



Self-consumption & energy storage



victron energy
BLUE POWER



Energy. Anytime. Anywhere.



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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.

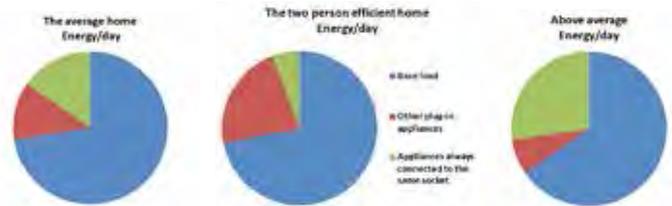
The other worst case scenario is the lack of ability to generate energy in periods of overcast weather and/or wind outages. This results in substantial battery storage to overcome this, which, like the large inverter power situation mentioned above, is only used on occasion.

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 baseload 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 the 24 hours of a day.

Examples of this are heating pumps, chargers and the standby power of household equipment. In order to optimise PV usage and limit the import of energy this base-load is the most efficient part to target.



Avoiding the import of the total energy need is possible but this would require a higher investment in the inverter, as it must then be able to cover for high loads. Most high loads are however peak loads and active over a limited period of time. So even though this requires a high energy supply, the time period is limited and the energy value within this peak-load period is quite 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. The energy stored in such a system is limited to the surplus PV power as part of the generated PV power is directly used by the loads. In this case PV power is sized according to the base load and any surplus energy is used overnight.

More information:
<https://www.victronenergy.com/upload/documents/Whitepaper-Self-Consumption-and-Grid-independence-with-the-Victron-Energy-Storage-Hub-EN.pdf>



Why choose Victron Energy for your Energy Storage system



A wide range of inverter/charger sizes and configurations

Our inverter/charger models range from a small 500VA unit all the way up to a 15kVA unit. Multiple units can be connected in parallel and/or 3-phase configuration. Thus it is possible to create systems ranging in power size from a small single phase system up to an impressive 180kVA 3-phase system.



Reinout Vader showing first inverter

Unrivalled experience with battery storage systems

Victron Energy was founded in 1973, back then we started with providing inverters and chargers for the marine industry. This quickly expanded to the land based and automotive market. We therefore have an unrivalled length of experience with battery storage systems.



DC-Coupled PV or AC-Coupled PV. Or even a combination of both

We can work with DC-Coupled PV: MPPT solar chargers. We have a broad range of efficient MPPT solar chargers. Starting from the MPPT 75V/15A (290 W charger) up to the 250V/100A (5.7kW solar charger).

We can also work with AC-Coupled PV etc. We are compatible with many brands of PV Inverters; with a strong collaboration with Fronius PV Inverters.

We can even combine AC and DC coupled PV in one system.



Excellent remote monitoring and diagnostics tools

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



UPS no-break output, operate without any disruption

Our inverter/charger takes over supplying power to the connected loads in the event of a grid or generator failure. This happens so fast (less than 20 milliseconds) that computers and other electronic equipment will continue to operate without any disruption.



Wide range of compatible battery technologies

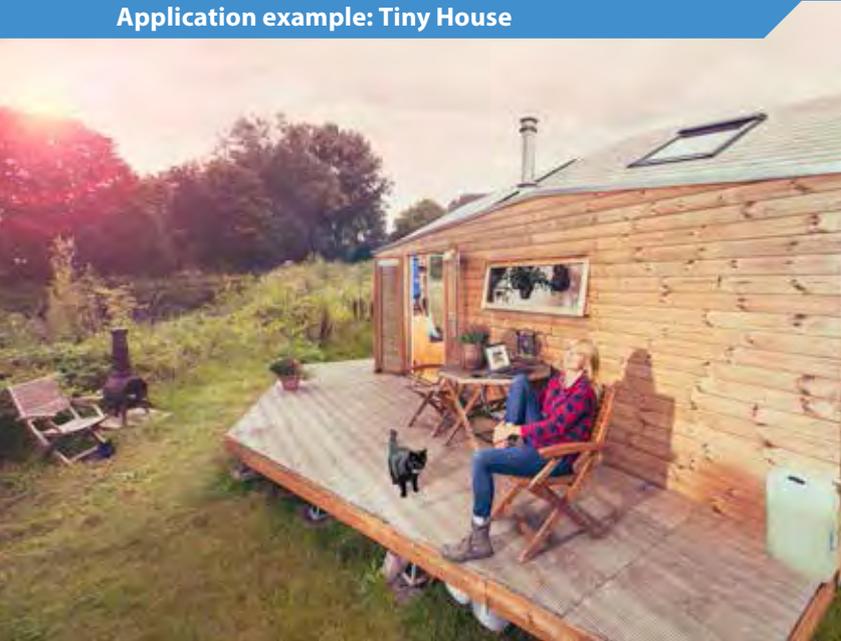
We sell our own brand of lead acid and lithium batteries. Also, our programmable inverter/chargers work with a wide range of battery technologies, see the logos below.

Battery technologies we work with:



And many more!

Application example: Tiny House



Tiny House

This is an application example of a Tiny House. Tiny Houses are very small homes that enable simple living in a smaller, more efficient space. They are usually made of wood, being creatively designed to maximise the utility of a small living space. The principal reasons for living in a Tiny House are to live sustainably in a financially and environmentally conscious way, whilst at the same time enjoying the resulting freedom.

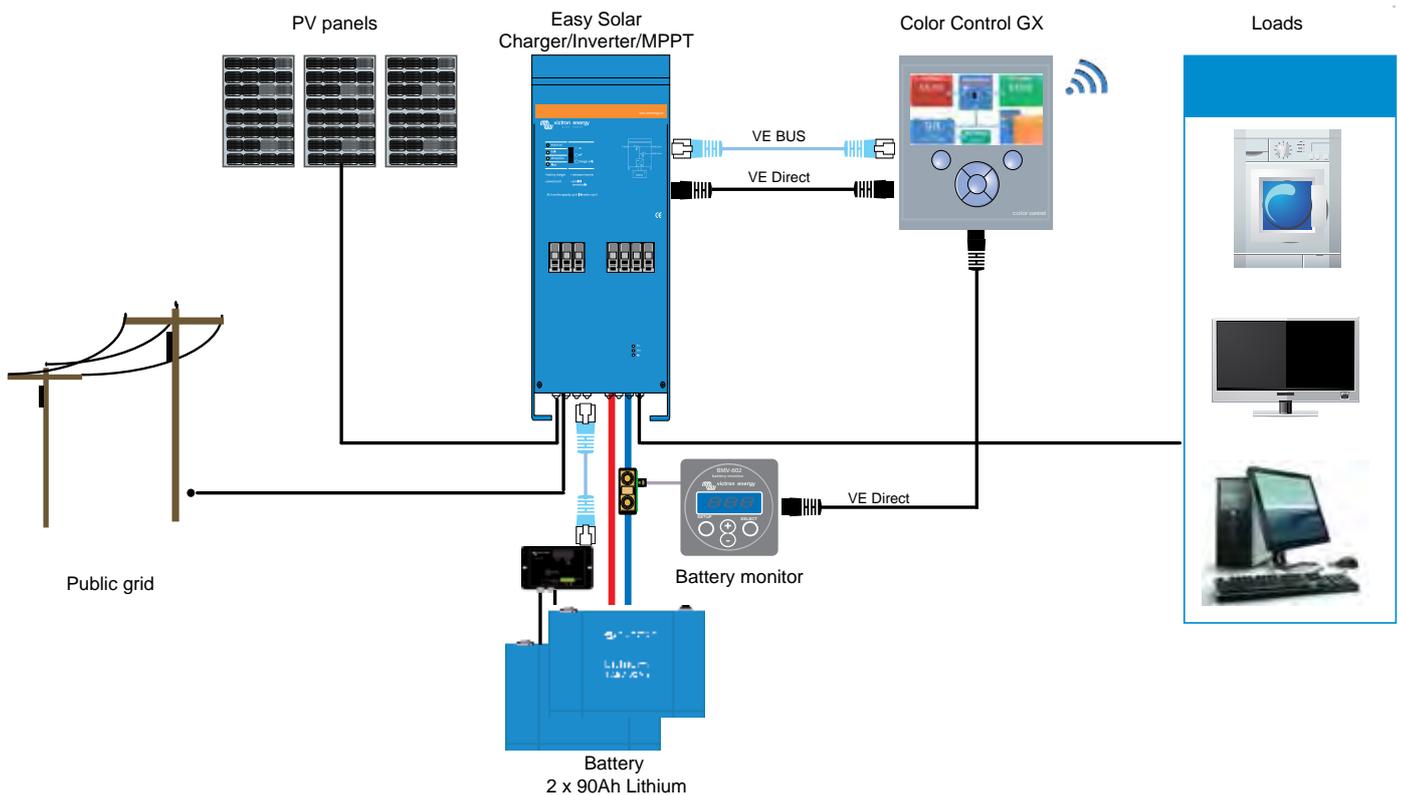
The Tiny House in the photograph belongs to Marjolein Jonker. She lives in The Netherlands and has built her own Tiny House, together with a team of specialists.

Victron equipment

The Tiny house of Marjolein is equipped with:

- EasySolar
- 2 x 90A Lithium-ion batteries
- BMV-700 Battery Monitor
- Color Control GX

For additional information about Marjolein Jonker's Tiny House please visit: <https://www.marjoleininhetklein.com/>





Smartflower POP+

This is an application example of the Smartflower. The Smartflower POP+ can not only turn the sun's energy into electricity very efficiently; it can store it in sufficient quantities too.

Enjoy the energy of the sun. Around the clock, almost independently of the grid

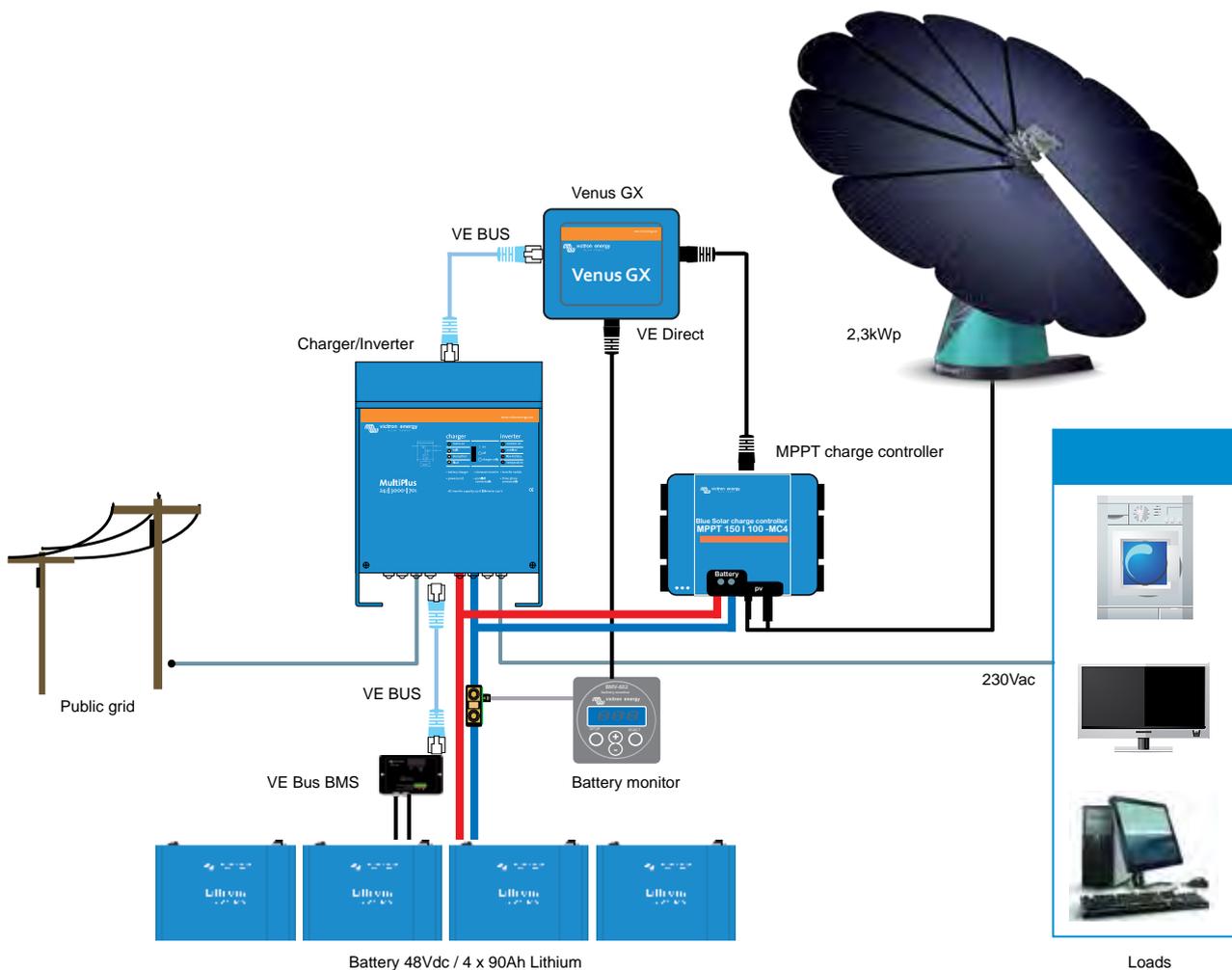
Completely integrated in an innovative all-in-one solar system that works on a plug-and-play principle like any normal household appliance. The intelligent tracking function of the PV modules ensures that the system makes the most efficient use of the sun's energy at all times of the day and year, while the battery is continuously recharged. So you can even enjoy cloudy days with a bright smile on your face.

Monitoring – access to the most important system data

With your personal access to the Monitoring System you can keep an eye on your current production, storage and consumption figures at all times. The system also allows you to make a number of different custom settings.

Victron inside & out

The Smartflower Pop+ uses a Victron Energy inverter, solar charge controller and Lithium batteries, plus this standalone unit connects to Victron Energy's VRM web portal for system monitoring.

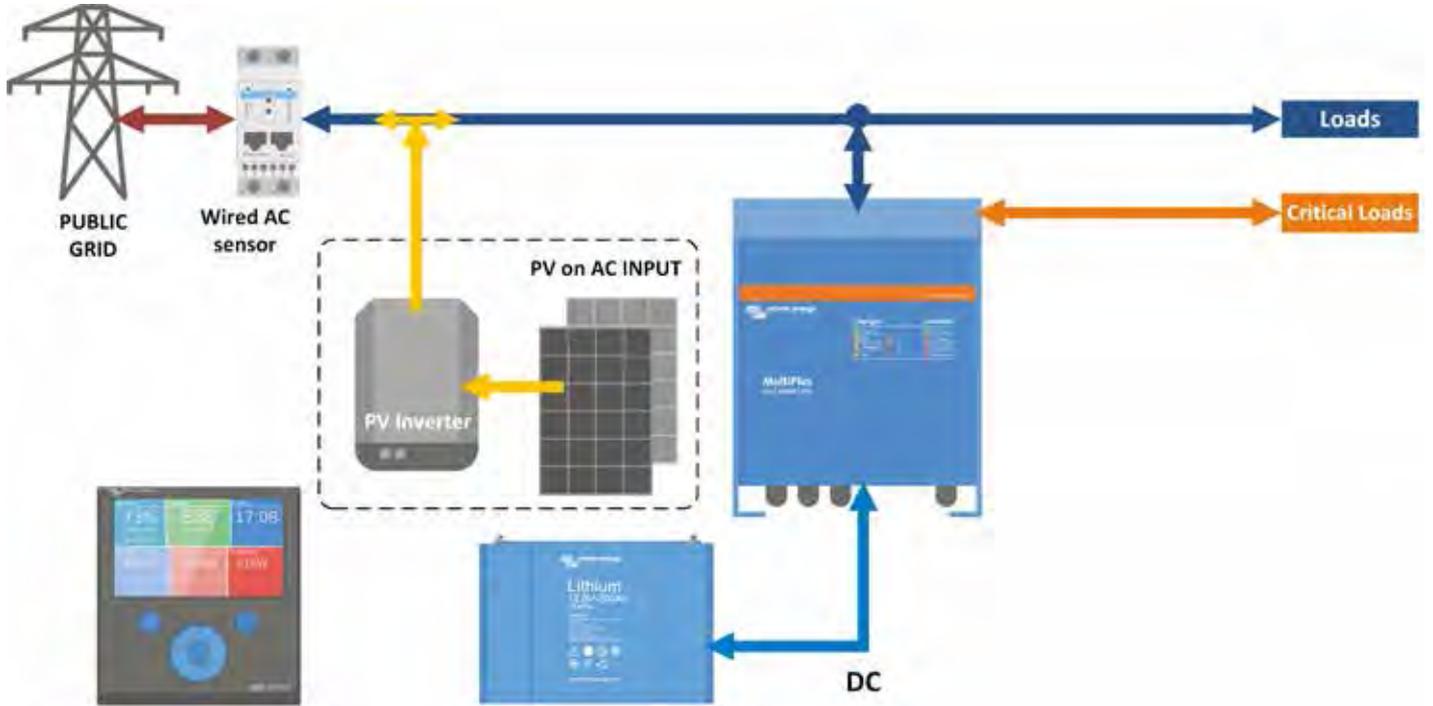


Which system to choose

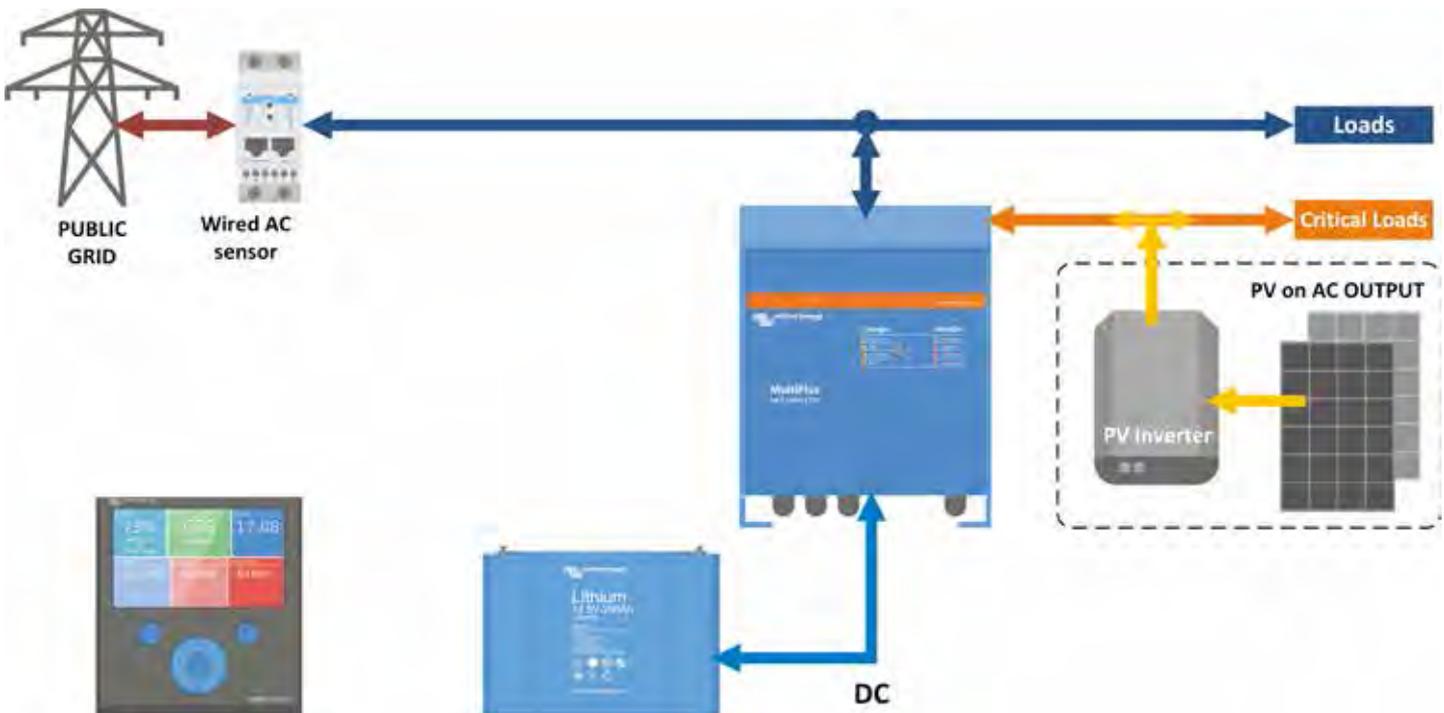
There is a solution for every situation, from simple to more complex solutions. We have different options available: PV in parallel, AC-Coupled PV, DC-Coupled PV or a combination of all these options.

Option 1: PV in parallel

Most practical solution to add battery storage to an existing grid connected PV system.

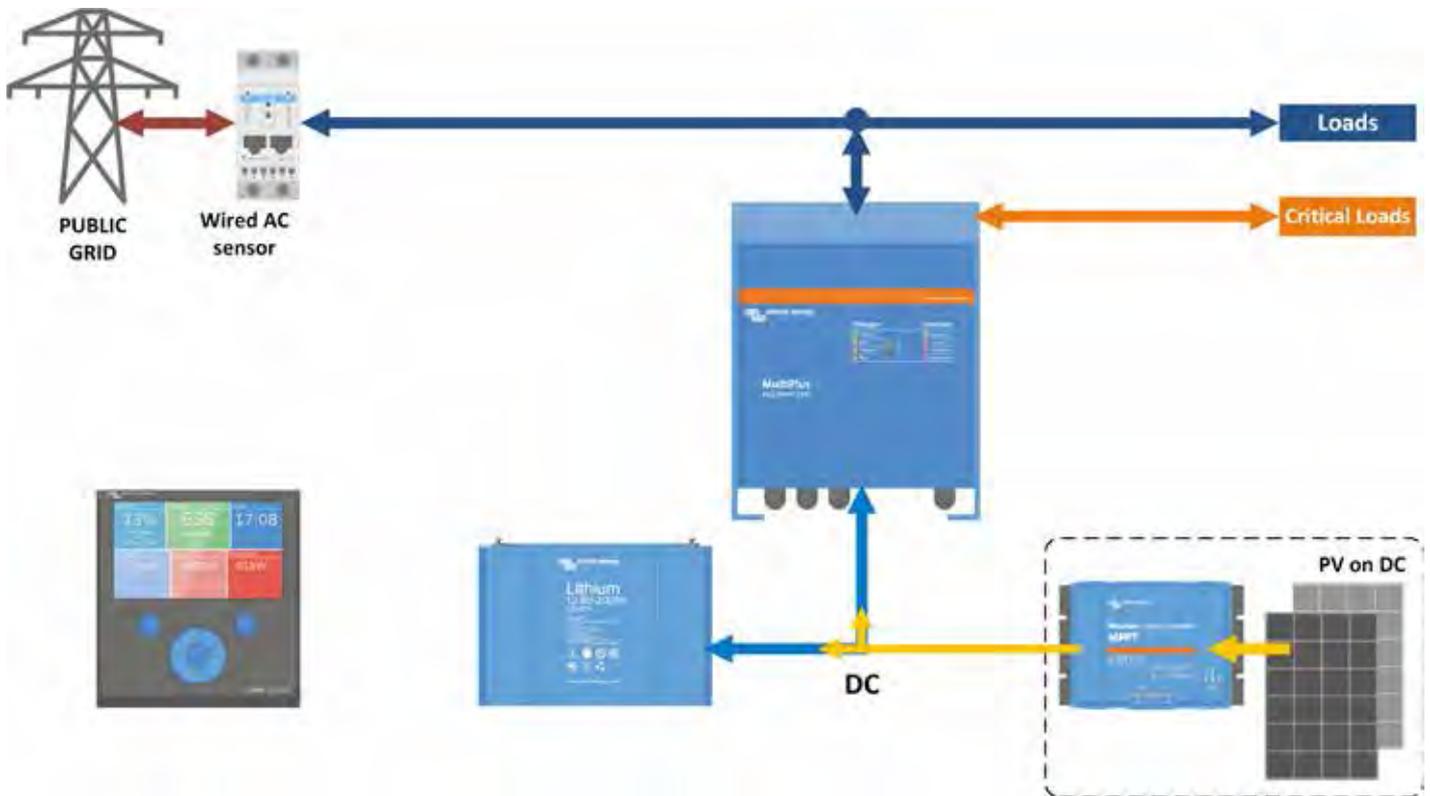


Option 2: AC-Coupled PV

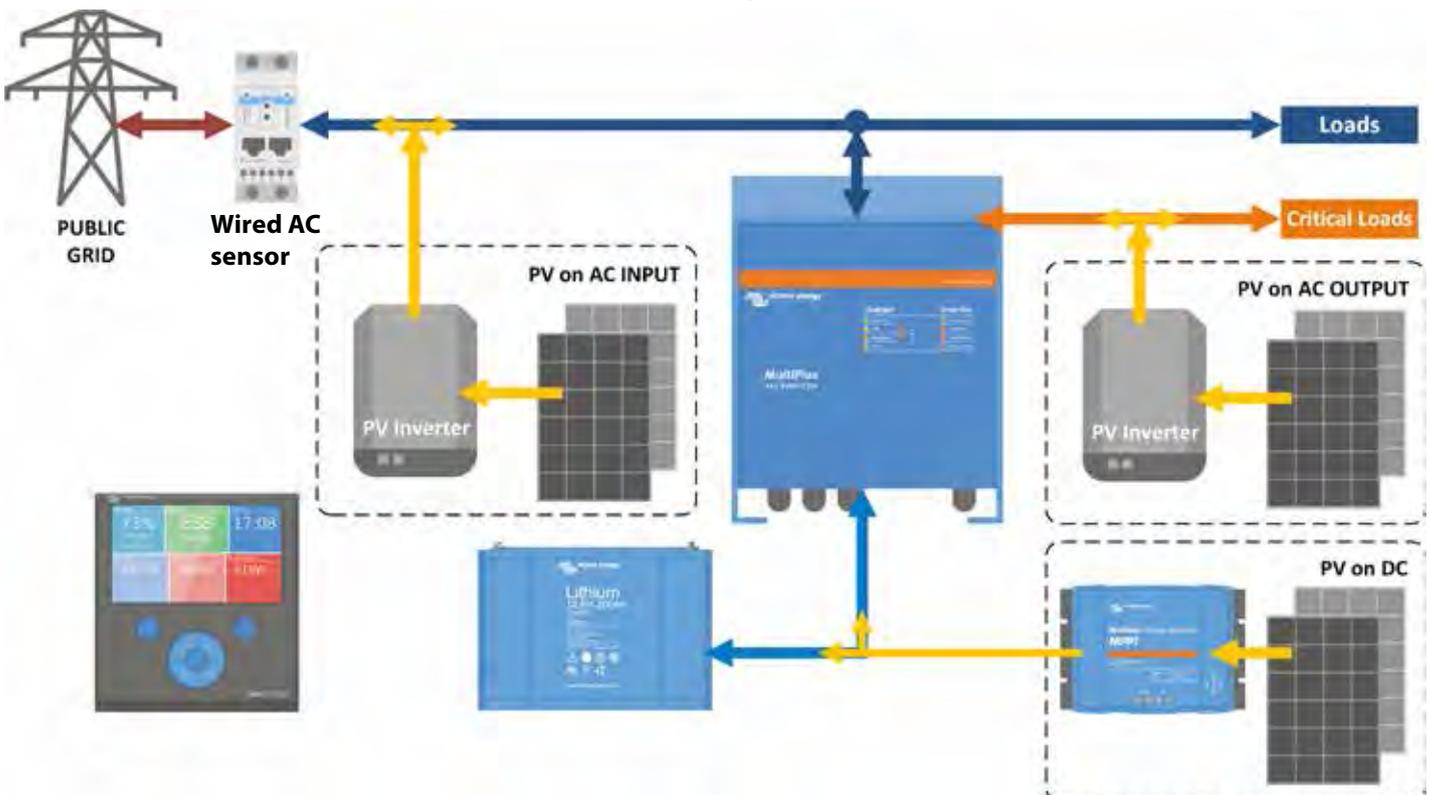


Option 3: DC-Coupled PV

The size of the PV array and the PV inverter is not limited by the maximum nominal power of the inverter/charger.



All options combined



Monitoring

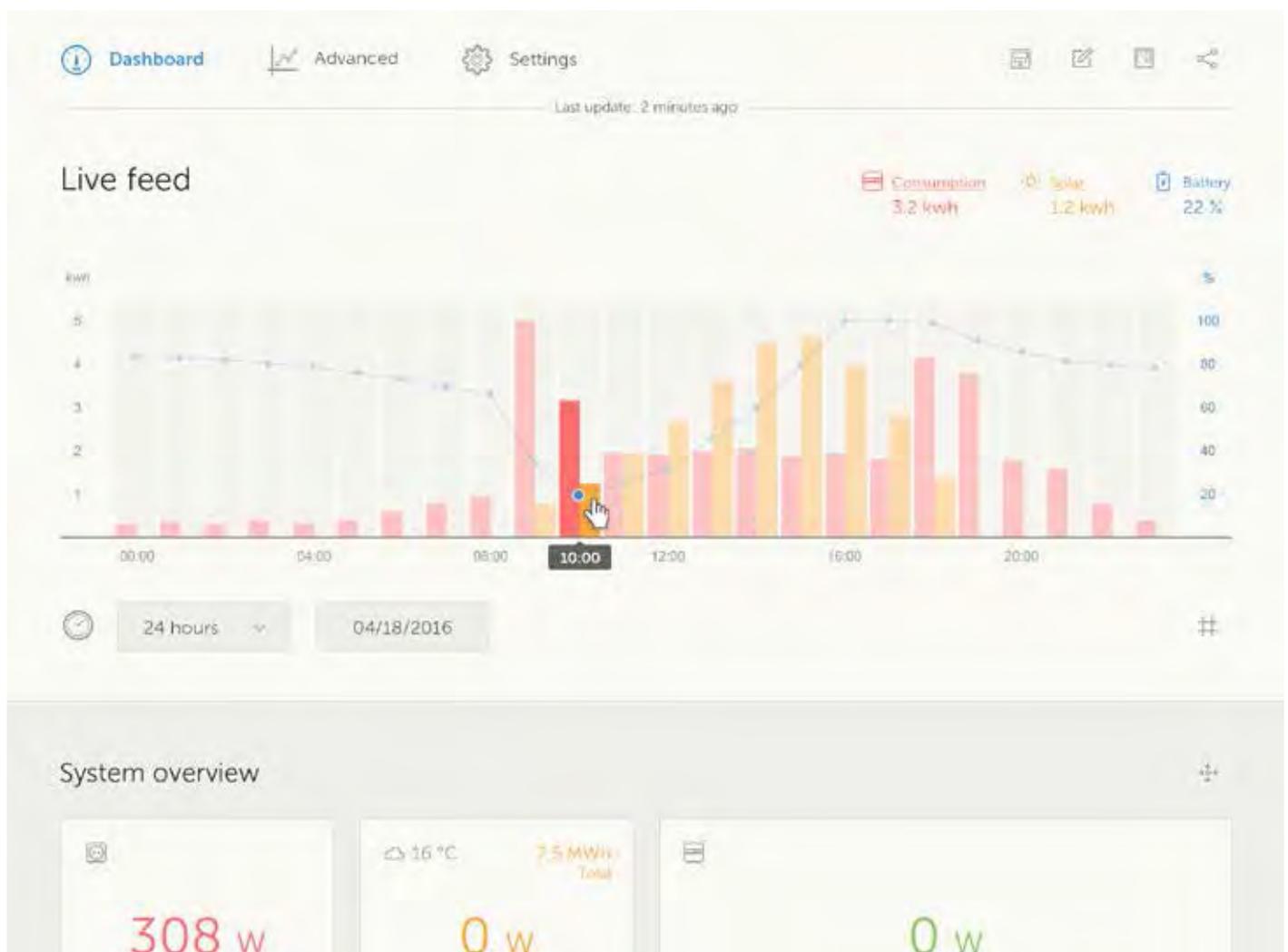
The major considerations for installing a self-consumption system are often financially and/or morally driven. For both, the goal is to minimise the import of grid energy and to optimise the consumption of self-generated power.

Modern inverter and battery monitoring technology helps to achieve this, by detecting how much energy to store and how and when to best use it. Besides this there is another important factor to consider.

This factor is the energy behaviour of the end-user themselves. This can differ between households and it is heavily dependent on circumstances, which can change from day to day. This makes coding the software, to precisely achieve optimal use of energy, quite a challenge.

If for example the washing machine is required on a particular day, the ideal day would be a sunny one just after the battery is (almost) full. Having said that direct power usage is preferable, which saves having to export energy to the grid or use battery power momentarily.

In order to be able to make these kinds of energy use decisions, monitoring is crucial to fine tune and optimise energy use based on ever changing circumstances. This makes monitoring systems an essential feature for every self-consumption system. Tests have shown that users of self-consumption systems with monitoring score a much higher level of self-consumption than those systems which lack it.



VRM: Live feed overview



Color Control GX



Venus GX

Victron Energy self-consumption systems can offer the best of both worlds

By using a Color Control GX, with its easy to use display, a clear system overview will show all the details needed to make crucial decisions as to which loads to use or to delay. Behind the overview screens other advanced information can be found - enough to satisfy even the most data-hungry users.

Venus GX

The Venus GX provides 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

VRM Online Portal

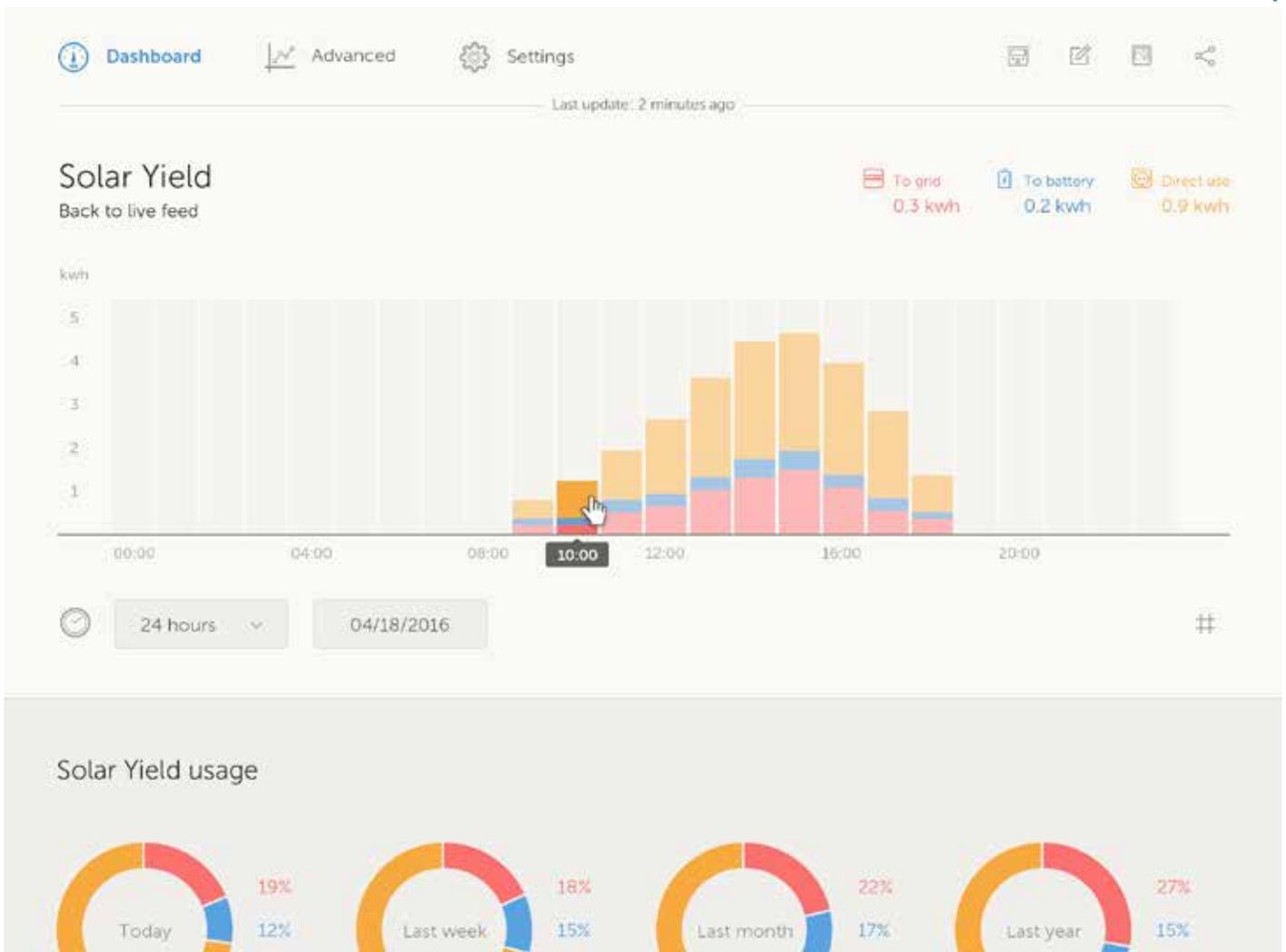
All this data is automatically sent to our free remote monitoring website: the VRM Online Portal, which allows even more options. It provides data analysis via the free VRM app which can be used on virtually every smartphone, so even when away from the Color Control GX the system can be easily monitored. Also the webserver is able to provide an advanced system overview, such as calculations of total solar yield, power generation and graphs - for all the equipment connected to the system.

To get an impression of the VRM Online Portal, please visit:

<https://vrm.victronenergy.com>



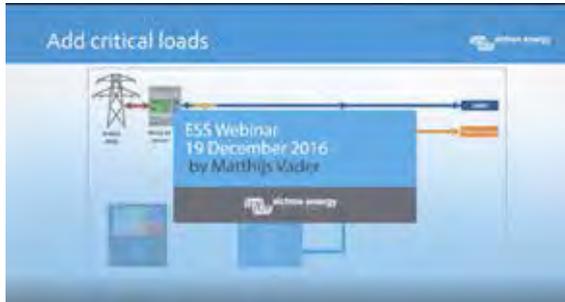
VRM app



VRM: Solar Yield overview

Tools

There are a lot of tools available that make it easy to work with Victron Energy products, for both Victron installers as Victron distributors. Whether you would like to configure and read out your Victron products with VictronConnect using your smartphone, tablet or computer or you want to show or share your VRM site.



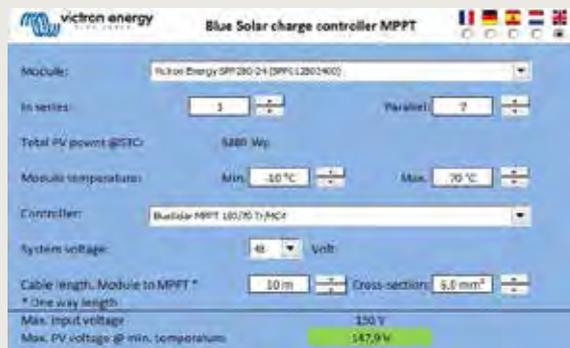
Instruction videos on Victron youtube channel

On our youtube channel you can watch Victron Energy instruction videos.

<https://www.youtube.com/user/VictronEnergyBV>

ESS Webinar

There is a webinar about ESS available on our youtube channel, in the languages English, Spanish, German and French.

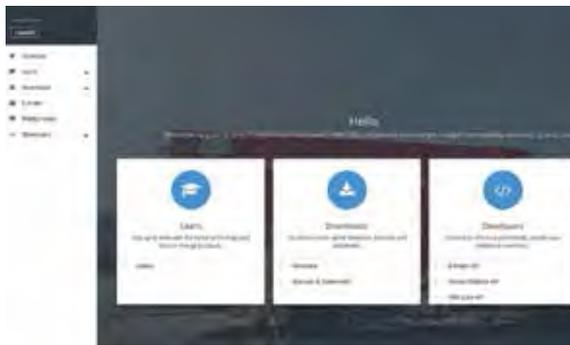


MPPT Calculator Excel sheet

With the MPPT Calculator Excel sheet you can match solar modules to MPPT charge controllers.

Download the Excel sheet from our software page:

<https://www.victronenergy.com/support-and-downloads/software>



Victron Professional

With Victron Professional you can get insight into training sessions, videos, firmware files, APIs and the latest news. If you already use E-Order you can login with those credentials.

Sign up for Victron Professional here:

<https://professional.victronenergy.com>



VRM World: View shared VRM sites around the world

Ever wanted to show your clients, friends, colleagues how much solar energy your installation is generating or indeed any other data that you can see on your VRM site? Well now you can – using VRM World.

You need a VRM account to be able to view shared VRM sites. In your VRM portal it is possible to publicly share on VRM World.

Visit VRM World here:

<https://vrm.victronenergy.com/world/>

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



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). It is also possible for the battery monitor to exchange data with the Victron Global Remote. This includes sending alarms.



Color Control GX

The Color Control GX provides intuitive control and monitoring for all products connected to it. The list of Victron products that can be connected is endless: Inverters, Multis, Quattros, MPPT 150/70, BMV-700 series, Skylla-i, Lynx-Ion and even more.



Venus GX

The Venus GX provides 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



MPPT Control

The MPPT Control lets you see the status as well as setup all BlueSolar and SmartSolar MPPT Charge Controllers that have a VE.Direct communications port. The new MPPT Control is mounted in the familiar BMV-700 series housing, maintaining a consistent and professional look to your panels and systems monitoring equipment.



Anti-islanding made easy: the anti-islanding box

The anti-islanding box is a complete pre-wired and easy to install anti-islanding device consisting of a Ziehl anti-islanding relay (model UFR1001E or model SPI1021), the required circuit breakers and a 63A contactor. For specifications of the Ziehl relay, see <http://www.ziehl.de>.



Energy Meter

The ET112 (for single phase max. 100A) and the ET340 (for three phase max. 65A) Energy Meters are typically used in an Energy Storage System. To measure the power and energy of the whole application at the distribution box. Or to measure the output of a PV Inverter, to display the data on the Color Control GX and the VRM Portal.



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 the Color Control. The two measurement wires can be connected to the AUX and/or temperature sense input of a Multi or Quattro.



Zigbee to USB converter & Zigbee to RS485

Zigbee to USB converter, DRF2618A, DTK
 Zigbee to RS485 converter, DRF2619A, DTK



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 bdeu-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 and look for the UFR1001E under the Mains monitoring group.



Ziehl Voltage and Frequency Relay SPI1021

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

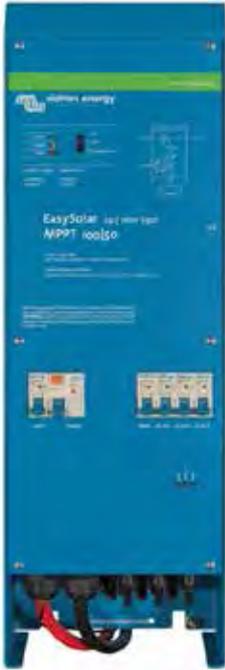
For more information, we refer you to the datasheet and certificates below which are available to download. Or visit www.ziehl.de and look for the SPI1021 under the Mains monitoring group.



Note - for our newest datasheets please refer to our website:
www.victronenergy.com

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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 (BlueSolar 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.

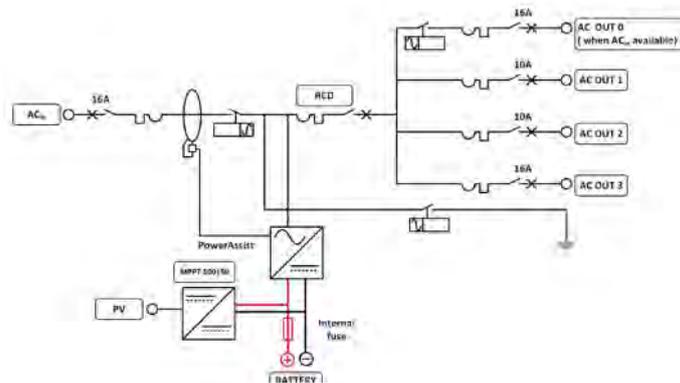
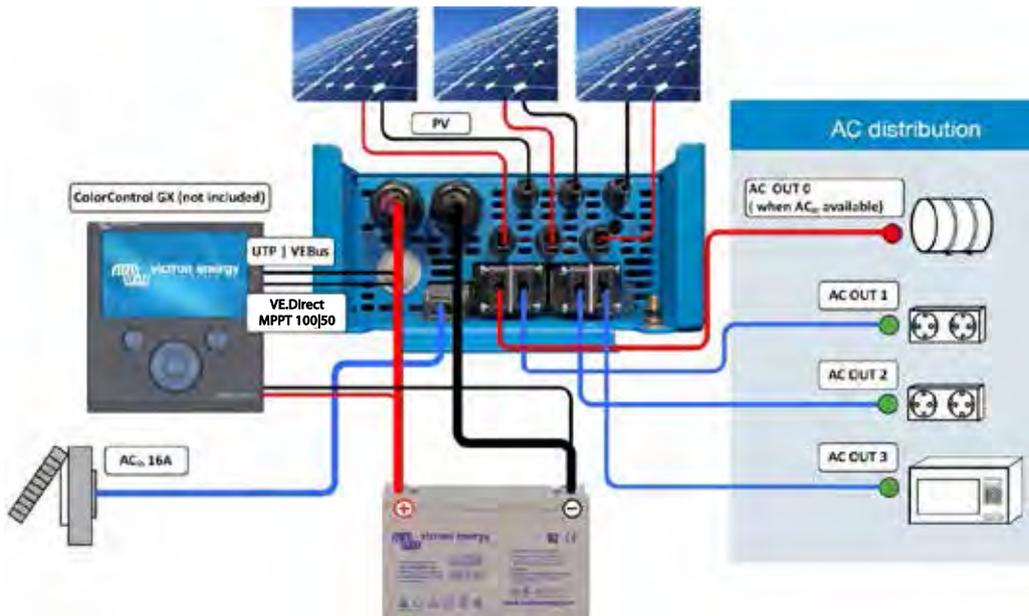
PowerAssist

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
Inverter/charger		
Transfer switch	16A	
INVERTER		
Input voltage range	9,5 – 17V	19 – 33V
'Heavy duty' output AC 0	16A	
Output AC1, 2, 3	Output voltage: 230 VAC \pm 2% Frequency: 50 Hz \pm 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
CHARGER		
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	
Solar Charge Controller		
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	
COMMON CHARACTERISTICS		
Operating temp. range	-20 to +50°C (fan assisted cooling)	
Humidity (non-condensing):	max 95%	
ENCLOSURE		
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 (hxwx d)	745 x 214 x 110mm	
STANDARDS		
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 3 kVA



EasySolar 5 kVA

The 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.

Color Control panel

Two outstanding functions:

- Prioritizes battery charging by the MPPT charge controller
- Connects to the internet, enabling remote monitoring (VRM website) and remote control.

AC distribution

The AC distribution consists of a RCD (30mA / 63A) and four AC outputs protected by two 10A and two 16A circuit breakers.

An additional 16A output is controlled by the AC input: it will switch on only when AC is available.

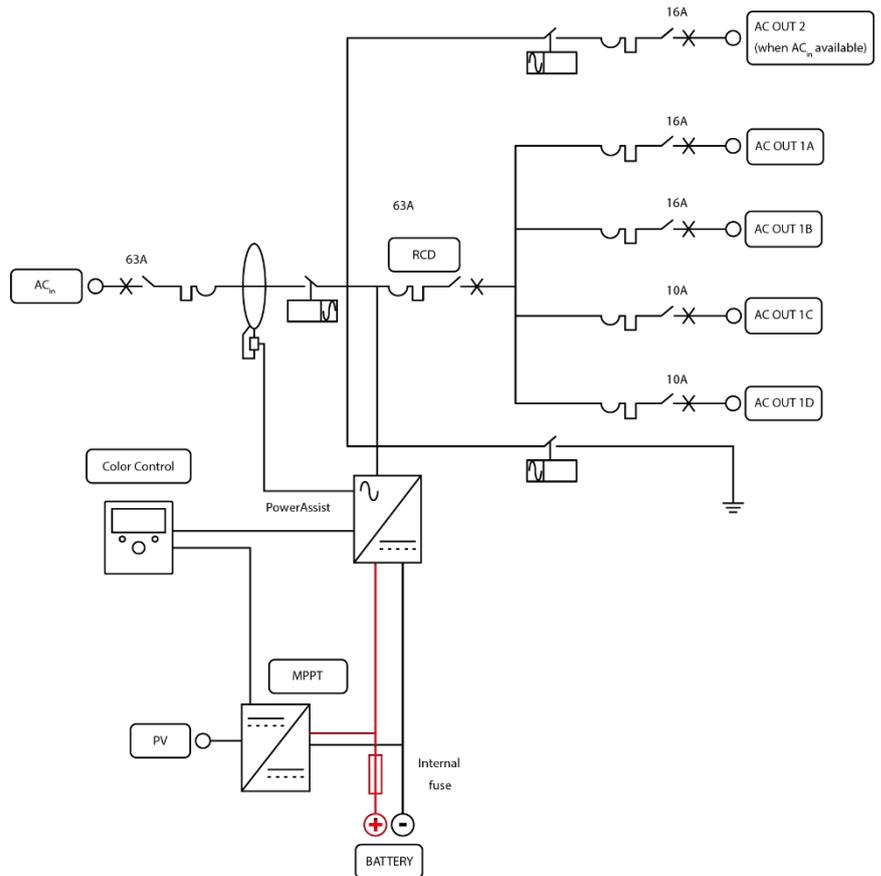
PowerAssist

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

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EasySolar	EasySolar 24/3000/70-50 MPPT150/70	EasySolar 48/3000/35-50 MPPT150/70	EasySolar 48/5000/70-100 MPPT150/100
INVERTER/CHARGER			
Transfer switch	50A	50A	100A
INVERTER			
Input voltage range	19 – 33V	38 – 66V	38 – 66V
'Heavy duty' output AC 2	16 A		
Output AC 1a, 1b, 1c, 1d	Output voltage: 230VAC ± 2% Frequency: 50 Hz ± 0,1% (1)		
Cont. output power at 25°C (3)	3000VA / 2400W	3000VA / 2400W	5000VA / 4000W
Cont. output power at 40°C	2200W	2200W	3700W
Cont. output power at 65°C	1700W	1700W	3000W
Peak power	6000W	6000W	10000W
Maximum efficiency	94%	95%	95%
Zero load power	20W	25W	35W
Zero load power in search mode	10W	12W	15W
CHARGER			
AC Input	Input voltage range: 187-265 VAC Input frequency: 45 – 65 Hz Power factor: 1		
Charge voltage 'absorption'	28,8V	57,6V	57,6V
Charge voltage 'float'	27,6V	55,2V	55,2V
Storage mode	26,4V	52,8V	52,8V
Charge current	70A	35A	70A
Battery temperature sensor	yes		
Programmable relay (5)	yes		
Protection (2)	a - g		
SOLAR CHARGE CONTROLLER			
Model	MPPT 150/70-MC4	MPPT 150/70-MC4	MPPT 150/100-MC4
Maximum output current (4)	70A	70A	100A
Maximum PV power	2000W	4000W	5800W
Maximum PV open circuit voltage	150V		
Maximum efficiency	98%		
Self-consumption	10mA		
Charge voltage 'absorption', default setting	28,8V	57,6V	57,6V
Charge voltage 'float', default setting	27,6V	55,2V	55,2V
Charge algorithm	multi-stage adaptive		
Temperature compensation	-16 mV / °C	-32 mV / °C	-64 mV / °C
Protection	a - g		
COMMON CHARACTERISTICS			
Operating temp. range	-40 to +65°C (fan assisted cooling)		
Humidity (non-condensing):	max 95%		
ENCLOSURE			
Material & Colour	aluminium (blue RAL 5012)		
Protection category	IP 21		
Battery-connection	Four M8 bolts (2 plus and 2 minus connections)		
PV connection	Two sets of MC4 PV connectors.		Three sets of MC4 PV connectors
230 V AC-connection	Screw terminals 13 mm ² (6 AWG)		
Weight	28kg	28kg	48kg
Dimensions (hwxwd)	810 x 258 x 218	810 x 258 x 218	877 x 328 x 241
STANDARDS			
Safety	EN 60335-1, EN 60335-2-29, EN 62109-1		
Emission / Immunity	EN 55014-1, EN 55014-2, EN 61000-3-3, EN 61000-6-3, EN 61000-6-2, EN 61000-6-1		
Anti-islanding	See our website		
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		

MultiGrid 3000 VA



Combined with the flexibility of a MultiPlus bidirectional converter

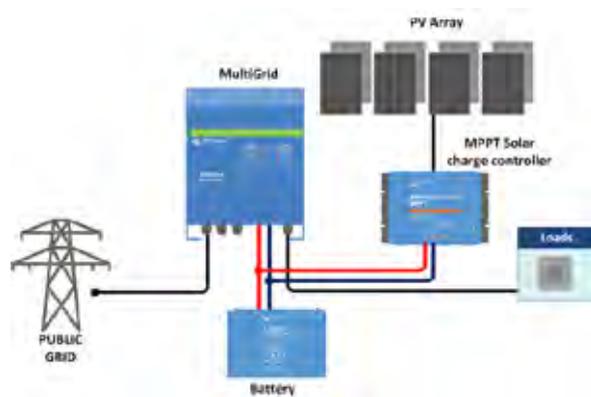
The MultiPlus range of bidirectional converters is the worldwide product of choice on boats and vehicles to generate AC power, and to recharge batteries, either with shore power or an onboard AC generator. The MultiPlus also is the industry standard in on-grid and off-grid energy storage systems and is approved for use in energy storage and self-consumption systems in the UK (G83/2 and G59-3-1 standards).

Several hardware and firmware modifications were needed to qualify for VDE-AR-N 4105 and several other country specific energy storage related standards. The resulting product is the **MultiGrid**.

The MultiGrid fits seamlessly in all common energy storage topologies

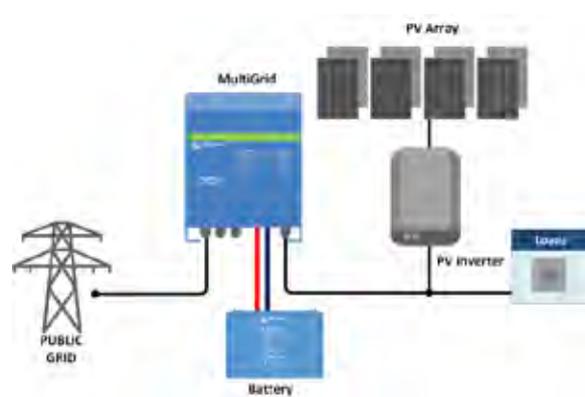
There is no one-size-fits-all solution to energy storage. The building blocks, topology and control systems will depend on local conditions and regulations.

The MultiGrid hardware, together with a wide range of software tools, seamlessly fits in all common topologies, shown in the pictures below. More detail can be found in our Energy Storage brochure.



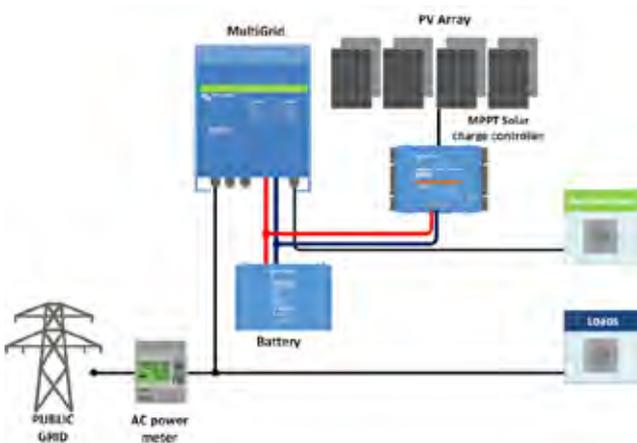
Grid in-line topology with MPPT solar charge controller

A solar charge controller supplies PV power to the battery. The stored energy is used by the MultiGrid to supply AC power to the load and, if required, to feed excess solar power back into the grid. In case of a utility power outage, the MultiGrid will disconnect the grid and continue to supply the load.



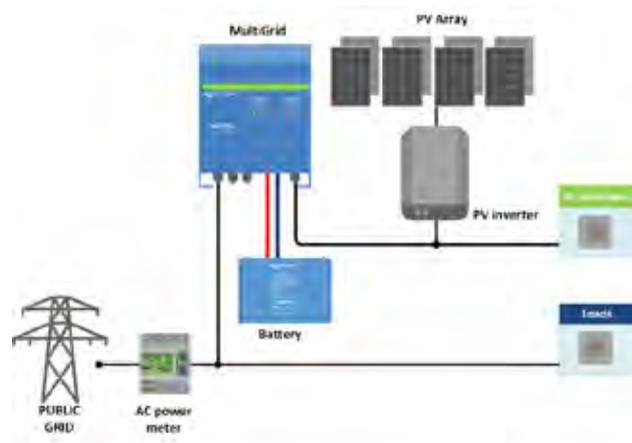
Grid in-line topology with PV inverter

PV power is converted to AC. The MultiGrid 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 MultiGrid will disconnect the grid and continue to supply the load.



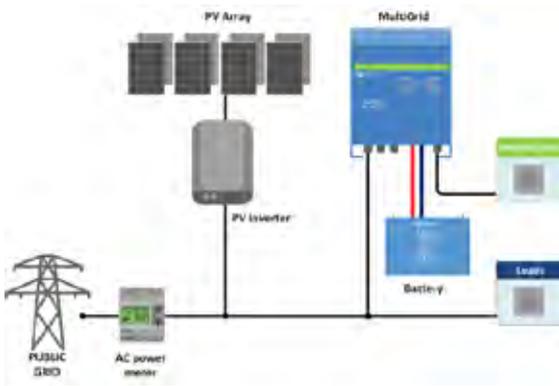
Grid parallel topology with MPPT solar charge controller

Certain critical loads only are protected against a power outage. The MultiGrid will use data from the power meter to optimise self-consumption and, if required, to prevent back feed of excess solar power into the grid.



Grid parallel topology with PV inverter

Certain critical loads only are protected against a power outage. The MultiGrid will use data from the power meter to optimise self-consumption and, if required, to prevent back feed of excess solar power into the grid.

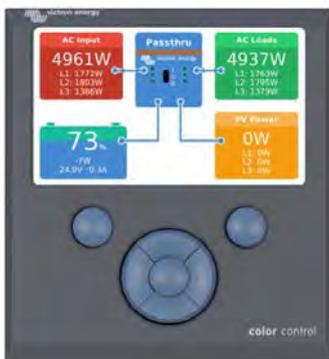


Grid parallel topology with PV inverter

Similar to Hub 4-2 but in this topology the PV inverter will shut down in case of a power outage.

Certain critical loads only are protected against a power outage.

The MultiGrid will use data from the power meter to optimise self-consumption and, if required, to prevent back feed of excess solar power into the grid.



Color Control Panel (CCGX)

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



VRM app

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) can display all your systems data in a comprehensive graphical format. System settings can be changed remotely via the portal. Alarms can be received by e-mail.

MultiGrid	24 Volt 48 Volt	24/3000/70 48/3000/35
PowerControl & PowerAssist	Yes	
Transfer switch	50 A	
INVERTER		
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	
Cont. output power at 25°C	2400 W	
Cont. output power at 40°C	2200 W	
Cont. output power at 65°C	1700 W	
Peak power (W)	6000 W	
Maximum efficiency	94 / 95 %	
Zero load power	20 / 25 W	
Zero load power in AES mode	15 / 20 W	
Zero load power in Search mode	10 / 12 W	
CHARGER		
AC Input	Input voltage range: 187-265 VAC Input frequency: 45 – 65 Hz	
Charge voltage 'absorption'	28,8 / 57,6 V	
Charge voltage 'float'	27,6 / 55,2 V	
Storage mode	26,4 / 52,8 V	
Maximum battery charge current (4)	70 / 35 A	
Battery temperature sensor	yes	
GENERAL		
Auxiliary output	Yes (16 A) Switches off when no external AC source available	
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	
Remote on-off	Yes	
Operating temperature range	-40 to +65°C (fan assisted cooling)	
Humidity (non-condensing)	max 95%	
ENCLOSURE		
Material & Colour	Aluminium, blue RAL 5012	
Protection category	IP 21	
Battery-connection	Four M8 bolts (2 plus and 2 minus connections)	
230 V AC-connection	Screw terminals 13 mm ² (6 AWG)	
Weight	18 kg	
Dimensions (hwxwd)	362 x 258 x 218 mm	
STANDARDS		
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, AS 62040.1	
Anti-islanding	VDE-AR-N 4105, AS/NZS 4777.2, NRS 097-2-1, UTE C15-712-1, C10/11, RD 1699-RD 413, TOR D4	

- 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 rating: 230V / 4A, DC rating: 4A up to 35VDC and 1A up to 60VDC

MultiPlus-II 3000VA



A MultiPlus, plus ESS (Energy Storage System) functionality

The MultiPlus-II combines the functions of the MultiPlus and the MultiGrid.

It has all the features of the MultiPlus, plus an external current sensor option which extends the PowerControl and PowerAssist function to 35A.

It also has all the features of the MultiGrid with built-in anti-islanding and an increasingly long list of country approvals.

PowerControl and PowerAssist - Boosting the capacity of grid or generator power

A maximum generator or grid current can be set. The Multi 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 Multi 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.

ESS: Energy Storage Systems

The MultiPlus can be used in off grid as well as grid connected PV and other alternative energy systems.

Several system configurations are possible, for more detailed information see the ESS Design and configuration manual.

On-site monitoring and control

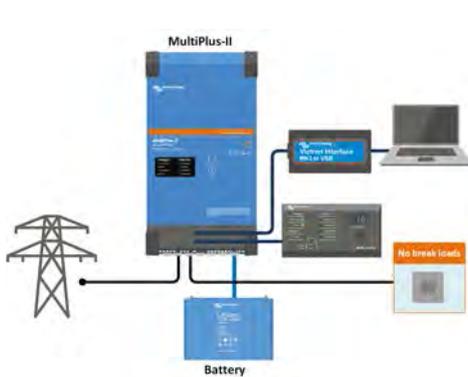
Several options are available: Battery Monitor, Digital Multi Control Panel, Color Control Panel, Bluetooth (Venus GX or Color Control panel needed), laptop or computer.

Remote configuring and monitoring

Install a Venus GX or a Color Control Panel to connect to the internet.

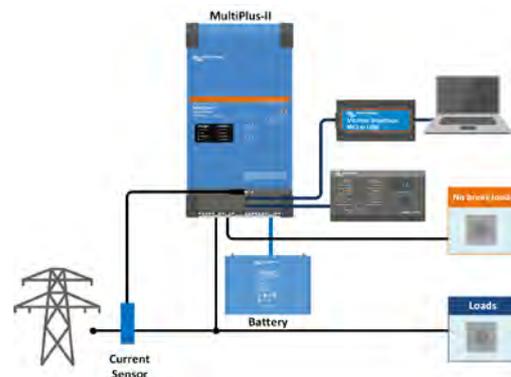
Data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge.

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



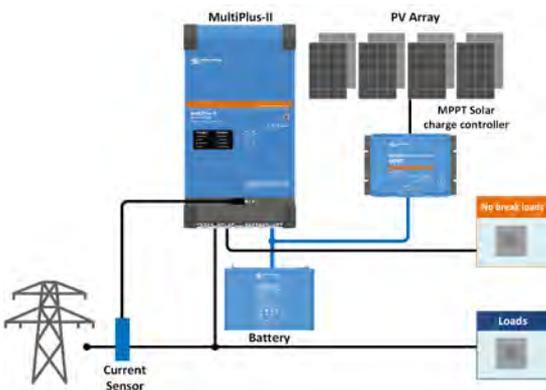
Standard mobile or off-grid application

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.



Standard mobile or off-grid application with external current sensor

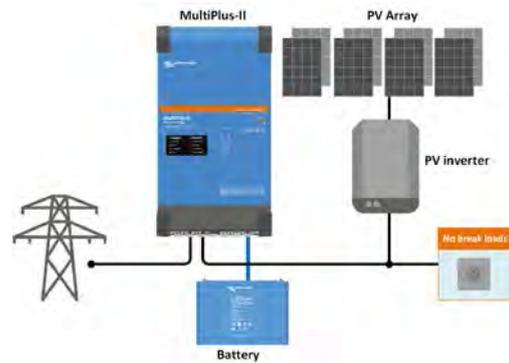
The 100A external current sensor extends the PowerControl and PowerAssist function to 100A.



Grid parallel topology with MPPT solar charge controller

Certain critical loads only are protected against a power outage.

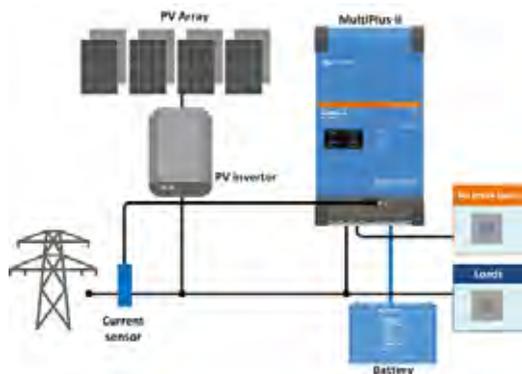
The MultiPlus-II will use data from an external AC current sensor or power meter to optimise self-consumption and, if required, to prevent back feed of excess solar power into the grid. In case of a power outage, the MultiPlus-II will continue to supply the critical loads



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.



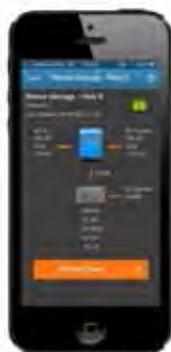
Grid parallel topology with PV inverter

In this topology the PV inverter will shut down in case of a power outage. The MultiPlus-II will use data from the external AC current sensor or power meter to optimize self-consumption and, if required, to prevent back feed of excess solar power into the grid.



Color Control Panel (CCGX)

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VRM app

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.

MultiPlus-II	48/3000/35
PowerControl & PowerAssist	Yes
Transfer switch	32A
Maximum AC input current	32A
INVERTER	
DC Input voltage range	38 – 66 V
Output	Output voltage: 230 VAC ± 2% Frequency: 50 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
Peak power	5500 W
Maximum efficiency	95 %
Zero load power	11 W
Zero load power in AES mode	7 W
Zero load power in Search mode	2 W
CHARGER	
AC Input	Input voltage range: 187-265 VAC Input frequency: 45 – 65 Hz
Charge voltage 'absorption'	57,6 V
Charge voltage 'float'	55,2 V
Storage mode	52,8 V
Maximum battery charge current (4)	35 A
Battery temperature and voltage sensor	VE.Bus Smart dongle (optional)
GENERAL	
Auxiliary output	Yes (32 A) Directly connected to the AC input
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%
ENCLOSURE	
Material & Colour	steel, blue RAL 5012
Protection category	IP22
Battery-connection	Two M6 bolts
230 V AC-connection	Screw terminals 13 mm ² (6 AWG)
Weight	18 kg
Dimensions (hxwx) d)	499 x 268 x 141 mm
STANDARDS	
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, AS 620401.1
Anti-islanding	VDE-AR-N 4105, TOR-D4, AS/NZS 4777.2, NRS 097-2-1, UTE C15-712-1, C10/11, RD 1699-RD 413, G59/3-2, G83/2
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 rating: 230V / 4A, DC rating: 4A up to 35VDC and 1A up to 60VDC	



Current sensor 100A:50mA

To extend the PowerControl and PowerAssist function to 35A, and to optimize self-consumption in systems with a grid connection of more than 32A.



Digital Multi Control Panel

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

BIDIRECTIONAL CONVERTER	
GridAssist function	In case of overload the ECOMulti will import power from the grid to prevent system shutdown.
Maximum AC current feed-through	50 A
AC voltage	230 V 50 Hz single phase
Cont. output power at 25 °C	3000 VA
Cont. output power at 25 °C	2500 W
Cont. output power at 40 °C	2200 W
Peak power	6000 W
Maximum efficiency	94%
Power factor range (when connected to the grid)	0,7 inductive to 0,7 capacitive (programmable)
Zero-load power (W)	15 W
Zero load power in AES mode	10 W (island mode operation with AC output lowered to 200 V when load < 50 Watt)
Charge voltage 'absorption'	28,2 V
Charge voltage 'float'	26,7 V
Maximum charge current	70 A
Maximum battery depth of discharge (DoD)	80%
Auxiliary output	To connect additional loads once the battery has been fully charged: 16 A relay
Programmable relay	For monitoring, alarm or other purposes
VE.Bus communication port	For parallel and three phase operation, remote monitoring, remote control and system integration
General purpose communication port	Yes
Remote on-off	Yes
BATTERY	
Technology	Lithium Iron Phosphate
Nominal voltage	25,6 V
Nominal energy at 25°C	2,3 kWh
Nominal capacity at 25°C	90 Ah
Nominal capacity at 0°C	72 Ah
Nominal capacity at -20°C	45 Ah
Battery Management System	Cell balancing, and system shutdown in case of cell over voltage, cell under voltage and over temperature
Cycle life, 80% DoD	2000 cycles
Cycle life, 70% DoD	3000 cycles
Cycle life, 50% DoD	5000 cycles
Max storage time at 25 °C	1 year
OTHER	
Display	Graphical display Graphical User Interface (GUI) Ethernet (standard) and Wifi (optional) for remote monitoring and control Data storage and graphical display on vrm.victronenergy.com Android and iPhone apps
Operating temperature	-20 to + 40°C
Storage temperature	-40 to + 50°C
Protection category	IP22
Humidity	95% non condensing
Warranty	System: 5 years Battery: 3 years full warranty plus 7 years prorated warranty
ENCLOSURE	
Colour	Blue RAL 5012
Weight	Without battery: 28 kg With battery: 60 kg
Dimensions (hxwxwd)	475 x 575 x 360 mm
STANDARDS	
Safety	EN 60335-1, EN 60335-2-29, VDE-AR-N 4105
Emission, Immunity	EN55014-1, EN 55014-2, EN 61000-3-3



Sizing the PV array

Sufficient energy must be harvested to recharge the battery and to power the home, even on a reasonably clear winter day.

At roughly 50 degrees latitude (Seattle, London, Amsterdam, Berlin, München) the two person energy conscious household will need a 2,5 kWp array. A four person household would need a 5 kWp array.

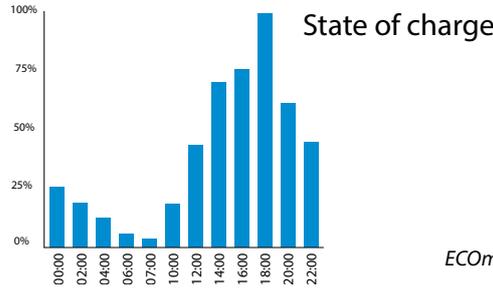
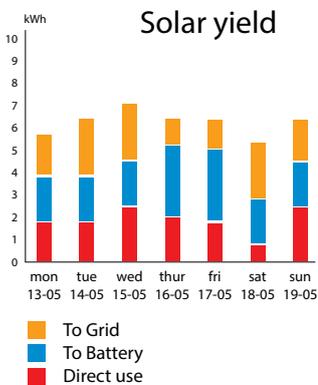
At roughly 30 to 40 degrees latitude (Los Angeles, Marseille, Sevilla) a 1 kWp resp. 2 kWp array will do.

A larger PV array will increase feedback into the grid, but not substantially increase battery utilization and self sufficiency.

Increasing storage capacity

More battery storage capacity will reduce feedback into the grid and increase self sufficiency, especially during the summer season.

To increase self sufficiency during wintertime both the battery and the PV array have to be enlarged.



Why 2,3 kWh?

Whenever PV output exceeds consumption, storing excess output for later use will increase self-consumption.

However

- PV harvest will fluctuate from season to season, from day to day and also within the day.
- Electricity consumption is likewise fluctuating: working days, weekends and holiday periods will all result in different consumption patterns.

A 2,3 kWh Li-ion battery is an efficient solution for a two person energy conscious household. Energy consumption from dusk to dawn will be 2 kWh or more, even when no energy hungry appliances like a dishwasher or clothes dryer are used. A fully charged 2,3 kWh battery will therefore be discharged before the sun starts shining again.

The average household with two children would fully utilize a 4,6 kWh Li-ion battery; one additional battery module.



Typical seasonal variations at roughly 50 degrees latitude ~ Seattle, London, Amsterdam, Berlin, München ~ with battery and without battery.

Two person energy conscious household

Consumption: 2500 kWh per year
 PV array: 2,5 kWp
 Battery: 2,3 kWh Li-ion

Four person energy conscious household

Consumption: 4500 kWh per year
 PV array: 5 kWp
 Battery: 4,6 kWh Li-ion

A simple wall mounted energy storage solution

The **ECOmulti** can be wall mounted, is easy to install, easy to program and easy to operate.

Extremely flexible

- Energy storage can be increased by adding battery modules.
- AC power can be increased by paralleling **ECOmulti** modules.
- Three **ECOmulti** modules can be configured for three phase operation.
- Two **ECOmulti** modules can be configured for split phase operation.

More self-consumption, more independence

With 2,3 kWh Li-ion storage capacity and a 3 kVA bidirectional inverter, the **ECOmulti** reduces dependence on power from the grid.

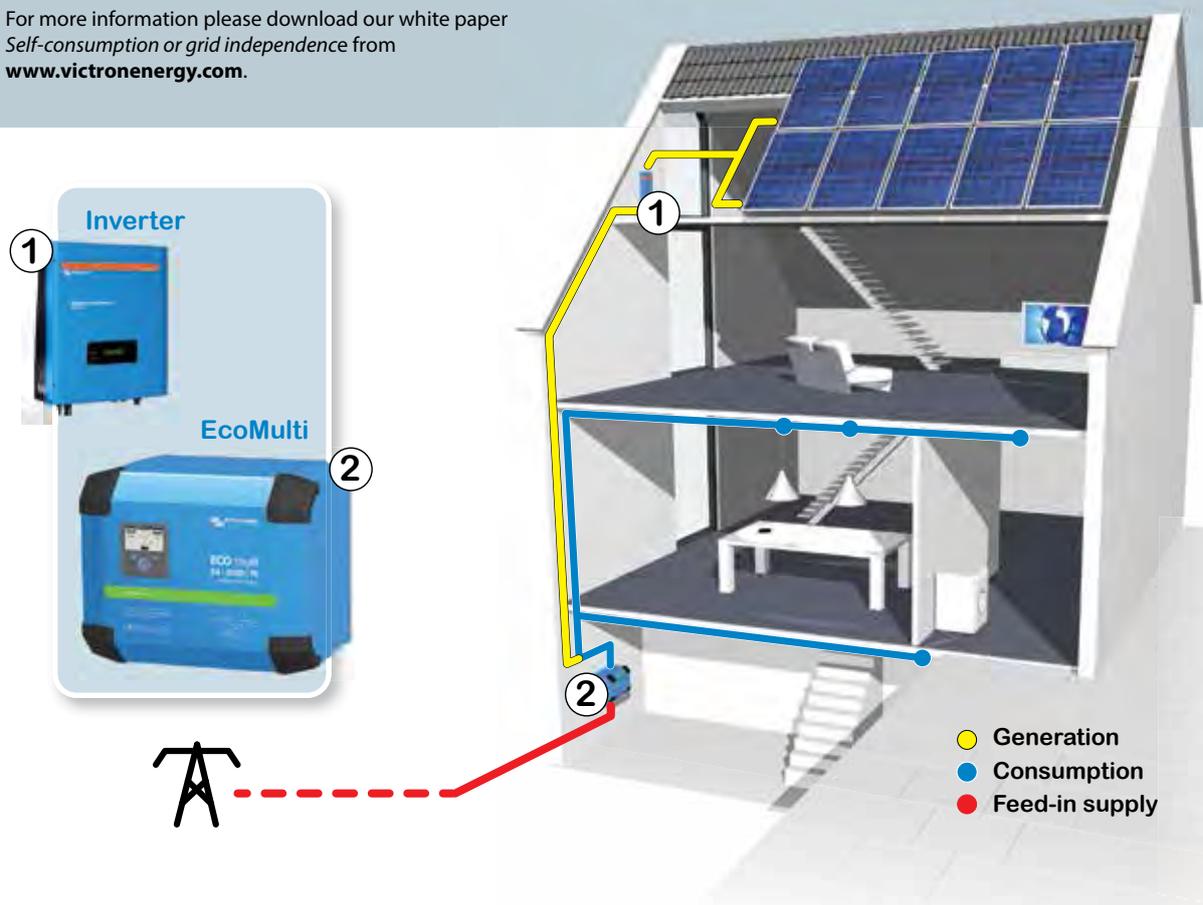
The growing interest in self-consumption is driven by increasing retail electricity prices and simultaneously decreasing feed in tariffs. Feed in tariffs are decreasing a. o. because it becomes increasingly difficult, and expensive, to ensure stability of the grid as more solar and wind power comes on line. Simultaneously, the retail price of electricity is increasing, to cover these same costs plus the cost to keep conventional power plants in hot standby to back-up renewable power generation in case the sun is not shining and/or the wind is not blowing.

The **ECOmulti** meets the German interconnection standard *VDE-AR-N 4105* and the Incentive Program for Solar Energy Storage Systems *Marktanreizprogramm für Batteriespeicher*.

With Intelligent Battery and Load Management the **ECOmulti** can limit power export to the grid to at most 60% of the installed Wp capacity; *KfW-Programm Erneuerbare Energien "Speicher"*.

According to the Fraunhofer-Institut für Solare Energiesysteme (ISE), a household that consumes 4500 kWh per year can reduce energy import from the grid by 60% when installing a 5 kWp solar array combined with 4 kWh usable energy storage.

For more information please download our white paper *Self-consumption or grid independence* from www.victronenergy.com.




**Phoenix Inverter
24/5000**
SinusMax - Superior engineering

Developed for professional duty, the Phoenix range of inverters is suitable for the widest range of applications. The design criteria have been to produce a true sine wave inverter with optimized efficiency but without compromise in performance. Employing hybrid HF technology, the result is a top quality product with compact dimensions, light in weight and capable of supplying power, problem-free, to any load.

Extra start-up power

A unique feature of the SinusMax technology is very high start-up power. Conventional high frequency technology does not offer such extreme performance. Phoenix Inverters, however, are well suited to power up difficult loads such as refrigeration compressors, electric motors and similar appliances.

Virtually unlimited power thanks to parallel and 3-phase operation capability

Up to 6 units inverters can operate in parallel to achieve higher power output. Six 24/5000 units, for example, will provide 24kW / 30kVA output power. Operation in 3-phase configuration is also possible.

To transfer the load to another AC source: the automatic transfer switch

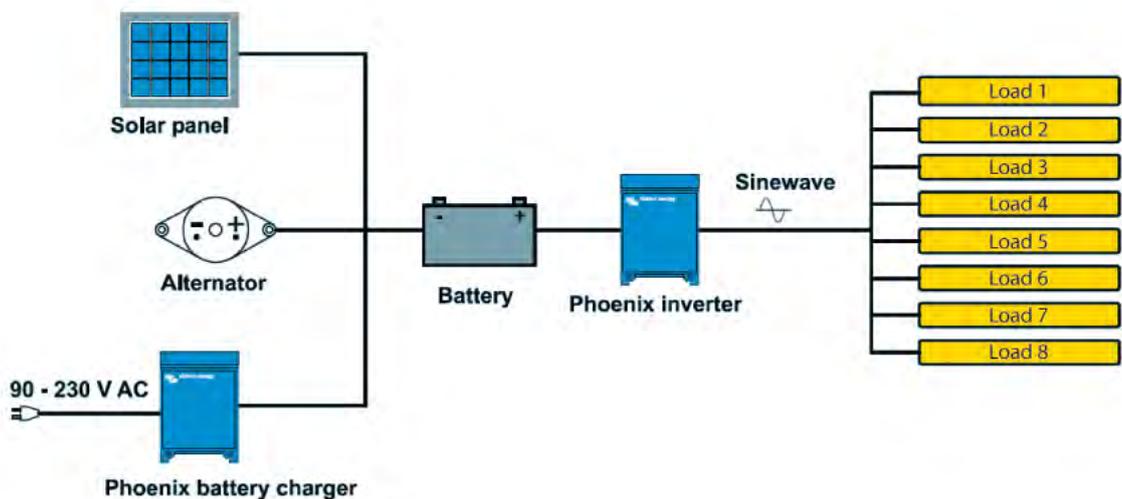
If an automatic transfer switch is required we recommend using the MultiPlus inverter/charger instead. The switch is included in these products and the charger function of the MultiPlus can be disabled. Computers and other electronic equipment will continue to operate without disruption because the MultiPlus features a very short switchover time (less than 20 milliseconds).

Computer interface

All models have a RS-485 port. All you need to connect to your PC is our MK3-USB VE.Bus to USB interface (see under accessories). Together with our VEConfigure software, which can be downloaded free of charge from our website, all parameters of the inverters can be customized. This includes output voltage and frequency, over and under voltage settings and programming the relay. This relay can for example be used to signal several alarm conditions, or to start a generator. The inverters can also be connected to VENet, the new power control network of Victron Energy, or to other computerized monitoring and control systems.

New applications of high power inverters

The possibilities of paralleled high power inverters are truly amazing. For ideas, examples and battery capacity calculations please refer to our book 'Energy Unlimited' (available free of charge from Victron Energy and downloadable from www.victronenergy.com).


**Phoenix Inverter Compact
24/1600**


Phoenix Inverter	C12/1200 C24/1200	C12/1600 C24/1600	C12/2000 C24/2000	12/3000 24/3000 48/3000	24/5000 48/5000
Parallel and 3-phase operation	Yes				
INVERTER					
Input voltage range (V DC)	9,5 – 17V 19 – 33V 38 – 66V				
Output	Output voltage: 230 VAC \pm 2% Frequency: 50 Hz \pm 0,1% (1)				
Cont. output power at 25°C (VA) (2)	1200	1600	2000	3000	5000
Cont. output power at 25°C (W)	1000	1300	1600	2400	4000
Cont. output power at 40°C (W)	900	1200	1450	2200	3700
Cont. output power at 65°C (W)	600	800	1000	1700	3000
Peak power (W)	2400	3000	4000	6000	10000
Max. efficiency 12/ 24 /48 V (%)	92 / 94 / 94	92 / 94 / 94	92 / 92	93 / 94 / 95	94 / 95
Zero load power 12 / 24 / 48 V (W)	8 / 10 / 12	8 / 10 / 12	9 / 11	20 / 20 / 25	30 / 35
Zero load power in AES mode (W)	5 / 8 / 10	5 / 8 / 10	7 / 9	15 / 15 / 20	25 / 30
Zero load power in Search mode (W)	2 / 3 / 4	2 / 3 / 4	3 / 4	8 / 10 / 12	10 / 15
GENERAL					
Programmable relay (3)	Yes				
Protection (4)	a - g				
VE.Bus communication port	For parallel and three phase operation, remote monitoring and system integration				
Remote on-off	Yes				
Common Characteristics	Operating temperature range: -40 to +65°C (fan assisted cooling) Humidity (non-condensing): max 95%				
ENCLOSURE					
Common Characteristics	Material & Colour: aluminium (blue RAL 5012) Protection category: IP 21				
Battery-connection	battery cables of 1.5 meter included		M8 bolts	2+2 M8 bolts	
230 V AC-connection	G-ST18i plug		Spring-clamp	Screw terminals	
Weight (kg)	10		12	18	30
Dimensions (hxwhd in mm)	375x214x110		520x255x125	362x258x218	444x328x240
STANDARDS					
Safety	EN 60335-1				
Emission Immunity	EN 55014-1 / EN 55014-2				
1) Can be adjusted to 60 Hz and to 240 V 2) Non-linear load, crest factor 3:1 3) 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, 1A up to 60VDC	4) Protection key: a) output short circuit b) overload c) battery voltage too high d) battery voltage too low e) temperature too high f) 230 V AC on inverter output g) input voltage ripple too high				



Phoenix Inverter Control

This panel can also be used on a MultiPlus Inverter/Charger when an automatic transfer switch but no charger function is desired. The brightness of the LEDs is automatically reduced during night time.

Computer controlled operation and monitoring

Several interfaces are available:



Color Control GX

Provides monitor 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-700 Battery Monitor

The BMV-700 Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge/discharge current. Besides this, the software includes complex calculation algorithms, like Peukert's formula, to exactly determine the state of charge of the battery. The BMV-700 selectively displays battery voltage, current, consumed Ah or time to go. The monitor also stores a host of data regarding performance and use of the battery.

Several models available (see battery monitor documentation).



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 huge 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, Ve.Net Blue Power Panel, Color Control Panel, smartphone or tablet (Bluetooth Smart), laptop or computer (USB or RS232).

Remote Monitoring and control

Victron Ethernet Remote, Venus GX and the Color Control Panel.

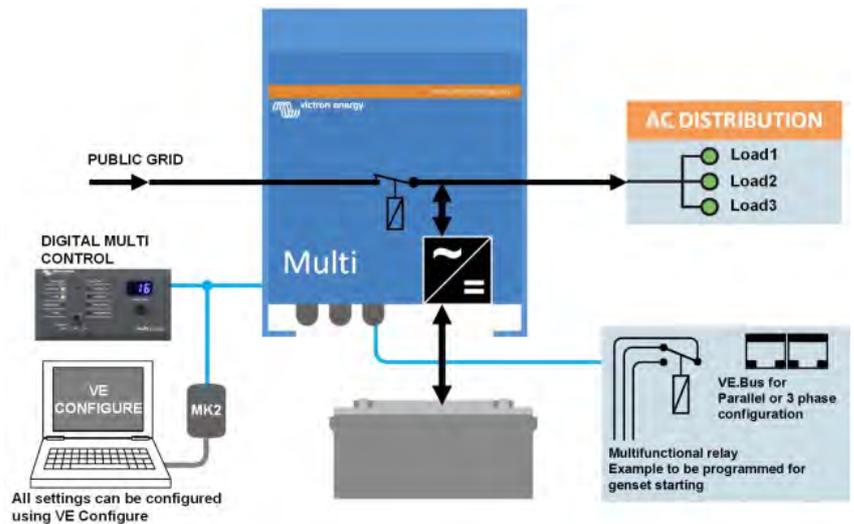
Data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge.

Remote configuring

When connected to the Ethernet, systems with a Color Control panel can be accessed remotely and settings can be changed.



Color Control Panel, showing a PV application



All settings can be configured using VE Configure

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
PowerControl		Yes	Yes	Yes	Yes	Yes	Yes
PowerAssist		Yes	Yes	Yes	Yes	Yes	Yes
Transfer switch (A)		16	16	16	30	16 or 50	100
INVERTER							
Input voltage range (V DC)		9,5 – 17 V		19 – 33 V	38 – 66 V		
Output		Output voltage: 230 VAC ± 2%			Frequency: 50 Hz ± 0,1% (1)		
Cont. output power at 25°C (VA) (3)		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	10.000
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
CHARGER							
AC Input		Input voltage range: 187-265 VAC		Input frequency: 45 – 65 Hz	Power factor: 1		
Charge voltage 'absorption' (V DC)					14,4 / 28,8 / 57,6		
Charge voltage 'float' (V DC)					13,8 / 27,6 / 55,2		
Storage mode (V DC)					13,2 / 26,4 / 52,8		
Charge current house battery (A) (4)		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					
GENERAL							
Auxiliary output (5)		n. a.	n. a.	n. a.	n. a.	Yes (16A)	Yes (25A)
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		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%					
ENCLOSURE							
Common Characteristics		Material & Colour: aluminium (blue RAL 5012)			Protection category: IP 21		
Battery-connection		battery cables of 1.5 meter		M8 bolts	Four M8 bolts (2 plus and 2 minus connections)		
230 V AC-connection		G-ST18i connector		Spring-clamp	Screw terminals 13 mm ² (6 AWG)		M6 bolts
Weight (kg)		10	10	10	12	18	30
Dimensions (hxxwxd in mm)		375x214x110		520x255x125	362x258x218		444x328x240
STANDARDS							
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		12V and 24V models: ECE R10-4					
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) At 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,					
c) battery voltage too high		DC under voltage or genset start/stop function					
d) battery voltage too low		AC rating: 230 V/4A					
e) temperature too high		DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC					
f) 230 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.



Blue Power Panel
Connects to a Multi or Quattro and all VE.Net devices, in particular the VE.Net Battery Controller. Graphic display of currents and voltages.

Computer controlled operation and monitoring
Several interfaces are available:



Color Control GX
Provides monitor 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-700 Battery Monitor
The BMV-700 Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge/discharge current. Besides this, the software includes complex calculation algorithms, like Peukert's formula, to exactly determine the state of charge of the battery. The BMV-700 selectively displays battery voltage, current, consumed Ah or time to go. The monitor also stores a host of data regarding performance and use of the battery. Several models available (see battery monitor documentation).

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.

Virtually unlimited power thanks to parallel operation

Up to 6 Quattro units can operate in parallel. Six units 48/10000/140, for example, will provide 48kW / 60kVA output power and 840 Amps charging capacity.

Three phase capability

Three units can be configured for three phase output. But that's not all: up to 6 sets of three units can be parallel connected to provide 144kW / 180kVA inverter power and more than 2500A 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 (16A per 5kVA Quattro at 230VAC). 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).

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Several options are available: Battery Monitor, Multi Control Panel, Ve.Net Blue Power panel, Color Control panel, smartphone or tablet (Bluetooth Smart), laptop or computer (USB or RS232).

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Victron Ethernet Remote, Venus GX and the Color Control Panel.

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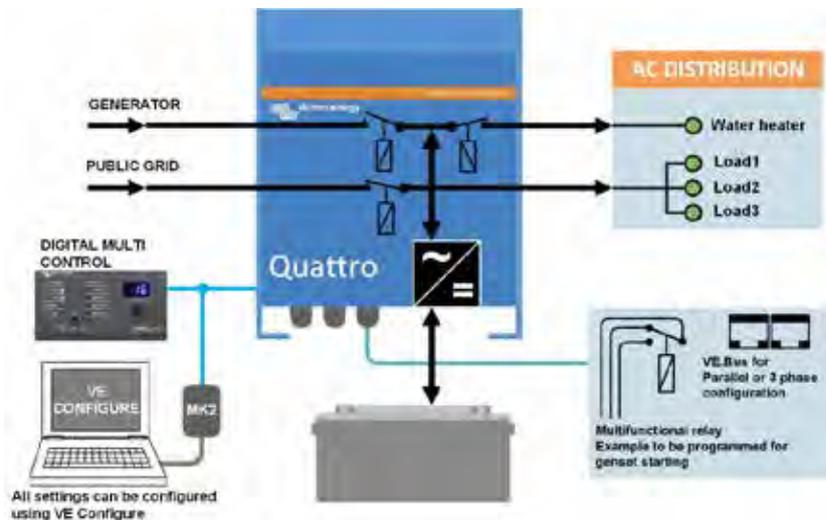
Quattro
48/5000/70-100/100



Quattro
48/15000/200-100/100



Color Control panel, 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
PowerControl / PowerAssist	Yes				
Integrated Transfer switch	Yes				
AC inputs (2x)	Input voltage range: 187-265 VAC Input frequency: 45 – 65 Hz Power factor: 1				
Maximum feed through current (A)	2x 50	2x100	2x100	2x100	2x100
INVERTER					
Input voltage range (V DC)	9,5 – 17V 19 – 33V 38 – 66V				
Output (1)	Output voltage: 230 VAC ± 2% Frequency: 50 Hz ± 0,1%				
Cont. output power at 25°C (VA) (3)	3000	5000	8000	10000	15000
Cont. output power at 25°C (W)	2400	4000	6500	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
Maximum efficiency (%)	93 / 94	94 / 94 / 95	94 / 96	96	96
Zero load power (W)	20 / 20	30 / 30 / 35	45 / 50	55	80
Zero load power in AES mode (W)	15 / 15	20 / 25 / 30	30 / 30	35	50
Zero load power in Search mode (W)	8 / 10	10 / 10 / 15	10 / 20	20	30
CHARGER					
Charge voltage 'absorption' (V DC)	14,4 / 28,8	14,4 / 28,8 / 57,6	28,8 / 57,6	57,6	57,6
Charge voltage 'float' (V DC)	13,8 / 27,6	13,8 / 27,6 / 55,2	27,6 / 55,2	55,2	55,2
Storage mode (V DC)	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 (12V and 24V models only)				
Battery temperature sensor	Yes				
GENERAL					
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.: -40 to +65°C Humidity (non-condensing): max. 95%				
ENCLOSURE					
Common Characteristics	Material & Colour: aluminium (blue RAL 5012) Protection category: IP 21				
Battery-connection	Four M8 bolts (2 plus and 2 minus connections)				
230 V AC-connection	Screw terminals 13 mm ² (6 AWG)	Bolts M6	Bolts M6	Bolts M6	Bolts M6
Weight (kg)	19	34 / 30 / 30	45 / 41	51	72
Dimensions (hwxwd in 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
STANDARDS					
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 R10-4				
Anti-landing	See our website				
1) Can be adjusted to 60 HZ; 120 V 60 Hz on request					
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) 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.



Blue Power Panel

Connects to a Multi or Quattro and all VE.Net devices, in particular the VE.Net Battery Controller. Graphical display of currents and voltages.

Computer controlled operation and monitoring

Several interfaces are available:



Color Control GX

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-700 Battery Monitor

The BMV-700 Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge/discharge current. Besides this, the software includes complex calculation algorithms, like Peukert's formula, to exactly determine the state of charge of the battery. The BMV-700 selectively displays battery voltage, current, consumed Ah or time to go.



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) 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 Phoenix 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!

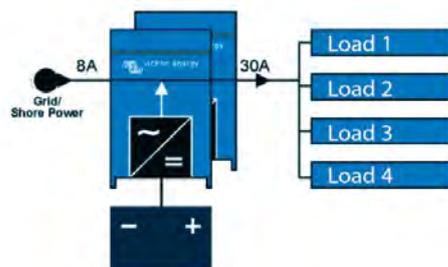
Alternatively, VE.Net can be used instead of the DIP switches.

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

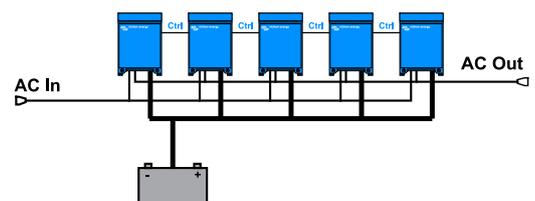


MultiPlus Compact
12/2000/80

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
INVERTER			
Input voltage range (V DC)		9,5 – 17 V	19 – 33 V
Output		Output voltage: 120 VAC ± 2%	Frequency: 60 Hz ± 0,1% (1)
Cont. output power at 25°C / 77°F (VA) (3)		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
CHARGER			
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) (4)		80 / 50	120 / 70
Charge current starter battery (A)			4
Battery temperature sensor			yes
GENERAL			
Auxiliary output (5)		n. a.	Yes (32A)
Programmable relay (6)		Yes (1x)	Yes (3x)
Protection (2)			a - g
VE.Bus communication port		For parallel and three phase operation, remote monitoring and system integration	
General purpose com. port (7)		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%
ENCLOSURE			
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 ²)	Screw-terminal 6 AWG (13mm ²)
Weight		13 kg 25 lbs.	19kg 40 lbs.
Dimensions (hwxwd in mm and inches)		520x255x125 mm 20.5x10.0x5.0 inch	362x258x218 mm 14.3x10.2x8.6 inch
STANDARDS			
Safety		EN 60335-1, EN 60335-2-29	
Emission Immunity		EN 55014-1, EN 55014-2, EN 61000-3-3	
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) At 75°F 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,	
c) battery voltage too high		DC under voltage or genset start/stop function	
d) battery voltage too low		AC rating: 230 V/4 A	
e) temperature too high		DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC	
f) 230 VAC on inverter output		7) A.o. to communicate with a Lithium Ion battery BMS	
g) input voltage ripple too high			



Digital Multi Control

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



Blue Power Panel

Connects to a Multi or Quattro and all VE.Net devices, in particular the VE.Net Battery Controller. Graphic display of currents and voltages.

Computer controlled operation and monitoring

Several interfaces are available:



Color Control GX

Provides monitor 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-700 Battery Monitor

The BMV-700 Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge/discharge current. Besides this, the software includes complex calculation algorithms, like Peukert's formula, to exactly determine the state of charge of the battery. The BMV-700 selectively displays battery voltage, current, consumed Ah or time to go. The monitor also stores a host of data regarding performance and use of the battery.

Two AC inputs with integrated transfer switch

The Quattro can be connected to two independent AC sources, for example shore-side power 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.

Virtually unlimited power thanks to parallel operation

Up to 6 Quattro units can operate in parallel. Six units 48/5000/70, for example, will provide 27kW / 30kVA output power and 420 Amps charging capacity.

Three phase capability

Three units can be configured for three-phase output. But that's not all: up to 6 sets of three units can be parallel connected to provide 81kW / 90kVA inverter power and 1260A charging capacity.

Split phase options

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

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

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 (Up to 40A per 5kVA Quattro at 120VAC). 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 shore 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 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 Quattro can be used in off grid as well as grid connected PV and other alternative energy systems.

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, Ve.Net Blue Power panel, Color Control panel, smartphone or tablet (Bluetooth Smart), laptop or computer (USB or RS232).

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Victron Ethernet Remote, Venus GX and the Color Control Panel.

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Remote configuring

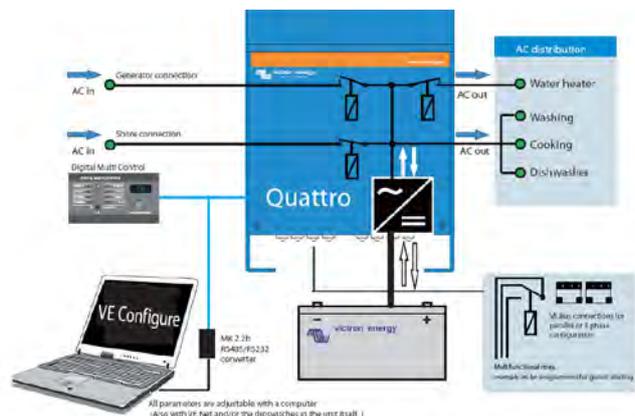
When connected to the Ethernet, systems with a Color Control panel can be accessed and settings can be changed.



Quattro
24/5000/120-100/100



Color Control panel, showing a PV application



Quattro	12/5000/200-100/100 120V	24/5000/120-100/100 120V	48/3000/35-50/50 120V	48/5000/70-100/100 120V
PowerControl / PowerAssist	Yes			
Integrated Transfer switch	Yes			
AC inputs (2x)	Input voltage range: 90-140 VAC Input frequency: 45 – 65Hz Power factor: 1			
Maximum feed through current (A)	2x100	2x100	2x50	2x100
INVERTER				
Input voltage range (V DC)	9,5 - 17	19 – 33	37,2 – 64,4	37,2 – 64,4
Output (1)	Output voltage: 120 VAC ± 2% Frequency: 60 Hz ± 0,1%			
Cont. output power at 25°C / 77°F (VA) (3)	5000	5000	3000	5000
Cont. output power at 25°C / 77°F (W)	4000	4000	2400	4000
Cont. output power at 40°C / 104°F (W)	3700	3700	2200	3700
Cont. output power at 65°C / 150°F (W)	3000	3000	1700	3000
Peak power (W)	10000	10000	6000	10000
Maximum efficiency (%)	94	94	94	95
Zero load power (W)	30	30	25	35
Zero load power in AES mode (W)	20	25	20	30
Zero load power in Search mode (W)	10	10	12	15
CHARGER				
Charge voltage 'absorption' (V DC)	14,4	28,8	57,6	57,6
Charge voltage 'float' (V DC)	13,8	27,6	55,2	55,2
Storage mode (V DC)	13,2	26,4	52,8	52,8
Charge current house battery (A) (4)	200	120	35	70
Charge current starter battery (A)	4	4	n. a.	n. a.
Battery temperature sensor	Yes			
GENERAL				
Auxiliary output (A) (5)	50	50	32	50
Programmable relay (6)	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 (7)	Yes, 2x			
Remote on-off	Yes			
Common Characteristics	Operating temp.: -40 - +65°C (-40 - 150°F) Humidity (non-condensing): max. 95%			
ENCLOSURE				
Common Characteristics	Material & Colour: aluminium (blue RAL 5012) Protection category: IP 21			
Battery-connection	Four M8 bolts (2 plus and 2 minus connections)			
230 V AC-connection	M6 bolts	M6 bolts	Screw terminals 13 mm ² (6 AWG)	M6 bolts
Weight (kg)	75 lb 34 kg	66 lb 30 kg	42 lb 19 kg	66 lb 30 kg
Dimensions (hwxwd)	18,5 x 14,0 x 11,2 inch 470 x 350 x 280 mm	17,5 x 13,0 x 9,6 inch 444 x 328 x 240 mm	14,3 x 10,2 x 8,6 inch 362 x 258 x 218 mm	17,5 x 13,0 x 9,6 inch 444 x 328 x 240 mm
STANDARDS				
Safety	EN 60335-1, EN 60335-2-29			
Emission, Immunity	EN 55014-1, EN 55014-2, EN 61000-3-3			
1) Can be adjusted to 50 Hz	3) Non-linear load, crest factor 3:1			
2) Protection key:	4) At 25°C ambient			
a) output short circuit	5) Switches off when no external AC source available			
b) overload	6) Programmable relay that can be set for general alarm, DC under voltage or genset start/stop function			
c) battery voltage too high	AC rating: 120 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	7) A.o. to communicate with a Lithium-Ion battery BMS			
f) 120 VAC on inverter output				
g) input voltage ripple too high				



Digital Multi Control

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



Blue Power Panel

Connects to a Multi or Quattro and all VE.Net devices, in particular the VE.Net Battery Controller. Graphic display of currents and voltages.

Computer controlled operation and monitoring

Several interfaces are available:



Color Control GX

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-700 Battery Monitor

The BMV-700 Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge/discharge current. Besides this, the software includes complex calculation algorithms, like Peukert's formula, to exactly determine the state of charge of the battery. The BMV-700 selectively displays battery voltage, current, consumed Ah or time to go. The monitor also stores a host of data regarding performance and use of the battery.



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. When multiple BlueSolar MPPTs with VE.Can are used in parallel, the all 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 Wi-Fi. To connect via Wi-Fi, a Wi-Fi 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](#).

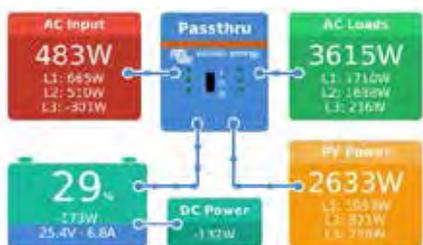
Other highlights

- 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	9 – 70V DC		
Current draw	12V DC	24V DC	48V DC
Switched off	0mA	0mA	0mA
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 VRM Portal		
Other			
Outer dimensions (h x w x d)	130 x 120 x 28mm		
Operating temperature range	-20 to +50°C		
Standards			
Safety	EN 60950		
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



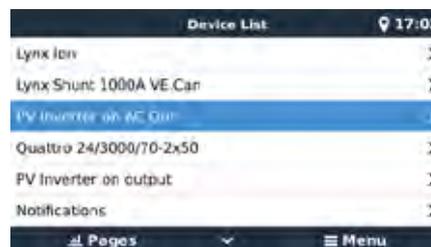
Mobile & boat overview



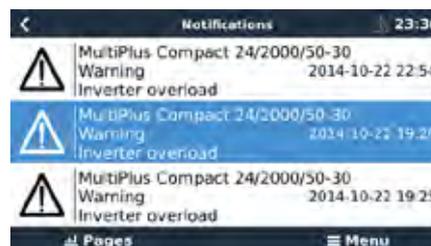
Genset control page



Main menu



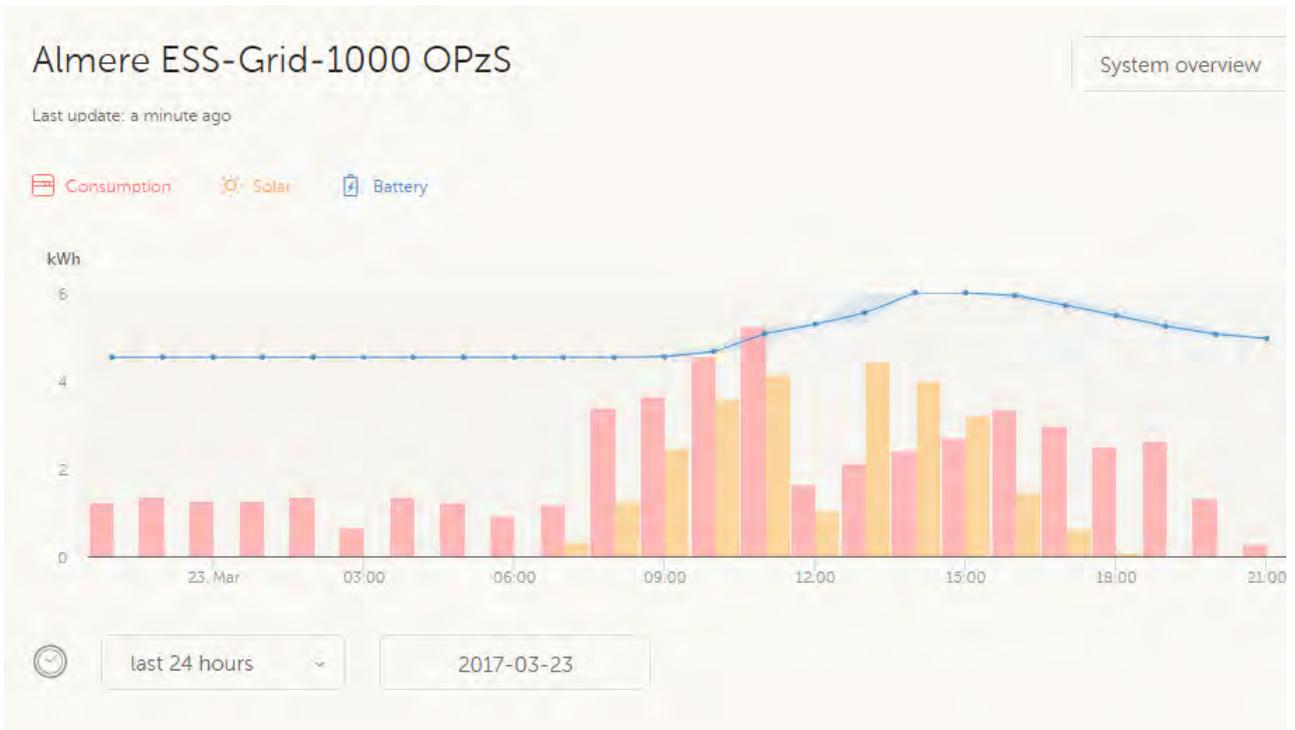
Alarm notifications



Tiles overview



VRM Portal - Dashboard



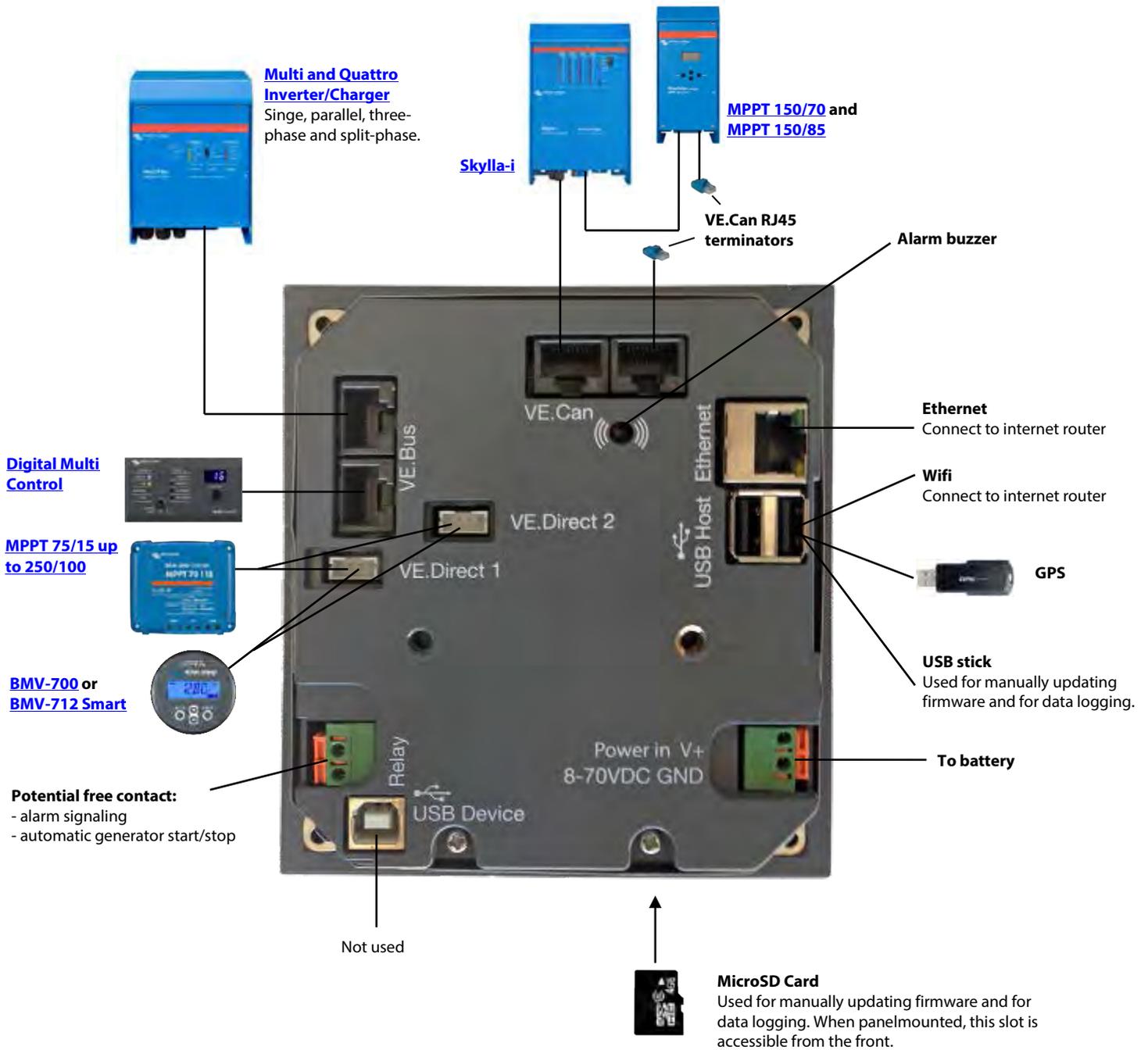
VRM Portal - Remote Console

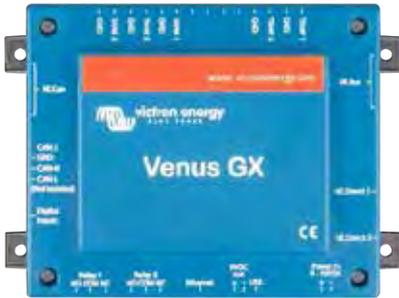
Almere ESS-Grid-1000 OPzS

Realtime data

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




Venus GX

Venus GX with connectors

Venus GX front angle

Venus GX

The Venus GX 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

All readings are 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

The way to access the device for setting up, as well as monitoring, is via Remote Console. Either via VRM, via the built-in WiFi Access Point, or on the local LAN/WiFi network.

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 Venus GX 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 Venus GX 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. When multiple BlueSolar MPPTs with VE.Can are used in parallel, the all 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 Venus GX. Use the VE.Direct Cable for this.
- BMV-600 family can be connected to the VE.Direct ports on the Venus GX. Requires an accessory cable.
- Lynx Ion + Shunt
- Lynx Ion BMS
- Lynx Shunt VE.Can
- Skylla-i battery chargers
- NMEA2000 tank sensors
- A USB GPS can be connected to the USB port. 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 Venus GX can be connected to internet with an Ethernet cable and via Wi-Fi. The Venus GX 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](#).

Tank level inputs

The tank level inputs are resistive: connect them to a resistive tank sender. Such tank senders are not supplied by Victron. The tank level ports can each be configured to work with either European tank senders (0 - 180 Ohm), or US (240 - 30 Ohm).

Other highlights

- The Venus GX 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 Venus GX 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>

Venus GX			
Power supply voltage range	8 – 70V DC		
Current Draw	210 mA @ 12V	110 mA @ 24V	60 mA @ 48V
Communication ports			
VE.Direct	2 separate VE.Direct ports – isolated		
VE.Can	2 paralleled RJ45 sockets – isolated		
CAN	2 nd CAN interface – non isolated		
VE.Bus	2 paralleled RJ45 sockets – isolated		
USB	2 USB Host ports – not isolated		
Ethernet	10/100/1000MB RJ45 socket – isolated except shield		
WiFi Access Point	Use to connect to Remote Console		
WiFi Client	Connect the Venux GX to an existing WiFi network		
IO			
Potential free contact	NO/COM/NC – 6 A 250 VAC/30 VDC		
Tank level inputs	3 x Configurable for European (0 - 180 Ohm) or US (240 - 30 Ohm)		
Temperature level inputs	2 x Requires ASS000001000.		
3rd party interfacing			
Modbus-TCP	Use Modbus-TCP to monitor and control all products connected to the Venus GX		
JSON	Use the VRM JSON API to retrieve data from the VRM Portal		
Other			
Outer dimensions (h x w x d)	45 x 143 x 96		
Operating temperature range	-20 to +50°C		
Standards			
Safety	EN 60950		
EMC	EN 61000-6-3, EN 55014-1, EN 61000-6-2, EN 61000-6-1, EN 55014-2		
Automotive	In progress		

BMV-712 Smart: Bluetooth inside



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: RJ 12 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: 0,7Ah per month (1mA) @12V and 0,6Ah per month (0,8mA) @ 24V

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 100Ah battery capacity. The battery will be damaged if the remaining capacity reserve is drawn from the battery. A residual current of 10mA for example may damage a 200Ah 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: 9,5 – 95V
- High current measurement resolution: 10 mA (0,01A)
- 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	< 1mA
Input voltage range, auxiliary battery	6,5 - 70 VDC
Battery capacity (Ah)	20 - 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	± 0,01A
Voltage	± 0,01V
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)
Body diameter	52mm (2.0 inch)
Body depth	31mm (1.2 inch)
STANDARDS	
Safety	EN 60335-1
Emission / Immunity	EN 55014-1 / EN 55014-2
Automotive	ECE R10-4 / EN 50498
ACCESSORIES	
Shunt (included)	500A / 50mV
Cables (included)	10 meter 6 core UTP with RJ12 connectors, and cable with fuse for '+' connection
Temperature sensor	Optional (ASS000100000)



1000A/50mV, 2000A/50mV and 6000A/50mV shunt

The quick connect PCB on the standard 500A/50mV 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 the Color Control or to a computer.



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 24V battery system increases to more than 27V, 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.

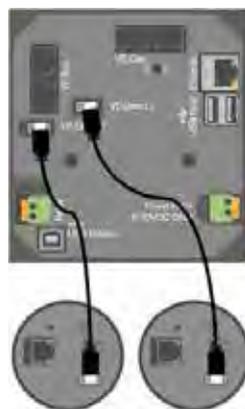
If needed, several balancers can be paralleled.

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



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 (NMEA2000), Ethernet and USB. Data can be stored and analysed on the VRM Portal.



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



Venus GX

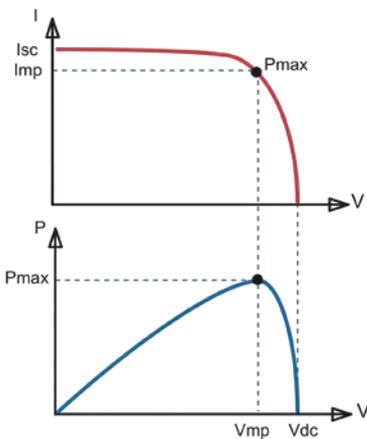
The Venus GX provides intuitive control and monitoring. It has the same functionality as the Color Control GX, with a few extras:

- lower cost, mainly because it has no display or buttons
- 3 tank sender inputs
- 2 temperature inputs





BlueSolar charge controllers MPPT - overview



Maximum Power Point Tracking

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 $I \times V$ 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 V_{mp} .

Feature highlights

- Ultra-fast Maximum Power Point Tracking (MPPT)
- Advanced Maximum Power Point Detection in case of partial shading conditions
- Load output on the small models
- Battery Life: intelligent battery management by load shedding
- Automatic battery voltage recognition
- Flexible charge algorithm
- Over-temperature protection and power de-rating when temperature is high.

Color Control GX

All Victron Energy MPPT Charge Controllers are compatible with the Color Control GX: The Color Control GX provides intuitive control and monitoring for all products connected to it. The list of Victron products that can be connected is endless: Inverters, Multis, Quattros, MPPT 150/70, BMV-600 series, BMV-700 series, Skylla-i, Lynx Ion and even more.

VRM Online Portal

Besides monitoring and controlling products on the Color Control GX, the information is also forwarded to our free remote monitoring website: the VRM Online Portal. To get an impression of the VRM Online Portal, visit <https://vr.victronenergy.com>, and use the 'Take a look inside' button. The portal is free of charge.

Related product: EasySolar

Minimal wiring and an all-in-one solution: the EasySolar takes power solutions one stage further, by combining an Ultra-fast BlueSolar charge controller (MPPT), an inverter/charger and AC distribution in one enclosure.

Model	Load output	Fan	Battery voltage	Optional display	Color Control GX	Com. port
75/10	Yes	No	12/24	MPPT control	Compatible	VE.Direct
75/15	Yes	No	12/24	MPPT control	Compatible	VE.Direct
100/15	Yes	No	12/24	MPPT control	Compatible	VE.Direct
100/30	No	No	12/24	MPPT control	Compatible	VE.Direct
100/50	No	No	12/24	MPPT control	Compatible	VE.Direct
150/35	No	No	12/24/36/48	MPPT control	Compatible	VE.Direct
150/45-Tr	No	No	12/24/36/48	MPPT control	Compatible	VE.Direct
150/45-MC4	No	No	12/24/36/48	MPPT control	Compatible	VE.Direct
150/60-Tr	No	No	12/24/36/48	MPPT control	Compatible	VE.Direct
150/60-MC4	No	No	12/24/36/48	MPPT control	Compatible	VE.Direct
150/70-Tr	No	No	12/24/36/48	MPPT control	Compatible	VE.Direct
150/70-MC4	No	No	12/24/36/48	MPPT control	Compatible	VE.Direct
150/70 CAN-bus	No	Yes	12/24/36/48	Integrated display	Compatible	VE.Can
150/85 CAN-bus	No	Yes	12/24/36/48	Integrated display	Compatible	VE.Can



MPPT150/60-MC4



MPPT Control



150/70 & 150/85 CAN-bus

SmartSolar charge controller MPPT 75/10, 75/15, 100/15 & 100/20

**Bluetooth Smart built-in: dongle not needed**

The wireless solution to set-up, monitor and update the controller using Apple and Android smartphones, tablets or other devices.

VE.Direct

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

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.

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.

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

Programming, real-time data and history display options

- Modern Apple and Android smartphones, tablets, macbooks and other devices: see the VE.Direct Bluetooth Smart dongle and the MPPT app discovery sheet for screenshots.
- ColorControl panel



**SmartSolar Charge Controller
MPPT 75/15**

SmartSolar Charge Controller	MPPT 75/10	MPPT 75/15	MPPT 100/15	MPPT 100/20
Battery voltage	12/24V Auto Select			
Rated charge current	10A	15A	15A	20A
Nominal PV power, 12V 1a,b)	145W	220W	220W	290W
Nominal PV power, 24V 1a,b)	290W	440W	440W	580W
Max. PV short circuit current 2)	13A	15A	15A	20A
Automatic load disconnect	Yes, maximum load 15A			20A
Maximum PV open circuit voltage	75V		100V	
Peak efficiency	98%			
Self-consumption	10 mA			
Charge voltage 'absorption'	14,4V / 28,8V (adjustable)			
Charge voltage 'float'	13,8V / 27,6V (adjustable)			
Charge algorithm	multi-stage adaptive			
Temperature compensation	-16 mV / °C resp. -32 mV / °C			
Continuous load current	15A			20A
Low voltage load disconnect	11,1V / 22,2V or 11,8V / 23,6V or Battery Life algorithm			
Low voltage load reconnect	13,1V / 26,2V or 14V / 28V or Battery Life algorithm			
Protection	Battery reverse polarity (fuse) / 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 ² / AWG10			
Protection category	IP43 (electronic components), IP22 (connection area)			
Weight	0,5 kg	0,6 kg	0,65 kg	
Dimensions (h x w x d)	100 x 113 x 40 mm		100 x 113 x 50 mm	100 x 113 x 60 mm
STANDARDS				
Safety	EN/IEC 62109-1			

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

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

Thereafter the minimum PV voltage is Vbat + 1V

2) A higher short circuit current may damage the controller in case of reverse polarity connection of the PV array.

SmartSolar charge controller MPPT 100/30 & 100/50



Bluetooth Smart built-in: dongle not needed

The wireless solution to set-up, monitor and update the controller using Apple and Android smartphones, tablets or other devices.

VE.Direct

For a wired data connection to a Color Control panel, Venus GX, 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%.

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.

Real-time data display options

- Apple and Android smartphones, tablets and other devices.

- Color Control panel.



**SmartSolar Charge Controller
MPPT 100/50**

SmartSolar Charge Controller	MPPT 100/30	MPPT 100/50
Battery voltage	12/24V Auto Select	
Rated charge current	30A	50A
Nominal PV power, 12V 1a,b)	440W	700W
Nominal PV power, 24V 1a,b)	880W	1400W
Maximum PV open circuit voltage	100V	100V
Max. PV short circuit current 2)	35A	60A
Maximum efficiency	98%	98%
Self-consumption	10 mA	
Charge voltage 'absorption'	Default setting: 14,4V / 28,8V (adjustable)	
Charge voltage 'float'	Default setting: 13,8V / 27,6V (adjustable)	
Charge algorithm	multi-stage adaptive	
Temperature compensation	-16 mV / °C resp. -32 mV / °C	
Protection	Battery reverse polarity (fuse, not user accessible) 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	13 mm ² / 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	
1a) If more PV power is connected, the controller will limit input power.		
1b) The PV voltage must exceed Vbat + 5V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1V.		
2) A higher short circuit current may damage the controller in case of reverse polarity connection of the PV array.		



Bluetooth Smart built-in: dongle not needed

The wireless solution to set-up, monitor and update the controller using Apple and Android smartphones, tablets or other devices.

VE.Direct

For a wired data connection to a Color Control panel, Venus GX, 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.

Real-time data display options

- Apple and Android smartphones, tablets and other devices.
- Color Control panel.



**SmartSolar Charge Controller
MPPT 150/35**

SmartSolar Charge Controller	MPPT 150/35
Battery voltage	12 / 24 / 48V Auto Select (software tool needed to select 36V)
Rated charge current	35A
Nominal PV power 1a, b)	12V: 500W / 24V: 1000W / 36V: 1500W / 48V: 2000W
Max. PV short circuit current 2)	40A
Maximum PV open circuit voltage	150V absolute maximum coldest conditions 145V start-up and operating maximum
Maximum efficiency	98%
Self-consumption	10 mA
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6V (adjustable)
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2V (adjustable)
Charge algorithm	multi-stage adaptive (eight pre-programmed algorithms)
Temperature compensation	-16 mV / -32 mV / -64 mV / °C
Protection	Battery reverse polarity (fuse, not user accessible) 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	13 mm ² / 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

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

1b) The PV voltage must exceed $V_{bat} + 5V$ for the controller to start.

Thereafter the minimum PV voltage is $V_{bat} + 1V$.

2) A higher short circuit current may damage the controller in case of reverse polarity connection of the PV array.



SmartSolar Charge Controller
MPPT 150/100-Tr
with pluggable display



SmartSolar Charge Controller
MPPT 150/100-MC4
without display

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 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.

Bluetooth Smart built-in: dongle not needed

The wireless solution to set-up, monitor and update the controller using Apple and Android smartphones, tablets or other devices.

VE.Direct

For a wired data connection to a Color Control panel, Venus GX, 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: pluggable LCD display

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



SmartSolar charge controller MPPT 250/60, 250/70, 250/85 & 250/100

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 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

Compensates absorption and float charge voltage for temperature.

Bluetooth Smart built-in: dongle not needed

The wireless solution to set-up, monitor and update the controller using Apple and Android smartphones, tablets or other devices.

VE.Direct

For a wired data connection to a Color Control panel, Venus GX, 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: pluggable LCD display

Remove the seal that protects the plug on the front of the controller, and plug-in the display.



**SmartSolar Charge Controller
MPPT 250/100-Tr
with pluggable display**



**SmartSolar Charge Controller
MPPT 250/100-MC4
without display**

SmartSolar Charge Controller	MPPT 250/60	MPPT 250/70	MPPT 250/85	MPPT 250/100
Battery voltage	12 / 24 / 48V Auto Select (software tool needed to select 36V)			
Rated charge current	60A	70A	85A	100A
Nominal PV power, 12V 1a,b)	860W	1000W	1200W	1450W
Nominal PV power, 24V 1a,b)	1720W	2000W	2400W	2900W
Nominal PV power, 48V 1a,b)	3440W	4000W	4900W	5800W
Max. PV short circuit current 2)	35A (max 30A per MC4 conn.)		70A (max 30A per MC4 conn.)	
Maximum PV open circuit voltage	250V absolute maximum coldest conditions 245V start-up and operating maximum			
Maximum efficiency	99%			
Self-consumption	Less than 35mA @ 12V / 20mA @ 48V			
Charge voltage 'absorption'	Default setting: 14,4 / 28,8 / 43,2 / 57,6V (adjustable with: rotary switch, display, VE.Direct or Bluetooth)			
Charge voltage 'float'	Default setting: 13,8 / 27,6 / 41,4 / 55,2V (adjustable: rotary switch, display, VE.Direct or Bluetooth)			
Charge algorithm	multi-stage adaptive			
Temperature compensation	-16 mV / -32 mV / -64 mV / °C			
Protection	Battery reverse polarity (fuse, not user accessible) 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 or Bluetooth			
Remote on/off	Yes (2 pole connector)			
Programmable relay	DPST AC rating: 240VAC / 4A DC rating: 4A up to 35VDC, 1A up to 60VDC			
Parallel operation	Yes (not synchronized)			

ENCLOSURE	
Colour	Blue (RAL 5012)
PV terminals 3)	35 mm ² / AWG2 (Tr models) Two sets of MC4 connectors (MC4 models 250/60 and 250/70) Three sets of MC4 connectors (MC4 models 250/85 and 250/100)
Battery terminals	35 mm ² / 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 MC4 models: 215 x 250 x 95 Tr models: 216 x 295 x 103 MC4 models: 246 x 295 x 103

STANDARDS	
Safety	EN/IEC 62109-1
1a) If more PV power is connected, the controller will limit input power to the stated maximum. 1b) The PV voltage must exceed Vbat + 5V for the controller to start. Thereafter the minimum PV voltage is Vbat + 1V.	
2) A PV array with a higher short circuit current may damage the controller in case of reverse polarity connection of the PV array.	
3) MC4 models: several splitter pairs may be needed to parallel the strings of solar panels. Maximum current per MC4 connector: 30A (the MC4 connectors are parallel connected to one MPPT tracker)	

24V 180Ah Lithium-ion battery and Lynx-ion



The advantages of a Lithium-ion battery over conventional lead-acid batteries

- High energy density: more energy with less weight;
- High charge currents (shortens the charge period);
- High discharge currents (enabling for example electrical cooking on a small battery bank);
- Long battery life (up to six times the battery life of a conventional battery);
- High efficiency between charging and discharging (very little energy loss due to heat development);
- Higher continuous power available.

Why Lithium-Iron-Phosphate?

Lithium-Iron-Phosphate (LiFePO₄ or LFP) is the safest of the mainstream Li-ion battery types. The nominal voltage of a LFP cell is 3,2V (lead-acid: 2V/cell). A 25,6V LFP battery consists of 8 cells connected in series.

24V 180Ah and 100Ah Lithium-Ion Battery



Lynx Ion + Shunt

Complete system

A complete system consists of:

- One or more **24V 180Ah or 100Ah Lithium-ion batteries**.
- (optional) The **Lynx Power In**, a modular dc bus bar.
- The **Lynx Ion + Shunt** is the Battery Management System (BMS) that controls the batteries. It contains a main safety contactor and a shunt. There are two models available: a 350A model and a 600A model.
- (optional) The **Lynx Distributor**, a DC distribution system with fuses.
- (optional) The **Ion Control**, a digital control panel.
- (optional) The **Color Control GX**, a more advanced digital control panel

The advantages of the Victron Lynx Lithium-ion battery system

The modular system used adds the following advantages:

- The Victron Lithium-ion Battery System is easy to install due to its modularity. No complicated wiring diagrams are required.
- Detailed information is available on the waterproof Ion Control display.
- The relay in the Lynx-ion + Shunt provides maximum safety: in case the chargers or loads do not respond to the commands from the Lynx-ion + Shunt, the main safety relay will open to prevent permanent damage to the batteries.
- For typical marine installations there is an extra small output, so you can still power the bilge pump while disconnecting all other house loads by opening the main relay.



Ion control: Main screen

24V 180Ah/100Ah Lithium-Ion Batteries

The base of the Victron Lithium-ion Battery System is formed by individual 24V/180Ah Lithium-ion batteries. They have a built-in Cell Management System (BMS) which protects the battery on a cell level. It monitors individual cell voltage and system temperature, and actively balances the individual cells. All measured parameters are sent to the Lynx Ion which monitors the system as a whole.



Ion control: History screen

Lynx Ion + Shunt

The Lynx Ion + Shunt is the BMS. It contains the safety contactor, and controls the cell-balancing, charging and discharging of the system. Also it keeps track of the State of Charge of the batteries, and calculates the Time to Go. It protects the battery pack from both overcharging and depletion. When an overcharge is imminent, it will signal the charging devices to decrease or stop charging. This is done with the VE.Can bus (NMEA2000) compatible, and also via the two available open/close contacts. Same when the battery is nearing empty, and there is no charging capability available. It will signal big loads to switch off.

For both overcharging and depletion there is a last safety resort, the built-in 350A or 600 A contactor. In case signalling does not stop the imminent overcharge or depletion, it will open the contactor.

VE.Can / NMEA2000 Canbus

Communication with the outside world is done via the VE.Can protocol.

Ion Control

See the separate [Ion Control](#) datasheet for more information.



Ion control: Lynx Ion Status

Color Control GX

See the separate [Color Control GX](#) datasheet for more information.

Lithium-Ion battery specifications

	Lithium-ion 24V 100Ah 2.6kWh battery	Lithium-ion 24V 180Ah 4.75kWh battery
Technology	Lithium iron phosphate (LiFePo4)	Lithium iron phosphate (LiFePo4)
Nominal voltage	25,6V	25,6V
Nominal capacity	100Ah	180Ah
Nominal power	2,6kWh	4,75kWh
Weight	30kg	55kg
Power/Weight ratio	86Wh/kg	86Wh/kg
Dimensions (lxwxh)	592x154x278mm	623x193x351mm
Charge/Discharge		
Charge cut-off voltage at 0.05C	28,8V	28,8V
Discharge cut-off voltage	20V	20V
Recommended charge/discharge current	30A (0,3C)	54A (0,3C)
Maximum charge current (1C)	100A	180A
Maximum discharge current (1.5C)	150A	270A
Pulse discharge current (10s)	500A	1000A
Cycle Life @80% DOD (0.3C)	3000	3000
Configuration		
Series configuration	Yes, up to 2 (more in series on request)	Yes, up to 2 (more in series on request)
Parallel configuration	Yes, easy up to 10 (more parallel on request)	Yes, easy up to 10 (more parallel on request)
Environmental		
Operating temp. charge	0~45°C	0~45°C
Operating temp. discharge	-20~55°C	-20~55°C
Storage temp.	-20~45°C	-20~45°C
Standards		
EMC: Emission	EN-IEC 61000-6-3:2007/A1:2011/C11:2012	
EMC: Immunity	EN-IEC 61000-6-1:2007	
Low voltage directive	EN 60335-1:2012/AC:2014	

Lynx Ion + Shunt specifications

Lynx Ion + Shunt	350A	600A
Maximum number batteries in series	2 (= 48 VDC)	
Maximum number batteries in parallel	48	
Supply voltage range	9 ... 60VDC	
Standby mode	73mW @ 26,2V and 138mW @ 52,4V	
Active mode	8,7 W	
Main safety contactor	350A	600A
Enclosure		
Material	ABS	
Weight	2,0kg	
Dimensions (lxwxh)	185 x 165 x 85 mm	
IO		
Aux. output	5A (output voltage = battery voltage), short circuit protection	
External safety contactor	5A (output voltage = battery voltage), short circuit protection	
Allow-to-charge	1A @ 60VDC, potential free	
Allow-to-discharge	1A @ 60VDC, potential free	
External status signal	12V / 140mA	
Environmental		
Operating temperature range	-20 °C to 50 °C	
Humidity	Max. 95% (non-condensing)	
Protection class	IP22	IP20
Standards		
EMC: Emission	EN-IEC 61000-6-3:2007/A1:2011/C11:2012	
EMC: Immunity	EN-IEC 61000-6-1:2007	
Low voltage directive	EN 60335-1:2012/AC:2014	
RoHS	EN 50581:2012	

Lithium-Ion HE Battery and Lynx Ion BMS



24V/100Ah HE battery



24V/200Ah HE battery



Lynx-ion BMS 1000A

Ultra-high energy density

185Wh/kg thanks to Lithium Nickel Manganese Cobalt Oxide (NMC) technology

Fan cooled

For high charge and discharge currents (up to 2C for short periods)

Parallel and series connection

Up to 64 batteries can be parallel connected.

For 48V systems two batteries can be connected in series, and up to 32 strings of two batteries can be parallel connected.

Galvanically isolated CAN-Bus communication

Protocol: VE.Can/NMEA2000

Lynx-ion BMS: 400A or 1000A

The Lynx-ion BMS reduces wiring and installation time to a minimum: it combines four fused battery connections, four fused DC load connections, a safety contactor and a current shunt with a BMS in one compact enclosure.

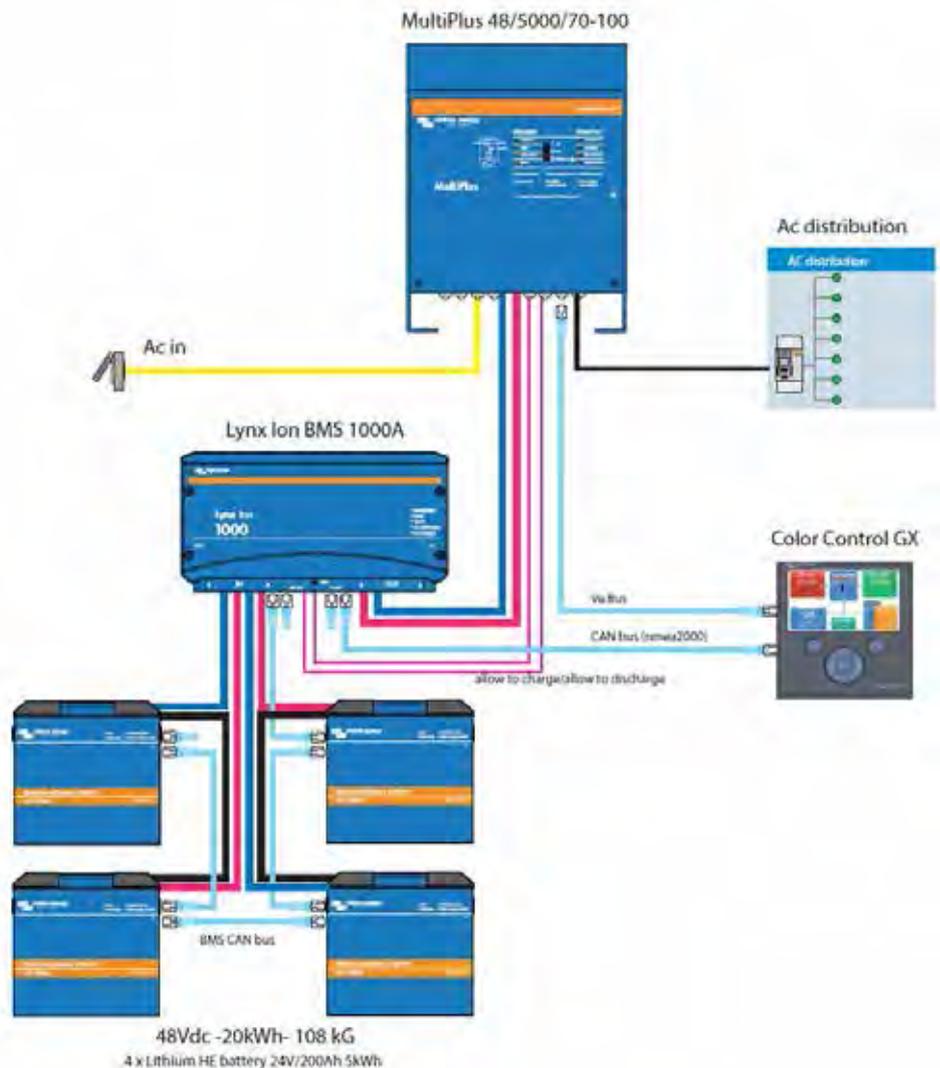
Monitoring: The Color Control GX or Venus GX

Monitors the complete system.

Is the gateway for remote monitoring on the VRM online portal.

Adds an amazing amount of useful functionality to system (such as a very sophisticated generator start-stop program)

See the Color Control GX and Venus GX datasheet for more information.



Lithium HE battery	24V / 100Ah	24V / 200Ah
Technology	Lithium-Ion NMC	Lithium-Ion NMC
Cell configuration	7S32P	7S64P
Nominal voltage	25,2 V	25,2 V
Nominal capacity	100 Ah	200 Ah
Nominal energy	2,5 kWh	5,0 kWh
Cycle Life @80% DoD (0,3C)	2000	2000
Energy/weight ratio (incl. BMS and enclosure)	159 Wh/kg	175 Wh/kg
Weight (incl. BMS and enclosure)	15,7 kg	28,6 kg
Discharge		
Discharge cut-off voltage	21 V	21 V
Recommended discharge current	30 A (0.3 C)	60 A (0.3 C)
Maximum discharge current (10 minutes)	150 A (1.5 C)	300 A (1.5 C)
Fuses	150 A, fuse inside	300 A, fuse inside
Charge		
Absorption voltage (1 hour)	28,4 V	28,4 V
Float voltage	27,5 V	27,5 V
Maximum charge current	100 A (1 C)	200 A (1 C)
Recommended charge current	30 A (0.3 C)	60 A (0.3 C)
Configuration		
Series configuration		Yes, up to 2
Parallel configuration		Yes, up to 96
Temperature		
Operating temp. charge		0~45°C
Operating temp. discharge		-20~55°C
Storage temp.		-20~45°C
Mechanical		
Power connections	M8 stud, Max. 15 Nm	M8 stud, Max. 15 Nm
Protection class	IP20	IP20
Cooling	Air, active (1x fan inside)	Air, active (2x fan inside)
Dimensions (l x w x h)	362 x 193 x 214 mm	362 x 193 x 355 mm
Safety		
Battery Management System (BMS)		Integrated slave BMS
Balancing		Passive
Compatible BMS master controller		Lynx Ion BMS
Communication with Lynx Ion BMS		CAN bus
Standards		
EMC: Emission		EN-IEC 61000-6-3
EMC: Immunity		EN-IEC 61000-6-1
Low voltage directive		EN 60335-1
Lynx Ion BMS		
	400A	1000A
Maximum number batteries in series		2 (= 48 VDC)
Maximum number batteries in parallel		96 (48 V: 48 strings of two batteries)
Supply voltage range		18 to 58 VDC
Power consumption, standby mode		73 mW @ 26,2V and 138 mW @ 52,4V
Power consumption, active mode		8,7 W
Main safety contactor	400A	1000A
Communication port	VE.CAN (NMEA2000, RJ45 connection, galvanically isolated)	
IO		
Auxiliary output	13,5 V / 1 A, short circuit protected	
Allow-to-charge (switched voltage)	13,5 V / 1 A, short circuit protected	
Allow-to-discharge (switched voltage)	13,5 V / 1 A, short circuit protected	
Allow-to-charge (relay output)	1 A @ 60 VDC, potential free	
Allow-to-discharge (relay output)	1 A @ 60 VDC, potential free	
Programmable contact (relay output)	1 A @ 60 VDC, potential free	
External status signal	13,5 V / 140 mA	
Enclosure		
Material	ABS	
Weight	4,6 kg	5,7 kg
Dimensions (lxwxh)	225 x 426 x 117 mm	
Environmental		
Operating temperature range	-20 °C to 50 °C	
Humidity	Max. 95% (non-condensing)	
Protection class	IP22	
Standards		
EMC: Emission	EN-IEC 61000-6-3	

About Victron Energy

With over 43 years of experience, Victron Energy enjoys an unrivalled reputation for technical innovation, reliability and quality. Victron is a world leader in the supply of self-supporting electrical power. Our products have been designed to meet the most demanding situations faced by a diversity of craft, recreational and commercial alike. Victron's ability to meet the demand for customized off-grid systems is unprecedented. Our product range includes sine wave inverters and inverter/chargers, battery chargers, DC/DC converters, transfer switches, gel and AGM batteries, alternators, battery monitors, solar charge regulators, solar panels, complete network solutions and many other innovative solutions.

World-wide service and support

Having served the off-grid, industrial and vehicle markets as well as both the commercial and leisure marine sectors for over 43 years, Victron has an established network of dealers and distributors covering the whole world. Our customer base is such that providing prompt and competent local service is essential.

This is reflected in the capabilities of our support network. Our flexible approach to service support and our commitment to quick turnaround for repairs is marketleading. There are countless examples of Victron products that have provided for decades of reliable service in the most demanding applications. This level of reliability combined with the highest level of technical know-how results in Victron Energy power systems that offer the very best value available.







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