same stability is required on the output of the MultiPlus, this setting may be disabled.

1.3 Minimum voltage levels

AC low disconnect: low limit: below this value, the MultiPlus will disconnect (default = 180Vac).

On generators where the output voltage drops under load, setting this value to a higher value can help solve shutdowns on overload.

AC Low connect: minimum value: at this value or any higher value, the MultiPlus will reconnect after having disconnected (default = 187Vac).

1.4 Maximum voltage levels

AC high disconnect: high limit: above this value, the MultiPlus will disconnect (default = 270Vac).

AC high connect: maximum value: at this value or any lower value, the MultiPlus will reconnect after having disconnected (default = 265Vac).

1.5 Loss of mains detection (LOM)

For Full information on Loss of Mains detection, please see [this more detailed explanation](#).

What is LOM detection?

LOM is an automatic process that detects a change and loss of the generator/grid supply. After the detection, the inverter/charger will open its back-feed relay, making sure there is no live AC voltage on its AC-inputs, and anything connected to these inputs.

Why is LOM detection required?

The purpose of LOM is to detect that the Multi is no longer connected to the mains. Be that a generator or the grid. In such case, the Multi needs to open its back-feed relay. Not doing that would be unsafe.

How does LOM detection relate to overload shutdowns?

To detect a loss of mains, the inverter/charger will constantly try to shift the AC frequency. When connected to a stable mains generator/grid supply, with a normal accepted impedance, it will not be possible to do so, and it can therefor detect that the mains is still present. In case the mains was lost, the inverter/charger will be able to shift the frequency at will, without any resulting correction currents.

When connected to a generator, with a long extension cable or long 'last mile' cable, the pushing and pulling on the grid does create high currents, and as a result the inverter/charger algorithm can become unstable and switch itself off in overload.

LOM detection Type A and Type B

LOM detection comes in two flavours: **Type A** and **Type B**.

Type A is the strongest form LOM detection, which results in the quickest detection time. It requires a low impedance connection to the grid (short, well sized cables). LOM **Type A** will not work with generators.

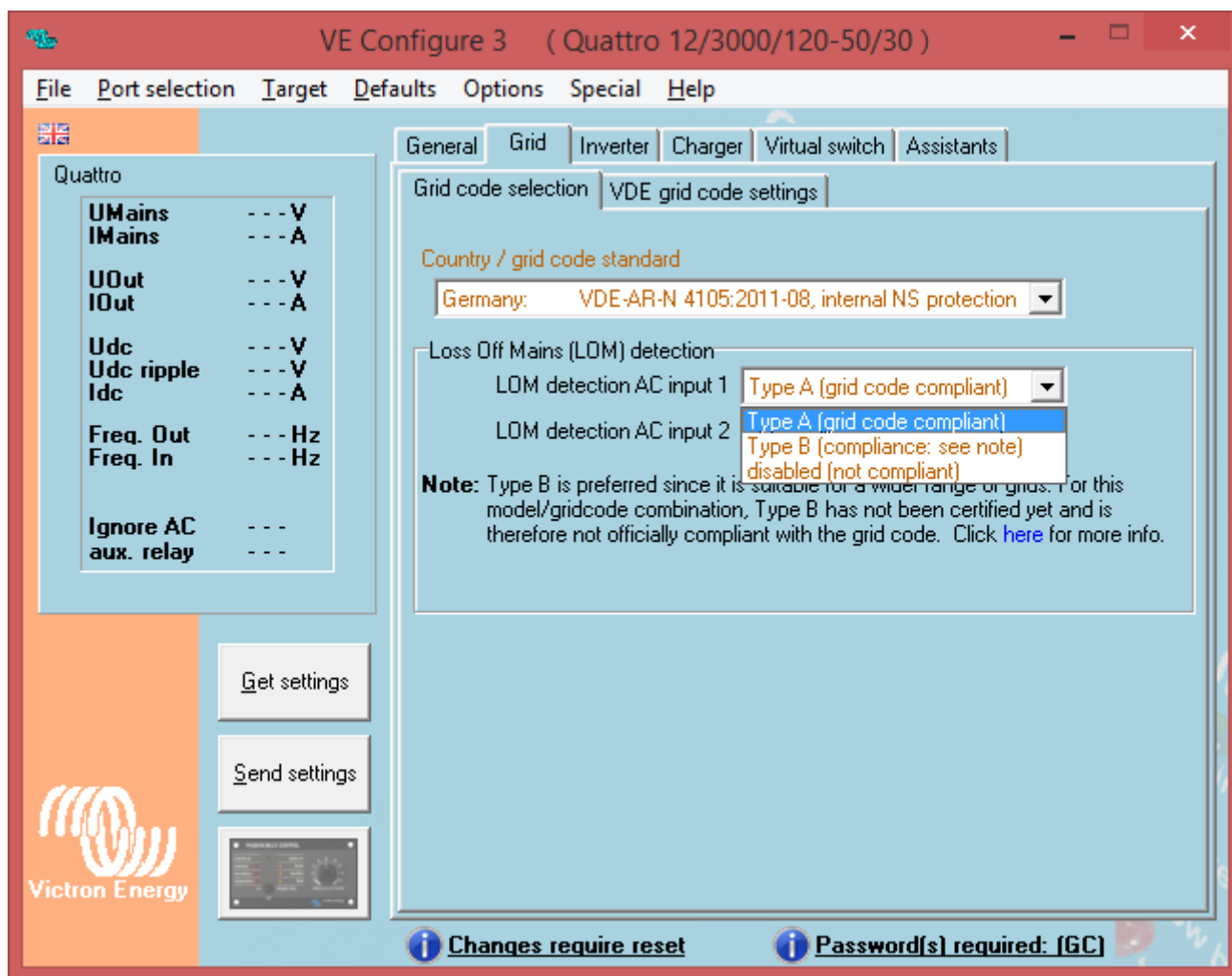
Type B has a more soft approach. Resulting in a slightly longer detection time. Still acceptable in several countries (South-Africa, and probably, though not tested and certified yet, also Germany). On generators, and also connection with a relatively high impedance mains connection, **Type B** will work better than **Type A**.

For generators on which also **Type B** does not work, see Disabling LOM.

Disabling LOM

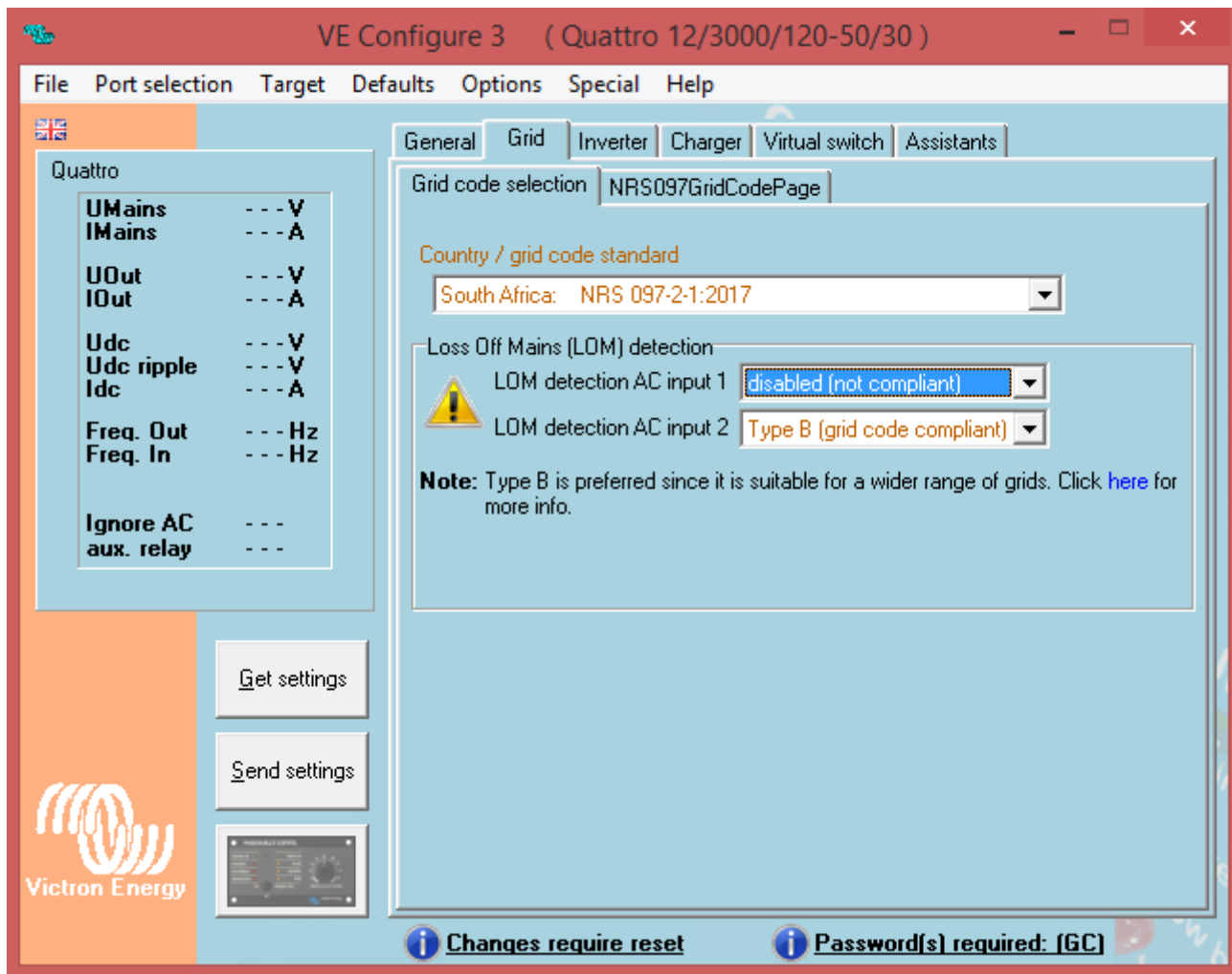
Besides choosing Type A and B, it is also possible to disable the LOM entirely. Note disabling the LOM on an input connected to the grid is only allowed when other external safety equipment is installed.

Disabling the LOM on an input connected to generator can be done, but then other methods / warning signs must be provided. Ensuring that any installer that will work on the generator will make sure to also switch off or otherwise disconnect the Inverter/charger system.



Example configuration in VEConfigure

- A generator that requires LOM to be disabled.
- Generator on AC in 1, and grid on AC in 2, as recommended.



Questions

Q1: Where can I get the password?

A: From your dealer.

Q2: Can I use ESS in a vehicle or a boat?

A: No you cannot. After unplugging the shore cord it can take up to a few seconds for the system to detect the loss of mains and open the back-feed relay. During those seconds, the shore power plug will be `live`: there is 230 Volts AC on the terminals. The exact number of seconds differs per country and depends on the local requirements.

The same applies to other solution where the wiring is not protected against accidental removing, for example a simple cable with end-user removable plug, such as a portable power supply.

Q3: Can I use ESS with a generator?

A: Yes you can. Note that the only installation type where that makes sense is a land based installation (no boat, and no vehicle). A Quattro must be used with AC input 1 connected to the

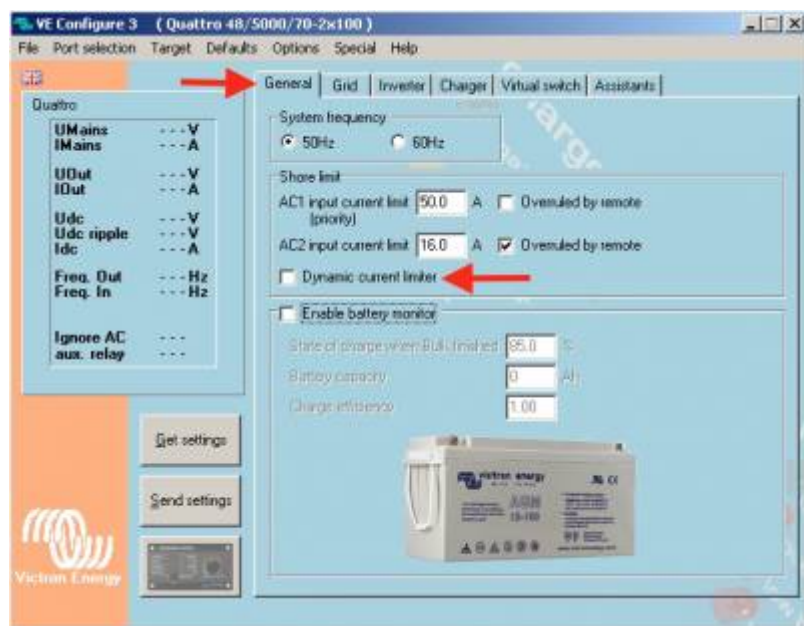
generator, and AC input 2 connected to the grid. The role of the generator will be to provide power during a long grid failure.

Some, bigger or better quality generators, will be able to work with LOM **Type B**. For other less stable generators it will be required to disable LOM entirely. In that case make the installation such that it is still safe: no simple extensions cords, use enclosed wiring cabinets with warnings on the outside and/or an external ENS.

Q4: I use ESS, but have disabled feed-back, is a grid-code still required?

A: Yes, also in this case LOM is required to make for a safe and also local regulations compliant system. Running ESS with disabled-feed-back is still not the same as using a Multi in its default configuration without ESS.

2. In the “General” tab of VE-Configure:



2.1 Dynamic current limiter

(default = disabled)

This feature is intended to reduce load impacts on low-power generators, such as portable inverter technology models. These generators may be unable to respond to sudden load impacts.

By activating the limiter, the **PowerAssist**® function of the MultiPlus will absorb the change in load and transfer it smoothly to the generator, giving it time to react.

2.2 AC Input Current Limit

The charger on the Multiplus is very powerful. If you have an existing generator that is not able to supply the maximum charging current of the Multi, you will need to adjust the AC Input Current Limit in the General Tab of VE-Configure.

A reasonable starting point for the AC Current input limit is 80% of the generator capacity in Watts. For example:

a 5kVA generator typically provides about 4 kW

80% of 4 kW is 3200 W

$3200\text{ W} / 230\text{ V volts} = 13.9\text{ A}$

Set the AC Current Input Limit to 13 A

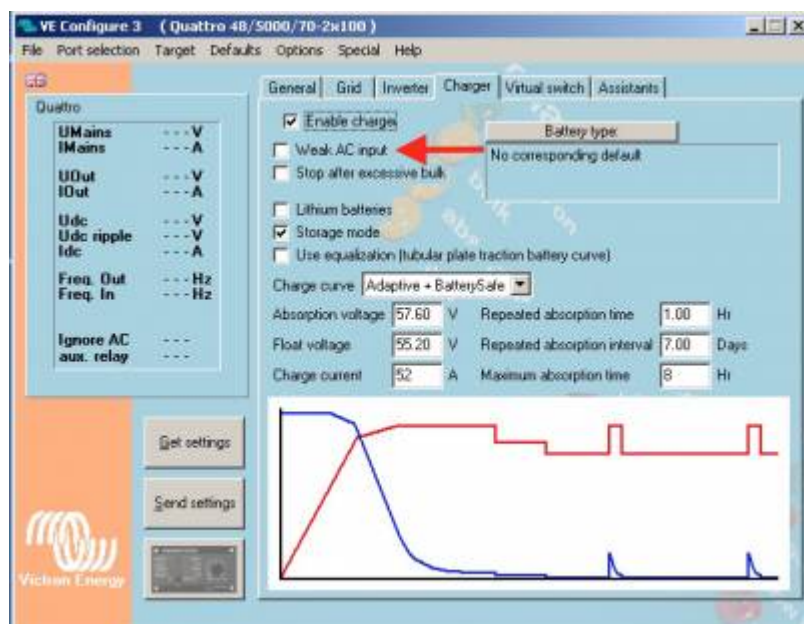
If you find the generator is still overloading, or running too hard, you may lower this further. It can also be increased if you find the generator easily handles the load (though this can be difficult to test as it requires a flat battery to maximise charging demand and a large load).

There is another additional setting in the Charger Tab for DC current limiting.

The AC input current should be adjusted first, as it also takes into account the PowerAssist functionality.

The Multi is able to synchronise the generator waveform with it's own and provide power to the loads from the generator as well charging the battery. This means it still possible to overload the generator with a low 'DC Charger current limit' if the AC input limit is not also set correctly to the size of the generators output.

3. In the "Charger" tab of VE-Configure:



Derating of the power factor

Some generators have a waveform which makes it difficult to charge with the normal charge mechanism. Through activating the “**Weak AC input**” function, another mechanism is used which will enable the MultiPlus to charge under practically any condition.

Disadvantage of using this option is that the input power factor, normally equal or close to 1, will be degraded. This function should be used only when the preceding ones are ineffective.

This leading or lagging power factor will have the effect of demanding more kVa from the generator for the same or less DC Watts delivered to the batteries. You may need to further reduce the DC Current Limit in the Charger tab of VEConfigure if the generator continues to overload after changing this setting.

Important note:

A detailed description of all settings is available in the VE-Configure help menu, and more instructions are available in our manuals.

Further Reading

There have been extensive articles and documentation written about generators and their interaction with Victron systems. This includes troubleshooting, real-world application and theory.

[MultiPlus magic: Small generator, big power](#) - In depth blog article with a real world application of a sailing yacht.

[Using the Multiplus to reduce operating cost of a generator](#) - Fuel Saving White-paper.

[Automatic Generator start/stop](#) - Outline and reference for generator auto-start functionality in Victron systems.

[Victron Community Questions and Answers about generators.](#)

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