Self-consumption & energy storage

Victron Energy
Blue Power

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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:
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.

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:

![Logos of various battery technologies]

And many more!
**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/](https://www.marjoleininhetklein.com/)
Application example: Smartflower

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.
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.
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.
**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
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/
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

Octo GX
The Octo GX is the communication-centre of your installation. It connects the components together and ensures they are working in harmony. Monitoring of live data, and changing settings is performed by using your smartphone (or other device) via our free-to-use Victron Remote Management Portal, VRM.

The Octo GX is a member of the GX Product family. The Octo GX is the best fit for installations that have many MPPT Solar Chargers, as it has 10 VE.Direct ports.
**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.

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

Zigbee to USB converter, DRF2658C, DTK
Zigbee to RS485 converter, DRF2659C, 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 bdew-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**

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.

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

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<td></td>
</tr>
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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 http://www.victronenergy.nl/support-and-downloads/software/
### EasySolar

<table>
<thead>
<tr>
<th>EasySolar</th>
<th>EasySolar 24/3000/70-50 MPPT/150/70</th>
<th>EasySolar 48/5000/70-100 MPPT/150/100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transfer switch</strong></td>
<td>50A</td>
<td>100A</td>
</tr>
<tr>
<td><strong>Input voltage range</strong></td>
<td>19 – 33V</td>
<td>38 – 66V</td>
</tr>
<tr>
<td>‘Heavy duty’ output AC 2</td>
<td>16 A</td>
<td></td>
</tr>
<tr>
<td><strong>Output AC 1a, 1b, 1c, 1d</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cont. output power at 25°C (3)</strong></td>
<td>3000VA / 2400W</td>
<td>5000VA / 4000W</td>
</tr>
<tr>
<td><strong>Cont. output power at 40°C</strong></td>
<td>2200W</td>
<td>3700W</td>
</tr>
<tr>
<td><strong>Cont. output power at 65°C</strong></td>
<td>1700W</td>
<td>3000W</td>
</tr>
<tr>
<td><strong>Peak power</strong></td>
<td>6000W</td>
<td>10000W</td>
</tr>
<tr>
<td><strong>Maximum efficiency</strong></td>
<td>94%</td>
<td>95%</td>
</tr>
<tr>
<td><strong>Zero load power</strong></td>
<td>20W</td>
<td>35W</td>
</tr>
<tr>
<td><strong>Zero load power in search mode</strong></td>
<td>10W</td>
<td>15W</td>
</tr>
</tbody>
</table>

### Inverter/Charger

<table>
<thead>
<tr>
<th><strong>AC Input</strong></th>
<th>Input voltage range: 187-265 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Charge voltage ‘absorption’</strong></td>
<td>28,8V</td>
</tr>
<tr>
<td><strong>Charge voltage ‘float’</strong></td>
<td>27,6V</td>
</tr>
<tr>
<td><strong>Storage mode</strong></td>
<td>26,4V</td>
</tr>
<tr>
<td><strong>Charge current</strong></td>
<td>70A</td>
</tr>
<tr>
<td><strong>Battery temperature sensor</strong></td>
<td>yes</td>
</tr>
<tr>
<td><strong>Programmable relay (5)</strong></td>
<td>yes</td>
</tr>
<tr>
<td><strong>Protection (2)</strong></td>
<td>a – g</td>
</tr>
</tbody>
</table>

### Solar Charge Controller

<table>
<thead>
<tr>
<th><strong>Model</strong></th>
<th>MPPT 150/70-MC4</th>
<th>MPPT 150/100-MC4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum output current (4)</strong></td>
<td>70A</td>
<td>100A</td>
</tr>
<tr>
<td><strong>Maximum PV power</strong></td>
<td>2000W</td>
<td>5800W</td>
</tr>
<tr>
<td><strong>Maximum PV open circuit voltage</strong></td>
<td>150V</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum efficiency</strong></td>
<td>98%</td>
<td></td>
</tr>
<tr>
<td><strong>Self-consumption</strong></td>
<td>10mA</td>
<td></td>
</tr>
<tr>
<td><strong>Charge voltage ‘absorption’, default setting</strong></td>
<td>28,8V</td>
<td></td>
</tr>
<tr>
<td><strong>Charge voltage ‘float’, default setting</strong></td>
<td>27,6V</td>
<td></td>
</tr>
<tr>
<td><strong>Charge algorithm</strong></td>
<td>multi-stage adaptive</td>
<td></td>
</tr>
<tr>
<td><strong>Temperature compensation</strong></td>
<td>-16 mV / °C</td>
<td></td>
</tr>
<tr>
<td><strong>Protection</strong></td>
<td>a – g</td>
<td></td>
</tr>
</tbody>
</table>

### 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. |
| **230 V AC-connection** | Three sets of MC4 PV connectors. |
| **Weight** | 28kg |
| **Dimensions (hxwxd)** | 810 x 258 x 218 |

### 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
MultiPlus-II 3000VA & 5000VA

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

PowerControl and PowerAssist - Boosting the capacity of the grid or a generator
A maximum grid or generator current can be set. The MultiPlus-II will then take account of other AC loads and use whatever is extra for battery charging, thus preventing the generator or grid from being overloaded (PowerControl function). PowerAssist takes the principle of PowerControl to a further dimension. Where peak power is so often required only for a limited period, the MultiPlus-II will compensate insufficient generator, shore or grid power with power from the battery. When the load reduces, the spare power is used to recharge the battery.

Solar energy: AC power available even during a grid failure
The MultiPlus-II can be used in off grid as well as grid connected PV and other alternative energy systems. It is compatible with both solar charger controllers and grid-tie inverters.

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

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

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

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

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

Grid parallel topology with MPPT solar charge controller
The MultiPlus-II will use data from the external AC current sensor (must be ordered separately) or power meter to optimise self-consumption and, if required, to prevent grid feed. In case of a power outage, the MultiPlus-II will continue to supply the critical loads.
MultiPlus-II 24/3000/70-32, 48/3000/35-32 & 48/5000/70-50

- **PowerControl & PowerAssist**: Yes
- **Transfer switch**: 32A
- **Maximum AC input current**: 32A

### INVERTER
- **DC Input voltage range**: 19 - 33V
- **Output voltage**: 230 VAC ± 2%
- **Frequency**: 50 Hz ± 0.1%
- **Cont. output power at 25°C**: 3000VA
- **Cont. output power at 50°C**: 2200W
- **Cont. output power at 65°C**: 1700W
- **Maximum apparent feed-in power**: 2500VA
- **Peak power**: 5500W
- **Maximum efficiency**: 94%
- **Zero load power**: 13W
- **Zero load power in AES mode**: 9W
- **Zero load power in Search mode**: 3W

### CHARGER
- **AC Input**: Input voltage range: 187-265 VAC
- **Input frequency**: 45 – 65 Hz
- **Charge voltage ‘absorption’**: 28.8V
- **Charge voltage ‘float’**: 27.6V
- **Storage mode**: 26.4V
- **Maximum battery charge current**: 70A
- **Battery temperature sensor**: Yes

### GENERAL
- **Auxiliary output**: Yes (32A)
- **External AC, Current sensor (optional)**: 50A
- **Programmable relay (S)**: Yes
- **Protection**: a – g
- **VE.Bus communication port**: For parallel and three phase operation, remote monitoring and system integration
- **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**: M8 bolts
- **AC output**: Screw terminals 13 mm² (6 AWG)
- **Weight**: 18 kg
- **Dimensions (hwxwdxmm)**: 506 x 275 x 147 mm

### STANDARDS
- **Safety**: EN-IEC 60335-1, EN-IEC 60335-2-29, EN-IEC 62109
- **Emission, Immunity**: EN-IEC 61000-3-2, EN-IEC 61000-3-3, IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3

### UNINTERRUPTIBLE POWER SUPPLY
- **Anti-islanding**: Please consult the certificates on our website.

---

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

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

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

**Connection Area**

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

**Digital Multi Control Panel**
A convenient and low-cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.
A MultiPlus-II with LCD and GX functionality
The MultiPlus-II GX integrates a MultiPlus-II inverter/charger and a GX device with a 2 x 16 character display.

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

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

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

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

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

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

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

Standard mobile or off-grid application with external current sensor
Maximum current sensing range: 50 A resp 100 A
MultiPlus-II required, to prevent grid feed. In case of a power outage, the MultiPlus-II will account by the PowerControl and PowerAssist function in order to limit AC input loads that should shut down when AC input power is not available can be Standard

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

A MultiPlus GX functionality

- A USB port.
- A VE.Can compatible port.
- A Ethernet port.

GX Charger

CHARGER

AC Input

Input voltage range: 187-265 VAC
Input frequency: 45 – 65 Hz
Charge voltage ‘absorption’ 28,8 V
Charge voltage ‘float’ 27,6 V
Storage mode 26,4 V
Maximum battery charge current (4) 70 A
Battery temperature sensor

GENERAL

Interfaces

BMS-Car, USB, Ethernet, VE.Direct, Wi-Fi
External AC current sensor (optional) 50 A
Programmable relay (5) Yes
Protection (2) 4 – 9
VE.Bus communication port
General purpose com. port
Remote on-off
Operating temperature range -40 to +65 °C (fan assisted cooling)
Humidity (non-condensing) max 95 %

ENCLOSURE

Material & Colour

Steel, blueRAL 5012
Protection category

IP22
Battery-connection

Screw terminals 13 mm² (6 AWG)
Weight

19 kg
30 kg
Dimensions (hxwxd) mm

506 x 275 x 147
565 x 323 x 148

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
IEC 61000-3-2, IEC 61000-3-3
IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3
Uninterruptible power supply

IEC 62040-1
Anti-islanding

Please consult the certificates on our website.

1) Can be adjusted to 60 Hz
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 voltage or generator start/stop function.
AC rating: 230 V / 4 A, DC rating: 4 A up to 35 VDC and 1 A up to 60 VDC.

MultiPlus-II GX

| PowerControl & PowerAssist | Yes |
| Transfer switch | 32 A / 50 A |
| Maximum AC input current | 32 A / 50 A |
| Auxiliary output | Yes (32 A) |

INVERTER

DC Input voltage range

19 – 33 V

Output

Output voltage: 230 VAC ± 2 %
Frequency: 50 Hz ± 0,1 %

Cont. output power at 25 °C (3)

3000 VA

Cont. output power at 25 °C (5)

2400 W

Cont. output power at 40 °C

2200 W

Cont. output power at 65 °C

1700 W

Maximum apparent feed-in power

2500 VA

Peak power

5500 W

Maximum efficiency

94 %

Zero load power

13 W

Zero load power in AES mode

9 W

Zero load power in Search mode

3 W

CHARGER

AC Input

Input voltage range: 187-265 VAC
Input frequency: 45 – 65 Hz
Charge voltage ‘absorption’ 28,8 V
Charge voltage ‘float’ 27,6 V
Storage mode 26,4 V
Maximum battery charge current (4) 70 A
Battery temperature sensor

GENERAL

Interfaces

BMS-Car, USB, Ethernet, VE.Direct, Wi-Fi
External AC current sensor (optional) 50 A
Programmable relay (5) Yes
Protection (2) 4 – 9
VE.Bus communication port
General purpose com. port
Remote on-off
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

Screw terminals 13 mm² (6 AWG)
Weight

19 kg
30 kg
Dimensions (hxwxd) mm

506 x 275 x 147
565 x 323 x 148

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
IEC 61000-3-2, IEC 61000-3-3
IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3
Uninterruptible power supply

IEC 62040-1
Anti-islanding

Please consult the certificates on our website.

1) Can be adjusted to 60 Hz
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 voltage or generator start/stop function.
AC rating: 230 V / 4 A, DC rating: 4 A up to 35 VDC and 1 A up to 60 VDC.

MultiPlus-II GX

| PowerControl & PowerAssist | Yes |
| Transfer switch | 32 A / 50 A |
| Maximum AC input current | 32 A / 50 A |
| Auxiliary output | Yes (32 A) |

INVERTER

DC Input voltage range

19 – 33 V

Output

Output voltage: 230 VAC ± 2 %
Frequency: 50 Hz ± 0,1 %

Cont. output power at 25 °C (3)

3000 VA

Cont. output power at 25 °C (5)

2400 W

Cont. output power at 40 °C

2200 W

Cont. output power at 65 °C

1700 W

Maximum apparent feed-in power

2500 VA

Peak power

5500 W

Maximum efficiency

94 %

Zero load power

13 W

Zero load power in AES mode

9 W

Zero load power in Search mode

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CHARGER

AC Input

Input voltage range: 187-265 VAC
Input frequency: 45 – 65 Hz
Charge voltage ‘absorption’ 28,8 V
Charge voltage ‘float’ 27,6 V
Storage mode 26,4 V
Maximum battery charge current (4) 70 A
Battery temperature sensor

GENERAL

Interfaces

BMS-Car, USB, Ethernet, VE.Direct, Wi-Fi
External AC current sensor (optional) 50 A
Programmable relay (5) Yes
Protection (2) 4 – 9
VE.Bus communication port
General purpose com. port
Remote on-off
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

Screw terminals 13 mm² (6 AWG)
Weight

19 kg
30 kg
Dimensions (hxwxd) mm

506 x 275 x 147
565 x 323 x 148

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
IEC 61000-3-2, IEC 61000-3-3
IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3
Uninterruptible power supply

IEC 62040-1
Anti-islanding

Please consult the certificates on our website.

1) Can be adjusted to 60 Hz
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 voltage or generator start/stop function.
AC rating: 230 V / 4 A, DC rating: 4 A up to 35 VDC and 1 A up to 60 VDC.
Bluetooth built-in: fully configurable with a tablet or smartphone
- Low battery voltage alarm
- Low battery voltage cut-off and restart levels
- Dynamic cut-off: load dependent cut-off level
- Output voltage: 210 - 245V
- Frequency: 50 Hz or 60 Hz
- ECO mode on/off and ECO mode sense level
- Alarm relay

Monitoring:
- In- and output voltage, load and alarms

**VE.Direct communication port**
The VE.Direct port can be connected to a computer (VE.Direct to USB interface cable needed) to configure and monitor the same parameters.

**Proven reliability**
The full bridge plus toroidal transformer topology has proven its reliability over many years. The inverters are short circuit proof and protected against overheating, whether due to overload or high ambient temperature.

**High start-up power**
Needed to start loads such as power converters for LED lamps, halogen lamps or electric tools.

**ECO mode**
When in ECO mode, the inverter will switch to standby when the load decreases below a preset value. Once in standby the inverter will switch on for a short period every 2,5 seconds (adjustable).

If the load exceeds the preset level, the inverter will remain on.

**Remote on/off**
A remote on/off switch or relay contact can be connected to a two pole connector. Alternatively, the H terminal (left) of the two pole connector can be switched to battery plus, or the L terminal (right) of the two pole connector can be switched to battery minus (or the chassis of a vehicle, for example).

**LED diagnosis**
Please see manual for a description.

**To transfer the load to another AC source: the automatic transfer switch**
For our low power inverters we recommend our Filax Automatic Transfer Switch. The Filax features a very short switchover time (less than 20 milliseconds) so that computers and other electronic equipment will continue to operate without disruption. Alternatively use a MultiPlus with built-in transfer switch.
## Phoenix Inverter Smart

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel and 3-phase operation</td>
<td>No</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>INVERTER</strong></td>
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</tr>
<tr>
<td><strong>Input voltage range</strong></td>
<td>9.3 – 17V</td>
<td>18.6 – 34V</td>
<td>37.2 – 68V</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Output</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Cont. output power at 25°C (1)</td>
<td>1600 VA</td>
<td>2000 VA</td>
<td>3000 VA</td>
<td>5000 VA</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cont. output power at 25°C</td>
<td>1300 W</td>
<td>1600 W</td>
<td>2400 W</td>
<td>4000 W</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cont. output power at 40°C</td>
<td>1200 W</td>
<td>1450 W</td>
<td>2200 W</td>
<td>3700 W</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cont. output power at 65°C</td>
<td>800 W</td>
<td>1000 W</td>
<td>1700 W</td>
<td>2800 W</td>
<td></td>
<td></td>
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<tr>
<td>Peak power</td>
<td>3000 W</td>
<td>4000 W</td>
<td>6000 W</td>
<td>10000 W</td>
<td></td>
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<tr>
<td>Dynamic load dependent DC low shut down (fully configurable)</td>
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<tr>
<td>Max. efficiency 12/ 24/ 48 V</td>
<td>92 / 94 / 94%</td>
<td>92 / 94 / 94%</td>
<td>93 / 94 / 95%</td>
<td>93 / 94 / 95%</td>
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<tr>
<td>Zero load power in ECO mode</td>
<td>0.6 / 1.3 / 2.1 W</td>
<td>0.6 / 1.3 / 2.1 W</td>
<td>1.5 / 1.9 / 2.8 W</td>
<td>1.5 / 1.9 / 2.8 W</td>
<td></td>
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<td><strong>GENERAL</strong></td>
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<td>Programmable relay (2)</td>
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<tr>
<td>Stop &amp; start power ECO-mode</td>
<td>adjustable</td>
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<td>Protection (3)</td>
<td>a - g</td>
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<td>Bluetooth wireless communication</td>
<td>For remote monitoring and system integration</td>
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<tr>
<td>VE.Direct communication port</td>
<td>For remote monitoring and system integration</td>
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<tr>
<td>Remote on-off</td>
<td>Yes</td>
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<td><strong>ENCLOSURE</strong></td>
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<tr>
<td>Common Characteristics</td>
<td>Material &amp; Colour: steel (blue RAL 5012; and black RAL 9017)</td>
<td>Protection category: IP21</td>
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<tr>
<td>Battery-connection</td>
<td>M8 bolts</td>
<td>M8 bolts</td>
<td>12 V/24 V: 2+2 M8 bolts</td>
<td>24 V/48 V: M8 bolts</td>
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<td>230 V AC-connection</td>
<td>Screw terminals</td>
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<tr>
<td><strong>STANDARDS</strong></td>
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<td>Safety</td>
<td>EN 60335-1</td>
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<tr>
<td>Emission Immunity</td>
<td>EN 55014-1 / EN 55014-2 / EN-IEC 61000-6-1 / EN-IEC 61000-6-2 / EN-IEC 61000-6-3</td>
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<td>Automotive Directive</td>
<td>ECE R10-5</td>
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</tbody>
</table>

1) Non-linear load, crest factor: 3.1
2) Programmable relay that can a.o. be set for general alarm, DC under voltage or genset start/stop function.
3) AC rating: 230 V / 4 A
4) DC rating: 4 A / 33 VDC, 1 A / 60VDC
5) 230 V AC on inverter output

### BMV-712 Smart Battery Monitor

The BMV 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 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.
**Phoenix inverters 1200VA - 5000VA 230V**

**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).

**Communications Interface**
These larger Phoenix inverter models come with a VE.Bus port. All you need to connect to your PC is our MK3-USB VE.Bus to USB interface (see under accessories). Together with our VictronConnect or VEConfigure software, which can be downloaded free of charge from our website, 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 a GX device (eg Cerbo GX) for monitoring and control.

**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

<table>
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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel and 3-phase operation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>INVERTER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input voltage range (V DC)</td>
<td>9,5 – 17V</td>
<td>19 – 33V</td>
<td>38 – 66V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Cont. output power at 25°C (VA)</td>
<td>1200</td>
<td>1600</td>
<td>2000</td>
<td>3000</td>
<td>5000</td>
</tr>
<tr>
<td>Cont. output power at 25°C (W)</td>
<td>1000</td>
<td>1300</td>
<td>1600</td>
<td>2400</td>
<td>4000</td>
</tr>
<tr>
<td>Cont. output power at 40°C (W)</td>
<td>900</td>
<td>1200</td>
<td>1450</td>
<td>2200</td>
<td>3700</td>
</tr>
<tr>
<td>Cont. output power at 65°C (W)</td>
<td>600</td>
<td>800</td>
<td>1000</td>
<td>1700</td>
<td>3000</td>
</tr>
<tr>
<td>Peak power (W)</td>
<td>2400</td>
<td>3000</td>
<td>4000</td>
<td>6000</td>
<td>10000</td>
</tr>
<tr>
<td>Max. efficiency 12/ 24 / 48V (%)</td>
<td>92 / 94 / 94</td>
<td>92 / 94 / 94</td>
<td>92 / 92</td>
<td>93 / 94 / 95</td>
<td>94 / 95</td>
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<tr>
<td>Zero load power 12 / 24 / 48V (W)</td>
<td>8 / 10 / 12</td>
<td>8 / 10 / 12</td>
<td>9 / 11</td>
<td>20 / 20 / 25</td>
<td>30 / 35</td>
</tr>
<tr>
<td>Zero load power in AES mode (W)</td>
<td>5 / 8 / 10</td>
<td>5 / 8 / 10</td>
<td>7 / 9</td>
<td>15 / 15 / 20</td>
<td>25 / 30</td>
</tr>
<tr>
<td>Zero load power in Search mode (W)</td>
<td>2 / 3 / 4</td>
<td>2 / 3 / 4</td>
<td>3 / 4</td>
<td>8 / 10 / 12</td>
<td>10 / 15</td>
</tr>
</tbody>
</table>

#### General

- Programmable relay (3)
- Protection (4)
- VE.Bus communication port for parallel and three phase operation, remote monitoring and system integration
- Remote on-off
- Common Characteristics: Operating temperature range: -40 to +65°C (fan assisted cooling)
- Humidity (non-condensing): max 95%

#### Enclosure

- Material & Colour: aluminium (blue RAL 5012)
- Protection category: IP21
- 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): 375 x 214 x 110
- 520 x 255 x 125
- 362 x 258 x 218
- 444 x 328 x 240

#### Standards

<table>
<thead>
<tr>
<th>Category</th>
<th>EN 60335-1</th>
<th>EN 55014-1 / EN 55014-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission Immunity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
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

### Computer controlled operation and monitoring

Several interfaces are available:

- **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.

- **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).
Two AC Outputs
The main output has no break functionality. The MultiPlus takes over the supply to the connected loads in the event of a grid failure or when shore/generator power is disconnected. This happens so fast (less than 20 milliseconds) that computers and other electronic equipment will continue to operate without disruption. The second output is live only when AC is available on the input of the MultiPlus. Loads that should not discharge the battery, like a water heater for example can be connected to this output (second output available on models rated at 3 kVA and more).

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

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

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

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

Solar energy: AC power available even during a grid failure
The MultiPlus can be used in off grid as well as grid connected PV and other alternative energy systems. Loss of mains detection software is available.

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

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

Remote Monitoring and control
Color Control GX or other GX devices.
Data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge.

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

Lithium Ion battery compatible
The second output is live only when AC is available on the input of the MultiPlus. Loads that should not discharge the battery cables of 1.5 mm² or 2.5 mm² (4 AWG or 6 AWG) and other electronic equipment will continue to operate without disruption.

The MultiPlus monitors and controls the power supply to the connected loads. It takes over the supply to the connected loads in the event of a mains failure or a fault condition. The main output has no break functionality.

For parallel and three phase operation, remote monitoring and system integration with PowerControl and PowerAssist levels. Several interfaces are available:

- Computer controlled operation and monitoring
  - Several interfaces are available:
    - Digital Multi Control Panel
      - A convenient and low cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.
    - Color Control GX and other GX devices
      - Monitoring and control. Locally, and also remotely on the VRM Portal.
    - MK3-USB (VE.Bus to USB Interface)
      - Connects to a USB port (see A guide to VEConf).net).
    - VE.Bus to NMEA 2000 interface
      - Connects the device to a NMEA2000 marine electronics network. See the NMEA2000 & MFD integration guide.

- Remote monitoring and control of Victron Energy B.V. | De Paal 35 | 1351 JG Almere | The Netherlands

**PowerControl**
- Yes
  - 12 Volt 24 Volt 48 Volt
  - C 12/2000/50 48/5000/70
  - C 12/2400/50 48/3000/15
  - C 12/3000/120 48/5000/70

**PowerAssist**
- Yes
  - 12 Volt 24 Volt 48 Volt
  - C 12/2000/50 48/5000/70
  - C 12/2400/50 48/3000/15
  - C 12/3000/120 48/5000/70

**Transfer switch (A)**
- 16
  - 12 Volt 24 Volt 48 Volt
  - C 12/2000/50 48/5000/70
  - C 12/2400/50 48/3000/15
  - C 12/3000/120 48/5000/70

### 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%

<table>
<thead>
<tr>
<th>Cont. output power at 25°C (VA)</th>
<th>800</th>
<th>1200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cont. output power at 25°C (W)</td>
<td>700</td>
<td>1000</td>
</tr>
<tr>
<td>Cont. output power at 40°C (W)</td>
<td>650</td>
<td>900</td>
</tr>
<tr>
<td>Cont. output power at 65°C (W)</td>
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<tr>
<td>Peak power (W)</td>
<td>1600</td>
<td>2400</td>
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<tr>
<td>Maximum efficiency (%)</td>
<td>92 / 94</td>
<td>93 / 94</td>
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<tr>
<td>Zero load power (W)</td>
<td>8 / 10</td>
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<tr>
<td>Zero load power in AES mode (W)</td>
<td>5 / 8</td>
<td>5 / 8</td>
</tr>
<tr>
<td>Zero load power in Search mode (W)</td>
<td>2 / 3</td>
<td>2 / 3</td>
</tr>
</tbody>
</table>

### 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

**Maximum efficiency (%)**
- 92 / 94

**DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC**

### GENERAL

**Ambient temperature (°C)**
- 0° to +65°C

**Weight (kg)**
- 2 / 3

**Dimensions (h x w x d in mm)**
- 375 x 214 x 110

### ENCLOSURE

**Battery connection**
- battery cables of 1.5 meter
- M8 bolts

**230 V AC-connection**
- G-STiZ connector
- Spring-clamp

**Weight (kg)**
- 10

**Dimensions (h x w x d in mm)**
- 375 x 214 x 110

### STANDARDS

**Safety**
- EN-IEC 61000-1
- EN-IEC 61000-2-29
- EN 62109-1

**Emission, Immunity**
- EN 55014-1, EN 55014-2
- EN 61000-3-2
- EN 61000-3-3
- EN 61000-6-1, 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 models available 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
7) DC rating: 230 V/4A
8) DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC

**Approved**
- CE
- UL
- EN 61000-6-2
- EN 55014-1
- EN 55014-2
- EN 61000-3-2
- EN 61000-3-3
- EN 61000-6-1, IEC 61000-6-1
- IEC 61000-6-2, IEC 61000-6-3

**MEASUREMENTS**
- 5 Volt monitor input
- 12 Volt and 24 Volt models:
  - Battery Monitor
  - Multi Control Panel
  - Color Control GX or other GX devices
  - Smartphone or other Bluetooth enabled device
  - VE.Bus Smart Dongle
  - USB connection: (4 plus and 2 minus connections)

**ACCESSORIES**
- Four M8 bolts (2 plus and 2 minus connections)
- Screw terminals 13 mm² (6 AWG)
- M6 bolts

**Electrical connections**
- See our website

**Commercial Characteristics**
- Operating temp. range: -40 to +65°C (fan assisted cooling)
- Humidity (non-condensing): max 95%
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.

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.

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).

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

Remote Monitoring and control
Color Control GX or other GX devices. Data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge.

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

<table>
<thead>
<tr>
<th>PowerControl / PowerAssist</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Transfer switch</td>
<td>Yes</td>
</tr>
<tr>
<td>AC inputs (2x)</td>
<td>Input voltage range: 187-265 VAC  Input frequency: 45 – 65 Hz  Power factor: 1</td>
</tr>
<tr>
<td>Maximum feed through current (A)</td>
<td>2x 50  2x100  2x100  2x100  2x100</td>
</tr>
</tbody>
</table>

### INVERTER

**Input voltage range (V DC)**

| 9.5 – 17V | 19 – 33V | 38 – 66V |

**Output (1)**

| 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 | 60 / 60 | 60 | 110 |

**Zero load power in AES mode (W)**

| 15 / 15 | 20 / 25 / 30 | 40 / 40 | 40 | 75 |

**Zero load power in Search mode (W)**

| 8 / 10 | 10 / 10 / 15 | 15 / 15 | 15 | 20 |

### CENTER

**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 | 200 |

**Charge current starter battery (A) (6)**

| 4 (12V and 24V models only) | (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 |

**Remote on/off**

| Yes |

**Common Characteristics**

Operating temp.: -40 to +65°C  Humidity (non-condensing): max. 95% |

### DIGITAL

**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 mm² (6 A/W)  Bolts M6  Bolts M6  Bolts M6  Bolts M6

| 19 | 34 / 30 / 30 | 45 / 41 | 51 | 72 |

**Dimensions (h%xw%xD in mm)**

| 362 x 258 x 218 |

**Weight (kg)**

| 470 x 350 x 280 |

**Dimensions (h%xw%xD in mm)**

| 444 x 328 x 240 |

**Output voltage: 230 VAC ± 2%**

| 470 x 350 x 280 |

**Frequency: 50 Hz ± 0.1%**

| 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

**1) Can be adjusted to 60 Hz. 120 V models available 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 be set for general alarm, DC under voltage or sensor start/stop function**

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

**Anti-islanding**

See our website

**Computer controlled operation and monitoring**

Several interfaces are available:

- **Color Control GX and other GX devices**
  Monitoring and control. Locally, and also remotely on the VRM Portal.

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

- **VE.Bus to NMEA 2000 Interface**
  Connects the device to a NMEA2000 marine electronics network. See the NMEA2000 & NFD integration guide.

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

**Digital Multi Control Panel**

A convenient and low cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.
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 13kW / 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.
### General Characteristics

<table>
<thead>
<tr>
<th>MultiPlus</th>
<th>12 Volt</th>
<th>12/2000/80</th>
<th>12/3000/120</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerControl</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PowerAssist</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer switch (A)</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parallel and 3 phase operation</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Inverter

<table>
<thead>
<tr>
<th>Feature</th>
<th>12 Volt</th>
<th>12/2000/80</th>
<th>12/3000/120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage range (V DC)</td>
<td>9.5 – 17 V</td>
<td>19 – 33 V</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>Output voltage: 120 VAC ± 2%</td>
<td>Frequency: 60 Hz ± 0.1%</td>
<td></td>
</tr>
<tr>
<td>Cont. output power at 25°C / 77°F (VA)</td>
<td>2000</td>
<td>3000</td>
<td></td>
</tr>
<tr>
<td>Cont. output power at 25°C / 77°F (W)</td>
<td>1600</td>
<td>2400</td>
<td></td>
</tr>
<tr>
<td>Cont. output power at 40°C / 104°F (W)</td>
<td>1450</td>
<td>2200</td>
<td></td>
</tr>
<tr>
<td>Cont. output power at 65°C / 159°F (W)</td>
<td>1100</td>
<td>1700</td>
<td></td>
</tr>
<tr>
<td>Peak power (W)</td>
<td>4000</td>
<td>6000</td>
<td></td>
</tr>
<tr>
<td>Maximum efficiency (%)</td>
<td>92 / 94</td>
<td>93 / 94</td>
<td></td>
</tr>
<tr>
<td>Zero load power (W)</td>
<td>9 / 11</td>
<td>20 / 20</td>
<td></td>
</tr>
<tr>
<td>Zero load power in AES mode (W)</td>
<td>7 / 8</td>
<td>15 / 15</td>
<td></td>
</tr>
<tr>
<td>Zero load power in Search mode (W)</td>
<td>3 / 4</td>
<td>8 / 10</td>
<td></td>
</tr>
</tbody>
</table>

### Charger

<table>
<thead>
<tr>
<th>Feature</th>
<th>12 Volt</th>
<th>12/2000/80</th>
<th>12/3000/120</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Input</td>
<td>Input voltage range: 95–140 VAC</td>
<td>Input frequency: 45 – 65 Hz</td>
<td>Power factor: 1</td>
</tr>
<tr>
<td>Charge voltage 'absorption' (V DC)</td>
<td>14.4 / 28.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charge voltage 'float' (V DC)</td>
<td>13.8 / 27.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage mode (V DC)</td>
<td>13.2 / 26.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charge current house battery (A)</td>
<td>80 / 50</td>
<td>120 / 70</td>
<td></td>
</tr>
<tr>
<td>Battery temperature sensor</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### General

<table>
<thead>
<tr>
<th>Feature</th>
<th>12 Volt</th>
<th>12/2000/80</th>
<th>12/3000/120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxiliary output (5)</td>
<td>n. a.</td>
<td></td>
<td>Yes (32A)</td>
</tr>
<tr>
<td>Programmable relay (6)</td>
<td>Yes (1x)</td>
<td></td>
<td>Yes (3x)</td>
</tr>
<tr>
<td>Protection (2)</td>
<td>a – 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VE Bus communication port</td>
<td>For parallel and three phase operation, remote monitoring and system integration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General purpose com. port (7)</td>
<td>n. a.</td>
<td></td>
<td>Yes (2x)</td>
</tr>
<tr>
<td>Remote on-off</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Common Characteristics</td>
<td>Operating temp. range: -40 – +65°C / -40 to 150°F (fan assisted cooling)</td>
<td>Humidity (non-condensing): max 95%</td>
<td></td>
</tr>
</tbody>
</table>

### Enclosure

<table>
<thead>
<tr>
<th>Feature</th>
<th>12 Volt</th>
<th>12/2000/80</th>
<th>12/3000/120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material &amp; Colour: aluminium blue</td>
<td>RAL 5012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection category</td>
<td>IP 21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery connection</td>
<td>M8 bolts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120 V AC connection</td>
<td>Screw-terminal 6 AWG (13 mm²)</td>
<td>Screw-terminal 6 AWG (13 mm²)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>13 kg</td>
<td>25 lbs</td>
<td>19kg / 40 lbs</td>
</tr>
<tr>
<td>Dimensions (boxed in mm and inches)</td>
<td>520x255x125 mm / 20 x 10 x 5 inch</td>
<td>362x258x218 mm / 14.3 x 10.2 x 8.6 inch</td>
<td></td>
</tr>
</tbody>
</table>

### Safety

<table>
<thead>
<tr>
<th>Feature</th>
<th>12 Volt</th>
<th>12/2000/80</th>
<th>12/3000/120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission and immunity</td>
<td>EN-IEC 60335-1, EN-IEC 60335-2-29</td>
<td>UL 1741, UL 458, EN-IEC 60335-1, EN-IEC 60335-2-29</td>
<td></td>
</tr>
<tr>
<td>Protection key:</td>
<td>No-linear load, crest factor 3:1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) output short circuit</td>
<td>3) At 75°F ambient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) overload</td>
<td>4) Switches off when no external AC source available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) battery voltage too high</td>
<td>5) Programmable relay that can a.o. be set for general alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) battery voltage too low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) temperature too high</td>
<td>DC under voltage or genset start/stop function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) 230 V AC on inverter output</td>
<td>AC rating: 230 V/4 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) input voltage ripple too high</td>
<td>DC rating: 4 A up to 35 VDC, 1 A up to 60 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Temperature too high</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Computer controlled operation and monitoring

Several interfaces are available:

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

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

- **VE.Bus to NMEA 2000 Interface**
  Connects the device to a NMEA2000 marine electronics network. See the NMEA2000 & MFD integration guide.

- **MK3-USB VE.Bus to USB Interface**
  Connects to a USB port (see ‘A guide to VEConfigure’).

- **Color Control GX and other GX devices**
  Provides monitor and control. Locally, and also remotely on the VRM Portal.

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

Split phase and three phase capability
Two units can be configured for split phase, and three units can be configured for three phase output. But that’s not all: up to 6 sets of three units can be parallel connected to provide 144kW / 180kVA inverter power and more than 2500A charging capacity. For more detail please enter parallel in the search box on our website.

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

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

Solar energy: AC power available even during a grid failure
The Quattro can be used in off grid as well as grid connected PV and other alternative energy systems. Loss of mains detection software is available.

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

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

Remote Monitoring and control
Color Control GX or other GX devices.
Data can be stored and displayed on our VRM (Victron Remote Management) website, free of charge.

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

<table>
<thead>
<tr>
<th>PowerControl / PowerAssist</th>
<th>48/3000/35-50/50 120V</th>
<th>12/5000/220-100/100 120V</th>
<th>24/5000/120-100/100 120V</th>
<th>48/10000/140-100/100 120V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Transfer switch</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>AC inputs (2x)</td>
<td>Input voltage range: 90-140 VAC</td>
<td>Input frequency: 45 – 65 Hz</td>
<td>Power factor: 1</td>
<td></td>
</tr>
<tr>
<td>Maximum feed through current</td>
<td>2x 50 A</td>
<td>2x 100 A</td>
<td>2x 100 A</td>
<td></td>
</tr>
</tbody>
</table>

### INVERTER

<table>
<thead>
<tr>
<th>Output range</th>
<th>9.5 – 17 V</th>
<th>19 – 33 V</th>
<th>38 – 66 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cont. output power at 25°C</td>
<td>3000 VA</td>
<td>5000 VA</td>
<td>10000 VA</td>
</tr>
<tr>
<td>Cont. output power at 25°C</td>
<td>2400 W</td>
<td>4000 W</td>
<td>8000 W</td>
</tr>
<tr>
<td>Cont. output power at 40°C</td>
<td>2200 W</td>
<td>3700 W</td>
<td>6500 W</td>
</tr>
<tr>
<td>Cont. output power at 65°C</td>
<td>1700 W</td>
<td>3000 W</td>
<td>4500 W</td>
</tr>
<tr>
<td>Peak power</td>
<td>6000 W</td>
<td>10000 W</td>
<td>20000 W</td>
</tr>
<tr>
<td>Maximum efficiency</td>
<td>94%</td>
<td>94 % / 94 / 95 %</td>
<td>96 %</td>
</tr>
<tr>
<td>Zero load power</td>
<td>25 W</td>
<td>30 / 30 / 35 W</td>
<td>60 W</td>
</tr>
<tr>
<td>Zero load power in AES mode</td>
<td>20 W</td>
<td>20 / 25 / 30 W</td>
<td>40 W</td>
</tr>
<tr>
<td>Zero load power in Search mode</td>
<td>12 W</td>
<td>10 / 10 / 15 W</td>
<td>15 W</td>
</tr>
</tbody>
</table>

### CHARGER

| Charge voltage ‘absorption’ (V DC) | 57.6 V | 14.4 / 28.8 / 57.6 V |
| Charge voltage ‘float’ (V DC)     | 55.2 V | 13.8 / 27.6 / 55.2 V |
| Storage mode (V DC)               | 52.8 V | 13.2 / 26.4 / 52.8 V |
| Charge current house battery (A)  | 35 A   | 200 / 120 / 70 A |
| Charge current starter battery (A)| 4 A    | (12V and 24V models only) |
| Battery temperature sensor        | Yes    |                        |

### GENERAL

| Auxiliary output | 32 A | 50 A                  |
| Programmable relay | 3x |                           |
| Protection (2) | 3x |                           |
| VBus communication port | For parallel, split phase and three phase operation, remote monitoring and system integration | |
| General purpose com. port | 2x |                           |
| Remote on-off | Yes |                           |

### COMMON CHARACTERISTICS

- Operating temp: –40 to +65°C
- Humidity (non-condensing): max. 95%

### ENCLOSURE

- Material & Colour: aluminium (blue RAL 5012)
- Protection category: IP 21
- Four M8 bolts (2 plus 2 minus connections)
- Screw terminals 13 mm² (6 AWG)
- Weight (kg): 42 lb / 19 kg
- Dimensions (hwxwxd): 14.3 x 10.2 x 8.6 inch / 362 x 259 x 218 mm
- 120 V AC connection:
  - 18.5 x 14.0 x 11.2 inch / 470 x 328 x 280 mm
  - 17.5 x 13.0 x 9.6 inch / 444 x 328 x 240 mm
  - 22.6 x 19.2 x 13.6 inch / 572 x 488 x 344 mm
- EN 55014-1, EN 55014-2, EN 61000-3-2, EN 61000-3-3, IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3

### STANDARDS

- Anti-islanding: 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. 120 V AC 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

### Computer controlled operation and monitoring

#### Several interfaces are available:
- **Digital Multi Control Panel**
  - A convenient and low cost solution for remote monitoring, with a rotary knob to set PowerControl and PowerAssist levels.
- **Color Control GX and other GX devices**
  - Monitoring and control. Locally, and also remotely on the VRM Portal.
- **BMV-712 Smart Battery Monitor**
  - Use a smartphone or other Bluetooth enabled device:
    - customize settings,
    - monitor all important data on single screen,
    - view historical data, and to
    - update the software when new features become available.
- **MK3-USB VBus to USB Interface**
  - Connects to a USB port (see “A guide to VEConfigure”)
- **VEBus to NMEA 2000 Interface**
  - Connects to the device of a NMEA2000 marine electronics network. See the NMEA2000 & MFD integration guide.
Cerbo GX & GX Touch 50

Cerbo GX: communication-centre
This communication-centre allows you to always have perfect control over your system from wherever you are and to maximise its performance. Simply access your system via our Victron Remote Management (VRM) portal, or access it directly, using the optional GX Touch 50 screen, a Multi-Functional Display (MFD) or our VictronConnect app thanks to its Bluetooth capability.

GX Touch 50: display accessory
The GX Touch 50 is a display accessory for the Cerbo GX. The five inch touch screen display gives an instant overview of your system and allows you to adjust settings. Simply connect the display to the Cerbo GX with just one cable. The GX Touch 50 has a waterproof design, has a top-mountable setup and is simple to install.

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

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

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

Ethernet  VE.Direct  HDMI

3 USB ports
the USB socket closest to the HDMI connector can only be used to power a GX Touch 50

Micro SD

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

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

outer dimensions (h x w x d) 87 x 128 x 12.4 mm
Cable length 2 meter
Display Resolution 800x480

Contents of the packaging are the metal CCGX display with the newer GX Touch 50.

1. outer dimensions (h x w x d) 78 x 154 x 48 mm
2. notes
3. safety tbd
4. EMC tbd
5. supply voltage 8 – 70V DC
6. operating temperature range -20 to +50°C
7. outer dimensions (h x w x d) 87 x 128 x 12.4 mm
8. Cable length 2 meter
9. Display Resolution 800x480

Mounting With included mounting accessories

Mounting Wall or DIN rail (35mm)(2)

Other

Standards

Other

Standards

Other

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Other
### Cerbo GX

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>8 – 70V DC</td>
</tr>
<tr>
<td>Mounting</td>
<td>Wall or DIN rail (35mm)²</td>
</tr>
</tbody>
</table>

**Communication ports**

<table>
<thead>
<tr>
<th>Port Type</th>
<th>Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>VE.Direct ports (always isolated)</td>
<td>3 ³</td>
</tr>
<tr>
<td>VE.Bus (always isolated)</td>
<td>2 paralleled RJ45 sockets</td>
</tr>
<tr>
<td>VE.Can</td>
<td>yes - non isolated</td>
</tr>
</tbody>
</table>

**Outer dimensions (h x w x d)**

87 x 128 x 12.4 mm

**Operating temperature range**

-20 to +50°C

**Other**

- Safety: tbd
- EMC: tbd
- Automotive: tbd

**Notes**

1. For more detailed information about the Cerbo GX and the GX Touch 50, please visit the Victron GX product range page at Victron Live: [www.victronenergy.com/live/venus-os:start](http://www.victronenergy.com/live/venus-os:start)
2. DIN rail mounting requires additional accessory - DIN35 Adapter.
3. The listed maximum on the `Performance` section in above table is the total connected VE.Direct devices such as MPPT Solar Charge controllers. Total means all directly connected devices plus the devices connected over USB. The limit is mostly bound by CPU processing power. Note that there is also a limit to the other type of devices of which often multiple are connected: PV Inverters. Up to three or four three phase inverters can typically be monitored on a CCGX. Higher power CPU devices can monitor more.

### Optional accessories

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

**DIN35 adapter small**

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

---

² Mounting bracket, the plastic bezel, and four mounting screws.

³ Only models with this feature are compatible.
Color Control GX

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

VRM Online Portal

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

Remote Console on VRM

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

Automatic genset start/stop

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

The heart of ESS – Energy Storage System

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

Data logging

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

Supported products

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

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

Internet connection

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

Other highlights

- The CCGX can automatically update itself from the internet, when there is a new software version available.
- Multiple languages: English, Czech, German, Spanish, French, Italian, Dutch, Russian, Swedish, Turkish, Chinese, Arabic.
- Use the CCGX as a Modbus-TCP gateway to all connected Victron products. See our Modbus-TCP FAQ for more information.
## Color Control GX

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

### Overview - Multi with PV inverter on output

![Overview - Multi with PV inverter on output](image)

### Mobile & boat overview

![Mobile & boat overview](image)

### Genset control page

![Genset control page](image)

### Main menu

- **Device List**
- **Lynx icon**
- **Lynx Shunt 1000A VE.Can**
- **PV Inverter or AC.DC**
- **Quattro 24/1000/70-2x50**
- **PV Inverter or output**
- **Notifications**

### Alarm notifications

- **MultiPlus Compact 24/2000/50-36 Warning Inverter overload**
- **MultiPlus Compact 24/2000/50-36 Warning Inverter overload**
- **MultiPlus Compact 24/2000/50-36 Warning Inverter overload**

### Tiles overview

![Tiles overview](image)
VRM Portal - Dashboard

Almere ESS-Grid-1000 OPzS

Last update: a minute ago

![Graph](image)

![Dashboard](image)

VRM Portal – Remote Console

Almere ESS-Grid-1000 OPzS

Last update: a minute ago

![Remote Console](image)

Realtime data
Multi and Quattro Inverter/Charger
Singe, parallel, three-phase and split-phase.

MPPT 150/70 and MPPT 150/85

VE.Can RJ45 terminators

Alarm buzzer

Connect to internet router

Connect to internet router

GPS

USB stick
Used for manually updating firmware and for data logging.

To battery

MicroSD Card
Used for manually updating firmware and for data logging. When panelmounted, this slot is accessible from the front.

Not used

Digital Multi Control

MPPT 75/15 up to 250/100

BMV-700 or BMV-712 Smart

Potential free contact:
- alarm signaling
- automatic generator start/stop

Ethernet

Wifi
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).
- EasySolar 1600VA
- BlueSolar MPPT Solar Chargers with a VE.Direct port.
- BlueSolar MPPT 150/70 and the MPPT 150/85 with VE.Can port.
- SmartSolar MPPT 150/70 and the MPPT 150/100 with VE.Can port. When multiple BlueSolar MPPTs or SmartSolar MPPTs with VE.Can are used in parallel, all the information is combined as one. See also our blog-post about synchronizing multiple MPPT 150/70 solar chargers.
- BMV-700 family can be connected directly to the VE.Direct ports on the 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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply voltage range</strong></td>
<td>8 – 70V DC</td>
</tr>
<tr>
<td><strong>Current Draw</strong></td>
<td></td>
</tr>
<tr>
<td>210 mA @ 12V</td>
<td></td>
</tr>
<tr>
<td>110 mA @ 24V</td>
<td></td>
</tr>
<tr>
<td>60 mA @ 48V</td>
<td></td>
</tr>
<tr>
<td><strong>Communication ports</strong></td>
<td></td>
</tr>
<tr>
<td>VE.Direct</td>
<td>2 separate VE.Direct ports – isolated</td>
</tr>
<tr>
<td>VE.Can</td>
<td>2 paralleled RJ45 sockets – isolated</td>
</tr>
<tr>
<td>CAN</td>
<td>2nd CAN interface – non isolated</td>
</tr>
<tr>
<td>VE.Bus</td>
<td>2 paralleled RJ45 sockets – isolated</td>
</tr>
<tr>
<td>USB</td>
<td>2 USB Host ports – not isolated</td>
</tr>
<tr>
<td>Ethernet</td>
<td>10/100/1000MB RJ45 socket – isolated except shield</td>
</tr>
<tr>
<td>WiFi Access Point</td>
<td>Use to connect to Remote Console</td>
</tr>
<tr>
<td>WiFi Client</td>
<td>Connect the Venus GX to an existing WiFi network</td>
</tr>
<tr>
<td><strong>IO</strong></td>
<td></td>
</tr>
<tr>
<td>Potential free contact</td>
<td>NO/COM/NC – 6 A 250 VAC/30 VDC</td>
</tr>
<tr>
<td>Tank level inputs</td>
<td>3 x Configurable for European (0 - 180 Ohm) or US (240 - 30 Ohm)</td>
</tr>
<tr>
<td>Temperature level inputs</td>
<td>2 x Requires ASS000001000.</td>
</tr>
<tr>
<td><strong>3rd party interfacing</strong></td>
<td></td>
</tr>
<tr>
<td>Modbus-TCP</td>
<td>Use Modbus-TCP to monitor and control all products connected to the Venus GX</td>
</tr>
<tr>
<td>JSON</td>
<td>Use the VRM JSON API to retrieve data from the VRM Portal</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
</tr>
<tr>
<td>Outer dimensions (h x w x d)</td>
<td>45 x 143 x 96</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-20 to +50°C</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
<td></td>
</tr>
<tr>
<td>EMC</td>
<td>EN 61000-6-3, EN 55014-1, EN 61000-6-2, EN 61000-6-1, EN 55014-2</td>
</tr>
<tr>
<td>Automotive</td>
<td>In progress</td>
</tr>
</tbody>
</table>
Bluetooth inside
With Bluetooth built-in, the BMV Smart is ready for the Internet of Things (IoT) era. With Bluetooth being implemented in most other Victron Energy products, wireless communication between products will simplify system installation and enhance performance.

Download the Victron Bluetooth app
Use a smartphone or other Bluetooth enabled device to
- customize settings,
- monitor all important data on single screen,
- view historical data, and to
- update the software when new features become available.

Easy to install
All electrical connections are to the quick connect PCB on the current shunt. The shunt connects to the monitor with a standard RJ12 telephone cable. Included: RJ12 cable (10 m) and battery cable with fuse (2 m); no other components needed.
Also included are a separate front bezel for a square or round display appearance, a securing ring for rear mounting and screws for front mounting.

Midpoint voltage monitoring
One bad cell or one bad battery can destroy a large, expensive battery bank. When batteries are connected in series, a timely warning can be generated by measuring the midpoint voltage. Please see the BMV manual, section 5.2, for more information.
We recommend our Battery Balancer (BMS012201000) to maximize service life of series-connected lead-acid batteries.

Very low current draw from the battery
Current consumption: 0.7Ah 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: 6.5 – 70V
- 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

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

### Battery Monitor

**BMV-712 Smart**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage range</td>
<td>6.5 - 70 VDC</td>
</tr>
<tr>
<td>Current draw, back light off</td>
<td>&lt; 1mA</td>
</tr>
<tr>
<td>Input voltage range, auxiliary battery</td>
<td>6.5 - 70 VDC</td>
</tr>
<tr>
<td>Battery capacity (Ah)</td>
<td>1 - 9999 Ah</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-40 - +50°C (-40 - 120°F)</td>
</tr>
<tr>
<td>Measures voltage of second battery, or</td>
<td></td>
</tr>
<tr>
<td>temperature, or midpoint</td>
<td></td>
</tr>
<tr>
<td>Temperature measurement range</td>
<td>-20 - +50°C</td>
</tr>
<tr>
<td>VE.Direct communication port</td>
<td>Yes</td>
</tr>
<tr>
<td>Bistable relay</td>
<td>60V / 1A normally open (function can be inverted)</td>
</tr>
</tbody>
</table>

### Resolution & Accuracy (with a 500A shunt)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>± 0.01A</td>
</tr>
<tr>
<td>Voltage</td>
<td>± 0.01V</td>
</tr>
<tr>
<td>Amp hours</td>
<td>± 0.1 Ah</td>
</tr>
<tr>
<td>State of charge (0 – 100%)</td>
<td>± 0.1%</td>
</tr>
<tr>
<td>Time to go</td>
<td>± 1 min</td>
</tr>
<tr>
<td>Temperature (0 – 50°C or 30 - 120°F)</td>
<td>± 1°C/°F</td>
</tr>
<tr>
<td>Accuracy of current</td>
<td>± 0.4%</td>
</tr>
<tr>
<td>Accuracy of voltage</td>
<td>± 0.3%</td>
</tr>
</tbody>
</table>

### Installation & Dimensions

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>Flush mount</td>
</tr>
<tr>
<td>Front</td>
<td>63mm diameter</td>
</tr>
<tr>
<td>Front bezel</td>
<td>69 x 69mm (2.7 x 2.7 inch)</td>
</tr>
<tr>
<td>Body diameter and depth</td>
<td>52mm (2.0 inch) and 31mm (1.2 inch)</td>
</tr>
<tr>
<td>Protection category</td>
<td>IP55 (not intended for outdoor use)</td>
</tr>
</tbody>
</table>

### Standards

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>EN 60335-1</td>
</tr>
<tr>
<td>Emission / Immunity</td>
<td>EN 55014-1 / EN 55014-2</td>
</tr>
<tr>
<td>Automotive</td>
<td>ECE R10-4 / EN 50498</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shunt (included)</td>
<td>500A / 50mV</td>
</tr>
<tr>
<td>Cables (included)</td>
<td>10 meter 6 core UTP with RJ12 connectors, and cable with fuse for ‘+’ connection</td>
</tr>
<tr>
<td>Temperature sensor</td>
<td>Optional (ASS000100000)</td>
</tr>
</tbody>
</table>

### 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.

### Battery Balancer (BMS0128/1000)

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.

### Interface cables

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

### Temperature sensor

The quick connect PCB on the standard 500A/50mV shunt can also be mounted on these shunts.

### 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

A maximum of four BMVs can be connected directly to a Color Control GX. Even more BMVs can be connected to a USB Hub for central monitoring.
### BlueSolar and SmartSolar MPPT Charge Controllers - Overview

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

![Color Control GX](image1.png)  
![Venus GX](image2.png)  
![Cerbo GX](image3.png)  
![Smart Battery Sense](image4.png)  
![VE.Direct Bluetooth Smart Dongle](image5.png)  
![VE.Direct to USB Interface](image6.png)

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

**Bluetooth Smart built-in**
The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

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

**Ultra-fast Maximum Power Point Tracking (MPPT)**
Especially in case of a 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 (48V model: interface with a relay).
Alternatively, an intelligent battery management algorithm can be chosen: see Battery Life.
The load output is short circuit proof.

**Battery Life: intelligent battery management**
When a solar charge controller is not able to recharge the battery to its full capacity within one day, the result is often that the battery will continually be cycled between a 'partially charged' state and the 'end of discharge' state. This mode of operation (no regular full recharge) will destroy a lead-acid battery within weeks or months.
The Battery Life algorithm will monitor the state of charge of the battery and, if needed, day by day slightly increase the load disconnect level (i.e. disconnect the load earlier) until the harvested solar energy is sufficient to recharge the battery to nearly the full 100%. From that point onwards, the load disconnect level will be modulated so that a nearly 100% recharge is achieved about once every week.

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

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

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

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

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

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

**ENCLOSURE**
- **Colour**: Blue (RAL 5012)
- **Power terminals**: 6 mm² / 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, UL 1741, CSA C22.2

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.
Otherwise, the minimum PV voltage is Vbat + 1V.
2) A PV array with a higher short circuit current may damage the controller.
Bluetooth Smart built-in
The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

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

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

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>SmartSolar Charge Controller</th>
<th>MPPT 100/30</th>
<th>MPPT 100/50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage</td>
<td>12/24V Auto Select</td>
<td></td>
</tr>
<tr>
<td>Rated charge current</td>
<td>30A</td>
<td>50A</td>
</tr>
<tr>
<td>Nominal PV power, 12V 1a,b</td>
<td>440W</td>
<td>700W</td>
</tr>
<tr>
<td>Nominal PV power, 24V 1a,b</td>
<td>880W</td>
<td>1400W</td>
</tr>
<tr>
<td>Maximum PV open circuit voltage</td>
<td>100V</td>
<td>100V</td>
</tr>
<tr>
<td>Max. PV short circuit current</td>
<td>35A</td>
<td>60A</td>
</tr>
<tr>
<td>Maximum efficiency</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>Self-consumption</td>
<td>12V: 30 mA 24V: 20 mA</td>
<td></td>
</tr>
<tr>
<td>Charge voltage 'absorption'</td>
<td>Default setting: 14.4V / 28.8V (adjustable)</td>
<td></td>
</tr>
<tr>
<td>Charge voltage 'float'</td>
<td>Default setting: 13.8V / 27.6V (adjustable)</td>
<td></td>
</tr>
<tr>
<td>Charge algorithm</td>
<td>multi-stage adaptive</td>
<td></td>
</tr>
<tr>
<td>Temperature compensation</td>
<td>-16 mV °C resp. -32 mV °C</td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td>PV reverse polarity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Output short circuit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over temperature</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
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<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>95%, non-condensing</td>
<td></td>
</tr>
<tr>
<td>Data communication port</td>
<td>See the data communication white paper on our website</td>
<td></td>
</tr>
</tbody>
</table>

ENCLoure

Colour
Blue (RAL 5012)

Power terminals
16 mm² / AWG6

Protection category
IP43 (electronic components), IP22 (connection area)

Weight
1.3 kg

Dimensions (h x w x d)
130 x 186 x 70 mm

STANDARDS

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

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 PV array with a higher short circuit current may damage the controller.
Bluetooth Smart built-in
The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

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

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

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

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

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

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

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

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

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

### Specifications

<table>
<thead>
<tr>
<th>SmartSolar Charge Controller</th>
<th>MPPT 150/35</th>
<th>MPPT 150/45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage</td>
<td>12 / 24 / 48V Auto Select (software tool needed to select 36V)</td>
<td></td>
</tr>
<tr>
<td>Rated charge current</td>
<td>35A</td>
<td>45A</td>
</tr>
<tr>
<td>Nominal PV power 1a, b</td>
<td>35A 12V: 500W / 24V: 1000W / 36V: 1500W / 48V: 2000W</td>
<td></td>
</tr>
<tr>
<td>Max. PV short circuit current 2)</td>
<td>40A</td>
<td>50A</td>
</tr>
<tr>
<td>Maximum PV open circuit voltage</td>
<td>150V absolute maximum coldest conditions</td>
<td></td>
</tr>
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<td>Maximum efficiency</td>
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</tr>
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<td>Charge voltage 'absorption'</td>
<td>Default setting: 14.4 / 28.8 / 43.2 / 57.6V (adjustable)</td>
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<td></td>
</tr>
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<td>Charge algorithm</td>
<td>multi-stage adaptive (eight pre-programmed algorithms)</td>
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</tr>
<tr>
<td>Temperature compensation</td>
<td>-16 mV / -32 mV / -64 mV / °C</td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td>PV reverse polarity / output short circuit / over-temperature</td>
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<tr>
<td></td>
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<td></td>
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**ENCLOSURE**

| Colour                  | Blue (RAL 5012) |
| Power terminals         | 16 mm² / AWG6 |
| Protection category     | IP43 (electronic components), IP22 (connection area) |
| Weight                  | 1.25 kg |
| Dimensions (h x w x d)  | 130 x 186 x 70 mm |

**STANDARDS**

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

1a) If more PV power is connected, the controller will limit input power.
1b) The PV voltage must exceed Vbat + 3V 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.
SmartSolar charge controller MPPT 150/45 - MPPT 150/100

**Bluetooth Smart built-in**
The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

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

**Advanced Maximum Power Point Detection in case of partial shading conditions**
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The innovative SmartSolar algorithm will always maximize energy harvest by locking to the optimum MPP.

**Outstanding conversion efficiency**
No cooling fan. Maximum efficiency exceeds 98%.

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

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

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

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

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

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

**Remote on-off**
To connect for example to a VE.Bus BMS.

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

**Optional: SmartSolar pluggable LCD display**
Simply remove the rubber seal that protects the plug on the front of the controller, and plug-in the display.

SmartSolar pluggable display
**SmartSolar charge controller MPPT 250/60 - 250/100**

**Bluetooth Smart built-in**
The wireless solution to set-up, monitor, update and synchronise SmartSolar Charge Controllers.

**Ultra-fast Maximum Power Point Tracking (MPPT)**
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For a wired data connection to a Color Control GX, other GX products, PC or other devices

**Remote on-off**
To connect for example to a VE.BUS BMS.

**Programmable relay**
Can be programmed (a.o. with a smartphone) to trip on an alarm, or other events.

**Optional: SmartSolar pluggable LCD display**
Simply remove the rubber seal that protects the plug on the front of the controller, and plug-in the display.
With over 46 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, battery monitors, solar charge controllers, 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 46 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.