

**Catamaran setup Quattro 5kVA 230VAC 24VDC 600Ah Li Lynx Smart BMS & distributors Cerbo GX touch generator MPPT Extra Alternators & WS500.pdf****What is this drawing about ?**

This drawing has been setup for catamarans and can be used for sail or motor cats using 24V DC with 230V/50Hz AC but can easily be used for 120V/60Hz as well.

**This Victron system works as follows:**

This system has been built around the 5kVA Quattro with 3 or 4 x 200Ah 24 Volt Li battery capacity (for 800 Ah Li capacity it will be better to use the 8kVA Quattro).

Protection of the Li batteries from a charge and discharge point of view is in good hands with use of the Lynx Smart BMS.

To make sure you will not run out of power that easily, there are multiple charge possibilities available for this setup:

1. AC Shore Power that will enable the 5kVA Quattro to charge with 120 Amps towards the Li batteries.
2. AC Generator Power that will enable the 5kVA Quattro to charge with 120 Amps towards the Li batteries.
3. DC Solar Power that will enable the 2 x Smart Solar MPPT 100|50 to charge towards the Li batteries. The total Charge capacity depends on the installed Solar array for each MPPT.
4. DC Engine charging power with an extra 24V/110A Alternator mounted on each engine that can either charge as standalone with 110 Amps or with both engines running with 220 Amps.

Charge combinations of the above mentioned devices also are possible.

DC Loads or users like lights, pumps, and so on, can be connected behind one of the two Smart Battery Protect 220 where the loads are split between main fuse 1 till 5 and 6 till 10.

AC Power will be available from the 5kVA Quattro Inverter/Charger the moment it has been switched on. This means that without any AC power on the input, the Quattro will give you 5kVA of inverter power on AC OUT-1. The moment AC Power is available on input AC IN-1 or AC IN-2, of the Quattro, AC Power will be used to charge the batteries and also is available for loads connected to AC OUT-1 and AC OUT-2. With use of the Cerbo GX one can adjust the available AC Shore power to the maximum AC current the Quattro will use and this is where the Power Assist function comes into play. Power Assist supplements AC inverter power to (for instance) a limited Shore power connection when needed.

All information about the system and its connected Victron devices is clearly visible on the GX Touch 50 Screen that is connected to the Cerbo GX. All AC Input power and AC Loads are clearly visible. Here you can monitor the state of charge (SoC) of your Li batteries and you also can exactly see what discharge current runs away and what charge current comes into the batteries. You can then rest assured that you are in control of your "on board" AC and DC power availability. More info about the system and its individual Victron parts used in this installation are explained in more details down below.

**This is how the system has been setup:****Around the Victron Lithium Batteries 25.6V Smart and Lynx Distributor-1 (Dip switch Pos-A)**

A Lynx Distributor is an easy to use and connect DC distribution system. It can hold 4 Mega fuses and three of them are in use here. It is important to always start with connecting the negative cable first before connecting the positive for each distribution position. Read the manual for additional information.

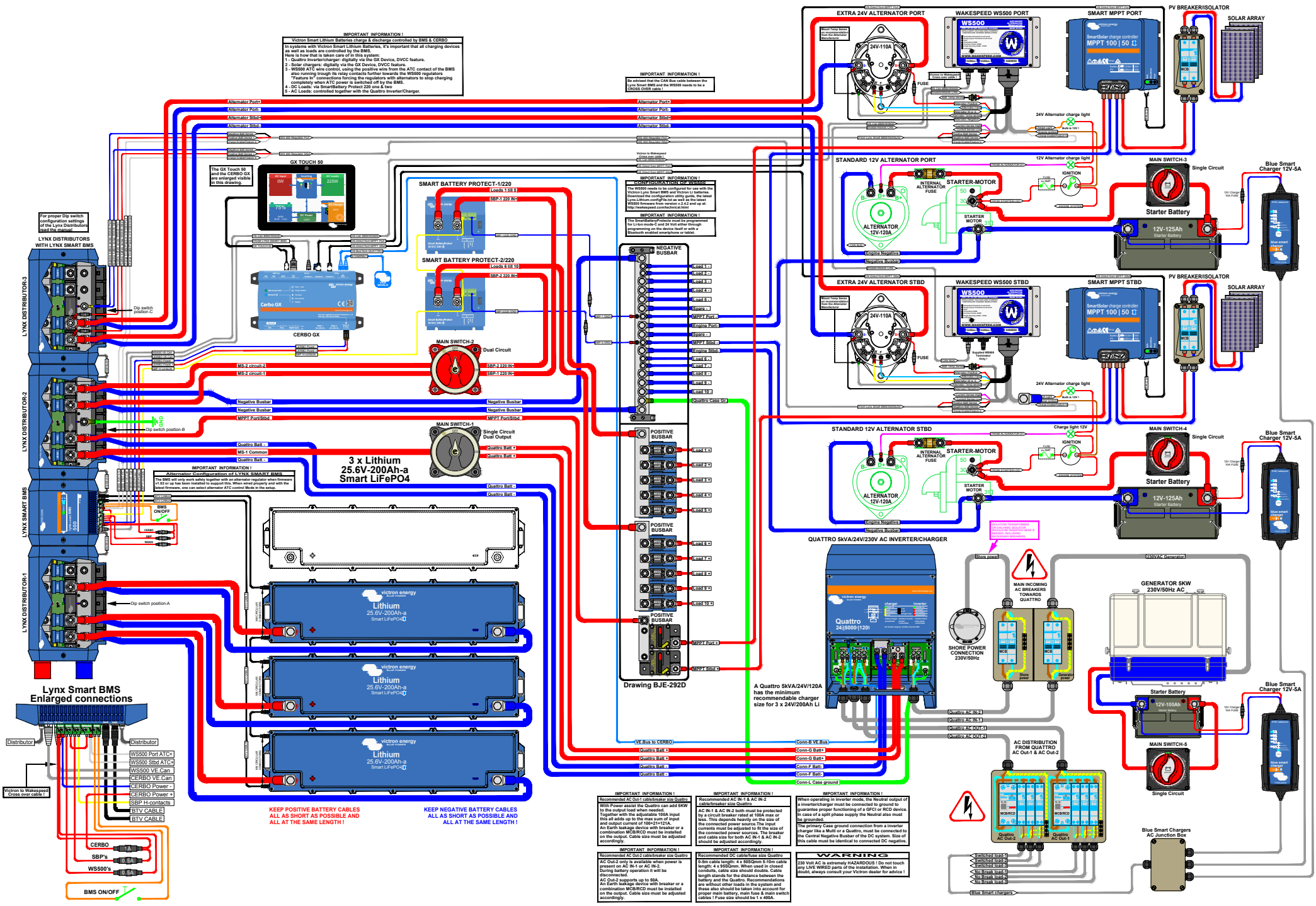
1. The first fuse position at the bottom of Distributor-1 holds a 300A fuse together with its lower positioned negative for Li Battery-1.
2. The second fuse position of Distributor-1 holds a 300A fuse together with its lower positioned negative for Li Battery-2.

**IMPORTANT INFORMATION!**  
 Victron Smart Lithium Batteries charge & discharge controlled by BMS & CERBO  
 In systems with Victron Smart Lithium Batteries, it's important that all charging devices as well as loads are controlled by the BMS.  
 Here is how that is taken care of in this system:  
 1. Quattro Inverter/Charger: digitally via the GX Device, DVCC feature.  
 2. Solar chargers: digitally via the GX Device, DVCC feature.  
 3. WS500 ATC wire control, using the positive wire from the ATC contact of the BMS also running through the relay contacts further towards the WS500 regulators.  
 \*Relay 3V connections forcing the regulators with alternators to stop charging completely when ATC power is switched off by the BMS.  
 4. DC Loads: via SmartBattery Protect 220 one & two  
 5. AC Loads: controlled together with the Quattro Inverter/Charger.

**IMPORTANT INFORMATION!**  
 In order to ensure that the cable between the Victron Smart BMS and the WS500 is not damaged, the Victron Smart BMS and the WS500 needs to be a 100% DVCC cable!

**IMPORTANT INFORMATION!**  
 The BMS needs to be connected to the Victron Smart BMS. Download the configuration utility and, the Victron Smart BMS configuration utility and the Victron Smart BMS from version 2.0.2 and up at: <http://www.victronenergy.com>

**IMPORTANT INFORMATION!**  
 The SmartBattery Protect needs to be programmed for the correct DC and AC Volt meter through programming on the device itself or with a Bluetooth enabled smartphone or tablet.



**KEEP POSITIVE BATTERY CABLES ALL AS SHORT AS POSSIBLE AND ALL AT THE SAME LENGTH!**

**KEEP NEGATIVE BATTERY CABLES ALL AS SHORT AS POSSIBLE AND ALL AT THE SAME LENGTH!**

**IMPORTANT INFORMATION!**  
 Recommended AC Out 1 cable/phase size Quattro  
 With Power assist the Quattro can add 5kW to the total load when using the AC in RICE mode. Together with the adjustable 100A input an Earth leakage device with breaker at the output current of 100-210A/21A.  
 An Earth leakage device with breaker at the output current of 100-210A/21A must be installed on the output. Cable size must be adjusted accordingly.

**IMPORTANT INFORMATION!**  
 Recommended AC Out 2 cable/phase size Quattro  
 AC Out 2 only a maximum power is present on AC IN 1 or AC IN 2. During battery operation it will be disconnected.  
 AC Out 2 supports up to 5kW. An Earth leakage device with breaker at the output current of 100-210A/21A must be installed on the output. Cable size must be adjusted accordingly.

**IMPORTANT INFORMATION!**  
 Recommended AC Out 3 cable/phase size Quattro  
 AC Out 3 only a maximum power is present on AC IN 1 or AC IN 2. During battery operation it will be disconnected.  
 AC Out 3 supports up to 5kW. An Earth leakage device with breaker at the output current of 100-210A/21A must be installed on the output. Cable size must be adjusted accordingly.

**IMPORTANT INFORMATION!**  
 When operating in inverter mode, the Neutral output of an inverter/charger must be connected to ground to guarantee proper functioning of a GFCI or RCD device. In case of a split phase supply the Neutral also must be grounded.  
 The primary phase ground connection from an inverter/charger like Multi or Quattro, must be connected to the Central Negative Busbar of the DC system. Size of this cable must be identical to connected DC negative.

**WARNINGS**  
 230 Volt AC is extremely HAZARDOUS! Do not touch any LIVE WIRE! Parts of the installation. When in doubt, always consult your Victron dealer for advice!

**IMPORTANT INFORMATION!**  
 Recommended AC Out 1 cable/phase size Quattro  
 AC Out 1 only a maximum power is present on AC IN 1 or AC IN 2. During battery operation it will be disconnected.  
 AC Out 1 supports up to 5kW. An Earth leakage device with breaker at the output current of 100-210A/21A must be installed on the output. Cable size must be adjusted accordingly.

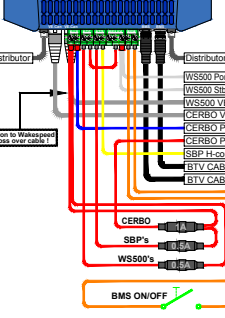
**IMPORTANT INFORMATION!**  
 Recommended AC Out 2 cable/phase size Quattro  
 AC Out 2 only a maximum power is present on AC IN 1 or AC IN 2. During battery operation it will be disconnected.  
 AC Out 2 supports up to 5kW. An Earth leakage device with breaker at the output current of 100-210A/21A must be installed on the output. Cable size must be adjusted accordingly.

**IMPORTANT INFORMATION!**  
 Recommended AC Out 3 cable/phase size Quattro  
 AC Out 3 only a maximum power is present on AC IN 1 or AC IN 2. During battery operation it will be disconnected.  
 AC Out 3 supports up to 5kW. An Earth leakage device with breaker at the output current of 100-210A/21A must be installed on the output. Cable size must be adjusted accordingly.

**IMPORTANT INFORMATION!**  
 When operating in inverter mode, the Neutral output of an inverter/charger must be connected to ground to guarantee proper functioning of a GFCI or RCD device. In case of a split phase supply the Neutral also must be grounded.  
 The primary phase ground connection from an inverter/charger like Multi or Quattro, must be connected to the Central Negative Busbar of the DC system. Size of this cable must be identical to connected DC negative.

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**Lynx Smart BMS Enlarged connections**



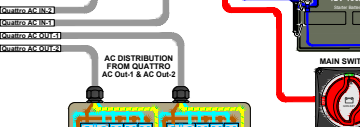
**Drawing BJE-292D**



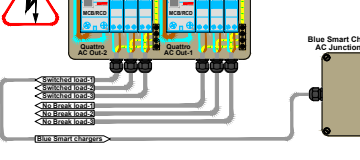
A Quattro 6kVA/24V/120A has the minimum recommendable charger size for 3 x 24V/200Ah Li



**AC DISTRIBUTION FROM QUATRO AC Out 1 & AC Out 2**



Blue Smart Chargers AC Junction Box



3. The third fuse position of Distributor-1 holds a 300A fuse together with its lower positioned negative for Li Battery-3.
4. The fourth fuse position of Distributor-1 holds a spare fuse together with its lower positioned negative for a spare Li battery.

### **Lynx Smart BMS:**

The Lynx Smart BMS is connected between Lynx Distributor-1 and Lynx Distributor-2. The BMS is the controlling safety heart of the system as this device protects the LiFePO<sub>4</sub> batteries against over Voltage, under Voltage and high temperature. The Victron Lithium Batteries 25.6V Smart have an integrated Balancing, Temperature and Voltage control (acronym: BTV) and connect to the BMS connections with two M8 circular connector cable sets. The BTV's of several batteries can be daisy-chained as in this drawing with 3 connected batteries. When cables are not long enough, extension cables are available in several lengths from your Victron dealer, which will suit your purpose. A shunt has been built inside this BMS in the negative connection bus. This shunt is needed to measure what the charge/discharge current is for all connected batteries. The protective part of the BMS for the Li batteries is called ATC (Allow To Charge) and ATD (Allow To Discharge) and this happens through two potential free contacts called ATC and ATD. You can see all these connections clearly in the enlarged part of the Lynx Smart BMS at the bottom left of the drawing next to the batteries. Power for these contacts to control external equipment can be taken from the Aux positive and Negative power connections through a fuse. ATC for both WS500 regulators has to be connected as follows: Positive power from the Aux + contact towards a 0.5A fuse. From the fuse to the left ATC contact and from the right ATC contact to Relay contact COM. From Relay contact NO, the ATC signal goes to WS500 Port ATC+ and to WS500 Stbd ATC+ Wakespeed Charge enable/Feature in connections. ATD for Smart battery Protect-1/220 and 2/220 has to be connected as follows: Positive power from the Aux + contact towards a 0.5A fuse. From the fuse to the left ATD contact and from the right ATD contact to SBP 1/220 and SBP 2/220 H connections. In the setup of the BMS the relay's modus has to be set to Alternator ATC.

Power for the Cerbo has to be connected as follows: from the Aux + contact towards a 1A fuse. From the fuse to the positive power connection of the Cerbo and from the Aux - contact to the negative power connection of the Cerbo.

Instead of a wire bridge you can install a small BMS ON/OFF switch connected to the BMS Remote-H and Remote-L connections as shown in the drawing. You can decide whether or not to use this switch. If you decide to use the BMS ON/OFF switch, make sure to mount it away/out of sight from little kid's hands otherwise you might be in the dark quite suddenly !

The Distributor RJ11 cables on the left and right hand side of the BMS have to be connected to Distributor-1 and Distributor-2 as they provide power to the LED PCB for each Distributor and can be daisy-chained from Distributor 2 to 3. These cables transfer data between the Distributor and the BMS about each main fuse status. Dip switches in each distributor need to be set properly to make this work. See settings behind each Distributor header.

Data at Can bus level to/from the BMS has to be connected to the Cerbo VE.Can port and to the Wakespeed Can bus connection. The VE.Can cable between the BMS and the Cerbo is a normal RJ45 cable, but the cable between the Cerbo and the WS500 is a Victron to Wakespeed Cross over cable. Do not forget to terminate the Can bus system at each end. Only use Wakespeed terminators for the WS500 as they are different compared to the ones for Victron.

The ATD contacts of the BMS will stop connected devices from discharging when the Battery Voltage has decreased below a preset value. (Detailed description as explained above and in the manual) The following Victron devices will be stopped when this happens:

- Smart Battery Protect SBP 1/220 and SBP 2/220 both controlling a full Load disconnect of what is connected to both SBP OUT Connections.

The ATC contacts of the BMS will stop connected devices from charging to prevent Cell over-Voltage or a Cell temperature that runs too high. (Detailed description as explained above and in the manual) The following Wakespeed devices will be stopped when this happens:

- WS500 Port ATC+ when connected to Charge enable/Feature in connection.

- WS500 Stbd ATC+ when connected to Charge enable/Feature in connection.

Other connected Victron devices in this system also need to be controlled from a charge and discharge point of view and this can be achieved through the connected GX device:

- Quattro Inverter/Charger will be controlled digitally through the GX device DVCC feature.
- Solar chargers will be controlled digitally through the GX Device DVCC feature.

Acronym: DVCC stands for: Distributed Voltage and Current Control.

### **Lynx Distributor-2 (Dip switch Pos-B)**

1. The first fuse position at the bottom of Distributor-2 holds a 400A fuse together with its lower positioned negative connections for the biggest device in this installation, a 5kVA Quattro inverter/charger. Keep the distance between Lynx Distributor Fuse-1, Main switch-1 (Blue Sea 3000) and the negative Quattro connections as short as possible. Read the Quattro manual carefully to proceed further. Notice that 2 negative connections are used here, 1 below Fuse-1 and one below Fuse-2.
2. The second fuse position of Distributor-2 holds a 150A fuse for the positive outputs of both Smart Solar charge controllers MPPT 100|50. The lower negative is used for the Quattro second negative connection as both negative outputs for the Solar charge controllers are connected to the negative Busbar.
3. The third fuse position of Distributor-2 holds a 250A fuse for Smart Battery Protect-1 220. Its lower positioned negative connection is used to connect to the Negative Busbar. Keep the distance between Lynx Distributor fuse-3, Main switch-2 and SBP-1 with its connected main fuses as short as possible.
4. The fourth fuse position of Distributor-2 holds a 250A fuse for Smart Battery Protect-2 220. Its lower positioned negative connection is used to connect to the Negative Busbar. Keep the distance between Lynx Distributor fuse-4, Main switch-2 and SBP-2 with its connected main fuses as short as possible.

Main switch-1 is a single circuit model used for the Quattro with dual output connections to provide two positive connections towards the Quattro. This makes connecting of the Quattro much easier. Main switch-2 is a dual circuit model used for Main fuse 3 and 4 towards SBP-1 and SBP-2. The PE/Earth connection will be dealt with later together with the Quattro.

### **Lynx Distributor-3 (Dip switch Pos-C)**

1. The first fuse position of Distributor-3 at the bottom of the Distributor holds a 150A fuse together with its lower positioned negative connection for the extra STBD Alternator. Also look at the 3 Amp in line fuse for the WS500 battery sense STBD connected to the same 150A fuse and the negative connection for the WS500 battery sense STBD connected to the negative busbar of Distributor-3.
2. The second fuse position of Distributor-3 holds a 150A fuse together with its lower positioned negative connection for the extra PORT Alternator. Also look at the 3 Amp in line fuse for the WS500 battery sense PORT connected to the same 150A fuse and the negative connection for the WS500 battery sense PORT connected to the negative busbar of Distributor-3.

Main fuse 3 and 4 are Spares and can be used for future users or charge possibilities.

### **SBP or Smart Battery Protect 1/220:**

This smart battery protect 220 is used for DC loads 1 till 5. One can make a choice what to use it for. The SBP is needed to protect the Li batteries from discharging beyond a low Voltage setpoint. It comes highly recommended to install a fuse of 300mA in the negative connection of the SBP.

### **SBP or Smart Battery Protect 2/220:**

This smart battery protect 220 is used for DC loads 6 till 10. One can make a choice what to use it for. The SBP is needed to protect the Li batteries from discharging beyond a low Voltage setpoint. It comes highly recommended to install a fuse of 300mA in the negative connection of the SBP.

### **Cerbo GX with GX Touch 50 Display:**

The Cerbo GX with its GX Touch 50 Display is visible next to Distributor-3. The Cerbo together with the GX Touch 50 Display is the monitoring heart of your installation showing you what is going on with all connected devices. Monitoring of your installation can be done either with the Cerbo in front of you or from anywhere in the world using an internet connection as shown in the

drawing with VRM World that connects to the Victron VRM portal either using the VictronConnect app or website. The Cerbo also provides Remote Firmware updates and allows settings to be changed Remotely. Whatever you connect to a Cerbo can be made visible on the GX Touch 50 display or with: Remote Console, VRM Dashboard, Advanced VRM Widgets, VRM App Widgets, and VE.Can/NMEA 2000. This all has been clearly explained in the Cerbo manual.

The positive power for the Cerbo comes from the Lynx Smart BMS AUX connections including its negative as explained with the BMS. The GX Touch 50 Display HDMI connector with attached USB power cable obviously has to go into the HDMI port of the Cerbo and the USB cable directly next to it.

The VE.Bus cable coming from the 5kVA Quattro goes into a VE.Bus port of the Cerbo. The Ethernet cable and its connector, to connect to the VRM Portal (if available), will go into the Network port of the Cerbo. The VE.Direct cables from Smart Solar MPPT 100|50 Port and Stbd, both connect to a VE.Direct port of the Cerbo. Data at VE.Can bus level to/from the Lynx Smart BMS has to be connected to a Cerbo VE.Can port. Do not forget to terminate the Can bus at the Cerbo with a Victron terminator.

These are all the connections you have to make for the Cerbo. There is plenty more you can connect and do with a Cerbo and that all is very well explained in its manual.

### **Smart Solar charge Controller MPPT 100|50 Port:**

Next to Wakespeed WS500 Port, you will find Smart Solar charge Controller MPPT 100|50 Port. Also visible here is a PV breaker/Isolator. The Solar array as shown in the drawing is just to visualize some solar panels and how things need to be connected.

It might be a good idea that you use the free MPPT sizing calculator available from the Victron website. This is a great and accurate tool to size what you need on Solar panel power and charge controllers for your project. On the Victron Website just search for MPPT calculator.

DC power from the solar array first passes through the PV breaker/Isolator and then connects to the MPPT PV input connections. The positive DC Output of the MPPT connects to a 60A Blue Sea breaker before connecting to the second fuse position of Distributor-2. The negative DC output connection of the MPPT connects to the Negative busbar.

The VE.Direct cable and connector from the MPPT has to be connected to a Cerbo VE.Direct Port. The Cerbo in connection with the BMS controls the MPPT from overcharging the Li batteries via DVCC or Distributed Voltage and Current Control.

### **Smart Solar charge Controller MPPT 100|50 Stbd:**

Next to Wakespeed WS500 Stbd, you will find Smart Solar charge Controller MPPT 100|50 Stbd. This MPPT connects up the same way as the MPPT 100|50 Port. It also feeds its positive DC Output connection of the MPPT to a 60A Blue Sea breaker before connecting to the second fuse position of Distributor-2. The negative DC output connection of the MPPT connects to the Negative busbar. Make sure that both 60A Blue Sea breakers are connected together with a small positive Busbar before connecting to the second fuse position of Distributor-2.

### **Engine Systems:**

The starter circuits for both engines Port & Stbd with individual 12V Starter Batteries, Main switches 3 & 4, Starter Motors, standard Alternators with main fuses and Ignition systems visible in this drawing should be seen as examples to show you how to connect your Victron products.

The starter circuit of the Generator with Starter Battery and Main switch-5 visible in this drawing also should be seen as an example to show you how to connect your Victron products.

### **Maintenance Chargers for starter batteries 230V/50Hz AC:**

There are 3 Victron Blue Smart 12V 5A chargers in this drawing each with a 10A in-line fuse. AC power for all chargers comes from switched Load Quattro output AC Out-2 through a breaker.

### **Quattro Inverter/Charger 5kVA/24V 230V/50Hz AC:**

Below the Stbd starter circuit you will find the Quattro Inverter/Charger.

The Quattro should be mounted in such a way that it can cool itself down properly and the space where it is in should be dry and well ventilated. Free space around the device should be at least

10cm or 4". Don't box the device in as this will certainly have a bad effect on its functioning and service life.

Most connections to and from the Quattro already have been discussed, but it might be a good idea to have them all together here again:

The DC power to and from the Quattro connects to the first fuse position at the bottom of Lynx Distributor-1 holding a 400A fuse together with its lower positioned negative connection and the lower positioned negative connection of Fuse-2.

The Positive connection from the first Fuse position connects to Main Switch-1. By using a Blue Sea 3000 HD Main Switch for Main Switch-1, one can connect two Positive connections towards the Quattro. This will make connecting of the Quattro much easier.

Incoming AC power comes through a Victron Shore Power connection. From there it passes through an incoming AC breaker panel towards the Quattro AC IN-2 connections. Incoming Generator power comes through an incoming AC breaker panel towards the Quattro AC IN-1 connections. AC OUT-1 of the Quattro is connected to an AC breaker panel and from the breaker panel onward these are NO Break AC outputs and as the name suggests are constantly powered by the Quattro Inverter. AC OUT-2 of the Quattro is also connected to an AC breaker panel and from the breaker panel onward these are switched AC outputs and as the name here suggest are switched off when there is no incoming AC power available. AC OUT-2 is live only when AC power is available on one of the inputs of the Quattro with a 2 minute connect delay.

The Quattro has two VE.Bus connections:

One is used for the Cerbo and the other one is Spare.

The Quattro has a Case Ground connection-L that should be connected to the negative Busbar as shown in this drawing. The Case Ground cable should be one size smaller compared to its total connected negative. All shown connections in this drawing, are made according to CE/ABYC regulations. This is a NON Isolated DC System setup. When in doubt about how to continue with these connections, consult your Victron dealer.

Read the Quattro manual carefully to proceed further.

### **Software settings for all shown Victron devices in this drawing, including Wakespeed WS500 regulator:**

- When setting up a new system, it will be good practice to update all Victron devices to the latest available Software/Firmware.
- The three Victron LiFePO4 25,6V 200Ah Smart batteries can be set, monitored and updated with use of the VictronConnect App.
- The two Victron Smart Battery Protects 220 can be set, monitored and updated with use of the VictronConnect App. Must be programmed for Li-Ion mode-C and 24V.
- The two Victron Smart Solar charge controllers MPPT 100|50 can be set, monitored and updated with use of the VictronConnect App. Must be programmed for Li-Ion mode and 24V.
- The Victron Cerbo GX Device can be updated to the latest Firmware in two different ways:
  - 1 - Update it via the internet, either manually or let it check for new updates every day.
  - 2 - Update it from a microSD-card or USB-stick. Check the Cerbo manual for this.
- The Victron Lynx Smart BMS can be set, monitored and updated with use of the VictronConnect App.
- The Victron Quattro can be set, monitored and updated with use of the MK3-USB interface and VEConfigure software (Windows only) or use the VictronConnect App (Multi Platform). Limitations of Victron Connect are that one can not add assistants, use Virtual Switch and/or change the Grid Code.
- The three Victron Blue Smart chargers of 12V 5A can be set, monitored and updated with use of the VictronConnect App.
- Both WS500's need to be configured for use with the Victron Lynx Smart BMS and Victron Li batteries. Download the configuration utility guide, the latest Lynx.Lithium.configFile.txt as well as the latest WS500 firmware from version v.2.4.2 and up at: <http://wakespeed.com/technical.html>.



**Wiring Calculations:**

There are no wire sizes visible in this drawing and there is a good reason why this is not available in any drawing on the Victron website. We at Victron do not know what the physical size of your project is and it therefore will be impossible to give you specific wire sizes that will fit your setup. But there is a very handy tool available from Victron called Victron Toolkit for Android and iPhone users. In this app you will find Cable Calc that will help you size any cable for AC and DC. This will help you find all the right cable sizes for your project.

**Wiring Unlimited:**

This is a book freely available for downloading from the Victron Website. This book is all about electrical wiring for systems containing batteries, inverters, charger, inverter/chargers and so on. With this book Victron aims to explain wiring basics of electrical systems. This book helps to explain the importance of 'getting it right' and the issues that might happen when a system has inferior wiring. It also assists electrical installers or users to troubleshoot issues that have arisen from bad wiring. This book will certainly help to get it right and to make sure proper conclusions can be drawn for the electrical systems its readers are involved with.

**Using the Victron-Remote-Monitoring / VRM app or website:**

Monitoring of your installation can be done either with the Cerbo in front of you or from anywhere in the world using an internet connection as shown in the drawing with VRM World that connects to the Victron VRM portal either using the VictronConnect app or website. Just login to your VRM account or setup a new one and tap on your account to view your installation. You can for instance set alarm status information for the state of charge or SoC and this will automatically warn you when a certain level has been reached. This is extremely useful during periods of absence or winterizing mode and..... it is free of charge ! For more info read the latest available VRM manual. The VRM app is available for Android and iPhone users.

**During periods of absence:**

Make sure to switch the Quattro to charger only. This prevents the inverter from draining the batteries when no AC input power is available. Switch off all unnecessary users. When proper calculations for both Solar systems were made, both solar arrays on Port and Stbd will maintain the batteries.

**Winterizing:**

Before putting the boat in hibernation for winterizing, make sure to fully charge the batteries first. Then switch off the Quattro and its main switch-2. You can also decide to switch off main switch-1 and the engine main switches 4-5-6 as well if needed be. Solar charging will continue to maintain the Li batteries. Check at regular intervals if the batteries are not losing too much capacity and make sure to prevent freezing at all times. A regular interval is 4-6 weeks. To keep communication of your system going with use of the VRM app or website, you do need an Internet connection to make this work and Victron also has a solution for this with the GX LTE 4G cellular modem. Check it out on the Victron website.

**In this drawing you will find the following Victron equipment with some additional material:**

| Victron Part description  | Part No.     | Amount | Remark                         |
|---|--------------|--------|--------------------------------|
| Breaker box PV with DC breaker isolator for solar Array               | .....        | 1      | Order from your Victron dealer |
| Breaker box Quattro AC OUT-1 & AC OUT-2                               | .....        | 1      | Order from your Victron dealer |
| Breaker box Quattro AC Shore power Input and AC Generator power Input | .....        | 1      | Order from your Victron dealer |
| Battery switch on/off 275A  | VBS127010010 | 3      |                                |

| Victron Part description  | Part No.      | Amount | Remark                                    |
|---|---------------|--------|---|
| Blue Sea Battery switch on/off. Single circuit, dual output.                                  | 3000          | 1      |   |
| Blue Sea Battery switch on/off. Dual circuit.   | 5501E         | 1      |   |
| Blue Sea Thermal breaker 60A for MPPT's   | 7184          | 2      |   |
| Blue Smart IP65s Charger 12/5 + DC connector  | BPC120533064R | 3      | maintenance chargers                      |
| Cables with M8 circular connector (for Li-ion batteries) Male to Female 3 pole 2 m (bag of 2) | ASS030560200  | 1      | Bag of 2                                  |
| Cerbo GX  | BPP900450100  | 1      |   |
| Fuse holder 2AG or 5x20mm by Little Fuse including fuses                                      | 150 series    | 10     | Order on line or from your Victron dealer |
| GX Touch 50 Display   | BPP900455050  | 1      |   |
| LiFePO4 Battery 25,6V/200Ah - Smart-a   | BAT524120610  | 3      |   |
| Lynx Smart BMS 500  | LYN034160200  | 1      |   |
| Lynx Distributor  | LYN060102000  | 3      | Order fuses from your Victron dealer      |
| MEGA-fuse 150A/32V (package of 5 pcs)   | CIP136150010  | 1      |   |
| MEGA-fuse 250A/32V (package of 5 pcs)   | CIP136250010  | 1      |   |
| MEGA-fuse 300A/32V (package of 5 pcs)   | CIP136300010  | 1      |   |
| MEGA-fuse 400A/32V (package of 5 pcs)   | CIP136400010  | 1      |   |
| Modular Mega fuse holder for Mega Fuse (1 till 10)  | CIP100200100  | 10     | Order fuses from your Victron dealer      |
| Modular Mega fuse holder Busbar CIP100200100  | CIP100400060  | 2      |   |
| Quattro 24/5000/120-100/100   | QUA245021010  | 1      |   |
| Power Inlet 32A stainless steel with cover  | SHP 303202000 | 1      |   |
| Power Cord 15m 25A for shore power inlet  | SHP304001500  | 1      |   |
| Smart BatteryProtect 12/24V-220A  | BPR122022000  | 2      |   |
| SmartSolar MPPT 100/50  | SCC110050210  | 2      |   |
| VE.Bus cables: from Quattro to Cerbo  | .....         | 1      | Cable lengths not known                   |
| VE.Direct cables: from MPPT Port & Stbd to Cerbo  | .....         | 2      | Cable lengths not known                   |
| RJ45 Can bus cables   | .....         | 3      | Cable lengths not known                   |
| WS500 Advanced Alternator Regulator   | WS500         | 2      |   |



| <b>Victron Part description</b>   | <b>Part No.</b> | <b>Amount</b> | <b>Remark</b>                               |
|---|-----------------|---------------|---|
| WS500 Regulator Wiring Harness for N-type Alternator. Includes Alt. Temp. Sensor. | WS500/NH        | 2             | Check if the Alternator is P or N regulated |
| Data Terminator Kit for WS500 Alternator Regulator. Includes two terminators.     | WS500-DT-K      | 1             |   |
| WS500 to Victron Energy Can bus Crossover Cable                                   | WS-VE-CABLE     | 1             |   |

Victron Energy B.V. | De Paal 35 | 1351 JG Almere | The Netherlands  
 General phone: +31 (0)36 535 97 00  
 E-mail: [sales@victronenergy.com](mailto:sales@victronenergy.com) | [www.victronenergy.com](http://www.victronenergy.com)