Quick Installation Guide

MultiPlus 12V 24V 48V 3000VA 16A 230Vac

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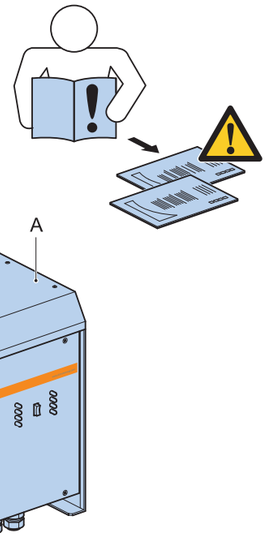
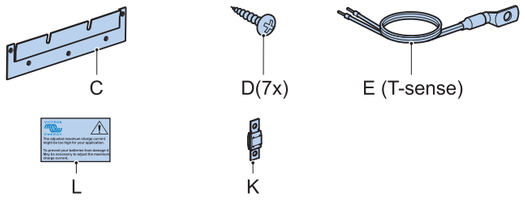
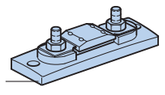




For fuse values:
refer to the user manual



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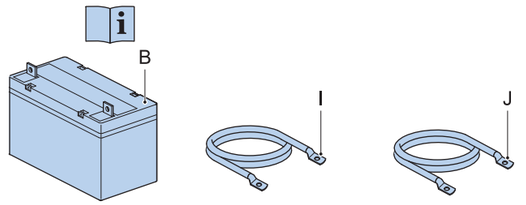

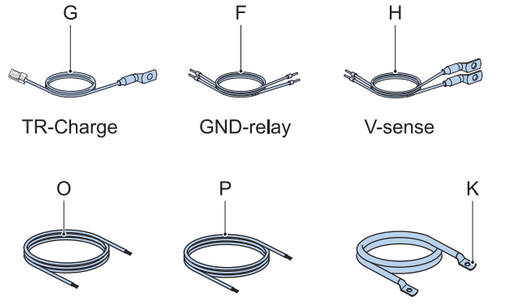

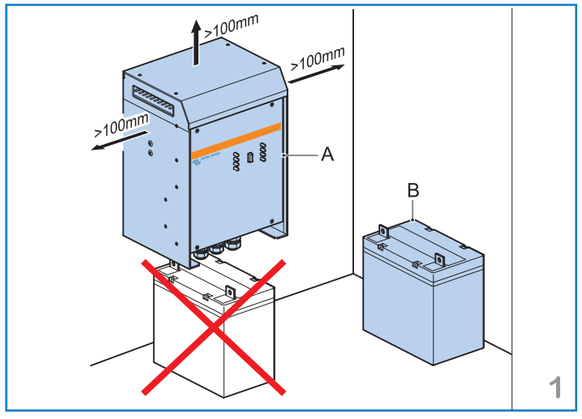

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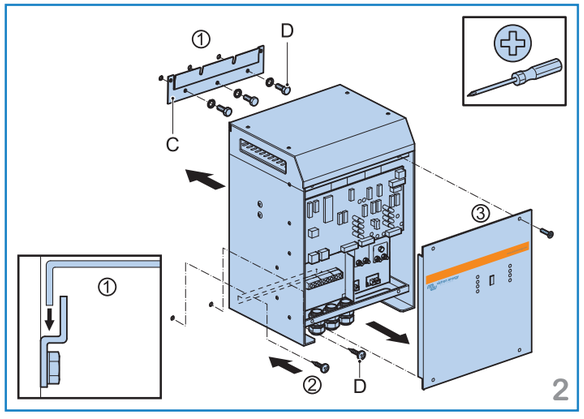

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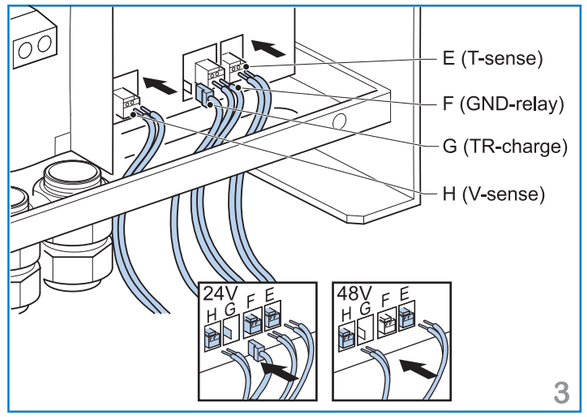

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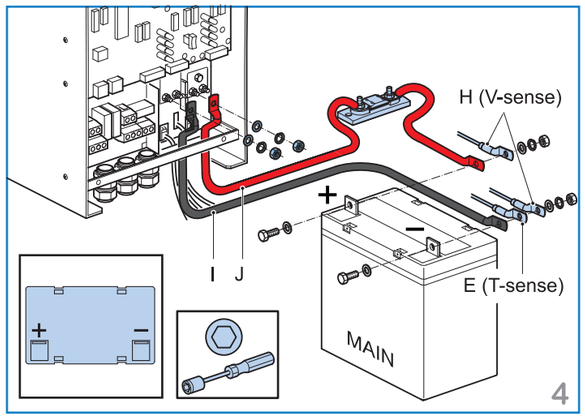

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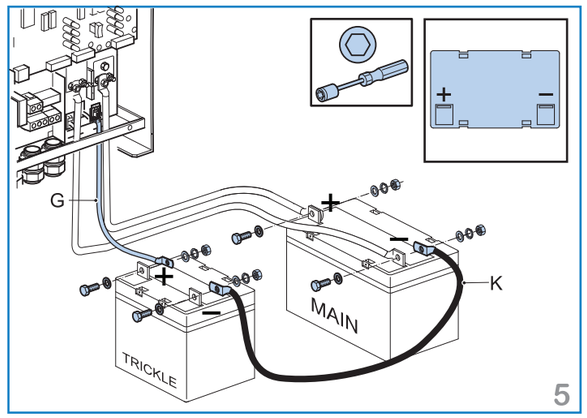

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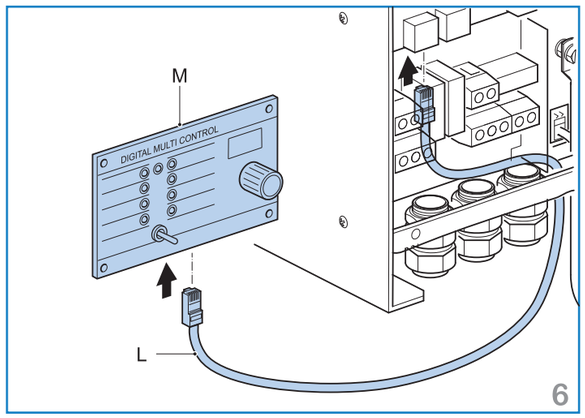

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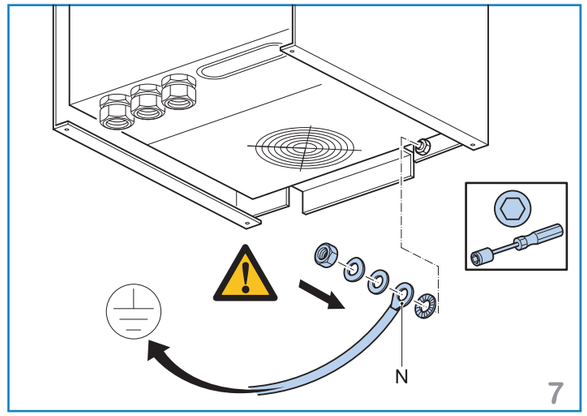

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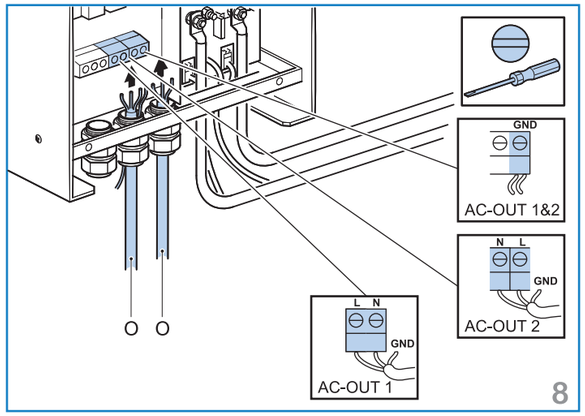

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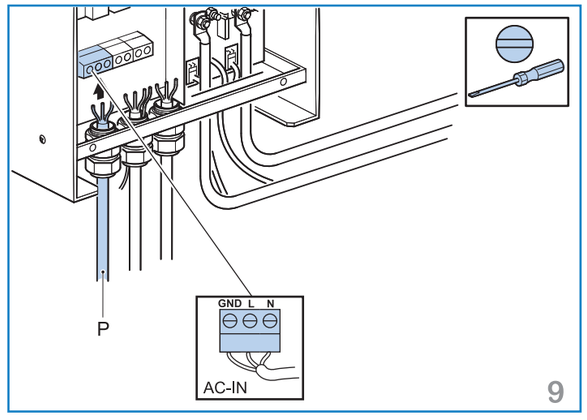

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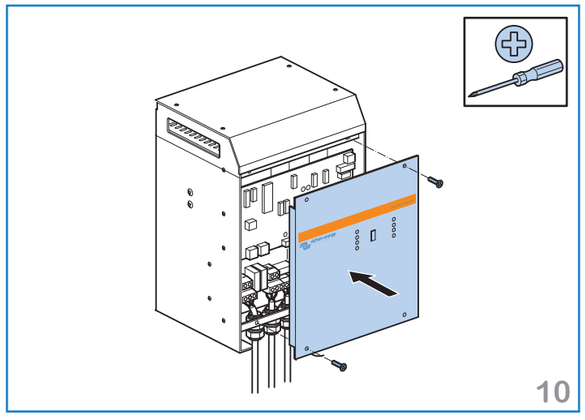

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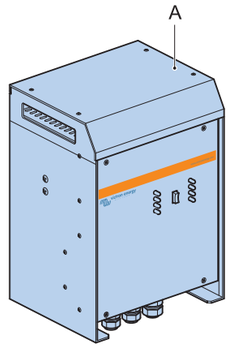
Rev.01

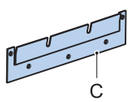
victron energy
BLUE POWER

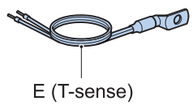
Quick Installation Guide

MultiPlus 12V 24V 48V 3000VA 50A 230Vac

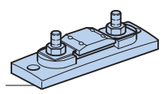
Included







For fuse values:
refer to the user manual



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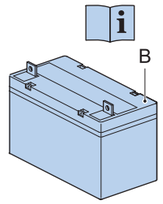
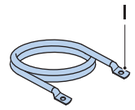
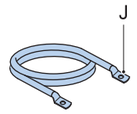


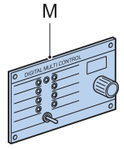
Battery



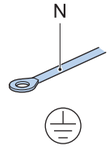
Battery Cable +



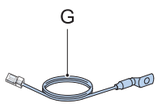
Battery Cable -



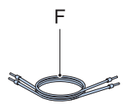
Remote control



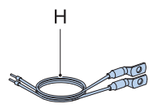
UTP-Cable



TR-Charge

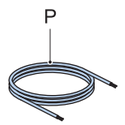


GND-relay



V-sense

AC-OUT



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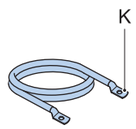
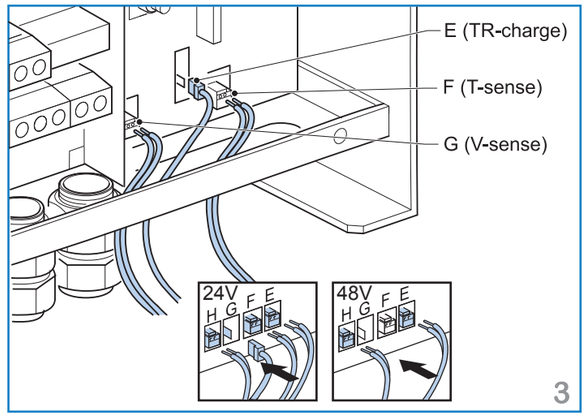


Battery Link 1x (2x12V)
Battery Link 3x (4x12V)



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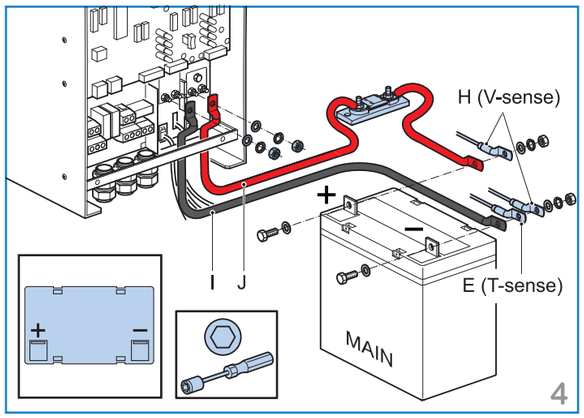

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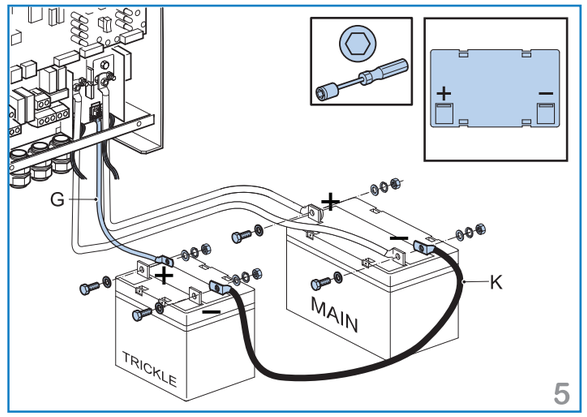

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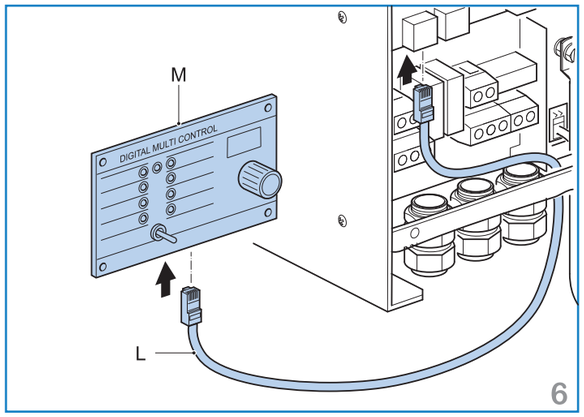

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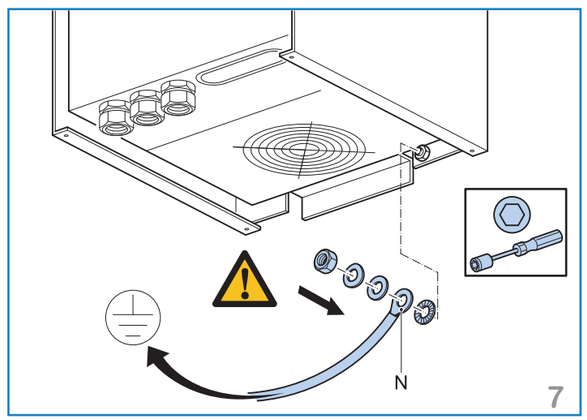

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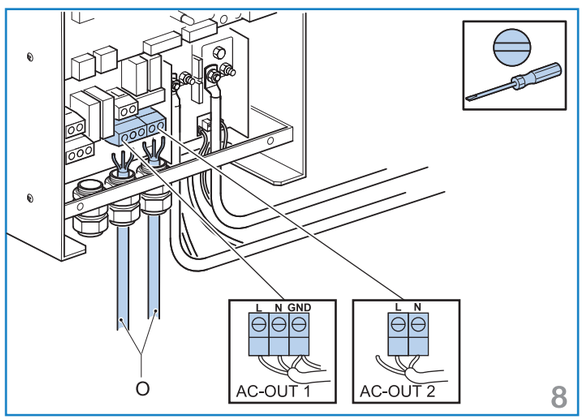

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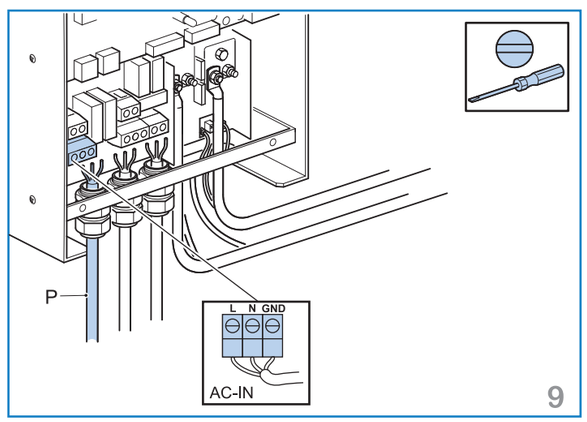

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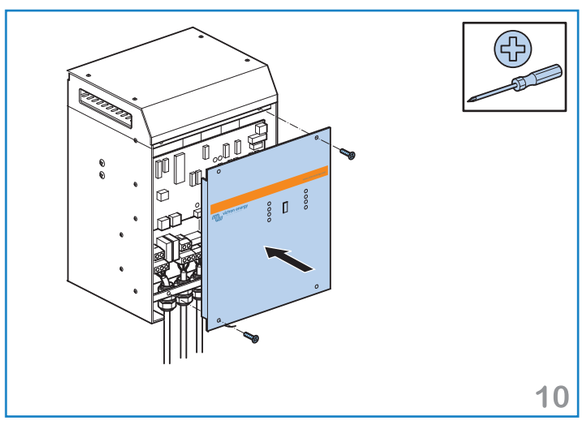

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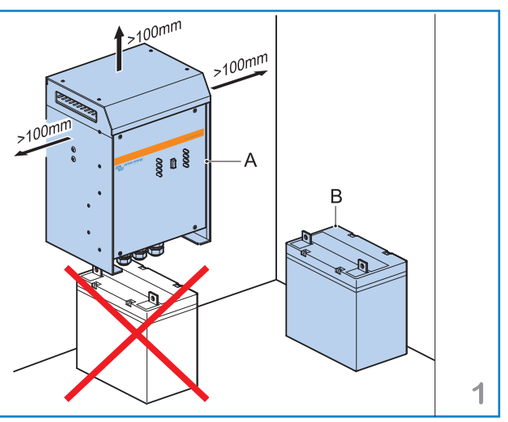

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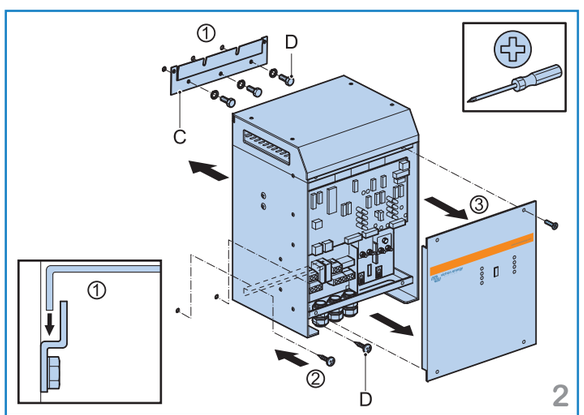


2

Rev.01

NMEA 2000 & MFD integration guide

1. Introduction

This technical document explains how to integrate a Victron system onto a Marine MFD, such as those from Garmin, Raymarine Navico and other brands.

There are multiple ways to integrate, so make sure to closely read the complete introductory chapter to find the best method for your type of system.

Systems with a GX Device

For most installations and integrations, it will be best to use one of our GX Products. It acts as a hub, collecting information from connected equipment, such as Inverters, Battery Monitors and Chargers; and then making them available to the MFD.

A GX Device can be connected to a Marine MFD in two ways: the simple plug and play like method uses an Ethernet connection, which enables the MFD App. Available for Raymarine, Garmin, as well as the Navico brands B&G, Lowrance and Simrad. Click those links to go straight to all information, videos and manuals.

The other type of integration is to connect the GX Device to the NMEA2000 network. See the NMEA 2000 chapter in the CCGX manual for details.

Both connections can be made and used at the same time, and each has its advantages and disadvantages. The MFD App is by far the simplest method. It presents an easy to use system overview without requiring any configuration. The NMEA 2000 integration on the other hand, whilst being more complex, allows more customisation on the MFD: the data will show up in the data-tree of the MFD, and most MFDs then allow the user to configure various pages and combinations of information. This is not so with the MFD App, as the only available settings are to show or hide battery parameters (Voltage, SOC, Current) as well as naming the batteries.

Note that, besides making information available on NMEA 2000, a GX Device can also tank level data from NMEA 2000. More information in the NMEA 2000 tank sender section in the CCGX Manual.

Direct connection - products with a VE.Can port only

Some of our products feature a VE.Can port; and can thus be directly connected to the NMEA 2000 network. No electronic converter necessary; only a plug conversion cable, the VE.Can to NMEA2000 cable.

Using our converter interfaces (DEPRECATED!)

- VE.Bus to NMEA 2000 interface
- VE.Direct to NMEA 2000 interface, for BMV Battery Monitors (only).

Note that the use of both those interfaces is deprecated. Use a GX Device instead.

What is NMEA 2000?

NMEA 2000 is is a plug-and-play communications standard used for connecting marine sensors and display units within ships and boats.

Victron Energy is a member of the NMEA 2000 organisation, and we have several of our products certified by NMEA 2000.

For brevity, this document will refer to NMEA 2000 as N2K.

Modbus-TCP Integration

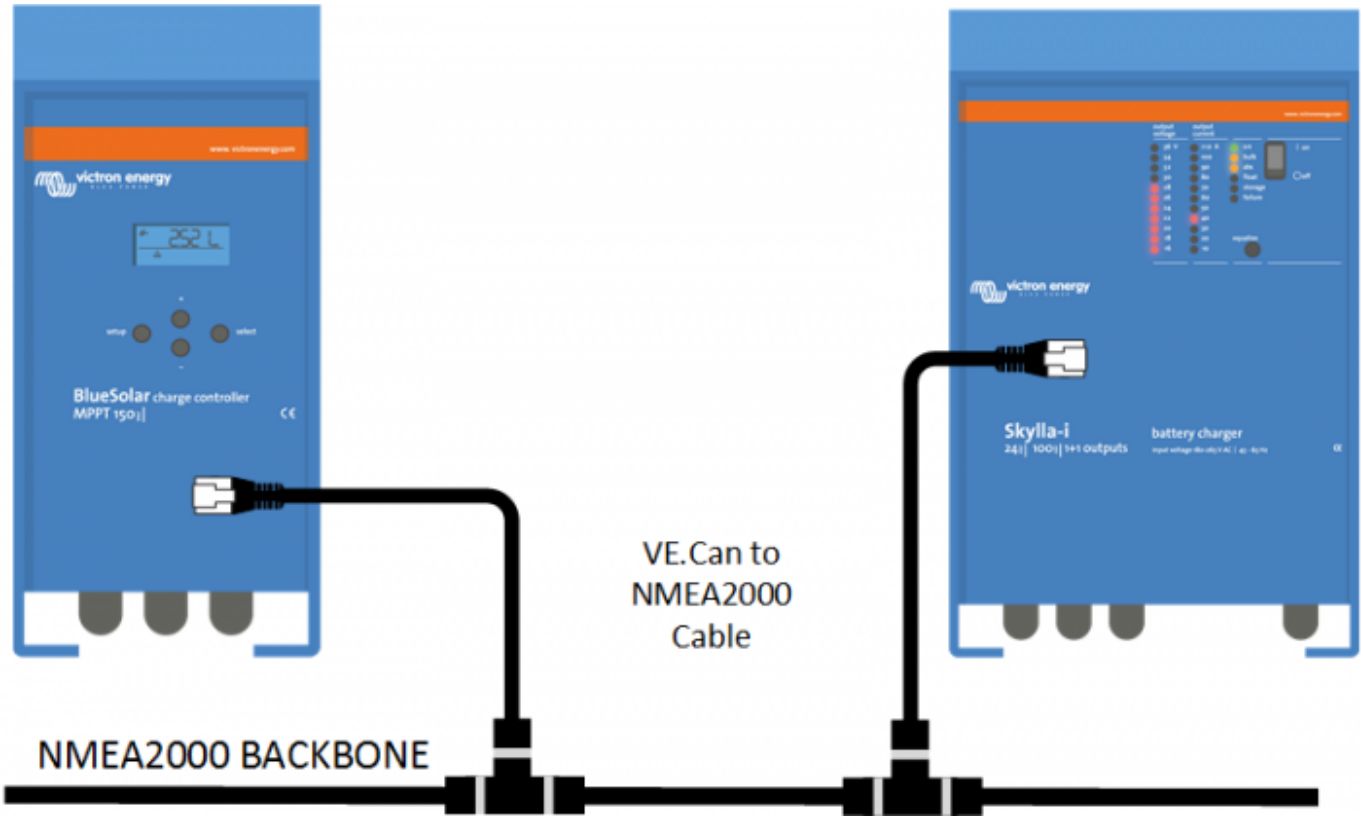
For larger vessels, using custom designed SCADA systems, the recommended protocol to use is ModbusTCP. See our GX ModbusTCP Manual.

2. Varia

2.1 VE.Can products (Skylla-i, Skylla-IP44, Lynx Shunt, Lynx Ion+Shunt and more)

Since the Victron VE.Can communication protocol is based on N2K, the following products can all be connected directly to a N2K network. The only thing necessary is a plug converter: the VE.Can to NMEA 2000 cable.

- Skylla-i 24V Battery Chargers
- Skylla IP44 Battery Chargers
- Lynx Shunt Battery Monitors
- Lynx Ion + Shunt all models
- SmartSolar MPPT Solar Chargers with VE.Can communications port



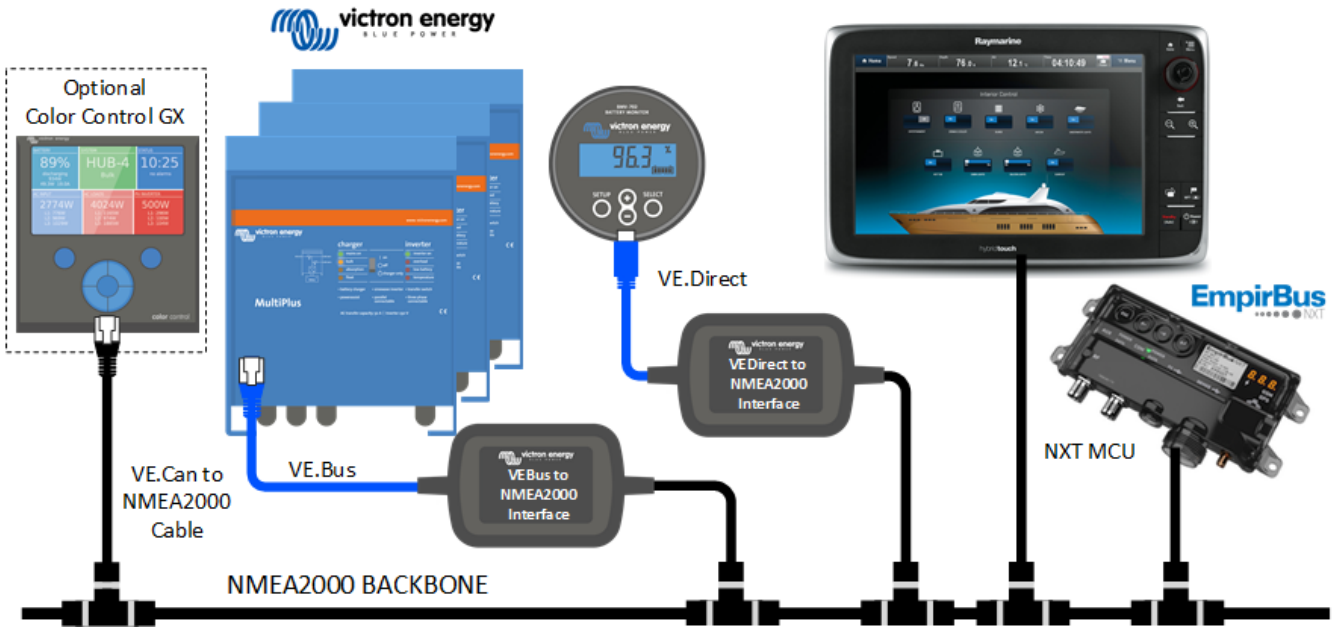
2.1 Raymarine & EmpirBus

Besides using NMEA 2000 and/or the Lighthouse App, integration onto Raymarine MFDs can also be done with an Empirbus NXT MCU . Though both are connected to the same N2K network, the NXT MCU translates the N2K PGNs originating from the Victron equipment into Raymarine proprietary messages.

In the EmpirBus Studio software you will find dedicated Victron building blocks than can be drawn onto the diagram.

Next, use the EmpirBus Graphical tool to design the pages for on the Raymarine MFDs.

The EmpirBus system requires the data instance of battery status and dc detailed status to be unique when using multiple sources. (how to change data instances)



2.2 Maretron

All data sent out by Victron devices can be picked up by the Maretron MFDs & software. See the Maretron N2KView® vessel monitoring and control software.

3. PGN overview

Refer to our Datacommunication whitepaper, page 8 and beyond, for a list of Victron products and their supported PGNs.

4. FAQ

Note that there are many more generic frequently asked questions answered in the Data communication white paper.

Q1: What about instances? Device instances, data instances?

See Changing NMEA2000 instances for details on that.

Q2: Can MPPT Solar Chargers with a VE.Direct port also be connected?

No, they cannot be connected. Even though the VE.Direct to NMEA 2000 interface can be physically connected to these solar chargers, it will not work. Use our Solar Chargers with a VE.Can port instead.

Similarly, also a GX Device does not (yet) transmit data from connected Solar Chargers on its NMEA2000-out port.

Q3: What about terminators and network layout?

A N2K CAN bus network needs to be laid out as in a backbone configuration, using drop cables to connect to each device. Also, there should be only two terminators in the network. Therefore:

- Use the NMEA 2000 cable as the backbone.
- Run a separate drop cable separately to each Victron device. The drop cable will be one of these three products:
    - VE.Bus to NMEA 2000 interface
    - VE.Direct to NMEA 2000 interface
    - VE.Can to NMEA 2000 cable
- Only terminate the NMEA 2000 backbone, do not terminate on the VE.Can side.

Q4: What PGNs does a GX Device transmit on N2K?

See the NMEA 2000 chapter in the CCGX manual for details.

Q5: Can integration onto Raymarine displays also be done without Empirbus NXT?

Yes, see the Raymarine integration page on our website.

Q6: What about Maretron and other brand tank sensors on the Ccgx?

See chapter 1.4.7 in the Color Control GX manual.

Adaptive Charging: how it works

The text below closely follows the explanation given in the Phoenix battery charger info sheet, but with additional detail.

For general knowledge about batteries and battery charging, please refer to the text Electricity on Board, available on the website of Victron Energy.

1. The right amount of charge: variable absorption time

To fully charge a battery, a period of charging at a relatively high voltage is needed. This period of the charging process is called absorption charge. A battery that has been deeply discharged needs an absorption time of several hours, whereas a battery that is only slightly discharged requires a much shorter absorptoin period.

Classic 3-step chargers nevertheless have a fixed absorption time, for example 4 hours. Charging a battery with a fixed absorption time works well as long the battery has been, on average, substantially discharged before a recharge cycle is started.

In several applications however a fixed absorption time can lead to overcharging, which will reduce service life. In case of flooded batteries frequent topping off of the electrolyte will also be needed, due to increased gassing.

Consider for example a typical boat, or a coach, connected to a shore-side supply with limited output. Household equipment like a microwave, coffee maker, washing machine or an electric stove might trip the shore supply circuit breaker. The solution is to run this equipment from the battery with help of an inverter. A charger is connected to shore power to charge the battery. The battery in this case is used as a peak shaver, with short discharges every time there is a high current draw due to household equipment being used. Chances are that, in case of a fixed absorption time, the battery will be subjected almost continually to absorption charge. The result is overcharging, which will substantially shorten battery life and might even result in thermal runaway of the batteries.
An adaptive charger will also execute a recharge cycle after each shallow discharge, but the absorption time will be much shorter, thereby increasing battery life.

The absorption time of a Phoenix Charger or Phoenix Multi will adapt itself as follows:
after each period of bulk charge (= the charger has reached its maximum current) an absorption period of 20 times the the bulk charge period will follow, with a maximum set at, for example, 4 hours.

2. Preventing damage due to excessive gassing: the BatterySafe mode

Often the absorption charge voltage of a battery does not exceed the gassing voltage limit (approximately 14,4 V for a fully charged 12 V battery). Some batteries however need a higher absorption voltage to fully charge them (tubular or thick plate deep cycle batteries for ex.), and open, flooded, batteries in general can be charged faster by not only increasing the bulk charge rate, but also the absorption voltage.

A high charge rate will heat the battery (temperature compensation needed!) and will also increase gassing, in extreme cases up to the point that the gas bubbles will push the active mass out of the plates, destroying the battery. The BatterySafe mode limits the rate of voltage rise of the charger output after the gassing voltage has been reached. The effect is a sharp drop in charge current which prevents excessive gassing (see fig. 2 on the Phoenix battery charger info sheet).

3. Less maintenance and aging when the battery is not in use: the Storage mode

After completion of the absorption period, a battery charger in general switches to the float charge mode. In case of a 3-stage charger the float voltage should be sufficiently high to compensate for self discharge of the battery, but should at the same time be as low as possible in order to limit corrosion of the positive plates and gassing. In practice the balance isn't perfect: flooded batteries will gas substantially more than when left open circuited and will need regular topping up.

We have therefore introduced a fourth stage: the Storage mode. The Storage mode kicks in whenever the battery has not been subjected to discharge during 24 hours. In the Storage mode float voltage is reduced to 2,2 V/cell (13,2 V for a 12 V battery), which is close to the open circuit voltage of a fully charged battery.
Corrosion and gassing are reduced to absolute minimum, but self-discharge is not compensated. To compensate for self discharge, and to stir up the electrolyte, the voltage is raised back to absorption level once every week.

Note: although sealed (VLRA AGM or gel) batteries can be float charged at 13,5 V to 13,8 V during long periods of time (no topping up needed!), some studies have shown that the Storage mode will increase service life of sealed batteries (see for ex. 'Batterie Technik' by Heinz Wenzl, Expert Verlag, 1999).

Adding a forth charge stage, the Storage mode, also provides the option to increase the voltage during the third, 'float' stage to 2,33 V/cell (14 V for a 12 V battery). This is the charge voltage generally used for starter batteries in vehicles, and is ideal to 'supercharge' an already charged battery.

Automatic Generator start/stop

1. Which relay and control to use?

Various Victron products have functions to automatically signal when to start and stop a generator. Here is advice on when to use which product and method.

Option 1: GX device like CCGX or Venus GX

When there is a GX device (CCGX, Venus GX, or other) in the system, the best option is to use its Generator Start Stop mechanism. Its the most feature-rich generator start/stop system that we have to offer. It provides for basic functions as starting and stopping on Battery State of Charge, Battery voltage as well as High load situations. And also has many advanced features, including automatic test runs and silent times.

Option 2: BMV Battery Monitor

The next most used option is a BMV-700 Battery Monitor or similar model. It can start the generator on low battery voltage and/or low battery state of charge. See the BMV-700 manual for configuration.

Option 3: Using the relay in the Multis or Quattros

The Multis, MultiPlus-IIs, Quattros, EasySolars and the rest of the VE.Bus family also have Generator start/stop feature with a relay. There are two different ways to configure them:

1. Generator Start/stop function of the Virtual Switch (recommended)
2. Generator start/stop Assistant (more advanced / complex)

Combining the options

Lastly, its of course also possible to combine above mentioned methods, by wiring the open contacts in parallel to each other, or in series, to the Generator.

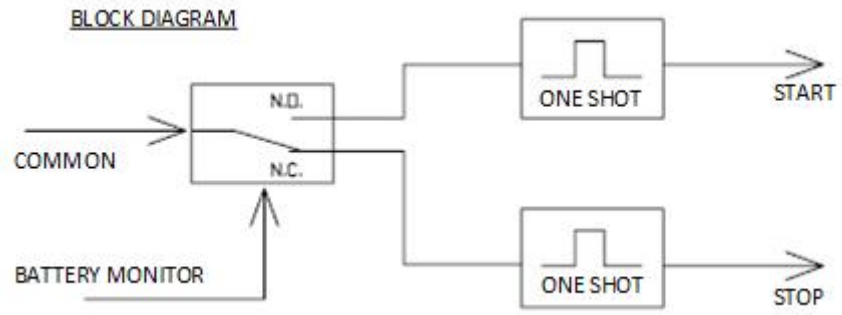
2. How to wire generators with a three-wire interface

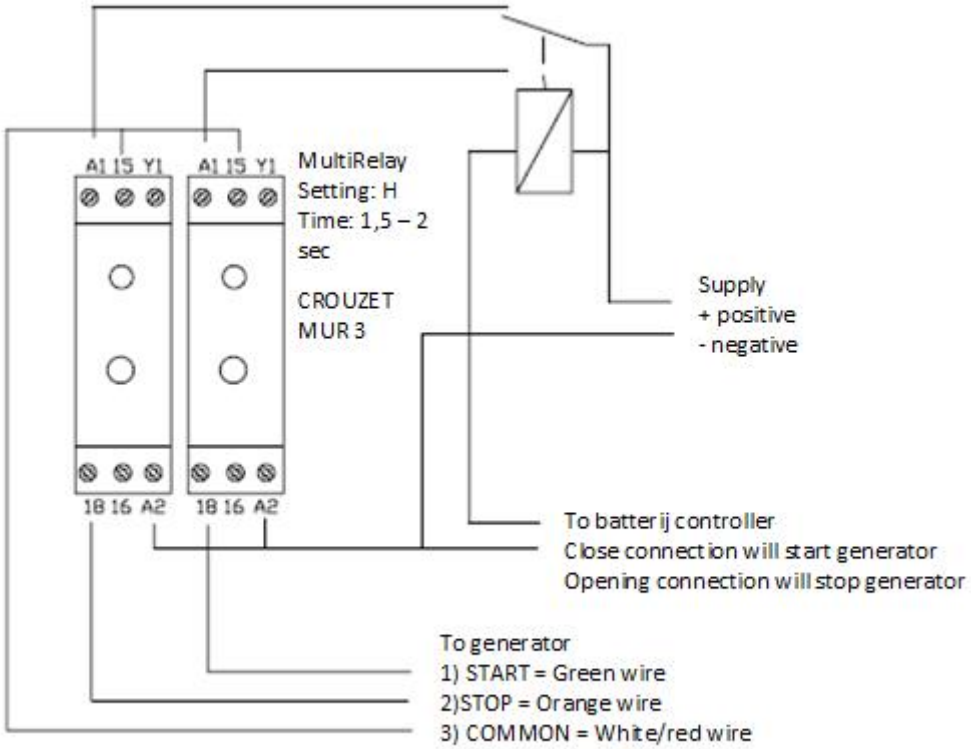
All above Victron products and devices have a single relay; which will close when the generator needs to starts; and then expect the generator to then keep running until the relay is opened again. Or the other way around.

When having a generator that requires a start pulse and a stop pulse, such as for example Cummins/Onan generators; additional wiring is required.

To start such a genset, the open/close contact needs to be converted into a start and stop pulse. Below solution, using standard available timing relays, does exactly that: when the open/close contact closes it generates the start pulse, and when the open/close contact opens again it generates the stop pulse.

Note that this solution should only be used on gensets that have their OWN control panel monitoring and automatically stopping on loss of oil pressure and other sensors. In other words: do not wire this directly to the starter motor and fuel solenoid.





Alternative using Assistants

(provided by Thierry Cortasa)

hi

just for information, one solution using multiplus relay for start stop a three-wire generator. i use k1

and k2 relais and relai programmable assistant

first to close k1 if voltage under 24v (for exemple) segond to open k1 if ac1 avalable third to close k2 if voltage uper 27v (for exemple) last to open k2 if ac1 not avalable

in this case you have a three-wire system with out any think more needed !

i have some systeme using this solution and all looks ok