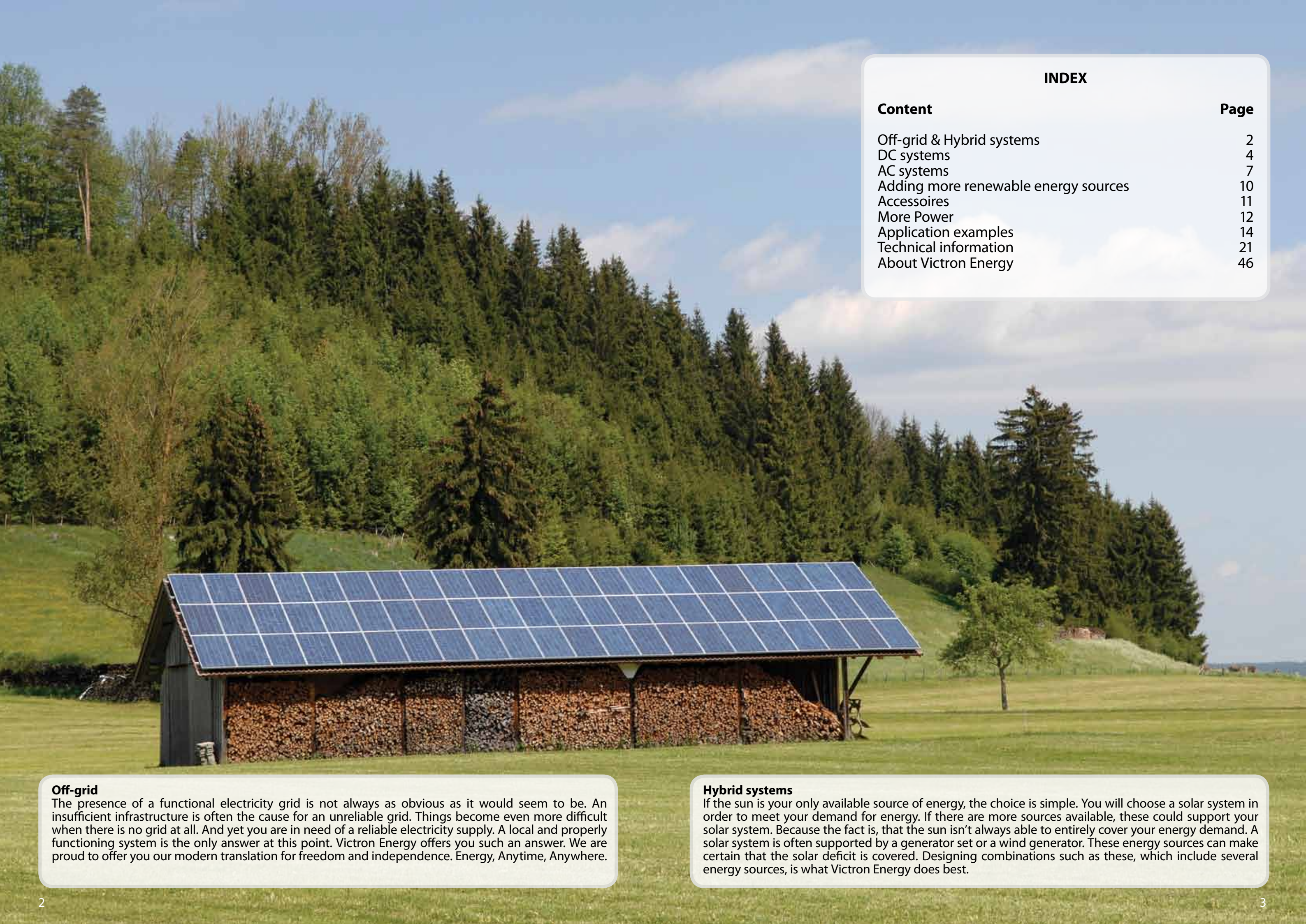


ENERGY. ANYTIME. ANYWHERE.

OFF-GRID BACK-UP & ISLAND SYSTEMS





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Off-grid

The presence of a functional electricity grid is not always as obvious as it would seem to be. An insufficient infrastructure is often the cause for an unreliable grid. Things become even more difficult when there is no grid at all. And yet you are in need of a reliable electricity supply. A local and properly functioning system is the only answer at this point. Victron Energy offers you such an answer. We are proud to offer you our modern translation for freedom and independence. Energy, Anytime, Anywhere.

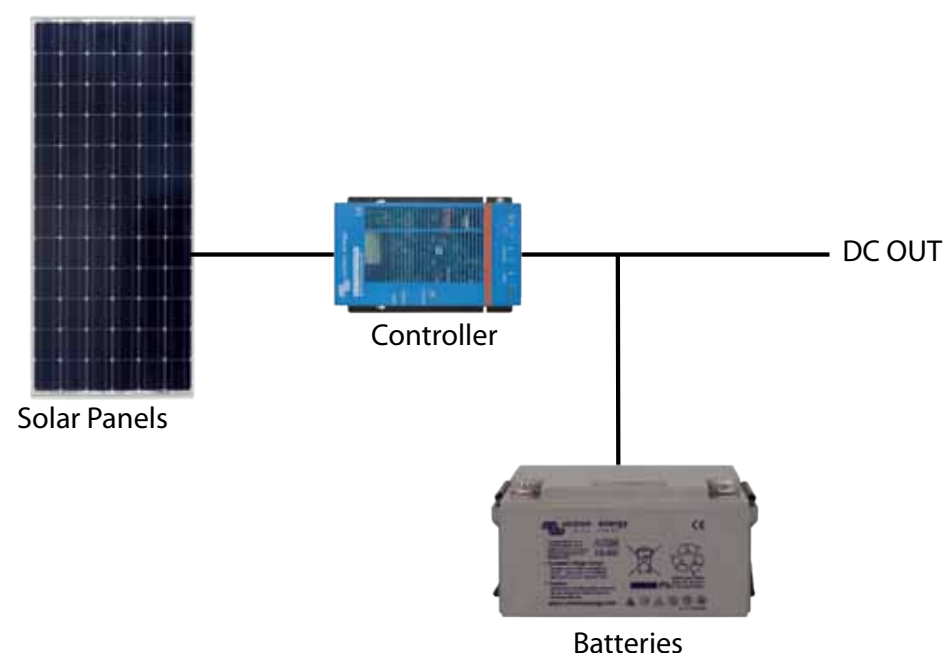
Hybrid systems

If the sun is your only available source of energy, the choice is simple. You will choose a solar system in order to meet your demand for energy. If there are more sources available, these could support your solar system. Because the fact is, that the sun isn't always able to entirely cover your energy demand. A solar system is often supported by a generator set or a wind generator. These energy sources can make certain that the solar deficit is covered. Designing combinations such as these, which include several energy sources, is what Victron Energy does best.

DC SYSTEMS

DC Systems

In DC systems solar energy is converted into regulated DC. Consequently the regulated DC is fed to the batteries and consumers. An inverter powers any AC consumers that are connected to the DC system. Unlike in DC systems, solar power is directly converted into AC in AC systems. On page 7 in this brochure, you will find a detailed explanation about AC systems.



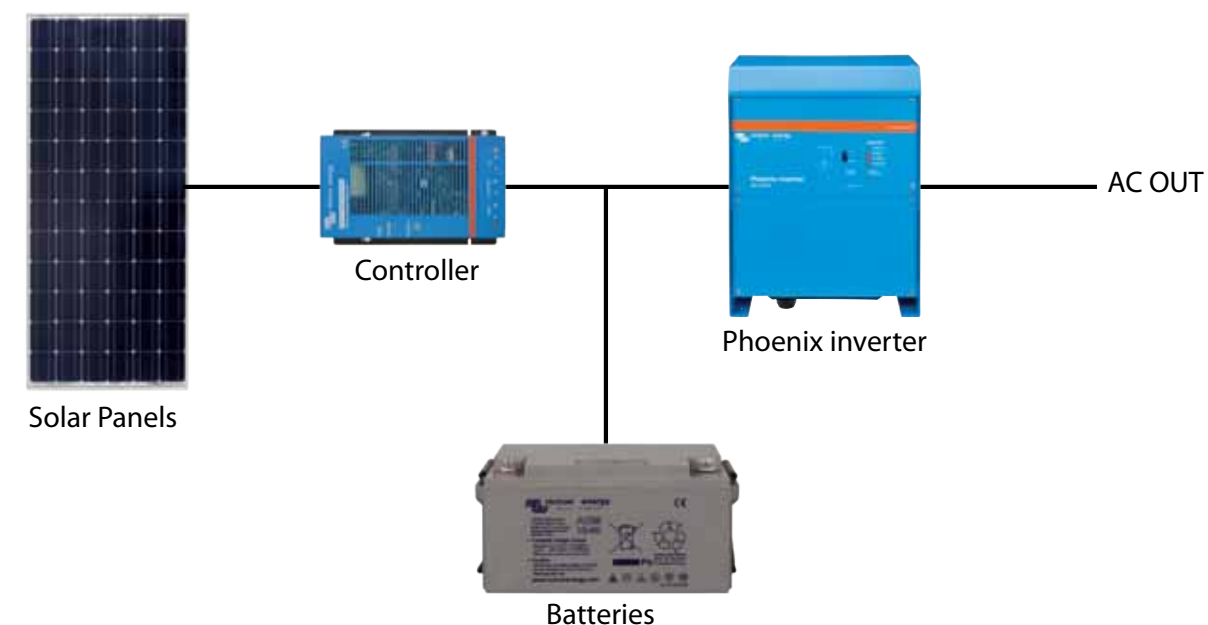
1. DC consumers

A solar panel feeds the consumers practically directly. The only item in between the panel and the power consumer is a charge controller. This Blue Solar Charge Controller controls the voltages for the consumers and the batteries. The DC consumers are directly connected to the batteries.



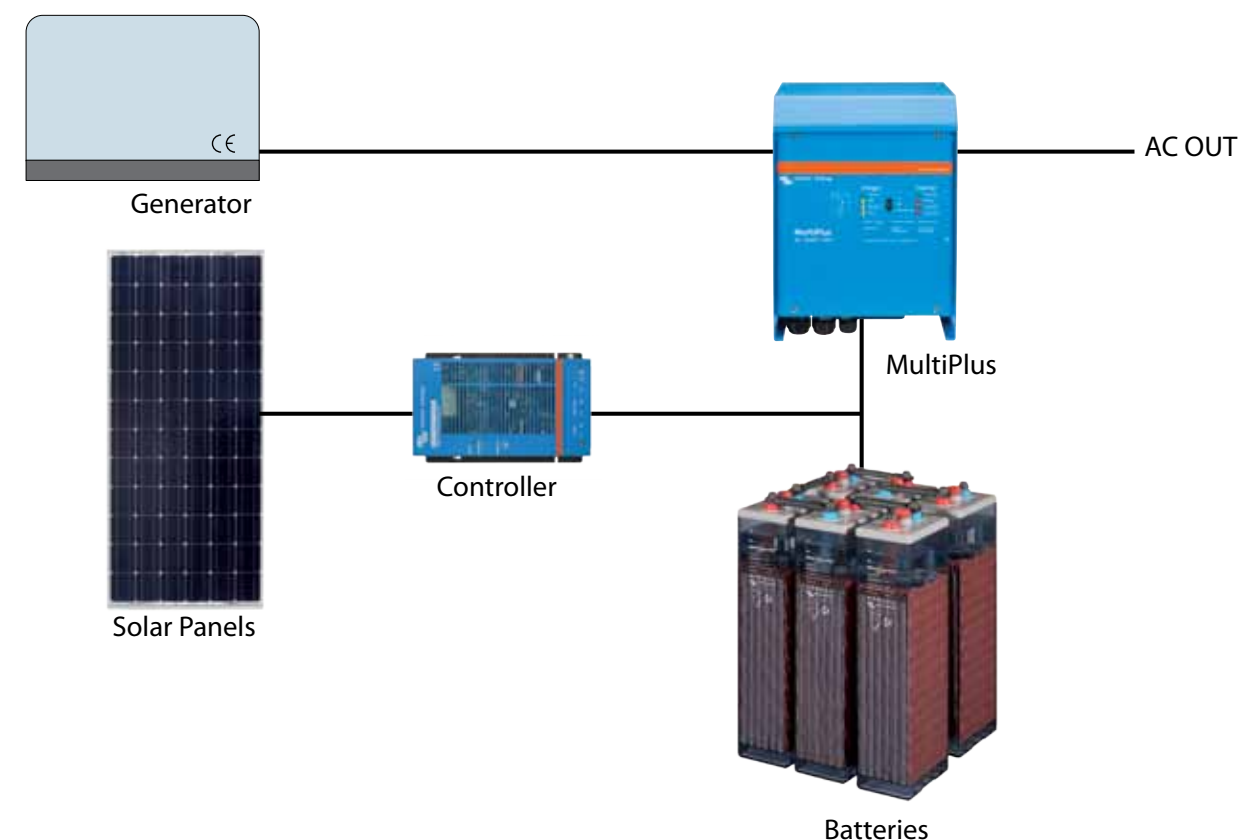
Algeria, North Africa: Traditional house with solar panel in the Sahara Desert.

DC SYSTEMS



2. AC consumers

This is a DC system with a 230 Volt output for AC consumers. In above example a Victron Phoenix inverter is added to provide the AC output.



3. Not enough sun – hybrid power

If the sun isn't providing you with enough energy, a generator is added to the system. In this case a MultiPlus inverter/charger is used instead of an inverter. The generator is connected directly to the MultiPlus. The MultiPlus automatically regulates the starting and stopping of the generator, while maximizing the use of solar power and securing a long battery life.

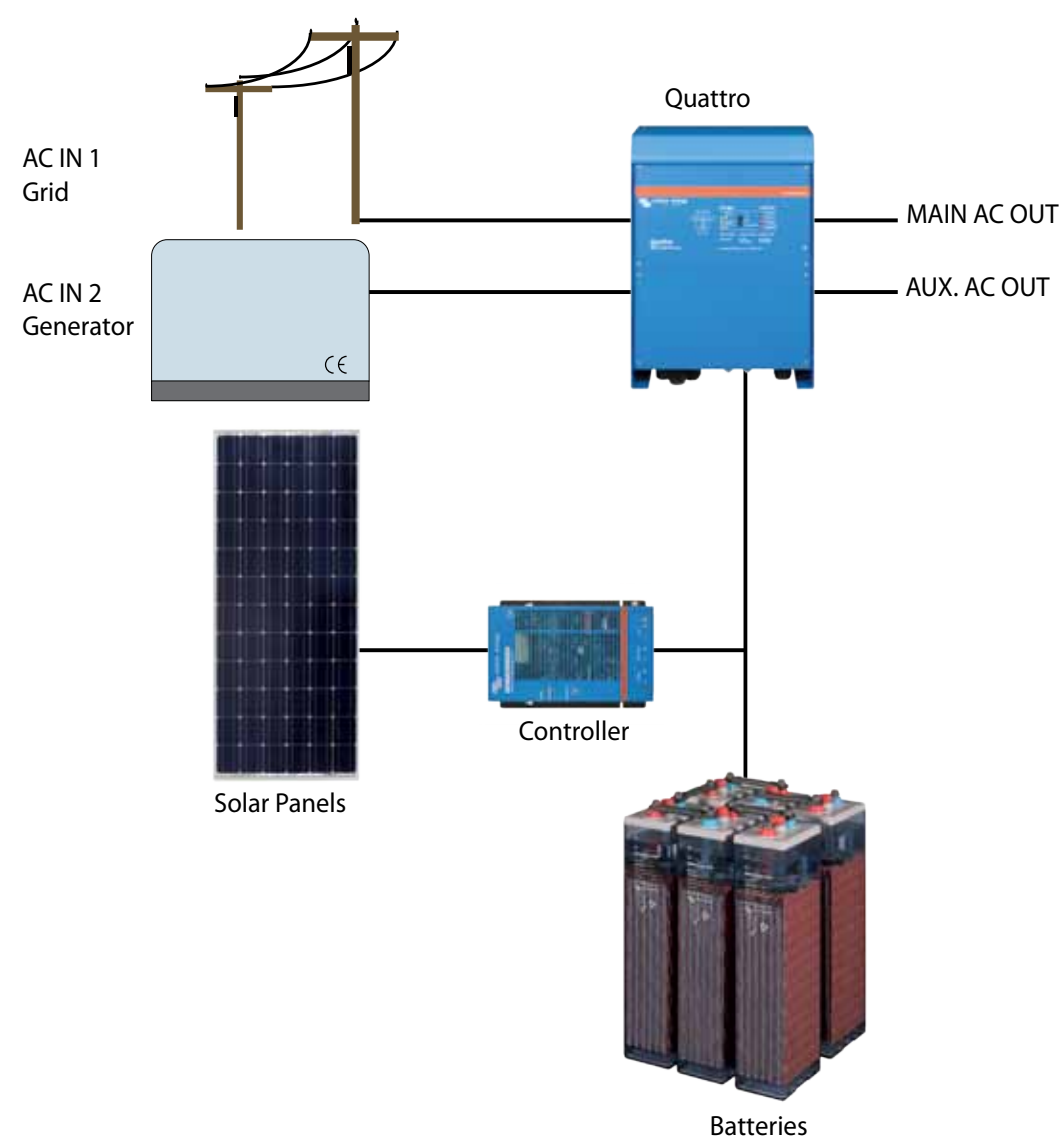
DC SYSTEMS

PowerAssist – boosting the capacity of grid or generator power

This unique Victron feature allows the MultiPlus to supplement the capacity of the grid or generator power. 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 with power from the battery. When the load reduces, the spare power is used to recharge the battery bank.

It is therefore no longer necessary to size a generator on the maximum peak load. Use the most efficient size generator instead.

Note: this feature is available in both the MultiPlus and the Quattro.



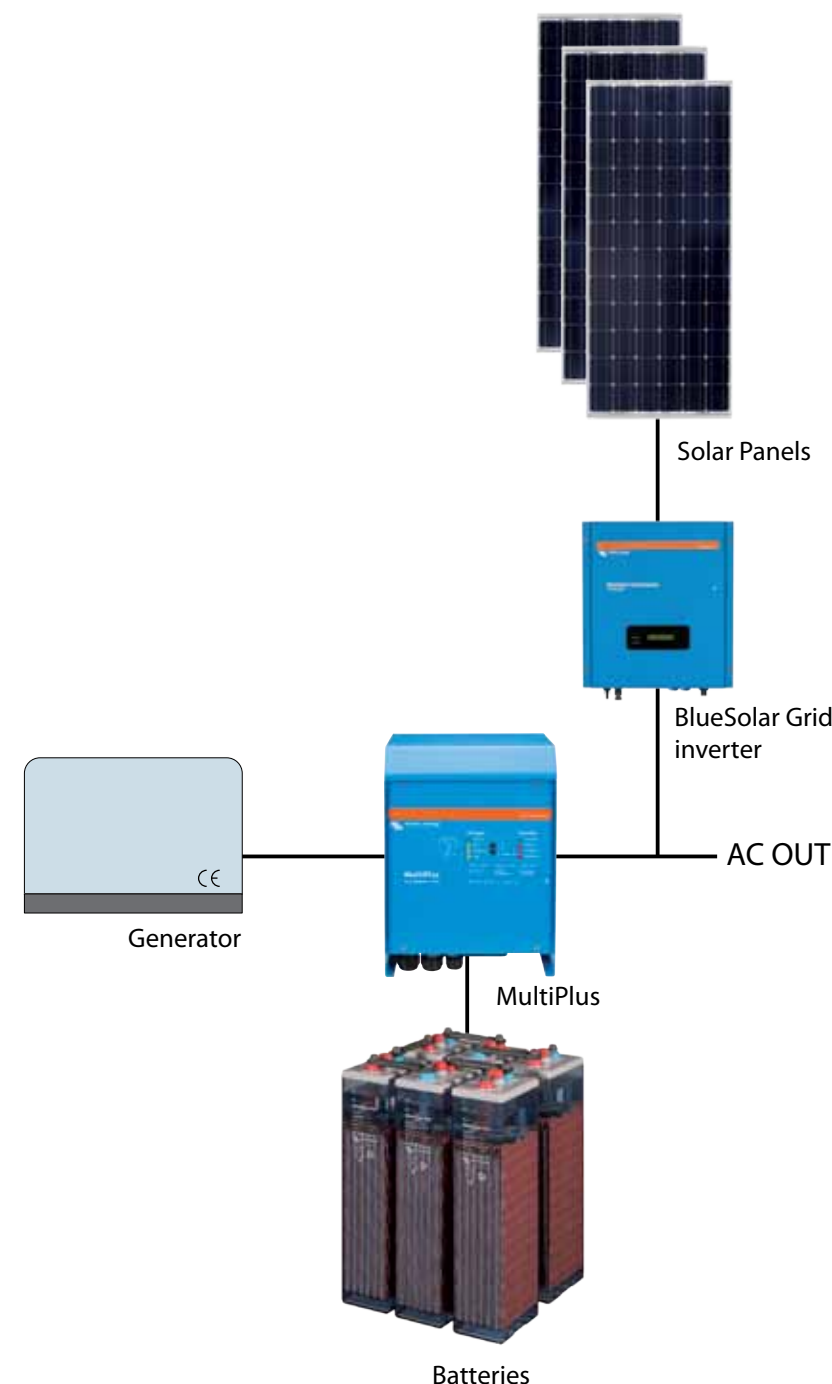
4. Back-up system

Solar energy can also be combined with a grid connection. But a grid that suffers from power failures in combination with an insufficient solar supply requires support of a generator. Instead of a MultiPlus, we recommend the Quattro, which is a MultiPlus with built-in transfer switch to connect both the grid and a generator. This entirely automates the switching process between the grid and the generator.

AC SYSTEMS

AC Systems

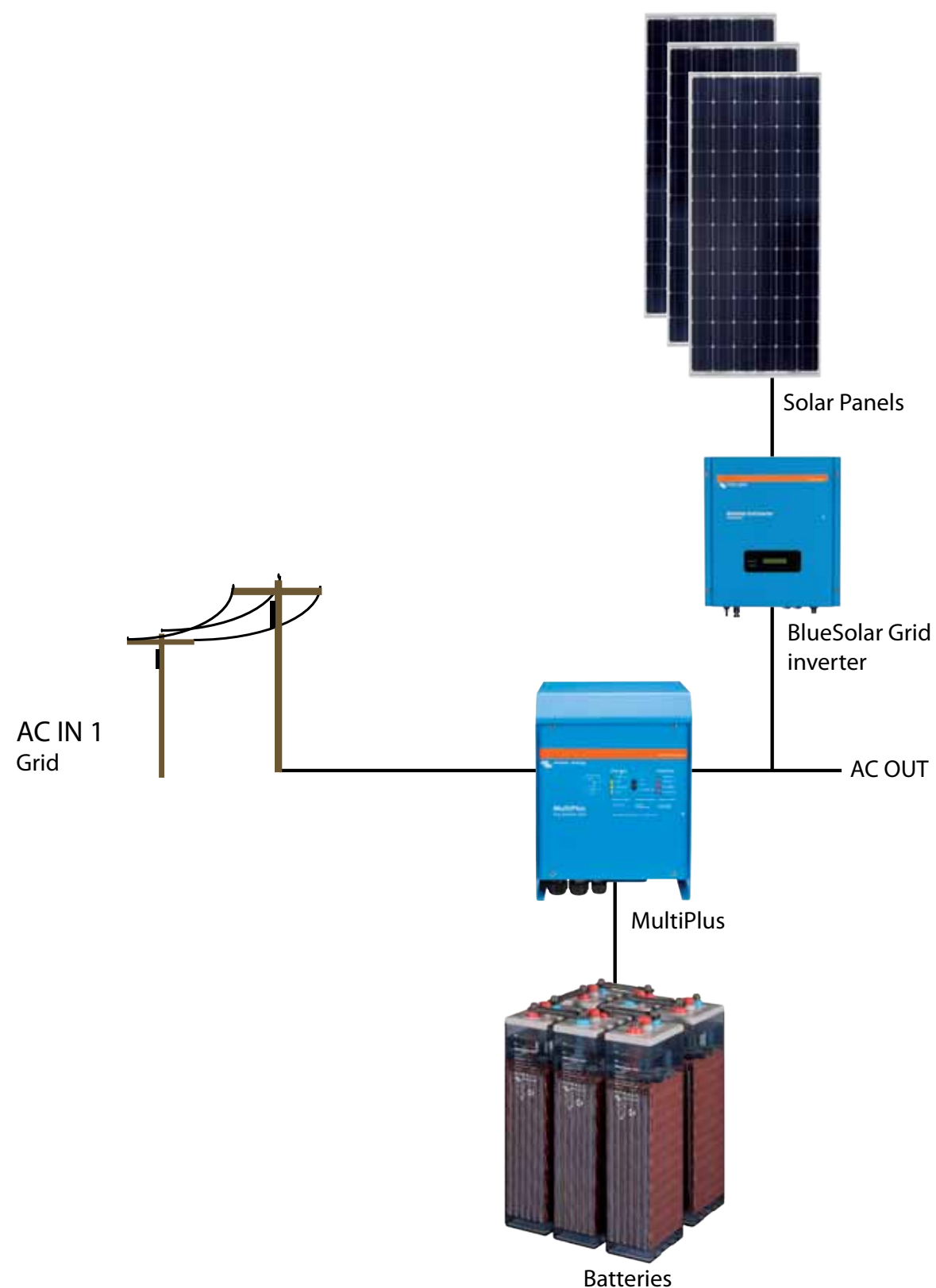
For larger solar systems that generally supply to AC consumers, it is more efficient to immediately invert the solar power into AC. Therefore we call these systems "AC systems". AC systems have a higher energy efficiency in comparison to DC systems. The Blue Solar Grid Inverter directly converts the solar energy into AC. This inverter requires 'grid', which is provided for by a MultiPlus or Quattro. All excess solar power which isn't used by the AC consumers is used to charge the batteries.



1. Island system with generator

As soon as energy is collected by the solar panels it is inverted to AC by the Blue Solar Grid Inverter. The generator supplies its alternating current directly to the MultiPlus inverter/charger. The MultiPlus will automatically start and stop the generator, while maximizing the use of solar power.

AC SYSTEMS



2. Solar and grid

In this back-up system, AC from the grid can supplement the energy supply coming from the solar panels. And vice versa, the energy from the solar panels can cover any grid failure that may occur.

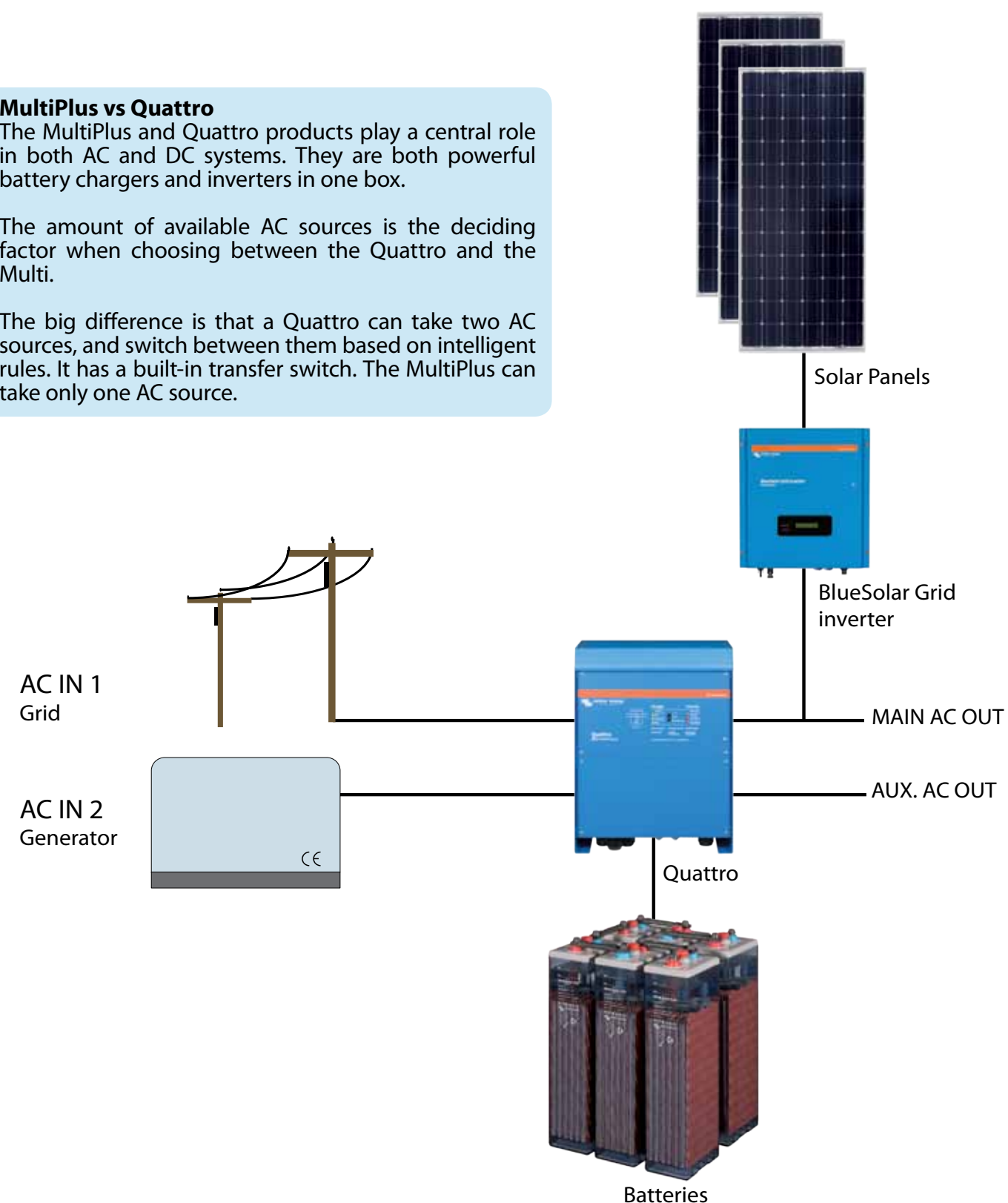
AC SYSTEMS

MultiPlus vs Quattro

The MultiPlus and Quattro products play a central role in both AC and DC systems. They are both powerful battery chargers and inverters in one box.

The amount of available AC sources is the deciding factor when choosing between the Quattro and the Multi.

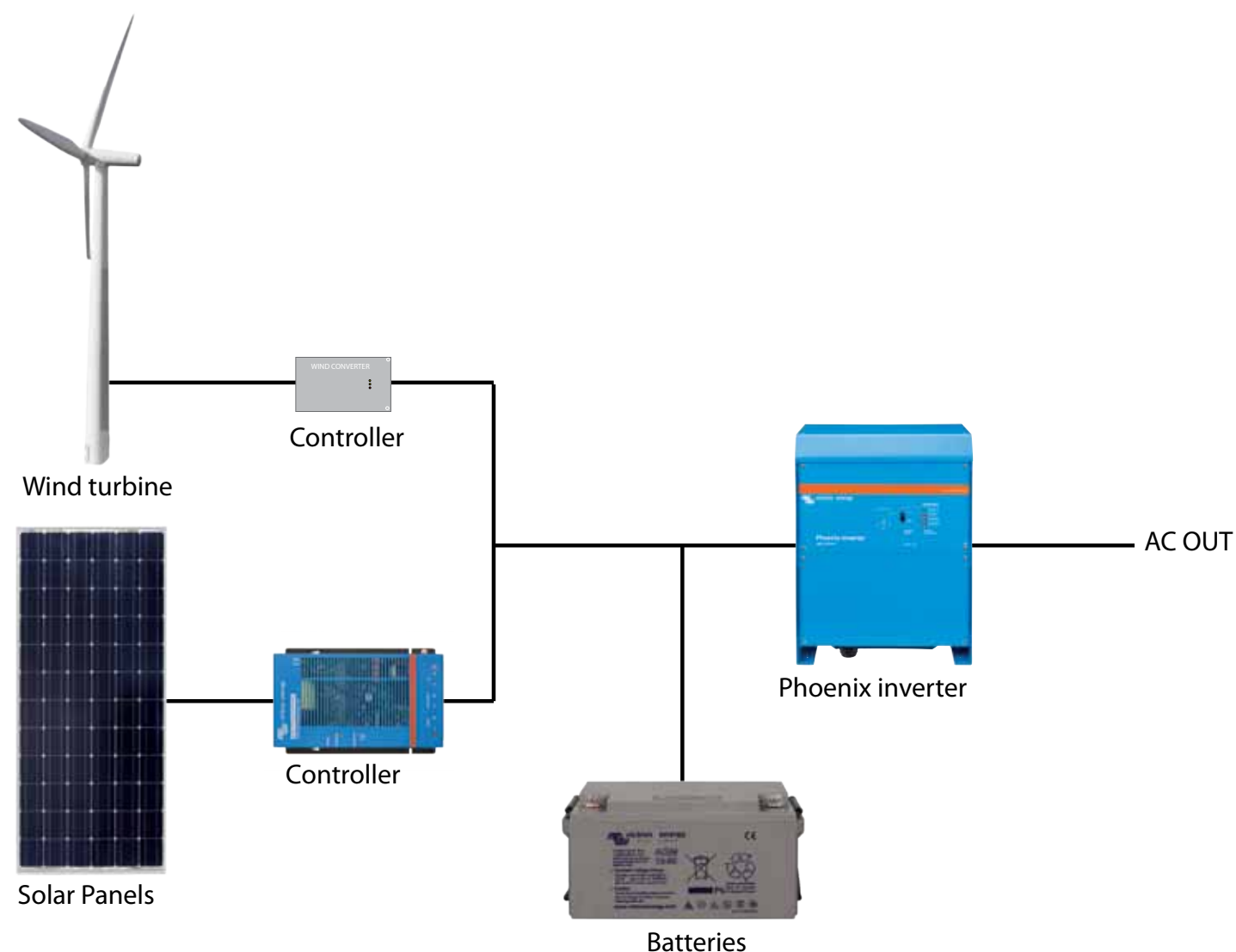
The big difference is that a Quattro can take two AC sources, and switch between them based on intelligent rules. It has a built-in transfer switch. The MultiPlus can take only one AC source.



3. Solar, generator and grid

An extensive back-up system such as the one illustrated here guarantees a non-stop supply of energy. If for example a grid failure occurs, the batteries are empty and at the same time there is a limited amount of solar energy available, the Quattro inverter/charger will start the generator. As soon as the generator is not needed anymore, it will be stopped automatically.

ADDING MORE RENEWABLE ENERGY SOURCES



Example showing how to add other renewable energy sources via the DC.

ACCESSOIRES

Our solar systems are comprised of various components. Some of which are specifically designed for solar systems. Other Victron components are applicable for a wide range of applications. You are able to find the specifications and other detailed information about these components in the 'Technical Information' section starting on page 23.



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.



Victron Global Remote

Monitoring from a large distance is possible with the Victron Global Remote. The Global Remote is a modem which sends text messages to a mobile phone. These messages contain information about the status of a system as well as warnings and alarms. The Global Remote also logs various types of data coming from Victron Battery Monitors, Multi's, Quattro's and Inverters. Consequently this data is sent to a website via a GPRS-connection. This enables you to access the read-outs remotely.



Victron Ethernet Remote

The Ethernet Remote is similar to the Global Remote. The difference is that the Ethernet Remote has a LAN-connection. A special cable can be used to connect the Ethernet Remote directly to an existing internet connection.



Digital Multi Control Panel

With this panel you are able to remotely monitor and control Multiplus and Quattro systems. A simple turn of the button can limit the power supply of for example a generator and/or shore-side current. The setting range is up to 200A.

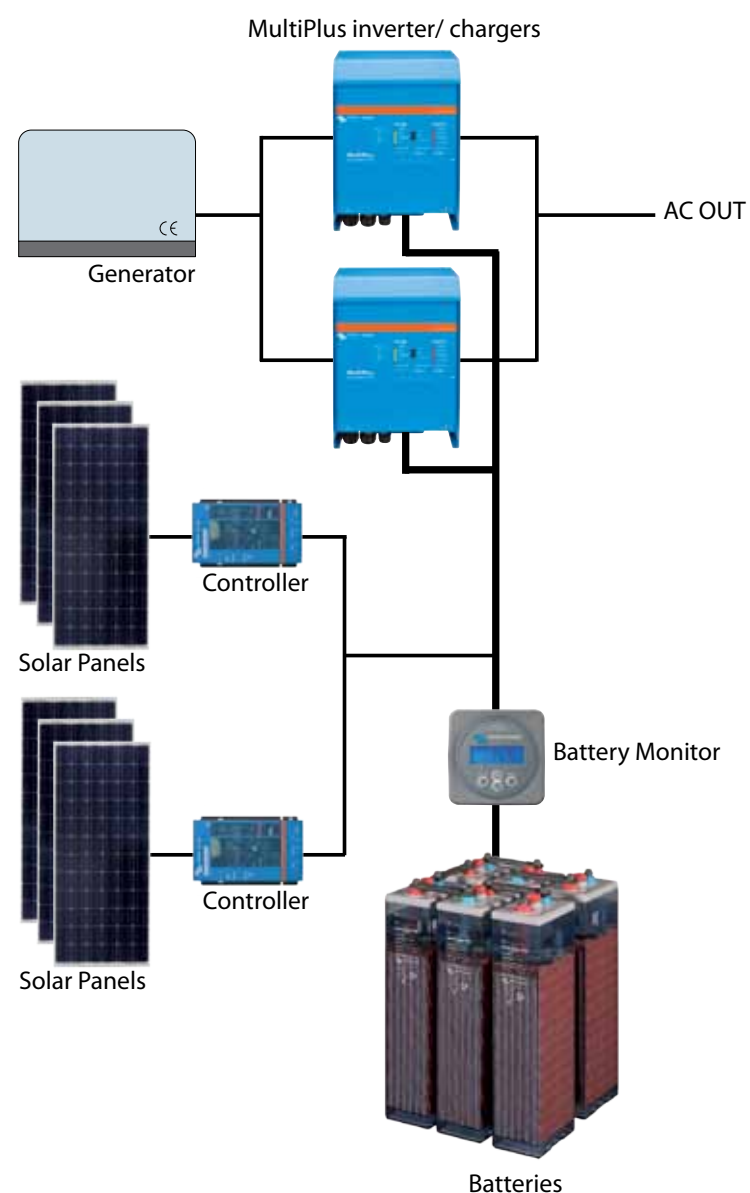


Blue Power Panel

It can be difficult to maintain a clear overview of your system as it grows larger. This is however not the case with a Blue Power Panel. Thanks to its clear display and intuitive control it enables you to effortlessly monitor and control all devices connected to VE.Net and VE.Bus. Examples are Multi's, Quattro's and the VE.Net Battery Controller, which keeps track of the status of your battery bank.

MORE POWER

The AC and DC systems which are shown in this brochure are examples of the various possibilities that Victron Energy offers. As illustrated they vary from very simple to very extensive solutions. Our products can be put in parallel, or in three-phase configurations, if the necessary power is too high for a single unit.

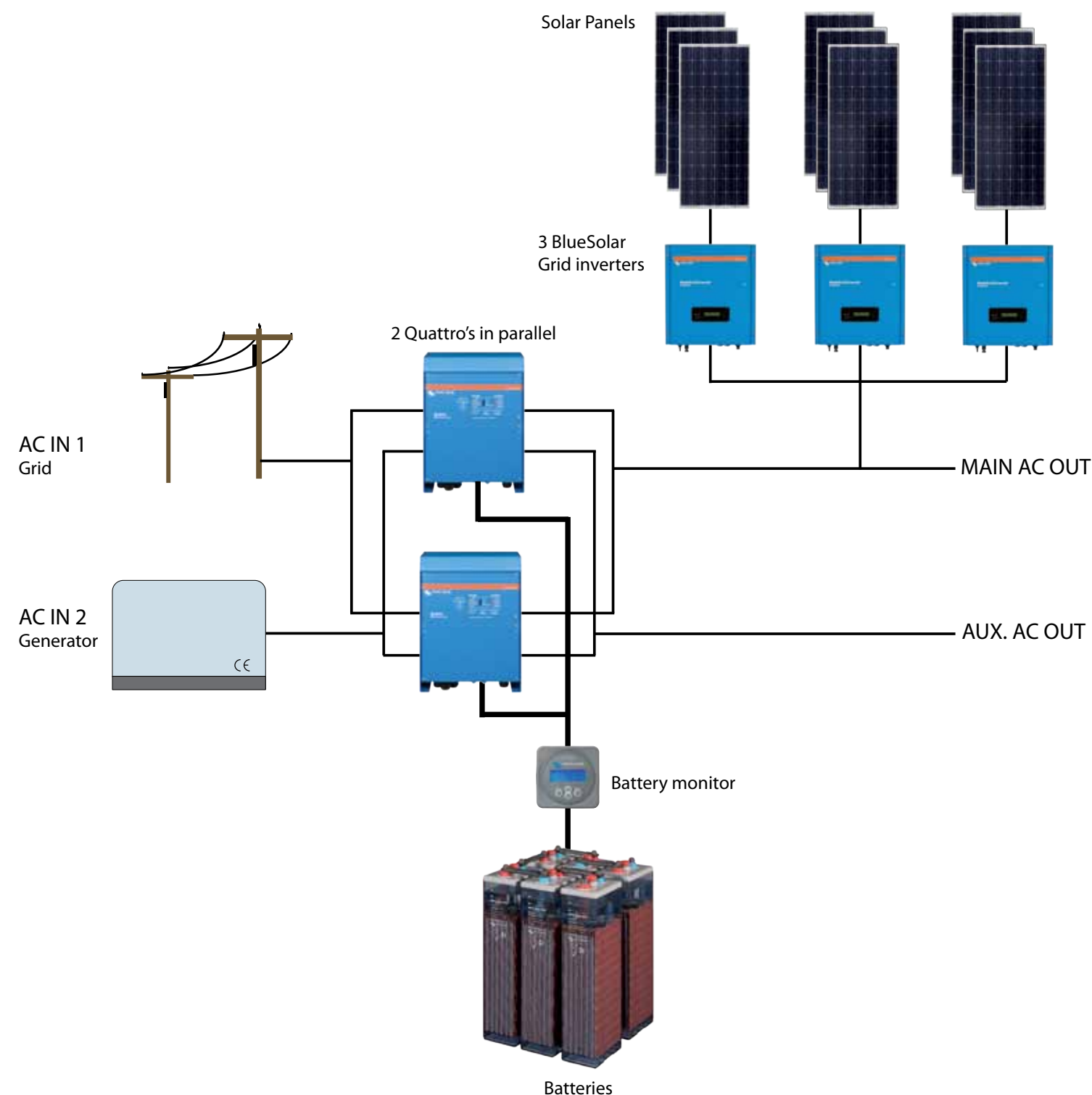


Easy to configure
 Configuring parallel and three phase systems is easy. Our VEConfigure software tool allows the installer to put components together, without any hardware changes or dipswitches. Just using standard products.

1. DC system

The illustration above shows a DC system with three charge controllers, two MultiPlus inverter/chargers configured in parallel and one generator.

MORE POWER



2. AC system

The illustration above shows an AC system with three grid inverters and two Quattro's in parallel.

APPLICATION EXAMPLES

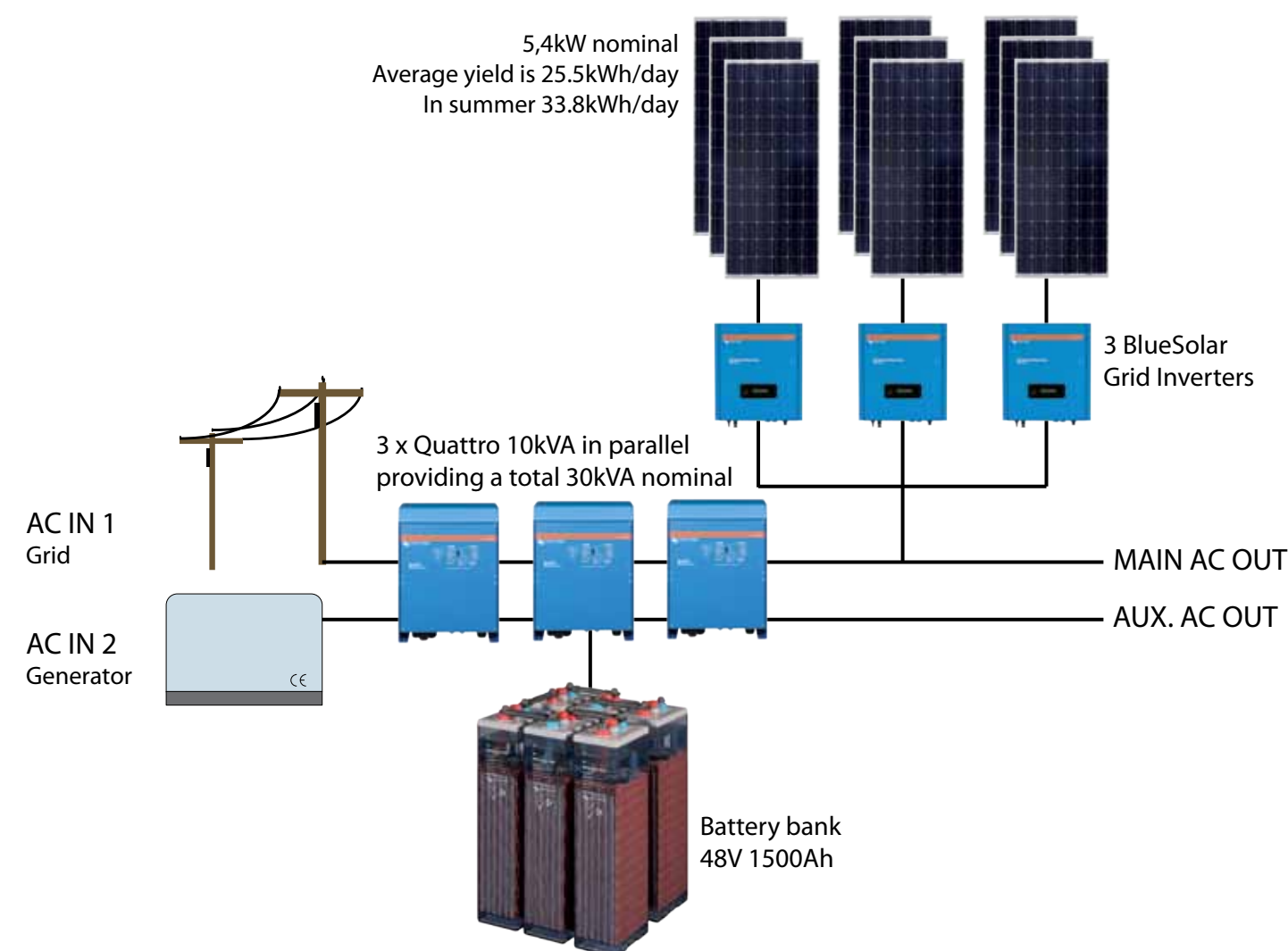


Calig, Spain: Grid connected house with Quattro and BlueSolar Grid Inverter

This Spanish grid connected house is using solar panels to support the load. It has a three phase system installed, containing three 10kVA Quattro's. They are in a three-phase configuration together with three 2000W BlueSolar Grid Inverters, one per phase. The battery bank is 48V 1500Ah. During the day the BlueSolar Grid Inverter is supplying the load for the house and charging the battery. If the battery is full, the Quattro shifts the output frequency to signal the Grid Inverter to stop charging. During this time the installation is not connected to the grid. In the evening and when there is no or little sun, the Quattro's are supplying the loads with energy from the batteries. When the battery bank is discharged below 60%, the Quattro's enable the grid to recharge the batteries and power the loads. There is also a generator installed to take care of grid failures.



APPLICATION EXAMPLES



Schematic overview of the installation in Calig, Spain.

APPLICATION EXAMPLES



Charity-run hospital in Cap-Haitien, Haiti

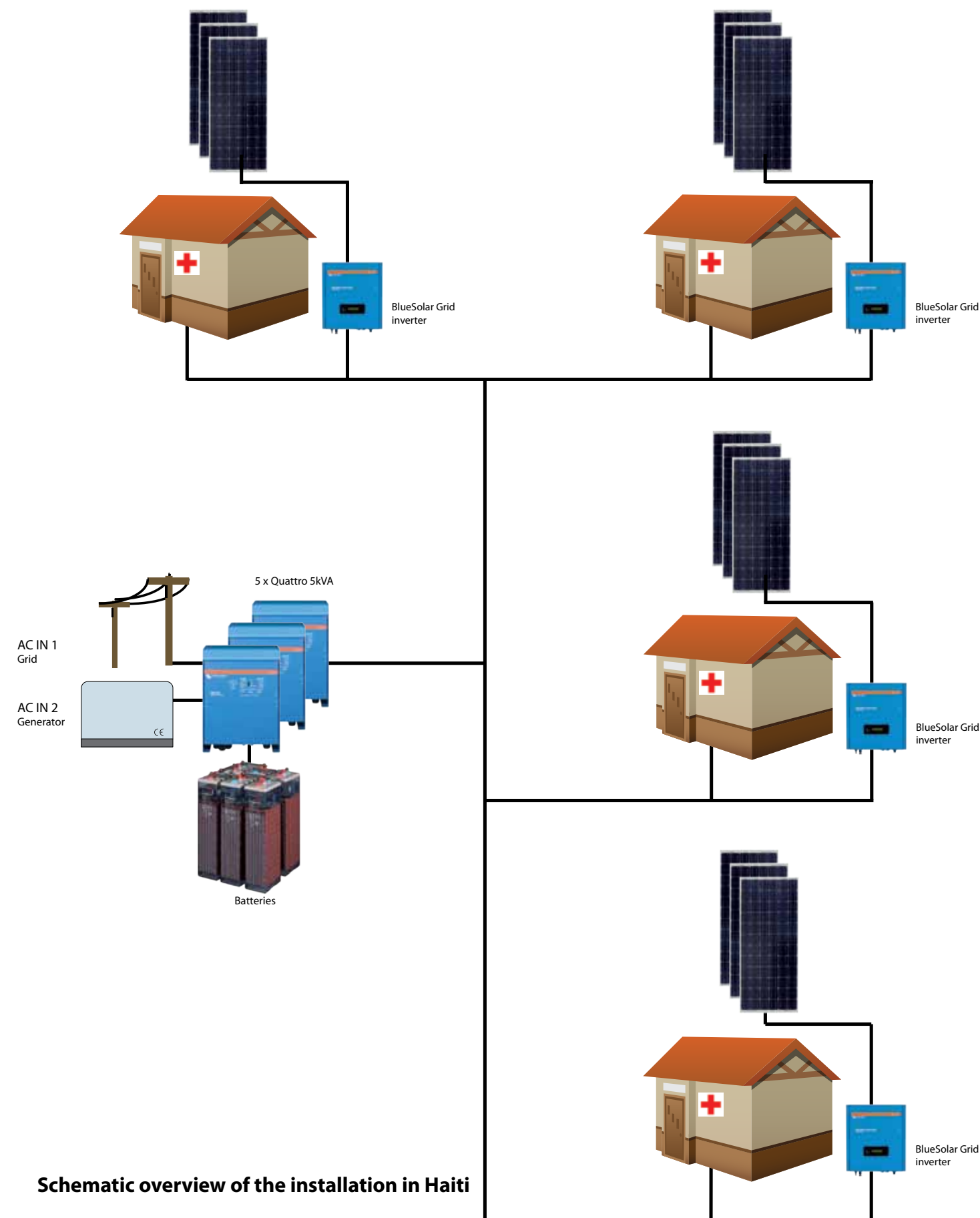
After the devastating earthquake in Haiti, people are still rebuilding and recovering. At a charity-run hospital in Cap-Haitien, Haiti, a comprehensive hybrid power system is installed to power a complete hospital. At the heart of this system there are five Victron 24/5000/120 Quattro's connected in parallel. Only a small grid connection is available, with a capacity of hundred Ampères. When the required power is higher, the Quattro's will supplement the grid with energy from the batteries. This is a unique Victron feature called PowerAssist, that synchronizes the output of the inverters with the grid. Effectively adding power to the grid. When the load reduces, the spare power is used to recharge the battery bank.

On top of being too small, the grid connection is also unreliable. On a loss of grid power, the Quattro's seamlessly pick up the power demand, so the Hospital can count on a reliable power supply. They'll also automatically start the 40kVA generator when the power outage is not restored quick enough.

All six buildings of the hospital have their roof filled with solar panels, eighty pieces of 180W panels in total. These panels are connected to the outputs of the Quattro's via grid inverters, powering the loads. All excess solar power is used to charge the batteries.



APPLICATION EXAMPLES



Schematic overview of the installation in Haiti

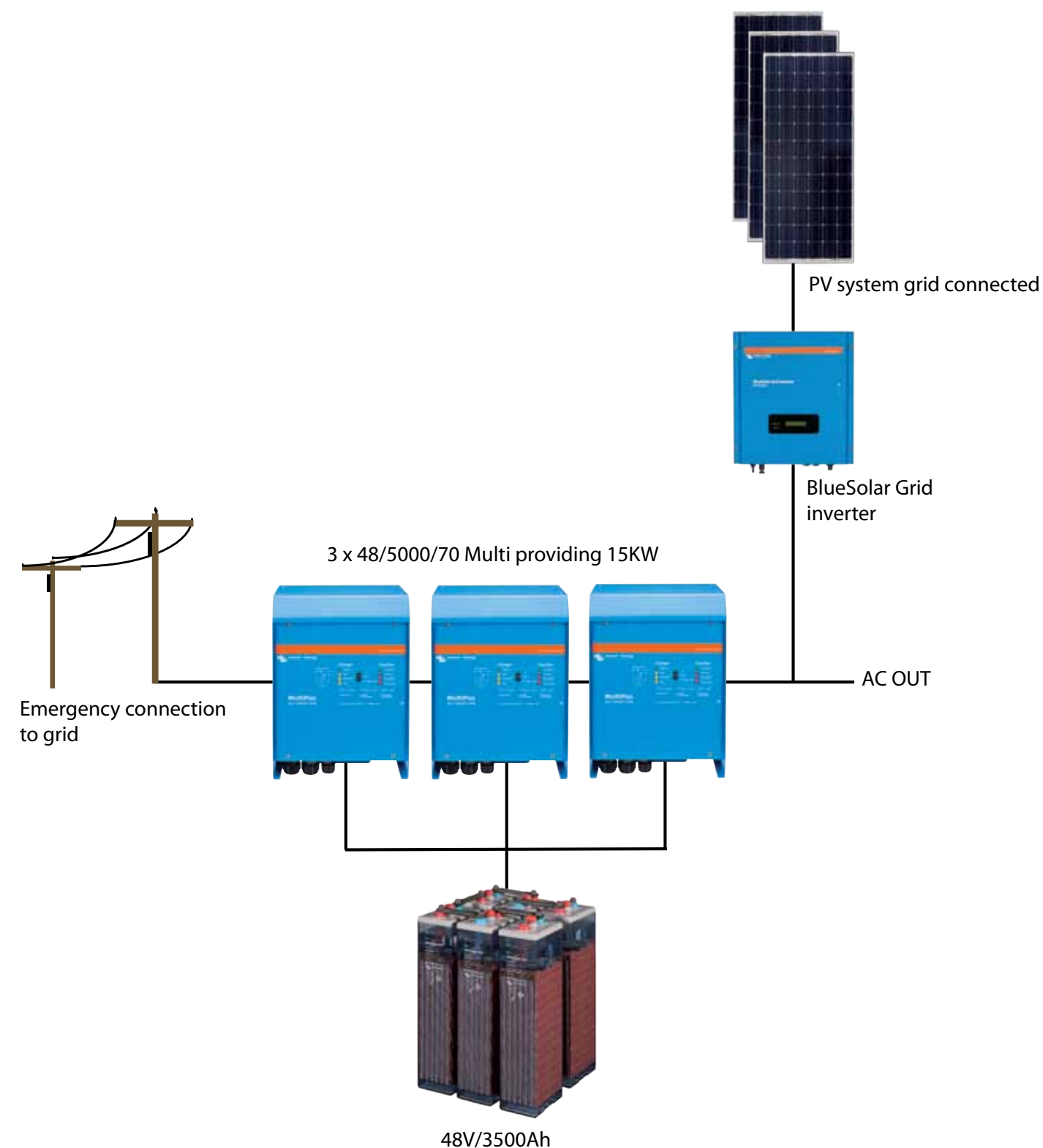
APPLICATION EXAMPLES



Through 28 solar panels, mounted on the roof of the Energy House, electricity is generated. This generated electricity is stored in 48 batteries so that electricity is present at all times. At night and in the winter months there is little or no sun to generate energy, the stored energy from the batteries will be used. When the batteries are fully charged, the house can be provided with the necessary energy for one month. The batteries have a storage capacity of 300 kWh and the installation produces 4200 kWh per year.



APPLICATION EXAMPLES



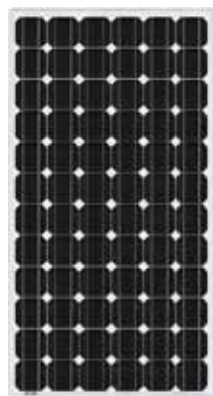
Schematic overview of the installation in Energyhouse 'de Mirre'.



TECHNICAL INFORMATION

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BLUE SOLAR MONOCRYSTALLINE PANELS



BlueSolar Monocrystalline 280W

- Low voltage-temperature coefficient enhances high-temperature operation.
- Exceptional low-light performance and high sensitivity to light across the entire solar spectrum.
- 25-year limited warranty on power output and performance.
- 2-year Limited warranty on materials and workmanship.
- Sealed, waterproof, multi-functional junction box gives high level of safety.
- High performance bypass diodes minimize the power drop caused by shade.
- Advanced EVA (Ethylene Vinyl Acetate) encapsulation system with triple-layer back sheet meets the most stringent safety requirements for high-voltage operation.
- A sturdy, anodized aluminum frame allows modules to be easily roof-mounted with a variety of standard mounting systems.
- Highest quality, high-transmission tempered glass provides enhanced stiffness and impact resistance.
- Pre wired quick-connect system with MC4 (PV-ST01) connectors.
(Except for the 30W panel)



MC4 connectors

| Type | Module Size | Glass size | Weight | Electrical data under STC ⁽¹⁾ | | | | |
|---|-----------------|---|-----------|--|-------------------|-------------------|----------------------|-----------------------|
| | | | | Nominal Power | Max-Power Voltage | Max-Power Current | Open-Circuit Voltage | Short-circuit Current |
| | | | | P _{MPP} | V _{MPP} | I _{MPP} | V _{oc} | I _{sc} |
| Module | mm | mm | Kg | W | V | A | V | A |
| SPM30-12 | 450 x 540 x 25 | 445 x 535 | 2.5 | 30 | 18 | 1.67 | 22.5 | 2 |
| SPM50-12 | 760 x 540 x 35 | 755 x 535 | 5.5 | 50 | 18 | 2.78 | 22.2 | 3.16 |
| SPM80-12 | 1110 x 540 x 35 | 1105 x 535 | 8.2 | 80 | 18 | 4.58 | 22.25 | 4.98 |
| SPM100-12 | 963 x 805 x 35 | 958 x 800 | 10.5 | 100 | 18 | 5.56 | 22.4 | 6.53 |
| SPM130-12 | 1482 x 676 x 35 | 1476 x 670 | 13 | 130 | 18 | 7.23 | 21.6 | 7.94 |
| SPM180-24 | 1580 x 808 x 35 | 1574 x 802 | 14.5 | 180 | 36 | 5.01 | 44.9 | 5.50 |
| SPM280-24 | 1956 x 992 x 50 | 1950 x 986 | 20 | 280 | 36 | 7.89 | 44.25 | 8.76 |
| | | | | | | | | |
| Module | | SPM30-12 | SPM50-12 | SPM80-12 | SPM100-12 | SPM130-12 | SPM180-24 | SPM280-24 |
| Nominal Power (±3% tolerance) | | 30W | 50W | 80W | 100W | 130W | 180W | 280W |
| Cell type | | Monocrystalline | | | | | | |
| Number of cells in series | | 36 | | | | | 72 | |
| Maximum system voltage (V) | | 1000V | | | | | | |
| Temperature coefficient of P _{MPP} (%) | | -0.48/°C | -0.48/°C | -0.48/°C | -0.48/°C | -0.48/°C | -0.48/°C | -0.48/°C |
| Temperature coefficient of V _{oc} (%) | | -0.34/°C | -0.34/°C | -0.34/°C | -0.34/°C | -0.34/°C | -0.34/°C | -0.34/°C |
| Temperature coefficient of I _{sc} (%) | | +0.037/°C | +0.037/°C | +0.037/°C | +0.037/°C | +0.05/°C | +0.037/°C | +0.037/°C |
| Temperature Range | | -40°C to +80°C | | | | | | |
| Surface Maximum Load Capacity | | 200kg/m² | | | | | | |
| Allowable Hail Load | | 23m/s, 7.53g | | | | | | |
| Junction Box Type | | PV-JH03-2 | PV-JH02 | PV-JH02 | PV-JH02 | PV-RH0301 | PV-JH03 | PV-JH200 |
| Connector Type | | No connector | MC4 | MC4 | MC4 | MC4 | MC4 | MC4 |
| Length of Cables | | 450mm | 750mm | 900mm | 900mm | 900mm | 900mm | 1000mm |
| Output tolerance | | +/-3% | | | | | | |
| Frame | | Aluminium | | | | | | |
| Product warranty | | 2 years | | | | | | |
| Warranty on electrical performance | | 10 years 90% + 25 years 80% of power output | | | | | | |
| Smallest packaging unit | | 1 panel | | | | | | |
| Quantity per pallet | | 40 panels | 40 panels | 20 panels | 20 panels | 20 panels | 20 panels | 20 panels |

1) STC (Standard Test Conditions): 1000W/m², 25°C, AM (Air Mass) 1.5

BLUE SOLAR POLYCRYSTALLINE PANELS



BlueSolar Polycrystalline 130W

- Low voltage-temperature coefficient enhances high-temperature operation.
- Exceptional low-light performance and high sensitivity to light across the entire solar spectrum.
- 25-year limited warranty on power output and performance.
- 2-year Limited warranty on materials and workmanship.
- Sealed, waterproof, multi-functional junction box gives high level of safety.
- High performance bypass diodes minimize the power drop caused by shade.
- Advanced EVA (Ethylene Vinyl Acetate) encapsulation system with triple-layer back sheet meets the most stringent safety requirements for high-voltage operation.
- A sturdy, anodized aluminum frame allows modules to be easily roof-mounted with a variety of standard mounting systems.
- Highest quality, high-transmission tempered glass provides enhanced stiffness and impact resistance.
- Pre wired quick-connect system with MC4 (PV-ST01) connectors.



MC4 connectors

| Type | Module Size | Glass size | Weight | Electrical data under STC ⁽¹⁾ | | | | |
|-----------|-------------|------------|--------|--|-------------------|-------------------|----------------------|-----------------------|
| | | | | Nomina l | Max-Power Voltage | Max-Power Current | Open-Circuit Voltage | Short-circuit Current |
| | | | | P _{MPP} | V _{MPP} | I _{MPP} | V _{oc} | I _{sc} |
| Module | mm | mm | Kg | W | V | A | V | A |
| SPP30-12 | 552x525x30 | 546x519 | 3 | 30 | 18 | 1.66 | 21.6 | 1.83 |
| SPP50-12 | 778x679x35 | 772x672 | 6.5 | 50 | 18 | 2.78 | 21.6 | 3.05 |
| SPP80-12 | 950x670x35 | 945x665 | 8.2 | 80 | 18 | 4.58 | 22.25 | 4.98 |
| SPP100-12 | 1150x670x35 | 1145x665 | 11.8 | 100 | 18 | 5.72 | 22.36 | 6.12 |
| SPP130-24 | 1482x676x50 | 1476x670 | 13 | 130 | 18 | 7.23 | 21.6 | 7.94 |
| SPP280-24 | 1956x992x50 | 1950x986 | 24 | 280 | 36 | 7.89 | 44.25 | 8.76 |

| Module | SPP30-12 | SPP50-12 | SPP80-12 | SPP100-12 | SPP130-12 | SPP280-24 |
|---|---|-----------|-----------|-----------|-----------|-----------|
| Nominal Power (±3% tolerance) | 30W | 50W | 80W | 100W | 130W | 280W |
| Cell type | Polycrystalline | | | | | |
| Number of cells in series | 36 | | | | | 72 |
| Maximum system voltage (V) | 1000V | | | | | |
| Temperature coefficient of P _{MPP} (%) | -0.47/°C | -0.47/°C | -0.47/°C | -0.47/°C | -0.47/°C | -0.47/°C |
| Temperature coefficient of V _{oc} (%) | -0.35/°C | -0.35/°C | -0.34/°C | -0.34/°C | -0.35/°C | -0.35/°C |
| Temperature coefficient of I _{sc} (%) | +0.05/°C | +0.05/°C | +0.045/°C | +0.045/°C | +0.05/°C | +0.045/°C |
| Temperature Range | -40°C to +80°C | | | | | |
| Surface Maximum Load Capacity | 200kg/m ² | | | | | |
| Allowable Hail Load | 23m/s, 7.53g | | | | | |
| Junction Box Type | PV-RH0301 | PV-RH0301 | PV-JH02 | PV-JH02 | PV-RH0301 | PV-JH200 |
| Connector Type | MC4 | | | | | |
| Length of Cables | 900mm | | | | | 1000mm |
| Output tolerance | +/-3% | | | | | |
| Frame | Aluminium | | | | | |
| Product warranty | 2 years | | | | | |
| Warranty on electrical performance | 10 years 90% + 25 years 80% of power output | | | | | |
| Smallest packaging unit | 1 panel | | | | | |
| Quantity per pallet | 40 panels | 40 panels | 20 panels | 20 panels | 20 panels | 20 panels |

1) STC (Standard Test Conditions): 1000W/m², 25°C, AM (Air Mass) 1.5

BLUESOLAR CHARGE CONTROLLERS



BlueSolar 12/24-PWM

Three models: 5A, 10A or 20A at 12V or 24V *

- Low cost PWM controller.
- Internal temperature sensor.
- Three stage battery charging (bulk, absorption, float).
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the solar panels and/or battery.
- With low voltage load disconnect output.
- Optional remote display (20A model only)

BlueSolar 12/24-10



BlueSolar DUO 12/24-20

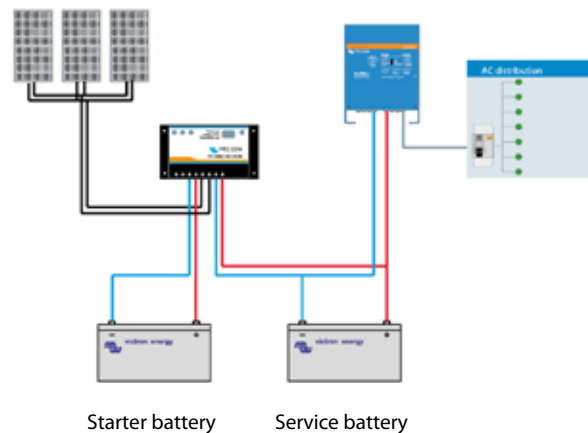
20A at 12V or 24V *

- PWM controller.
- Charges two separate batteries. For example the starter battery and the service battery of a boat or mobile home.
- Programmable charge current ratio (standard setting: equal current to both batteries).
- Charge voltage settings for three battery types (Gel, AGM and Flooded).
- Internal temperature sensor and optional remote temperature sensor.
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the solar panels and/or battery.

BlueSolar DUO 12/24-20



Remote display for
BlueSolar 12/24-20

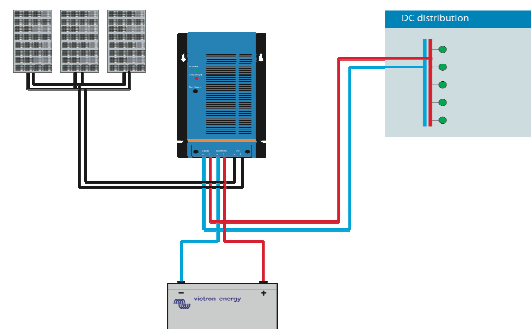


BlueSolar MPPT 12/24-40

BlueSolar MPPT 12/24-40

40A at 12V or 24V *

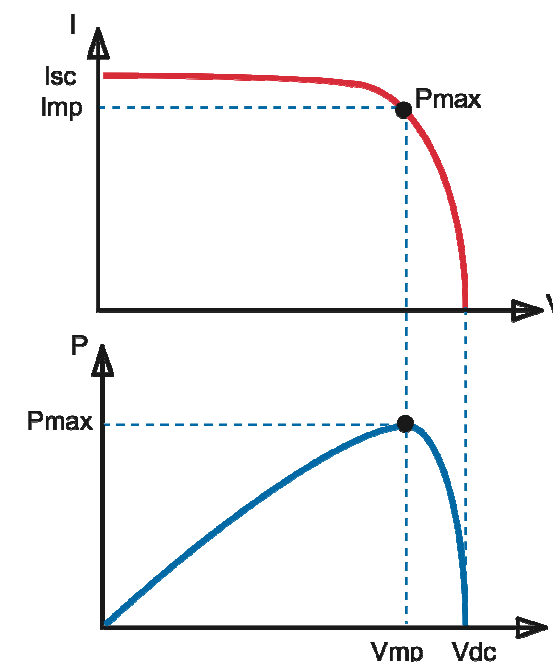
- Maximum Power Point Tracking (MPPT) controller. Increases charge current by up to 30% compared to a PWM controller.
- Charge voltage settings for eight battery types, plus two equalize settings.
- Remote temperature sensor.
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the solar panels and/or battery.
- With low voltage load disconnect output.



* For 12V use 36 cells solar panels
For 24V use 72 cells solar panels

BLUESOLAR CHARGE CONTROLLERS

| BlueSolar | BlueSolar 12/24-5 BlueSolar 12/24-10 BlueSolar 12/24-20 | | BlueSolar DUO 12/24-20 | | BlueSolar MPPT 12/24-40 | |
|---|---|----------|------------------------------------|----------|--|----------|
| | 12V | 24V | 12V | 24V | 12V | 24V |
| Battery Voltage | 12/24V Auto Select (2) | | 12/24V Auto Select (2) | | 12/24V Auto Select (2) | |
| Rated charge current | 5/10/20A | | 20A | | 40A | |
| MPPT Tracking | No | | No | | Yes | |
| Second battery output | No | | Yes | | No | |
| Automatic load disconnect | Yes (maximum load 10/10/20A) | | n. a. | | Yes (maximum load 15A) | |
| Maximum solar voltage | 28/55V (2) | | 28/55V (2) | | 28/55V (2) | |
| Self-consumption | 6mA | | 4mA | | 10mA | |
| Default settings | | | | | | |
| Absorption charge (1) | 14.4V | 28.8V | 14.4V | 28.8V | 14.4V | 28.8V |
| Float charge (1) | 13.7V | 27.4V | 13.7V | 27.4V | 13.7V | 27.4V |
| Equalization charge | n. a. | | n. a. | | 15.0V | 30.0V |
| Over charge disconnect | n. a. | | n. a. | | 14.8V | 29.6V |
| Over charge recovery | n. a. | | n. a. | | 13.6V | 27.2V |
| Low voltage load disconnect | 11.1V | 22.2V | n. a. | | 10.8V | 21.6V |
| Low voltage load reconnect | 12,6V | 25.2V | n. a. | | 12.3V | 24.6V |
| Enclosure & Environmental | | | | | | |
| Battery temperature sensor | Yes Internal sensor | | Yes Internal sensor | | Yes Remote sensor | |
| Temperature compensation | -30mV/°C | -60mV/°C | -30mV/°C | -60mV/°C | -30mV/°C | -60mV/°C |
| Operating temperature | -35°C to +55°C (full load) | | -35°C to +55°C (full load) | | 0-40 °C (full load) 40-60 °C (derating) | |
| Cooling | Natural Convection | | Natural Convection | | Natural Convection | |
| Humidity (zonder condensatie) | Max. 95% | | Max. 95% | | Max. 95% | |
| Veiligheidsklasseclass | IP20 | | IP20 | | IP20 | |
| Terminal size | 6mm² / AWG10 | | 6mm² / AWG10 | | 8mm² / AWG8 | |
| Weight | 160/160/180gr | | 180gr | | 1400gr | |
| Dimension (h x w x d) | 70x133x34 mm 70x133x34 mm 76x153x37 mm | | 76x153x37 mm | | 202x66x140 mm | |
| Mounting | Vertical wall mount Indoor only | | Vertical wall mount Indoor only | | Vertical wall mount Indoor only | |
| Standards | | | | | | |
| Safety | EN60335-1 | | | | | |
| EMC | EN61000-6-1, EN61000-6-3 | | | | | |
| | | | | | | |
| 1) BlueSolar 12/24-20, DUO 12/24-20 and BlueSolar MPPT 12/24-40: Other settings possible (see manual) | | | | | | |
| 2) For 12V use 36 cell Solar panels For 24V use 72 cell Solar panels | | | | | | |



Maximum Power Point Tracking

Upper curve:
Output current (I) of a solar panel as function of output voltage (V).
The maximum power point (MPP) is the point P_{max} along the curve where the product I x V reaches its peak.

Lower curve:
Output power P = I x V as function of output voltage.
When using a PWM (not MPPT) controller the output voltage of the solar panel will be nearly equal to the voltage of the battery, and will be lower than V_{MP}.

MULTIPLUS INVERTER/ CHARGER 800VA - 5kVA



MultiPlus
24/3000/70

Multi-functional, 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 one of the inputs 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 with 50A transfer switch only).

Virtually unlimited power thanks to parallel operation

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

Three phase capability

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

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

The MultiPlus is a very powerful battery charger. It will therefore draw a lot of current from the generator or shore side supply (nearly 10A per 5kVA Multi at 230VAC). 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 forth 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 (trickle charge output available on 12V and 24V models only).

System configuring has never been easier

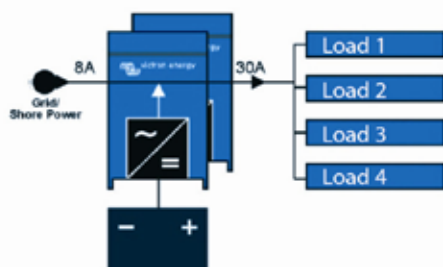
After installation, the MultiPlus is ready to go.

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

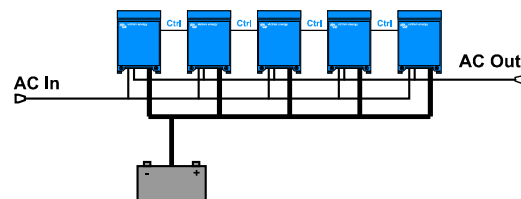
Alternatively, VE.Net can be used instead of the DIP switches.

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

PowerAssist with 2x MultiPlus in parallel



Five parallel units: output power 25 kVA



MULTIPLUS INVERTER/ CHARGER 800VA - 5kVA

| | | | | | | | |
|--|--|-----------------------------|------------------------------|------------------------------|--|---|---------------------------|
| MultiPlus | 12 Volt 24 Volt 48 Volt | C 12/800/35 C 24/ 800/16 | C 12/1200/50 C 24/1200/25 | C 12/1600/70 C 24/1600/40 | C 12/2000/80 C 24/2000/50 | 12/3000/120 24/3000/70 48/3000/35 | 24/5000/120 48/5000/70 |
| PowerControl | | Yes | Yes | Yes | Yes | Yes | Yes |
| PowerAssist | | Yes | Yes | Yes | Yes | Yes | Yes |
| Transfer switch (A) | | 16 | 16 | 16 | 30 | 16 or 50 | 50 |
| Parallel and 3-phase operation | | Yes | Yes | Yes | Yes | Yes | Yes |
| INVERTER | | | | | | | |
| Input voltage range (V DC) | 9,5 – 17 V 19 – 33 V 38 – 66 V | | | | | | |
| Output | Output voltage: 230 VAC ± 2% Frequency: 50 Hz ± 0,1% (1) | | | | | | |
| Cont. output power at 25 °C (VA) (3) | 800 | 1200 | 1600 | 2000 | 3000 | 5000 | |
| Cont. output power at 25 °C (W) | 700 | 1000 | 1300 | 1600 | 2500 | 4500 | |
| Cont. output power at 40 °C (W) | 650 | 900 | 1200 | 1450 | 2200 | 4000 | |
| Peak power (W) | 1600 | 2400 | 3000 | 4000 | 6000 | 10.000 | |
| Maximum efficiency (%) | 92 / 94 | 93 / 94 | 93 / 94 | 93 / 94 | 93 / 94 / 95 | 94 / 95 | |
| Zero-load power (W) | 8 / 10 | 8 / 10 | 8 / 10 | 9 / 11 | 15 / 15 / 16 | 25 / 25 | |
| Zero load power in AES mode (W) | 5 / 8 | 5 / 8 | 5 / 8 | 7 / 9 | 10 / 10 / 12 | 20 / 20 | |
| Zero load power in Search mode (W) | 2 / 3 | 2 / 3 | 2 / 3 | 3 / 4 | 4 / 5 / 5 | 5 / 6 | |
| CHARGER | | | | | | | |
| AC Input | Input voltage range: 187-265 VAC Input frequency: 45 – 65 Hz Power factor: 1 | | | | | | |
| Charge voltage 'absorption' (V DC) | 14,4 / 28,8 / 57,6 | | | | | | |
| Charge voltage 'float' (V DC) | 13,8 / 27,6 / 55,2 | | | | | | |
| Storage mode (V DC) | 13,2 / 26,4 / 52,8 | | | | | | |
| Charge current house battery (A) (4) | 35 / 16 | 50 / 25 | 70 / 40 | 80 / 50 | 120 / 70 / 35 | 120 / 70 | |
| Charge current starter battery (A) | 4 (12V and 24V models only) | | | | | | |
| Battery temperature sensor | yes | | | | | | |
| GENERAL | | | | | | | |
| Auxiliary output (5) | n. a. | n. a. | n. a. | n. a. | Yes (16A) | Yes (25A) | |
| Programmable relay (6) | Yes | | | | | | |
| Protection (2) | a - g | | | | | | |
| VE.Bus communication port | For parallel and three phase operation, remote monitoring and system integration | | | | | | |
| General purpose com. port (7) | n. a. | n. a. | n. a. | n. a. | At request | At request | |
| Common Characteristics | Operating temp. range: -20 to +50°C (fan assisted cooling) Humidity (non condensing) : max 95% | | | | | | |
| ENCLOSURE | | | | | | | |
| Common Characteristics | Material & Colour: aluminium (blue RAL 5012) Protection category: IP 21 | | | | | | |
| Battery-connection | battery cables of 1.5 meter | | | M8 bolts | Four M8 bolts (2 plus and 2 minus connections) | | |
| 230 V AC-connection | G-ST18i connector | | | Spring-clamp | Screw terminals 13 mm² (6 AWG) | | |
| Weight (kg) | 10 | 10 | 10 | 12 | 18 | 30 | |
| Dimensions (hxxwxd in mm) | 375x214x110 | | | 520x255x125 | 362x258x218 | 444x328x240 | |
| STANDARDS | | | | | | | |
| Safety | EN 60335-1, EN 60335-2-29 | | | | | | |
| Emission, Immunity | EN55014-1, EN 55014-2, EN 61000-3-3 | | | | | | |
| Automotive Directive | 2004/104/EC | | | | | | |
| 1) Can be adjusted to 60 Hz; 120 V 60 Hz on request 2) Protection key: a) output short circuit b) overload c) battery voltage too high d) battery voltage too low e) temperature too high f) 230 VAC on inverter output g) input voltage ripple too high | 3) Non linear load, crest factor 3:1 4) At 25 °C ambient 5) Switches off when no external AC source available 6) Programmable relay that can a. o. be set for general alarm, DC undervoltage or genset start/stop function AC rating: 230V/4A DC rating: 4A up to 35VDC, 1A up to 60VDC 7) A. o. to communicate with a Lithium Ion battery BMS | | | | | | |



Digital Multi Control

This panel is intended both for Multi's and Quattro's. Allows PowerControl and PowerAssist current limit setting for two AC sources: a generator and shore-side current for example. Setting range: up to 200 Amps. The brightness of the LED's is automatically reduced during night time.

Computer controlled operation and monitoring

Several interfaces are available:

- **MK2.2 VE.Bus to RS232 converter**
Connects to the RS232 port of a computer (see 'A guide to VEConfigure')
- **MK2-USB VE.Bus to USB converter**
Connects to a USB port (see 'A guide to VEConfigure')
- **VE.Net to VE.Bus converter**
Interface to VE.Net (see VE.Net documentation)
- **VE.Bus to E-PLEX converter**
Interface to the E-PLEX System. The world's most advanced and field proven digital switching and monitoring system.
- **Victron Global Remote**
The Global Remote is a modem which sends alarms, warnings and system status reports to cellular phones via text messages (SMS). It can also log data from Victron Battery Monitors, Multi's, Quattro's and Inverters to a website through a GPRS connection. Access to this website is free of charge.

BMV-600 Battery Monitor

The BMV-600 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-600 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).

BLUESOLAR GRID INVERTER

| BluePower Grid Inverter | 1500 | 2000 | 2800 | 4000 | 5000 |
|---------------------------------------|--|-------------|------------------|-------------|-------------|
| GRID OUTPUT (AC) | | | | | |
| Nominal output power | 1500W | 2000W | 2800W | 4000W | 5000W |
| Maximum output power | 1650W | 2200W | 3000W | 4400W | 5500W |
| Nominal output current | 6.52A | 8.7A | 12A | 17.5A | 22A |
| Maximum output current | 7.2A | 9.5A | 13A | 19A | 24A |
| Maximum fuse protection | 16A | 16A | 16A | 25A | 25A |
| Harmonic distortion of output current | <3% at nominal power | | <5% at 50% power | | |
| Nominal AC output voltage | 220V - 230V - 240V | | | | |
| Power factor | >0,99% at nominal power | | | | |
| Operating AC voltage range | 190-260V | | | | |
| Nominal AC frequency | 50Hz | | | | |
| Operating AC frequency range | 45.5-54.5Hz | | | | |
| Internal consumption at night | <0,1W | | | | |
| Short circuit proof | Yes | | | | |
| SOLAR INPUT (DC) | | | | | |
| Maximum Input voltage | 450V | 500V | 500V | 550V | 550V |
| Input Voltage MPPT range | 110-430V | 110-480V | 110-480V | 110-530V | 110-530V |
| Maximum input current | 9A | 10A | 13A | 18A | 20A |
| Maximum input power | 1750W | 2280W | 3160W | 4500W | 5200W |
| Number of MPPT trackers | 1 | 1 | 1 | 1 | 1 |
| Number of strings | 1 | 1 | 2 | 4 | 4 |
| Start-up power | 7W | 7W | 7W | 10W | 10W |
| Ground fault monitoring | RCMU (residual current monitoring unit) | | | | |
| Reverse polarity protection | Yes, with short circuit diode | | | | |
| EFFICIENCY | | | | | |
| Maximum efficiency | 95.5% | 96.4% | 96.4% | 97.6% | 97.8% |
| European standard efficiency | 94.5% | 95.4% | 95.5% | 96.7% | 96.9% |
| GENERAL | | | | | |
| Topology | Transformerless | | | | |
| Communication port | RS232 | | | | |
| Operating temperature range | -20°C to 60°C (automatic power limit in case of internal over temperature) | | | | |
| Nominal power temperature range | -20°C to 55°C | | | | |
| Storage temperature range | -20°C to 70°C | | | | |
| Maximum operating altitude | 2000 m (5% derating at 4000 m) | | | | |
| Cooling method | Natural convection | | | | |
| Relative humidity | Max 95% | | | | |
| ENCLOSURE | | | | | |
| Protection degree | IP54 | | | | |
| DC connectors | MC4 (Multi Contact 4mm) | | | | |
| Weight (kg) | 14.8 kg | 14.8 kg | 14.8 kg | 20.7 kg | 20.7 kg |
| Dimensions (h x w x d, mm)) | 376x415x125 | 376x415x125 | 376x415x125 | 368x475x195 | 368x475x195 |
| STANDARDS | | | | | |
| Safety | EN 50178 | | | | |
| EMC, Emission | EN 61000-6-3 | | | | |
| EMC, Immunity | EN 61000-6-2 | | | | |
| EMC, Harmonics and Flicker | EN 61000-3-2, EN 61000-3-3 | | | | |
| Automatic Grid Disconnection | VDE 0126-1-1 (2006) | | | | |

OPZS SOLAR BATTERIES



Battery OPzS Solar

Long life flooded tubular plate batteries

Design life: >20 years at 20°C, >10 years at 30°C, >5 years at 40°C.
Cycling expectancy of up to 1500 cycles at 80% depth of discharge.
Manufactured according to DIN 40736, EN 60896 and IEC 896-1.

Low maintenance

Under normal operating conditions and 20°C, distilled water has to be added every 2 – 3 years.

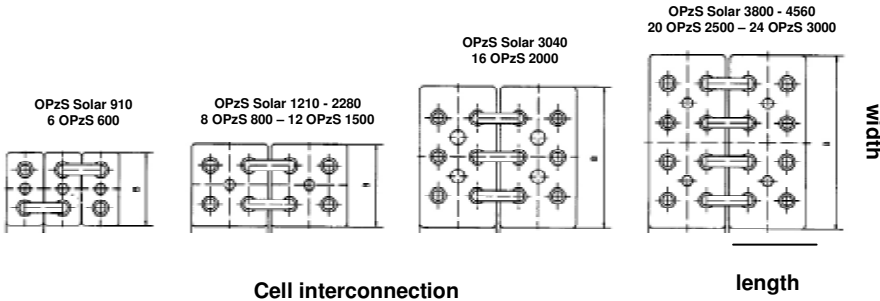
Dry-charged or ready for use electrolyte filled

The batteries are available filled with electrolyte or dry-charged (for long term stocking, container transport or air transport). Dry charged batteries have to be filled with diluted sulphuric acid (density 1,24kg/l @ 20°C).
The electrolyte may be stronger for cold- or weaker for hot climates.

Learn more about batteries and battery charging

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

| OPzS Solar type | OPzS Solar 910 | OPzS Solar 1210 | OPzS Solar 1520 | OPzS Solar 1830 | OPzS Solar 2280 | OPzS Solar 3040 | OPzS Solar 3800 | OPzS Solar 4560 |
|--|--|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Nominal capacity (120 hr / 20°C) | 910 Ah | 1210 Ah | 1520 Ah | 1830 Ah | 2280 Ah | 3040 Ah | 3800 Ah | 4560 Ah |
| Capacity (10 hr / 20°C) | 640 Ah | 853 Ah | 1065 Ah | 1278 Ah | 1613 Ah | 2143 Ah | 2675 Ah | 3208 Ah |
| Capacity 2 / 5 / 10 hours (% of 10hr capacity) | 60 / 85 / 100 (@ 68°F/20°C, end of discharge 1,8 Volt per cell) | | | | | | | |
| Capacity 20 / 24 / 48 / 72 hours (% of 120hr capacity) | 77 / 80 / 89 / 95 (@ 68°F/20°C, end of discharge 1,85 Volt per cell) | | | | | | | |
| Capacity 100 / 120 / 240 hours (% of 120hr capacity) | 99 / 100 / 104 (@ 68°F/20°C, end of discharge 1,85 Volt per cell) | | | | | | | |
| Self-discharge @ 70°F/20°C | 3% per month | | | | | | | |
| Absorption voltage (V) @ 70°F/20°C | 2,35 to 2,50 V/cell (28,2 to 30,0 V for a 24 Volt battery) | | | | | | | |
| Float voltage (V) @ 70°F/20°C | 2,23 to 2,30 V/cell (26,8 to 27,6 V for a 24 Volt battery) | | | | | | | |
| Storage voltage (V) @ 70°F/20°C | 2,18 to 2,22 V/cell (26,2 to 26,6 V for a 24 Volt battery) | | | | | | | |
| Float design life @ 70°F/20°C | 20 years | | | | | | | |
| Cycle design life @ 80% discharge | 1500 | | | | | | | |
| Cycle design life @ 50% discharge | 2500 | | | | | | | |
| Cycle design life @ 30% discharge | 4000 | | | | | | | |
| Dimensions (l x w x h, mm) | 147 x 208 x 666 | 191 x 210 x 666 | 233 x 210 x 666 | 275 x 210 x 666 | 275 x 210 x 821 | 397 x 212 x 797 | 487 x 212 x 797 | 576 x 212 x 797 |
| Dimensions (l x w x h, inches) | 5,8 x 8,2 x 26,3 | 7,5 x 8,2 x 26,3 | 9,2 x 8,2 x 26,3 | 10,8 x 8,2 x 26,3 | 10,8 x 8,2 x 32,4 | 15,7 x 8,4 x 31,4 | 19,2 x 8,4 x 31,4 | 22,7 x 8,4 x 31,4 |
| Weight without acid (kg / pounds) | 35 / 77 | 46 / 101 | 57 / 126 | 66 / 146 | 88 / 194 | 115 / 254 | 145 / 320 | 170 / 375 |
| Weight with acid (kg / pounds) | 50 / 110 | 65 / 143 | 80 / 177 | 93 / 205 | 119 / 262 | 160 / 253 | 200 / 441 | 240 / 530 |



GEL AND AGM BATTERIES



1. VRLA technology

VRLA stands for Valve Regulated Lead Acid, which means the batteries are sealed. Gas will escape through the safety valves only in case of overcharging or cell failure. VRLA batteries have exceptional leak resistance, and can be used in any position. VRLA batteries are maintenance free for life.

2. Sealed (VRLA) AGM batteries

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

3. Sealed (VRLA) Gel batteries

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

4. Low Self-discharge

Because of the use of lead calcium grids and high purity materials, Victron VRLA batteries can be stored during long periods of time without recharge. The rate of self-discharge is less than 2% per month at 20°C. The self discharge doubles for every increase in temperature with 10°C. Victron VRLA batteries can therefore be stored during up to a year without recharging, if kept under cool conditions.

5. Exceptional Deep Discharge Recovery

Victron VRLA batteries have exceptional discharge recovery, even after deep or prolonged discharge. It should however be stressed that repetitive deep discharge and prolonged discharge have a very negative influence on the service life of all lead acid batteries, Victron batteries are no exception.

6. Battery discharging characteristics

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

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

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

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

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

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

7. Effect of temperature on service life

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

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

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



GEL AND AGM BATTERIES

8. Effect of temperature on capacity

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

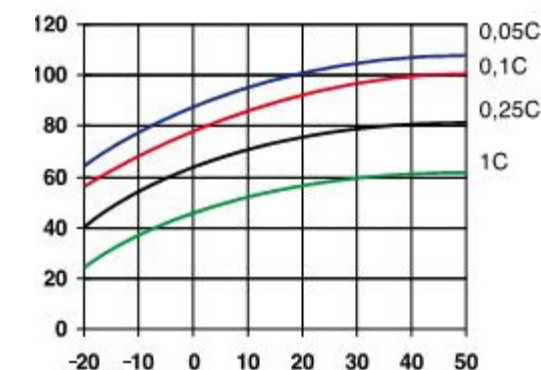


Fig. 1: Effect of temperature on capacity

9. Cycle life of Victron batteries

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

■ AGM Deep Cycle ■ Gel Deep Cycle ■ Gel Long Life

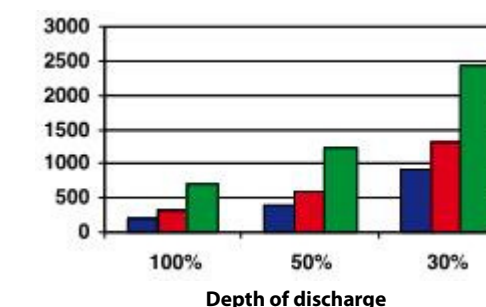


Fig. 2: Cycle life

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

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

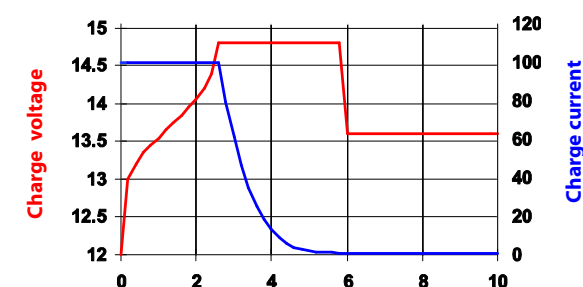


Fig. 3: Three step charge curve

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

GEL AND AGM BATTERIES

Disadvantages of the traditional 3-step charge characteristic:

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

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

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

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

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

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

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

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

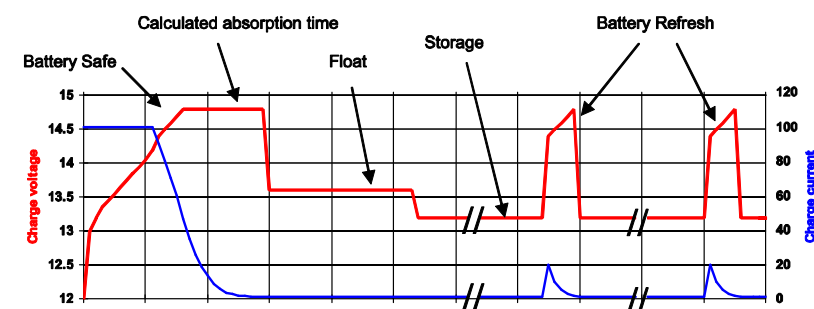


Fig. 4: Four-step adaptive charge curve

13. Optimum charge voltage of Victron VRLA batteries

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

14. Effect of temperature on charging voltage

The charge voltage should be reduced with increased temperature. Temperature compensation is required when the temperature of the battery is expected to be less than 10°C / 50°F or more than 30°C / 85°F during long periods of time. The recommended temperature compensation for Victron VRLA batteries is -4 mV / Cell (-24 mV / °C for a 12 V battery). The centre point for temperature compensation is 20°C / 70°F.

GEL AND AGM BATTERIES

15. Charge current

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

| | Float service | Cycle service Normal | Cycle service Fastest recharge |
|---------------------------------|---------------|----------------------|--------------------------------|
| Victron AGM "Deep Cycle" | | | |
| Absorption | | 14,2 - 14,6 | 14,6 - 14,9 |
| Float | 13,5 - 13,8 | 13,5 - 13,8 | 13,5 - 13,8 |
| Storage | 13,2 - 13,5 | 13,2 - 13,5 | 13,2 - 13,5 |
| Victron Gel "Deep Cycle" | | | |
| Absorption | | 14,1 - 14,4 | |
| Float | 13,5 - 13,8 | 13,5 - 13,8 | |
| Storage | 13,2 - 13,5 | 13,2 - 13,5 | |
| Victron Gel "Long Life" | | | |
| Absorption | | 14,0 - 14,2 | |
| Float | 13,5 - 13,8 | 13,5 - 13,8 | |
| Storage | 13,2 - 13,5 | 13,2 - 13,5 | |

Table 3: Recommended charge voltage

| 12 Volt Deep Cycle AGM | | | | | | | General Specification |
|------------------------|-----|----|--------------|-----------|----------|---------------|--|
| Article number | Ah | V | l x w x h mm | Weight kg | CCA @0°F | RES CAP @80°F | Technology: flat plate AGM Terminals: copper |
| BAT406225080 | 240 | 6 | 320x176x247 | 31 | 1500 | 480 | Rated capacity: 20 hr discharge at 25°C Float design life: 7-10 years at 20 °C Cycle design life: 200 cycles at 100% discharge* 400 cycles at 50% discharge 900 cycles at 30% discharge |
| BAT212070080 | 8 | 12 | 151x65x101 | 2,5 | | | |
| BAT212120080 | 14 | 12 | 151x98x101 | 4,1 | | | |
| BAT212200080 | 22 | 12 | 181x77x167 | 5,8 | | | |
| BAT412350080 | 38 | 12 | 197x165x170 | 12,5 | | | |
| BAT412550080 | 60 | 12 | 229x138x227 | 20 | 450 | 90 | |
| BAT412600080 | 66 | 12 | 258x166x235 | 24 | 520 | 100 | |
| BAT412800080 | 90 | 12 | 350x167x183 | 27 | 600 | 145 | |
| BAT412101080 | 110 | 12 | 330x171x220 | 32 | 800 | 190 | |
| BAT412121080 | 130 | 12 | 410x176x227 | 38 | 1000 | 230 | |
| BAT412151080 | 165 | 12 | 485x172x240 | 47 | 1200 | 320 | |
| BAT412201080 | 220 | 12 | 522x238x240 | 65 | 1400 | 440 | |

| 12 Volt Deep Cycle GEL | | | | | | | General Specification |
|------------------------|-----|----|--------------|-----------|----------|---------------|---|
| Article number | Ah | V | l x w x h mm | Weight kg | CCA @0°F | RES CAP @80°F | Technology: flat plate GEL Terminals: copper |
| BAT412550100 | 60 | 12 | 229x138x227 | 20 | 300 | 80 | Rated capacity: 20 hr discharge at 25 °C Float design life: 12 years at 20 °C Cycle design life: 300 cycles at 100% discharge * 600 cycles at 50% discharge 1300 cycles at 30% discharge |
| BAT412600100 | 66 | 12 | 258x166x235 | 24 | 360 | 90 | |
| BAT412800100 | 90 | 12 | 350x167x183 | 26 | 420 | 130 | |
| BAT412101100 | 110 | 12 | 330x171x220 | 33 | 550 | 180 | |
| BAT412121100 | 130 | 12 | 410x176x227 | 38 | 700 | 230 | |
| BAT412151100 | 165 | 12 | 485x172x240 | 48 | 850 | 320 | |
| BAT412201100 | 220 | 12 | 522x238x240 | 66 | 1100 | 440 | |

| 2 Volt Long Life GEL | | | | | General Specification | |
|----------------------|------|---|--------------|-----------|---|--|
| Article number | Ah | V | l x b x h mm | Weight kg | Technology: tubular plate GEL Terminals: copper | |
| BAT702601260 | 600 | 2 | 149x208x710 | 48 | Rated capacity: 10 hr discharge at 25 °C Float design life: 20 years at 20 °C Cycle design life: 1200 cycles at 100% discharge * 1200 cycles at 50% discharge 2400 cycles at 30% discharge | |
| BAT702801260 | 800 | 2 | 215x193x710 | 68 | | |
| BAT702102260 | 1000 | 2 | 215x235x710 | 82 | | |
| BAT702122260 | 1200 | 2 | 215x277x710 | 94 | | |
| BAT702152260 | 1500 | 2 | 215x277x855 | 120 | | |
| BAT702202260 | 2000 | 2 | 215x400x815 | 160 | | |
| BAT702252260 | 2500 | 2 | 215x490x815 | 200 | | |
| BAT702302260 | 3000 | 2 | 215x580x815 | 240 | | |

Other capacities and terminal types: at request

* End of discharge voltage: 10,8 V for a 12 V battery



PHOENIX INVERTERS 180VA - 750VA



**Phoenix Inverter
12/750**



**Phoenix Inverter
12/750**



**Phoenix Inverter
12/750 with Schuko socket**

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 computers and low power electric tools.

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

For our lower power models we recommend the use of 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.

LED diagnosis

Please see manual for a description.

Remote on/off switch

Connector for remote on off switch available on all models.

Remote control panel (750VA model only)

Connects to the inverter with a RJ12 UTP cable (length 3 meter, included).

DIP switch for 50/60Hz selection (750VA model only)

DIP switches for Power Saving Mode (750VA model only)

When operating in Power Saving Mode, the no-load current is reduced to 1/3 of nominal. In this mode the inverter is switched off in case of no load or very low load, and switches on every two seconds for a short period. If the output current exceeds a set level. The inverter will continue to operate. If not, the inverter will shut down again. The on/off level can be set from 15W to 85W with DIP switches.

Available with three different output sockets

Please see pictures below.



**Phoenix Inverter 12/350
with IEC-320 sockets**



**Phoenix Inverter 12/180
with Schuko socket**



**Phoenix Inverter 12/180
with Nema 5-15R sockets**

PHOENIX INVERTERS 180VA - 750VA

| Phoenix Inverter | 12 Volt 24 Volt 48 Volt | 12/180 24/180 | 12/350 24/350 48/350 | 12/750 24/750 48/750 |
|---|--|---|----------------------------|----------------------------|
| Cont. AC power at 25 °C (VA) (3) | | 180 | 350 | 750 |
| Cont. power at 25 °C / 40 °C (W) | | 175 / 150 | 300 / 250 | 700 / 650 |
| Peak power (W) | | 350 | 700 | 1400 |
| Output AC voltage / frequency (4) | 110VAC or 230VAC +/- 3% 50Hz or 60Hz +/- 0,1% | | | |
| Input voltage range (V DC) | 10,5 - 15,5 / 21,0 - 31,0 / 42,0 - 62,0 | | | |
| Low battery alarm (V DC) | 11,0 / 22 / 44 | | | |
| Low battery shut down (V DC) | 10,5 / 21 / 42 | | | |
| Low battery auto recovery (V DC) | 12,5 / 25 / 50 | | | |
| Max. efficiency 12 / 24 / 48 V (%) | 87 / 88 | 89 / 89/ 90 | | 91 / 93 / 94 |
| Zero-load power 12 / 24 / 48 V (W) | 2,6 / 3,8 | 3,1 / 5,0 / 6,0 | | 14 / 14 / 13 |
| Zero-load power in Power Saving mode | n. a. | n. a. | | 3 / 4 / 5 |
| Protection (2) | a - e | | | |
| Operating temperature range | -20 to +50°C (fan assisted cooling) | | | |
| Humidity (non condensing) | max 95% | | | |
| ENCLOSURE | | | | |
| Material & Colour | aluminium (blue Ral 5012) | | | |
| Battery-connection | 1) | 1) | | Screw terminals |
| Standard AC outlets | IEC-320 (IEC-320 plug included), Schuko, or Nema 5-15R | | | |
| Other outlets (at request) | United Kingdom, Australia/New Zealand | | | |
| Protection category | IP 20 | | | |
| Weight (kg / lbs) | 2,7 / 5,4 | 3,5 / 7,7 | | 2,7 / 5,4 |
| Dimensions (hwxwd in mm) (hwxwd in inches) | 72x132x200 2.8x5.2x7.9 | 72x155x237 2.8x6.1x9.3 | | 72x180x295 2.8x7.1x11.6 |
| ACCESSORIES | | | | |
| Remote control panel | n. a. | n. a. | | Optional |
| Remote on-off switch | Two pole connector | | | RJ12 plug |
| Automatic transfer switch | Filax | | | |
| STANDARDS | | | | |
| Safety | EN 60335-1 | | | |
| Emission Immunity | EN55014-1 / EN 55014-2 | | | |
| 1) Battery cables of 1.5 meter (12/180 with cigarette plug) 2) Protection key: a) output short circuit b) overload c) battery voltage too high d) battery voltage too low e) temperature too high | | 3) Non linear load, crest factor 3:1 4) Frequency can be set by DIP switch (750VA models only) | | |



Battery Alarm

An excessively high or low battery voltage is indicated by an audible and visual alarm, and a relay for remote signalling.



Remote Control Panel

(750VA models only)
RJ12 UTP cable to connect to the inverter is included (length: 3 meter).



BMV-600 Battery Monitor

The BMV-600 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 to exactly determine the state of charge of the battery. The BMV-600 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



**Phoenix Inverter
24/5000**



**Phoenix Inverter Compact
24/1600**

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 optimised efficiency but without compromise in performance. Employing hybrid HF technology, the result is a top quality product with compact dimensions, light in weight and capable of supplying power, problem-free, to any load.

Extra start-up power

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

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

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

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

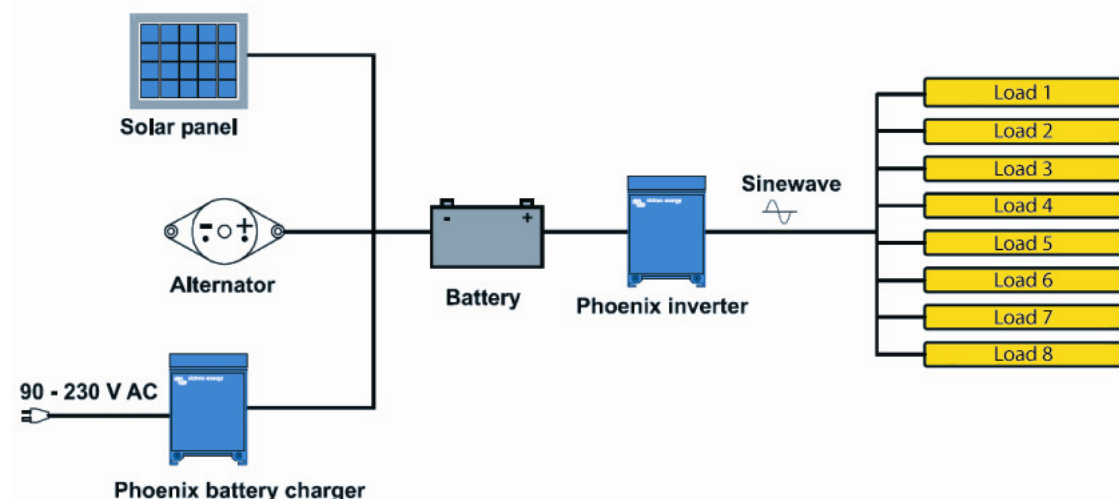
If an automatic transfer switch is required we recommend using the MultiPlus inverter/charger instead. The switch is included in these products and the charger function of the MultiPlus can be disabled. Computers and other electronic equipment will continue to operate without disruption because the MultiPlus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

Computer interface

All models have a RS-485 port. All you need to connect to your PC is our MK2 interface (see under accessories). This interface takes care of galvanic isolation between the inverter and the computer, and converts from RS-485 to RS-232. A RS-232 to USB conversion cable is also available. Together with our VEConfigure software, which can be downloaded free of charge from our website, all parameters of the inverters can be customised. This includes output voltage and frequency, over and under voltage settings and programming the relay. This relay can for example be used to signal several alarm conditions, or to start a generator. The inverters can also be connected to VENet, the new power control network of Victron Energy, or to other computerised monitoring and control systems.

New applications of high power inverters

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



PHOENIX INVERTER 1200VA - 5000VA

| Phoenix Inverter | C12/1200 C24/1200 | C12/1600 C24/1600 | C12/2000 C24/2000 | 12/3000 24/3000 48/3000 | 24/5000 48/5000 |
|--|--|----------------------|----------------------|-------------------------------|--------------------|
| Parallel and 3-phase operation | Yes | | | | |
| INVERTER | | | | | |
| Input voltage range (V DC) | 9,5 – 17V 19 – 33V 38 – 66V | | | | |
| Output | Output voltage: 230 VAC ±2% Frequency: 50 Hz ± 0,1% (1) | | | | |
| Cont. output power at 25 °C (VA) (2) | 1200 | 1600 | 2000 | 3000 | 5000 |
| Cont. output power at 25 °C (W) | 1000 | 1300 | 1600 | 2500 | 4500 |
| Cont. output power at 40 °C (W) | 900 | 1200 | 1450 | 2200 | 4000 |
| Peak power (W) | 2400 | 3000 | 4000 | 6000 | 10000 |
| Max. efficiency 12/ 24 /48 V (%) | 92 / 94 | 92 / 94 | 92 / 92 | 93 / 94 / 95 | 94 / 95 |
| Zero-load power 12 / 24 / 48 V (W) | 8 / 10 | 8 / 10 | 9 / 11 | 15 / 15 / 16 | 25 / 25 |
| Zero-load power in AES mode (W) | 5 / 8 | 5 / 8 | 7 / 9 | 10 / 10 / 12 | 20 / 20 |
| Zero-load power in Search mode (W) | 2 / 3 | 2 / 3 | 3 / 4 | 4 / 5 / 5 | 5 / 6 |
| GENERAL | | | | | |
| Programmable relay (3) | Yes | | | | |
| Protection (4) | a - g | | | | |
| VE.Bus communication port | For parallel and three phase operation, remote monitoring and system integration | | | | |
| Common Characteristics | Operating temperature range: -20 to +50 °C (fan assisted cooling) Humidity (non condensing): max 95% | | | | |
| ENCLOSURE | | | | | |
| Common Characteristics | Material & Colour: aluminum (blue RAL 5012) Protection category: IP 21 | | | | |
| Battery-connection | battery cables of 1.5 meter included | | M8 bolts | 2+2 M8 bolts | |
| 230 V AC-connection | G-ST18i plug | | Spring-clamp | Screw terminals | |
| Weight (kg) | 10 | | 12 | 18 | 30 |
| Dimensions (hxxwhd in mm) | 375x214x110 | | 520x255x125 | 362x258x218 | 444x328x240 |
| STANDARDS | | | | | |
| Safety | EN 60335-1 | | | | |
| Emission Immunity | EN 55014-1 / EN 55014-2 | | | | |
| Automotive Directive | 2004/104/EC | 2004/104/EC | | 2004/104/EC | |
| 1) Can be adjusted to 60Hz and to 240V 2) Non linear load, crest factor 3:1 3) Programable relay that can a.o. be set for general alarm, DC undervoltage or genset start/stop function. AC rating: 230V/4A DC rating: 4a up to 35VDC, 1A up to 60VDC | 4) Protection key: a) output short circuit b) overload c) battery voltage too high d) battery voltage too low e) temperature too high f) 230 V AC on inverter output g) input voltage ripple too high | | | | |



Phoenix Inverter Control

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



Computer controlled operation and monitoring

Several interfaces are available:

- **MK2.2 VE.Bus to RS232 converter**
Connects to the RS232 port of a computer (see 'A guide to VEConfigure')
- **MK2-USB VE.Bus to USB converter**
Connects to a USB port (see 'A guide to VEConfigure')
- **VE.Net to VE.Bus converter**
Interface to VE.Net (see VE.Net documentation)
- **VE.Bus to E-PLEX converter**
Interface to the E-PLEX System. The world's most advanced and field proven digital switching and monitoring system.
- **Victron Global Remote**
The Global Remote is a modem which sends alarms, warnings and system status reports to cellular phones via text messages (SMS). It can also log data from Victron Battery Monitors, Multi's, Quattro's and Inverters to a website through a GPRS connection. Access to this website is free of charge.



BMV-600 Battery Monitor

The BMV-600 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-600 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).

QUATTRO INVERTER/ CHARGER 3kVA - 10kVA



Quattro
48/5000/70-50/30



Quattro
24/3000/70-50/30

Two AC inputs with integrated transfer switch

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

Two AC Outputs

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

Virtually unlimited power thanks to parallel operation

Up to 10 Quattro units can operate in parallel. Ten units 48/10000/140, for example, will provide 90kW / 100kVA output power and 1400 Amps charging capacity.

Three phase capability

Three units can be configured for three-phase output. But that's not all: up to 10 sets of three units can be parallel connected to provide 270kW / 300kVA inverter power and more than 4000A 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 shore supply from being overloaded.

PowerAssist – Boosting shore or generator power

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

Solar energy: AC power available even during a grid failure

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

System configuring has never been easier

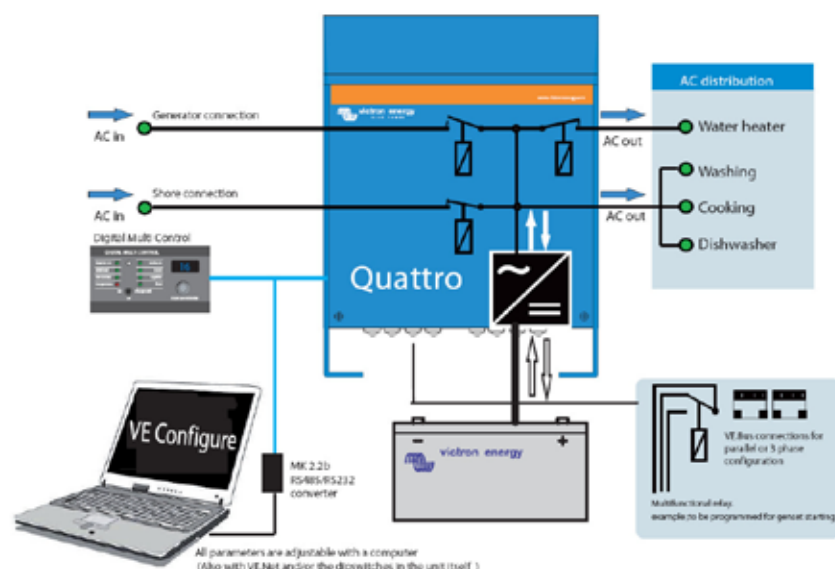
After installation, the Quattro is ready to go.

If settings have to be changed, this can be done in a matter of minutes with a new 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.



QUATTRO INVERTER/ CHARGER 3kVA - 10kVA

| Quattro | 12/3000/120 24/3000/70 | 12/5000/200 24/5000/120 48/5000/70 | 24/8000/200 48/8000/110 | 48/10000/140 |
|---|--|---|----------------------------|-----------------|
| PowerControl / PowerAssist | Yes | | | |
| Integrated Transfer switch | Yes | | | |
| AC inputs (2x) | Input voltage range: 187-265 VAC Input frequency: 45 – 65 Hz Power factor: 1 | | | |
| Maximum feed through current (A) | 50 / 30 | 2x100 / 2x100 / 50/30 | 2x100 | 2x100 |
| INVERTER | | | | |
| Input voltage range (V DC) | 9,5 – 17V 19 – 33V 38 – 66V | | | |
| Output (1) | Output voltage: 230 VAC ± 2% Frequency: 50 Hz ± 0,1% | | | |
| Cont. output power at 25 °C (VA) (3) | 3000 | 5000 | 8000 | 10000 |
| Cont. output power at 25 °C (W) | 2500 | 4500 | 7000 | 9000 |
| Cont. output power at 40 °C (W) | 2200 | 4000 | 6300 | 8000 |
| Peak power (W) | 6000 | 10000 | 16000 | 20000 |
| Maximum efficiency (%) | 93 / 94 | 94 / 94 / 95 | 96 | 96 |
| Zero-load power (W) | 15 / 15 | 25 / 25 / 25 | 35 | 35 |
| Zero load power in AES mode (W) | 10 / 10 | 20 / 20 / 20 | 30 | 30 |
| Zero load power in Search mode (W) | 4 / 5 | 5 / 5 / 6 | 10 | 10 |
| CHARGER | | | | |
| Charge voltage 'absorption' (V DC) | 14,4 / 28,8 | 14,4 / 28,8 / 57,6 | 57,6 | 57,6 |
| Charge voltage 'float' (V DC) | 13,8 / 27,6 | 13,8 / 27,6 / 55,2 | 55,2 | 55,2 |
| Storage mode (V DC) | 13,2 / 26,4 | 13,2 / 26,4 / 52,8 | 52,8 | 52,8 |
| Charge current house battery (A) (4) | 120 / 70 | 200 / 120 / 70 | 110 | 140 |
| Charge current starter battery (A) | 4 (12V and 24V models only) | | | |
| Battery temperature sensor | Yes | | | |
| GENERAL | | | | |
| Auxiliary output (A) (5) | 25 | 50/50/25 | 50 | 50 |
| Programmable relay (6) | 1x | 3x / 3x / 1x | 3x | 3x |
| Protection (2) | a-g | | | |
| VE.Bus communication port | For parallel and three phase operation, remote monitoring and system integration | | | |
| General purpose com. port (7) | 1x | 2x / 2x / 1x | 2x | 2x |
| Common Characteristics | Operating temp.: -40 to +50 °C Humidity (non condensing): max. 95% | | | |
| ENCLOSURE | | | | |
| Common Characteristics | Material & Colour: aluminium (blue RAL 5012) Protection category: IP 21 | | | |
| Battery-connection | Four M8 bolts (2 plus and 2 minus connections) | | | |
| 230 V AC-connection | Screw terminals 13 mm ² (6 AWG) | B0lts M6 | B0lts M6 | B0lts M6 |
| Weight (kg) | 19 | 34 / 30 / 30 | 45/41 | 45 |
| Dimensions (hxxwxd in mm) | 362 x 258 x 218 | 470 x 350 x 280 444 x 328 x 240 444 x 328 x 240 | 470 x 350 x 280 | 470 x 350 x 280 |
| STANDARDS | | | | |
| Safety | EN 60335-1, EN 60335-2-29 | | | |
| Emission, Immunity | EN55014-1, EN 55014-2, EN 61000-3-3 | | | |
| 1) Can be adjusted to 60 HZ; 120 V 60 Hz on request | 3) Non linear load, crest factor 3:1 4) At 25 °C ambient | | | |
| 2) Protection key: | 5) Switches off when no external AC source available | | | |
| a) output short circuit | 6) Programmable relay that can a. o. be set for general alarm, | | | |
| b) overload | DC undervoltage or genset start/stop function | | | |
| c) battery voltage too high | AC rating: 230V/4A | | | |
| d) battery voltage too low | DC rating: 4A up to 35VDC, 1A up to 60VDC | | | |
| e) temperature too high | 7) A. o. to communicate with a Lithium Ion battery BMS | | | |
| f) 230 VAC on inverter output | | | | |
| g) input voltage ripple too high | | | | |



Digital Multi Control Panel

A convenient and low cost solution for remote monitoring, with a rotary knob to set Power Control and Power Assist levels.



Blue Power Panel

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



Computer controlled operation and monitoring

Several interfaces are available:

- **MK2.2 VE.Bus to RS232 converter**
Connects to the RS232 port of a computer (see 'A guide to VEConfigure')
- **MK2-USB VE.Bus to USB converter**
Connects to a USB port (see 'A guide to VEConfigure')

- **VE.Net to VE.Bus converter**

Interface to VE.Net (see VE.Net documentation)

- **VE.Bus to E-PLEX converter**

Interface to the E-PLEX System. The world's most advanced and field proven digital switching and monitoring system.

- **Victron Global Remote**

The Global Remote is a modem which sends alarms, warnings and system status reports to cellular phones via text messages (SMS). It can also log data from Victron Battery Monitors, Multi's, Quattro's and Inverters to a website through a GPRS connection. Access to this website is free of charge.

- **Victron Ethernet Remote**

To connect to Ethernet.



BMV 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. Several models available (see battery monitor documentation).

PRECISION BATTERY MONITORING



BMV 600



BMV bezel square



BMV shunt 500A/50mV
With quick connect pcb



BMV 602S Black



VE.Net Battery Controller

Precision monitoring

The essential function of a battery monitor is to calculate ampere-hours consumed and the state of charge of a battery. Ampere-hours consumed is calculated by integrating the current flowing in or out of the battery. In case of a constant current, this integration is equivalent to current multiplied by time. A discharge current of 10A during 2 hours, for example, amounts to 20Ah consumed. All our battery monitors are based on a powerful microprocessor, programmed with the algorithms needed for precision monitoring.

Standard information and alarms

- Battery voltage (V).
- Battery charge/discharge current (A).
- Ampere-hours consumed (Ah).
- State of charge (%).
- Time to go at the current rate of discharge.
- Visual and audible alarm: over- and under voltage, and/or battery discharged.
- Programmable alarm or generator start relay.

BMV 600S: low cost ultra high resolution monitor

- Highest resolution: 10mA (0,01A) with 500A shunt.
- Can be used with 50, 60 or 100mV shunts, current rating from 100A to 1000A
- Lowest current consumption: 4mA @12V and 3mA @ 24V.
- Easiest to wire: the BMV 600S comes with shunt, 10 meter RJ 12 UTP cable and 2 meter battery cable with fuse; no other components needed.
- Easiest to install: separate front bezel for square or round appearance; ring for rear mounting and screws for front mounting.
- Broadest voltage range: 9.5 – 95 VDC without prescaler needed.
- Communication port (Isolated RS232 interface is needed to connect to a computer)

BMV 602S: two batteries

In addition to all the features of the BMV600S, the BMV602S can measure the voltage of a second battery. A version with a black front bezel (BMV 602S Black) is also available.

BMV 600HS: 70 to 350VDC voltage range

No prescaler needed. Note: suitable for systems with grounded minus only (battery monitor is not isolated from shunt).

Optional Isolated RS232 communication interface and software

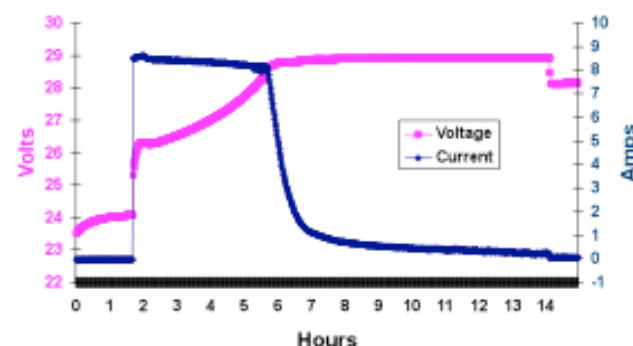
(for all BMV models) Displays all information on a computer and loads charge/discharge data in an Excel file for graphical display.

VE.Net Battery Controller: any number of batteries

- One VE.Net panel or Blue Power panel will connect to any number of battery controllers.
- Comes with 500A/50mV shunt and can be programmed for 50, 60 or 100mV shunts, current rating from 100A to 10.000A.
- With use, abuse and data memory.
- Temperature sensor and connection kit included.

High voltage VE.Net Battery Controller: 70 to 350VDC

No prescaler needed. Note: RJ45 connectors are galvanically isolated from Controller and shunt.



Example of a battery charge curve recorded with a BMV 602 and VEBat software

PRECISION BATTERY MONITORING

| Battery monitor | BMV 600S | BMV 602S & BMV 602S BLACK | BMV 600HS | VE. Net Battery Controller | VE. Net High Voltage Battery Controller |
|--------------------------------------|---|---------------------------|--------------|-----------------------------|---|
| Power supply voltage range | 9.5 - 90 VDC | 9.5 - 90 VDC | 70 – 350 VDC | 7 - 75 VDC | 70 - 350 VDC ¹ |
| Current draw, back light off | < 4 mA | < 4 mA | < 4 mA | < 5 mA | < 4 mA |
| Input voltage range (VDC) | 9.5 - 95 VDC | 9.5 - 95 VDC | 70 – 350 VDC | 0 - 75 VDC | 0 – 350 VDC |
| Battery capacity (Ah) | 20 – 9.999 Ah | | | 20 - 60.000 Ah | |
| Operating temperature range | -20 +50°C (0 - 120°F) | | | | |
| Measures voltage of second battery | No | Yes | Yes | Yes | |
| Communication port | Yes | Yes | Yes | Yes (VE.Net) | |
| Potential free contacts | 60V/1A (N/O) | | | | |
| RESOLUTION (with a 500 A shunt) | | | | | |
| Current | ± 0,01 A | | | ± 0,1 A | |
| Voltage | | | | ± 0,01 V | |
| Amp hours | | | | ± 0,1 Ah | |
| State of charge (0 – 100 %) | | | | ± 0,1 % | |
| Time to go | | | | ± 1 min | |
| Temperature (0 - 50°C or 30 - 120°F) | n. a. | | | ± 1°C (± 1°F) | |
| Accuracy of current measurement | | | | ± 0,3 % | |
| Accuracy of voltage measurement | | | | ± 0,4 % | |
| INSTALLATION & DIMENSIONS | | | | | |
| Installation | Flush mount | | | DIN rail | |
| Front | 63 mm diameter | | | 22 X 75 mm (0.9 x 2.9 inch) | |
| Front bezel | 69 x 69 mm (2.7 x 2.7 inch) | | | n. a. | |
| Body diameter | 52mm (2.0 inch) | | | n. a. | |
| Body depth | 31mm (1.2 inch) | | | 105 mm (4,1 inch) | |
| ACCESSORIES | | | | | |
| Shunt (included) | 500 A / 50 mV ² | | | 500 A / 50 mV ³ | |
| Cables (included) | 10 meter 6 core UTP with RJ12 connectors, and cable with fuse for '+-' connection | | | Supplied with 1 m cables | |
| Temperature sensor | n. a. | | | Supplied with 3 m cable | |
| Computer interface | optional | | | n.a. | |
| | | | | | |
| | 1) 7 – 75 VDC needed for VE.Net network power supply 2) HV version with shunt in plastic enclosure 3) HV version with shunt + Controller in plastic enclosure | | | | |



Victron Global Remote

The Global Remote is a modem which sends alarms, warnings and system status reports to cellular phones via text messages (SMS). It can also log data from Victron Battery Monitors, MultiPlus units, Quattro's and Inverters to a website through a GPRS connection. Access to this website is free of charge.



Victron Global Remote to BMV 60xS Connection Kit

Cable kit required to connect the BMV and the Victron Global Remote. BMV Data Link included.



Blue Power panel

The VE.Net Blue Power Panel is the panel that connects to the VE.Net Battery Controller. The panel can show the information of multiple batteries on one display for simple and efficient monitoring of your battery systems. For our other VE.Net products please refer to our VE.Net datasheet.



1000A/50mV shunt

For ease of use with BMV series: quick connect pcb of standard 500A/50mV shunt can be mounted on this shunt.



2000A/50mV shunt

For ease of use with BMV series: quick connect pcb of standard 500A/50mV shunt can be mounted on this shunt.

VICTRON GLOBAL REMOTE 2 AND VICTRON ETHERNET REMOTE



Victron Global Remote 2: A GSM/GPRS modem

The Global Remote is a modem which sends alarms, warnings and system status reports to cellular phones via text messages (SMS). It can also log data from Victron Battery Monitors, Multi's, Quattro's and Inverters to a website through a GPRS connection. The usage of this website is free of charge.



Victron Ethernet Remote: A GSM/GPRS modem with Ethernet connection

The Ethernet Remote has the same functions as the Global Remote. An extra function of the Ethernet Remote is that it can connect with LAN, due to a special cable. In this way, the Ethernet Remote can be connected to the internet without a SIM-card.

Simple and easy to use

The idea is simple: you can use it to get SMS alarms from a Multi, a Battery System, or both. When monitoring the usage of batteries, it can be extremely helpful to receive under and overvoltage alarms; whenever they occur. For this purpose, the Global Remote is perfect. A prepaid SIM-card (for example) in combination with the Global Remote is adequate for remotely monitoring your system.

Connections Global Remote

The Global Remote has two serial connections. The can be used to connect to a VE.Bus Multi/Quattro/Inverter unit or system. This connection needs a MK2 which is supplied with the VGR. The other connection is to connect a BMV-600S or BMV-602S Battery Monitor. To connect it to a BMV you will also need the connection kit accessory which needs to be purchased separately. The Global Remote also has a connection for an optional accessoire, the VGR IO Extender.

Connections Ethernet Remote

The Ethernet Remote has one serial connection. This can be used to connect to a VE.Bus Multi/Quattro/Inverter unit or system, or a BMV Battery Monitor. To connect it to a BMV you will also need the connection kit accessory which needs to be purchased separately.

Advanced usage: Monitoring historic data

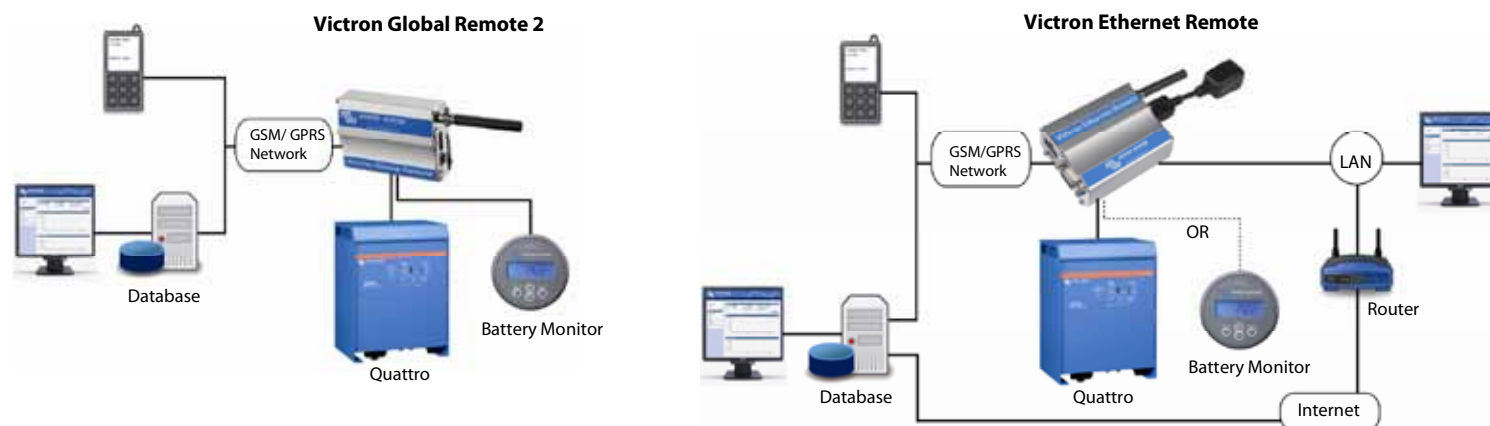
Taking it one step further, an internet browser and -connection is all you need to view all of the data online. You can simply create an account on the website and add your modem(s). Subsequently you can configure the GPRS connection, which will enable you to monitor the historic data of several basic properties such as system voltages, power levels and status information. All of this data is graphed. These graphs are available in daily, weekly and monthly timeframes.

Victron Remote Management

Victron Remote Management is the name of the system which consists of the VGR and the monitoring website. To get a preview: please go to <https://vrm.victronenergy.com>, and login with below details.

Username: demo@victronenergy.com

Password: vrmdemo



VICTRON GLOBAL REMOTE 2 AND VICTRON ETHERNET REMOTE

| | Victron Global Remote 2 | Victron Ethernet Remote |
|---|---|-------------------------|
| Serial connection (Mk2.2a – included) | Connect VE.Bus Multi/Quattro/Inverter unit/system | |
| Serial connection (BMV-602 Datalink – not included) | Connect BMV-602 Battery Monitor | |
| | GENERAL | |
| Power supply voltage range | 5.5 to 32VDC | |
| Current draw (max.) | 0.48A at 5.5VDC | |
| Current draw (connected to GSM network) | 90mA at 12VDC and 50mA at 24 VDC | |
| Operating temperature range | -30° to 75° C. / -22° to 167° F. | |
| | ENCLOSURE | |
| Dimensions VGR Modem (h x w x d) | 73 x 54.5 x 25.5 mm / 2.9 x 2.1 x 1 inch | |
| Weight VGR Modem | 89 grams / 3.1 ounces | |
| Body | Aluminium | |
| Installation | Two aluminum mounting bridges | |
| | GSM / GPRS | |
| GPRS data usage | Depends on usage | |
| | INCLUDED ACCESSORIES | |
| GSM antenna | Included | Included |
| Ethernet attachment | n.a. | Included |
| Battery cable | With inline fuse | Included |
| Y-cable for serial and IO Extender connection | Included | Included |
| Male DB15 to female DB9 cable | Included | Included |
| MK2 interface | Included | Included |
| | OPTIONAL ACCESSORIES (NOT INCLUDED, TO BE ORDERED SEPARATELY) | |
| Global Remote to BMV-60xS conn. kit | Compatible | Compatible |
| VGR IO Extender | Compatible | Not compatible |



BMV-600S and 602S

The BMV-600S and 602S are our newest high precision battery monitors. The essential function of a battery monitor is to calculate ampere-hours consumed as well as the state of charge of a battery. Ampere-hours consumed are calculated by integrating the current flowing in or out of the battery.



Global Remote to BMV-60xS conn. kit

Cable kit required to connect the BMV-60xS and the Victron Global Remote. BMV 60xS Data Link included.



MultiPlus Inverter/Charger

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.



Phoenix Inverter

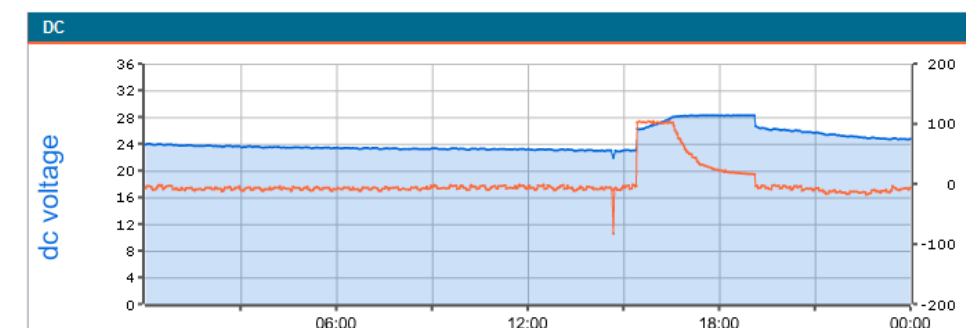
Pure sinwave output, high peak power and high efficiency. Combined high frequency and line frequency technologies ensure the best of both worlds.



Quattro Inverter/Charger

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

Example of graph available on <https://vrm.victronenergy.com>



ABOUT VICTRON ENERGY

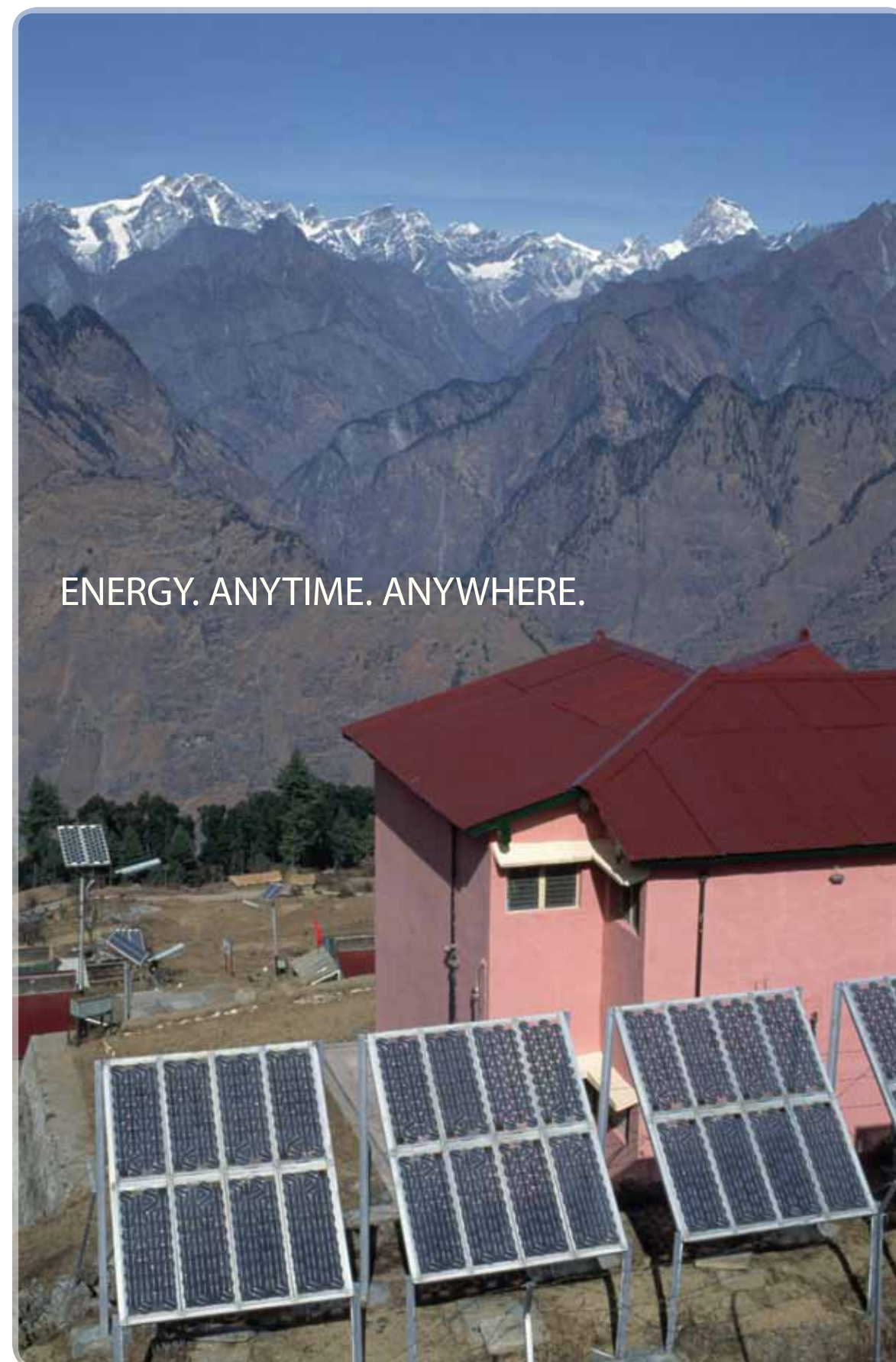
With over 35 years of experience, Victron Energy enjoys an unrivalled reputation for technical innovation, reliability and quality. Victron is a world leader in the supply of self-supporting electrical power. Our products have been designed to meet the most demanding situations faced by a diversity of 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 inverterchargers, battery chargers, DC/DC converters, transfer switches, gel and AGM batteries, alternators, battery monitors, solar charge regulators, solar panels, complete network solutions and many other innovative solutions.

World-wide service and support

Having served the off-grid, industrial and vehicle markets as well as both the commercial and leisure marine sectors for over 35 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.

Victron Energy solar products:





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