

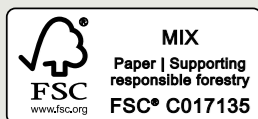


## Self-consumption & energy storage

*System examples & products*



**victron energy**  
BLUE POWER



MIX  
Paper | Supporting  
responsible forestry  
FSC® C017135

SELF-CONSUMPTION & ENERGY STORAGE

## How do you minimise energy usage from the grid and optimise self-consumption?

The solution is powered by know-how. With almost 50 years of experience, we've learned what it takes to build a robust ecosystem of flexible building blocks that are powered by up-to-date features. Millions of customers value the reassurance that our power solutions deliver, knowing they have our worldwide network of authorised dealers by their side. They know our family-run business is built on a foundation of trust they can always depend on.

**Energy. Anytime. Anywhere.**





## Index

- 10** Introduction
- 12** Dynamic ESS
- 14** Application example
- 18** System designs
- 20** Supported battery and AC-PV technologies
- 24** System monitoring components
- 28** Helpful system design resources
- 32** Components for Energy Storage Systems
- 35** Technical information
- 114** Why Victron?

## How do you prepare for power outages whilst minimising energy usage from the grid?

The solution is powered by know-how. Solar energy is stored until you need it and sent to the grid when you don't. Simply select your battery's minimum state of charge to weather any brown-out and let our algorithms do the rest. It's good to know the power of know-how is by your side.

Find out more about Energy Storage Systems at [victronenergy.com](https://victronenergy.com)

**Energy. Anytime. Anywhere.**



## Introduction to self-consumption and energy storage

### Self-consumption or grid independence

The primary goal of a self-consumption system is to optimise the use of solar and/or wind power. The major obstacle in such a system is that power generation times do not match with the actual times of power use. This results in a system being forced to import energy from the grid and export it when there is a surplus. In an optimised self-consumption system, surplus energy is stored locally for local on-demand use. Such energy storage is becoming an increasingly attractive proposition, especially with feed-in tariffs decreasing and grid supplies becoming less stable and more expensive.

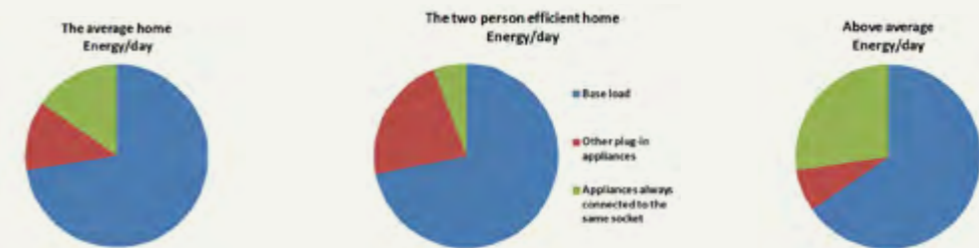
### Self-consumption versus off-grid systems

There are some major considerations which should be taken into account when comparing an off-grid system with a self-consumption system. An off-grid system is a system that is not (or mostly not) connected to grid power and is used to supply the total energy needs of the complete energy system. Therefore it is sized to cope in a worst case scenario. This worst case scenario can occur when there is simultaneous usage of high loads which then requires a high power inverter for occasional use.



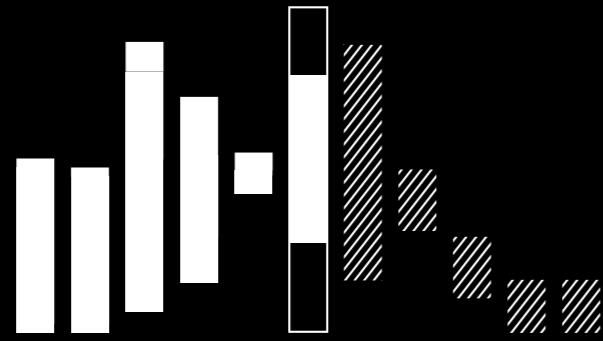
The other worst case scenario is the lack of ability to generate energy in periods of overcast weather and/or no wind. This results in substantial battery storage provision, which, like the large inverter power situation mentioned above, is only used on occasion. In general it can therefore be stated that an off-grid system is oversized in both inverter power and storage capacity in order to deal with such situations.

For a self-consumption system this is different, as there is always a grid present. With Grid assist functionality the grid can be used seamlessly, whenever there is a high peak load, meaning the inverter can be sized according to the base load. The base load is the part of the total energy-need which generally comes from low-powered equipment and these loads continue to draw energy almost constantly over a 24 hour period.



Examples of this are heating pumps, chargers and the standby power of household equipment. In order to optimise PV usage and limit the use of imported energy, targeting the base load offers the greatest rewards. It's possible to avoid importing any energy at all, but this would require investment in a larger inverter capable of meeting the greatest loads. Most high loads, however, are of short duration and the actual energy consumed is relatively low - so the investment in a larger inverter is often not justified.

When considering battery capacity, a self-consumption system is able to work with a smaller battery capacity. By day, PV energy is consumed by live loads and any surplus energy is stored in the battery. In this case the solar array is sized according to the base load, and stored energy used overnight.

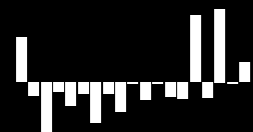


# Dynamic ESS is here

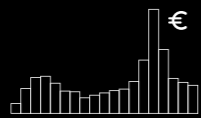
Our new and free-to-use Dynamic ESS feature automatically combines grid, battery and solar energy based on day ahead pricing, predicted energy-use and solar yield so it's always consuming the cheapest energy.

Learn more at [victronenergy.com/ecosystem/dynamic-ess](https://victronenergy.com/ecosystem/dynamic-ess)

## Minimises utility costs with tailor made scheduling



Automated buying/selling energy from/to the grid



Works with dynamic, variable- and fixed day/night tariffs



Solar irradiance forecast based on location



Disable selling energy to grid option

## Peakshaving for ESS



Peakshaving high-power loads



Avoid paying peak-rates for incidental peak usage



Configurable max. import current



Configurable max. export current



**Energy. Anytime. Anywhere.**

APPLICATION EXAMPLE

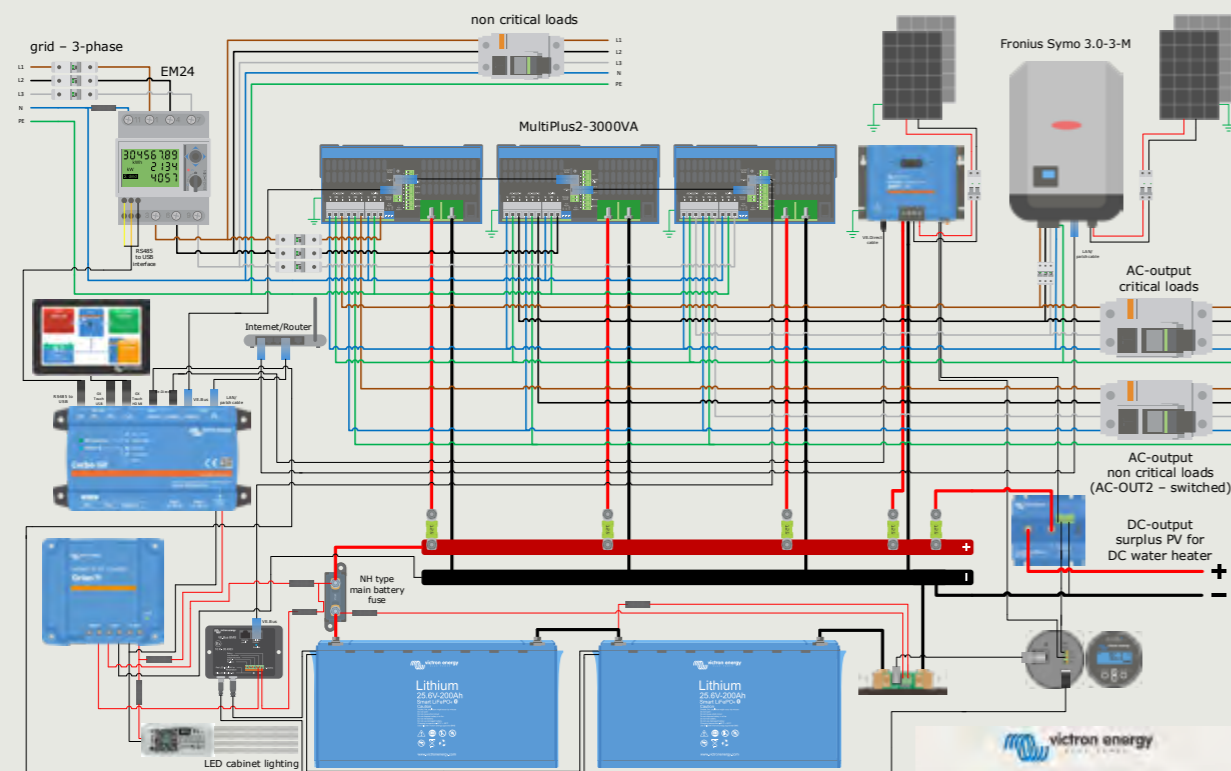
## Victron Training in a cabinet ESS / Off Grid / 3Phase

Victron Ambassador Markus Pauritsch has packed a 3-Phase ESS Off-Grid energy system into a stylish cabinet which he uses for training. The fully operational cabinet demonstrates the features of a full-scale static installation. It includes Lithium battery storage with a battery management system; three-phase power from MultiPlus II units - plus integration with a third party 'Fronius' three phase inverter; energy metering - low-voltage battery protection ...and monitoring from anywhere in the world.

### So what is happening on the inside?

Packed into the case there's a 9000VA 3-phase ESS system including 10kW/h battery storage:

- 3 x MultiPlus-II 48/3000/35-32
- SmartSolar MPPT 150/45-Tr
- Cerbo GX
- GX Touch 50
- Fronius Symo 3.0-3- M
- Energy meter EM24 – 3 phase – max. 64A/phase
- 2 x LiFePO4 Batteries 25,6V/200Ah smart.
- VE.Bus BMS
- Orion-Tr 48/12-9A (110W)
- Smart BatteryProtect 48V-100A
- Battery Monitor BMV-712 Smart, together with all necessary Fuses, cables and Busbars.



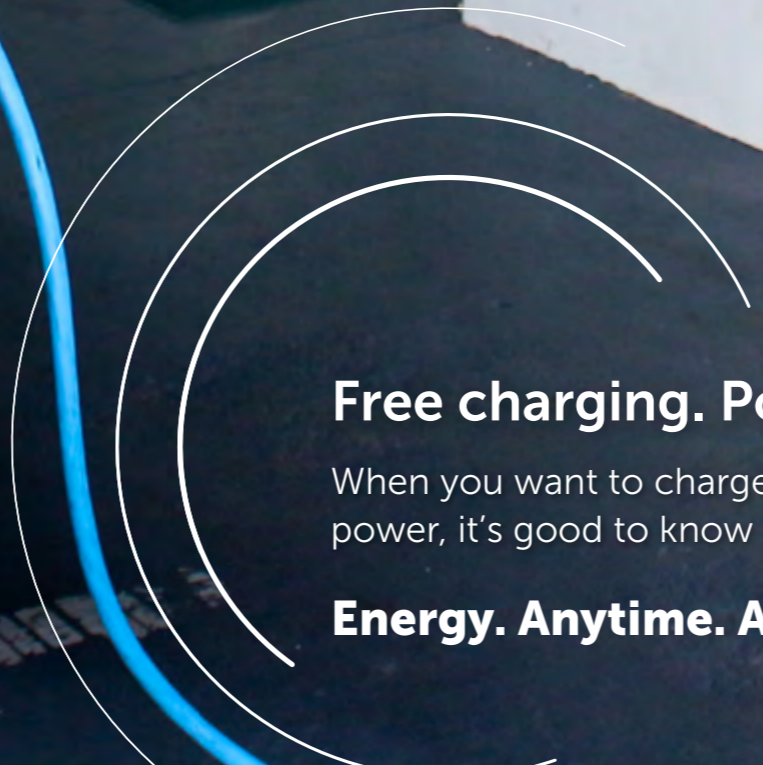
The fully functioning cabinet is designed to work like this: 5.1kWp solar modules feed both the Fronius Inverter and the SmartSolar MPPT. Four AC powered fans mounted in the cabinet-roof provide ventilation and control internal temperature. Excess PV power can be used for water heating using 48V DC immersion heaters. The 48V-100A Smart BatteryProtect will turn the water heating elements on/off, so there's no risk of melting relay contacts.

The cabinet is fitted with RGB LED downlighting. A Wi-Fi enabled controller operates the LED strips – and a neat enhancement is that it is possible to change lighting colours according to system conditions (State of Charge; warnings and alarms, etc.) via Node-RED. The default setup of the 3-Phase AC and DC coupled cabinet is as an ESS, but it can easily be reconfigured to an Off-Grid system. Markus uses the cabinet for training sessions on Power Calculation; System configuration; Tips and tricks regarding cable calculations; and Troubleshooting - and when not in use he employs the cabinet installation in his own house!

Markus Pauritsch shows us the GX Touch 50 which provides at-a-glance system information and access to settings of his 3-phase training cabinet.







**Free charging. Powered by know-how.**

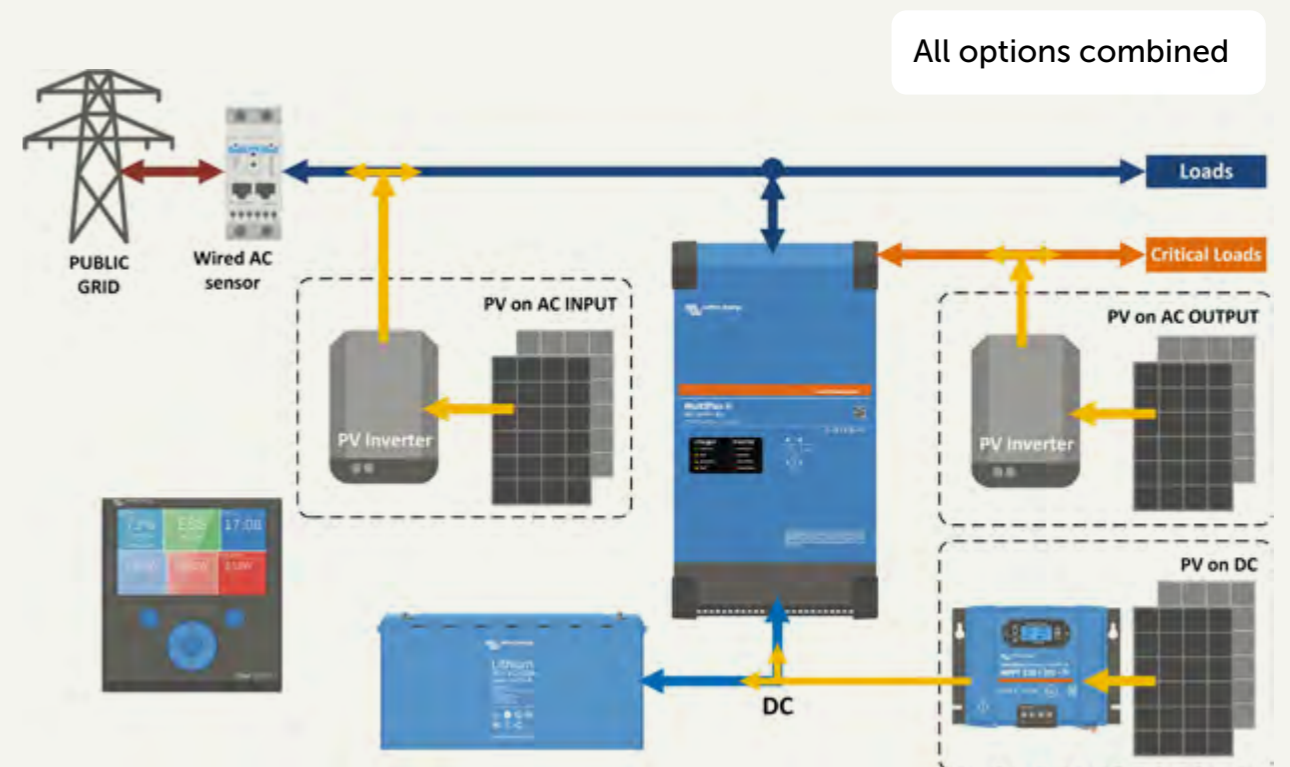
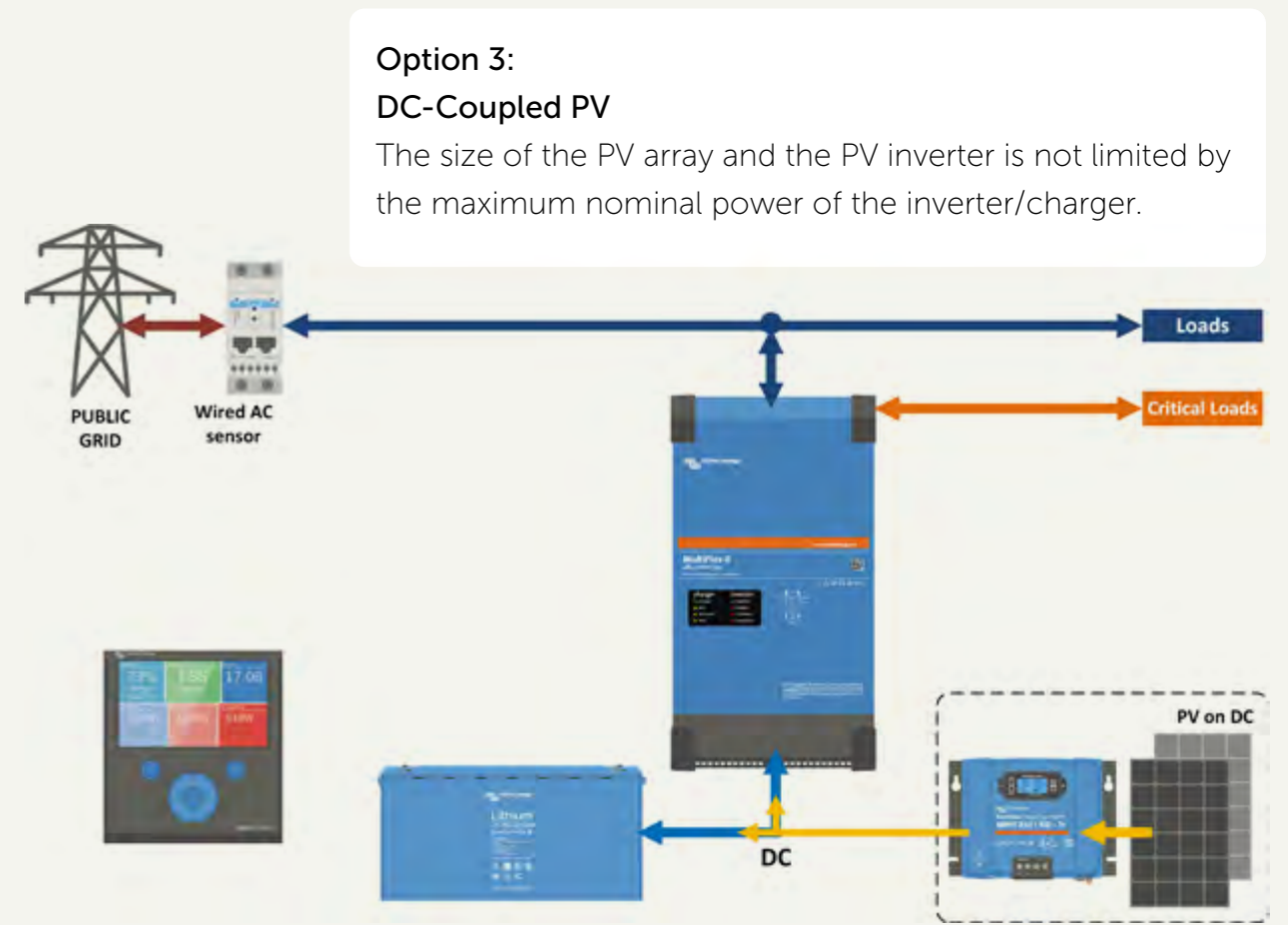
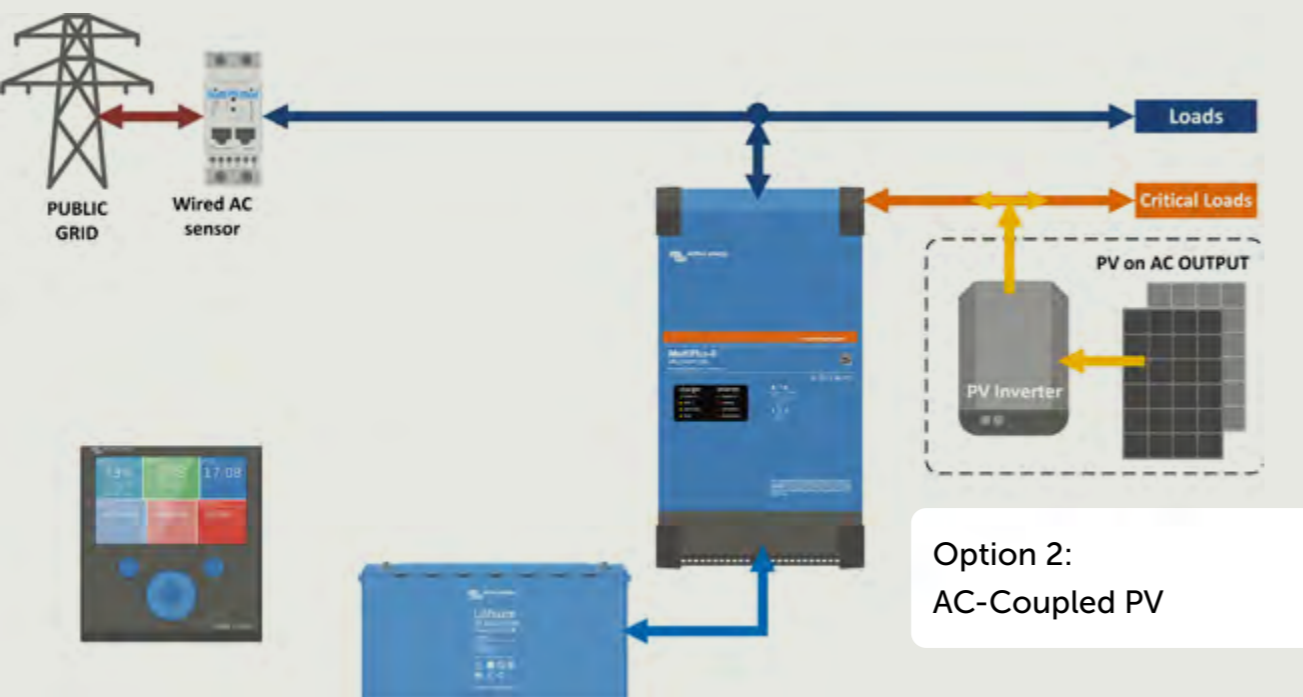
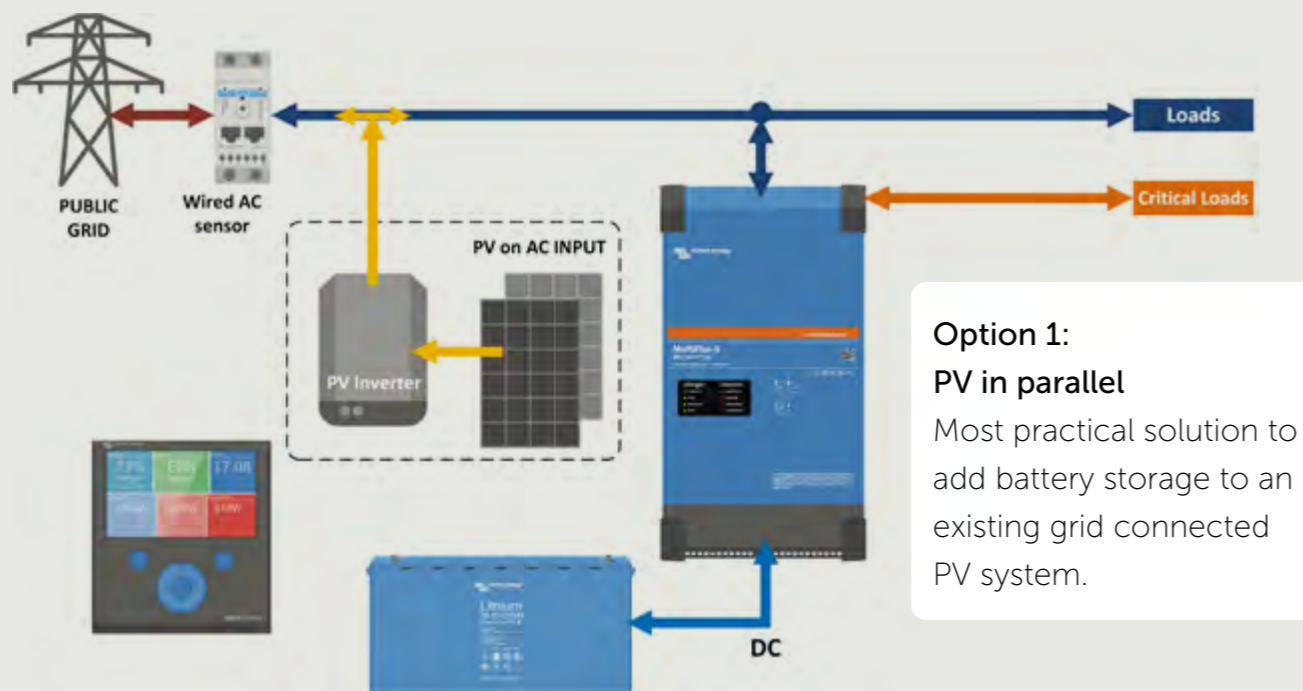
When you want to charge your electric vehicle with excess solar power, it's good to know the power of know-how is by your side.

**Energy. Anytime. Anywhere.**



# Which system to choose

There is a solution for every situation, from simple to more complex. We have different options available: PV in parallel, AC-Coupled PV, DC-Coupled PV or a combination of all these options.

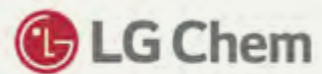
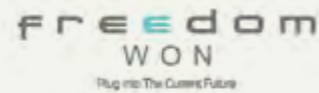
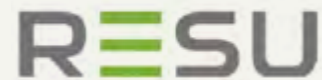


SELF-CONSUMPTION & ENERGY STORAGE

## Open architecture means choice.

We believe that offering choice to our customers is crucial. Great efforts are made to ensure a deep and problem free integration with a long list of third party managed battery brands, AC-PV manufacturers and more. We are proud to closely work together with many of the leading brands. The global recognition for our efforts only pushes us further, giving 'seamless' even more meaning.

### Supported battery technologies



### Easy integration

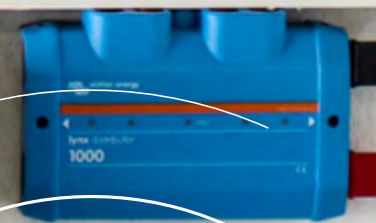
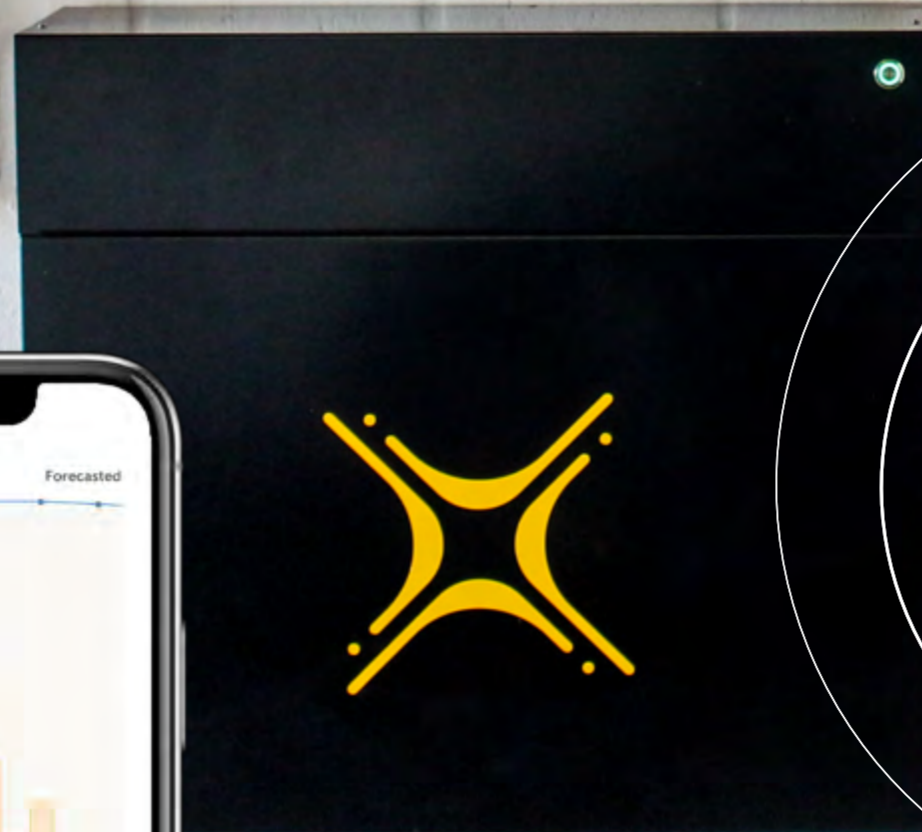
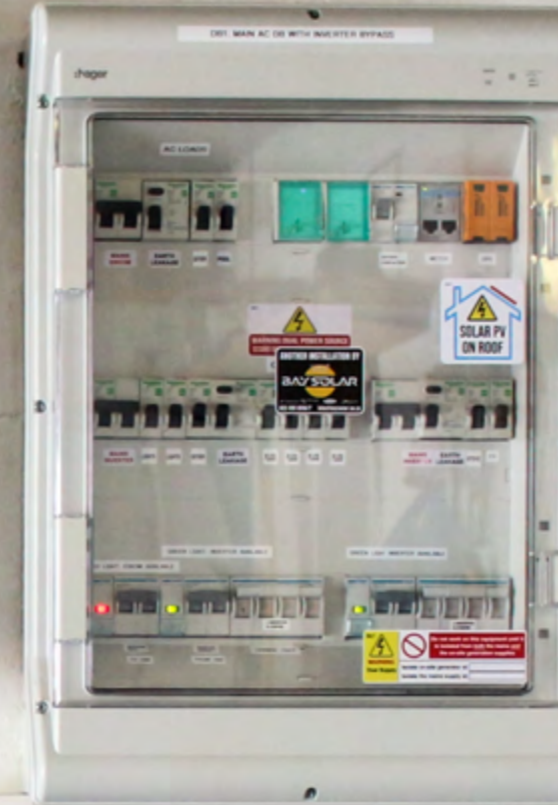
Managed batteries can be integrated through our GX devices in minutes. Search for our ever growing battery compatibility list on [victronenergy.com](http://victronenergy.com)



### Supported AC-PV manufacturers

We are compatible with many brands of PV Inverters; with a strong collaboration with Fronius PV Inverters.

AC-PV inverters are supported directly after installing a software assistant on our inverters.



## How to optimise your energy usage behaviour to achieve higher levels of self-consumption?

The solution is powered by know-how. With our VRM - remote management portal and widgets, detailed insights into your energy usage will help increase efficiency and lower utility bills. Simply check the new solar forecast in VRM and learn when it's best to run heavy loads. It's good to know the power of know-how is by your side.

**Energy. Anytime. Anywhere.**

## MONITORING SOLUTIONS

### System monitoring components

Monitoring is crucial to fine-tune and optimize energy harvest and use based on ever-changing circumstances. With Victron you have complete insight in your installation, from the system's performance to its tank levels, temperatures and more. To enable remote monitoring via VRM and our Dynamic ESS feature, add a communication-centre, such as the Cerbo GX. If local monitoring is sufficient, choose a Smart product.

Learn more at [victronenergy.com/monitoring](https://victronenergy.com/monitoring)



#### Cerbo GX

This communication-centre allows you to always have perfect control over your system from wherever you are and maximises its performance. Simply connect through our Victron Remote Management (VRM) portal, or access directly, using the separate GX Touch, a MFD or our VictronConnect app. Offers the highest level of control thanks to an impressive range of features and integrations.



#### Battery Monitor

Key tasks of the Victron Battery Monitor are measuring charge and discharge currents as well as calculating the state-of-charge and time-to-go of a battery. An alarm is sent when certain limits are exceeded (such as an excessive discharge).



#### GX Touch 50 and GX Touch 70

The GX Touch 50 and GX Touch 70 are display accessories for our Cerbo GX. The five inch and seven inch touch screen displays give an instant overview of your system and allow to adjust settings in the blink of an eye. Simply connected to the Cerbo GX with one cable. Their super slim waterproof design, top-mountable setup and simple installation bring a lot of flexibility when creating a crisp and clean dashboard.



#### SmartSolar Control Display

The SmartSolar Control Display is a pluggable LCD display for the SmartSolar Charge Controllers. Simply remove the rubber seal that protects the plug on the front of the controller and plug-in the display.



#### Ekran - All-in-one GX device

Combines a full featured GX device and GX Touch in one. This practical combination of a Cerbo GX and GX Touch gives you easy access to the ports from the back of the device.



#### Smart Battery Sense

Smart Battery Sense is a wireless battery voltage and temperature sensor for Victron MPPT Solar Chargers.

With voltage and temperature sense in place, batteries will be better charged; improving charging-efficiency and prolonging battery life.



#### GlobalLink 520

The GlobalLink 520 allows you to connect Victron VE.Direct equipment, such as: battery monitors, MPPT solar chargers, the IP43 Charger or Phoenix Inverters, to our free remote monitoring website: the VRM Portal. The GlobalLink uses the LTE-M cellular network and the first five years of cellular connectivity is included in the purchase price. The unit will come pre-configured and ready for use out of the box. No need to change any settings.



## How do you charge your electric vehicle with excess solar power while running your house on solar too?

The solution is powered by know-how. Solar energy is stored for self-consumption while your electric vehicle is charged with excess solar power. Simply select the auto mode and let our algorithms do the rest. It's good to know the power of know-how is by your side.

**Energy. Anytime. Anywhere.**



## Helpful system design resources

Victron Energy offers one of the largest product ranges in the market to cover almost every power challenge.

Admittedly, choosing the right system concept and products can be overwhelming. This brochure intends to assist with basics in systems design, covering a number of different system concepts and solutions for backup and off-grid.

Alternatively, check our helpful resources or feel free to discuss your ideas with a local Victron specialist.

Check our [Off-grid, Backup and Storage](#) market webpage to explore our deepdive with example calculations.



### Product & design information

Our [product pages](#) on the website provide all necessary product information, such as product data sheets, product manuals, more system examples, enclosure drawings and certificates.

### MPPT Calculator Excel sheet

With the MPPT Calculator Excel sheet you can match solar modules to MPPT charge controllers. Download the [Excel sheet](#) from our software page.

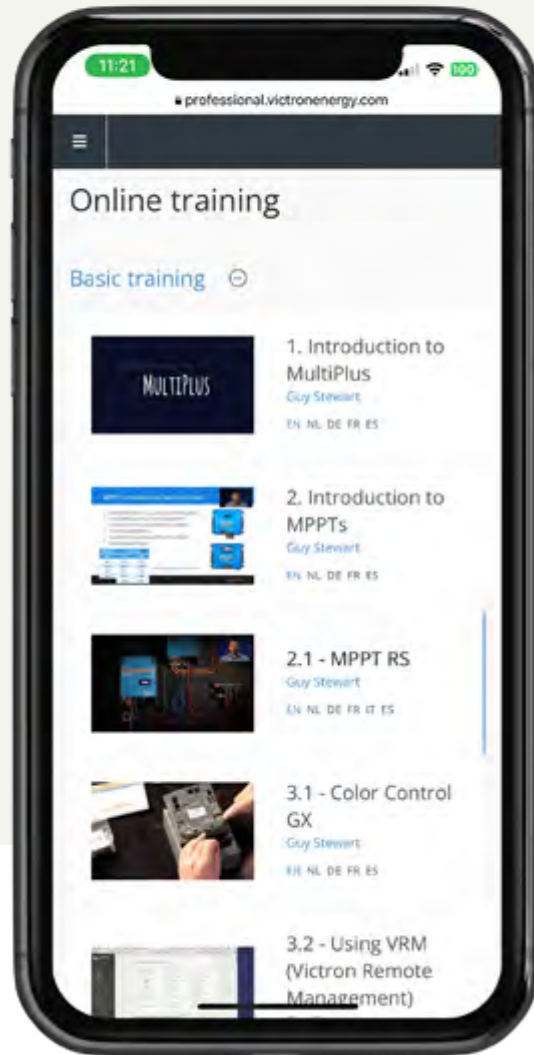
### System examples booklet

Download our systems [examples booklet](#) for Off-grid, backup and storage applications with many different system design examples.

### Energy Unlimited & Wiring Unlimited

Understand the principles behind off-grid power systems and get your wiring right with Wiring Unlimited. Find a large variety of technical papers and example system schematics in the [download section](#).

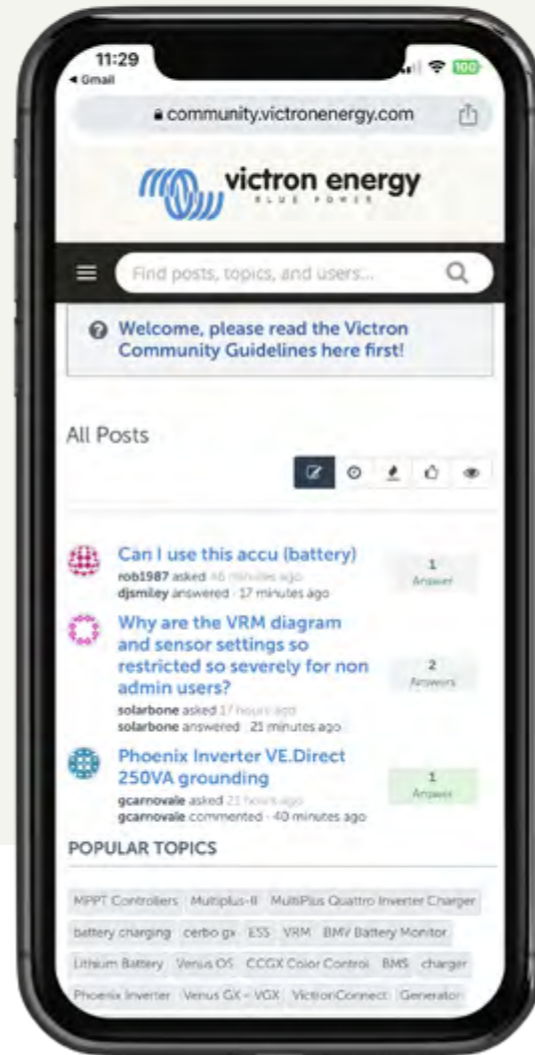




### Victron Professional

Get updated with the latest developments and access our large range of training courses. Successful completion is rewarded with a certificate.

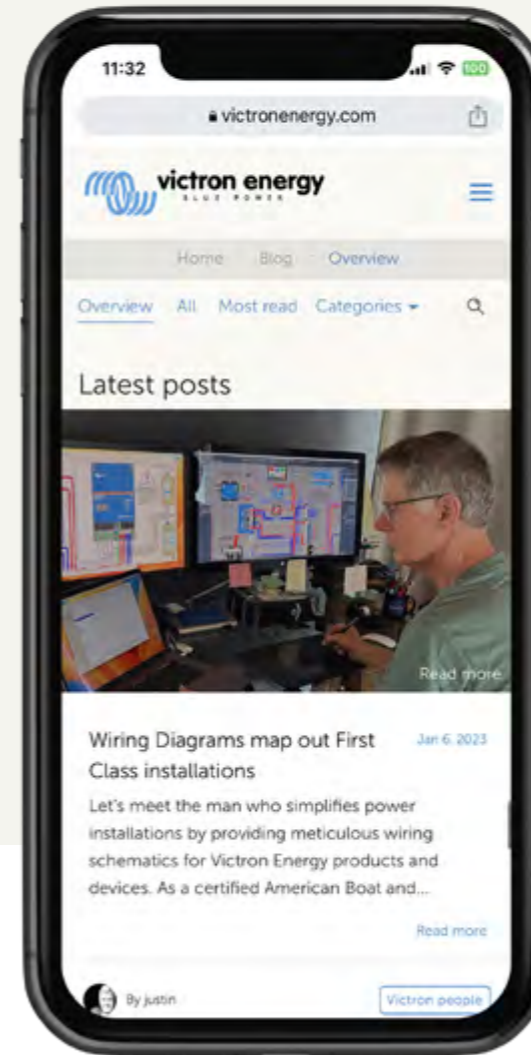
[professional.victronenergy.com](http://professional.victronenergy.com)



### Victron Community

Search in the [knowledge base](#) for questions and answers or ask our large and active community of experienced Victron users.

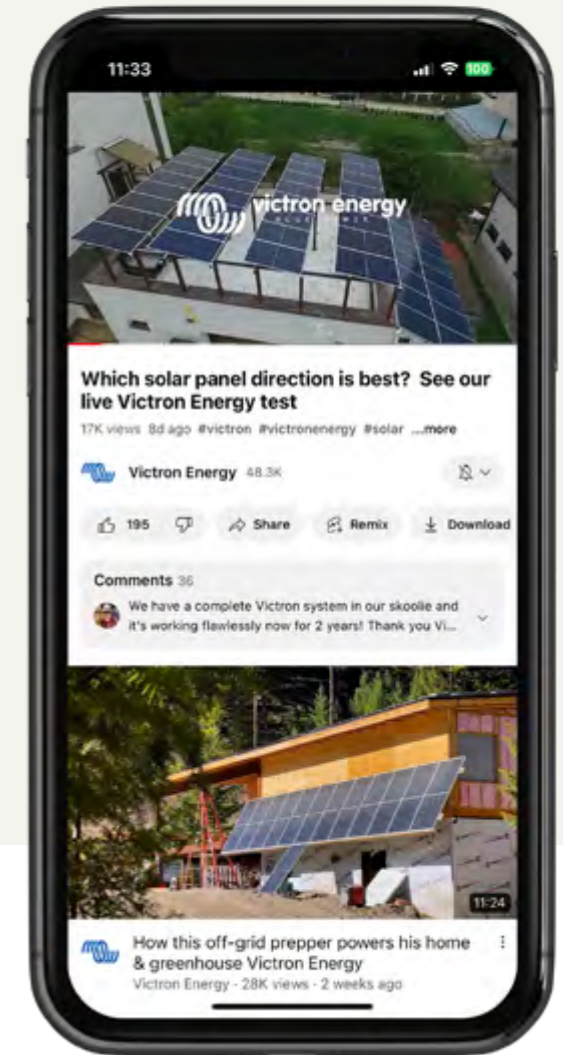
[community.victronenergy.com](http://community.victronenergy.com)



### Victron Energy Blog

Follow interesting cases in great detail, learn about new products and new system design resources.

[victronenergy.com/blog](http://victronenergy.com/blog)



### YouTube

Follow our youtube channel to see interesting case videos and field tests. Learn from instructional video's, Q&A sessions and new product introductions.

[youtube.com/victronenergy](http://youtube.com/victronenergy)





## COMPONENTS

### Components for Energy Storage Systems

Our systems are comprised of various components. Some of which are especially designed for specific markets. Other Victron components are applicable to a wide range of applications. You can find the specifications and other detailed information about these components in the 'Technical Information' section.

[victronenergy.com](http://victronenergy.com)



#### Current Transformer for MultiPlus-II

Current Transformer 100A:50mA for MultiPlus-II / MultiGrid-II to implement PowerControl and PowerAssist and to optimize self-consumption with external current sensing.



#### Ziehl Voltage and frequency relay UFR1001E

The UFR1001E monitors voltage and frequency in plants for own generation of electricity. It fulfills the requirements of VDE-AR-N 4105 bdev-directive, G59/3, G83/2 and ÖVE/ÖNORM E 8001-4-712:2009 for generators connected to the public grid.

For more information, we refer you to the datasheet and certificates below which are available to download. Or visit [www.ziehl.de](http://www.ziehl.de) and look for the UFR1001E under the Mains monitoring group.



#### Energy Meter

The VM-3P75CT single- or three-phase energy meter measures the power and energy of the entire application at the distribution box and minimises energy import or export to the grid and enable features such as Dynamic ESS. They can also be used to measure specific AC loads or the output of PV inverters. Fast update rates ensure accurate metering and installation is plug & play. Works with our VRM - remote management portal.



#### Ziehl Voltage and Frequency Relay SPI1021

Voltage- and Frequency-Relay with integrated Vector-Shift-Relay Grid- and Plant Protection.

For more information, we refer you to the datasheet and certificates below which are available to download. Or visit [www.ziehl.de](http://www.ziehl.de) and look for the SPI1021 under the Mains monitoring group.



#### AC Current sensor - single phase - max 40A

The AC Current sensor is a simple external current sensor used to measure AC Current, Power (VA) and calculate energy of a PV Inverter connected to the AC input or output of a Multi or Quattro. These values can then be displayed and sent to the VRM-website by a communication centre. The two measurement wires can be connected to the AUX and/or temperature sense input of a Multi or Quattro.



#### Anti-Islanding Box 63A single- and three-phase

The Anti-Islanding Box 63A single- and three-phase is a combination of an anti-islanding device, the Ziehl UFR1001E, two in-line contactors and main circuit breaker. It is suitable for both single- and three-phase systems. It is rated up to 63A per phase and all parts are conveniently housed in an IP65 rated enclosure.

The Anti-Islanding Box can be added to a grid-feeding inverter/charger system (ESS) to meet local anti-islanding regulations.



#### Zigbee to USB converter & Zigbee to RS485

This pair of Zigbee converters is used to connect an Energy Meter to a GX Device, wirelessly.

Zigbee to USB converter, DRF2658C, DTK  
Zigbee to RS485 converter, DRF2659C, DTK





Note - for our latest datasheets please refer to our website:  
[www.victronenergy.com](http://www.victronenergy.com)

## Technical information

- 36** EasySolar 12V and 24V, 1600VA
- 38** Easysolar-II 3kVA MPPT 250/70 GX & 5kVA MPPT 250/100 GX
- 40** MultiPlus inverter/charger 500VA - 2kVA 230V
- 42** MultiPlus inverter/charger 800VA - 5kVA 230V
- 44** Quattro inverter/charger 3kVA - 10kVA 230V
- 46** MultiPlus-II inverter/charger 3kVA - 15kVA 230V
- 48** MultiPlus-II inverter/charger 3kVA & 5kVA 230V GX
- 50** MultiPlus inverter/charger 2kVA & 3kVA 120V
- 52** MultiPlus-II inverter/charger 3kVA 2 x 120V
- 54** Quattro inverter/charger 3kVA - 10kVA 120V
- 56** Ekrano GX
- 58** Cerbo GX & GX Touch
- 60** Color Control GX
- 64** BMV-712 Smart
- 66** SmartShunt 500A / 1000A / 2000A
- 68** SmartShunt IP65 500A / 1000A / 2000A
- 70** BlueSolar & SmartSolar MPPT Charge Controllers - Overview
- 72** SmartSolar charge controller MPPT 75/10, 75/15, 100/15 & 100/20-48V
- 73** SmartSolar charge controller MPPT 100/30 & 100/50
- 74** SmartSolar charge controller MPPT 150/35 & 150/45
- 76** SmartSolar charge controller MPPT 150/60 & 150/70
- 78** SmartSolar charge controller MPPT 150/70 up to 150/100 VE.Can
- 80** SmartSolar charge controller MPPT 250/60 & 250/70
- 82** SmartSolar charge controller MPPT 250/70 up to 250/100 VE.Can
- 84** SmartSolar MPPT RS 450/100 & 450/200
- 88** EV Charger NS
- 89** GlobalLink 520
- 90** Telecom batteries
- 91** AGM Super cycle battery
- 92** GEL & AGM batteries
- 96** 12,8V & 25,6 Volt Lithium-Ion Phospate Batteries Smart
- 98** Lynx Shunt VE.Can
- 100** Lynx Smart BMS



# EASYSOLAR 12V AND 24V, 1600VA



### All-in-one solar power solution

The EasySolar combines a MPPT solar charge controller, an inverter/charger and AC distribution in one enclosure. The product is easy to install, with a minimum of wiring.

### The solar charge controller: Blue Solar MPPT 100/50

Up to three strings of PV panels can be connected to three sets of MC4 (PV-ST01) PV connectors.

### The inverter/charger: MultiPlus Compact 12/1600/70 or 24/1600/40

The MPPT charge controller and the MultiPlus Compact inverter/charger share the DC battery cables (included). The batteries can be charged with solar power (SmartSolar MPPT) and/or with AC power (inverter/charger) from the utility grid or a genset.

### AC distribution

The AC distribution consists of a RCD (30 mA/16 A) and four AC outputs protected by two 10A and two 16A circuit breakers. One 16A output is controlled by the AC input: it will switch on only when AC is available.

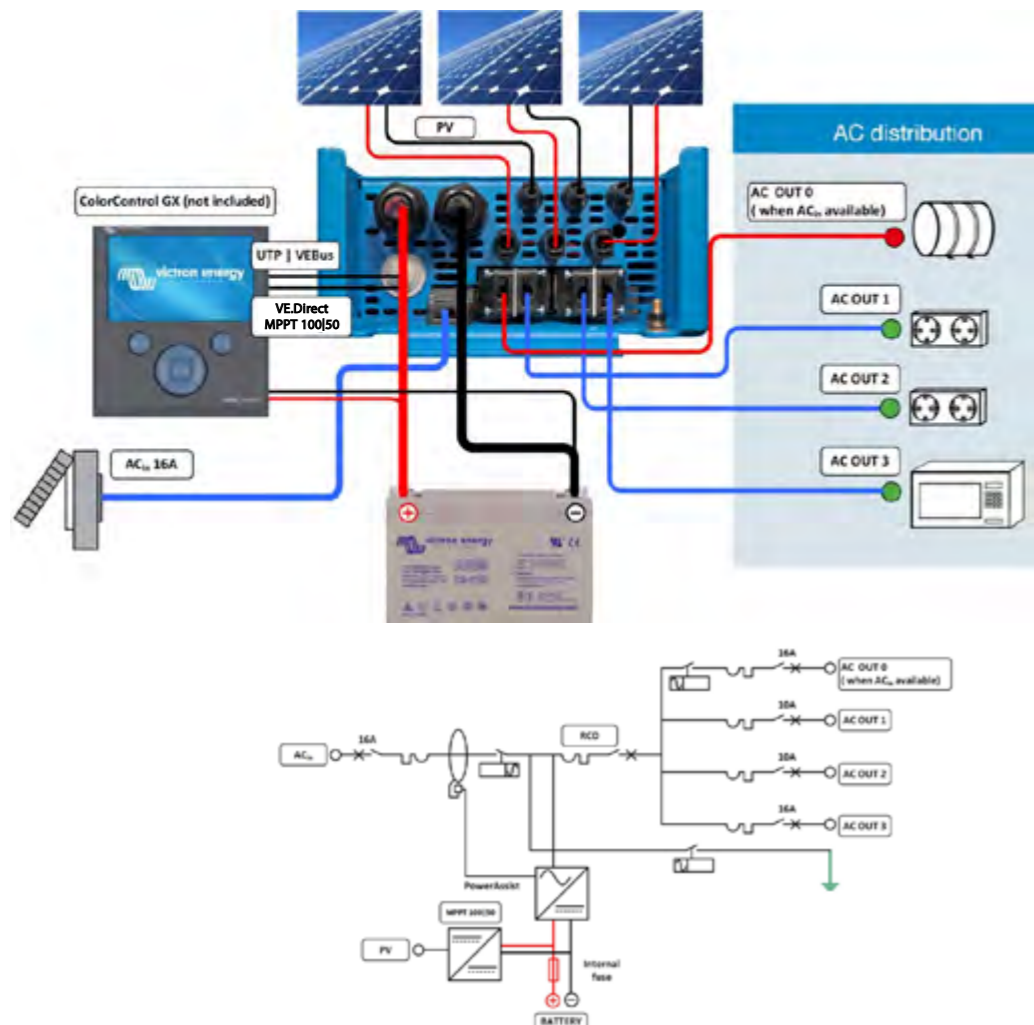
### PowerAssist

Unique PowerAssist technology protects the utility or generator supply from being overloaded by adding extra inverter power when needed.

### Unique solar application software

Several software programs (Assistants) are available to configure the system for various grid interactive or stand-alone applications. Please see

<http://www.victronenergy.nl/support-and-downloads/software/>



EasySolar	EasySolar 12/1600/70	EasySolar 24/1600/40
<b>Inverter/charger</b>		
Transfer switch	16A	
<b>INVERTER</b>		
Input voltage range	9,5 – 17V	19 – 33V
'Heavy duty' output AC 0	16A	
Output AC 1, 2, 3	Output voltage: 230 VAC ± 2% Frequency: 50 Hz ± 0,1% (1)	
Cont. output power at 25°C (3)	1600VA / 1300W	
Cont. output power at 40°C	1200W	
Peak power	3000W	
Maximum efficiency	92%	94%
Zero load power	8W	10W
Zero load power in search mode	2W	3W
<b>CHARGER</b>		
AC Input	Input voltage range: 187-265VAC Input frequency: 45 – 65Hz Power factor: 1	
Charge voltage 'absorption'	14,4V	28,8V
Charge voltage 'float'	13,8V	27,6V
Storage mode	13,2V	26,4V
Charge current house battery (4)	70A	40A
Charge current starter battery (A)	4	
Battery temperature sensor	Yes	
Programmable relay (5)	Yes	
Protection (2)	a – g	
<b>Solar Charge Controller</b>		
Model	MPPT 100/50	
Maximum output current	50A	
Maximum PV power, 6a,b)	700W	1400W
Maximum PV open circuit voltage	100V	100V
Maximum efficiency	98%	
Self-consumption	10 mA	
Charge voltage 'absorption', default setting	14,4V	28,8V
Charge voltage 'float', default setting	13,8V	27,6V
Charge algorithm	multi-stage adaptive	
Temperature compensation	-16mV/°C	-32mV/°C
Protection	a – g	
<b>COMMON CHARACTERISTICS</b>		
Operating temp. range	-20 to +50°C (fan assisted cooling)	
Humidity (non-condensing):	max 95%	
<b>ENCLOSURE</b>		
Material & Colour	aluminium (blue RAL 5012)	
Protection category	IP 21	
Battery-connection	Battery cables of 1.5 meter	
PV connection	Three sets of MC4 (PV-ST01) PV connectors.	
230 V AC-connection	G-ST18i connector	
Weight	15kg	
Dimensions (hwxwd)	745 x 214 x 110mm	
<b>STANDARDS</b>		
Safety	EN 60335-1, EN 60335-2-29, EN 62109	
Emission / Immunity	EN 55014-1, EN 55014-2, EN 61000-3-3	
Automotive Directive	2004/104/EC	
1) Can be adjusted to 60Hz and to 240V 2) Protection a. Output short circuit b. Overload c. Battery voltage too high d. Battery voltage too low e. Temperature too high f. 230 VAC on inverter output g. Input voltage ripple too high	3) Non-linear load, crest factor 3:1 4) At 25°C ambient 5) Programmable relay which can be set for general alarm, DC under voltage or genset start signal function 6a) If more PV power is connected, the controller will limit input power to 700W resp. 1400W 6b) PV voltage must exceed Vbat + 5V for the controller to start. Thereafter minimum PV voltage is Vbat + 1V	

# EASYSOLAR-II 3KVA MPPT 250/70 GX & 5KVA MPPT 250/100 GX



EasySolar-II GX 3 KVA



**VRM app for Wi-Fi**  
Monitor and manage your Victron Energy system from your smart phone and tablet. Available for both iOS and Android.



**VRM Portal**  
Our free remote monitoring website (VRM) will display all your system data in a comprehensive graphical format. System settings can be changed remotely via the portal. Alarms can be received by e-mail.

## The all-in-one solar power solution

The Victron EasySolar-II GX integrates the following elements:

- A MultiPlus-II inverter/charger
- A SmartSolar MPPT -Tr solar charge controller
- A GX device with a 2 x 16-character display.

These elements come prewired together inside a single unit. This greatly simplifies most installations, saving time and money.

## Display and Wi-Fi

The display reads battery, inverter and solar charge controller parameters.

The same parameters can be accessed with a smartphone or other Wi-Fi enabled device.

In addition, Wi-Fi can be used to set up the system and to change settings.

## Solar charge controller

The DC output of the SmartSolar MPPT is parallel wired with the DC connection of the MultiPlus-II inverter/charger.

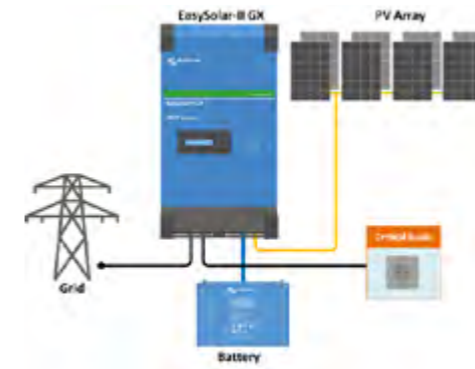
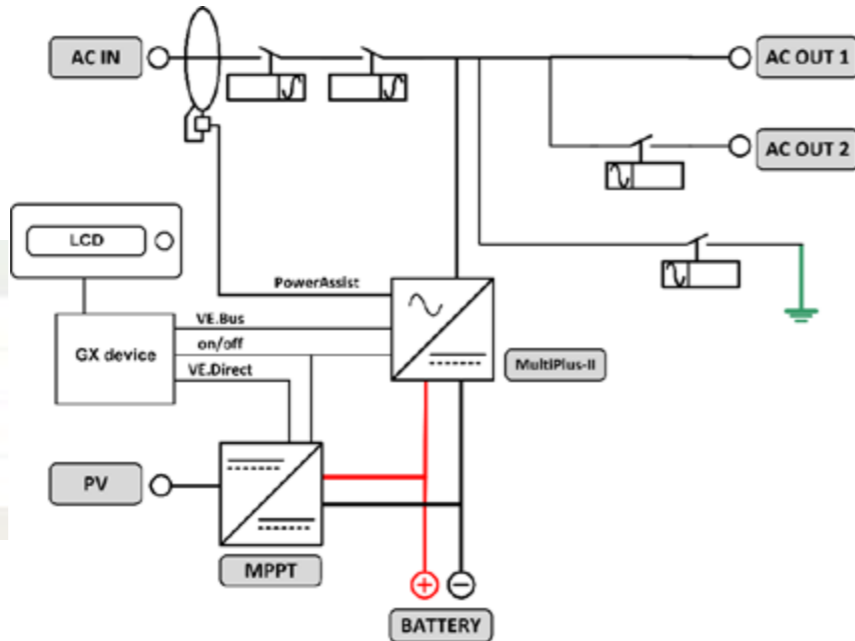
The on/off mechanism of the MultiPlus-II also controls the SmartSolar MPPT.

## GX device

The integrated GX device includes:

- A BMS-Can interface. This can be used to connect to a compatible CAN-bus managed battery. Note that this not a VE.Can compatible port.
- A USB port
- An Ethernet port
- A VE.Direct port

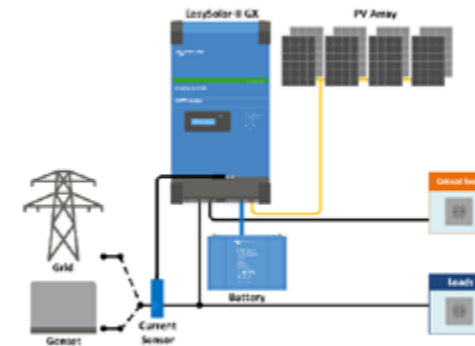
The GX device controls the MultiPlus-II and the SmartSolar MPPT with respectively a VE.Bus and a VE.Direct connection.



## Grid in-line topology

The EasySolar-II GX will use excess PV power to charge the batteries or to feed power back into the grid and will discharge the battery or use power from the grid to supplement a shortage of PV power. In case of a power outage, the EasySolar-II GX will disconnect the grid and continue to supply the loads.

Loads that should shut down when AC input power is not available can be connected to a second output (not shown). These loads will be taken into account by the PowerControl and PowerAssist function in order to limit AC input current to a safe value.



## Grid parallel topology

The EasySolar-II GX will use data from the external AC current sensor (must be ordered separately) or power meter to optimise self-consumption and, if required, to prevent grid feed. In case of a power outage, the EasySolar-II GX will continue to supply the critical loads



## Current sensor 100A:50mA

To implement PowerControl and PowerAssist and to optimise self-consumption with external current sensing.  
Maximum current: 50 A resp. 100 A.  
Length of connection cable: 1 m.



Connection area

EasySolar-II	24/3000/70-32 MPPT 250/70 GX	48/3000/35-32 MPPT 250/70 GX	48/5000/70-50 MPPT 250/100 GX
<b>INVERTER/CHARGER</b>			
PowerControl & PowerAssist	Yes		
Transfer switch	32 A		50 A
Maximum AC input current	32 A		50 A
Auxiliary output	32 A		50 A
<b>INVERTER</b>			
Input voltage range	19 – 33 V	38 – 66 V	38 – 66 V
Output	Output voltage: 230 VAC ± 2 % Frequency: 50 Hz ± 0,1 % (1)		
Cont. output power at 25 °C (3)	3000 VA / 2400 W	3000 VA / 2400 W	5000 VA / 4000 W
Cont. output power at 40 °C / 55 °C	2200 W / 1700 W	2200 W / 1700 W	3700 W / 3000 W
Maximum apparent feed-in power	2470W / 3000 VA	2470W / 3000 VA	4400 W / 5000 VA
Peak power	5500 W	5500 W	9000 W
Maximum efficiency	94 %	95 %	96%
Zero load power	13 W	11 W	18 W
Zero load power in AES mode	9 W	7 W	12 W
Zero load power in Search mode	3 W	2 W	2 W
<b>CHARGER</b>			
AC Input	Input voltage range: 187-265 VAC Input frequency: 45 – 65 Hz		
Charge voltage 'absorption'	28.8 V		57,6 V
Charge voltage 'float'	27.6 V		55,2 V
Storage mode	26.4 V		52,8 V
Maximum battery charge current	70 A	35 A	70 A
Battery temperature sensor	Yes		
Programmable relay (5)	Yes		
Protection (2)	a - g		
VE.Bus communication port	For parallel and three phase operation, remote monitoring and system integration		
General purpose com. port	Yes, 2x		
<b>SMARTSOLAR CHARGE CONTROLLER</b>			
Model	MPPT 250/70-Tr		MPPT 250/100-Tr
Maximum output current	70 A		100 A
Maximum PV power	2000 W	4000 W	5800 W
Maximum PV open circuit voltage	250 V		
Maximum efficiency	99%		
Self-consumption	20 mA		
Charge voltage 'absorption', default	57,6 V		
Charge voltage 'float', default	55,2 V		
Protection (2)	a - e		
<b>GENERAL</b>			
Interfaces	BMS-Can, USB, Ethernet, VE.Direct, Wi-Fi		
Remote on-off	Yes		
Operating temp. range	-20 to +45 °C (fan assisted cooling) Max. altitude 2000 m		
Humidity (non-condensing):	max 95 %		
<b>ENCLOSURE</b>			
Material & Colour	aluminium (blue RAL 5012)		
Protection category	IP21		
Battery-connection	M8 bolts		
PV connection	M6 bolts		
230 VAC-connection	Screw terminals 16 mm <sup>2</sup> (6 AWG)		
Weight	26 kg	26 kg	38.6 kg
Dimensions (h x w x d) mm	499 x 268 x 237		604 x 323 x 253
<b>STANDARDS</b>			
Safety	EN-IEC 60335-1, EN-IEC 60335-2-29, EN-IEC 62109-1, EN-IEC 62109-2		
Emission / Immunity	EN 55014-1, EN 55014-2, EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3		
Anti-islanding	See our website		
1) Can be adjusted to 60 Hz 2) Protection key: a) output short circuit b) overload c) battery voltage too high d) battery voltage too low e) temperature too high f) 230 VAC on inverter output g) input voltage ripple too high	3) Non-linear load, crest factor 3:1 4) At 25 °C ambient 5) Programmable relay which can be set for general alarm, DC under voltage or genset start/stop function. AC ratings: 230 V / 4 A, DC rating: 4 A up to 35 VDC and 1 A up to 60 VDC		

# MULTIPLUS INVERTER/CHARGER 500VA - 2KVA 230V



MultiPlus  
500 / 800 / 1200 / 1600 VA



MultiPlus 2000 VA  
(bottom cover removed)

## Multifunctional, with intelligent power management

The MultiPlus is a powerful true sine wave inverter, a sophisticated battery charger that features adaptive charge technology, and a high-speed AC transfer switch in a single compact enclosure. Next to these primary functions, the MultiPlus has several advanced features, as outlined below.

### Parallel operation and three phase capability

Up to six Multis can operate in parallel to achieve higher power output. In addition to parallel connection, three units can be configured for three-phase output.

### PowerControl - Dealing with limited generator, shore side or grid power

With the Multi Control Panel a maximum generator or shore current can be set. The MultiPlus will then take account of other AC loads and use whatever is extra for charging, thus preventing the generator or shore supply from being overloaded.

### PowerAssist - Boosting the capacity of shore or generator power

This feature takes the principle of PowerControl to a further dimension. It allows the MultiPlus to supplement the capacity of the alternative source. Where peak power is so often required only for a limited period, the MultiPlus will make sure that insufficient shore or generator power is immediately compensated for by power from the battery. When the load reduces, the spare power is used to recharge the battery.

### Four stage adaptive charger and dual bank battery charging

The main output provides a powerful charge to the battery system by means of advanced 'adaptive charge' software. The software fine-tunes the three-stage automatic process to suit the condition of the battery, and adds a fourth stage for long periods of float charging. The adaptive charge process is described in more detail on the Charger datasheet and on our website, under Technical Information. In addition to this, the MultiPlus will charge a second battery using an independent trickle charge output intended for a main engine or generator starter battery.

### High start-up power

Needed to start high inrush loads such as power converters for LED lamps, halogen lamps or electric tools.

### Search Mode

When Search Mode is 'on', the power consumption of the inverter in no-load operation is decreased by approx. 70%. In this mode the Multi, when operating in inverter mode, is switched off in case of no load or very low load, and switches on every two seconds for a short period. If the output current exceeds a set level, the inverter will continue to operate. If not, the inverter will shut down again.

### Programmable relay

By default, the programmable relay is set as an alarm relay, i.e. the relay will de-energise in the event of an alarm or a pre-alarm (inverter almost too hot, ripple on the input almost too high, battery voltage almost too low).

### Remote on / off / charger on

Three pole connector.

### On-site system configuring, monitoring and control

After installation, the MultiPlus is ready to go.

Some settings can be changed with DIP switches.

500/800/1200VA models: remote switch / battery charge voltage / inverter frequency / search mode.

1600/2000VA models: battery charge voltage / search mode.

For more settings use VE-Config or the VE.Bus Smart dongle.

### Remote configuring and monitoring

Install a Cerbo GX or other GX product to connect to the internet.

Operational data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge.

When connected to the internet, systems can be accessed remotely, and settings can be changed.



### GX Touch and Cerbo GX

Provides intuitive system control and monitoring.

Besides system monitoring and control the Cerbo GX enables access to our free remote monitoring website: the VRM Online Portal.



### VRM Portal

Our free remote monitoring website (VRM) will display all your system data in a comprehensive graphical format. System settings can be changed remotely via the portal. Alarms can be received by e-mail.

12 Volt 24 Volt 48 Volt	MultiPlus 12/500/20 MultiPlus 24/500/10 MultiPlus 48/500/6	MultiPlus 12/800/35 MultiPlus 24/800/16 MultiPlus 48/800/9	MultiPlus 12/1200/50 MultiPlus 24/1200/25 MultiPlus 48/1200/13	MultiPlus 12/1600/70 MultiPlus 24/1600/40 MultiPlus 48/1600/20	MultiPlus 12/2000/80 MultiPlus 24/2000/50 MultiPlus 48/2000/25
PowerControl / PowerAssist	No	Yes	Yes	Yes	Yes
Three Phase and parallel operation	Yes	Yes	Yes	Yes	Yes
Transfer switch	16 A	16 A	16 A	16 A	35 A
<b>INVERTER</b>					
Input voltage range	9,5 – 17 V		19 – 33 V	38 – 66 V	
Output	Output voltage: 230VAC ± 2%		Frequency: 50Hz ± 0,1% (1)		
Cont. output power at 25°C (2)	500 VA	800 VA	1200 VA	1600 VA	2000 VA
Cont. output power at 25°C	430 W	700 W	1000 W	1300 W	1600 W
Cont. output power at 40°C	400 W	650 W	900 W	1100 W	1400 W
Cont. output power at 65°C	300 W	400 W	600 W	800 W	1000 W
Peak power	900 W	1600 W	2400 W	2800 W	3500 W
Maximum efficiency	90 / 91 / 92%	92 / 93 / 94%	93 / 94 / 95%	93 / 94 / 95%	93 / 94 / 95%
Zero-load power	6 / 6 / 7 W	7 / 7 / 8 W	10 / 9 / 10 W	10 / 9 / 10 W	10 / 9 / 10 W
Zero-load power in search mode	2 / 2 / 3 W	2 / 2 / 3 W	3 / 3 / 3 W	3 / 3 / 3 W	3 / 3 / 3 W
<b>CHARGER</b>					
AC Input	Input voltage range: 187-265 VAC		Input frequency: 45 – 65 Hz		
Charge voltage 'absorption'	14,4 / 28,8 / 57,6 V				
Charge voltage 'float'	13,8 / 27,6 / 55,2 V				
Storage mode	13,2 / 26,4 / 52,8 V				
Charge current house battery (4)	20 / 10 / 6 A	35 / 16 / 9 A	50 / 25 / 13 A	70 / 40 / 20 A	80 / 50 / 25 A
Charge current starter battery	1A (12 V and 24 V models only)				
Battery temperature sensor	Yes				
<b>GENERAL</b>					
Programmable relay (5)	Yes				
Protection (2)	a – g				
VE.Bus communication port	For parallel and three phase operation, remote monitoring and system integration (RJ45-splitter ASS030065510 needed for 500 / 800 / 1200 VA models)				
Remote on-off	On/off/charger only			On/off	
DIP switches	Yes (6)	Yes (6)	Yes (6)	Yes (7)	Yes (7)
Internal DC fuse	125 / 60 / 30 A	150 / 80 / 40 A	200 / 100 / 50 A	200 / 125 / 60 A	no
Common Characteristics	Operating temp. range: -40 to +65°C (fan assisted cooling)		Humidity (non-condensing): max 95%		
<b>ENCLOSURE</b>					
Common Characteristics	Material & Colour: Steel/ABS (blue RAL 5012)		Protection category: IP 21		Steel (RAL 5012), IP22
Battery-connection	16 / 10 / 10 mm <sup>2</sup>	25 / 16 / 10 mm <sup>2</sup>	35 / 25 / 10 mm <sup>2</sup>	50 / 35 / 16 mm <sup>2</sup>	M8 bolts
230V AC-connection	G-ST18i connector				
Weight	4,4 kg	6,4 kg	8,2 kg	10,2 kg	15,5 kg
Dimensions (h x w x d)	311 x 182 x 100 mm	360 x 240 x 100 mm	406 x 250 x 100 mm	470 x 265 x 120 mm	506 x 236 x 147 mm
<b>STANDARDS</b>					
Safety	EN-IEC 60335-1, EN-IEC 60335-2-29, EN 62109-1				
Emission Immunity	EN 55014-1, EN 55014-2, EN-IEC 61000-3-2, EN-IEC 61000-3-3, IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3				
Automotive Directive	ECE R10-5				
1) Can be adjusted to 60Hz and to 240V	3) Non-linear load, crest factor 3:1				
2) Protection:	4) Up to 25°C ambient				
a. Output short circuit	5) Programmable relay which can be set for:				
b. Overload	general alarm, DC under voltage or generator start/stop signal function				
c. Battery voltage too high	AC rating: 230V/4A				
d. Battery voltage too low	DC rating: 4A up to 35VDC, 1A up to 60VDC				
e. Temperature too high	6) Remote / battery charge voltage / inverter frequency / search mode				
f. 230VAC on inverter output	7) Battery charge voltage / search mode				
g. Input voltage ripple too high					



### Digital Multi Control Panel

A convenient and low cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.



### VE.Bus Smart Dongle

Measures battery voltage and temperature and allows monitoring and control of Multis and Quattros with a smartphone or other Bluetooth enabled device.



### VRM app

Monitor and manage your Victron Energy system from your smart phone and tablet. Available for both iOS and Android



### MK3-USB (VE.Bus to USB interface)

Connects to a USB port (see 'A guide to VEConfigure')



### BMV-712 Smart Battery Monitor

Use a smartphone or other Bluetooth enabled device to:

1. customize settings,
2. monitor all important data on single screen,
3. view historical data,
4. update the software when new features become available.



# MULTIPLUS INVERTER/CHARGER 800VA - 5KVA 230V



MultiPlus  
24/3000/70



MultiPlus Compact  
12/2000/80

### Two AC Outputs

The main output has no break functionality. The MultiPlus takes over the supply to the connected loads in the event of a grid failure or when shore/generator power is disconnected. This happens so fast (less than 20 milliseconds) that computers and other electronic equipment will continue to operate without disruption.

The second output is live only when AC is available on the input of the MultiPlus. Loads that should not discharge the battery, like a water heater for example can be connected to this output (second output available on models rated at 3 kVA and more).

### Virtually unlimited power thanks to parallel operation

Up to 6 Multis can operate in parallel to achieve higher power output. Six 24/5000/120 units, for example, will provide 25 kW / 30 kVA output power with 720 Amps charging capacity.

### Three phase capability

In addition to parallel connection, three units of the same model can be configured for three phase output. But that's not all: up to 6 sets of three units can be parallel connected for a 75 kW / 90 kVA inverter and more than 2000 Amps charging capacity.

### PowerControl - Dealing with limited generator, shore side or grid power

The MultiPlus is a very powerful battery charger. It will therefore draw a lot of current from the generator or shore side supply (nearly 10 A per 5 kVA Multi at 230 VAC). With the Multi Control Panel a maximum generator or shore current can be set. The MultiPlus will then take account of other AC loads and use whatever is extra for charging, thus preventing the generator or shore supply from being overloaded.

### PowerAssist - Boosting the capacity of shore or generator power

This feature takes the principle of PowerControl to a further dimension. It allows the MultiPlus to supplement the capacity of the alternative source. Where peak power is so often required only for a limited period, the MultiPlus will make sure that insufficient shore or generator power is immediately compensated for by power from the battery. When the load reduces, the spare power is used to recharge the battery.

### Solar energy: AC power available even during a grid failure

The MultiPlus can be used in off grid as well as grid connected PV and other alternative energy systems. Loss of mains detection software is available.

### System configuring

- In case of a stand-alone application, if settings have to be changed, this can be done in a matter of minutes with a DIP switch setting procedure.
- Parallel and three phase applications can be configured with VE.Bus Quick Configure and VE.Bus System Configurator software.
- Off grid, grid interactive and self-consumption applications, involving grid-tie inverters and/or MPPT Solar Chargers can be configured with Assistants (dedicated software for specific applications).

### On-site Monitoring and control

Several options are available: Battery Monitor, Multi Control Panel, Color Control GX or other GX devices, smartphone or tablet (Bluetooth Smart), laptop or computer (USB or RS232).

### Remote Monitoring and control

Color Control GX or other GX devices.

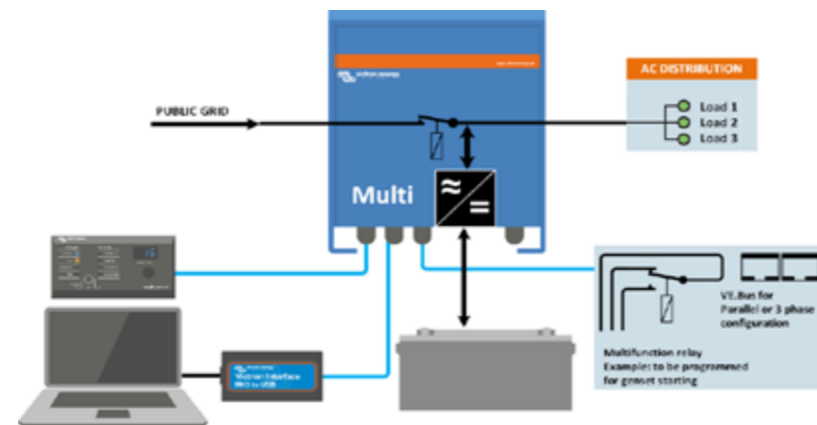
Data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge.

### Remote configuring

When connected to the Ethernet, systems with a Color Control GX or other GX device can be accessed and settings can be changed remotely.



Color Control GX  
showing a PV application



MultiPlus	12 Volt 24 Volt 48 Volt	C 12/800/35 C 24/ 800/16	C 12/1200/50 C 24/1200/25	C 12/1600/70 C 24/1600/40	C 12/2000/80 C 24/2000/50	12/3000/120 24/3000/70 48/3000/35	24/5000/120 48/5000/70
Nominal Battery voltage		n. a.	n. a.	n. a.	n. a.	12 V battery 24 V battery 48 V battery	24 V battery 48 V battery
PowerControl		Yes	Yes	Yes	Yes	Yes	Yes
PowerAssist		Yes	Yes	Yes	Yes	Yes	Yes
AC input		Input voltage range: 187-250 V			Input frequency: 50/60 Hz	Cos Φ > 0.8	
Transfer switch (A)		16	16	16	30	16 or 50	100
<b>INVERTER</b>							
Input voltage range (VDC)		9.5 – 17 V			19 – 33 V	38 – 66 V	
Input current (A DC)		n. a.	n. a.	n. a.	n. a.	250 / 125 / 65	238 / 118
Output		Output voltage: 230 VAC ± 2 %			Frequency: 50 Hz ± 0,1 % <sup>(1)</sup>		
Cont. output power at 25 °C (VA) <sup>(3)</sup>		800	1200	1600	2000	3000	5000
Cont. output power at 25 °C (W)		700	1000	1300	1600	2400	4000
Cont. output power at 40 °C (W)		650	900	1200	1400	2200	3700
Cont. output power at 65 °C (W)		400	600	800	1000	1700	3000
Peak power (W)		1600	2400	3000	4000	6000	10000
Maximum continuous Output current (A-)		n. a.	n. a.	n. a.	n. a.	11	19
Power factor range		n. a.	n. a.	n. a.	n. a.	±0.8	±0.8
Maximum output fault current		n. a.	n. a.	n. a.	n. a.	32A peak 1 sec.	53A peak 1sec
Maximum efficiency (%)		92 / 94	93 / 94	93 / 94	93 / 94	93 / 94 / 95	94 / 95
Zero load power (W)		8 / 10	8 / 10	8 / 10	9 / 11	20 / 20 / 25	30 / 35
Zero load power in AES mode (W)		5 / 8	5 / 8	5 / 8	7 / 9	15 / 15 / 20	25 / 30
Zero load power in Search mode (W)		2 / 3	2 / 3	2 / 3	3 / 4	8 / 10 / 12	10 / 15
<b>CHARGER</b>							
AC Input		Input voltage range: 187-265 VAC			Input frequency: 45 – 65 Hz	Power factor: 1	
Charge voltage 'absorption' (VDC)		14,4 / 28,8 / 57,6					
Charge voltage 'float' (VDC)		13,8 / 27,6 / 55,2					
Storage mode (VDC)		13,2 / 26,4 / 52,8					
Charge current house battery (A) <sup>(4)</sup>		35 / 16	50 / 25	70 / 40	80 / 50	120 / 70 / 35	120 / 70
Charge current starter battery (A)		4 (12 V and 24 V models only)					
Battery temperature sensor		yes					
<b>GENERAL</b>							
Auxiliary output <sup>(5)</sup>		n. a.	n. a.	n. a.	n. a.	Yes (16A)	Yes (50A)
Programmable relay <sup>(6)</sup>		Yes					
Protection <sup>(2)</sup>		a - g					
VE.Bus communication port		For parallel and three phase operation, remote monitoring and system integration					
General purpose com. port		n. a.	n. a.	n. a.	n. a.	Yes	Yes
Remote on-off		Yes					
Common Characteristics		Operating temp. range: -40 to +65 °C (fan assisted cooling) Humidity (non-condensing): max 95 %					
<b>ENCLOSURE</b>							
Common Characteristics		Material & Colour: aluminium (blue RAL 5012), Protection category: IP20, pollution degree 2, OVCIII lcv: 6kA 30mS					
Battery-connection		battery cables of 1.5 meter		M8 bolts	Four M8 bolts (2 plus and 2 minus connections)		
230 VAC-connection		G-ST18i connector		Spring-clamp	Screw terminals 13 mm <sup>2</sup> (6 AWG)		M6 bolts
Weight (kg)		10	10	10	12	18	30
Dimensions (hwxwx d in mm)		375 x 214 x 110		520 x 255 x 125	362 x 258 x 218		444 x 328 x 240
<b>STANDARDS</b>							
Safety		EN-IEC 60335-1, EN-IEC 60335-2-29, IEC 62109-1					
Emission, Immunity		EN 55014-1, EN 55014-2, EN-IEC 61000-3-2, EN-IEC 61000-3-3, IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3					
Road vehicles		12 V and 24 V models: ECE R10-4					
Anti-islanding		See our website					
<p>1) Can be adjusted to 60 HZ. 120 V models available on request</p> <p>2) Protection key: a) output short circuit b) overload c) battery voltage too high d) battery voltage too low e) temperature too high f) 230 VAC on inverter output g) input voltage ripple too high</p> <p>3) Non-linear load, crest factor 3:1 4) Up to 25 °C ambient 5) Switches off when no external AC source available 6) Programmable relay that can a.o. be set for general alarm, DC under voltage or genset start/stop function AC rating: 230 V/4 A DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC 7) A.o. to communicate with a Lithium Ion battery BMS</p>							



**Digital Multi Control Panel**  
A convenient and low cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.



**VE.Bus Smart Dongle**  
Measures battery voltage and temperature and allows monitoring and control of Multis and Quattros with a smartphone or other Bluetooth enabled device.



**Computer controlled operation and monitoring**  
Several interfaces are available:



**Color Control GX and other GX devices**  
Monitoring and control. Locally, and also remotely on the [VRM Portal](#).



**MK3-USB (VE.Bus to USB interface)**  
Connects to a USB port (see ['A guide to VEConfigure'](#))



**VE.Bus to NMEA 2000 interface**  
Connects the device to a NMEA 2000 marine electronics network. See the [NMEA 2000 & MFD integration guide](#)



**BMV-712 Smart Battery Monitor**  
Use a smartphone or other Bluetooth enabled device to:  
- customize settings,  
- monitor all important data on single screen,  
- view historical data, and to update the software when new features become available.

# QUATTRO INVERTER/CHARGER 3KVA - 10KVA 230V



Quattro  
48/5000/70-100/100



Quattro  
48/15000/200-100/100

### Two AC inputs with integrated transfer switch

The Quattro can be connected to two independent AC sources, for example the public grid and a generator, or two generators. The Quattro will automatically connect to the active source.

### Two AC Outputs

The main output has no-break functionality. The Quattro takes over the supply to the connected loads in the event of a grid failure or when shore/generator power is disconnected. This happens so fast (less than 20 milliseconds) that computers and other electronic equipment will continue to operate without disruption.

The second output is live only when AC is available on one of the inputs of the Quattro. Loads that should not discharge the battery, like a water heater for example, can be connected to this output.

### Split phase option

A split phase AC source can be obtained by connecting our autotransformer (see data sheet on [www.victronenergy.com](http://www.victronenergy.com)) to a 'European' inverter programmed to supply 240 V / 60 Hz.

### Three phase capability

Three units can be configured for three phase output. But that's not all: up to 4 sets of three 15 kVA units can be parallel connected to provide 144 kW / 180 kVA inverter power and 2400 A charging capacity.

### PowerControl – Dealing with limited generator, shore side or grid power

The Quattro is a very powerful battery charger. It will therefore draw a lot of current from the generator or shore side supply (16 A per 5 kVA Quattro at 230 VAC). A current limit can be set on each AC input. The Quattro will then take account of other AC loads and use whatever is spare for charging, thus preventing the generator or mains supply from being overloaded.

### PowerAssist – Boosting shore or generator power

This feature takes the principle of PowerControl to a further dimension allowing the Quattro to supplement the capacity of the alternative source. Where peak power is so often required only for a limited period, the Quattro will make sure that insufficient mains or generator power is immediately compensated for by power from the battery. When the load reduces, the spare power is used to recharge the battery.

### Solar energy: AC power available even during a grid failure

The Quattro can be used in off grid as well as grid connected PV and other alternative energy systems. Loss of mains detection software is available.

### System configuring

- In case of a stand-alone application, if settings have to be changed, this can be done in a matter of minutes with a DIP switch setting procedure.
- Parallel and three phase applications can be configured with VE.Bus Quick Configure and VE.Bus System Configurator software.
- Off grid, grid interactive and self-consumption applications, involving grid-tie inverters and/or MPPT Solar Chargers can be configured with Assistants (dedicated software for specific applications).

### On-site Monitoring and control

Several options are available: Battery Monitor, Multi Control Panel, Color Control GX or other GX devices, smartphone or tablet (Bluetooth Smart), laptop or computer (USB or RS232).

### Remote Monitoring and control

Color Control GX or other GX devices.

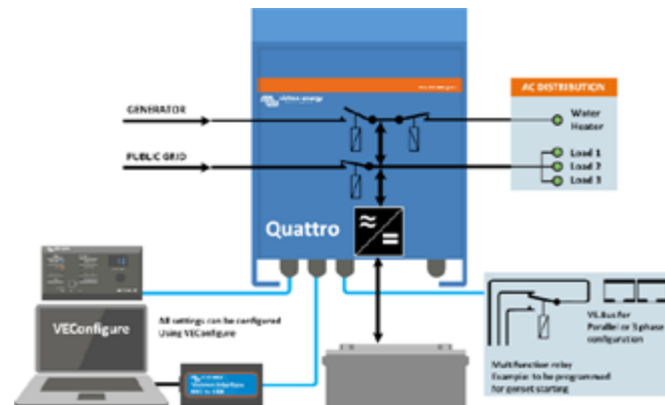
Data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge.

### Remote configuring

When connected to the Ethernet, systems with a Color Control GX or other GX device can be accessed and settings can be changed remotely.



Color Control GX, showing a PV application



Quattro	12/3000/120-50/50 24/3000/70-50/50	12/5000/220-100/100 24/5000/120-100/100 48/5000/70-100/100	24/8000/200-100/100 48/8000/110-100/100	48/10000/140-100/100	48/15000/200-100/100
Nominal Battery Voltage	12/3000: 12 V battery 24/3000: 24 V battery	12/5000: 12 V battery 24/5000: 24 V battery 48/5000: 48 V Battery	24/8000: 24 V battery 48/8000: 48 V battery	48 V battery	
PowerControl / PowerAssist	Yes				
Integrated Transfer switch	Yes				
AC inputs (2x)	Input voltage range: 187-250 VAC Input frequency: 50/60 Hz Cos Φ >0.8				
Maximum feed through current (A)	2x 50	2x100	2x100	2x100	2x100
ICw	6 kA 30 mS				
<b>INVERTER</b>					
Input voltage range (VDC)	9,5 – 17 V 19 – 33 V 38 – 66 V				
Output (1)	Output voltage: 230 VAC ± 2 % Frequency: 50 Hz ± 0,1 %				
Cont. output power at 25 °C (VA) (1)	3000	5000	8000	10000	15000
Cont. output power at 25 °C (W)	2400	4000	6400	8000	12000
Cont. output power at 40 °C (W)	2200	3700	5500	6500	10000
Cont. output power at 65 °C (W)	1700	3000	3600	4500	7000
Peak power (W)	6000	10000	16000	20000	25000
Input current (A DC)	250 / 125	458/238/118	381/188	235	350
Maximum continuous Output current (A~)	11	19	30	37	53/50
Power factor range	+0.8	+0.8	+0.8	+0.8	+0.8
Maximum output fault current	32 A peak 1 sec.	53 A 1 sec.	100 A 1 sec	100 A 1 sec	150 A 1 sec
Maximum efficiency (%)	93 / 94	94 / 94 / 95	94 / 96	96	96
Zero load power (W)	20 / 20	30 / 30 / 35	60 / 60	60	110
Zero load power in AES mode (W)	15 / 15	20 / 25 / 30	40 / 40	40	75
Zero load power in Search mode (W)	8 / 10	10 / 10 / 15	15 / 15	15	20
<b>CHARGER</b>					
Charge voltage 'absorption' (VDC)	14,4 / 28,8	14,4 / 28,8 / 57,6	28,8 / 57,6	57,6	57,6
Charge voltage 'float' (VDC)	13,8 / 27,6	13,8 / 27,6 / 55,2	27,6 / 55,2	55,2	55,2
Storage mode (VDC)	13,2 / 26,4	13,2 / 26,4 / 52,8	26,4 / 52,8	52,8	52,8
Charge current house battery (A) (4)	120 / 70	220 / 120 / 70	200 / 110	140	200
Charge current starter battery (A)	4 (12 V and 24 V models only)				
Battery temperature sensor	Yes				
<b>GENERAL</b>					
Auxiliary output (A) (5)	25	50	50	50	50
Programmable relay (6)	3x	3x	3x	3x	3x
Protection (2)	a-g				
VE.Bus communication port	For parallel and three phase operation, remote monitoring and system integration				
General purpose com. port	2x	2x	2x	2x	2x
Remote on-off	Yes				
Common Characteristics	Operating temp.: -20 to +60 °C Humidity (non-condensing): max. 95 %				
Maximum altitude	3500 m				
<b>ENCLOSURE</b>					
Common Characteristics	Material & Colour: aluminium (blue RAL 5012) Protection category: IP20, pollution degree 2, OVC III				
Battery-connection	Four M8 bolts (2 plus and 2 minus connections)				
230 VAC-connection	Screw terminals 13 mm <sup>2</sup> (6 AWG)	Bolts M6	Bolts M6	Bolts M6	Bolts M6
Weight (kg)	19	34 / 30 / 30	45 / 41	51	72
Dimensions (hwxwd x mm)	362 x 258 x 218	470 x 350 x 280 444 x 328 x 240 444 x 328 x 240	470 x 350 x 280	470 x 350 x 280	572 x 488 x 344
<b>STANDARDS</b>					
Safety	EN-IEC 60335-1, EN-IEC 60335-2-29, EN-IEC 62109-1				
Emission, Immunity	EN 55014-1, EN 55014-2, EN-IEC 61000-3-2, EN-IEC 61000-3-3, IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3				
Road vehicles	12 V and 24 V models: ECE R10-4				
Anti-islanding	See our website				
1) Can be adjusted to 60 HZ. 120 V models available on request			3) Non-linear load, crest factor 3:1		
2) Protection key: a) output short circuit b) overload c) battery voltage too high d) battery voltage too low e) temperature too high f) 230 VAC on inverter output g) input voltage ripple too high			4) Up to 25 °C ambient 5) Switches off when no external AC source available 6) Programmable relay that can a.o. be set for general alarm, DC under voltage or genset start/stop function AC rating: 230 V / 4 A DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC		



### Digital Multi Control Panel

A convenient and low cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.



### VE.Bus Smart Dongle

Measures battery voltage and temperature and allows monitoring and control of Multis and Quattros with a smartphone or other Bluetooth enabled device.

### Computer controlled operation and monitoring

Several interfaces are available:



### Color Control GX and other GX devices

Monitoring and control. Locally, and also remotely on the [VRM Portal](http://VRM Portal).



### MK3-USB (VE.Bus to USB interface)

Connects to a USB port (see 'A guide to VEConfigure')



### VE.Bus to NMEA 2000 interface

Connects the device to a NMEA 2000 marine electronics network. See the [NMEA2000 & MFD integration guide](http://NMEA2000 & MFD integration guide)



### BMV-712 Smart Battery Monitor

Use a smartphone or other Bluetooth enabled device to:

- customize settings,
- monitor all important data on single screen,
- view historical data, and to update the software when new features become available.

# MULTIPLUS-II INVERTER/CHARGER 3KVA - 15KVA 230V

## A MultiPlus, plus ESS (Energy Storage System) functionality

The MultiPlus-II is a multifunctional inverter/charger with all the features of the MultiPlus, plus an external current sensor option which extends the PowerControl and PowerAssist function to 50A resp. 100A. The MultiPlus-II is ideally suited for professional marine, yachting, vehicle and land based off-grid applications. It also has built-in anti-islanding functionality, and an increasingly long list of country approvals for ESS application. Several system configurations are possible. For more detailed information see the ESS Design and configuration manual.



## PowerControl and PowerAssist - Boosting the capacity of the grid or a generator

A maximum grid or generator current can be set. The MultiPlus-II will then take account of other AC loads and use whatever is extra for battery charging, thus preventing the generator or grid from being overloaded (PowerControl function).

PowerAssist takes the principle of PowerControl to a further dimension. Where peak power is so often required only for a limited period, the MultiPlus-II will compensate insufficient generator, shore or grid power with power from the battery. When the load reduces, the spare power is used to recharge the battery.

## Solar energy: AC power available even during a grid failure

The MultiPlus-II can be used in off grid as well as grid connected PV and other alternative energy systems. It is compatible with both solar charger controllers and grid-tie inverters.

## Two AC Outputs

The main output has no break functionality. The MultiPlus-II takes over the supply to the connected loads in the event of a grid failure or when shore/generator power is disconnected. This happens so fast (less than 20 milliseconds) that computers and other electronic equipment will continue to operate without disruption. The second output is live only when AC is available on the input of the MultiPlus-II. Loads that should not discharge the battery, like a water heater for example, can be connected to this output.

## Virtually unlimited power thanks to parallel (not for the 8k, 10k and 15k models) and three phase operation

Up to 6 Multis can operate in parallel to achieve higher power output. Six 48/5000/70 units, for example, will provide 25 kW / 30 kVA output power with 420 Amps charging capacity. In addition to parallel connection, three units of the same model can be configured for three phase output. But that's not all: up to 6 sets of three units can be parallel connected for a 75 kW / 90 kVA inverter and more than 1200 Amps charging capacity.

## On-site system configuring, monitoring and control

Settings can be changed in a matter of minutes with VEConfigure software (computer or laptop and MK3-USB interface needed). Several monitoring and control options are available: Cerbo GX, Color Control GX, Venus GX, Octo GX, CANvu GX, laptop, computer, Bluetooth (with the optional VE.Bus Smart dongle), Battery Monitor, Digital Multi Control Panel.

## Remote configuring and monitoring

Install a Cerbo GX or other GX product to connect to the internet. Operational data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge. When connected to the internet, systems can be accessed remotely, and settings can be changed.



**GX Touch and Cerbo GX**  
Provides intuitive system control and monitoring. Besides system monitoring and control the Cerbo GX enables access to our free remote monitoring website: the VRM Online Portal.



**VRM Portal**  
Our free remote monitoring website (VRM) will display all your system data in a comprehensive graphical format. System settings can be changed remotely via the portal. Alarms can be received by e-mail.

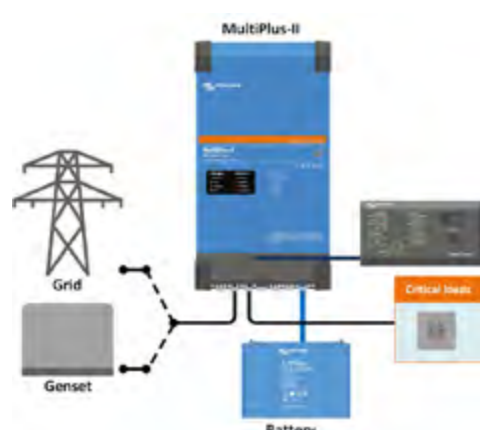


**VRM app**  
Monitor and manage your Victron Energy system from your smart phone and tablet. Available for both iOS and Android.

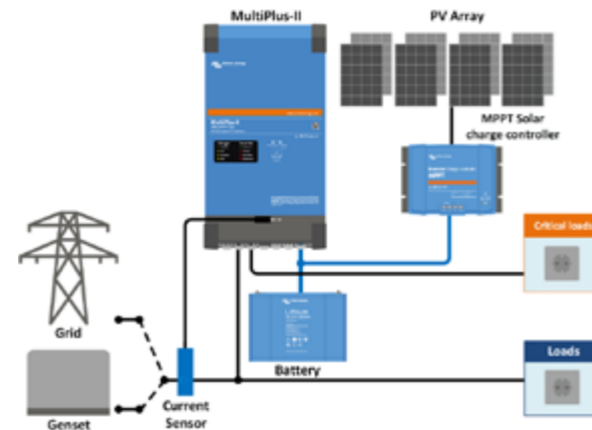


**VE.Bus Smart Dongle**  
Measures battery voltage and temperature and allows monitoring and control with a smart phone or other Bluetooth enabled device.

MultiPlus-II 230V	12/3000/120-32 24/3000/70-32 48/3000/35-32	24/5000/120-50 48/5000/70-50	48/8000/ 110-100	48/10000/ 140-100	48/15000/ 200-100
PowerControl & PowerAssist	Yes				
Transfer switch	32 A	50 A	100 A	100 A	100 A
Maximum AC input current	32 A	50 A	100 A	100 A	100 A
<b>INVERTER</b>					
DC Input voltage range	12V - 9,5-17 V	24V - 19-33V	48V - 38-66 V		
Output	Output voltage: 230 VAC ± 2% Frequency: 50 Hz ± 0,1% (1)				
Cont. output power at 25°C (3)	3000 VA	5000 VA	8000 VA	10000 VA	15000 VA
Cont. output power at 25°C	2400 W	4000 W	6400 W	8000 W	12000 W
Cont. output power at 40°C	2200 W	3700 W	5500 W	7000 W	10000 W
Cont. output power at 65°C	1700 W	3000 W	4000 W	6000 W	7000 W
Max apparent feed-in power	3000 VA	5000 VA	8000 VA	10000 VA	15000 VA
Peak power	5500 W	9000 W	15000 W	18000 W	27000 W
Maximum efficiency	93%/94%/95%	96%	95%	96%	95%
Zero load power	13 / 13 / 11 W	18 W	29 W	38 W	55 W
Zero load power in AES mode	9 / 9 / 7 W	12 W	19 W	27 W	39 W
Zero load power in Search mode	3 / 3 / 2 W	2 W	3 W	4 W	6 W
<b>CHARGER</b>					
AC Input	Input voltage range: 187-265 VAC Input frequency: 45 - 65 Hz				
Charge voltage 'absorption'	14,4 / 28,8 / 57,6 V				
Charge voltage 'float'	13,8 / 27,6 / 55,2 V				
Storage mode	13,2 / 26,4 / 52,8 V				
Max. battery charge current (4)	120 / 70 / 35 A	120 / 70 A	110 A	140 A	200 A
Battery temperature sensor	Yes				
<b>GENERAL</b>					
Auxiliary output	Yes (32A)		Yes (50A)		
External AC current sensor (optional)	50A or 100A				
Programmable relay (5)	Yes				
Protection (2)	a - g				
VE.Bus communication port	For parallel (not for 8k, 10k and 15k models) and three phase operation, remote monitoring and system integration				
General purpose com. port	Yes, 2x				
Remote on-off	Yes				
Operating temperature range	-40 to +65°C (fan assisted cooling)				
Humidity (non-condensing)	max 95%				
<b>ENCLOSURE</b>					
Material & Colour	Steel, blue RAL 5012				
Protection category	IP22				
Battery-connection	M8 bolts		Four M8 bolts (2 plus and 2 minus connections)		
230 V AC-connection	Screw terminals 13 mm <sup>2</sup> (6 AWG)		Bolts M6	Bolts M6	Bolts M6
Weight	19 kg	30 kg	42 kg	49 kg	80 kg
Dimensions (hxxwxd) mm	546 x 275 x 147 499 x 268 x 141 499 x 268 x 141	607 x 330 x 149 565 x 320 x 149	642 x 363 x 206	677 x 363 x 206	810 x 405 x 217
<b>STANDARDS</b>					
Safety	EN-IEC 60335-1, EN-IEC 60335-2-29, EN-IEC 62109-1, EN-IEC 62109-2, EN 55014-1, EN 55014-2				
Emission, Immunity	EN-IEC 61000-3-2, EN-IEC 61000-3-3, IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3				
Uninterruptible power supply	Please consult the certificates on our website.				
Anti-islanding	Please consult the certificates on our website.				
1) Can be adjusted to 60 Hz	3) Non-linear load, crest factor 3:1				
2) Protection key:	4) Up to 25°C ambient				
a) output short circuit	5) Programmable relay which can be set for general alarm, DC under voltage or genset start/stop function. AC rating: 230V / 4A, DC rating: 4A up to 35VDC and 1A up to 60VDC				
b) overload					
c) battery voltage too high					
d) battery voltage too low					
e) temperature too high					
f) 230 VAC on inverter output					
g) input voltage ripple too high					



**Standard marine, mobile or off-grid application**  
Loads that should shut down when AC input power is not available can be connected to a second output (not shown). These loads will be taken into account by the PowerControl and PowerAssist function in order to limit AC input current to a safe value when AC power is available.



**Grid parallel topology with MPPT solar charge controller**  
The MultiPlus-II will use data from the external AC current sensor (must be ordered separately) or power meter to optimise self-consumption and, if required, to prevent grid feed. In case of a power outage, the MultiPlus-II will continue to supply the critical loads.



Connection Area MultiPlus-II 3k



**Current sensor 100A:50mA**  
To implement PowerControl and PowerAssist and to optimize self-consumption with external current sensing. Maximum current: 50A resp. 100A. Length of connection cable: 1 m.



**Digital Multi Control Panel**  
A convenient and low-cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.





# MULTIPLUS-II INVERTER/CHARGER 3KVA & 5KVA 230V GX



### A MultiPlus-II with LCD and GX functionality

The MultiPlus-II GX integrates a MultiPlus-II inverter/charger and a GX device with a 2 x 16 character display.

#### Display and Wi-Fi

The display reads battery, inverter and solar charge controller parameters. The same parameters can be accessed with a smartphone or other Wi-Fi enabled device.

#### GX device

The integrated GX device includes:

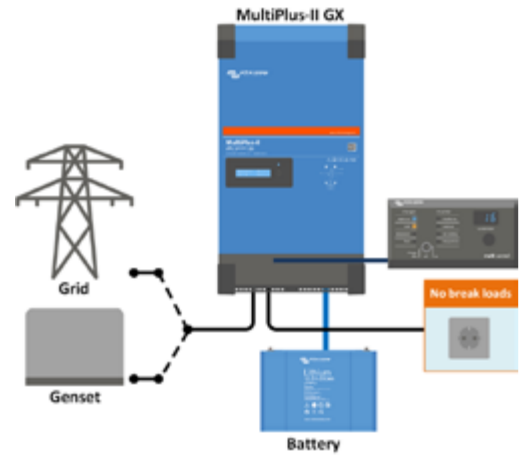
- A BMS-Can interface. This can be used to connect to a compatible CAN-bus managed battery. Note that this not a VE.Can compatible port.
- A USB port.
- A Ethernet port.
- A VE.Direct port.

#### Applications

The MultiPlus-II GX is intended for applications where additional interfacing with other products and/or remote monitoring is required, such as on-grid or off-grid energy storage systems and certain mobile applications.

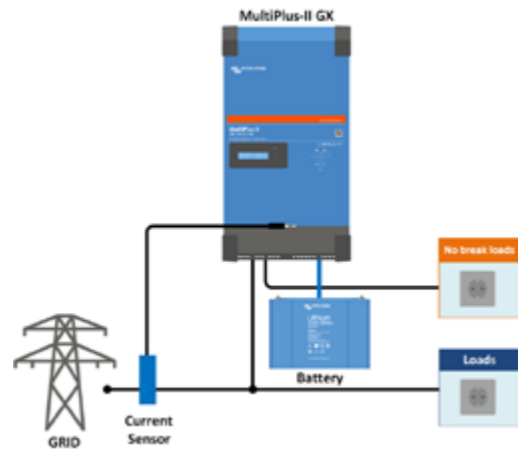
#### Parallel and three phase operation

Only one GX unit is needed in case of Parallel and three phase operation.



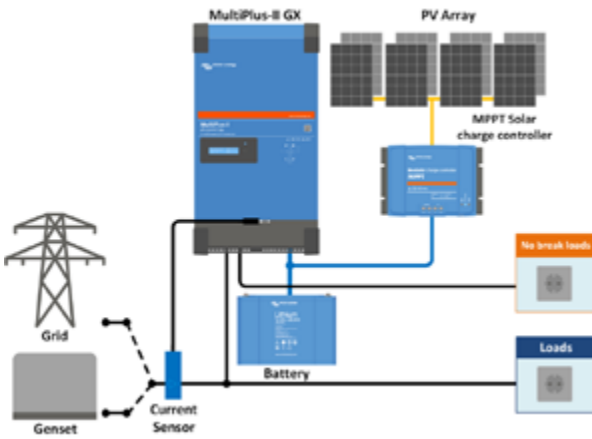
#### Standard marine, mobile or off-grid application

Loads that should shut down when AC input power is not available can be connected to a second output (not shown). These loads will be taken into account by the PowerControl and PowerAssist function in order to limit AC input current to a safe value when AC power is available.



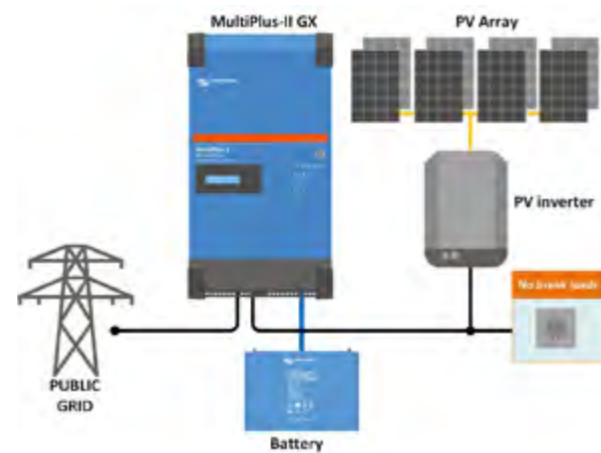
#### Standard mobile or off-grid application with external current sensor

Maximum current sensing range: 50 A resp 100 A



#### Grid parallel topology with MPPT solar charge controller

The MultiPlus-II will use data from the external AC current sensor (must be ordered separately) or power meter to optimise self-consumption and, if required, to prevent grid feed. In case of a power outage, the MultiPlus-II will continue to supply the critical loads



#### Grid in-line topology with PV inverter

PV power is directly converted to AC. The MultiPlus-II will use excess PV power to charge the batteries or to feed power back into the grid, and will discharge the battery or use power from the grid to supplement a shortage of PV power. In case of a power outage, the MultiPlus-II will disconnect the grid and continue to supply the loads.



#### VRM Portal

Our free remote monitoring website (VRM) will display all your system data in a comprehensive graphical format. System settings can be changed remotely via the portal. Alarms can be received by e-mail.



#### VRM app for Wi-Fi

Monitor and manage your Victron Energy system from your smart phone and tablet. Available for both iOS and Android.



#### GX GSM

A cellular modem; providing a mobile internet for the system and connection to Victron Remote Management (VRM). Optional: outdoor GSM antenna and GPS antenna. For more detail please enter *GX GSM* in the search box on our website



Connection Area

MultiPlus-II GX	24/3000/70-32	48/3000/35-32	48/5000/70-50
PowerControl & PowerAssist	Yes		
Transfer switch	32 A	50 A	
Maximum AC input current	32 A		
Auxiliary output	Yes (32 A)		
<b>INVERTER</b>			
DC Input voltage range	19 – 33 V	38 – 66 V	
Output	Output voltage: 230 VAC ± 2 % Frequency: 50 Hz ± 0,1 % (1)		
Cont. output power at 25 °C (3)	3000 VA	5000 VA	
Cont. output power at 25 °C	2400 W	4000 W	
Cont. output power at 40 °C	2200 W	3700 W	
Cont. output power at 65 °C	1700 W	3000 W	
Maximum apparent feed-in power	3000 VA	5000 VA	
Peak power	5500 W		
Maximum efficiency	94 %	95 %	96 %
Zero load power	13 W	11 W	18 W
Zero load power in AES mode	9 W	7 W	12 W
Zero load power in Search mode	3 W	2 W	2 W
<b>CHARGER</b>			
AC Input	Input voltage range: 187-265 VAC Input frequency: 45 – 65 Hz		
Charge voltage 'absorption'	28,8 V	57,6 V	
Charge voltage 'float'	27,6 V	55,2 V	
Storage mode	26,4 V	52,8 V	
Maximum battery charge current (4)	70 A	35 A	70 A
Battery temperature sensor	Yes		
<b>GENERAL</b>			
Interfaces	BMS-Can, USB, Ethernet, VE.Direct, Wi-Fi		
External AC current sensor (optional)	50 A	100 A	
Programmable relay (5)	Yes		
Protection (2)	a – g		
VE.Bus communication port	For parallel and three phase operation, remote monitoring and system integration		
General purpose com. port	Yes, 2x		
Remote on-off	Yes		
Operating temperature range	-40 to +65 °C (fan assisted cooling)		
Humidity (non-condensing)	max 95 %		
<b>ENCLOSURE</b>			
Material & Colour	Steel, blue RAL 5012		
Protection category	IP22		
Battery-connection	M8 bolts		
230 V AC-connection	Screw terminals 13 mm <sup>2</sup> (6 AWG)		
Weight	20 kg	31 kg	
Dimensions (hwxwx) mm	506 x 275 x 147	565 x 323 x 148	
<b>STANDARDS</b>			
Safety	EN-IEC 60335-1, EN-IEC 60335-2-29, EN-IEC 62109-1, EN-IEC 62109-2		
Emission, Immunity	EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3		
Uninterruptible power supply	IEC 62040-1		
Anti-islanding	Please consult the certificates on our website.		
1) Can be adjusted to 60 Hz	3) Non-linear load, crest factor 3:1		
2) Protection key:	4) Up to 25 °C ambient		
a) output short circuit	5) Programmable relay which can be set for general alarm, DC under voltage or genset start/stop function.		
b) overload	AC rating: 230 V / 4 A, DC rating: 4 A up to 35 VDC and 1 A up to 60 VDC		
c) battery voltage too high			
d) battery voltage too low			
e) temperature too high			
f) 230 VAC on inverter output			
g) input voltage ripple too high			



#### Current sensor 100 A:50 mA

To implement PowerControl and PowerAssist and to optimize self-consumption with external current sensing. Maximum current: 50 A resp. 100 A. Length of connection cable: 1 m.



#### Digital Multi Control Panel

A convenient and low-cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.



# MULTIPLUS INVERTER/CHARGER 2KVA & 3KVA 120V



MultiPlus  
24/3000/70

### Multifunctional, with intelligent power management

The MultiPlus is a powerful true sine wave inverter, a sophisticated battery charger that features adaptive charge technology, and a high-speed AC transfer switch in a single compact enclosure. Next to these primary functions, the MultiPlus has several advanced features, as outlined below.

### Two AC Outputs

The main output has no-break functionality. The MultiPlus takes over the supply to the connected loads in the event of a grid failure or when shore-/generator power is disconnected. This happens so fast (less than 20 milliseconds) that computers and other electronic equipment will continue to operate without disruption.

The second output is live only when AC is available on the input of the MultiPlus. Loads that should not discharge the battery, like a water heater for example, can be connected to this output (second output available on models rated at 3kVA and more).

### Virtually unlimited power thanks to parallel operation

Up to six Multis can operate in parallel to achieve higher power output. Six 24/3000/70 units, for example, provide 15kW / 18kVA output power with 420 Amps of charging capacity.

### Three phase capability

In addition to parallel connection, three units can be configured for three-phase output. But that's not all: with three strings of six parallel units a 45 kW / 54 kVA three phase inverter and 1260 A charger can be built.

### Split phase options

Two units can be stacked to provide 120-0-120 V, and additional units can be paralleled up to a total of 6 units per phase, to supply up to 30 kW / 36 kVA of split phase power.

Alternatively, a split phase AC source can be obtained by connecting our autotransformer (see data sheet on [www.victronenergy.com](http://www.victronenergy.com)) to a 'European' inverter programmed to supply 240 V / 60 Hz.

### PowerControl - Dealing with limited generator, shore side or grid power

The MultiPlus is a very powerful battery charger. It will therefore draw a lot of current from the generator or shore side supply (nearly 20 A per 3 kVA MultiPlus at 120 VAC). With the Multi Control Panel a maximum generator or shore current can be set. The MultiPlus will then take account of other AC loads and use whatever is extra for charging, thus preventing the generator or shore supply from being overloaded.

### PowerAssist - Boosting the capacity of shore or generator power

This feature takes the principle of PowerControl to a further dimension. It allows the MultiPlus to supplement the capacity of the alternative source. Where peak power is so often required only for a limited period, the MultiPlus will make sure that insufficient shore or generator power is immediately compensated for by power from the battery. When the load reduces, the spare power is used to recharge the battery.

### Four stage adaptive charger and dual bank battery charging

The main output provides a powerful charge to the battery system by means of advanced 'adaptive charge' software. The software fine-tunes the three stage automatic process to suit the condition of the battery, and adds a fourth stage for long periods of float charging. The adaptive charge process is described in more detail on the Charger datasheet and on our website, under Technical Information. In addition to this, the MultiPlus will charge a second battery using an independent trickle charge output intended for a main engine or generator starter battery.

### System configuring has never been easier

After installation, the MultiPlus is ready to go.

If settings have to be changed, this can be done in a matter of minutes with a DIP switch setting procedure. Even parallel and 3-phase operation can be programmed with DIP switches: no computer needed!

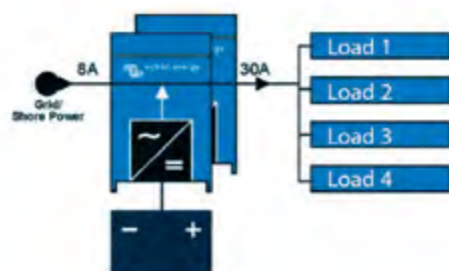
Alternatively, VE.Net can be used instead of the DIP switches.

And sophisticated software (VE.Bus Quick Configure and VE.Bus System Configurator) is available to configure several new, advanced, features.

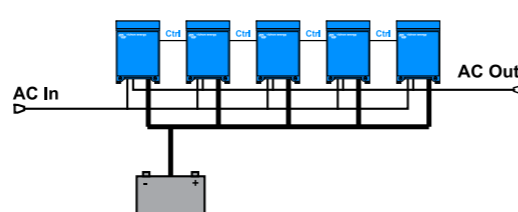


MultiPlus Compact  
12/2000/80

PowerAssist with 2x MultiPlus in parallel



Five parallel units: output power 12,5 kW



MultiPlus	12 Volt 24 Volt	12/2000/80 24/2000/50	12/3000/120 24/3000/70
PowerControl			Yes
PowerAssist			Yes
Transfer switch (A)			50
Parallel and 3-phase operation			Yes
<b>INVERTER</b>			
Input voltage range (V DC)		9,5 – 17 V	19 – 33 V
Output		Output voltage: 120 VAC ± 2% Frequency: 60 Hz ± 0,1% <sup>(1)</sup>	
Cont. output power at 25°C / 77°F (VA) <sup>(3)</sup>		2000	3000
Cont. output power at 25°C / 77°F (W)		1600	2400
Cont. output power at 40°C / 104°F (W)		1450	2200
Cont. output power at 65°C / 150°F (W)		1100	1700
Peak power (W)		4000	6000
Maximum efficiency (%)		92 / 94	93 / 94
Zero load power (W)		9 / 11	20 / 20
Zero load power in AES mode (W)		7 / 8	15 / 15
Zero load power in Search mode (W)		3 / 4	8 / 10
<b>CHARGER</b>			
AC Input		Input voltage range: 95-140 VAC	Input frequency: 45 – 65 Hz Power factor: 1
Charge voltage 'absorption' (V DC)			14,4 / 28,8
Charge voltage 'float' (V DC)			13,8 / 27,6
Storage mode (V DC)			13,2 / 26,4
Charge current house battery (A) <sup>(4)</sup>		80 / 50	120 / 70
Charge current starter battery (A)			4
Battery temperature sensor			yes
<b>GENERAL</b>			
Auxiliary output <sup>(5)</sup>		n. a.	Yes (32A)
Programmable relay <sup>(6)</sup>		Yes (1x)	Yes (3x)
Protection <sup>(2)</sup>			a - g
VE.Bus communication port		For parallel and three phase operation, remote monitoring and system integration	
General purpose com. port <sup>(7)</sup>		n. a.	Yes (2x)
Remote on-off			Yes
Common Characteristics		Operating temp. range: -40 - +65°C / -40 to 150°F (fan assisted cooling)	Humidity (non-condensing): max 95%
<b>ENCLOSURE</b>			
Common Characteristics		Material & Colour: aluminium (blue RAL 5012)	Protection category: IP 21
Battery-connection		M8 bolts	M8 bolts (2 plus and 2 minus connections)
120 V AC-connection		Screw-terminal 6 AWG (13 mm <sup>2</sup> )	Screw-terminal 6 AWG (13mm <sup>2</sup> )
Weight		13 kg 25 lbs.	19kg 40 lbs.
Dimensions (hxxwxd in mm and inches)		520x255x125 mm 20.5x10.0x5.0 inch	362x258x218 mm 14.3x10.2x8.6 inch
<b>STANDARDS</b>			
Safety		UL 458, EN-IEC 60335-1, EN-IEC 60335-2-29	UL 1741, UL 458, EN-IEC 60335-1, EN-IEC 60335-2-29
Emission and Immunity		EN-IEC 61000-3-2/3-3/, EN-IEC 61000-6-1/6-2/6-3	EN-IEC 61000-3-2/3-3/, EN-IEC 61000-6-1/6-2/6-3
1) Can be adjusted to 50 Hz; 2) Protection key: a) output short circuit b) overload c) battery voltage too high d) battery voltage too low e) temperature too high f) 120 VAC on inverter output g) input voltage ripple too high 3) Non-linear load, crest factor 3:1 4) Up to 75°F ambient 5) Switches off when no external AC source available 6) Programmable relay that can a.o. be set for general alarm, DC under voltage or genset start/stop function AC rating: 120 V/4 A DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC 7) A.o. to communicate with a Lithium Ion battery BMS			



### Digital Multi Control

A convenient and low cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.

### Computer controlled operation and monitoring

Several interfaces are available:



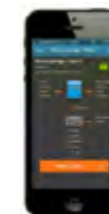
### Color Control GX and other GX devices

Provides monitor and control. Locally, and also remotely on the [VRM Portal](http://VRM Portal).



### VE.Bus Smart Dongle

Measures battery voltage and temperature and allows monitoring and control of Multis and Quattros with a smartphone or other Bluetooth enabled device.



### MK3-USB VE.Bus to USB interface

Connects to a USB port (see 'A guide to VEConfigure')



### VE.Bus to NMEA 2000 interface

Connects the device to a NMEA2000 marine electronics network. See the [NMEA2000 & MFD integration guide](http://NMEA2000 & MFD integration guide)



### BMV-712 Smart Battery Monitor

Use a smartphone or other Bluetooth enabled device to:

- customize settings,
- monitor all important data on single screen,
- view historical data, and to update the software when new features become available.

# MULTIPLUS-II INVERTER/CHARGER 3KVA 2 X 120V



## 120/240V input and output, or 120V input and output (always 120V output when in inverter mode)

The AC input can be supplied from a split phase 120/240V source, or single phase 120V source. When an AC source is available, the MultiPlus will feed through the AC to its output. The output will therefore mirror the AC input.

The inverter/charger connects to the neutral and the preferred input line (L1). Power needed to charge the batteries will therefore be drawn from L1.

The MultiPlus switches to inverter operation when no AC source is available. The inverter output is 120V single phase. In invert mode, the MultiPlus connects both output lines (L1 and L2) together to provide 120VAC to loads on either line.

Any 240V loads will therefore be supplied only when the MultiPlus is supplied by a split phase AC source. This prevents heavy loads such as water heaters or 240V air conditioners from discharging the battery.

## PowerControl and PowerAssist - Boosting the capacity of the grid or a generator

A maximum grid or generator current can be set. The MultiPlus will then take account of other AC loads and use whatever is extra for battery charging, thus preventing the generator or grid from being overloaded (PowerControl function).

PowerAssist takes the principle of PowerControl to a further dimension. Where peak power is so often required only for a limited period, the MultiPlus-II will compensate insufficient generator, shore or grid power with power from the battery. When the load reduces, the spare power is used to recharge the battery (available on L1 input only).

## Two AC Outputs

The main output has no break functionality. The MultiPlus takes over the supply to the connected 120V loads in the event of a grid failure or when shore/generator power is disconnected. The transfer time of the L1 output is less than 18 milliseconds so that computers and other electronic equipment will continue to operate without disruption. The transfer time of the L2 output is longer: approximately 40 milliseconds.

The second (auxiliary) output is live only when AC is available on the input of the MultiPlus. Loads that should not discharge the battery can be connected to this output.

## Virtually unlimited power thanks to parallel and three phase operation

Up to 6 Multis can operate in parallel to achieve higher power output.

In addition to parallel connection, three units of the same model can be configured for three phase output. In multi-phase setups, L2 is disabled on all units.

## On-site system configuring, monitoring and control

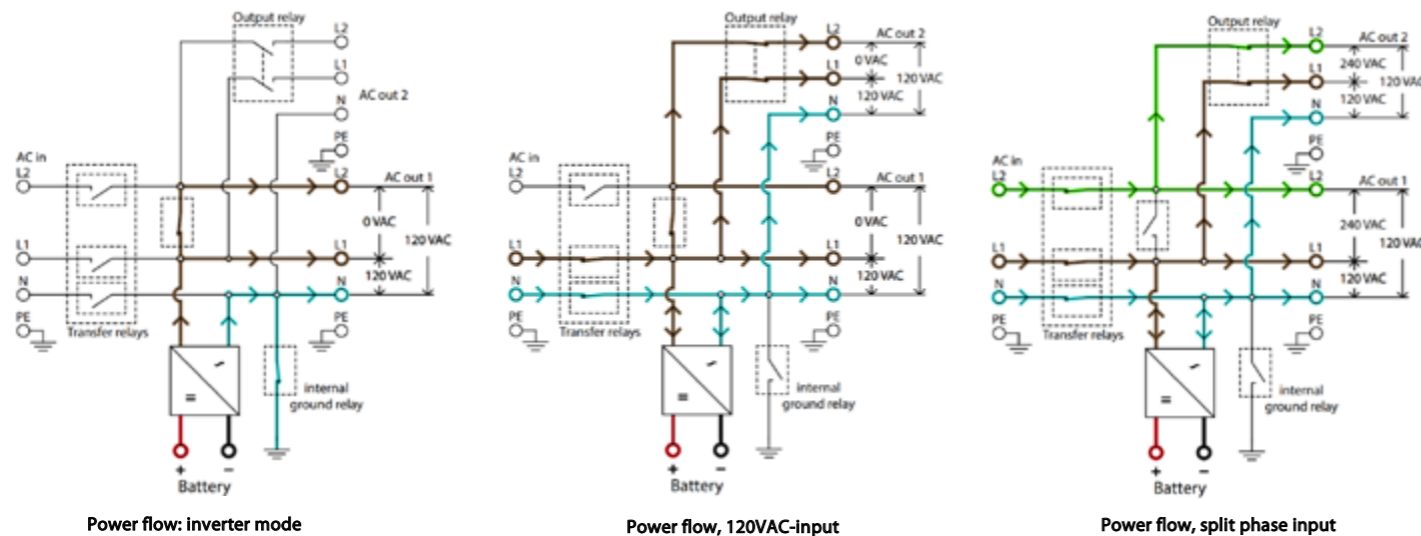
Settings can be changed in a matter of minutes with VEConfigure software (computer or laptop and MK3-USB interface needed).

Several monitoring and control options are available: Cerbo GX, Color Control GX, Venus GX, CANvu GX, laptop, computer, Bluetooth (with the optional VE.Bus Smart dongle), Battery Monitor, Digital Multi Control Panel.

## Remote configuring and monitoring

Install a Cerbo GX or other GX product to connect to the internet.

Operational data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge. When connected to the internet, systems can be accessed remotely, and settings can be changed.



Power flow: inverter mode

Power flow, 120VAC-input

Power flow, split phase input



Cerbo GX with GX Touch 50

Provides intuitive system control and monitoring. Besides system monitoring and control the Cerbo enables access to our free remote monitoring website: the VRM Online Portal



VRM Portal

Our free remote monitoring website (VRM) will display all system data in a comprehensive graphical format. System settings can be changed remotely via the portal. Alarms can be received by e-mail.



VRM app

Monitor and manage your Victron Energy system from your smart phone and tablet. Available for both iOS and Android.



VE.Bus Smart Dongle

Measures battery voltage and temperature and allows monitoring and control with a smart phone or other Bluetooth enabled device.



Connection Area

MultiPlus-II 2x120V	12/3000/120-50	24/3000/70-50
PowerControl & PowerAssist	Yes (on L1 input)	
Transfer switch	50 A	
Maximum AC input current	50A (each leg)	
<b>INVERTER</b>		
DC Input voltage range	9,5 - 17 V	19-33V
Output when in inverter mode	Output voltage: 120 VAC ± 2% Frequency: 60 Hz ± 0,1% (1)	
Cont. output power at 25°C (3)	3000 VA	
Cont. output power at 25°C	2400 W	
Cont. output power at 40°C	2200 W	
Cont. output power at 65°C	1700 W	
Maximum apparent feed-in power	2500 VA	
Peak power	5500 W	
Maximum efficiency	93%	94%
Zero load power	15W	11W
Zero load power in AES mode	10W	8W
Zero load power in Search mode	4W	4W
<b>CHARGER</b>		
AC Input	Split phase: 180-280 VAC 45 - 65 Hz Single phase: 90-140 VAC 45 - 65 Hz	
Charge voltage 'absorption'	14,4 V	28,8 V
Charge voltage 'float'	13,8 V	27,6 V
Storage mode	13,2 V	26,4 V
Maximum battery charge current (4)	120 A	70 A
Battery temperature sensor	Yes	
<b>GENERAL</b>		
Auxiliary output (5)	50 A (each leg) See note 8	
External AC current sensor (optional)	100 A	
Programmable relay (6)	Yes	
Protection (2)	a - g	
VE.Bus communication port	For parallel and three phase operation, remote monitoring and system integration	
General purpose com. Port (7)	Yes, 2x	
Remote on-off	Yes	
Operating temperature range	-40 to +65°C (-40 -150°F) Fan assisted cooling	
Humidity (non-condensing)	max 95%	
<b>ENCLOSURE</b>		
Material & Colour	Steel, blue RAL 5012	
Protection category	IP22	
Battery-connection	2x2 M8 bolts	2 M8 bolts
120/240 V AC-connection	Screw terminals 21 mm <sup>2</sup> (4 AWG)	
Weight	22 kg (48 lb)	
Dimensions (hwxwd)	578 x 275 x 148 mm (23 x 11 x 6 inch)	578 x 275 x 148 mm (23 x 11 x 6 inch)
<b>STANDARDS</b>		
Safety	EN-IEC 60335-1, EN-IEC 60335-2-29, UL 458	
Emission, Immunity	EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3	
1) Can be adjusted to 50 Hz 2) Protection key: a) output short circuit b) overload c) battery voltage too high d) battery voltage too low e) temperature too high f) 120 VAC on inverter output g) input voltage ripple too high 3) Non-linear load, crest factor 3:1 4) Up to 75 °F / 25 °C ambient 5) Switches off when no external AC source available 6) Programmable relay that can a.o. be set for general alarm, DC under voltage or genset start/stop function AC rating: 120 V/4 A DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC 7) A. o. to communicate with a Lithium-Ion battery BMS 8) The auxiliary output of an early production batch of this product was rated at 35A instead of 50A. This batch has serial numbers starting with HQ2107. Later batches, with 50A aux. output have serial numbers starting with HQ2114 or higher.		



Current sensor 100A:50mA

To implement PowerControl and PowerAssist and to optimize self-consumption with external current sensing. Maximum current: 50A resp. 100A.



Digital Multi Control Panel

A convenient and low-cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.

# QUATTRO INVERTER/CHARGER 3KVA - 10KVA 120V

## Two AC inputs with integrated transfer switch

The Quattro can be connected to two independent AC sources, for example the public grid and a generator, or two generators. The Quattro will automatically connect to the active source.

## Two AC Outputs

The main output has no-break functionality. The Quattro takes over the supply to the connected loads in the event of a grid failure or when shore/generator power is disconnected. This happens so fast (less than 20 milliseconds) that computers and other electronic equipment will continue to operate without disruption.

The second output is live only when AC is available on one of the inputs of the Quattro. Loads that should not discharge the battery, like a water heater for example, can be connected to this output.

## Split phase and three phase capability

Two units can be configured for split phase, and three units can be configured for three phase output. But that's not all: up to 4 sets of three units can be parallel connected to provide 96W / 120kVA inverter power and more than 1600A charging capacity. For more detail please enter *parallel* in the search box on our website.

## PowerControl – Dealing with limited generator, shore side or grid power

A current limit can be set on each AC input. The Quattro will then take account of other AC loads and use whatever is spare for charging, thus preventing the generator or mains supply from being overloaded.

## PowerAssist – Boosting shore or generator power

This feature takes the principle of PowerControl to a further dimension allowing the Quattro to supplement the capacity of the alternative source. Where peak power is so often required only for a limited period, the Quattro will make sure that insufficient mains or generator power is immediately compensated for by power from the battery. When the load reduces, the spare power is used to recharge the battery.

## Solar energy: AC power available even during a grid failure

The Quattro can be used in off grid as well as grid connected PV and other alternative energy systems. Loss of mains detection software is available.

## System configuring

- In case of a stand-alone application, if settings have to be changed, this can be done in a matter of minutes with a DIP switch setting procedure.
- Parallel and three phase applications can be configured with VE.Bus Quick Configure and VE.Bus System Configurator software.
- Off grid, grid interactive and self-consumption applications, involving grid-tie inverters and/or MPPT Solar Chargers can be configured with Assistants (dedicated software for specific applications).

## On-site Monitoring and control

Several options are available: Battery Monitor, Multi Control Panel, Color Control GX or other GX devices, smartphone or tablet (Bluetooth Smart), laptop or computer (USB or RS232).

## Remote Monitoring and control

Color Control GX or other GX devices.

Data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge.

## Remote configuring

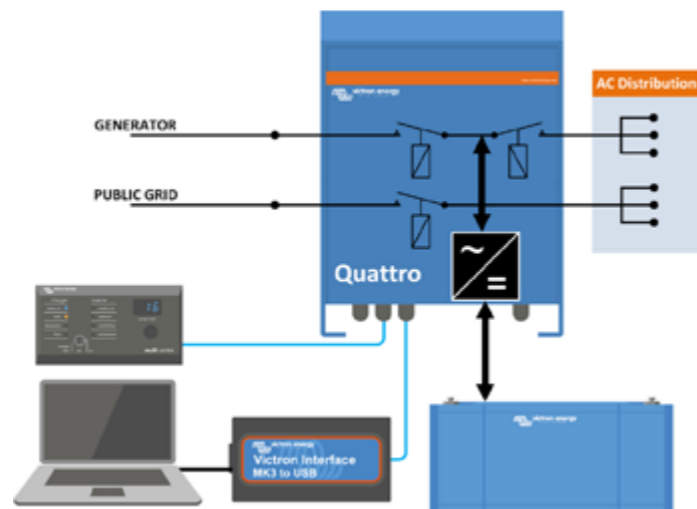
When connected to the Ethernet, systems with a Color Control GX or other GX device can be accessed, and settings can be changed remotely.



Quattro  
48/5000/70-100/100



Color Control GX, showing a PV application



Quattro	48/3000/35-50/50 120V	12/5000/220-100/100 120V 24/5000/120-100/100 120V 48/5000/70-100/100 120V	48/10000/140-100/100 120V
PowerControl / PowerAssist	Yes		
Integrated Transfer switch	Yes		
AC inputs (2x)	Input voltage range: 90-140 VAC Input frequency: 45 – 65 Hz Power factor: 1		
Maximum feed through current	2x 50 A	2x 100 A	2x 100 A
<b>INVERTER</b>			
Input voltage range	9,5 – 17 V 19 – 33V 38 – 66 V		
Output (1)	Output voltage: 120 VAC ± 2% Frequency: 60 Hz ± 0,1%		
Cont. output power at 25°C (3)	3000 VA	5000 VA	10000 VA
Cont. output power at 25°C	2400 W	4000 W	8000 W
Cont. output power at 40°C	2200 W	3700 W	6500 W
Cont. output power at 65°C	1700 W	3000 W	4500 W
Peak power	6000 W	10000 W	20000 W
Maximum efficiency	94 %	94 / 94 / 95 %	96 %
Zero load power	25 W	30 / 30 / 35 W	60 W
Zero load power in AES mode	20 W	20 / 25 / 30 W	40 W
Zero load power in Search mode	12 W	10 / 10 / 15 W	15 W
<b>CHARGER</b>			
Charge voltage 'absorption' (V DC)	57,6 V	14,4 / 28,8 / 57,6 V	57,6 V
Charge voltage 'float' (V DC)	55,2 V	13,8 / 27,6 / 55,2 V	55,2 V
Storage mode (V DC)	52,8 V	13,2 / 26,4 / 52,8 V	52,8 V
Charge current house battery (A) (4)	35 A	200 / 120 / 70 A	140 A
Charge current starter battery (A)	4 A (12V and 24V models only)		
Battery temperature sensor	Yes		
<b>GENERAL</b>			
Auxiliary output (5)	32 A	50 A	50 A
Programmable relay (6)	3x		
Protection (2)	a-g		
VE.Bus communication port	For parallel, split phase and three phase operation, remote monitoring and system integration		
General purpose com. port	2x		
Remote on-off	Yes		
Common Characteristics	Operating temp.: -40 to +65°C Humidity (non-condensing): max. 95%		
<b>ENCLOSURE</b>			
Common Characteristics	Material & Colour: aluminium (blue RAL 5012) Protection category: IP 21		
Battery-connection	Four M8 bolts (2 plus and 2 minus connections)		
120 V AC-connection	Screw terminals 13 mm <sup>2</sup> (6 AWG)	Bolts M6	Bolts M6
Weight (kg)	42 lb 19 kg	75 / 66 / 66 lb 34 / 30 / 30 kg	128 lb 58 kg
Dimensions (hwxwd)	14,3 x 10,2 x 8,6 inch	18,5 x 14,0 x 11,2 inch	470 x 350 x 280 mm
	362 x 258 x 218 mm	17,5 x 13,0 x 9,6 inch	444 x 328 x 240 mm
		17,5 x 13,0 x 9,6 inch	444 x 328 x 240 mm
<b>STANDARDS</b>			
Safety	EN-IEC 60335-1, EN-IEC 60335-2-29, EN-IEC 62109-1		
Emission, Immunity	EN 55014-1, EN 55014-2, EN-IEC 61000-3-2, EN-IEC 61000-3-3, IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3		
Road vehicles	12V and 24V models: ECE R10-5		
Anti-islanding	See our website		
1) Can be adjusted to 60 HZ; 120 V 60 Hz on request		3) Non-linear load, crest factor 3:1	
2) Protection key:		4) Up to 25°C ambient	
a) output short circuit		5) Switches off when no external AC source available	
b) overload		6) Programmable relay that can a.o. be set for general alarm, DC under voltage or genset start/stop function	
c) battery voltage too high		AC rating: 230 V / 4 A	
d) battery voltage too low		DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC	
e) temperature too high			
f) 120 VAC on inverter output			
g) input voltage ripple too high			



## Digital Multi Control Panel

A convenient and low cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.

## VE.Bus Smart Dongle

Measures battery voltage and temperature and allows monitoring and control of Multis and Quattros with a smartphone or other Bluetooth enabled device.

## Computer controlled operation and monitoring

Several interfaces are available:



## Color Control GX and other GX devices

Monitoring and control. Locally, and also remotely on the [VRM Portal](#).



## MK3-USB VE.Bus to USB interface

Connects to a USB port (see ['A guide to VEConfigure'](#))



## VE.Bus to NMEA 2000 interface

Connects the device to a NMEA2000 marine electronics network. See the [NMEA2000 & MFD integration guide](#)



## BMV-712 Smart Battery Monitor

Use a smartphone or other Bluetooth enabled device to:

- customize settings,
- monitor all important data on single screen,
- view historical data, and to update the software when new features become available.

# EKRANO GX



Ekrano GX front and back



Accessories included with the Ekrano GX



## Ekrano GX: communication-centre

The Ekrano GX represents the next generation in the GX product family. With its complete range of connections and interfaces as well as a built-in 7-inch touchscreen display, it is the most powerful GX device to date and allows you to always have perfect control over your system from wherever you are and to maximise its performance. Simply access your system via our [Victron Remote Management \(VRM\) portal](#), or access it directly, using the built-in touchscreen, a Multi-Functional Display (MFD) or our [VictronConnect app](#) thanks to its built-in WiFi Access Point. The Ekrano GX is also the successor to the Color Control GX.

## Built-in 7-inch touchscreen display

The seven-inch touchscreen display gives an instant overview of your system and allows you to adjust settings. The touch function can be disabled (or enabled) via a recessed button on the back to prevent unauthorised use. When mounted using the supplied steel bracket, the display is watertight from the outside.

## Remote Console on VRM

Monitor, control and configure the Ekrano GX remotely, over the internet, just like if you were standing in front of the device, using the Remote Console. The same functionality is also available via local LAN network or via the built-in WiFi access point of the Ekrano GX.

## Perfect monitoring & control

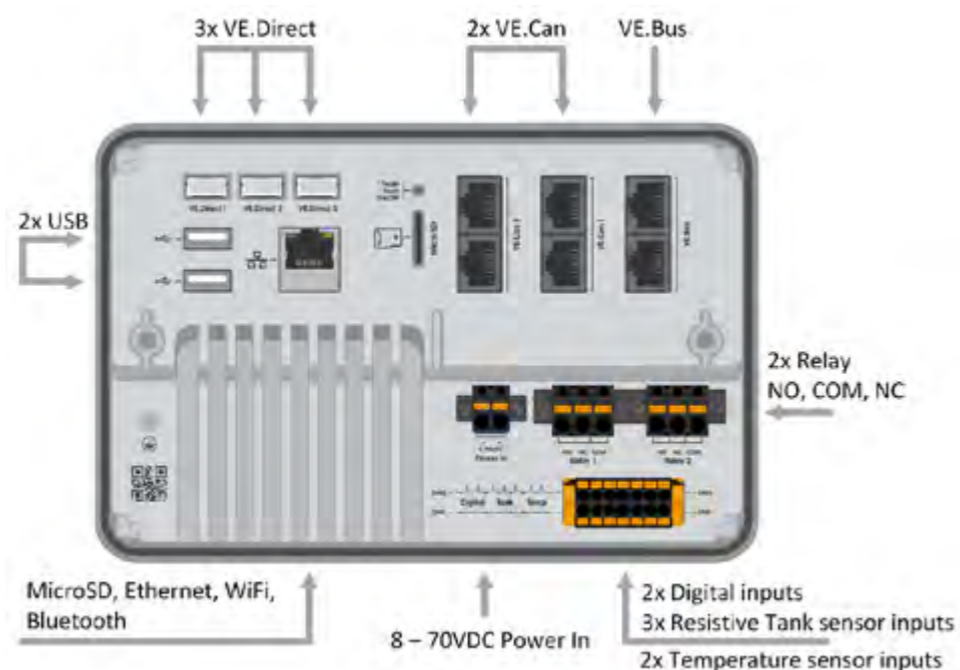
Instantly monitor the battery state of charge, power consumption, power harvest from PV, generator, and mains, or check tank levels and temperature measurements. Easily control the shore power input current limit, (auto) start/stop generator(s) or change any setting to optimise the system. Follow up on alerts, perform diagnostic checks and resolve complications remotely.

## Simple mounting and configuration

The Ekrano GX installs easily via a cut-out for flush panel mounting and includes both a steel bracket and springs for blind hole mounting. All ports are easily accessible from the back. The power and relay terminal blocks can be screwed in place and the IO terminal block has a quick release clamp for easy access. The Bluetooth feature allows for quick connection and configuration via our VictronConnect app.



Temperature sensor for Quattro, MultiPlus and GX device (e.g. Ekrano GX) as an additional accessory.



Ekrano GX <sup>[1]</sup>	
Supply voltage	8 – 70 VDC
Power draw display on (100 % brightness)	6.2 W @ 12 V   6.6 W @ 24 V   7.4 W @ 48 V
Power draw display off	2.6 W 12 V   3.0 W @ 24 V   3.7 W @ 48 V
Relay	2 x NO/NC <sup>[2]</sup> DC up to 30 VDC: 3 A AC: 1 A, 125 VAC
Communication ports	
VE.Direct ports (always isolated)	3 (max. possible VE.Direct devices: 25) <sup>[7]</sup>
VE.Bus (always isolated)	1 bus with 2 paralleled RJ45 sockets
VE.Can 1	Yes - isolated
VE.Can 2	Yes - non-isolated
Ethernet	Yes
WiFi	Yes
Bluetooth Smart	Yes <sup>[3]</sup>
USB Host ports	Yes – 2 x USB-A (max. 1.5 A@5 V combined)
MicroSD Card Slot	Yes – SDHC cards up to max. 32 GB
IO	
Resistive tank level inputs	3 <sup>[4]</sup>
Temperature sense inputs	2 <sup>[5]</sup>
Digital Inputs	2 <sup>[6]</sup>
Display	
Display resolution	1024 x 600 pixels
Display max. backlight brightness	1000 cd/m <sup>2</sup>
Backlight dimming	Yes – dynamic via built-in ambient light sensor or manually via Remote Console With timer for auto on/off
Touch toggle on/off button	Yes – recessed button on the back (prevents unauthorised use)
Dimensions	
Outer dimensions (h x w x d)	124 x 187 x 29.8 mm   4.88 x 7.36 x 1.17 in (without connectors and mounting accessories)
Operating temperature range	-20 to +50 °C
Other	
Mounting	Panel integrated flush mount or blind hole mount with included mounting accessories
Buzzer	Yes
Protection category	Front: IP54 (when installed with steel bracket) IP31 (when installed with springs) Back: IP21
Standards	
Safety	IEC 62368-1
EMC	EN 301489-1, EN 301489-17
Automotive	ECE R10-6
<b>Notes</b>	
1.	For more detailed information about the Ekrano GX, please visit the <a href="#">Victron GX product range page</a> .
2.	Currently, Relay 1 can be used for programming as an alarm relay, generator start/stop, tank pump, temperature controlled relay or manual operation. Relay 2 is available for programming as a temperature controlled relay or manual operation in the Relay menu of the GX (requires firmware 2.80 or higher).
3.	Bluetooth functionality is intended to be used to assist with initial connection and networking configuration. You cannot use Bluetooth to connect to other Victron products (e.g. SmartSolar charge controllers).
4.	The tank level inputs are resistive and should be connected to a resistive tank sender. Victron does not supply tank senders. The tank level ports can each be configured to work with either European (0 - 180 Ohm); or US tank senders (240 - 30 Ohm).
5.	The Ekrano GX has 2 temperature inputs. They can be used to measure & monitor all kinds of temperatures. Temperature senders are not included. The required sensor is ASS000001000 - Temperature Sensor QUA/PMP/Venus GX. (Note that this is not the same as the BMV temperature accessory). Temperature range is -20 °C to +70 °C. Actually, it can measure up to 100 °C, but the sensor is not made to withstand temperatures above 70 °C long term. Note that this is intended as a crude temperature sensor, and not calibrated. A deviation of +/- 2 °C is to be expected.
6.	The digital inputs can be used for open/closed monitoring of alarms, for example doors, or fire- or bilge alarms and can also be used for pulse counting. See the product manual for electrical specifications of the digital inputs.
7.	The listed maximum in above table is the total connected VE.Direct devices such as MPPT Solar Charge controllers. Total means all directly connected devices plus the devices connected over USB. The limit is mostly bound by CPU processing power. Note that there is also a limit to the other type of devices of which often multiple are connected: PV Inverters. Up to three or four three phase inverters can typically be monitored on a CCGX. Higher power CPU devices can monitor more.



# CERBO GX & GX TOUCH

## Cerbo GX: communication-centre

This communication-centre allows you to always have perfect control over your system from wherever you are and to maximise its performance. Simply access your system via our Victron Remote Management (VRM) portal, or access it directly, using the optional GX Touch screen, a Multi-Functional Display (MFD) or our VictronConnect app thanks to its Bluetooth capability.

## GX Touch: display accessory

The GX Touch 50 and GX Touch 70 are display accessories for the Cerbo GX. The five inch and seven inch touch screen displays give an instant overview of your system and allows you to adjust settings. Simply connect the display to the Cerbo GX with just one cable. Both GX Touch displays have a waterproof design, a top-mountable setup and are simple to install. The supplied (from serial number HQ2242) protection cover prevents damage from UV light during prolonged exposure to the sun.

## Remote Console on VRM

Monitor, control and configure the Cerbo GX remotely, over the internet. Just like if you were standing in front of the device, using Remote Console. The same functionality is also available on the local network LAN, or using the WiFi Access Point of the Cerbo GX.

## Perfect monitoring & control

Instantly monitor the battery state of charge, power consumption, power harvest from PV, generator, and mains, or check tank levels and temperature measurements. Easily control the shore power input current limit, (auto)start/stop generator(s) or change any setting to optimise the system. Follow up on alerts, perform diagnostic checks and resolve complications remotely.

## Simple mounting and configuration

The Cerbo GX is easily mountable and can also be mounted on a DIN-Rail using the DIN35 adapter small, (not included). Its separate touchscreen can be bolted on a dashboard, eliminating the need to create perfect cut-outs (like with the Color Control GX). Connection is easy via just one cable, taking away the hassle of having to bring many wires to the dashboard. The Bluetooth feature enables a quick connection and configuration via our VictronConnect app.



Cerbo GX



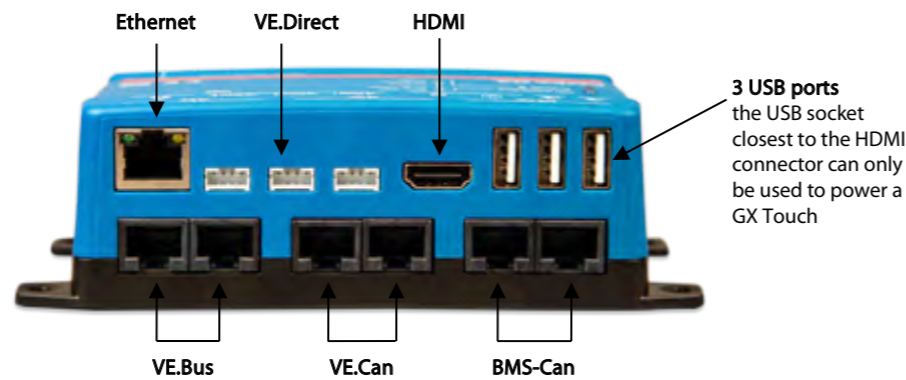
Accessories included with the Cerbo GX



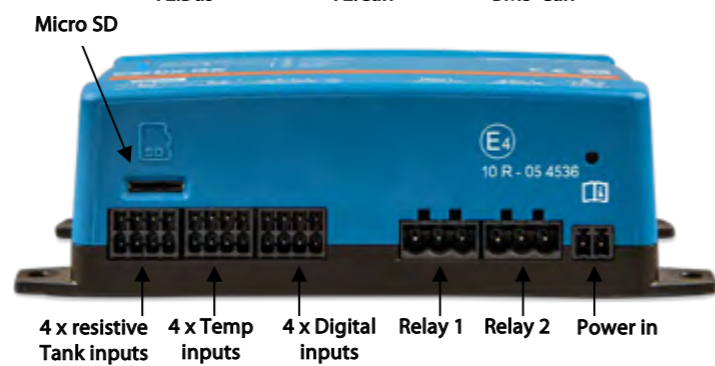
GX Touch (optional display for Cerbo GX and Cerbo-S GX)



GX Touch 50 & 70 protective plastic cover

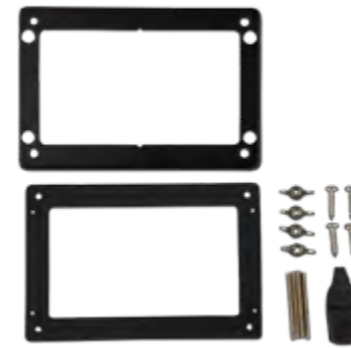


3 USB ports the USB socket closest to the HDMI connector can only be used to power a GX Touch



**WiFi indicator LED**  
The Cerbo GX can connect to a WiFi Network

**Bluetooth indicator LED**  
The Cerbo GX can be accessed directly via Bluetooth using the VictronConnect app.



Accessories included with the GX Touch

## Optional accessories



**GX Touch adapter for CCGX cut-out**  
This adapter is designed to easily replace the CCGX display with the newer GX Touch 50 or the GX Touch 70. Contents of the packaging are the metal bracket, the plastic bezel, and four mounting screws.



**Temperature sensor for Quattro, MultiPlus and GX Device (such as the Cerbo GX)**



**DIN35 adapter small**  
DIN-Rail adapter to easily mount a device on a DIN-Rail. Suitable for the Cerbo GX.

	Cerbo GX	Cerbo-S GX
Supply voltage	8 – 70 VDC	
Power draw without GX Touch	2.8 W @ 12 V	
Power draw with GX Touch	Backlight off: 3.8 W @ 12 V Backlight at max: 4.8 W @ 12 V	
Mounting	Wall or DIN rail (35 mm) <sup>(2)</sup>	
<b>Communication ports</b>		
VE.Direct ports (always isolated)	3 (max. possible VE.Direct devices: 15) <sup>(3)</sup>	
VE.Bus (always isolated)	2 paralleled RJ45 sockets	
VE.Can	yes - non isolated	
BMS-Can port	Yes	No
Bluetooth	Yes <sup>(4)</sup>	
<b>IO</b>		
Resistive tank level inputs	4	0
Temperature sense inputs	4	0
Digital Inputs	4	4
Relays <sup>(5)</sup>	2 x NO/NC DC up to 30 VDC: 6 A DC up to 70 VDC: 1 A AC: 6 A, 125 VAC	
<b>Other</b>		
Outer dimensions (h x w x d)	78 x 154 x 48 mm	
Operating temperature range	-20 to +50 °C	
IP Rating	IP20	
<b>Standards</b>		
Safety	IEC 62368-1	
EMC	EN 301489-1, EN 301489-17	
Automotive	ECE R10-6	
<b>GX Touch 50 / GX Touch 70</b>		
Mounting	With included mounting accessories	
Protection cover	Included with every GX Touch from serial number HQ2242 Can also be purchased individually: Part # BPP900462050: GX Touch 50 protection cover Part # BPP900462070: GX Touch 70 protection cover	
Display Resolution	GX Touch 50: 800 x 480 GX Touch 70: 1024 x 600	
IP Rating	IP54 (without connectors)	
<b>Other</b>		
Outer dimensions (h x w x d)	GX Touch 50: 87 x 128 x 12.4 mm GX Touch 70: 113 x 176 x 13.5 mm	
Cable length	2 meter	

## Notes

- For more detailed information about the Cerbo GX and the GX Touch, please visit the Victron GX product range page at Victron live: [www.victronenergy.com/live/venus-os-start](http://www.victronenergy.com/live/venus-os-start)
- DIN rail mounting requires an additional accessory - [DIN35 adapter small](#).
- The listed maximum in above table is the total connected VE.Direct devices such as MPPT Solar Charge controllers. Total means all directly connected devices plus the devices connected over USB. The limit is mostly bound by CPU processing power. Note that there is also a limit to the other type of devices of which often multiple are connected: PV Inverters. Up to three or four three phase inverters can typically be monitored on a CCGX. Higher power CPU devices can monitor more.
- Bluetooth functionality is intended to be used to assist with initial connection and networking configuration. You cannot use Bluetooth to connect to other Victron products (e.g. SmartSolar charge controllers).
- In Cerbo GX hardware there are two relays. Currently, Relay 1 can be used for programming as an alarm relay, generator start/stop, tank pump, temperature-controlled relay or manual operation. Relay 2 is available for programming as a temperature-controlled relay or manual operation in the Relay menu of the GX (requires firmware 2.80 or higher).

# COLOR CONTROL GX



## Color Control GX

The Color Control (CCGX) provides intuitive control and monitoring for all Victron power systems. The list of Victron products that can be connected is endless: Inverters, Multis, Quattros, MPPT solar chargers, BMV battery monitors, Lynx Ion + Shunt and more.

## VRM Online Portal

Besides monitoring and controlling products locally on the CCGX itself, all readings are also forwarded to our free remote monitoring website: the VRM Online Portal. To get an impression, try the demo on <https://vrm.victronenergy.com>. See also the screenshots below.

## Remote Console on VRM

Monitor, control and configure the CCGX remotely, over the internet. Just like standing in front of the device, everything can also be done remotely. The same functionality is also available on the local network, Remote Console on LAN.

## Automatic genset start/stop

A highly customizable start/stop system. Use state of charge, voltage, load and other parameters. Define a special set of rules for quiet times, and optionally a monthly test run.

## The heart of ESS – Energy Storage System

The CCGX is the Energy Manager in an ESS system. More information in the ESS manual: <https://www.victronenergy.com/live/ess:design-installation-manual>

## Data logging

When connected to the internet, all data is sent to the VRM Portal. When there is no internet connection available, the CCGX will store the data internally, up to 48 hours. By inserting a micro SD-card or USB stick, more data can be stored. These files can then be uploaded to the VRM Portal, or offline converted with the VictronConnect app, for analysis.

## Supported products

- Multis and Quattros, including split-phase and three-phase systems. Monitoring and control (on/off and current limiter). Changing configuration is possible (only remotely via the internet, not without an internet connection).
- BlueSolar MPPT Solar Chargers with a VE.Direct port.
- BlueSolar MPPT 150/70 and the MPPT 150/85 with VE.Can port.
- SmartSolar MPPT 150/70 and the MPPT 150/100 with VE.Can port. When multiple BlueSolar MPPTs or SmartSolar MPPTs with VE.Can are used in parallel, all the information is combined as one. See also our blog-post about [synchronizing multiple MPPT 150/70 solar chargers](#).
- BMV-700 family can be connected directly to the VE.Direct ports on the CCGX. Use the VE.Direct Cable for this.
- BMV-600 family can be connected to the VE.Direct ports on the CCGX. Requires an accessory cable.
- Lynx Ion + Shunt
- Lynx Shunt VE.Can
- Skylla-i battery chargers
- NMEA2000 tank sensors
- A USB GPS can be connected to the USB port. Location and speed will be visible on the display, and the data is sent to the VRM Portal for tracking purposes. The map on VRM will show the latest position.
- Fronius PV Inverters

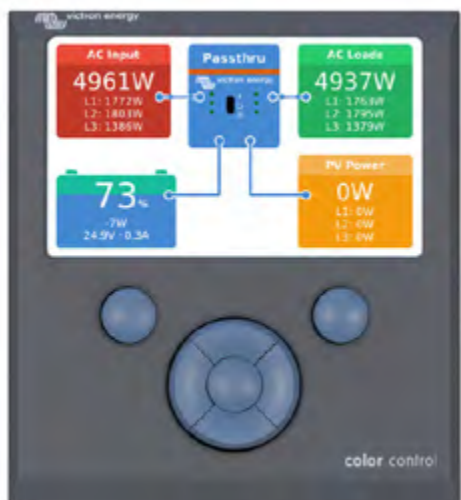
When more than two VE.Direct products must be connected, USB can be used.

## Internet connection

The CCGX can be connected to internet with an Ethernet cable and via wifi. To connect via wifi, a wifi USB accessory is required. The CCGX has no internal cellular modem: there is no slot for a sim-card. Use an off-the-shelf GPRS or 3G router instead. See the [blog post about 3G routers](#).

## Other highlights

- The CCGX can automatically update itself from the internet, when there is a new software version available.
- Multiple languages: English, Czech, German, Spanish, French, Italian, Dutch, Russian, Swedish, Turkish, Chinese, Arabic.
- Use the CCGX as a Modbus-TCP gateway to all connected Victron products. See our [Modbus-TCP FAQ](#) for more information.
- Powered by the Venus OS – embedded linux. <https://github.com/victronenergy/venus/wiki/sales-pitch>



Color Control GX			
Power supply voltage range	8 – 70V DC		
<b>Current draw</b>	12V DC	24V DC	48V DC
Display off	140mA	80mA	40mA
Display at minimum intensity	160mA	90mA	45mA
Display at maximum intensity	245mA	125mA	65mA
Potential free contact	3A / 30V DC / 250V AC (Normally open)		
Communication ports			
VE.Direct	2 separate VE.Direct ports – isolated		
VE.Can	2 paralleled RJ45 sockets – isolated		
VE.Bus	2 paralleled RJ45 sockets – isolated		
USB	2 USB Host ports – not isolated		
Ethernet	10/100/1000MB RJ45 socket – isolated except shield		
3rd party interfacing			
Modbus-TCP	Use Modbus-TCP to monitor and control all products connected to the Color Control GX		
JSON	Use the VRM JSON API to retrieve data from the <a href="#">VRM Portal</a>		
Other			
Outer dimensions (h x w x d)	130 x 120 x 28mm		
Operating temperature range	-20 to +50°C		
Standards			
Safety	EN 60950-1:2005+A1:2009+A2:2013		
EMC	EN 61000-6-3, EN 55014-1, EN 61000-6-2, EN 61000-6-1, EN 55014-2		
Automotive	E4-10R-053535		

## Overview - Multi with PV Inverter on output



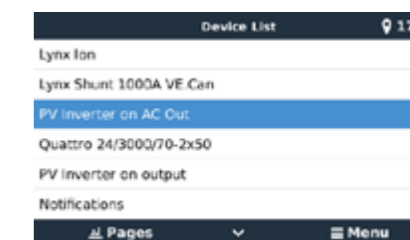
## Mobile & boat overview



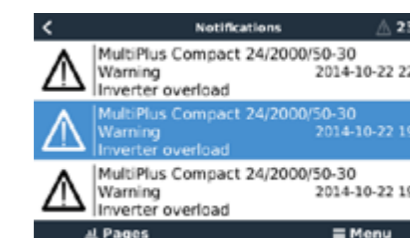
## Genset control page



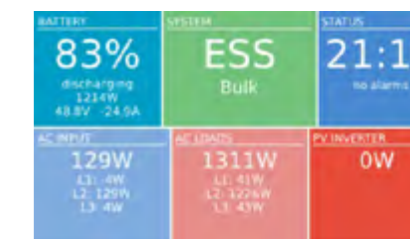
## Main menu



## Alarm notifications

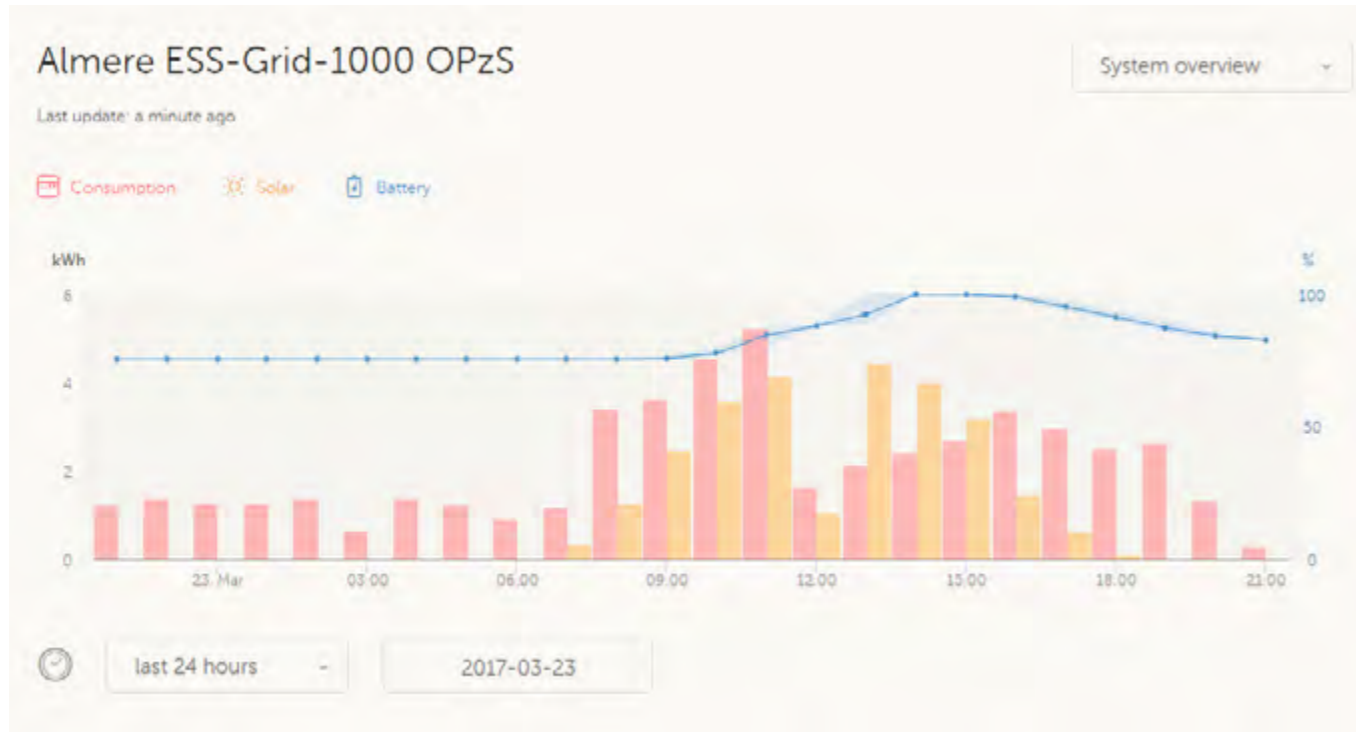


## Tiles overview



# COLOR CONTROL GX

VRM Portal - Dashboard



VRM Portal - Remote Console

Almere ESS-Grid-1000 OPzS

System overview

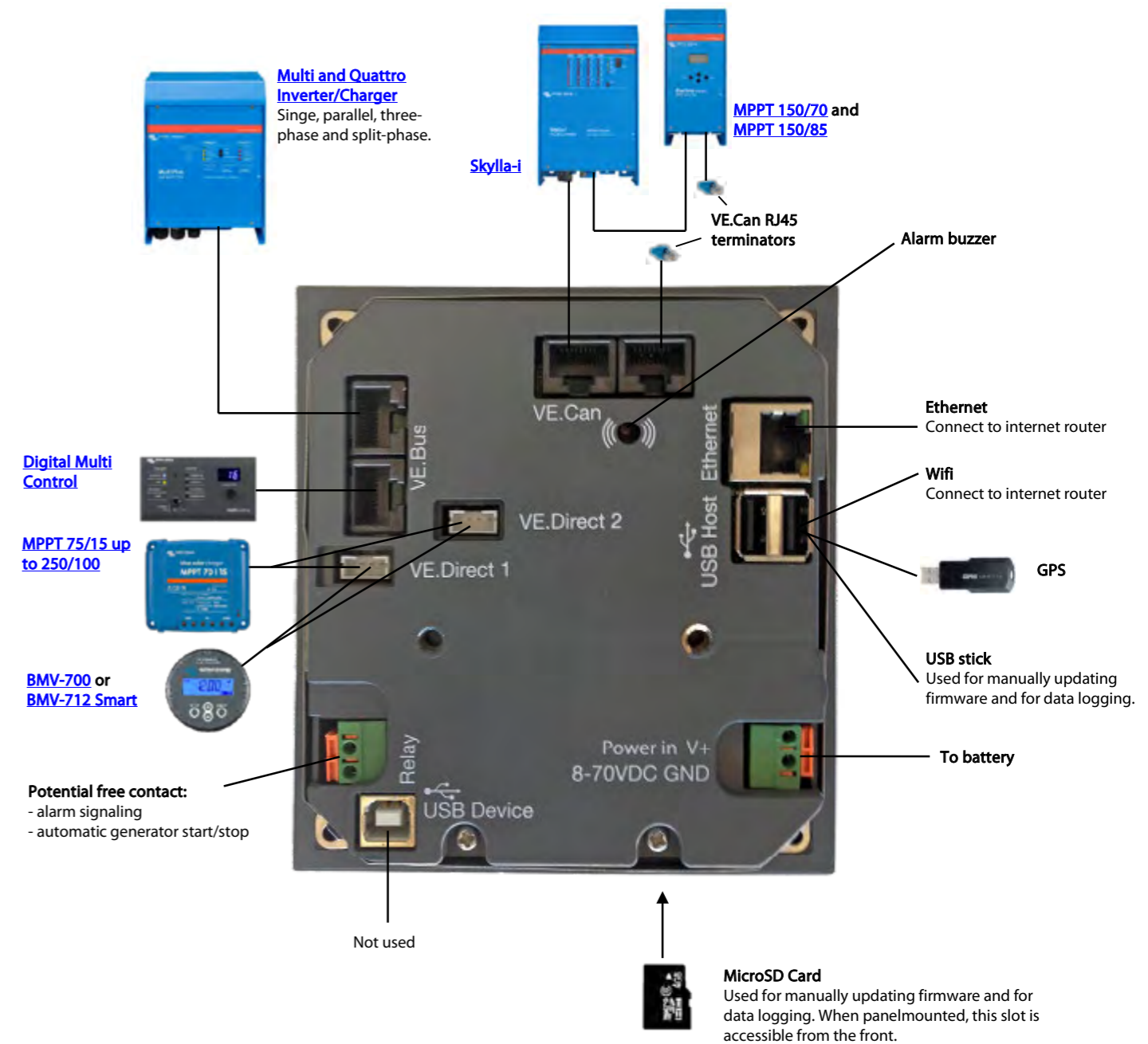
Device List 21:18

Fronius Symo 8.2-3-M	0W
Grid meter	216W
MultiPlus 48/5000/70-50	Bulk
PV Inverter on input 1	0W
Notifications	
Settings	

Pages Menu

Almere ESS-Grid-1000 OPzS Remote Console

Realtime data





## BMV-712 SMART



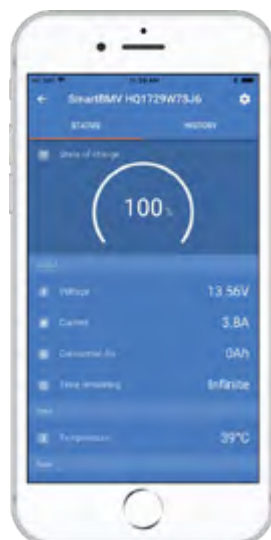
BMV-712 Smart



BMV bezel square



BMV shunt 500A/50mV  
With quick connect pcb



See the VictronConnect BMV app Discovery Sheet for more screenshots

### Bluetooth inside

With Bluetooth built-in, the BMV Smart is ready for the Internet of Things (IoT) era. With Bluetooth being implemented in most other Victron Energy products, wireless communication between products will simplify system installation and enhance performance.

### Download the Victron Bluetooth app

Use a smartphone or other Bluetooth enabled device to

- customize settings,
- monitor all important data on single screen,
- view historical data, and to
- update the software when new features become available.

### Easy to install

All electrical connections are to the quick connect PCB on the current shunt. The shunt connects to the monitor with a standard RJ12 telephone cable. Included: RJ12 cable (10 m) and battery cable with fuse (2 m); no other components needed.

Also included are a separate front bezel for a square or round display appearance, a securing ring for rear mounting and screws for front mounting.

### Midpoint voltage monitoring

One bad cell or one bad battery can destroy a large, expensive battery bank. When batteries are connected in series, a timely warning can be generated by measuring the midpoint voltage. Please see the BMV manual, section 5.2, for more information.

We recommend our **Battery Balancer** (BMS012201000) to maximize service life of series-connected lead-acid batteries.

### Very low current draw from the battery

Current consumption: 0.7 Ah per month (1 mA) @12 V and 0.6 Ah per month (0.8 mA) @ 24 V  
Especially Li-ion batteries have virtually no capacity left when discharged until low voltage shutdown. After shutdown due to low cell voltage, the capacity reserve of a Li-ion battery is approximately 1Ah per 100 Ah battery capacity. The battery will be damaged if the remaining capacity reserve is drawn from the battery. A residual current of 10 mA for example may damage a 200 Ah battery if the system is left in discharged state during more than 8 days.

### Bi-stable alarm relay

Prevents increased current draw in case of an alarm.

### Other features

- Battery voltage, current, power, ampere-hours consumed and state of charge
- Remaining time at the current rate of discharge
- Programmable visual and audible alarm
- Programmable relay, to turn off non critical loads or to run a generator when needed
- 500 Amp quick connect shunt and connection kit
- Shunt selection capability up to 10,000 Amps
- VE.Direct communication port
- Stores a wide range of historical events, which can be used to evaluate usage patterns and battery health
- Wide input voltage range: 6.5 – 70 V
- High current measurement resolution: 10 mA (0.01 A)
- Additional input to measure voltage (of a second battery), temperature or midpoint voltage, and corresponding alarm and relay settings

Battery Monitor	BMV-712 Smart
Supply voltage range	6.5 - 70 VDC
Current draw, back light off	< 1 mA
Input voltage range, auxiliary battery	6.5 - 70 VDC
Battery capacity (Ah)	1 - 9999 Ah
Operating temperature range	-40 +50 °C (-40 - 120 °F)
Measures voltage of second battery, or temperature, or midpoint	Yes
Temperature measurement range	-20 +50 °C
VE.Direct communication port	Yes
Bistable relay	60V / 1A normally open (function can be inverted)

RESOLUTION & ACCURACY (with a 500 A shunt)	
Current	± 0.01 A
Voltage	± 0.01 V
Amp hours	± 0.1 Ah
State of charge (0 - 100%)	± 0.1 %
Time to go	± 1 min
Temperature (0 - 50°C or 30 - 120°F)	± 1 °C/°F
Accuracy of current measurement	± 0.4 %
Accuracy of voltage measurement	± 0.3 %

INSTALLATION & DIMENSIONS	
Installation	Flush mount
Front	63mm diameter
Front bezel	69 x 69mm (2.7 x 2.7 inch)
Shunt connections bolts	M10 (0.3937 inch)
Body diameter and depth	52 mm (2.0 inch) and 31 mm (1.2 inch)
Protection category	IP55 (not intended for outdoor use)

STANDARDS	
Safety	EN 60335-1
Emission / Immunity	EN 55014-1 / EN 55014-2
Automotive	ECE R10-4 / EN 50498

ACCESSORIES	
Shunt (included)	500 A / 50 mV
Cables (included)	10 meter 6 core UTP with RJ12 connectors, and cable with 1Amp slow blow fuse for '+' connection
Temperature sensor	Optional (ASS000100000)

STORED TRENDS	
Data stored	Battery voltage, Current, State of Charge % as well as the Aux input (Battery temperature, or midpoint deviation, or starter battery voltage).
Number of days trends data is stored	46



**Color Control**  
The powerful Linux computer, hidden behind the colour display and buttons, collects data from all Victron equipment and shows it on the display. Besides communicating with Victron equipment, the Color Control communicates through CAN bus (NMEA 2000), Ethernet and USB. Data can be stored and analysed on the VRM Portal.



A maximum of four BMVs can be connected directly to a Color Control GX. Even more BMVs can be connected to a USB Hub for central monitoring.



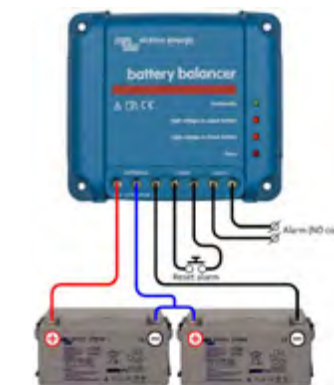
**1000A/50 mV, 2000 A/50 mV and 6000 A/50 mV shunt**  
The quick connect PCB on the standard 500 A/50 mV shunt can also be mounted on these shunts.



**Interface cables**  
- VE.Direct cables to connect a BMV 712 to the Color Control (ASS030530xxx)  
- VE.Direct to USB interface (ASS030530000) to connect several BMV 70x to a Color Control GX or to a computer.



Temperature sensor



**Battery Balancer (BMS012201000)**  
The Battery Balancer equalizes the state of charge of two series connected 12V batteries, or of several parallel strings of series connected batteries. When the charge voltage of a 24 V battery system increases to more than 27 V, the Battery Balancer will turn on and compare the voltage over the two series connected batteries. The Battery Balancer will draw a current of up to 1A from the battery (or parallel connected batteries) with the highest voltage. The resulting charge current differential will ensure that all batteries will converge to the same state of charge.

If needed, several balancers can be paralleled.

A 48 V battery bank can be balanced with three Battery Balancers.



**Venus GX**  
The Venus GX provides intuitive control and monitoring. It has the same functionality as the Color Control GX, with a few extras:  
- lower cost, mainly because it has no display or buttons  
- 3 tank sender inputs  
- 2 temperature inputs



# SMARTSHUNT 500A / 1000A / 2000A

The SmartShunt is an all in one battery monitor, only without a display. Your phone acts as the display.

The SmartShunt connects via Bluetooth to the VictronConnect App on your phone (or tablet) and you can conveniently read out all monitored battery parameters, like state of charge, time to go, historical information and much more.

Alternatively, the SmartShunt can be connected and be read by a GX device. Connection to the SmartShunt is made via a VE.Direct cable.

The SmartShunt is a good alternative for a BMV battery monitor, especially for systems where battery monitoring is needed but less wiring and clutter is wanted.

The SmartShunt is equipped with Bluetooth, a VE.Direct port and a connection that can be used to monitor a second battery, for midpoint monitoring, or to connect a temperature sensor.

### Differences compared to BMV-712 Battery Monitor

- No programmable visual and audible alarm.
- No programmable relay.



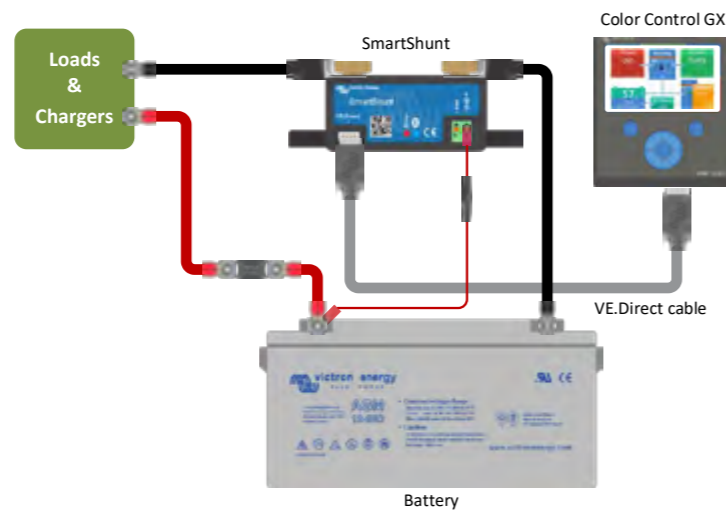
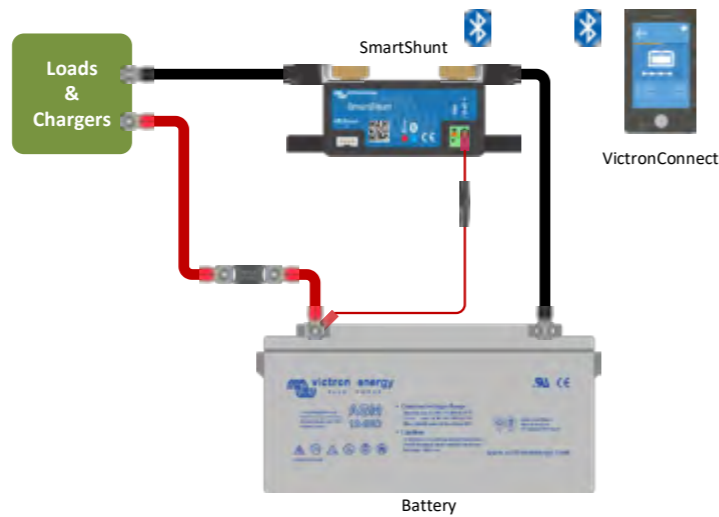
SmartShunt 500 A



SmartShunt 1000 A



SmartShunt 2000 A



SmartShunt	500A / 1000A / 2000A
Supply voltage range	6.5 - 70 VDC
Current draw	< 1 mA
Input voltage range, auxiliary battery	6.5 - 70 VDC
Battery capacity (Ah)	1 - 9999 Ah
Operating temperature range	-40 +50°C (-40 - 120°F)
Measures voltage of second battery, or temperature, or midpoint	Yes
Temperature measurement range	-20 +50°C
VE.Direct communication port	Yes

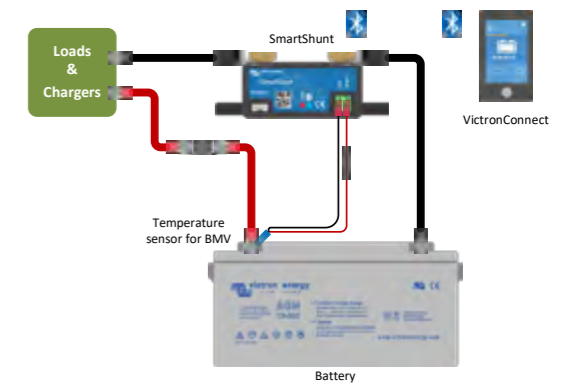
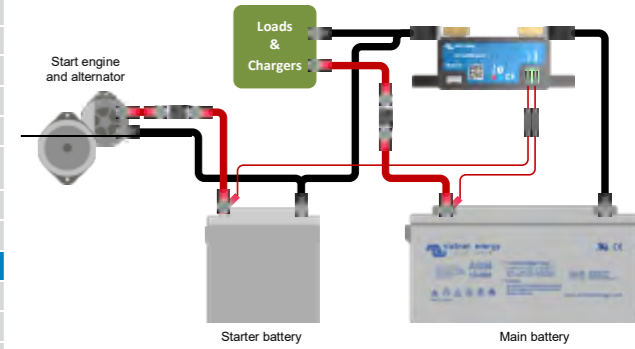
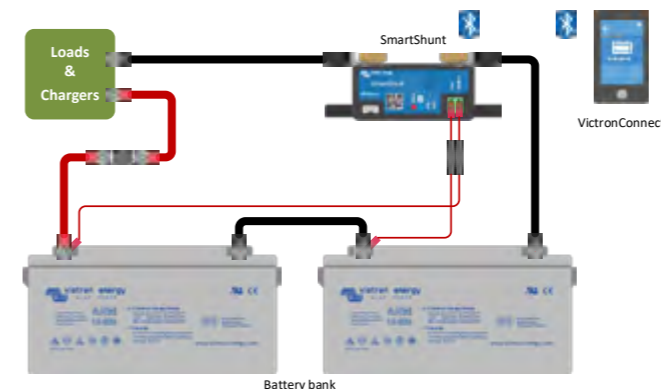
RESOLUTION & ACCURACY	
Current	± 0.01 A
Voltage	± 0.01 V
Amp hours	± 0.1 Ah
State of charge (0 - 100 %)	± 0.1 %
Time to go	± 1 min
Temperature (if optional temperature sensor connected)	± 1 °C/°F (0 - 50 °C or 30 - 120 °F)
Accuracy of current measurement	± 0.4 %
Offset	Less than 20 / 40 / 80 mA
Accuracy of voltage measurement	± 0.3 %

INSTALLATION & DIMENSIONS	
Dimensions (h x w x d)	500 A: 46 x 120 x 54 mm 1000 A: 68 x 168 x 75 mm 2000 A: 68 x 168 x 100 mm
Shunt connection bolts	M10 (0.3937 inch)
Protection category	IP21

STANDARDS	
Safety	EN 60335-1
Emission / Immunity	EN-IEC 61000-6-1 EN-IEC 61000-6-2 EN-IEC 61000-6-3
Automotive	EN 50498

ACCESSORIES	
Cables (included)	Two cables with 1 A fuse, for '+' connection and starter battery or midpoint connection
Temperature sensor	Optional (ASS000100000)
A note regarding the range of the Bluetooth signal	The shunt and the electric cables do negatively influence the range of the Bluetooth signal. The resulting range of 10-15 meter is however satisfactory in most cases. The proximity of other electrically conducting elements, such as the metal chassis of a vehicle or seawater around the hull if a boat, may reduce the range of the Bluetooth signal to an unacceptable level. The solution in such a case is to add a VE.Direct Bluetooth Dongle (ASS030536011) to the system, and to switch off Bluetooth in the SmartShunt.

STORED TRENDS	
Data stored	Battery voltage, Current, State of Charge % as well as the Aux input (Battery temperature, or midpoint deviation, or starter battery voltage).
Number of days trends data is stored	46



# SMARTSHUNT IP65 500A / 1000A / 2000A

The SmartShunt IP65 is an all-in-one battery monitor, only without a display. Your phone acts as the display.

The SmartShunt IP65 is water resistant and is available in a 500 A, 1000 A or 2000 A version.

The SmartShunt IP65 connects via Bluetooth to the VictronConnect app on your phone (or tablet) and you can conveniently read out all monitored battery parameters, like state of charge, time to go, historical information and much more.

Alternatively, the SmartShunt IP65 can be connected and be read by a GX device. Connection to the SmartShunt is made via a VE.Direct cable.

The SmartShunt is a good alternative for a BMV battery monitor, especially for systems where battery monitoring is needed but less wiring and clutter is wanted.

The SmartShunt is equipped with Bluetooth, has a VE.Direct port and an auxiliary connection that can be used to monitor a second battery, for midpoint monitoring, or to connect a temperature sensor.

### Differences compared to BMV-712 Battery Monitor

- No visual and audible alarm (alarms are only visible via the VictronConnect app or GX device).
- No programmable relay.
- Waterproof.
- The shunt is attached to the battery monitor unit.



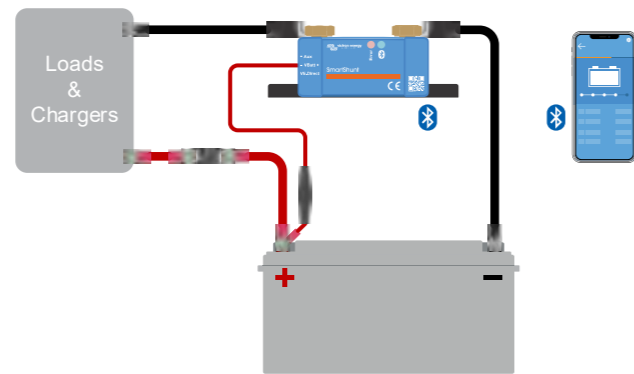
SmartShunt IP65 500 A



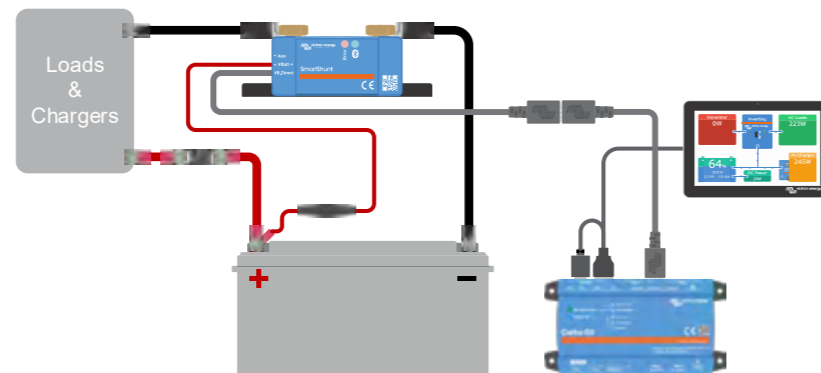
SmartShunt IP65 1000 A



SmartShunt IP65 2000 A



Basic SmartShunt wiring



Connecting a SmartShunt to a GX device

SmartShunt IP65	500 A / 1000 A / 2000 A
Supply voltage range	6.5 - 70 VDC
Current draw	< 1 mA
Input voltage range, auxiliary battery	6.5 - 70 VDC
Battery capacity (Ah)	1 - 9999 Ah
Operating temperature range	-40 +50 °C (-40 - 120 °F)
Measures voltage of second battery, or temperature, or midpoint	Yes
Temperature measurement range	-20 +50 °C
VE.Direct communication port	Yes

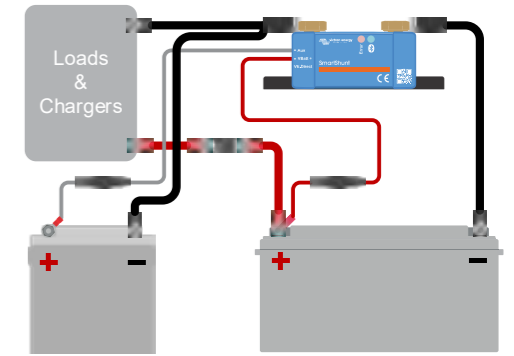
RESOLUTION & ACCURACY	
Current	± 0.01 A
Voltage	± 0.01 V
Amp hours	± 0.1 Ah
State of charge (0 - 100 %)	± 0.1 %
Time to go	± 1 min
Temperature (if optional temperature sensor connected)	± 1 °C/°F (0 - 50 °C or 30 - 120 °F)
Accuracy of current measurement	± 0.4 %
Offset	Less than 20 / 40 / 80 mA
Accuracy of voltage measurement	± 0.3 %

INSTALLATION & DIMENSIONS	
Dimensions (h x w x d)	500A: 46 x 120 x 54 mm 1000A: 68 x 168 x 75 mm 2000A: 68 x 168 x 100 mm
Shunt connection bolts	M10 (0.3937 inch)
Protection category	IP65

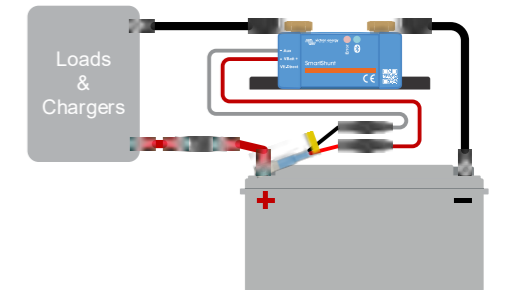
STANDARDS	
Safety	EN 60335-1
Emission / Immunity	EN-IEC 61000-6-1 EN-IEC 61000-6-2 EN-IEC 61000-6-3
Automotive	EN 50498

Cables	Two 1.5 m cables with 1 A fuse, for '+' connection and starter battery or midpoint connection
VE.Direct cable	1.5 m cable with a VE.Direct socket. Note that a (not included) VE.Direct cable is needed to connect a GX device.
Temperature sensor	Optional (ASS000100000)
A note regarding the range of the Bluetooth signal	The shunt and the electric cables do negatively influence the range of the Bluetooth signal. The resulting range of 10-15 meter is however satisfactory in most cases. The proximity of other electrically conducting elements, such as the metal chassis of a vehicle or seawater around the hull if a boat, may reduce the range of the Bluetooth signal to an unacceptable level. The solution in such a case is to add a VE.Direct Bluetooth Dongle (ASS030536011) to the system, and to switch off Bluetooth in the SmartShunt.

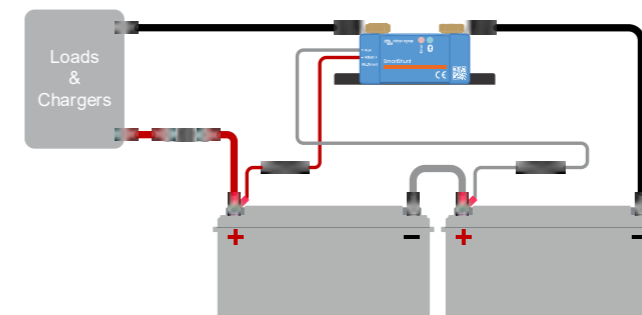
STORED TRENDS	
Data stored	Battery voltage, Current, State of Charge % as well as the Aux input (Battery temperature, or midpoint deviation, or starter battery voltage).
Number of days trends data is stored	46



Measuring voltage of the starter battery



Measuring battery temperature



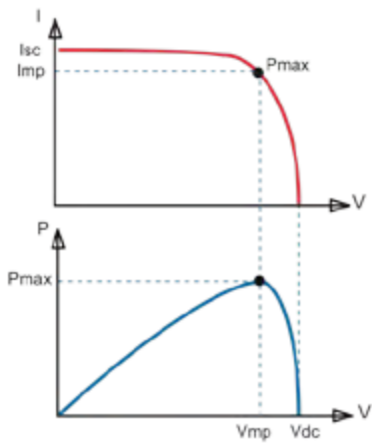
Measuring battery bank midpoint



Stored trends for SmartShunt



# BLUESOLAR & SMARTSOLAR MPPT CHARGE CONTROLLERS - OVERVIEW



## Maximum Power Point Tracking (MPPT)

### Upper curve:

Output current (I) of a solar panel as function of output voltage (V). The Maximum Power Point (MPP) is the point Pmax along the curve where the product I x V reaches its peak.

### Lower curve:

Output power  $P = I \times V$  as function of output voltage. When using a PWM (not MPPT) controller the output voltage of the solar panel will be nearly equal to the voltage of the battery, and will be lower than Vmp.



MPPT Control



SmartSolar Control



VictronConnect Application

## Feature highlights common to all models

- Ultra-fast Maximum Power Point Tracking (MPPT).
- Advanced Maximum Power Point Detection in case of partial shading conditions.
- Outstanding conversion efficiency.
- Natural convection cooling.
- Automatic battery voltage recognition.
- Flexible charge algorithm.
- Over temperature protection and power derating when temperature is high.

## Sizing options:

- Suitable for a variety of battery voltages. Most models connect to 12, 24, and 48V batteries, some only connect to 12 and 24V batteries, or only to 48V batteries.
- Charge currents rating from 10A all the way up to 100A.
- Maximum PV array Voc voltages ranging from 75V up to 250V.
- Multiple chargers can be used in parallel, for large systems we recommend to use the models with a VE.Can communication port.

## PV terminal options:

- TR - one positive and one negative screw terminal.
- MC4 - 3 pairs of paralleled MC4 connectors.

## Bluetooth options:

- SmartSolar models have Bluetooth.
- BlueSolar models do not have Bluetooth. They can be retrofitted to have Bluetooth by connecting the VE.Direct Bluetooth Smart dongle. Advantage: the product is not Bluetooth accessible when the dongle is not connected. Note that on the SmartSolar models, Bluetooth can be disabled.

## Display options:

- VictronConnect Application. Connects via Bluetooth or via the VE.Direct - USB interface
- MPPT Control. Connects to all models via a VE.Direct cable
- SmartSolar Control Display. Plugs directly into the housing of the larger models
- GX device
- VRM website (GX monitoring device needed)

## Communication ports:

- VE.Direct - all models
- VE.Direct and VE.Can - limited models. VE.Can is especially suitable for systems with multiple solar chargers. All units are simply "daisy chained" to each other with a single RJ45 cable between each unit and also between the last unit in the chain and the a GX monitoring device.

## Temperature sensor options:

- Internally (all models).
- Externally via the Smart Battery Sense (only SmartSolar models).

## Load output options:

- Physical output - On the 10, 15 and 20A models.
- Virtual output - via VE.Direct TX digital output cable and the BatteryProtect or a solid-state relay.

## Remotely enabling and disabling the charger:

- All larger units feature the Victron standard remote on/off terminals. All models that don't feature an onboard Remote on/off terminal can be remotely controlled by using the [VE.Direct non inverting remote on/off cable - ASS030550310](#). Note that this prohibits using the VE.Direct port for anything else.

## Firmware update options:

- Local updates via the VictronConnect Application (via Bluetooth or USB-VE.Direct interface)
- Remote updates via VRM website and a GX device

## Optional accessories:

- VictronConnect Application (free download)
- Wire boxes, to cover and protect the terminals. See table on page 2 for wire box types
- Control and display panels: MPPT control or SmartSolar control)
- GX monitoring device (CCGX, Venus GX, Octo GX or Cerbo GX)
- Data cables: VE.Direct cable, RJ45 Cable (VE.Can models only), USB-VE.Direct interface
- External control cables: TX cable, non-inverting cable
- Bluetooth dongle (for non-smart models)

## More information:

- To access the above-mentioned documents or information: press the search button on our website and enter the appropriate search word.
- For connection to a Color Control GX or other GX device see: <https://www.victronenergy.com/live/venus-os:start>.

BlueSolar Charge Controller	Load output	Battery voltage	Optional display	Bluetooth	Com. port	Remote on-off	Programmable relay	Wire Box
75/10	15A	12/24V	MPPT control	Optional dongle	VE.Direct	No	No	S 75-10/15
75/15	15A	12/24V	MPPT control	Optional dongle	VE.Direct	No	No	S 75-10/15
100/15	15A	12/24V	MPPT control	Optional dongle	VE.Direct	No	No	S 100-15
100/20 (up to 48V)	20A/20A/1A	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	S 100-20
100/30	No	12/24V	MPPT control	Optional dongle	VE.Direct	No	No	M
100/50	No	12/24V	MPPT control	Optional dongle	VE.Direct	No	No	M
150/35	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	M
150/45	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	M
150/60-Tr	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	L
150/60-MC4	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	L
150/70-Tr	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	L
150/70-MC4	No	12/24/36/48V	MPPT control	Optional dongle	VE.Direct	No	No	L
150/100-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Optional dongle	VE.Direct & VE.Can	Yes	Yes	XL
250/70-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Optional dongle	VE.Direct & VE.Can	Yes	Yes	L
250/100-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Optional dongle	VE.Direct & VE.Can	Yes	Yes	XL

SmartSolar Charge Controller	Load output	Battery voltage	Optional display	Bluetooth	Com. port	Remote on-off	Programmable relay	Wire Box
75/10	15A	12/24V	MPPT control	Built-in	VE.Direct	No	No	S 75-10/15
75/15	15A	12/24V	MPPT control	Built-in	VE.Direct	No	No	S 75-10/15
100/15	15A	12/24V	MPPT control	Built-in	VE.Direct	No	No	S 100-15
100/20 (up to 48V)	20A/20A/1A	12/24/36/48V	MPPT control	Built-in	VE.Direct	No	No	S 100-20
100/30	No	12/24V	MPPT control	Built-in	VE.Direct	No	No	M
100/50	No	12/24V	MPPT control	Built-in	VE.Direct	No	No	M
150/35	No	12/24/36/48V	MPPT control	Built-in	VE.Direct	No	No	M
150/45	No	12/24/36/48V	MPPT control	Built-in	VE.Direct	No	No	M
150/60-Tr	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
150/60-MC4	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
150/70-Tr	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
150/70-MC4	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
150/70-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	L
150/70-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	L
150/85-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
150/85-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
150/100-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
150/100-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
250/60-Tr	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
250/60-MC4	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
250/70-Tr	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
250/70-MC4	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct	Yes	Yes	L
250/70-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	L
250/70-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	L
250/85-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
250/85-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
250/100-Tr VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL
250/100-MC4 VE.Can	No	12/24/36/48V	MPPT ctrl & SmartSolar ctrl	Built-in	VE.Direct & VE.Can	Yes	Yes	XL



Color Control GX



Venus GX



Cerbo GX



Smart Battery Sense



VE.Direct Bluetooth Smart Dongle



VE.Direct to USB interface



# SMARTSOLAR CHARGE CONTROLLER MPPT 75/10, 75/15, 100/15 & 100/20-48V



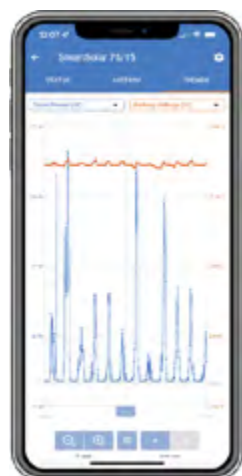
SmartSolar Charge Controller MPPT 75/15



Bluetooth sensing Smart Battery Sense



Bluetooth sensing BMV-712 Smart Battery Monitor



Stored trends

## Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

**VE.Direct** - For a wired data connection to a Color Control GX, other GX products, PC or other devices

## Ultra-fast Maximum Power Point Tracking (MPPT)

Especially in case of a cloudy sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30 % compared to PWM charge controllers and by up to 10 % compared to slower MPPT controllers.

## Load output

Over-discharge of the battery can be prevented by connecting all loads to the load output. The load output will disconnect the load when the battery has been discharged to a pre-set voltage (48 V model: interface with a relay). Alternatively, an intelligent battery management algorithm can be chosen: see Battery Life. The load output is short circuit proof.

## Battery Life: intelligent battery management

When a solar charge controller is not able to recharge the battery to its full capacity within one day, the result is often that the battery will continually be cycled between a 'partially charged' state and the 'end of discharge' state. This mode of operation (no regular full recharge) will destroy a lead-acid battery within weeks or months.

The Battery Life algorithm will monitor the state of charge of the battery and, if needed, day by day slightly increase the load disconnect level (i.e. disconnect the load earlier) until the harvested solar energy is sufficient to recharge the battery to nearly the full 100 %. From that point onwards, the load disconnect level will be modulated so that a nearly 100 % recharge is achieved about once every week.

**Programmable battery charge algorithm** - See the software section on our website for details

**Day/night timing and light dimming option** - See the software section on our website for details

**Internal temperature sensor** - Compensates absorption and float charge voltage for temperature.

## Optional external battery voltage and temperature sensing via Bluetooth

A Smart Battery Sense or a BMV-712 Smart Battery Monitor can be used to communicate battery voltage and temperature to one or more SmartSolar Charge Controllers.

## Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts. Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

SmartSolar Charge Controller	MPPT 75/10	MPPT 75/15	MPPT 100/15	MPPT 100/20-48V
Battery voltage (auto select)		12/24 V		12/24/48 V
Rated charge current	10 A	15 A	15 A	20 A
Nominal PV power, 12 V 1a,b)	145 W	220 W	220 W	290 W
Nominal PV power, 24 V 1a,b)	290 W	440 W	440 W	580 W
Nominal PV power, 48 V 1a,b)	n.a.	n.a.	n.a.	1160 W
Max. PV short circuit current 2)	13 A	15 A	15 A	20 A
Automatic load disconnect	Yes			
Max. PV open circuit voltage	75 V		100 V	
Peak efficiency	98 %			
Self-consumption – load on	12 V: 19 mA	24 V: 16 mA	26 / 20 / 19 mA	
Self-consumption – load off	12 V: 10 mA	24 V: 8 mA	10 / 8 / 7 mA	
Charge voltage 'absorption'	14,4 V / 28,8 V (adjustable)		14,4 V / 28,8 V / 57,6 V (adj.)	
Charge voltage 'float'	13,8 V / 27,6 V (adjustable)		13,8 V / 27,6 V / 55,2 V (adj.)	
Charge algorithm	multi-stage adaptive			
Temperature compensation	-16 mV / °C resp. -32 mV / °C			
Max. continuous load current	15 A			20 A / 20 A / 1 A
Low voltage load disconnect	11,1 V / 22,2 V / 44,4 V or 11,8 V / 23,6 V / 47,2 V or Battery Life algorithm			
Low voltage load reconnect	13,1 V / 26,2 V / 52,4 V or 14 V / 28 V / 56 V or Battery Life algorithm			
Protection	Output short circuit / Over temperature			
Operating temperature	-30 to +60 °C (full rated output up to 40 °C)			
Humidity	95 %, non-condensing			
Data communication port	VE.Direct (see the data communication white paper on our website)			

ENCLOSURE	
Colour	Blue (RAL 5012)
Power terminals	6 mm <sup>2</sup> / AWG10
Protection category	IP43 (electronic components), IP22 (connection area)
Weight	0,5 kg
Dimensions (h x w x d)	100 x 113 x 40 mm

STANDARDS	
Safety	EN/IEC 62109-1, UL 1741, CSA C22.2

STORED TRENDS	
Data stored	Battery voltage, current and temperature, as well as load output current, PV voltage and PV current.
Number of days trends data is stored	46

1a) If more PV power is connected, the controller will limit input power.  
 1b) The PV voltage must exceed Vbat + 5 V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1 V  
 2) A PV array with a higher short circuit current may damage the controller.

# SMARTSOLAR CHARGE CONTROLLER MPPT 100/30 & 100/50



SmartSolar Charge Controller MPPT 100/50



Bluetooth sensing Smart Battery Sense



Bluetooth sensing BMV-712 Smart Battery Monitor



## Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

## VE.Direct

For a wired data connection to a Color Control GX, other GX products, PC or other devices

## Ultrafast Maximum Power Point Tracking (MPPT)

Especially in case of a cloudy sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30 % compared to PWM charge controllers and by up to 10 % compared to slower MPPT controllers.

## Advanced Maximum Power Point Detection in case of partial shading conditions

If partial shading occurs, two or more maximum power points may be present on the power-voltage curve. Conventional MPPTs tend to lock to a local MPP, which may not be the optimum MPP. The innovative BlueSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

## Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 98 %. The full output current up to 40 °C (104 °F).

## Flexible charge algorithm

Fully programmable charge algorithm (see the software page on our website), and eight pre-programmed algorithms, selectable with a rotary switch (see manual for details).

## Extensive electronic protection

Over-temperature protection and power derating when temperature is high. PV short circuit and PV reverse polarity protection. PV reverse current protection.

## Internal temperature sensor

Compensates absorption and float charge voltage for temperature.

## Optional external battery voltage and temperature sensing via Bluetooth

A Smart Battery Sense or a BMV-712 Smart Battery Monitor can be used to communicate battery voltage and temperature to one or more SmartSolar Charge Controllers.

## Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts. Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

SmartSolar Charge Controller	MPPT 100/30	MPPT 100/50
Battery voltage	12/24 V Auto Select	
Rated charge current	30 A	50 A
Nominal PV power, 12 V 1a,b)	440 W	700 W
Nominal PV power, 24 V 1a,b)	880 W	1400 W
Maximum PV open circuit voltage	100 V	100 V
Max. PV short circuit current 2)	35 A	60 A
Maximum efficiency	98 %	98 %
Self-consumption	12 V: 30 mA	24 V: 20 mA
Charge voltage 'absorption'	Default setting: 14,4 V / 28,8 V (adjustable)	
Charge voltage 'float'	Default setting: 13,8 V / 27,6 V (adjustable)	
Charge algorithm	multi-stage adaptive	
Temperature compensation	-16 mV / °C resp. -32 mV / °C	
Protection	PV reverse polarity Output short circuit Over temperature	
Operating temperature	-30 to +60 °C (full rated output up to 40 °C)	
Humidity	95 %, non-condensing	
Data communication port	VE.Direct	
See the data communication white paper on our website		
ENCLOSURE		
Colour	Blue (RAL 5012)	
Power terminals	16 mm <sup>2</sup> / AWG6	
Protection category	IP43 (electronic components), IP22 (connection area)	
Weight	1,3 kg	
Dimensions (h x w x d)	130 x 186 x 70 mm	
STANDARDS		
Safety	EN/IEC 62109-1, UL 1741, CSA C22.2	
STORED TRENDS		
Data stored	Battery voltage, current and temperature, as well as load output current, PV voltage and PV current.	
Number of days trends data is stored	46	

1a) If more PV power is connected, the controller will limit input power.  
 1b) The PV voltage must exceed Vbat + 5 V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1 V.  
 2) A PV array with a higher short circuit current may damage the controller.



# SMARTSOLAR CHARGE CONTROLLER MPPT 150/35 & 150/45



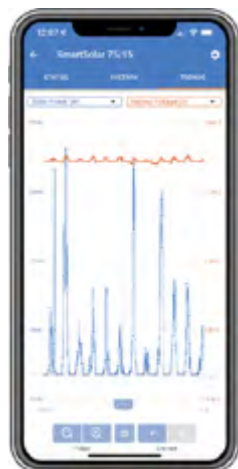
SmartSolar Charge Controller MPPT 150/35



Bluetooth sensing Smart Battery Sense



Bluetooth sensing BMV-712 Smart Battery Monitor



### Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

### VE.Direct

For a wired data connection to a Color Control GX, other GX products, PC or other devices

### Ultrafast Maximum Power Point Tracking (MPPT)

Especially in case of a clouded sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30 % compared to PWM charge controllers and by up to 10 % compared to slower MPPT controllers.

### Advanced Maximum Power Point Detection in case of partial shading conditions

If partial shading occurs, two or more maximum power points may be present on the power-voltage curve. Conventional MPPTs tend to lock to a local MPP, which may not be the optimum MPP. The innovative BlueSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

### Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 98 %. Full output current up to 40 °C (104 °F).

### Flexible charge algorithm

Fully programmable charge algorithm (see the software page on our website), and eight preprogrammed algorithms, selectable with a rotary switch (see manual for details).

### Extensive electronic protection

- Over-temperature protection and power derating when temperature is high.
- PV short circuit and PV reverse polarity protection.
- PV reverse current protection.

### Internal temperature sensor

Compensates absorption and float charge voltage for temperature.

### Optional external battery voltage and temperature sensing via Bluetooth

A Smart Battery Sense or a BMV-712 Smart Battery Monitor can be used to communicate battery voltage and temperature to one or more SmartSolar Charge Controllers.

### Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts. Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

SmartSolar Charge Controller	MPPT 150/35	MPPT 150/45
Battery voltage	12 / 24 / 48 V Auto Select (software tool needed to select 36 V)	
Rated charge current	35 A	45 A
Nominal PV power 1a, b)	35 A 12 V: 500 W / 24 V: 1000 W / 36 V: 1500 W / 48 V: 2000 W 45 A 12 V: 650 W / 24 V: 1300 W / 36 V: 1950 W / 48 V: 2600 W	
Max. PV short circuit current 2)	40 A	50 A
Maximum PV open circuit voltage	150 V absolute maximum coldest conditions 145 V start-up and operating maximum	
Maximum efficiency	98 %	
Self-consumption	12 V: 20 mA 24 V: 15 mA 48 V: 10 mA	
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6 V (adjustable)	
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2 V (adjustable)	
Charge algorithm	multi-stage adaptive (eight pre-programmed algorithms)	
Temperature compensation	-16 mV / -32 mV / -64 mV / °C	
Protection	PV reverse polarity / output short circuit / over-temperature	
Operating temperature	-30 to +60°C (full rated output up to 40°C)	
Humidity	95 %, non-condensing	
Data communication port	VE.Direct	

### ENCLOSURE

Colour	Blue (RAL 5012)
Power terminals	16 mm <sup>2</sup> / AWG6
Protection category	IP43 (electronic components), IP22 (connection area)
Weight	1,25 kg
Dimensions (h x w x d)	130 x 186 x 70 mm

### STANDARDS

Safety	EN/IEC 62109-1, UL 1741, CSA C22.2
--------	------------------------------------

### STORED TRENDS

Data stored	Battery voltage, current and temperature, as well as load output current, PV voltage and PV current.
Number of days trends data is stored	46

1a) If more PV power is connected, the controller will limit input power.

1b) The PV voltage must exceed Vbat + 5 V for the controller to start.

Thereafter the minimum PV voltage is Vbat + 1 V.

2) A PV array with a higher short circuit current may damage the controller.



# SMARTSOLAR CHARGE CONTROLLER MPPT 150/60 & 150/70



SmartSolar Charge Controller  
MPPT 150/70-Tr  
without optional display



SmartSolar Charge Controller  
MPPT 150/70-Tr  
without optional display



Bluetooth sensing:  
Smart Battery Sense



Bluetooth sensing:  
BMV-712 Smart Battery Monitor



Bluetooth sensing: SmartShunt

## Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

## Ultra-fast Maximum Power Point Tracking (MPPT)

Especially in case of a clouded sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30 % compared to PWM charge controllers and by up to 10 % compared to slower MPPT controllers.

## Advanced Maximum Power Point Detection in case of partial shading conditions

If partial shading occurs, two or more maximum power points (MPP) may be present on the power-voltage curve.

Conventional MPPTs tend to lock to a local MPP, which may not be the optimum MPP.

The innovative SmartSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

## Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 98 %.

## Flexible charge algorithm

Fully programmable charge algorithm (see the software page on our website), and eight pre-programmed algorithms, selectable with a rotary switch (see manual for details).

## Extensive electronic protection

Over-temperature protection and power derating when temperature is high.

PV short circuit and PV reverse polarity protection.

PV reverse current protection.

## Internal temperature sensor

Compensates absorption and float charge voltage for temperature.

## Optional external battery voltage, temperature and current sensing via Bluetooth

A Smart Battery Sense, a BMV-712 Smart Battery Monitor or a SmartShunt can be used to communicate battery voltage and temperature (and current, in case of a BMV-712 or a SmartShunt) to one or more SmartSolar Charge Controllers.

## Synchronized parallel charging with Bluetooth

Up to 10 units can be synchronized with Bluetooth.

## Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts.

Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

## VE.Direct

For a wired data connection to a Color Control GX, other GX products, PC or other devices

## Remote on-off

To connect for example to a VE.BUS BMS.

## Programmable relay

Can be programmed to trip on an alarm, or other events.

## Optional: SmartSolar pluggable LCD display

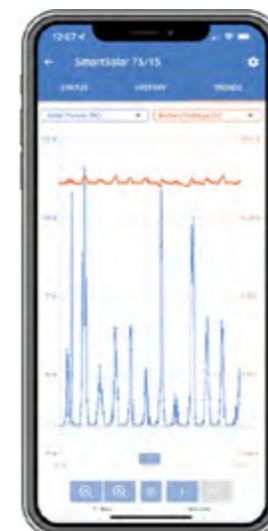
Simply remove the rubber seal that protects the plug on the front of the controller, and plug-in the display.



SmartSolar pluggable display



SmartSolar Charge Controller	150/60	150/70
Battery voltage	12 / 24 / 48 V Auto Select (software tool needed to select 36 V)	
Rated charge current	60 A	70 A
Nominal PV power, 12 V 1a,b)	860 W	1000 W
Nominal PV power, 24 V 1a,b)	1720 W	2000 W
Nominal PV power, 36 V 1a,b)	2580 W	3000 W
Nominal PV power, 48 V 1a,b)	3440 W	4000 W
Max. PV short circuit current 2)	50 A (max 30 A per MC4 conn.)	
Maximum PV open circuit voltage	150 V absolute maximum coldest conditions 145 V start-up and operating maximum	
Maximum efficiency	98 %	
Self-consumption	Less than 35mA @ 12 V / 20mA @ 48 V	
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6 V (adjustable with: rotary switch, display, VE.Direct or Bluetooth)	
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2 V (adjustable: rotary switch, display, VE.Direct or Bluetooth)	
Charge voltage 'equalization'	Default setting: 16,2 V / 32,4 V / 48,6 V / 64,8 V (adjustable)	
Charge algorithm	multi-stage adaptive (eight pre-programmed algorithms) or user defined algorithm	
Temperature compensation	-16 mV / -32 mV / -64 mV / °C	
Protection	PV reverse polarity / Output short circuit / Over temperature	
Operating temperature	-30 to +60 °C (full rated output up to 40 °C)	
Humidity	95 %, non-condensing	
Maximum altitude	5000m (full rated output up to 2000m)	
Environmental condition	Indoor, unconditioned	
Pollution degree	PD3	
Data communication port	VE.Direct or Bluetooth	
Remote on/off	Yes (2 pole connector)	
Programmable relay	DPST AC rating: 240 VAC / 4 A DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC	
Parallel operation	Yes: up to 10 units can be synchronized with Bluetooth	
<b>ENCLOSURE</b>		
Colour	Blue (RAL 5012)	
PV terminals 3)	35 mm <sup>2</sup> / AWG2 (Tr models) Two pairs of MC4 connectors (MC4 models)	
Battery terminals	35 mm <sup>2</sup> / AWG2	
Protection category	IP43 (electronic components), IP22 (connection area)	
Weight	3 kg	
Dimensions (h x w x d)	Tr models: 185 x 250 x 95 mm MC4 models: 215 x 250 x 95 mm	
<b>STANDARDS</b>		
Safety	EN/IEC 62109-1, UL 1741, CSA C22.2	
<b>STORED TRENDS</b>		
Data stored	Battery voltage, current and temperature, as well as load output current, PV voltage and PV current.	
Number of days trends data is stored	46	
1a) If more PV power is connected, the controller will limit input power. 1b) The PV voltage must exceed Vbat + 5 V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1 V. 2) A PV array with a higher short circuit current may damage the controller. 3) MC4 models: several splitter pairs may be needed to parallel the strings of solar panels Maximum current per MC4 connector: 30 A (the MC4 connectors are parallel connected to one MPPT tracker)		



# SMARTSOLAR CHARGE CONTROLLER MPPT 150/70 UP TO 150/100 VE.CAN



SmartSolar Charge Controller MPPT 150/100-Tr VE.Can with optional pluggable display



SmartSolar Charge Controller MPPT 150/100-Tr VE.Can without display



Bluetooth sensing: Smart Battery Sense



Bluetooth sensing: BMV-712 Smart Battery Monitor



Bluetooth sensing: SmartShunt

## Ultra-fast Maximum Power Point Tracking (MPPT)

Especially in case of a cloudy sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30 % compared to PWM charge controllers and by up to 10 % compared to slower MPPT controllers.

## Advanced Maximum Power Point Detection in case of partial shading conditions

If partial shading occurs, two or more maximum power points (MPP) may be present on the power-voltage curve.

Conventional MPPTs tend to lock to a local MPP, which may not be the optimum MPP.

The innovative SmartSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

## Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 98 %.

## Flexible charge algorithm

Fully programmable charge algorithm, and eight pre-programmed algorithms, selectable with a rotary switch (see manual for details).

## Extensive electronic protection

Over-temperature protection and power derating when temperature is high.

PV short circuit and PV reverse polarity protection.

PV reverse current protection.

## Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

## Internal temperature sensor and optional external battery voltage, temperature and current sensing via Bluetooth

A Smart Battery Sense, a BMV-712 Smart Battery Monitor or a SmartShunt can be used to communicate battery voltage and temperature (and current, in case of a BMV-712 or a SmartShunt) to one or more SmartSolar Charge Controllers.

## VE.Direct or VE.Can

For a wired data connection to a Color Control GX, other GX products, PC or other devices

## Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts.

Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

## VE.Can: the multiple controller solution

Up to 25 units can be synchronised with VE.Can, and up to 10 units with Bluetooth

## Remote on-off

To connect for example to a VE.BUS BMS.

## Programmable relay

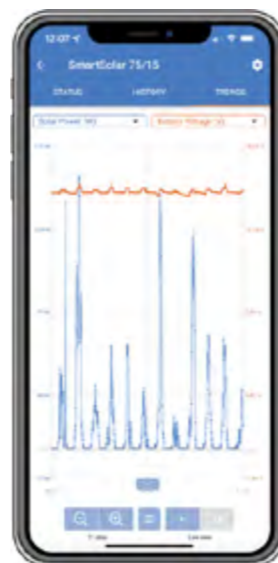
Can be programmed to trip on an alarm, or other events.

## Optional: SmartSolar pluggable LCD display

Simply remove the rubber seal that protects the plug on the front of the controller, and plug-in the display.



SmartSolar pluggable display



SmartSolar Charge Controller with VE.Can interface	150/70 VE.Can	150/85 VE.Can	150/100 VE.Can (also available without Bluetooth)
Battery voltage	12/24/48 V Auto Select (36 V: manual)		
Rated charge current	70 A	85 A	100 A
Nominal PV power, 12 V 1a,b)	1000 W	1200 W	1450 W
Nominal PV power, 24 V 1a,b)	2000 W	2400 W	2900 W
Nominal PV power, 36 V 1a,b)	3000 W	3600 W	4350 W
Nominal PV power, 48 V 1a,b)	4000 W	4900 W	5800 W
Max. PV short circuit current 2)	50 A (max 30 A per MC4 conn.)	70 A (max 30 A per MC4 conn.)	
Maximum PV open circuit voltage	150 V absolute maximum coldest conditions 145 V start-up and operating maximum		
Maximum efficiency	98 %		
Self-consumption	Less than 35 mA @ 12 V / 20 mA @ 48 V		
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6 V (adjustable with: rotary switch, display, VE.Direct or Bluetooth)		
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2 V (adjustable: rotary switch, display, VE.Direct or Bluetooth)		
Charge voltage 'equalization'	Default setting: 16,2 V / 32,4 V / 48,6 V / 64,8 V (adjustable)		
Charge algorithm	multi-stage adaptive (eight preprogrammed algorithms) or user defined algorithm		
Temperature compensation	-16 mV / -32 mV / -64 mV / °C		
Protection	PV reverse polarity / Output short circuit / Over temperature		
Operating temperature	-30 to +60 °C (full rated output up to 40 °C)		
Humidity	95 %, non-condensing		
Maximum altitude	5000m (full rated output up to 2000m)		
Environmental condition	Indoor, unconditioned		
Pollution degree	PD3		
Data communication	VE.Can, VE.Direct and Bluetooth		
Remote on/off	Yes (2 pole connector)		
Programmable relay	DPST AC rating: 240 VAC / 4 A DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC		
Parallel operation	Yes, parallel synchronised operation with VE.Can (max. 25 units) or Bluetooth (max. 10 units)		
<b>ENCLOSURE</b>			
Colour	Blue (RAL 5012)		
PV terminals 3)	35 mm <sup>2</sup> / AWG2 (Tr models) Two pairs of MC4 connectors (MC4 models)	35 mm <sup>2</sup> / AWG2 (Tr models) Three pairs of MC4 connectors (MC4 models)	
Battery terminals	35mm <sup>2</sup> / AWG2		
Protection category	IP43 (electronic components), IP22 (connection area)		
Weight	3 kg	4,5kg	
Dimensions (h x w x d) in mm	Tr models: 185 x 250 x 95 mm MC4 models: 215x 250 x 95 mm	Tr models: 216 x 295 x 103 MC4 models: 246 x 295 x 103	
<b>STANDARDS</b>			
Safety	EN/IEC 62109-1, UL 1741, CSA C22.2		
<b>STORED TRENDS</b>			
Data stored	Battery voltage,current and temperature, as well as load output current, PV voltage and PV current.		
Number of days trends data is stored	46		

1a) If more PV power is connected, the controller will limit input power.  
 1b) The PV voltage must exceed Vbat + 5 V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1 V.  
 2) A PV array with a higher short circuit current may damage the controller.  
 3) MC4 models: several splitter pairs may be needed to parallel the strings of solar panels  
 Maximum current per MC4 connector: 30 A (the MC4 connectors are parallel connected to one MPPT tracker)



With VE.Can or Bluetooth up to 25 respectively up to 10 Charge Controllers can be daisy-chained for synchronous charging and connected to a Color Control GX or other GX device. Each Controller can be monitored individually, for example on a Color Control GX and on the VRM website (VE.Can) or on a smartphone or iPad (Bluetooth)





# SMARTSOLAR CHARGE CONTROLLER MPPT 250/60 & 250/70



SmartSolar Charge Controller  
MPPT 250/70-Tr  
with optional pluggable display



SmartSolar Charge Controller  
MPPT 250/70-MC4  
without display



Bluetooth sensing:  
Smart Battery Sense



Bluetooth sensing:  
BMV-712 Smart Battery Monitor



Bluetooth sensing: SmartShunt

## Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

## Ultra-fast Maximum Power Point Tracking (MPPT)

Especially in case of a clouded sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30 % compared to PWM charge controllers and by up to 10 % compared to slower MPPT controllers.

## Advanced Maximum Power Point Detection in case of partial shading conditions

If partial shading occurs, two or more maximum power points (MPP) may be present on the power-voltage curve.

Conventional MPPTs tend to lock to a local MPP, which may not be the optimum MPP.

The innovative SmartSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

## Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 99 %.

## Flexible charge algorithm

Fully programmable charge algorithm (see the software page on our website), and eight pre-programmed algorithms, selectable with a rotary switch (see manual for details).

## Extensive electronic protection

Over-temperature protection and power derating when temperature is high.

PV short circuit and PV reverse polarity protection.

PV reverse current protection.

## Internal temperature sensor and optional external battery voltage and temperature sensing via Bluetooth

A Smart Battery Sense, a BMV-712 Smart Battery Monitor or a SmartShunt can be used to communicate battery voltage and temperature (and current, in case of a BMV-712 or a SmartShunt) to one or more SmartSolar Charge Controllers

## Synchronized parallel charging with Bluetooth

Up to 10 units can be synchronized with Bluetooth.

## Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts.

Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

## VE.Direct

For a wired data connection to a Color Control GX, other GX products, PC or other devices

## Remote on-off

To connect for example to a VE.BUS BMS.

## Programmable relay

Can be programmed (a.o. with a smartphone)

to trip on an alarm, or other events.

## Optional: SmartSolar pluggable LCD display

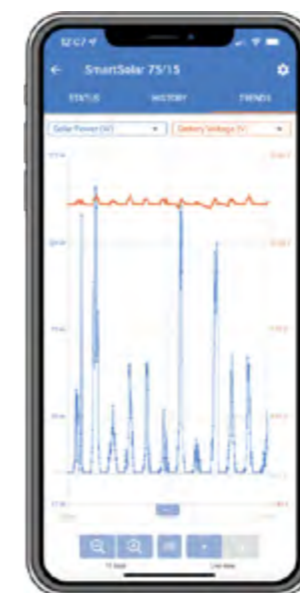
Simply remove the rubber seal that protects the plug on the front of the controller, and plug-in the display.



SmartSolar pluggable display



SmartSolar Charge Controller	250/60	250/70
Battery voltage	12 / 24 / 48 V Auto Select (software tool needed to select 36 V)	
Rated charge current	60 A	70 A
Nominal PV power, 12 V 1a,b)	860 W	1000 W
Nominal PV power, 24 V 1a,b)	1720 W	2000 W
Nominal PV power, 36 V 1a,b)	2580 W	3000 W
Nominal PV power, 48 V 1a,b)	3440 W	4000 W
Max. PV short circuit current 2)	35 A (max 30 A per MC4 conn.)	
Maximum PV open circuit voltage	250 V absolute maximum coldest conditions 245 V start-up and operating maximum	
Maximum efficiency	99 %	
Self-consumption	Less than 35 mA @ 12 V / 20 mA @ 48 V	
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6 V (adjustable with: rotary switch, display, VE.Direct or Bluetooth)	
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2 V (adjustable: rotary switch, display, VE.Direct or Bluetooth)	
Charge voltage 'equalization'	Default setting: 16,2 V / 32,4 V / 48,6 V / 64,8 V (adjustable)	
Charge algorithm	multi-stage adaptive (eight pre-programmed algorithms) or user defined algorithm	
Temperature compensation	-16 mV / -32 mV / -64 mV / °C	
Protection	PV reverse polarity / Output short circuit / Over temperature	
Operating temperature	-30 to +60 °C (full rated output up to 40 °C)	
Humidity	95 %, non-condensing	
Maximum altitude	5000m (full rated output up to 2000m)	
Environmental condition	Indoor, unconditioned	
Pollution degree	PD3	
Data communication port	VE.Direct or Bluetooth	
Remote on/off	Yes (2 pole connector)	
Programmable relay	DPST AC rating: 240 VAC / 4 A DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC	
Parallel operation	Yes: up to 10 units can be synchronized with Bluetooth	
<b>ENCLOSURE</b>		
Colour	Blue (RAL 5012)	
PV terminals 3)	35 mm <sup>2</sup> / AWG2 (Tr models) Two pairs of MC4 connectors (MC4 models)	
Battery terminals	35 mm <sup>2</sup> / AWG2	
Protection category	IP43 (electronic components), IP22 (connection area)	
Weight	3 kg	
Dimensions (h x w x d)	Tr models: 185 x 250 x 95 mm MC4 models: 215 x 250 x 95 mm	
<b>STANDARDS</b>		
Safety	EN/IEC 62109-1, UL 1741, CSA C22.2	
<b>STORED TRENDS</b>		
Data stored	Battery voltage, current and temperature, as well as load output current, PV voltage and PV current.	
Number of days trends data is stored	46	
1a) If more PV power is connected, the controller will limit input power. 1b) The PV voltage must exceed Vbat + 5 V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1 V. 2) A PV array with a higher short circuit current may damage the controller. 3) MC4 models: several splitter pairs may be needed to parallel the strings of solar panels Maximum current per MC4 connector: 30 A (the MC4 connectors are parallel connected to one MPPT tracker)		



# SMARTSOLAR CHARGE CONTROLLER MPPT 250/70 UP TO 250/100 VE.CAN



SmartSolar Charge Controller  
MPPT 250/100-Tr VE.Can  
with optional pluggable display



SmartSolar Charge Controller  
MPPT 250/100-Tr VE.Can  
without display



Bluetooth sensing:  
Smart Battery Sense



Bluetooth sensing:  
BMV-712 Smart Battery Monitor



Bluetooth sensing: SmartShunt

## Ultra-fast Maximum Power Point Tracking (MPPT)

Especially in case of a clouded sky, when light intensity is changing continuously, an ultra-fast MPPT controller will improve energy harvest by up to 30 % compared to PWM charge controllers and by up to 10 % compared to slower MPPT controllers.

## Advanced Maximum Power Point Detection in case of partial shading conditions

If partial shading occurs, two or more maximum power (MPP) points may be present on the power-voltage curve.

Conventional MPPTs tend to lock to a local MPP, which may not be the optimum MPP.

The innovative SmartSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

## Outstanding conversion efficiency

No cooling fan. Maximum efficiency exceeds 99 %.

## Flexible charge algorithm

Fully programmable charge algorithm, and eight pre-programmed algorithms, selectable with a rotary switch (see manual for details).

## Extensive electronic protection

Over-temperature protection and power derating when temperature is high.

PV short circuit and PV reverse polarity protection.

PV reverse current protection.

## Bluetooth Smart built-in

The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

## Internal temperature sensor and optional external battery voltage, temperature and current sensing via Bluetooth

A Smart Battery Sense, a BMV-712 Smart Battery Monitor or a SmartShunt can be used to communicate battery voltage and temperature (and current, in case of a BMV 712 or a SmartShunt) to one or more SmartSolar Charge Controllers.

## VE.Direct or VE.Can

For a wired data connection to a Color Control GX, other GX products, PC or other devices.

## Synchronized parallel charging with VE.Can or Bluetooth

Up to 25 units can be synchronized with VE.Can, and up to 10 units with Bluetooth.

## Fully discharged battery recovery function

Will initiate charging even if the battery has been discharged to zero volts.

Will reconnect to a fully discharged Li-ion battery with integrated disconnect function.

## VE.Can: the multiple controller solution

Up to 25 units can be synchronised with VE.Can.

## Remote on-off

To connect for example to a VE.BUS BMS.

## Programmable relay

Can be programmed to trip on an alarm, or other events.

## Optional: SmartSolar pluggable LCD display

Simply remove the rubber seal that protects the plug on the front of the controller, and plug-in the display.



SmartSolar pluggable display



SmartSolar Charge Controller with VE.Can interface	250/70	250/85	250/100
Battery voltage	12/24/48 V Auto Select (36 V: manual)		
Rated charge current	70 A	85 A	100 A
Nominal PV power, 12 V 1a,b)	1000 W	1200 W	1450 W
Nominal PV power, 24 V 1a,b)	2000 W	2400 W	2900 W
Nominal PV power, 36 V 1a,b)	3000 W	3600 W	4350 W
Nominal PV power, 48 V 1a,b)	4000 W	4900 W	5800 W
Max. PV short circuit current 2)	35 A (max 30 A per MC4 conn.)	70 A (max 30 A per MC4 conn.)	
Maximum PV open circuit voltage	250 V absolute maximum coldest conditions 245 V start-up and operating maximum		
Maximum efficiency	99 %		
Self-consumption	Less than 35 mA @ 12 V / 20 mA @ 48 V		
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6 V (adjustable with: rotary switch, display, VE.Direct or Bluetooth)		
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2 V (adjustable: rotary switch, display, VE.Direct or Bluetooth)		
Charge voltage 'equalization'	Default setting: 16,2 V / 32,4 V / 48,6 V / 64,8 V (adjustable)		
Charge algorithm	multi-stage adaptive (eight pre-programmed algorithms) or user defined algorithm		
Temperature compensation	-16 mV / -32 mV / -64 mV / °C		
Protection	PV reverse polarity / Output short circuit / Over temperature		
Operating temperature	-30 to +60 °C (full rated output up to 40 °C)		
Humidity	95 %, non-condensing		
Maximum altitude	5000 m (full rated output up to 2000 m)		
Environmental condition	Indoor, unconditioned		
Pollution degree	PD3		
Data communication	VE.Can, VE.Direct and Bluetooth		
Remote on/off	Yes (2 pole connector)		
Programmable relay	DPST AC rating: 240 VAC / 4 A DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC		
Parallel operation	Yes, parallel synchronised operation with VE.Can (max. 25 units) or Bluetooth (max. 10 units)		

## ENCLOSURE

Colour	Blue (RAL 5012)		
PV terminals 3)	35 mm <sup>2</sup> / AWG2 (Tr models) Two pairs of MC4 connectors (MC4 models)	35 mm <sup>2</sup> / AWG2 (Tr models) Three pairs of MC4 connectors (MC4 models)	
Battery terminals	35mm <sup>2</sup> / AWG2		
Protection category	IP43 (electronic components), IP22 (connection area)		
Weight	3 kg	4,5 kg	
Dimensions (h x w x d) in mm	Tr models: 185 x 250 x 95 mm MC4 models: 215 x 250 x 95 mm	Tr models: 216 x 295 x 103 MC4 models: 246 x 295 x 103	

## STANDARDS

Safety	EN/IEC 62109-1, UL 1741, CSA C22.2		
--------	------------------------------------	--	--

## STORED TRENDS

Data stored	Battery voltage, current and temperature, as well as load output current, PV voltage and PV current.		
Number of days trends data is stored	46		

- 1a) If more PV power is connected, the controller will limit input power.
- 1b) The PV voltage must exceed Vbat + 5 V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1 V.
- 2) A PV array with a higher short circuit current may damage the controller.
- 3) MC4 models: several splitter pairs may be needed to parallel the strings of solar panels  
Maximum current per MC4 connector: 30 A (the MC4 connectors are parallel connected to one MPPT tracker)



With VE.Can up to 25 Charge Controllers can be daisy-chained and connected to a Color Control GX or other GX device  
Each Controller can be monitored individually, for example on a Color Control GX and on the VRM website



# SMARTSOLAR MPPT RS 450/100 & 450/200



SmartSolar MPPT RS 450|100



Inside the SmartSolar MPPT RS 450|100

**Ultra-fast Maximum Power Point Tracking (MPPT) Solar Charge Controller**  
 The MPPT RS SmartSolar is a 48 V Solar charge controller with up to 450 VDC PV input and either 100 A, or 200 A output. It is used in on-grid and off-grid solar applications where maximum battery charging power is required.

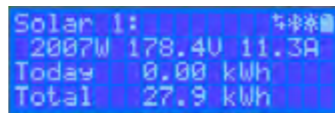
**Multiple independent MPPT tracking inputs**  
 With multiple MPPT trackers, you can optimize your solar panel design for maximum performance for your specific location.

**Isolated PV connections for additional safety**  
 Full galvanic isolation between PV and battery connections provide additional overall system safety.

**Wide MPPT voltage range**  
 80 – 450 VDC PV operating range, with a 120 VDC PV startup voltage.

**Light weight, efficient and quiet**  
 Thanks to high frequency technology and a new design this powerful charger weighs only 7.9 kg for the 100 A model. In addition to this it has an excellent efficiency, low standby power, and a very quiet operation.

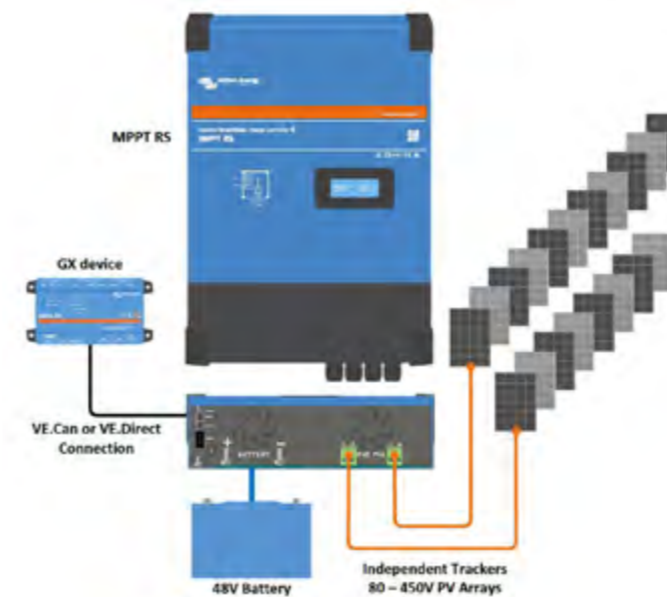
**Display and Bluetooth**  
 The display reads battery, and controller parameters. The parameters can be accessed with a smartphone or other Bluetooth enabled device. In addition, Bluetooth can be used to set up the system and to change settings with VictronConnect.



**PV Isolation resistance monitoring for peace of mind at higher voltages**  
 The MPPT RS continuously monitors the PV array and can detect if there are faults that reduce the isolation of the panels to unsafe levels.

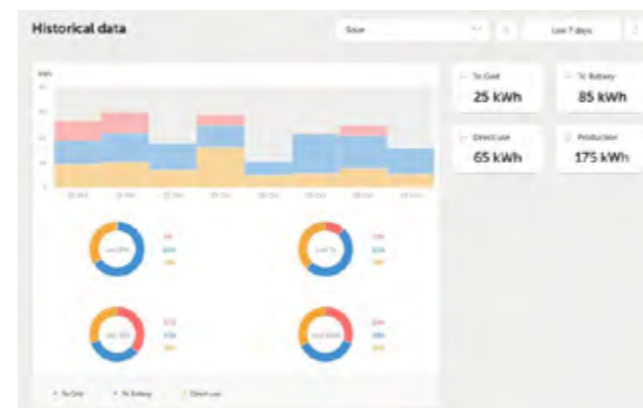
**VE.Can and VE.Direct port**  
 For connection to a GX device for system monitoring, data logging, and remote firmware updates. VE.Can allows for up to 25 units to be connected together in parallel and synchronize their charging.

**I/O Connections**  
 Programmable Relay, temperature sensor, auxiliary, digital input and voltage sensor connections. The remote input can accept the Victron smallBMS, and other BMS with allow-to-charge signal.



**System example diagram**  
 The 100 A MPPT RS combined with a GX device, charging a 48 V battery with 2 separate solar PV strings.

**VRM Portal**  
 When the MPPT RS is connected to a GX device with internet connection, or the GlobalLink 520 with built in 4G connectivity, you can access our free remote monitoring website (VRM). This will display all your system data in a comprehensive graphical format. Alarms can be received by e-mail.



**Configure and monitor with VictronConnect →**

The built-in Bluetooth Smart connection allows for quick monitoring and settings adjustment.

The built-in 30-day history shows individual performance of the separate MPPT trackers.

Try the VictronConnect demo to see the full range of configuration and display options with sample data.



Isolated SmartSolar MPPT RS	450 100	450 200
<b>CHARGER</b>		
Battery voltage	48 V	
Rated charge current	100 A	200 A
Maximum charge power	5.8 kW at 57.6 V	11.5 kW at 57.6 V
Charge voltage 'absorption'	Default setting: 57,6 V (adjustable)	
Charge voltage 'float'	Default setting: 55,2 V (adjustable)	
Programmable voltage range	Minimum: 36 V Maximum: 60 V <sup>(7)</sup>	
Charge algorithm	Multi-stage adaptive (adjustable)	
Battery temperature sensor	Included	
Maximum efficiency	96 %	
Self-consumption	15 mA	
<b>SOLAR</b>		
Maximum DC PV voltage	450 V	
Start-up voltage	120 V	
MPPT operating voltage range	80 – 450 V <sup>(1)</sup>	
Number of trackers	2	4
Max. PV operational input current	18 A per tracker	
Max. PV short circuit current <sup>(2)</sup>	20 A per tracker	
Max. DC output charging power	4000 W per tracker 5760 W total	4000 W per tracker 11520 W total
Maximum PV array size per tracker <sup>(3)</sup>	7200 Wp (450 V x 20 A) <sup>(3)</sup>	
PV Isolation fail level <sup>(4)</sup>	100 kΩ	
<b>GENERAL</b>		
Synchronised Parallel Operation	Yes, up to 25 units with VE.Can	
Programmable relay <sup>(5)</sup>	Yes	
Protection	PV reverse polarity Output short circuit Over temperature	
Data communication	VE.Direct port, VE.Can port & Bluetooth (6)	
Bluetooth frequency	2402 – 2480 MHz	
Bluetooth power	4dBm	
General purpose analogue/digital in port	Yes, 2x	
Remote on-off	Yes	
Operating temperature range	-40 to +60 °C (fan assisted cooling)	
Humidity (non-condensing)	max 95 %	
<b>ENCLOSURE</b>		
Material & Colour	steel, blue RAL 5012	
Protection category	IP21	
Battery-connection	M8 bolts	
Power terminals PV input (-Tr version)	2	16 mm <sup>2</sup>
Power terminals PV input (MC4 version)	1 pair of male and female MC4 connectors per tracker	
Weight	7,9 kg	13,7 kg
Dimensions (h x w x d) in mm	440 x 313 x 126	487 x 434 x 146
<b>STANDARDS</b>		
Safety	EN-IEC 62109-1, EN-IEC 62109-2	
Country of Origin	Designed in The Netherlands, made in India	

1) MPPT operating voltage range is constrained by battery voltage - PV VOC should not exceed 8 x battery float voltage. For example, a 52,8 V float voltage results in a maximum PV VOC of 422,4 V. See product manual for further information.  
 2) A higher short circuit current may damage the controller if PV array is connected in reverse polarity.  
 3) Max. 450 VOC result in appr. 360 Vmp, therefore the maximum PV array is appr. 360 V x 20 A = 7200 Wp.  
 4) The MPPT RS will test for sufficient resistive isolation between PV+ and GND, and PV- and GND. In the event of a resistance below the threshold, the unit will stop charging, display the error, and send the error signal to the GX device (if connected) for audible and email notification.  
 5) Programmable relay which can be set for general alarm, DC under voltage or genset start/stop function. DC rating: 4 A up to 35 VDC and 1 A up to 70 VDC  
 6) The MPPT RS is currently not compatible with VE.Smart Networks.  
 7) The Charger set-point (float and absorption) can be set to max 60 V. The output voltage at the charger terminals can be higher, due to temperature compensation as well as compensation for voltage drop over the battery cables. The maximum output current is reduced on a linear basis from full current at 60 V to 5A at 62 V. The equalization voltage can be set to max 62V, the equalization current percentage can be set to max 6%.





CIRCONTROL

1 DC  
50kW

2 DC  
50kW

EV Quick Charger

victrol energy  
ELECTRIC POWER

## EV CHARGER NS



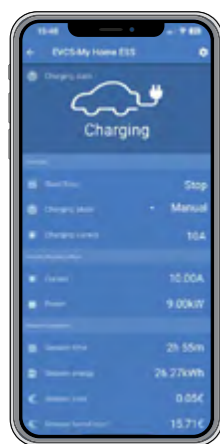
EV Charging Station NS



EV Charging Station NS - Front



Black, blue (default) or white front



VictronConnect app

### High power EV Charging Station

The EV Charging Station NS has three-phase and single-phase capabilities. It delivers a maximum of 22 kW AC in three-phase or 7.3 kW in single-phase mode. It comes with a blue front. A black or white front can be purchased separately.

### WiFi Communication

WiFi: 802.11 b/g/n for configuration, monitoring and control. The internal WiFi module can be configured in Access Point or Station mode for both, the initial setup and monitoring.

### Easy operation and control via Bluetooth and the VictronConnect App

Get full control and overview of all operating parameters and session statistics at a glance.

### Light Ring for fast viewing the device state

Fully programmable RGB Light Ring around the charging port to quickly determine the device state. It can be programmed from the integrated web interface to display different light effects based on the current state (disconnected, charging, charged etc.).

### Three working modes available:

- Manual Mode to configure output current**  
Manual mode allows configurable output current between 6-32 A. The charging power can be regulated in different ways: by using the web interface, from a GX device and VRM and via VictronConnect. It allows to manually start or stop the charging process when a vehicle is connected to the charging station.
- Automatic Mode to ensure maximum PV system efficiency**  
Detects when excess power is available and uses only that power to charge the vehicle.
- Scheduled Mode to charge the EV at certain time intervals**  
A fully programmable scheduler allows charging at different time intervals, for example at certain times during the night when grid energy is cheaper.

### Integration with GX devices and VRM

Control and monitor the EV Charging Station NS from a GX device touch display and the Remote Console and the VRM Portal. The VRM Portal also offers real time and custom reports for configurable time periods.

EV Charging Station NS	EVC200300200
Input voltage range (V AC)	170 – 265 VAC
Rated charge current	32 A / phase
Nominal power	22 kW
Current output range	6 – 32 A
WiFi standards	802.11 b/g/n (2.4 Ghz only)
Self-consumption	15 mA@230 V
Configurable Max. Current	10-32 A
Configurable Min. Current	6 A up to 1 A below max. value
Connector type	IEC 62196 Type 2
GENERAL	
Means to Disconnect	External circuit breaker (40 A recommended)
Configurable price/kWh calculator(Eur)	Default setting: 0.13 (adjustable)
Control type	Web page, GX Device over Modbus TCP, VictronConnect via Bluetooth
Light Ring	55 light configurable light effects available
Protection	External RCD is required
Operating temperature	-25 °C to +50 °C
Storage temperature	-40 °C to +80 °C
Humidity	95 %, non-condensing
Data communication	Modbus TCP over WiFi, Bluetooth
ENCLOSURE	
Enclosure colour	Light Blue (RAL 5012), Traffic Black (RAL 9017), Traffic White (RAL 9016)
Power terminals	6-10 mm <sup>2</sup> / AWG 10-8
Protection category	IP44
Ventilation	not required
Weight	3 kg
Dimensions (h x w x d)	372 x 292 x 122mm
STANDARDS	
Safety	IEC 61851-1, IEC 61851-22 Detection for Relay Contact welded Detection for missing protective conductor Detection for missing Ground Detection for shorted CP

## GLOBALLINK 520



GlobalLink 520

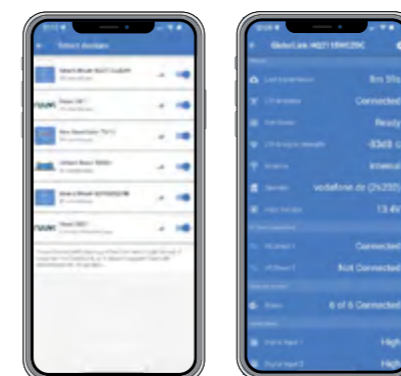


Accessories included with the GlobalLink 520



Optional Outdoor LTE-M wall-mount antenna (ANT100200100)

Outdoor LTE-M puck antenna (ANT100200200)



The GlobalLink 520 connects your remote Victron system or individual products to VRM, our online [Victron Remote Management portal](#). Through that portal, you can monitor current and historical system operation – such as battery voltage and state of charge – from anywhere in the world. VRM is free to use.

Unique is the pre-installed and pre-paid SIM card: the GlobalLink comes with 5 years of 4G LTE-M connectivity. No need to purchase and maintain SIM-cards.

### Features

- Smart device<sup>1)</sup> and VE.Direct support: Connect up to 10 Victron smart products using BLE and two hard wired VE.Direct devices.
- VRM-monitoring: Monitor battery state of charge, power consumption, power harvest from PV, generator and grid or check temperature measurements. Follow up on alerts and perform diagnostics checks.
- RuuviTag support: These sensors connect via BLE and are easy to setup via VictronConnect. All the data, like temperature, humidity and atmospheric pressure will be directly available in VRM.
- Support for custom SIM cards.
- Simple mounting and configuration: The GlobalLink 520 is wall mountable. The Bluetooth feature enables a quick connection and easy configuration via our VictronConnect app.

<sup>1)</sup> See the [GlobalLink 520 manual](#) for supported Victron products that can be connect over Bluetooth.

GlobalLink 520	ASS030543020		
Supply voltage	8 – 70V DC		
Power draw	Average with relay open	Average with relay closed	
	12V	50mA	64mA
	24V	26mA	34mA
	48V	14mA	19mA
Mounting	Wall		
Input connectivity			
VE.Direct ports (always isolated)	2		
RuuviTag support	Yes		
Instant readout via Bluetooth	Yes (connect up to 10 additional Smart devices via BLE)		
Digital Inputs	2		
Relay	1 x NO/NC DC up to 30VDC: 2A AC: 0.5A, 125VAC		
Output connectivity			
Bluetooth	Yes		
WiFi	No		
Cellular	CAT M1 (LTE-M) 17 bands supported from 699Mhz to 2690Mhz (Total world-wide support) Bands supported are currently: 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 18, 19, 20, 25, 26, 28, 66		
Dimensions			
Outer dimensions (h x w x d)	123 x 67 x 23 mm		
Operating temperature range	-20 to +50°C		
Other			
Antenna	Internal and SMA connector for optional external antenna		
Factory included SIM	Prepaid 1nce data SIM with 5 years of connectivity		
Support for custom SIM	Yes		
Optional external LTE-M SMA-M antenna	Outdoor wall mount antenna	3 meter	ANT100200100
	Outdoor puck antenna	3 meter	ANT100200200
<b>Notes</b>			
1.	For more detailed information about the GlobalLink 520 see the product page, the manual and check out our community pages: <a href="https://www.victronenergy.com/panel-systems-remote-monitoring/globalink-520">https://www.victronenergy.com/panel-systems-remote-monitoring/globalink-520</a> <a href="https://www.victronenergy.com/media/pg/GlobalLink_520/en/index-en.html">https://www.victronenergy.com/media/pg/GlobalLink_520/en/index-en.html</a> <a href="https://community.victronenergy.com/topics/65904/globalink.html">https://community.victronenergy.com/topics/65904/globalink.html</a>		



## TELECOM BATTERIES



Telecom Battery  
Battery AGM 12V 200Ah

### Designed for telecom applications; excellent 'floor space savers' for marine and vehicle applications

The deep cycle AGM telecom series has been designed for use in telecom systems. With front access terminals and small footprint, the batteries are ideal for racked systems. Similarly, these batteries can help solve limited floor space and access problems on board boats and vehicles.

### AGM technology

AGM stands for Absorbent Glass Mat. In these batteries the electrolyte is absorbed into a glass-fibre mat between the plates by capillary action.

### Low self-discharge

Because of the use of lead calcium grids and high purity materials, Victron VRLA batteries can be stored during long periods of time without recharge. The rate of self-discharge is less than 2% per month at 20°C. The self-discharge doubles for every increase in temperature by 10°C.

### Low internal resistance

Accepts very high charge and discharge rates.

### High cyclic life capability

More than 500 cycles at 50% depth of discharge.

### Learn more about batteries and battery charging

To learn more about batteries and charging batteries, please refer to our book 'Energy Unlimited' (available free of charge from Victron Energy and downloadable from [www.victronenergy.com](http://www.victronenergy.com)).



Telecom Battery  
Battery AGM 12V 200Ah

12V AGM Telecom battery	115Ah	165Ah	200Ah
Capacity 1 / 3 / 5 / 10 / 20 hours (% of nominal)	60 / 75 / 82 / 91 / 100 (@ 70°F/25°C, end of discharge 10,5V)		
Capacity 10 / 20 / 30 / 40 minutes (% of nominal)	33 / 44 / 53 / 57 (@ 70°F/25°C, end of discharge 9,6V)		
Nominal capacity (77°F/25°C, 10,5V)	115Ah	165Ah	200Ah
Cold Cranking Amps @ 0°F/-18°C	1000	1500	1800
DIN cold start current (A) @ 0°F/-18°C	600	900	1000
Short Circuit Current (A)	3500	5000	6000
Reserve Capacity (minutes)	200	320	400
Shelf life @ 70°F/20°C	1 year		
Absorption voltage (V) @ 70°F/20°C	14,4 - 14,7		
Float voltage (V) @ 70°F/20°C	13,6 - 13,8		
Storage voltage (V) @ 70°F/20°C	13,2		
Float design life @ 70°F/20°C	12 years		
Cycle design life @ 80% discharge	500		
Cycle design life @ 50% discharge	750		
Cycle design life @ 30% discharge	1800		
Dimensions (l x w x h, mm)	395 x 110 x 293mm	548 x 105 x 316mm	546 x 125 x 323mm
Dimensions (l x w x h, inches)	15.57 x 4.33 x 11.53	21.57 x 4.13 x 12.44	21.49 x 4.92 x 12.71
Weight (kg/pounds)	35kg/77lbs	49kg/108lbs	60kg/132lbs

## AGM SUPER CYCLE BATTERY

### A truly innovative battery

The AGM Super Cycle batteries are the result of recent battery electrochemistry developments.

The paste of the positive plates is less sensitive to softening, even in case of repeated 100% discharge of the battery, and new additives to the electrolyte reduce sulfation in case of deep discharge.

### Exceptional 100% depth of discharge (DoD) performance

Tests have shown that the Super Cycle battery does withstand at least three hundred 100% DoD cycles.

The tests consist of a daily discharge to 10,8V with  $I = 0,2C_{20}$ , followed by approximately two hours rest in discharged condition, and then a recharge with  $I = 0,2C_{20}$ .

The two hours rest period in discharged condition will damage most batteries within 100 cycles, but not the Super Cycle battery.

We recommend the Super Cycle battery for applications where an occasional discharge to 100% DoD, or frequent discharge to 60-80% DoD is expected.

### Smaller and lighter

An additional advantage of the new chemistry is a slightly smaller size and less weight compared to our standard deep cycle AGM batteries.

### Low internal resistance

The internal resistance is also slightly lower compared to our standard deep cycle AGM batteries.

### Recommended charge voltage:

	Float Service	Cycle service Normal	Cycle service Fast recharge
Absorption		14,2 - 14,6 V	14,6 - 14,9 V
Float	13,5 - 13,8 V	13,5 - 13,8 V	13,5 - 13,8 V
Storage	13,2 - 13,5 V	13,2 - 13,5 V	13,2 - 13,5 V

### Specifications

Article number	V	Ah C5 (10,8V)	Ah C10 (10,8V)	Ah C20 (10,8V)	l x w x h mm	Weight kg	CCA @0°F	RES CAP @80°F	Terminals
BAT412015080	12	13	14	15	151 x 100 x 103	4,1			Faston
BAT412025081	12	22	24	25	181 x 77 x 175	6,5			M5 insert
BAT412038081	12	34	36	38	267 x 77 x 175	9,5			M5 insert
BAT412060081	12	52	56	60	224 x 135 x 178	14	300	90	M5 insert
BAT412110081	12	82	90	100	260 x 168 x 215	26	500	170	M6 insert
BAT412112081	12	105	114	125	330 x 171 x 214	33	550	220	M8 insert
BAT412117081	12	145	153	170	336 x 172 x 280	45	600	290	M8 insert
BAT412123081	12	200	210	230	532 x 207 x 226	57	700	400	M8 insert

### Cycle life

≥ 300 cycles @ 100% DoD (discharge to 10,8V with  $I = 0,2C_{20}$ , followed by approximately two hours rest in discharged condition, and then a recharge with  $I = 0,2C_{20}$ )

≥ 700 cycles @ 60% DoD (discharge during three hours with  $I = 0,2C_{20}$ , immediately followed by recharge at  $I = 0,2C_{20}$ )

≥ 1000 cycles @ 40% DoD (discharge during two hours with  $I = 0,2C_{20}$ , immediately followed by recharge at  $I = 0,2C_{20}$ )

### Effect of temperature on charging voltage

The charge voltage should be reduced with increased temperature. Temperature compensation is required when the temperature of the battery is expected to be less than 10°C / 50°F or more than 30°C / 85°F during long periods of time.

The recommended temperature compensation for Victron VRLA batteries is -4 mV / Cell (-24 mV / °C for a 12V battery).

The centre point for temperature compensation is 25°C / 70°F.



Super Cycle Battery 12V 230Ah



# GEL & AGM BATTERIES



AGM Battery  
12V 90Ah

## 1. VRLA technology

VRLA stands for Valve Regulated Lead Acid, which means that the batteries are sealed. Gas will escape through the safety valves only in case of overcharging or cell failure. VRLA batteries are maintenance free for life.

## 2. Sealed (VRLA) AGM Batteries

AGM stands for Absorbent Glass Mat. In these batteries the electrolyte is absorbed into a glass-fibre mat between the plates by capillary action. As explained in our book 'Energy Unlimited', AGM batteries are more suitable for short-time delivery of high currents than gel batteries.

## 3. Sealed (VRLA) Gel Batteries

Here the electrolyte is immobilized as gel. Gel batteries in general have a longer service life and better cycle capacity than AGM batteries.

## 4. Low Self-Discharge

Because of the use of lead calcium grids and high purity materials, Victron VRLA batteries can be stored during long periods of time without recharge. The rate of self-discharge is less than 2% per month at 20°C. The self-discharge doubles for every increase in temperature by 10°C.

Victron VRLA batteries can therefore be stored for up to a year without recharging, if kept under cool conditions.

## 5. Exceptional Deep Discharge Recovery

Victron VRLA batteries have exceptional discharge recovery, even after deep or prolonged discharge. Nevertheless repeatedly deep and prolonged discharge has a very negative effect on the service life of all lead acid batteries, Victron batteries are no exception.

## 6. Battery Discharging Characteristics

The rated capacity of Victron AGM and Gel Deep Cycle batteries refers to 20 hour discharge, in other words: a discharge current of 0,05 C.

The rated capacity of Victron Tubular Plate Long Life batteries refers to 10 hours discharge.

The effective capacity decreases with increasing discharge current (see table 1). Please note that the capacity reduction will be even faster in case of a constant power load, such as an inverter.

Discharge time (constant current)	End Voltage V	AGM 'Deep Cycle' %	Gel 'Deep Cycle' %	Gel 'Long Life' %
20 hours	10,8	100	100	112
10 hours	10,8	92	87	100
5 hours	10,8	85	80	94
3 hours	10,8	78	73	79
1 hour	9,6	65	61	63
30 min.	9,6	55	51	45
15 min.	9,6	42	38	29
10 min.	9,6	38	34	21
5 min.	9,6	27	24	
5 seconds		8 C	7 C	

Table 1: Effective capacity as a function of discharge time (the lowest row gives the maximum allowable 5 seconds discharge current)

Our AGM deep cycle batteries have excellent high current performance and are therefore recommended for high current applications such as engine starting. Due to their construction, Gel batteries have a lower effective capacity at high discharge currents. On the other hand, Gel batteries have a longer service life, both under float and cycling conditions.

## 7. Effect of temperature on service life

High temperature has a very negative effect on service life. The service life of Victron batteries as a function of temperature is shown in table 2.

Average Temperature	AGM 'Deep Cycle' years	Gel 'Deep Cycle' years	Gel 'Long Life' years
20°C / 68°F	7 - 10	12	20
30°C / 86°F	4	6	10
40°C / 104°F	2	3	5

Table 2: Design service life of Victron batteries under float service

## 8. Effect of temperature on capacity

As is shown by the graph below, capacity reduces sharply at low temperatures.

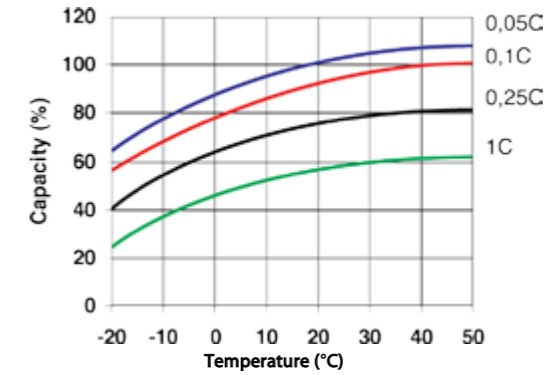


Fig. 1: Effect of temperature on capacity

## 9. Cycle life of Victron batteries

Batteries age due to discharging and recharging. The number of cycles depends on the depth of discharge, as is shown in figure 2.

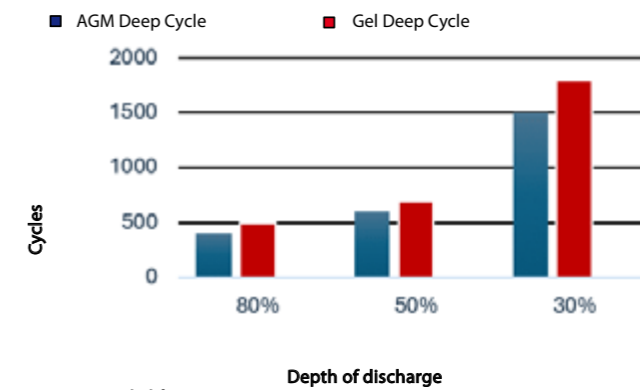


Fig. 2: Cycle life

## 10. Battery charging in case of cycle use: the 3-step charge curve

The most common charge curve used to charge VRLA batteries in case of cyclic use is the 3-step charge curve, whereby a constant current phase (the bulk phase) is followed by two constant voltage phases (absorption and float), see fig. 3.

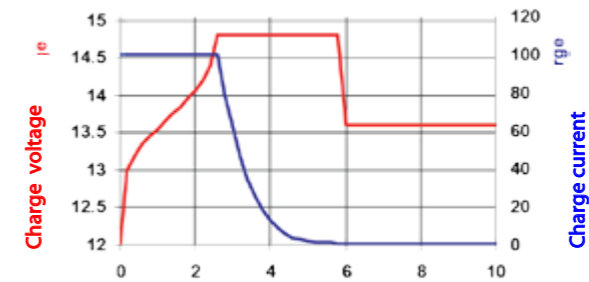


Fig. 3: Three step charge curve

During the absorption phase the charge voltage is kept at a relatively high level in order to fully recharge the battery within reasonable time. The third and last phase is the float phase: the voltage is lowered to standby level, sufficient to compensate for self-discharge.



## GEL & AGM BATTERIES

### Disadvantages of the traditional 3-step charge curve:

- During the bulk phase the current is kept at a constant and often high level, even after the gassing voltage (14,34V for a 12V battery) has been exceeded. This can lead to excessive gas pressure in the battery. Some gas will escape through the safety valves, reducing service life.
- Thereafter the absorption voltage is applied during a fixed period of time, irrespective of how deep the battery has been discharged previously. A full absorption period after a shallow discharge will overcharge the battery, again reducing service life (a.o. due to accelerated corrosion of the positive plates).
- Research has shown that battery life can be increased by decreasing float voltage to an even lower level when the battery is not in use.

### 11. Battery charging: longer battery life with Victron 4-step adaptive charging

Victron developed the adaptive charge curve. The 4-step adaptive charge curve is the result of years of research and testing.

#### The Victron four-step adaptive charge curve solves the 3 main problems of the 3-step curve:

- **Battery Safe Mode**  
In order to prevent excessive gassing, Victron has invented the 'Battery Safe Mode'. The Battery Safe Mode will limit the rate of voltage increase once the gassing voltage has been reached. Research has shown that this will reduce internal gassing to a safe level.
- **Variable absorption time**  
Based on the duration of the bulk stage, the charger calculates how long the absorption time should be in order to fully charge the battery. If the bulk time is short, this means the battery was already charged and the resulting absorption time will also be short, whereas a longer bulk time will also result in a longer absorption time.
- **Storage mode**  
After completion of the absorption period the battery should be fully charged, and the voltage is lowered to the float or standby level. If no discharge occurs during the next 24 hours, the voltage is reduced even further and the battery goes into storage mode. The lower storage voltage reduces corrosion of the positive plates. Once every week the charge voltage is increased to the absorption level for a short period to compensate for self-discharge (Battery Refresh mode).

### 12. Battery charging in case of standby use: constant voltage float charging

When a battery is not frequently deeply discharged, a 2-step charge curve can be used. During the first phase the battery is charged with a limited current (the bulk phase). Once a pre-set voltage has been reached the battery is kept at that voltage (the float phase).

This charge method is used for starter batteries in vehicles and in uninterruptible power supplies (UPS).

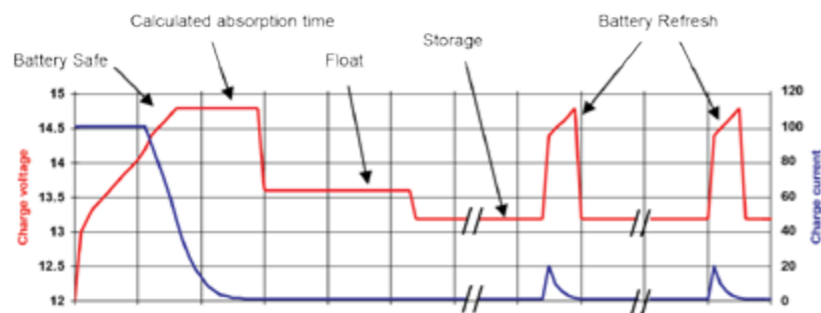


Fig. 4: Four-step adaptive charge curve

### 13. Optimum charge voltage of Victron VRLA batteries

The recommended charge voltage settings for a 12V battery are shown in table 3.

### 14. Effect of temperature on charging voltage

The charge voltage should be reduced with increased temperature. Temperature compensation is required when the temperature of the battery is expected to be less than 10°C / 50°F or more than 30°C / 85°F during long periods of time. The recommended temperature compensation for Victron VRLA batteries is -4 mV / Cell (-24 mV / °C for a 12V battery). The centre point for temperature compensation is 25°C / 70°F.

### 15. Charge current

The charge current should preferably not exceed 0,2C (20A for a 100Ah battery). The temperature of a battery will increase by more than 10°C if the charge current exceeds 0,2C. Therefore temperature compensation is required if the charge current exceeds 0,2C.

	Float Service (V)	Cycle service Normal (V)	Cycle service Fastest recharge (V)
<b>Victron AGM 'Deep Cycle'</b>			
Absorption		14,2 - 14,6	14,6 - 14,9
Float	13,5 - 13,8	13,5 - 13,8	13,5 - 13,8
Storage	13,2 - 13,5	13,2 - 13,5	13,2 - 13,5
<b>Victron Gel 'Deep Cycle'</b>			
Absorption		14,1 - 14,4	
Float	13,5 - 13,8	13,5 - 13,8	
Storage	13,2 - 13,5	13,2 - 13,5	

Table 3: Recommended charge voltage

12 Volt Deep Cycle AGM							General Specification
Article number	Ah	V	l x w x h mm	Weight kg	CCA @0°F	RES CAP @80°F	Technology: flat plate AGM Terminals: copper
BAT406225084	240	6	320 x 176 x 247	31	700	270	Rated capacity: 20 hr. discharge at 25°C Float design life: 7-10 years at 20°C Cycle design life: 400 cycles at 80% discharge 600 cycles at 50% discharge 1500 cycles at 30% discharge
BAT212070084	8	12	151 x 65 x 101	2,5			
BAT212120086	14	12	151 x 98 x 101	4,4			
BAT212200084	22	12	181 x 77 x 167	5,8			
BAT412350084	38	12	197 x 165 x 170	12,5			
BAT412550084	60	12	229 x 138 x 227	20	280	80	
BAT412800084	90	12	350 x 167 x 183	27	400	130	
BAT412101084	110	12	330 x 171 x 220	32	500	170	
BAT412121084	130	12	410 x 176 x 227	38	550	200	
BAT412151084	165	12	485 x 172 x 240	47	600	220	
BAT412201084	220	12	522 x 238 x 240	65	650	250	
BAT412124081	240	12	522 x 240 x 224	67	650	250	

12 Volt Deep Cycle GEL							General Specification
Article number	Ah	V	l x w x h mm	Weight kg	CCA @0°F	RES CAP @80°F	Technology: flat plate GEL Terminals: copper
BAT412550104	60	12	229 x 138 x 227	20	250	70	Rated capacity: 20 hr. discharge at 25°C Float design life: 12 years at 20°C Cycle design life: 500 cycles at 80% discharge 750 cycles at 50% discharge 1800 cycles at 30% discharge
BAT412800104	90	12	350 x 167 x 183	26	360	120	
BAT412101104	110	12	330 x 171 x 220	33	450	150	
BAT412121104	130	12	410 x 176 x 227	38	500	180	
BAT412151104	165	12	485 x 172 x 240	48	550	200	
BAT412201104	220	12	522 x 238 x 240	66	600	220	
BAT412126101	265	12	520 x 268 x 223	75	650	250	

Other capacities and terminal types: at request





# 12,8V & 25,6 VOLT LITHIUM-ION PHOSPHATE BATTERIES SMART

Victron Energy Lithium Battery Smart batteries are Lithium Iron Phosphate (LiFePO4) batteries and are available in 12.8 V or 25.6 V in various capacities. They can be connected in series, parallel and series/parallel so that a battery bank can be built for system voltages of 12 V, 24 V or 48 V. The maximum number of batteries in one system is 20, which results in a maximum energy storage of 84 kWh in a 12 V system and up to 102 kWh in a 24 V<sup>1)</sup> and 48 V<sup>1)</sup> system.

A single LFP cell has a nominal voltage of 3.2 V. A 12.8 V battery consists of 4 cells connected in series and a 25.6 V battery consists of 8 cells connected in series.

## Why lithium-iron-phosphate?

### Rugged

A lead-acid battery will fail prematurely due to sulfation:

- If it operates in deficit mode during long periods of time (i.e. if the battery is rarely, or never at all, fully charged).
- If it is left partially charged or worse, fully discharged (yacht or mobile home during wintertime).

A LFP battery:

- Does not need to be fully charged. Service life even slightly improves in case of partial charge instead of a full charge. This is a major advantage of LFP compared to lead-acid.
- Other advantages are the wide operating temperature range, excellent cycling performance, low internal resistance and high efficiency (see below).

LFP is therefore the chemistry of choice for demanding applications.

### Efficient

- In several applications (especially off-grid solar and/or wind), energy efficiency can be of crucial importance.
- The round-trip energy efficiency (discharge from 100 % to 0 % and back to 100 % charged) of the average lead-acid battery is 80 %.
- The round-trip energy efficiency of a LFP battery is 92 %.
- The charge process of lead-acid batteries becomes particularly inefficient when the 80 % state of charge has been reached, resulting in efficiencies of 50 % or even less in solar systems where several days of reserve energy is required (battery operating in 70 % to 100 % charged state).
- In contrast, a LFP battery will still achieve 90 % efficiency under shallow discharge conditions.

### Size and weight

- Saves up to 70 % in space
- Saves up to 70 % in weight

### Expensive?

- LFP batteries are expensive when compared to lead-acid. But in demanding applications, the high initial cost will be more than compensated by longer service life, superior reliability and excellent efficiency.

### Bluetooth

- With Bluetooth cell voltages, temperature and alarm status can be monitored.
- Instant readout: The [VictronConnect App](#) can display the most important data on the Device list page without the need to connect to the product.
- Very useful to localize a (potential) problem, such as cell imbalance.

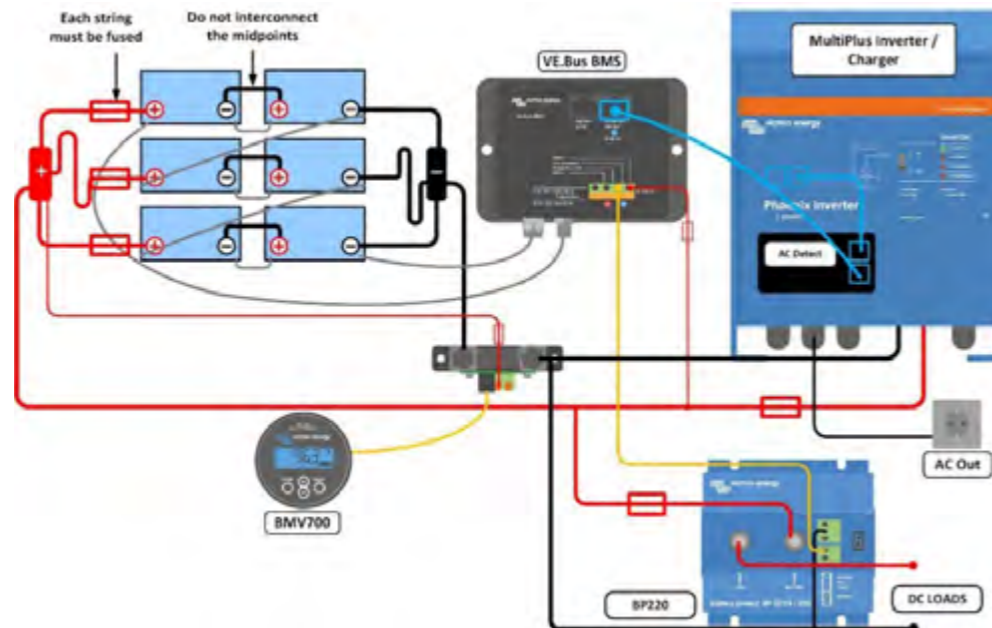
<sup>1)</sup>To reduce required balancing time, we recommend using a little different batteries in series as possible for the application. 24 V systems are best built using 24 V batteries. And 48 V systems are best built using two 24 V batteries in series. While the alternative, four 12 V batteries in series, will work, it will require more periodic balancing time.



12,8 V 330 Ah LiFePO4 Battery



VictronConnect App



Our LFP batteries have integrated cell balancing and cell monitoring. The cell balancing/monitoring cables can be daisy-chained and must be connected to a Battery Management System (BMS).

### Battery Management System (BMS)

The BMS will:

1. Generate a pre-alarm whenever the voltage of a battery cell decreases to less than 3.1 V (adjustable 2.85 V – 3.15 V).
2. Disconnect or shut down the load whenever the voltage of a battery cell decreases to less than 2.8 V (adjustable 2.6 V – 2.8 V).
3. Stop the charging process whenever the voltage of a battery cell increases to more than 3.75 V or when the temperature becomes too high or too low.

See the BMS datasheets for more features.

Battery specification								
VOLTAGE AND CAPACITY	LFP-Smart 12,8/50	LFP-Smart 12,8/100	LFP-Smart 12,8/160	LFP-Smart 12,8/180	LFP-Smart 12,8/200	LFP-Smart 12,8/330	LFP-Smart 25,6/100	LFP-Smart 25,6/200-a
Nominal voltage	12,8 V	12,8 V	12,8 V	12,8 V	12,8 V	12,8 V	25,6 V	25,6 V
Nominal capacity @ 25 °C*	50 Ah	100 Ah	160 Ah	180 Ah	200 Ah	330 Ah	100 Ah	200 Ah
Nominal capacity @ 0 °C*	40 Ah	80 Ah	130 Ah	150 Ah	160 Ah	260 Ah	80 Ah	160 Ah
Nominal capacity @ -20 °C*	25 Ah	50 Ah	80 Ah	90 Ah	100 Ah	160 Ah	50 Ah	100 Ah
Nominal energy @ 25 °C*	640 Wh	1280 Wh	2048 Wh	2304 Wh	2560 Wh	4220 Wh	2560 Wh	5120 Wh
*Discharge current ≤1C								
CYCLE LIFE (capacity ≥ 80 % of nominal)								
80 % DoD	2500 cycles							
70 % DoD	3000 cycles							
50 % DoD	5000 cycles							
DISCHARGE								
Maximum continuous discharge current	100 A	200 A	320 A	360 A	400 A	400 A	200 A	400 A
Recommended continuous discharge current	≤50 A	≤100 A	≤160 A	≤180 A	≤200 A	≤300 A	≤100 A	≤200 A
End of discharge voltage	11.2 V	11.2 V	11.2 V	11.2 V	11.2 V	11.2 V	22.4 V	22.4 V
Internal resistance	2 mΩ	0.8 mΩ	0.9 mΩ	0.9 mΩ	0.8 mΩ	0.8 mΩ	1.6 mΩ	1.5 mΩ
OPERATING CONDITIONS								
Operating temperature	Discharge: -20 °C to +50 °C				Charge: +5 °C to +50 °C			
Storage temperature	-45 °C to +70 °C							
Humidity (non-condensing)	Max. 95 %							
Protection class	IP 22							
CHARGE								
Charge voltage	Between 14 V/28 V and 14,4 V/28,8 V (14,2 V/28,4 V recommended)							
Float voltage	13,5 V/27 V							
Maximum charge current	100 A	200 A	320 A	360 A	400 A	400 A	200 A	400 A
Recommended charge current	≤30 A	≤50 A	≤80 A	≤90 A	≤100 A	≤150 A	≤50 A	≤100 A
MOUNTING								
Can be placed on their sides	Yes <sup>2)</sup>	Yes <sup>2)</sup>	Yes <sup>2)</sup>	Yes <sup>2)</sup>	Yes <sup>2)</sup>	No <sup>3)</sup>	Yes <sup>2)</sup>	Yes <sup>2)</sup>
OTHER								
Max storage time @ 25°C <sup>1)</sup>	1 year							
BMS connection	Male + female cable with M8 circular connector, length 50 cm							
Power connection (threaded inserts)	M8	M8	M8	M8	M8	M10	M8	M8
Dimensions (h x w x d) mm	199 x 188 x 147	197 x 321 x 152	237 x 321 x 152	237 x 321 x 152	237 x 321 x 152	265 x 359 x 206	197 x 650 x 163	237 x 650 x 163
Weight	7 kg	14 kg	18 kg	18 kg	20 kg	29 kg	28 kg	39 kg
STANDARDS								
Safety	Cells: UL1973 + IEC62619:2017 + UL9540A	Cells: IEC62133:2012		Cells: UL1973 + IEC62619:2017 + UL9540A Battery: IEC62619:2017 + IEC62620:2014	Cells: UL1642	Cells: UL1973 + UL9540A		Cells: UL1973 + IEC62619:2017 + UL9540A Battery: IEC62620:2014
EMC	EN 60335-1:2012/AC:2014, EN-IEC 62368-1: 2020, IEC 61427-1:2013							
Automotive	EN-IEC 61000-6-3:2007/A1:2011/AC:2012 - EN 55014-1:2017/A11:2020							
	ECE R10-6							

<sup>1)</sup> When fully charged

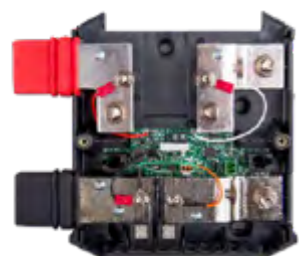
<sup>2)</sup> The lithium battery can be mounted upright and on its side, but not with the battery terminals facing down

<sup>3)</sup> The 12.8V/330Ah lithium battery may only be mounted in an upright position

## LYNX SHUNT VE.CAN



Lynx Shunt VE.Can



Lynx Shunt VE.Can without cover



RJ45 VE.Can terminator

### Busbar integrated battery monitoring

The Lynx Shunt VE.Can contains a positive and negative busbar, a battery monitor and a fuse holder for the main system fuse. It is part of the Lynx Distribution system.

The Lynx Distributor has a power LED.

The Lynx Shunt VE.Can can communicate via VE.Can with an GX device.

The Lynx Shunt VE.Can ships with two RJ45 VE.Can terminators, these are used when connecting to a GX device.

The Lynx Shunt VE.Can is designed to hold a CNN fuse. The fuse needs to be purchased separately. For more info see section [Fusing](#) in the Lynx Shunt VE.Can manual.

### The Lynx Distribution System

The Lynx Distribution System is a modular busbar system that incorporates DC connections, distribution, fusing, battery monitoring and/or Lithium battery management. For more information also see the [DC Distribution Systems product page](#).

The Lynx Distribution System consist of the following parts:

- **Lynx Power In** - A positive and negative busbar with 4 connections for batteries or DC equipment.
- **Lynx Distributor** - A positive and negative busbar with 4 fused connections for batteries or DC equipment together with fuse monitoring.
- **Lynx Shunt VE.Can** - A positive busbar with a space for a main system fuse and a negative busbar with a shunt for battery monitoring. It has VE.Can communication for monitoring and setup with a GX device.
- **Lynx Smart BMS** - For use together with Victron Energy Smart Lithium batteries. It contains a positive busbar with a contactor that is driven by a battery management system (BMS) and a negative busbar with a shunt for battery monitoring. It has Bluetooth communication for monitoring and setup via the VictronConnect App and VE.Can communication for monitoring with a GX device and the VRM portal.



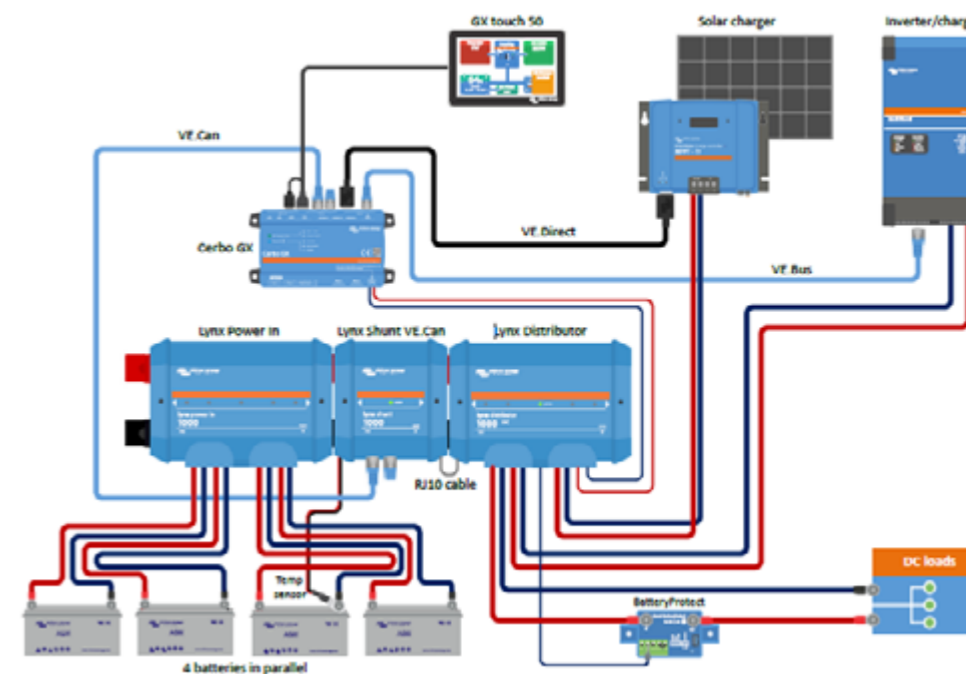
The Lynx modules: Lynx Power In, Lynx Distributor, Lynx Shunt VE.Can and Lynx Smart BMS

Lynx Shunt VE.Can	
POWER	
Supply voltage range	9 - 70 Vdc
Supported system voltages	12, 24 or 48V
Reverse polarity protection	No
Current rating	1000Adc continuous
Power consumption	60mA @ 12V 33mA @ 24V 20mA @ 48V
Potential free alarm contact	3A, 30Vdc, 250Vac
CONNECTIONS	
Busbar	M8
Fuse	M8
VE.Can	RJ45 and RJ45 terminator
Power supply connection to Lynx Distributor	RJ10 (a RJ10 cable ships with each Lynx Distributor)
Temperature sensor	Screw terminal
Relay	Screw terminal
PHYSICAL	
Enclosure material	ABS
Enclosure dimensions (h x w x d)	190 x 180 x 80 mm
Unit weight	1.4 kg
Busbar material	Tinned copper
Busbar dimensions (h x w)	8 x 30 mm
ENVIRONMENTAL	
Operating temperature range	-40°C to +60°
Storage temperature range	-40°C to +60°
Humidity	Max. 95% (non-condensing)
Protection class	IP22

### System example – Lynx Shunt VE.Can, Lynx Power In, Lynx Distributor and lead acid batteries

This system contains the following components:

- Lynx Power In with 4 paralleled 12V lead acid batteries.
- Identical cable lengths for each battery.
- Lynx Shunt VE.Can with main system fuse and battery monitor.
- Lynx Distributor with fused connections for inverter/charger(s), loads and chargers. Note that additional modules can be added if more connections are needed.
- Cerbo GX (or other GX device) to read out the battery monitor data.



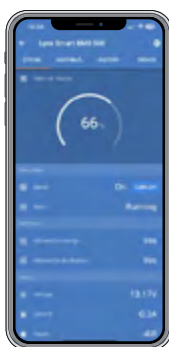
## LYNX SMART BMS



Lynx Smart BMS 500 A



Lynx Smart BMS 1000 A



VictronConnect

### System example – Lynx Smart BMS, 2x Lynx Distributor and lithium batteries

This system contains the following components:

- Lynx Distributor with 2 fused paralleled Lithium Smart batteries.
- Lynx Smart BMS with BMS, contactor and battery monitor.
- A second Lynx Distributor provides fused connections for inverter/charger(s), loads and chargers. Additional modules can be added if more connections are needed.
- A Cerbo GX (or other GX device) to read out the Lynx Smart BMS and Lynx Distributor data.

The Lynx Smart BMS is a dedicated Battery Management System (BMS) for the [Victron Lithium Battery Smart](#) batteries. These batteries are Lithium Iron Phosphate (LiFePO4) batteries and are available in 12.8 V or 25.6 V in various capacities. They can be connected in series, parallel and series/parallel so that a battery bank can be built for system voltages of 12V, 24 V or 48 V. The maximum number of batteries in one system is 20, which results in a maximum energy storage of 84 kWh in a 12 V and up to 102 kWh in a 24 V<sup>1)</sup> and 48 V<sup>1)</sup> system.

For more information on these batteries, visit the [Victron Lithium Battery Smart product page](#).

Out of the various available BMSes, the Lynx Smart BMS is the most feature rich and complete option and integrates seamlessly into the [Lynx Distributor system](#). It is available in 500 A (M8) and 1000 A (M10) versions.

#### Built-in 500 A or 1000 A contactor

The contactor acts as a secondary safety system to protect the battery in case the primary controls (ATC, ATD and/or DVCC) fail to disable loads and/or chargers when required and is also suitable as a remote controllable main system switch.

#### Pre-charge circuit

In addition to the contactor, a built-in pre-charge circuit prevents high inrush currents when connecting a capacitive load such as a MultiPlus/Quattro or other inverter, eliminating the need for external pre-charging.

#### Monitoring and control

Monitor and control the BMS via Bluetooth using the [VictronConnect App](#) or a GX device such as a [Cerbo GX](#) and the [VRM Portal](#). A built-in battery monitor that operates in a similar fashion as the other [Victron Energy battery monitors](#), provides data such as state of charge, voltage, current, historical data, status info and more in real time, and with [Instant Readout](#) even without the need to connect to the BMS, allowing diagnostic at a glance.

#### DVCC closed loop control as well as ATC/ATD contacts

Compatible Victron inverter/chargers and solar chargers are automatically controlled via a connected GX device and [DVCC](#). The ATC/ATD contacts can be used to control other chargers and loads that have a remote on/off port.

#### Programmable relay

The relay can be used either as an alarm relay (combined with the pre-alarm) or to control an alternator via its external regulator (ignition cable). In Alternator ATC mode, the relay will only activate when the contactor is closed. Alternator ATC contact of the alternator opens first and then with a delay of 2 seconds the contactor. These 2 seconds ensure that the alternator is switched off before the battery is disconnected from the system.

#### AUX terminal

The advantage of the onboard auxiliary power supply (1.1 A @ system voltage) is to provide power to specific loads (i.e. a GX device) after the BMS has shut down the loads in the event of a low cell voltage event. If no charge voltage is detected within 5 minutes, the BMS including the AUX connection switches off.

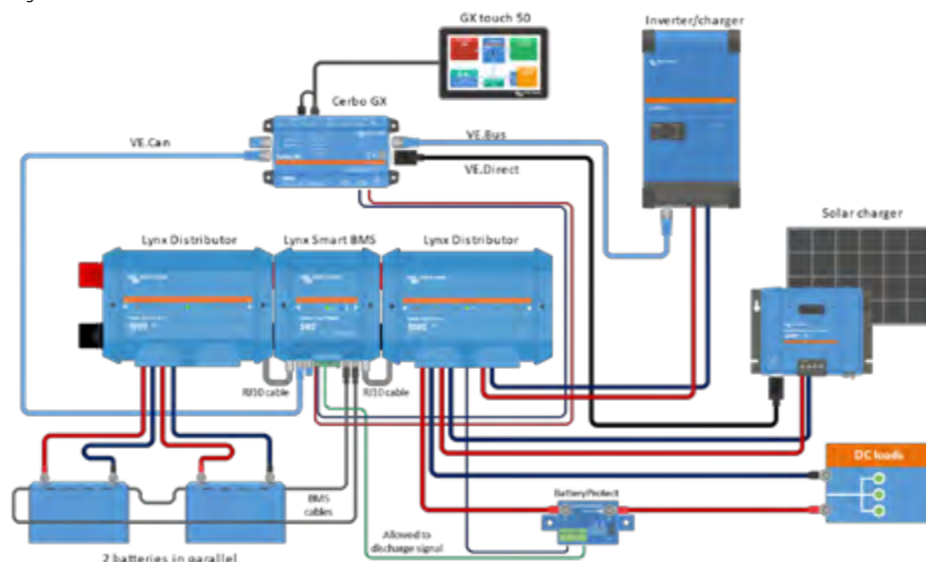
#### VE.Can and NMEA 2000 data communication

VE.Can allows for easy connection (standard RJ45 network cable) and communication with a GX device. Since the CANbus protocol is based on NMEA 2000 (and J1939), it is easy to integrate into a marine network and feed your marine MFD with data (requires a [VE.Can to NMEA 2000 micro-C male cable](#)).

#### Lynx Distributor fuse monitoring

Read out fuse status and receive an alarm in case a fuse is blown. The Lynx Smart BMS monitors up to 4 connected Lynx Distributors and their fuses via VictronConnect or a GX device

<sup>1)</sup> To reduce required balancing time, we recommend to use a little different batteries in series as possible for the application. 24 V systems are best built using 24 V batteries. And 48 V systems are best built using two 24 V batteries in series. While the alternative, four 12 V batteries in series, will work, it will require more periodic balancing time.



Lynx Smart BMS	500 A (LYN040102100)	1000 A
<b>POWER</b>		
Battery voltage range	9 – 60 VDC	
Maximum input voltage	75 VDC	
Supported system voltages	12, 24 or 48 V	
Reverse polarity protection	No	
Main safety contactor continuous current rating	500 A continuous	1000 A continuous
Main safety contactor peak current rating	600 A for 5 minutes	1200 A for 5 minutes
Power consumption OFF mode	0.3 mA for all system voltages	
Power consumption in Standby mode	Approximately 0.6 W (50 mA at 12 V)	
Power consumption in ON mode	Approx. 2.6 W (217 mA at 12 V) depending on the state of the relays	Approximately 4.2 W (350 mA at 12 V) depending on the state of the relays
Minimum load resistance for pre-charging	10 Ω and above for 12 V systems 20 Ω and above for 24 V and 48 V systems	
AUX output maximum current rating	1.1 A continuous, protected by resettable fuse	
Allow-to-charge port Maximum current rating	0.5 A at 60 VDC, protected by resettable fuse	
Allow-to-discharge port Maximum current rating	0.5 A at 60VDC, protected by resettable fuse	
Alarm relay (SPDT) Maximum current rating	2 A at 60 VDC	
<b>CONNECTIONS</b>		
Busbar	M8 (Torque: 14 Nm)	M10 (Torque: 33 Nm) (17 Nm for units with a serial number before HQ2340XXXX)
VE.Can	RJ45	
I/O	Removable multi-connector with screw terminals	
Battery BTV cables	Male and female circular 3-pole connector with M8 screw ring Up to 20 batteries can be connected in one system	
Lynx Distributor fuse monitoring (up to 4 modules)	RJ10 (cable ships with each Lynx Distributor)	
<b>PHYSICAL</b>		
Enclosure material	ABS	
Enclosure dimensions (h x w x d)	190 x 180 x 80 mm	230 x 180 x 100 mm
Unit weight	1.9 kg	2.7 kg
Busbar material	Tinned copper	
Busbar dimensions (h x w)	8 x 30 mm	
<b>ENVIRONMENTAL</b>		
Operating temperature range	-40 °C to +60 °C	
Storage temperature range	-40 °C to +60 °C	
Humidity	Max. 95 % (non-condensing)	
Protection class	IP22	
<b>STANDARDS</b>		
Safety	EN-IEC 63000:2018	
EMC	EN-IEC 61000-6-3:2007/A1:2011/AC:2012	
QMS	NEN-EN-ISO 9001:2015	



## System schematic drawing & requirements

Always feel free to contact your local Victron dealer, they are happy to help and trained with the highest of know-how to translate your needs into a robust system. Find your local dealer at ['Where to buy'](#) on our website.



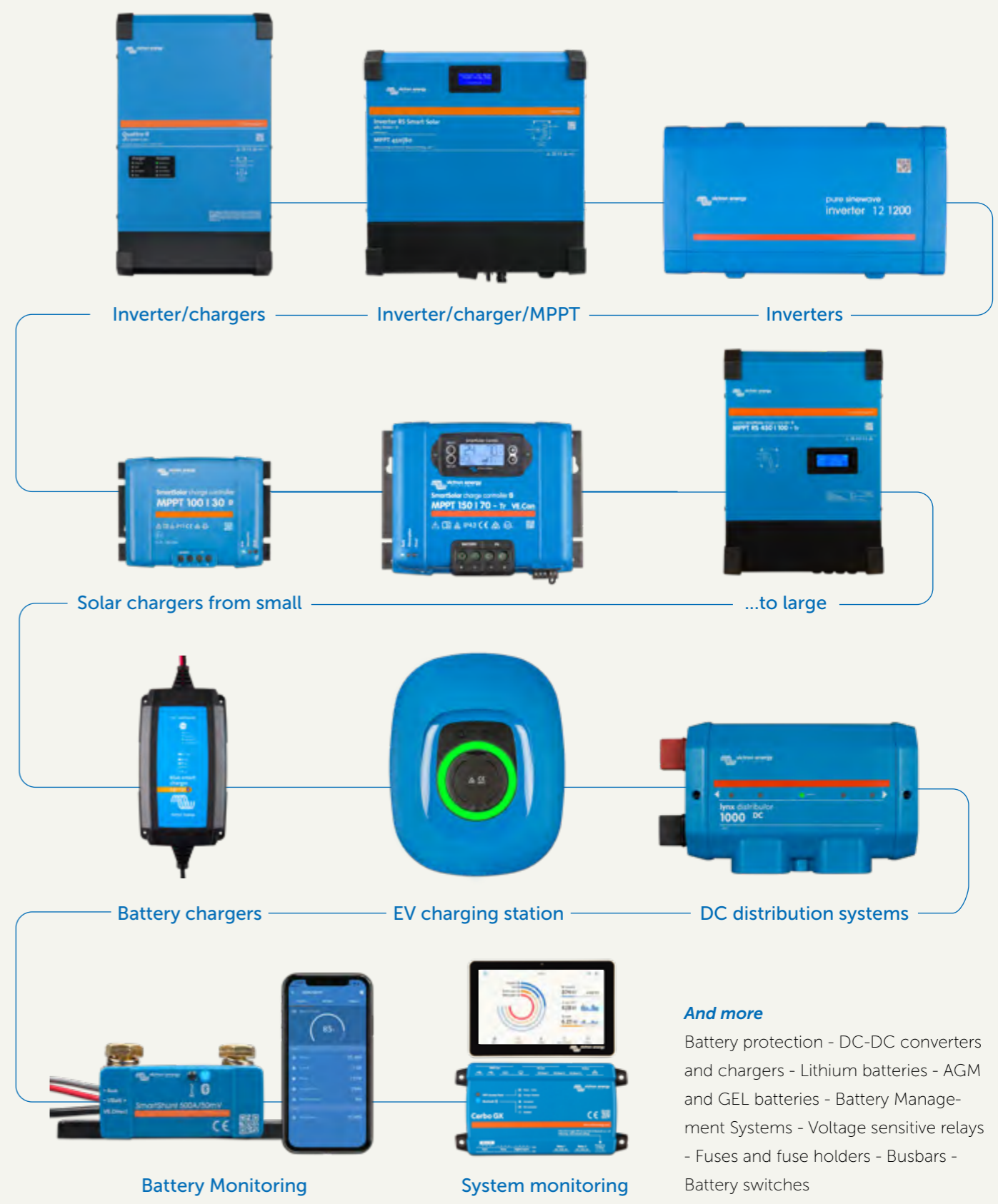


SELF-CONSUMPTION AND ENERGY STORAGE

# Flexible building blocks to solve any kind of power challenge

With Victron Energy you have one of the widest ranges of robust connected power products that keep performing, even in the harshest of climates. Our up-to-date solutions counter most challenges and can be fine-tuned to the most demanding and specific needs.

Feel free to ask your local [Victron dealer](#) for advice.  
[www.victronenergy.com](http://www.victronenergy.com)



**And more**  
 Battery protection - DC-DC converters and chargers - Lithium batteries - AGM and GEL batteries - Battery Management Systems - Voltage sensitive relays - Fuses and fuse holders - Busbars - Battery switches



SELF-CONSUMPTION AND ENERGY STORAGE

## Self-consumption and energy storage systems at work

An up-to-date range of flexible and robust products is only half the story. Installing them correctly is equally important. It is the dedication and drive of authorised Victron Professionals that makes it all work. Together we turn Victron Energy systems into unbeatable systems powered by know-how. *Let's have a look at some recent installations.*



SELF-CONSUMPTION AND ENERGY STORAGE





How do you get honest and fair advice for your energy transition business case?

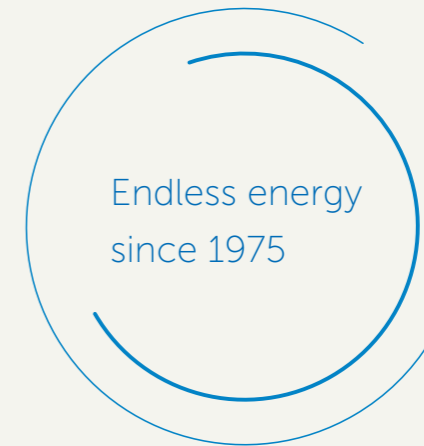
The answer is powered by know-how. Every power system is different and different locations present unique challenges. That is why we relentlessly train our global network of 1000+ authorised Victron installers with the highest level of know-how. They take their responsibility to offer well-considered, accurate advice seriously and do whatever they can to provide peace of mind for years to come.

Find your specialist at [victronenergy.com](https://www.victronenergy.com)

**Energy. Anytime. Anywhere.**

## Why Victron?

At Victron Energy we're as dedicated and driven to making and improving power solutions today as we were when we started in 1975. Thanks to our customer feedback, data and knowledge sharing, we innovate 24/7. We are powered by know-how, it keeps us going and our users going, ensuring peace of mind in off-grid for years to come.



01



### It's not one thing that makes it all work.

Our modular, robust and connected power systems have been proven to deliver unequalled reliability time and time again, even in the harshest of climates. But it's our unique combination of up-to-date hard- and software, intelligent monitoring apps, the network of highly trained authorized professionals and widespread repair centers that turns a Victron Energy system into an unbeatable system, that is powered by know-how.

02



### Reliability powers long service life cycles.

When making power supply investment decisions, calculations purely based on price can be deceptive. Their true performance and expected service life cycle are equally important. Good thing Victron Energy lives up to our specifications, both in terms of performance and expected life cycle (when used as designed). Our 5 or 10 year warranty and fair and fast repair policies mean your investments are protected and won't let you down.

03



### How efficiency translates into cost-effectiveness.

With battery-based systems, efficiency is always key to providing great levels of cost-effectiveness. From our incredibly efficient Smart-Solar Charge Controllers to the way our GX-communication centres maximise performance, with a Blue Power system you can be sure that all the details are thought-through. This, combined with our reputation for extreme resilience and long life cycles, translates into cost-effective solutions, especially when compared to 'cheaper' options.

04



### Intelligent monitoring means optimized systems.

Monitoring is crucial to fine-tune and optimize energy harvest and use based on ever-changing circumstances. With Victron you have the power of know-how at your fingertips. Through our industry leading and free VictronConnect app, you always have perfect control over your system from wherever you are. With our app and VRM portal you can monitor the complete system, change settings and catch potential issues early by programming alerts and alarms.

05



### Our worldwide network of authorized dealers is by your side.

Our global network of ±1000 highly trained distributors, installers and service partners are always on hand to help. From stock advice, installation recommendations, after-care and technical support.

With the Victron Energy team, our partners and lively community you can always be sure the power of know-how is by your side.

**CERBO GX**

# Connect it all. Control it all.

Unlock the full power of Victron Remote Management with the Cerbo GX



Managed Batteries



Victron Connected Products



Marine MFD's



Wireless temperature sensors

Works with



VictronConnect app



VRM - Remote Management portal



MFD & NMEA 2000 integration



Tank levels




Switch Relays




Solar irradiance & wind meters



Auto start/stop the generator



With the power of know-  
how by your side, you get  
**Energy. Anytime. Anywhere.**



**Victron Energy B.V.**  
De Paal 35 • 1351JG Almere • The Netherlands  
E-mail: [sales@victronenergy.com](mailto:sales@victronenergy.com)  
[www.victronenergy.com](http://www.victronenergy.com)



Energy. Anytime. Anywhere.