

3 Phase setup with 15kVA MultiPlus-II WITH AC breakers, 4 x SmartSolar charge controllers 250-100, Solar arrays with breakers and surge protectors, Lynx Power in, Lynx Distributors, Cerbo GX with GX Touch 70, Tank level sensor, GX LTE 4G, Generator with breaker and surge protector and 16 x BYD Flex Lite batteries with BYD LV-BMU.

What is this drawing about ?

This drawing can be used as a basic plan and as an example to setup off-grid solar applications where AC power is required for 3 x 230V/50Hz AC single phase and 400V/50Hz 3 Phase.

Differences between Single phase and 3 Phase power usage:

The most important difference between single and 3-phase power is the consistency of the delivery of power. A three-phase power supply can support three times as much power compared to a single-phase power supply, while only needing three or four wires instead of two.

A single-phase power supply will show peaks and dips in voltage and especially when bigger loads are switched on and off, where a three-phase power supply delivers power with efficient constant stability. This obviously only counts for 3 phase powered users.

This Victron system works as follows:

This system has been built around 3 x MultiPlus-II of 15kVA 48V connected in 3 Phase configuration, 4 x SmartSolar charge controllers MPPT 250-100 and 16 x 5kWh 51.2 Volt parallel connected BYD Flex Lite batteries resulting to 80kWh total battery capacity.

There are two charge possibilities available in this drawing:

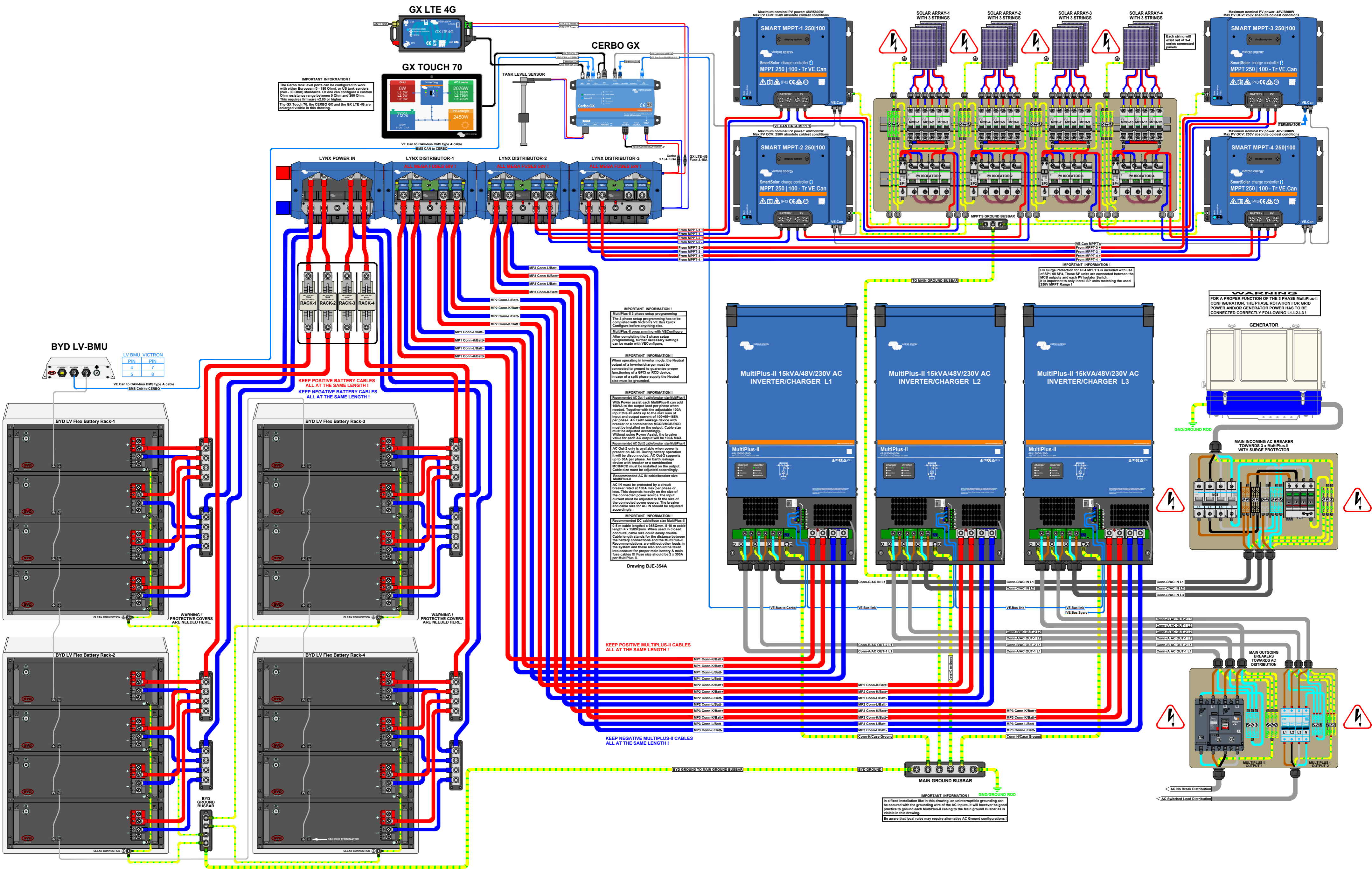
1. 400V AC Generator Power that will enable each 15kVA MultiPlus-II to charge with about 200 Amps towards the Li batteries. This can add up to a total charge current of 3x200A or 600A in total and this will be managed by the battery system itself with use of a Cerbo GX and DVCC to prevent overcharging.
2. DC Solar Power coming from 4 x SmartSolar charge controllers MPPT 250-100. Although each SmartSolar MPPT can charge with about 100A each, the total Charge capacity depends on the size of the installed Solar arrays, but eventually this can add up to a total charge current of 4 x 100A or 400A in total. This will be managed by the battery system itself with use of a Cerbo GX and DVCC to prevent overcharging.

Charge combinations of the two above mentioned charge possibilities also are possible and this also will be managed with use of DVCC to prevent overcharging.

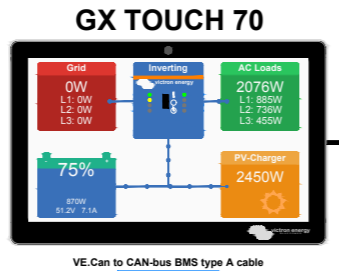
There are no DC Loads or users like lights, pumps, and so on connected in this drawing, but that can also be made possible as there are 2 main fuses free in Lynx Distributor-3 for this. If needed an extra Distributor can be installed next to Distributor-3 to connect more DC loads to the system.

Three phase AC Power will be available from all three phase connected 15 kVA MultiPlus-II Inverter/Chargers the moment they all are switched on. This means that without any 3 phase power on the AC inputs, the 3 phase connected MultiPlus-II devices will give you 45kVA of inverter power on the AC OUT-1 connections. The moment 3 phase AC Power is available on the AC IN inputs, AC power will be used to charge the batteries with each MultiPlus-II device and also is available for loads connected to AC OUT-1 and AC OUT-2 in 3 phase connection and individual single phase connection per device. The second AC outputs AC OUT-2 will be live only when AC power is available on AC IN of each MultiPlus-II.

With use of the Cerbo GX one can adjust the available AC Generator power to the maximum AC current the 3-phase connected MultiPlus-II units will use to charge the batteries and to supply AC power to connected loads on AC Outputs-1 and AC Outputs-2.



IMPORTANT INFORMATION!
 The Cerbo tank level ports can be configured to work with either European (0 - 100 Ohm) or US tank sensors (240 - 30 Ohm) standards. Or one can configure a custom Ohm resistance range between 0 Ohm and 300 Ohm. This requires firmware v2.80 or higher.
 The GX Touch 70, the CERBO GX and the GX LTE 4G are enlarged visible in this drawing.



IMPORTANT INFORMATION!
 MultiPlus-II 3 phase setup programming
 The 3 phase setup programming has to be completed with Victoria's M&M Check Configurator before anything else.
 MultiPlus-II programming with VECConfigure
 After completing the 3 phase setup programming, further necessary settings can be made with VECConfigure.

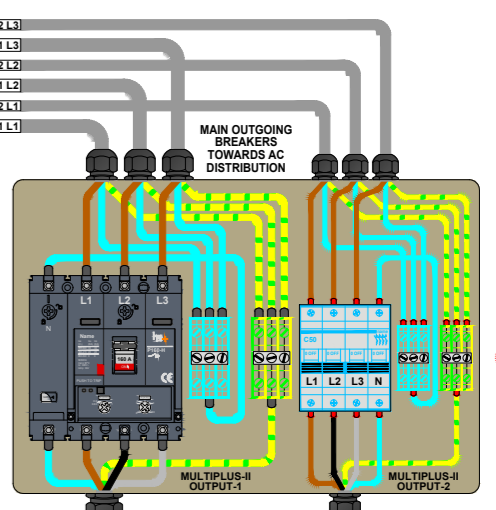
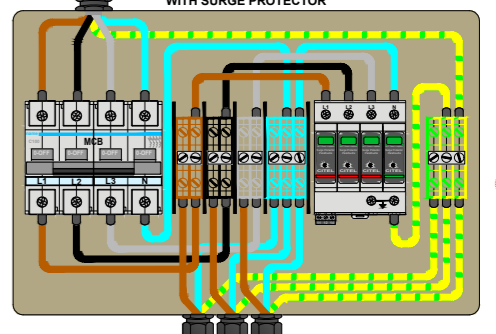
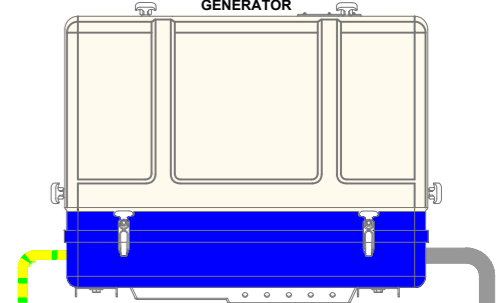
IMPORTANT INFORMATION!
 When operating in inverter mode, the Neutral output of an inverter/charger must be connected to ground to guarantee proper functioning of a GFCI or RCD device. In case of a split phase supply the Neutral also must be grounded.

IMPORTANT INFORMATION!
 Recommended AC Out 1 cable size MultiPlus-II
 With three phase each MultiPlus-II can add 15kVA to the output load per phase when needed. Together with the adjustable 100 input this all adds up to the max sum of input and output current of 100A/MSA per phase. An Earth leakage device with breaker or a combination MCB/RCD must be installed on the output. Cable size must be adjusted accordingly. Without using Power Assist, the breaker value for each AC output will be 100A MAX.
 Recommended AC Out 2 cable size MultiPlus-II
 AC Out 2 is only available when power is present on AC IN. During battery operation it will be disconnected. AC Out 2 supports up to 50A per phase. An Earth leakage device with breaker or a combination MCB/RCD must be installed on the output. Cable size must be adjusted accordingly.
 Recommended AC IN cable size MultiPlus-II
 AC IN must be protected by a circuit breaker rated at 100A max per phase 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.

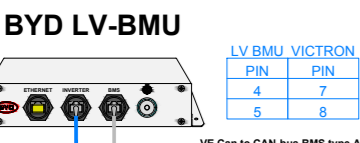
IMPORTANT INFORMATION!
 Recommended DC cable size MultiPlus-II
 0-5 m cable length: 4 x 95Gmm. 5-10 m cable length: 4 x 150Gmm. When used in closed conduits, cable size could easily double. Cable length stands for the distance between the battery connections and the MultiPlus-II. Recommendations are without other loads in the system and these also should be taken into account for proper main battery & main fuse cables. Fuse size should be 2 x 300A per MultiPlus-II.

Drawing BJE-354A

WARNING!
 FOR A PROPER FUNCTION OF THE 3 PHASE MultiPlus-II CONFIGURATION, THE PHASE ROTATION FOR GRID POWER AND/OR GENERATOR POWER HAS TO BE CONNECTED CORRECTLY FOLLOWING L1-L2-L3!



IMPORTANT INFORMATION!
 In a fixed installation like in this drawing, an uninterruptible grounding can be secured with the grounding wire of the AC inputs. It will however be good practice to ground each MultiPlus-II casing to the Main ground Busbar as is visible in this drawing.
 Be aware that local rules may require alternative AC Ground configurations!



LV BMU VICTRON	PIN	PIN
4	7	
5	8	

KEEP POSITIVE BATTERY CABLES ALL AT THE SAME LENGTH!
KEEP NEGATIVE BATTERY CABLES ALL AT THE SAME LENGTH!

KEEP POSITIVE MULTIPLUS-II CABLES ALL AT THE SAME LENGTH!
KEEP NEGATIVE MULTIPLUS-II CABLES ALL AT THE SAME LENGTH!

WARNING!
 PROTECTIVE COVERS ARE NEEDED HERE.

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WARNING!

WARNING!

WARNING!

WARNING!

WARNING!
 AC No Break Distribution

WARNING!
 AC Switched Load Distribution

All information about the system and its connected Victron devices are clearly visible on the Cerbo GX Touch Screen. All AC Input power and AC Loads are clearly visible as well.

Here you can monitor the state of charge (SoC) from your Li batteries.

You can see exactly how much charge or discharge current is flowing into or out of the batteries from all 3 MultiPlus-II devices together with the DC charge power coming from all 4 SmartSolar charge controllers. You can also individually check detailed information from each MPPT 250-100 in the Cerbo device list.

You can then rest assured that you are in control of your 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 16 x parallel connected BYD LV Flex Lite Batteries, and the 4 x HRC NH3 fuses.

There are 4 x 19" battery racks each equipped with 4 x parallel connected BYD LV Flex Lite batteries. This gives a total of 16 x 5kWh 51.2 Volt parallel connected batteries resulting to 80kWh total battery capacity. Each battery rack is equipped with a positive and a negative busbar to support safe connections toward each rack numbered individual HRC NH3 500A main fuse and a Lynx Power In unit. Every individual BYD LV Flex Lite is internally equipped with a 150A main fuse.

This is how the main battery cabling has to be set up:

Battery Rack-1 till 4 have their own dedicated positive and negative busbar on the lefthand site of each Rack. All battery positive and negative connections for each rack are connected towards these dedicated busbars with equal positive cable lengths and equal negative cable lengths.

1. The positive busbar of Rack-1 needs to be connected to Rack-1 HRC NH3 500A fuse.
The negative busbar of Rack-1 needs to be connected to the first negative connection of the Lynx Power In unit.
2. The positive busbar of Rack-2 needs to be connected to Rack-2 HRC NH3 500A fuse.
The negative busbar of Rack-2 needs to be connected to the second negative connection of the Lynx Power In unit.
3. The positive busbar of Rack-3 needs to be connected to Rack-3 HRC NH3 500A fuse.
The negative busbar of Rack-3 needs to be connected to the third negative connection of the Lynx Power In unit.
4. The positive busbar of Rack-4 needs to be connected to Rack-4 HRC NH3 500A fuse.
The negative busbar of Rack-4 needs to be connected to the fourth negative connection of the Lynx Power In unit.

All positive connections between the positive busbars and the HRC NH3 fuse holders 1-2-3-4 need to be fitted with equal positive cable lengths.

All positive connections between the HRC NH3 fuse holders 1-2-3-4 and the positive Lynx Power In unit connections 1-2-3-4 need to be fitted with equal positive cable lengths.

BYD LV-BMU connected to BYD LV Flex Lite batteries:

All 4 battery Racks have to be Data connected with use of Cat5 cables according to the BYD manual and as visible in this drawing and the last open Out port in Rack-4 needs a Terminator.

The first In port in Rack-1 needs to be connected to The BYD LV-BMU BMS port.

The BYD LV-BMU Inverter port connection should be connected directly to the Cerbo BMS Can port and this Can bus cable is different compared to standard Cat5 cables.

Follow the BYD manual for this with the right pinout configuration between BYD and Victron.

You can also order this so called VE.Can to CAN-bus BMS type A cable from Victron.

See the parts list for this. The second BMS-Can bus port on the Cerbo needs to be terminated.

For all other information and settings regarding the BYD LV Flex Lite batteries and the BYD LV-BMU please use the supplied manuals for this.

CERBO GX with GX TOUCH-70 display & GX LTE 4G:

The Cerbo GX with its GX Touch 70 Display and the 4G communication device GX LTE 4G are all visible right above Lynx Distributor 1 till 3.

The Cerbo together with the GX Touch 70 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 through the Victron GX LTE 4G device as shown in the drawing with 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 70 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. You can find the latest version of this manual on the Victron website.

The positive power for the Cerbo comes through a 3.15A fuse placed inside an In-Line fuse holder and connected to the positive busbar of Lynx Distributor-3. Negative power for the Cerbo needs to be connected to the negative busbar of Lynx Distributor-3. Both these connections can be easily made on the right hand side of Lynx Distributor-3.

The GX Touch 70 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.Can bus cable coming from SmartSolar charge controllers 1 till 4 connects to a VE.Can port of the Cerbo.

Don't forget that the open VE.Can port needs a terminator.

The BYD LV-BMU BMS Can bus cable needs to be connected to a BMS Can port of the Cerbo.

Don't forget that the open BMS Can port needs a terminator.

The Can bus cable between the BYD LV-BMU and the Cerbo is not your normal CAT5 cable !!!

This cable has a different pinout and you can order this so called VE.Can to CAN-bus BMS type A cable from Victron. See the parts list for this.

The VE.Bus cable coming from all 3 MultiPlus-II Inverter/Chargers needs to be connected to a VE.Bus port of the Cerbo.

Positive power for the GX LTE 4G unit comes through a 3.15A fuse placed inside an In-Line fuse holder and connected to the positive busbar of Lynx Distributor-3. Negative power for the GX LTE 4G unit needs to be connected to the negative busbar of Lynx Distributor-3.

Both these connections can be easily made on the right hand side of Lynx Distributor-3.

The USB cable from the GX LTE 4G unit needs to be connected to one of the two USB connections of the Cerbo.

Be aware that you need to order a GX LTE 4G device to match the available LTE bands in your country. You can find this info in the manual.

A tank level sensor has been connected to Tank Port-1. This can be quite useful to measure the Diesel fuel tank-level of the Generator to receive warnings about a certain reached fuel level.

The Cerbo tank level ports can be configured to work with either European (0-180 Ohm), or US tank senders (240-30 Ohm) standards. Or one can configure a custom Ohm resistance range between 0 Ohm and 300 Ohm. This requires firmware v2.80 or higher.

A generator start/stop signal has been connected to Relay-1 NO-COM-NC connections.

Using this feature and how to set it up and connect has been well explained in the Cerbo manual.

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.

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

- All 3 MultiPlus 15kVA/48V/230V Inverter/Chargers will be controlled digitally through the GX device DVCC feature.
- All 4 SmartSolar charge controllers MPPT 250|100-Tr VE.Can will be controlled digitally through the GX device DVCC feature.

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

Lynx Distributor-1:

Lynx Distributor-1 is connected directly to the right hand side of the Lynx Power In device. A Lynx Distributor is an easy to use and connect DC distribution system. It can hold 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. IMPORTANT: the positive cable lugs need to be connected on top of the fuse and NOT the other way around ! Read the Distribution manual for additional information.

1. The first fuse position of Distributor-1 holds a 300A fuse together with its lower positioned negative connection for MultiPlus-II L1. These are the first positive and negative connections for MultiPlus-II L1.
2. The second fuse position of Distributor-1 holds a 300A fuse together with its lower positioned negative connection for MultiPlus-II L1. These are the second positive and negative connections for MultiPlus-II L1.
3. The third fuse position of Distributor-1 holds a 300A fuse together with its lower positioned negative connection for MultiPlus L2. These are the first positive and negative connections for MultiPlus-II L2.
4. The fourth fuse position of Distributor-1 holds a 300A fuse together with its lower positioned negative connection for MultiPlus L2. These are the second positive and negative connections for MultiPlus-II L2.

Keep the positive cables between the Lynx Distributor fuses and all 3 MultiPlus-II devices at the same length and as short as possible. Keep the negative cables between the negative Lynx Distributor connections and all 3 MultiPlus-II Devices at the same length and as short as possible. *Read the MultiPlus-II manual carefully to proceed further.*

Lynx Distributor-2:

Lynx Distributor-2 is connected directly to the right hand side of the Lynx Distributor-1. A Lynx Distributor is an easy to use and connect DC distribution system. It can hold 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. IMPORTANT: the positive cable lugs need to be connected on top of the fuse and NOT the other way around ! Read the Distribution manual for additional information.

1. The first fuse position of Distributor-2 holds a 300A fuse together with its lower positioned negative connection for MultiPlus-II L3. These are the first positive and negative connections for MultiPlus-II L3.
2. The second fuse position of Distributor-2 holds a 300A fuse together with its lower positioned negative connection for MultiPlus-II L3. These are the second positive and negative connections for MultiPlus-II L3.
3. The third fuse position of Distributor-2 holds a 125A fuse together with its lower positioned negative connection for SmartSolar MPPT-1.
4. The fourth fuse position of Distributor-2 holds a 125A fuse together with its lower positioned negative connection for SmartSolar MPPT-2.

Keep the positive cables between the Lynx Distributor fuses and all 3 MultiPlus-II devices at the same length and as short as possible. Keep the negative cables between the negative Lynx Distributor connections and all 3 MultiPlus-II Devices at the same length and as short as possible.

Keep the positive cables between the Lynx Distributor fuses and all 4 SmartSolar MPPT devices at the same length and as short as possible. Keep the negative cables between the negative Lynx Distributor connections and all 4 SmartSolar MPPT Devices at the same length and as short as possible.

Read the MultiPlus-II and SmartSolar MPPT manuals carefully to proceed further.

Lynx Distributor-3:

Lynx Distributor-3 is connected directly to the right hand side of the Lynx Distributor-2.

A Lynx Distributor is an easy to use and connect DC distribution system.

It can hold 4 Mega fuses and 2 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. IMPORTANT: the positive cable lugs need to be connected on top of the fuse and NOT the other way around ! Read the Distribution manual for additional information.

1. The first fuse position of Distributor-3 holds a 125A fuse together with its lower positioned negative connection for SmartSolar MPPT-3.
2. The second fuse position of Distributor-3 holds a 125A fuse together with its lower positioned negative connection for SmartSolar MPPT-4.
3. The third fuse position of Distributor-3 holds a Spare fuse together with its lower positioned negative connection for a future spare device.
4. The fourth fuse position of Distributor-3 holds a Spare fuse together with its lower positioned negative connection for a future spare device.

Keep the positive cables between the Lynx Distributor fuses and all 4 SmartSolar MPPT devices at the same length and as short as possible. Keep the negative cables between the negative Lynx Distributor connections and all 4 SmartSolar MPPT Devices at the same length and as short as possible.

Read the SmartSolar MPPT manual carefully to proceed further.

MultiPlus-II 48V 15kVA 200A Inverter/Chargers in 3 phase setup:

Below the MPPT's, the Solar arrays and its breakers, you will find 3 x MultiPlus-II 15kVA/48V/230V device in 3 phase setup.

Each 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 above and below each device should be at least 10cm. Don't box the devices in as this will certainly have a bad effect on its functioning and service life.

Most connections to and from each MultiPlus-II already have been discussed, but it might be a good idea to have them all together here:

Both negative connections for each MultiPlus-II should be connected first to its dedicated Lynx Distributor 1 and 2 negative connections as shown in the drawing. Both positive connections for each MultiPlus-II should be connected last to its dedicated Lynx Distributor 1 and 2 fuses as shown in the drawing. *IMPORTANT: the positive cable lugs need to be connected on top of the fuse and NOT the other way around !*

3 phase Incoming AC Power from a Generator passes through a 3 phase incoming AC MCB breaker panel towards each MultiPlus-II AC IN connections L1-L2-L3.

AC OUT-1 of each MultiPlus-II is connected to a 3 phase MCCB & MCB AC breaker panel and from the breaker panel onward these are NO Break AC outputs and as the name suggests are constantly powered by all 3 MultiPlus-II Inverters L1-L2-L3.

AC OUT-2 of each MultiPlus-II is also connected to the same 3 phase MCCB & MCB 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 L1-L2-L3 are live only when AC power is available on the input of each MultiPlus-II with a 2 minute connect delay.

The 3 phase AC breaker panels AC IN and AC OUT-1, AC-OUT-2 need to be seen as examples. It is very important that proper MCCB and MCB breakers are being used sized to what is needed. Combination MCB/RCD or GFCI breakers should be used on the 3 phase outputs before connecting to specific sized breakers for users.

Also check the local requirements as this can be setup directly for 3 phase or for single phase usage or a combination of both.

The MultiPlus-II has two VE.Bus connections:

As shown in the drawing, at MultiPlus-1 one VE.Bus connection is used for the Cerbo and the other one needs to be looped through to MultiPlus-2 and from MultiPlus-2 to MultiPlus-3.

In a fixed installation like in this drawing, an uninterruptible grounding can be secured with the grounding wire of the AC input. But this also heavily depends on the Ground situation of the connected AC Generator. It will be good practice to ground the casing with use of Case Ground connection-H of each MultiPlus-II to the Main Ground Busbar as is visible in this drawing. Each Case Ground cable should be able to carry the full combined ground current of the AC input including the total Inverter current of each MultiPlus-II device.

This is the maximum throughput current towards the loads each MultiPlus-II can handle.

Be aware that local rules may require alternative AC ground configurations.

When in doubt about how to continue with these connections, consult your Victron dealer.

Read the MultiPlus-II manual carefully to proceed further.

Smart Solar charge Controllers 4 x MPPT 250|100 each with a Solar array, 3 x Double Pole-MCB, PV Isolator and Surge Protector:

You will find all 4 Smart Solar charge Controllers MPPT 250|100 above the 3 MultiPlus-II devices.

All 4 systems are identically built. MCB 1 till 3 receive solar power from 3 independent arrays.

Each array can have multiple solar panels connected in series or parallel and this obviously depends on what is needed. Adapt the MCB Amp value if needed.

As long as the total combined solar power will not go over the limitations of each MPPT 250|100.

Read the MPPT 250|100 manual carefully to proceed further.

At the bottom side of MCB 1 till 3 all positive connections are connected together to a Positive Busbar and all Negative connections are connected together to a Negative Busbar.

From the Positive Busbar power first runs towards Surge Protector 1 or SP1 Positive and from the same SP1 Positive connection it continues towards PV Isolator-1 IN-1 Positive.

From the Negative Busbar power first runs towards Surge Protector 1 or SP1 Negative and from the same SP1 Negative connection it continues towards PV Isolator-1 IN-3 Negative.

From PV Isolator-1 OUT-2 the Positive Power connection runs towards the positive input of Smart MPPT-1 250|100.

From PV Isolator-1 OUT-4 the Negative Power connection runs towards the Negative input of Smart MPPT-1 250|100.

The battery Positive connection of MPPT-1 is connected to the third fuse position of Distributor-2 holding a 125A fuse together with its lower positioned negative connection for SmartSolar MPPT-1.

For Solar array-2 with MCB-4 till 6 and PV Isolator-2 all connections are similar.

From PV Isolator-2 OUT-2 the Positive Power connection runs towards the positive input of Smart MPPT-2 250|100.

From PV Isolator-2 OUT-4 the Negative Power connection runs towards the Negative input of Smart MPPT-2 250|100.

The battery Positive connection of MPPT-2 is connected to the fourth fuse position of Distributor-2 holding a 125A fuse together with its lower positioned negative connection for SmartSolar MPPT-2.

For Solar array-3 with MCB-7 till 9 and PV Isolator-3 all connections are similar.

From PV Isolator-3 OUT-2 the Positive Power connection runs towards the positive input of Smart MPPT-3 250|100.

From PV Isolator-3 OUT-4 the Negative Power connection runs towards the Negative input of Smart MPPT-3 250|100.

The battery Positive connection of MPPT-3 is connected to the first fuse position of Distributor-3 holding a 125A fuse together with its lower positioned negative connection for SmartSolar MPPT-3.

For Solar array-4 with MCB-10 till 12 and PV Isolator-4 all connections are similar. From PV Isolator-4 OUT-2 the Positive Power connection runs towards the positive input of Smart MPPT-4 250|100. From PV Isolator-4 OUT-4 the Negative Power connection runs towards the Negative input of Smart MPPT-4 250|100.

The battery Positive connection of MPPT-4 is connected to the second fuse position of Distributor-3 holding a 125A fuse together with its lower positioned negative connection for SmartSolar MPPT-4.

It comes highly recommended to construct a similar build setup around all 4 MPPT's.

WARNING: Do not underestimate the power coming from a solar array. These DC Voltages can be lethal !!!

The VE.Can connection coming from the Cerbo should be connected to SmartSolar charge controller MPPT-1. All the other VE.Can connections from MPPT-1 till MPPT-4 should be looped through and the last one with an open VE.Can bus port needs a terminator.

GROUNDING and SURGE PROTECTION:

Ground the frames of all installed PV arrays and MPPT's in a star shape connection pattern for each set and link them all through with use of AC Ground/PE terminal connections that also make a connection to the Din size Omega rail. From there on two ground connections have been made to the MPPT's Ground Busbar. The MPPT's Ground Busbar should be connected to the Main Ground Busbar. A Ground Rod should be connected to the Main Ground Busbar. Depending on how far away the generator has been positioned another Ground Rod should be placed directly next to the Generator as well.

The DC surge protection devices SP1 till SP4 in this drawing are SPD Type-2 models and they can help protecting the solar arrays and MPPT devices from lightning surges. The moment a surge happens it will be shorted out to ground sacrificing one or both surge cartridges inside surge protection devices SP1 till SP4. This will be shown in each surge protection device by a Red cartridge color and this means that the cartridge in question needs a replacement.

The AC Inputs of all MultiPlus-II devices also are protected with a SPD Type-2 model Surge Protector. The moment a surge happens on the Generator side towards the AC inputs it will be shorted out to ground sacrificing one or all cartridges inside the AC surge protection device. This will be shown when the color of a cartridge is not green anymore and this means that the cartridge in question needs a replacement.

Read the manuals carefully and when in doubt about how to proceed further with the ground connections, consult your Victron dealer.

Be aware that local rules may require different Surge Protection Device (SPD) classification models like Type-1, Type-2 or Type-3.

Be aware that local rules may require alternative AC ground configurations including Ground Rod positioning.

Software/Firmware 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 Cerbo GX Device can be updated to the latest Firmware in two different ways:
 - 1 - Update it via the on board WiFi or internet connection, either manually or let it check for new

updates every day. Instructions are available in the Cerbo manual.

2 - Update it from a microSD-card or USB-stick. Instructions are available in the Cerbo manual.

- The Victron GX LTE 4G: Updates for the GX LTE 4G are included in VenusOS. This means that an updated Cerbo GX device will keep the GX LTE 4G up to date as well.
- 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 Victron Connect are that one can not add assistants, use Virtual Switch and/or change the Grid Code.
- The Victron SmartSolar charge controller MPPT 250|100 can be set, monitored and updated with use of the VictronConnect App. Must be programmed for Li-Ion mode and 48V.

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 Voltage Drop 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 connected GX Touch 70 in front of you or from anywhere in the world using an internet connection as shown in the drawing with use of a GX LT 4G and 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 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.

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

Victron Part description	Part No.	Amount	Remark
BYD LV Flex Battery Rack 1 till 4 with 4 batteries per Rack	.....	4	16 batteries in total
BYD LV-BMU	.....	1	
Busbar 600A 4 Pole with cover. Positive and Negative next to each BYD Flex battery rack.	VBB160040010	8	
Busbar 250A 4 Pole with cover. BYD Ground Busbar and MPPT Ground Busbar	VBB125040010	2	
Busbar 250A 6 Pole with cover. Main Ground	VBB125060020	1	
Cerbo GX MK2	BPP900451100	1	

Victron Part description	Part No.	Amount	Remark
DC Main Fuse box with 4 x 500A NH3 HRC Fuse and Fuse holder for battery Rack 1 till 4	.....	1	Order from your Victron dealer
DC Solar array Connect box with 12 x DC MCB, 4 x DC Surge Protector, 4 x PV Isolator and 12 x Din size Ground terminals	.....	1	Order from your Victron dealer
GX LTE 4G communication device	GSM100100400	1	Antenna systems can differ for in-or outside
GX-Touch 70 Display	BPP900455070	1	
Lynx Power In M10	LYN020102010	1	
Lynx Distributor M10	LYN060102010	3	
MEGA-fuse 125A/58V (package of 5 pcs)	CIP137125010	1	
MEGA-fuse 300A/58V (package of 5 pcs)	CIP137300010	2	
MultiPlus-II 48/15000/200-100 230V	PMP483150000	3	
SmartSolar 250|100-Tr VE.Can	SCC125110412	4	
Tank level sensor for Diesel fuel Generator	.....	1	To be connected to Cerbo GX
VE.Can cable: from Cerbo to MPPT-1 till 4	.....	4	RJ45 Cable length not known
VE.Can to CAN-bus BMS type A cable	ASS030710018	1	1.8 meters long
VE.Bus cable: from Cerbo to MultiPlus-II 1-2-3	.....	4	RJ45 Cable length not known
3 phase AC Breaker Box towards 3 x MultiPlus-II with 4 pole MCB & surge protector for AC IN	.....	1	Order from your Victron dealer
3 phase AC Breaker box from 3 x MultiPlus-II with 4 pole MCCB & MCB breakers for AC OUT-1 & AC OUT-2	1	Order from your Victron dealer

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