VEConfigure: grid codes & loss of mains detection

This document applies to VE.Bus firmware 419 and later.

1. Grid codes and complying to local regulations

All countries have their own legislation and therewith their own requirements with regards to the speed of Loss of mains detection, under & over voltages, accepted ramp times, and so forth. To make an installation comply to local regulations, the correct grid-code needs to be selected.

The exact requirements differ widely between the countries. For example the normal Multis, Quattros and MultiCompacts are certified for use in the UK. For other countries, Germany for example, only the MultiPlus-II is certified to be installed without requiring additional external anti-islanding safety devices (ENS). And in yet other countries an external ENS is required and/or the inverter/charger must be configured with the right grid-code. Check the safety certificates on our website to see the allowed models for your country.

In certain situations, the inverter/charger built-in Loss of Mains detection (LOM) causes issues. This document explains how to identify if that is the case, as well as how to resolve.

Make sure to also read the ESS manual, and when trouble shooting Overload and/or Passthru issues, then especially its FAQ Chapter.

2. Loss of mains detection (LOM)

2.1 What is LOM detection?

LOM is an automatic process that detects a loss of the mains/network/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.

2.2 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. Imagine an electrician working on the street, and disconnecting a house. He then needs to be able to safely work on the wiring from the house.

2.3 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 grid, with a normal accepted impedance, it will not be possible to do so, and it can therefore 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, or to a grid with a long extension cable or long ‘last mile’ cable, the impedance of the grid becomes much higher and the pushing and pulling on the grid will have a certain affect on the grid voltage. As a result the inverter/charger algorithm can become unstable, which, in rare cases, can result in high currents and the unit switching itself off in overload.

2.4 How does LOM detection relate to passthru?

Similar to above section about overload, a too weak connection to the utility can cause continuous increases and decreases in frequency, not resulting in overload but still resulting in continuous shifts in frequency.

This (can) cause a safety mechanism to activate which temporarily disables feed-in.

2.5 How to identify if LOM detection causes overload issues?

By temporarily disabling the LOM, one can identify that the LOM is causing overload issues. Here is how to disable it:

Open VEConfigure, and then on the Grid tab, change LOM detection setting to None. This requires a password, contact your dealer.

Save the settings, and wait to see if this helps.

In case disabling LOM solves the overload issue, one solution is to make for a better (lower impedance) connection to the utility. In case that can't be improved, another solution is to keep LOM disabled and install an external anti-islanding safety devices (ENS). For example from Ziehl, or another brand. They have different techniques of detecting a loss of mains, and can (often) therefor work without any problem. Detailed instructions for permanently disabling the built-in LOM feature are in the next chapter.

NOTE: for LOM to cause overload issues is really rare. Its documented in detail on this page to help installations where it does cause an issue, but its really rather rare to happen in the first place. Do make sure to read the ESS manual, and especially its FAQ chapter, for other common causes of issues when troubleshooting.

2.6 Disabling LOM

There are a few situations in which LOM needs to be disabled:

1. For certain generators
2. In case LOM causes Overload, Passthru or other issues while connected to the utility (see

above)

To disable LOM, use VEConfigure and go to the Grid tab. A password is required to choose “Disabled” in the LOM options. Contact your dealer for the password.

KNOWN LIMITATION: Note that, even with the LOM detection disabled on an AC input, the inverter/charger will still use the acceptance limits required by the selected gridcode and thus in most cases be somewhat less acceptive on that input compared to setting the grid code to either code “None”, “Other” and “Germany: VDE-AT-N 4105:2018-11 external NS protection”.

Safety notes - Generator

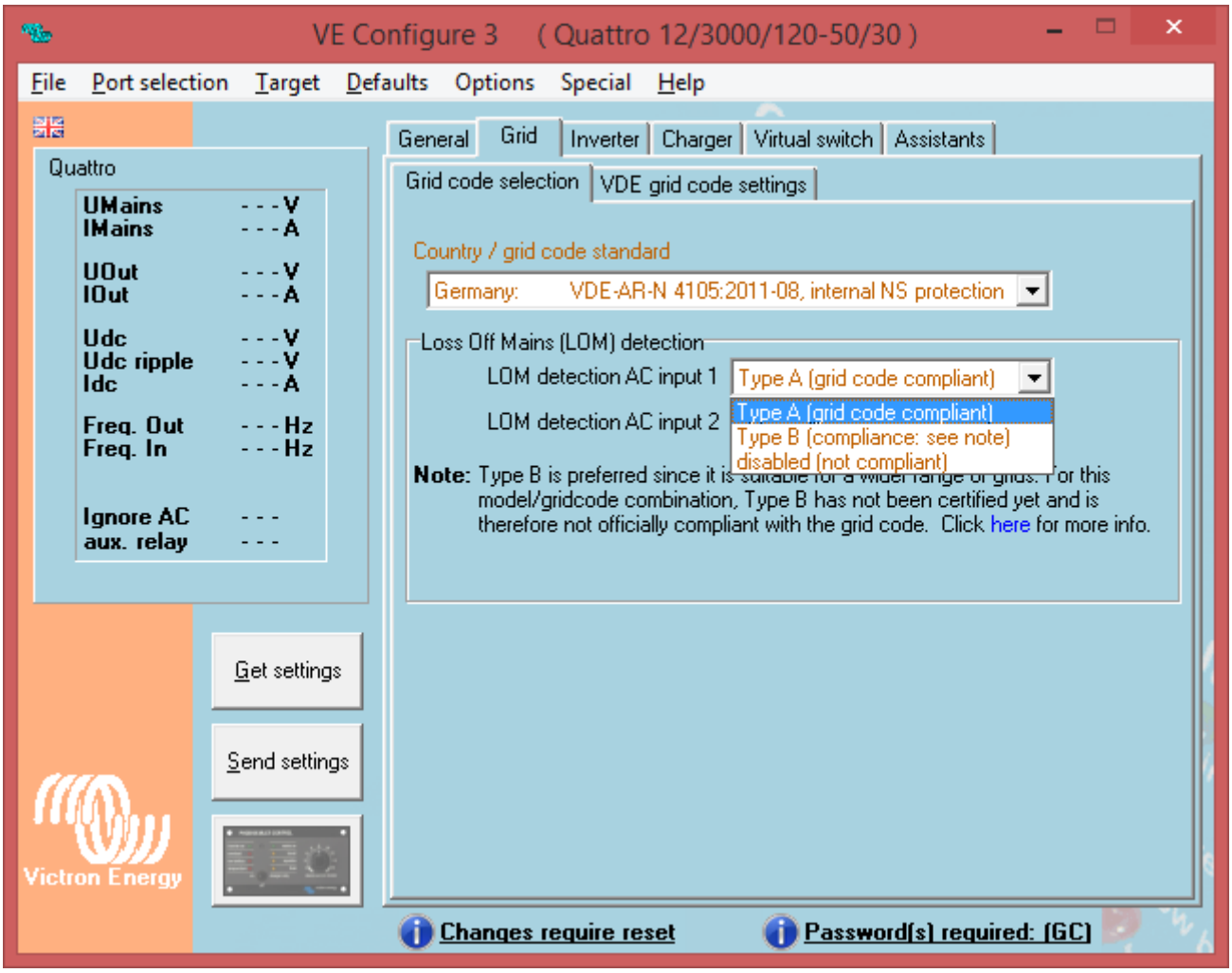
There is no regulatory need to install external anti-islanding equipment when disabling LOM in combination with a generator. To make sure. by installing signs and other means, that it is very clear to any installer working on the generator that he must also switch off, or otherwise disconnect, the inverter/charger system.

Safety notes - Utility connection

Disabling the LOM on an input connected to the grid is only allowed when other external safety equipment is installed, by means of an anti-islanding safety device. Victron does not make such producs. A common brand is Ziehl.

Make sure to comply to local rules & regulations - this is a critical safety issue.

Screenshot of LOM settings



2.7 Background: LOM detection Type A and Type B

Within the Victron product range, there are two types of LOM detection available: Type A and Type B.

All recent certified grid codes use Type B. On the MultiPlus-II models, **all** grid codes use Type B, and Type A is no longer used.

Type A is the strongest form of LOM detection resulting 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 and a slightly longer detection time. Type B has been type tested and approved for most Multi/gridcode combinations.

The default value in VEConfigure is the approved value. When Type B is approved, Type A will not be shown in VEConfigure as an option, because there is no reason to prefer Type A over Type B in that case.

BE AWARE: Whether a Multi/Quattro is approved for a certain country CANNOT be concluded from the fact that VEConfigure shows the option. Check the safety certificates on our website to see the allowed models for your country.

On generators, and also with installations having a relatively high impedance mains connection, Type

B will work better than Type A.

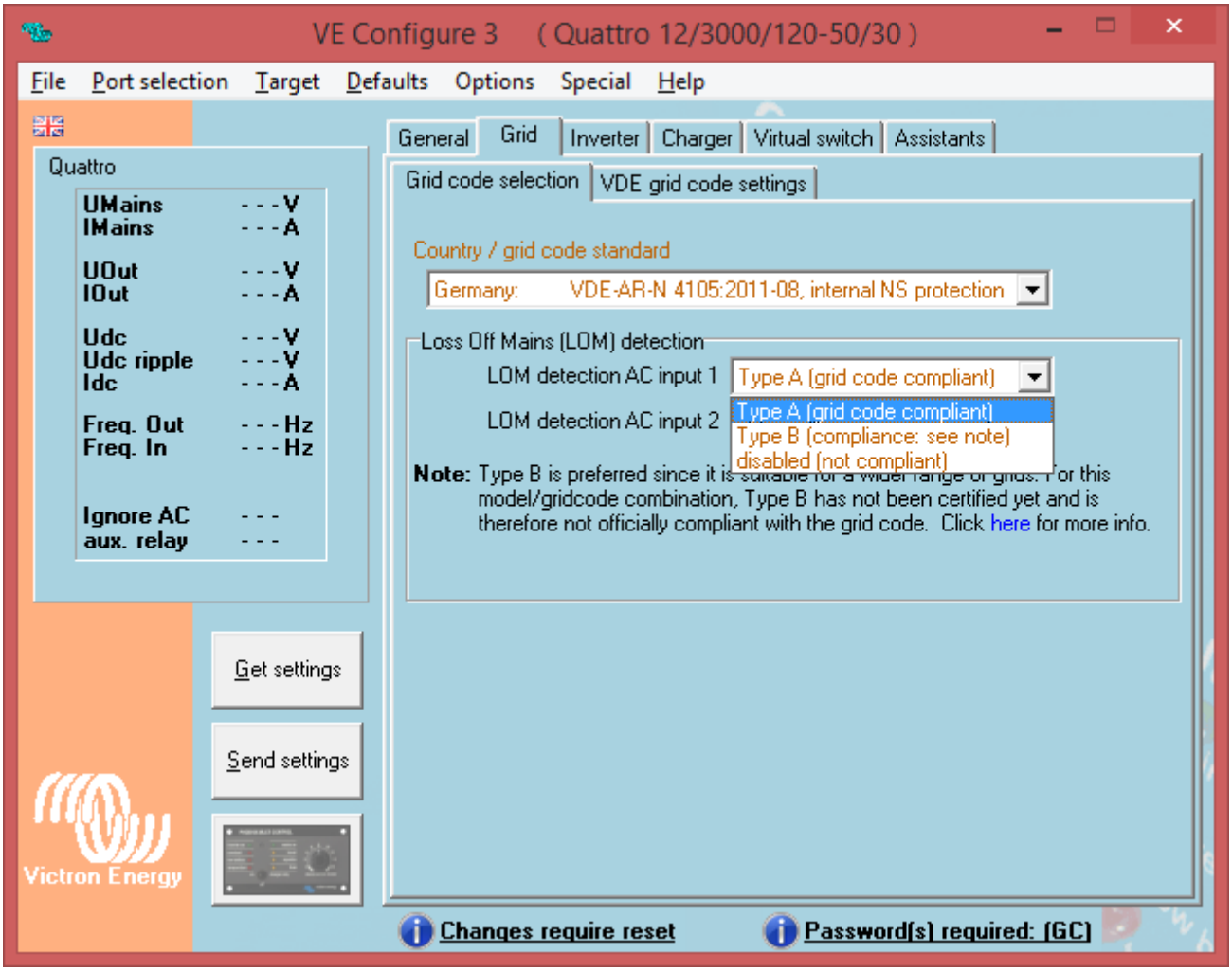
For generators on which also Type B does not work, see the Disabling LOM section above, as well as the there noted limitation.

2.8 Grid codes and Type A and Type B LOM

At the time of writing all Grid codes use Type B or “LOM disabled” (Denmark does not allow active LOM detection).

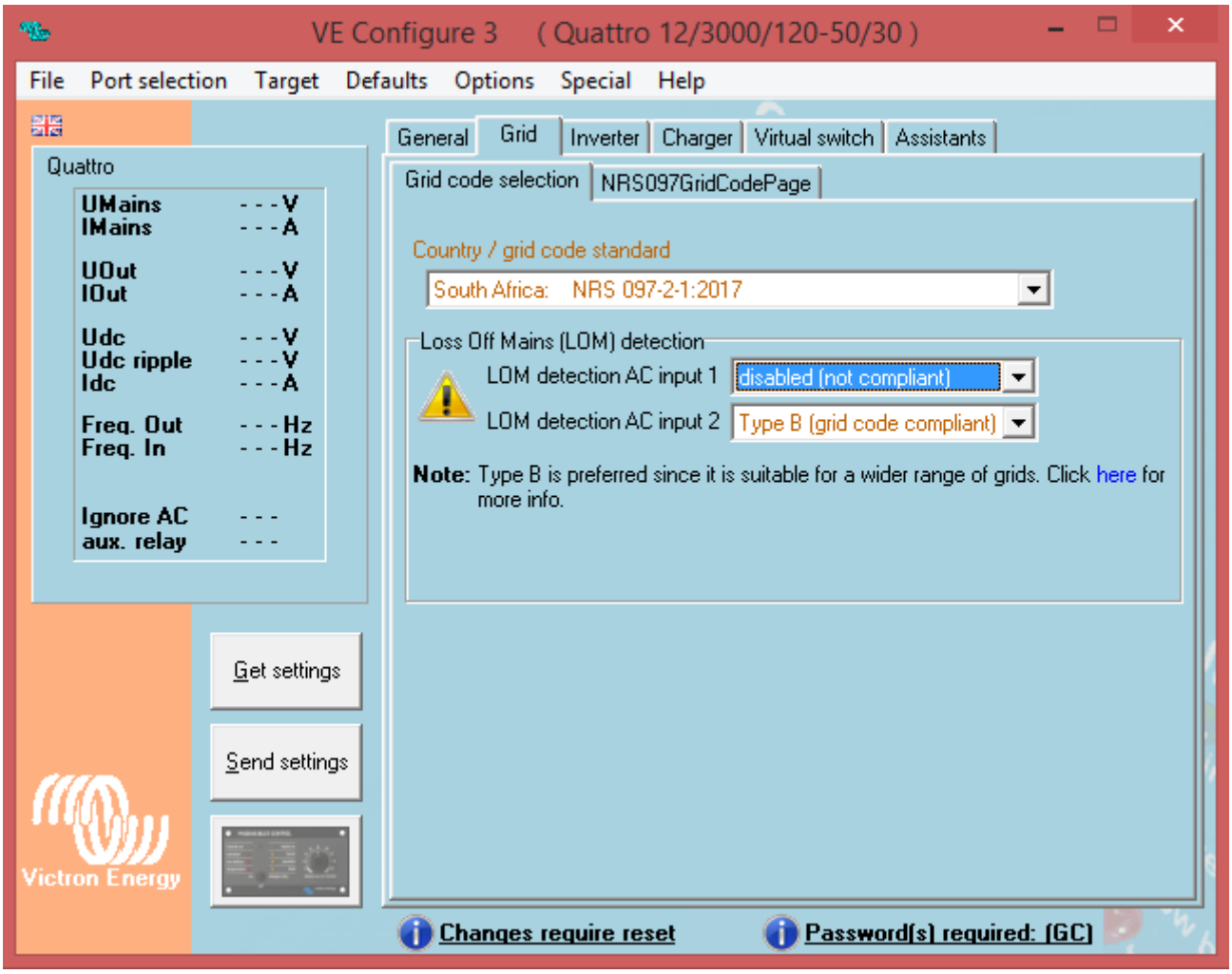
The Type that has been tested and approved for compliancy is marked with grid code compliant. See below screenshot.

- Grid codes using Type A: VEConfigure lets you override that to Type B and/or disabling LOM.
- Grid codes using Type B: VEConfigure lets the installer override it to disabling LOM only.
- Grid codes using “disabled”: VEConfigure lets the installer override it to Type B only.



3. 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.



4. 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.

Note that it is also possible for some generators that it is not accepted by the inverter/charger at all, unless very specific grid codes are chosen. See the section “Disabling LOM” above for details.

More information about Victron Inverter/chargers combined with Generators is in the MultiPlus Generator FAQ.

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.

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