

Van or small Motorhome drawing with: VE.Bus BMS V2 MultiPlus-II 3kVA DMC 400Ah Li Cerbo SBP 100A SmartShunt MPPT 100-50 OrionTr

What is this drawing about ?

This drawing typically has been setup for Camper Vans or Motorhomes for the US market 120V/60Hz AC but can easily be used for boats as well.

This Victron system works as follows:

This system has been built around the 3kVA MultiPlus-II and the Li battery capacity has been adjusted to give you enough spare capacity. Protection of the Li batteries from a charge and discharge point of view is in good hands with use of the VE.Bus BMS V2.

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

1. AC Campsite Power that will enable the 3kVA MultiPlus-II Inverter/Charger to charge with 120 Amps towards the Li batteries.
2. DC Solar Power that will enable the Smart Solar MPPT 100|50 to charge towards the Li batteries. The total Charge capacity depends on the installed Solar array.
3. DC Engine charging power that will enable both Orion Tr Smart 12|12-30 to charge with 60 Amps together towards the Li batteries when the Engine runs.

Charge combinations of the above mentioned devices also are possible.

DC loads or power consumers such as lights, pumps and so on, can be connected behind a Smart Battery Protect 100 with use of a DC switch panel and a negative busbar.

AC Power will be available from the 3kVA MultiPlus-II Inverter/Charger the moment it has been switched on. This means that without any AC power on the input, the MultiPlus-II will give you 3kVA of inverter power on AC OUT-1. The moment AC Power is available on input AC IN-1 of the MultiPlus-II, AC Power will be used to charge the batteries and also is available for loads connected to AC OUT-1. The second AC output AC OUT-2 is live only when AC power is available on the input of the MultiPlus-II. With the easily settable Digital Multi Control one can adjust the available AC campsite power to the maximum AC current the MultiPlus-II 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:

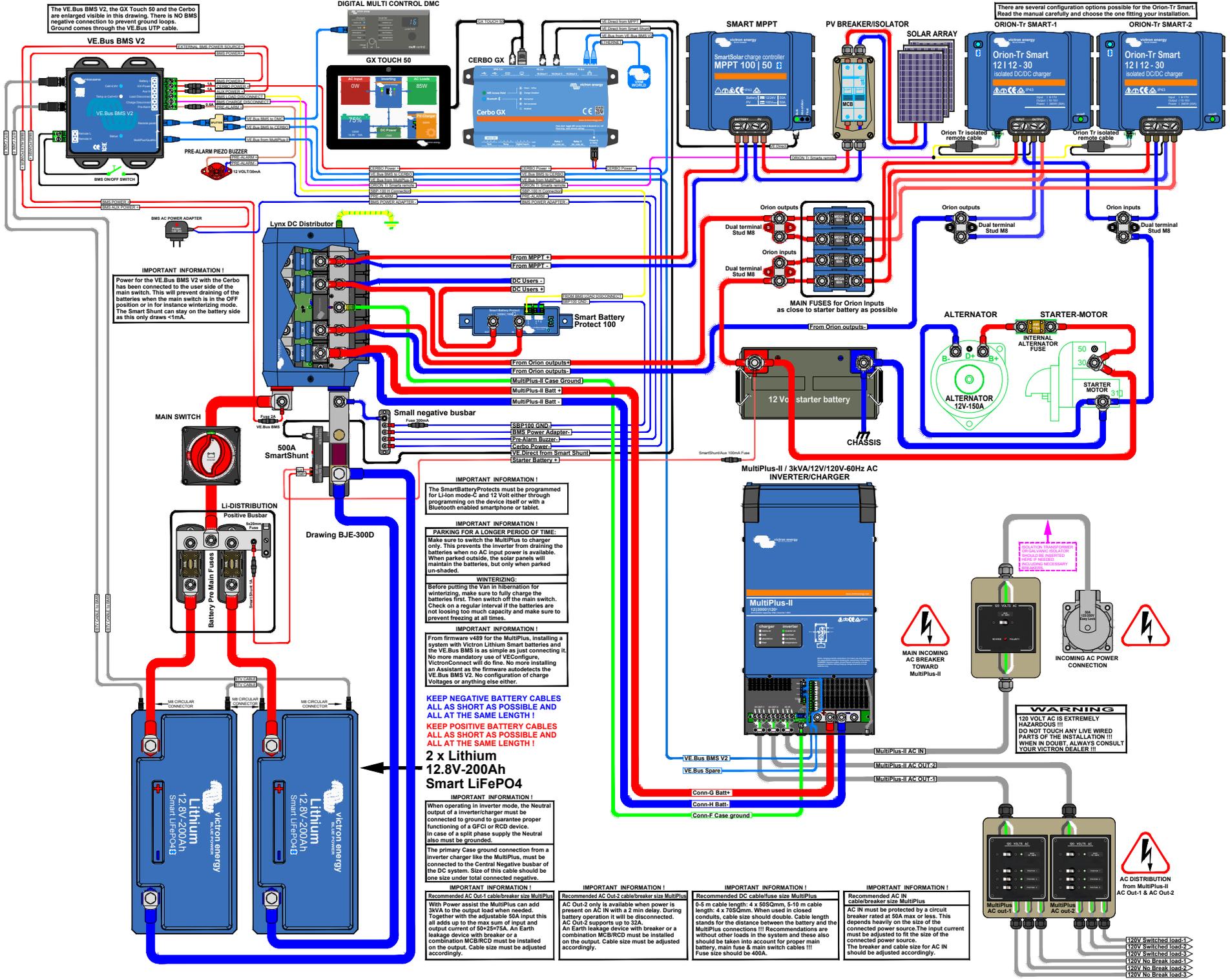
Around the Victron Lithium Batteries 12.8V Smart.

There are two Victron Lithium Batteries 12.8V Smart of 200Ah in this drawing.

Following the drawing from the bottom-left, both positive battery terminals are connected to an individual ANL fuse-holder with a 300A fuse. The top side of the ANL fuse holders are connected together with a piece of Tinned copper bar. On the same copper bar is a fuse holder connected for the Smart Shunt with a fuse of 1A keeping it on 24-7. Between the two ANL fuse holders is a Center Tab connection that runs to the Victron Main Switch and from the Main Switch a connection has been made to the Lynx Distributor positive Battery connection and that connection includes a fuse holder for the VE.Bus BMS with a fuse of 2A.

Both negative battery terminals are directly connected to the Smart Shunt Battery Connection.

The VE.Bus BMS V2, the GX Touch 50 and the Cerbo are enlarged visible in this drawing. There is NO BMS negative connection to prevent ground loops. Ground comes through the VE.Bus UTP cable.



IMPORTANT INFORMATION !
Power for the VE.Bus BMS V2 with the Cerbo has been connected to the user side of the main switch. This will prevent draining of the batteries when the main switch is in the OFF position or in for instance winterizing mode. The Smart Shunt can stay on the battery side as this only draws $1mA$.

IMPORTANT INFORMATION !
The SmartBatteryProtects must be programmed for Li-Ion mode-C and 12 Volt either through programming on the device itself or with a Bluetooth enabled smartphone or tablet.

IMPORTANT INFORMATION !
PARKING FOR A LONGER PERIOD OF TIME:
Make sure to switch the MultiPlus to charger only. This prevents the inverter from draining the batteries when no AC input power is available. When parked outside, the solar panels will maintain the batteries, but only when parked un-shaded.

WINTERIZING:
Before putting the Van in hibernation for winterizing, make sure to fully charge the batteries first. Then switch off the main switch. Check on a regular interval if the batteries are not loosing too much capacity and make sure to prevent freezing at all times.

IMPORTANT INFORMATION !
From firmware v489 for the MultiPlus, installing a system with Victron Lithium Smart batteries and the VE.Bus BMS is as simple as just connecting it. No more mandatory use of VEConfigure, VictronConnect will do fine. No more installing an Assistant as the firmware autodetects the VE.Bus BMS V2. No configuration of charge voltages or anything else either.

KEEP NEGATIVE BATTERY CABLES ALL AS SHORT AS POSSIBLE AND ALL AT THE SAME LENGTH !
KEEP POSITIVE BATTERY CABLES ALL AS SHORT AS POSSIBLE AND ALL AT THE SAME LENGTH !
2 x Lithium 12.8V-200Ah Smart LiFePO4

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 Case ground connection from a inverter charger like the MultiPlus, must be connected to the Central Negative busbar of the DC system. Size of this cable should be one size under total connected negative.

IMPORTANT INFORMATION !
Recommended AC Out-1 cable/breaker size MultiPlus
With Power assist the MultiPlus can add 3kVA to the output load when needed. Together with the adjustable 50A input this all adds up to the max sum of input and output current of 50+25=75A. An Earth leakage device with breaker or a combination MCB/RCD must be installed on the output. Cable size must be adjusted accordingly.

IMPORTANT INFORMATION !
Recommended AC Out-2 cable/breaker size MultiPlus
AC Out-2 only is available when power is present on AC-IN with a 2 min delay. During battery operation it will be disconnected. AC Out-2 supports up to 30A.
An Earth leakage device with breaker or a combination MCB/RCD must be installed on the output. Cable size must be adjusted accordingly.

IMPORTANT INFORMATION !
Recommended DC cable/fuse size MultiPlus
0.5 m cable length: 4 x 50S2mm, 5-10 m cable length: 4 x 70S2mm. When used in closed conduits, cable size should double. Cable length stands for the distance between the battery and the MultiPlus connections !!! Recommendations are without other loads in the system and these also should be taken into account for proper main battery, main fuse & main switch cables !!! Fuse size should be 400A.

IMPORTANT INFORMATION !
Recommended AC IN cable/breaker size MultiPlus
AC IN must be protected by a circuit breaker rated at 50A max or less. This depends heavily on the size of the connected power source. The input current must be adjusted to fit the size of the connected power source.
The breaker and cable size for AC IN should be adjusted accordingly.

WARNING
120 VOLT AC IS EXTREMELY HAZARDOUS !!!
DO NOT TOUCH ANY LIVE WIRED PARTS OF THE INSTALLATION !!!
WHEN IN DOUBT, ALWAYS CONSULT YOUR VICTRON DEALER !!!

AC DISTRIBUTION from MultiPlus-II AC Out-1 & AC Out-2

- 120V Switched load
- 120V Switched load
- 120V Switched load
- 120V No Break load
- 120V No Break load
- 120V No Break load

The Smart Shunt System Minus connection is connected to the Lynx Distributor negative Battery connection with a piece of Tinned copper bar. Also connected here is a small negative Busbar that will be needed for the following negative connections:

- 1 - Smart Battery Protect 100 GND (with a 300mA fuse)
- 2 - BMS Power Adapter
- 3 - Pre-Alarm Buzzer
- 4 - Cerbo Power

Smart Shunt 500A:

The Smart Shunt 500A used in this drawing has two positive connection terminals, one for its own Power and measurements named Vbatt+ and one called Aux. The Aux connection can be used to measure the Battery Voltage of the Starter battery as shown in this drawing. Place an In-Line fuse for this of 1A close to the positive starter battery terminal and connect to the Aux connection of the Smart Shunt. The negatives of the starter battery and the service batteries have to be connected together to make this work. The Smart Shunt VE.Direct connector has to be connected to the Cerbo and by doing this all battery information will be available on the GX Touch-50 screen.

Lynx Distributor:

A Lynx Distributor is an easy-to-use and connect DC distribution system. It holds 4 Mega fuses and all 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 the Distributor holds a 400A fuse together with its lower positioned negative connection for the biggest device in this installation, a 3kVA MultiPlus-II inverter/charger. Keep the distance between the Lynx Distributor and the MultiPlus-II as short as possible. If that can not be achieved, you have to double up the positive and negative DC power cables to power up the MultiPlus-II efficiently. Read the MultiPlus-II manual carefully to proceed further.
2. The second fuse position holds a 125A fuse together with its lower positioned negative connection for both Orion Tr Smart 12|12-30 Outputs.
3. The third fuse position holds a 100A fuse together with its lower positioned negative connection for a Smart Battery Protect 100. This one can be used for a DC switch panel.
4. The fourth fuse position holds a 60A fuse together with its lower positioned negative connection for the output of a Smart Solar charge controller MPPT 100|50.
5. The PE/Earth connection will be dealt with later together with the MultiPlus-II.

Smart Battery Protect 100:

The smart battery protect 100A model can be used for a DC switch panel and 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.

VE.Bus BMS V2:

Above the Lynx distributor you will find the VE.Bus BMS V2. This device protects the LiFePO4 batteries against over Voltage, under Voltage and high temperature. The Victron Lithium Batteries 12.8V Smart have an integrated Balancing, Temperature and Voltage control (acronym: BTV) and connect to the BMS with two M8 circular connector cable sets. The BTV's of several batteries can be daisy-chained as in this drawing. When cables are not long enough, extensions cables are available in several lengths from your Victron dealer, which will suit your purpose.

The battery plus connection for the BMS comes from a 2A fuse connected to the Lynx positive Battery connection. This means that the BMS switches off when the main switch is in the OFF position. There is a small BMS ON/OFF switch connected to the Remote-H en Remote-L connections. 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 Battery negative for the BMS is not available. Reason for this is to prevent unwanted ground loops. Instead the battery negative connection comes through the VE.Bus UTP cable connected to the MultiPlus-II.

The GX-Power connection feeds power through a 1A fuse to the Cerbo and this output will be turned off in case of a low Cell Voltage to prevent draining the batteries beyond recovery.

The Aux-In connection is for feeding in external DC power to the BMS as shown in this drawing through an AC Power adapter protected by a 1A fuse.

The Load disconnect output of the BMS will stop connected devices from discharging when the Battery Voltage has decreased below a preset value.

The following Victron devices will be stopped when this happens:

- Smart Battery Protect 100 controlling a full Load disconnect of what is connected to the SBP100 OUT Connection

The Charge disconnect output of the BMS will stop connected devices from charging to prevent Cell over-Voltage or a Cell temperature that runs too high.

The following Victron devices will be stopped when this happens:

- Orion Tr isolated remote cable for Orion Tr Smart-1 controlling a charge disconnect for Orion-1
- Orion Tr isolated remote cable for Orion Tr Smart-2 controlling a charge disconnect for Orion-2

All Load and Charge Disconnect connections coming from the BMS need to be connected to a H terminal connection of for instance a Smart Battery protect etc..

The Pre-Alarm output of the BMS will generate a Pre-Alarm signal to warn of an imminent Cell under-Voltage. The buzzer will sound and this will give you ample time to start a charge or to switch off devices preventing a load disconnect.

The BMS LED indicators can help you identify what is going on with the BMS & Li batteries:

Blue light blinking: BMS is operating normally.

Cell>2,8V (color Blue Off): Low cell Voltage. BMS is in Load Disconnect mode. Charge batteries !

Cell>4V (color Red On) High cell voltage or high temperature: BMS is in Charge Disconnect mode.

For more LED indication info, read the BMS manual.

The VE.Bus BMS V2 has two VE.Bus connections:

1 for a GX device like a Cerbo in this drawing and/or a Digital Multi Control or DMC device as shown in this drawing. Both are connected with use of a RJ45 splitter.

1 for a MultiPlus or Quattro connected to a VE.Bus Mains detector.

A Mains detector comes standard with the VE.Bus BMS V2 and is needed for the BMS to restart a MultiPlus or Quattro when AC power becomes available and especially in case the BMS has switched the MultiPlus off due to low cell voltage, otherwise it can not recharge the batteries.

The supplied Mains detector is not needed here because a MultiPlus-II model is used in this drawing that has the functionality of a Mains detector built in.

GX Device communication with VE.Bus will take place between the BMS and the Cerbo.

The BMS can control equipment that is connected to a GX device, like the Smart Solar charge Controller MPPT 100|50 in this drawing via DVCC and this will prevent overcharging of the Li batteries.

Cerbo GX with GX Touch 50 Display:

The Cerbo GX with its GX Touch 50 Display are visible in this drawing right above the Lynx Distributor. 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 GX-Power output of the BMS. The negative power for the Cerbo comes from the small negative busbar. 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 BMS and the Splitter goes into a VE.Bus port of the Cerbo and the Ethernet cable and its connector, to connect to the VRM Portal, into the Network port of the Cerbo. The VE.Direct cable and connector from the Smart Shunt goes into a VE.Direct port of the Cerbo and the same for the VE.Direct cable and connector from the Smart Solar MPPT 100|50.

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:

Next to the Cerbo you will find a Smart Solar charge Controller MPPT 100|50.

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 Van or Motorhome. 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 connection of the MPPT connects to the fourth fuse position of the Lynx Distributor. The fourth fuse position holds a 60A fuse together with its lower positioned negative connection for the MPPT output. 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.

Orion Tr Smart 12|12-30 DC/DC converters:

Next to the PV Breaker/Isolator and Solar Array you will find two Orion Tr Smart 12|12-30 DC/DC converters. These two are working in parallel and will give a total charge current of 60A.

Isolated models are used to prevent any interference with the engine's CAN bus system and that is also the reason why you have to use Orion Tr isolated remote cables. Both grey wires from the Orion Tr isolated remote should be connected to the Orions L & H connections. The black wire should be connected to the output negative of the Orion and the yellow wire connects to the BMS Charge Disconnect (purple wire).

The Power input of each Orion comes from the starter battery positive through individual main fuses of 60 Amp each and from the starter motor negative connection-31.

The power positive output of each Orion also runs through individual main fuses of 60 Amp each. The power negative output of each Orion runs towards a Black Victron Dual terminal stud.

From both Orion Output Dual terminal studs in Red and Black, power runs to the second fuse position of the Lynx distributor holding a 125A fuse together with its lower positioned negative connection for both Orion Tr Smart 12|12-30 Outputs.

Engine System:

The starter circuit of the engine with Starter Battery and Chassis ground connections, Alternator with main fuse and Starter Motor visible in this drawing should be seen as an example to show you how to connect your Victron products.

MultiPlus-II Inverter/Charger 3kVA/12V 120V/60Hz AC:

Below the starter circuit you will find the MultiPlus-II Inverter/Charger.

The MultiPlus-II 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 Multiplus-II 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 MultiPlus-II connects to the first fuse position at the bottom of the Lynx Distributor holding a 400A fuse together with its lower positioned negative connection.

Incoming AC power into the Van or Motorhome comes through a Camp site or Shore Power connection of 50A. From there it passes through an incoming AC breaker panel towards the MultiPlus-II AC IN-1 connections.

AC OUT-1 of the MultiPlus-II is connected to an AC breaker panel.

These are NO Break AC outputs and as the name suggests are constantly powered through the MultiPlus-II Inverter.

AC OUT-2 of the MultiPlus-II is also connected to an AC breaker panel.

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 the input of the MultiPlus-II with a 2 minute connect delay.

The MultiPlus-II has two VE.Bus connections:

One is used for the VE.Bus BMS.V2 and the other one is Spare.

The MultiPlus-II has a Case Ground connection-F that should be connected to the Lynx Distributor negative Busbar as shown in this drawing. The PE/Ground connection also is connected to the Lynx Distributor negative Busbar as shown at the top of the Lynx Distributor. 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 MultiPlus-II manual carefully to proceed further.

Digital Multi Control:

The Digital Multi Control is used to remotely view and adjust the AC input current of your MultiPlus in a direct and easy way by the turn of a knob, and you can switch your MultiPlus-II remotely ON or OFF, or to Charger Only.

Software settings for all shown Victron devices in this drawing:

- When setting up a new system, it will be good practice to update all Victron devices to the latest available Software/Firmware.
- The Victron LiFePO4 12,8V 200Ah Smart batteries can be set, monitored and updated with use of the VictronConnect App.
- The Victron Smart Shunt 500A can be set, monitored and updated with use of the VictronConnect App. Don't forget to set the Battery capacity.
- The Victron Smart Battery Protect 100 can be set, monitored and updated with use of the VictronConnect App. Must be programmed for Li-Ion mode-C and 12V.
- The Victron Smart Solar charge controller MPPT 100|50 can be set, monitored and updated with use of the VictronConnect App. Must be programmed for Li-Ion mode and 12V.
- The Victron Orion-Tr Smart 12|12-30A Isolated DC/DC Chargers can be set, monitored and updated with use of the VictronConnect App. Must be programmed for Li-Ion mode. Adjust settings for start and stop charging according to the installed alternator and if it is a normal or Smart alternator.
- 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 VE.Bus BMS V2. Can be updated to the latest Firmware locally and also remotely via the VRM portal.
- The Victron MultiPlus-II 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 VictronConnect are that one can not add assistants, use Virtual Switch and/or change the Grid Code.
- From firmware v489 there is no need to use the VE.Bus BMS assistant anymore. Using this firmware results in practically the same behavior as previously when the Assistant had to be used. As soon as the MultiPlus-II sees the VE.Bus BMS V2, and the (new) checkbox called "Configured for VE.Bus BMS" is not checked yet, it will automatically configure itself.

The recommended way to commission a MultiPlus-II system like in this drawing is to:

- Update the firmware first.
- Install and connect the VE.Bus BMS V2.

- Unplug the VE.Bus BMS V2 with the VE.Bus cable and wait for the MultiPlus-II to switch to passthrough/switch off. This step ensures that the MultiPlus-II has properly detected the VE.Bus BMS V2.
- Re-insert the VE.Bus cable into the VE.Bus BMS V2.
- Finish the commissioning, or connect with VictronConnect and make the rest of the configuration that you wish to make.

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 Victron connect 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 for long time parking 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.

Parking for a longer period of time:

Make sure to switch the MultiPlus-II to charger only. This prevents the inverter from draining the batteries when no AC input power is available. When parked outside, the solar panels will maintain the batteries, but only when parked away from shade.

Winterizing:

Before putting the Camper Van or motorhome in hibernation for winterizing, make sure to fully charge the batteries first. Then switch off the MultiPlus-II and the main switch. The VE.Bus BMS V2 switches off when the main switch is in the OFF position together with the Cerbo. The Smart Shunt is on 24-7. 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. If you wish you can use the BMS AC power adapter to keep the VE.Bus BMS V2 powered on and communication of your system going with use of the VRM app or website.

Installing a small Victron maintenance charger for wintertime is a very good investment. With for instance a Victron Blue Smart IP65 Charger 120V/12V/10A, you can switch off the MultiPlus-II and only use the maintenance charger and monitor your system 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
Battery switch on/off 275A	VBS127010010	1	
Blue Sea ANL Pre-Main fuse holders for the Li batteries	5005	2	
Blue Sea ANL 300A Main fuse	5133	2	
Blue Sea Mini BusBar - 5 Gang with Cover	2314	1	
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	
Digital Multi Control 200/200A GX	DMC000200010R	1	
Dual Terminal Stud M8-linked set (1 red/1 black)	VBB413020010	2	
Fuse holder 2AG or 5x20mm by Little Fuse including fuses	150 series	7	Order on line or from your Victron dealer
GX Touch 50 Display	BPP900455050	1	
LiFePO4 Battery 12,8V/200Ah - Smart	BAT512120610	2	
Lynx Distributor	LYN060102000	1	Order fuses from your Victron dealer
MEGA-fuse 60A/32V (package of 5 pcs)	CIP136060010	1	
MEGA-fuse 100A/32V (package of 5 pcs)	CIP136100010	1	
MEGA-fuse 125A/32V (package of 5 pcs)	CIP136125010	1	
MEGA-fuse 400A/32V (package of 5 pcs)	CIP136400010	1	
Modular fuse holder for Mega-fuse	CIP100200100	4	
MultiPlus-II 12/3000/120-50 120V	PMP122305110	1	
Orion-Tr Isolated DC-DC Charger remote cable	ASS070300100	2	
Orion-Tr Smart 12/12-30A Isolated DC-DC charger	ORI121236120	2	
Paneltronics 120 Volt AC main Input panel	.....	1	
Paneltronics 120 Volt AC Output panel	.....	2	
PV Breaker/Isolator	.....	1	Order from your Victron dealer
Smart BatteryProtect 12/24V-100A	BPR110022000	1	
Smartshunt 500A/50mV	SHU050150050	1	
SmartSolar MPPT 100/50	SCC110050210	1	
VE.Bus cables: from VE.Bus BMS V2 to splitter, from splitter to DMC, from splitter to Cerbo, from Multiplus-II to VE.Bus BMS V2	.....	0	Cable lengths not known

Victron Part description	Part No.	Amount	Remark
VE.Direct cables: from MPPT to Cerbo, from Smart Shunt to Cerbo.	.....	0	Cable lengths not known
VE.Bus BMS V2	BMS300200200	1	
VE.Bus BMS V2 Piezo buzzer, on/off switch, splitter, power adapter	1	Order from your Victron dealer

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