

charger
mains on
bulk
absorption
float

I on
O off
⏻ charger only

Phoenix MultiPlus

Multi-functional inverter / battery charger with intelligent
mains and generator power management

Phoenix MultiPlus Explained



Multi function with intelligent mains and generator power management

The MultiPlus gets its name from the multiple functions it will perform. It is a powerful sinewave inverter, a sophisticated battery charger that features adaptive charge technology and a high speed power transfer switch; all in a tough, compact enclosure. The MultiPlus is much more than this, however, and it's many advanced, even unique, functions open a whole new spectrum of applications.

Powerful sinewave inverter

As an inverter MultiPlus delivers high quality pure sinewave power for trouble free operation of all appliances. The high peak capacity also delivers double the rated output as starting power.

Uninterrupted AC Power (UPS function)

Switching from inverter to mains or generator and back is automatic and so fast (within 20 milliseconds) that computers and other connected equipment are unaffected and continue to operate as normal.

Virtually unlimited power thanks to parallel connection

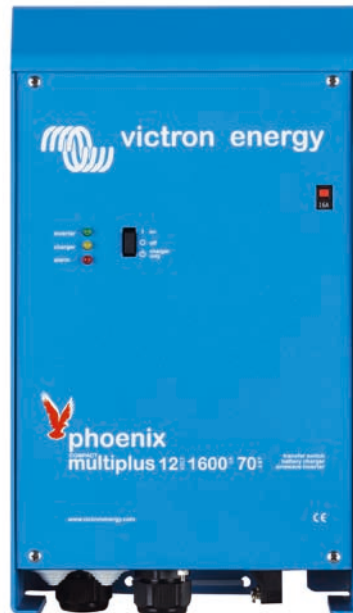
To achieve high power solutions, several MultiPlus can be connected together for increased inverter and charger output. For example, four MultiPlus 24/3000/70 models will provide an output of 52A at 230V (and double that for a few seconds to start loads such as air-conditioning) and 280A of battery charging. Connection in this mode is straight-forward using a simple plug-in data cable.

Multi phase capability

In addition to parallel operation, multiple units can be connected together to provide three-phase power. For US compatible applications, units can be connected for split phase configuration. And of course, multi phase sets can be connected in parallel too!

Four stage adaptive charger and dual battery charging

There are two charge outputs in each MultiPlus. The main output benefits from a true 4-step adaptive charge characteristic that fine tunes every charge cycle to deliver exactly what the battery needs each time. No more, no less. The fourth and final stage of the charge process, battery storage mode, keeps all the batteries in perfect condition over long periods of inactivity. Battery temperature and voltage sensing are also standard features. Altogether, this adds up to keeping your battery in perfect condition. The second charge output is float-only and intended specifically for an engine start battery.



PowerControl®

Dealing with limited generator or mains side/grid power

All models in the MultiPlus range feature powerful battery chargers. When the largest model is working hard it can draw almost 10A from a 230V supply. Using the remote panel it is possible to 'dial-in' the maximum current that is available from mains or generator. The MultiPlus will then automatically regulate the charger taking account of other AC loads and ensuring the charger only uses what is spare. This way it is possible to avoid tripping the mains power or overloading the generator.

PowerAssist®

Boosting the power available from mains or generator, an innovative feature of MultiPlus.

The feature that most distinguishes the MultiPlus from other inverter / chargers is PowerAssist. This feature takes the principle of PowerControl to a further dimension by allowing a MultiPlus to supplement the power available from mains or generator to 'assist' during periods of high demand. Peak power demand is almost always sustained only for short periods, either a few minutes (in the case of items like cooking appliances) or just a few seconds (in the case of the burst of energy needed to start an air-conditioning or refrigeration compressor).

With the capacity of the generator or mains power set on the remote panel, the MultiPlus detects when the load is becoming too much for the supply and will instantly provide the extra power required. When the demand has reduced, the unit returns to charging the battery. This feature is equally effective in large and small systems helping to reduce the required generator capacity or to achieve greater things with limited mains power. There is even a special feature to enable the MultiPlus to work perfectly with portable generators.



Energy Unlimited

With the features of parallel connection and PowerAssist what can be achieved is truly amazing. All the possibilities for optimising the use of energy resources are explored in the book 'Energy Unlimited' that is free to download at www.victronenergy.com or can be sent to you free of charge on request. The book provides details about effective battery management, how to apply the MultiPlus in different circumstances and much more practical advice on power systems in general.



Typical Installation

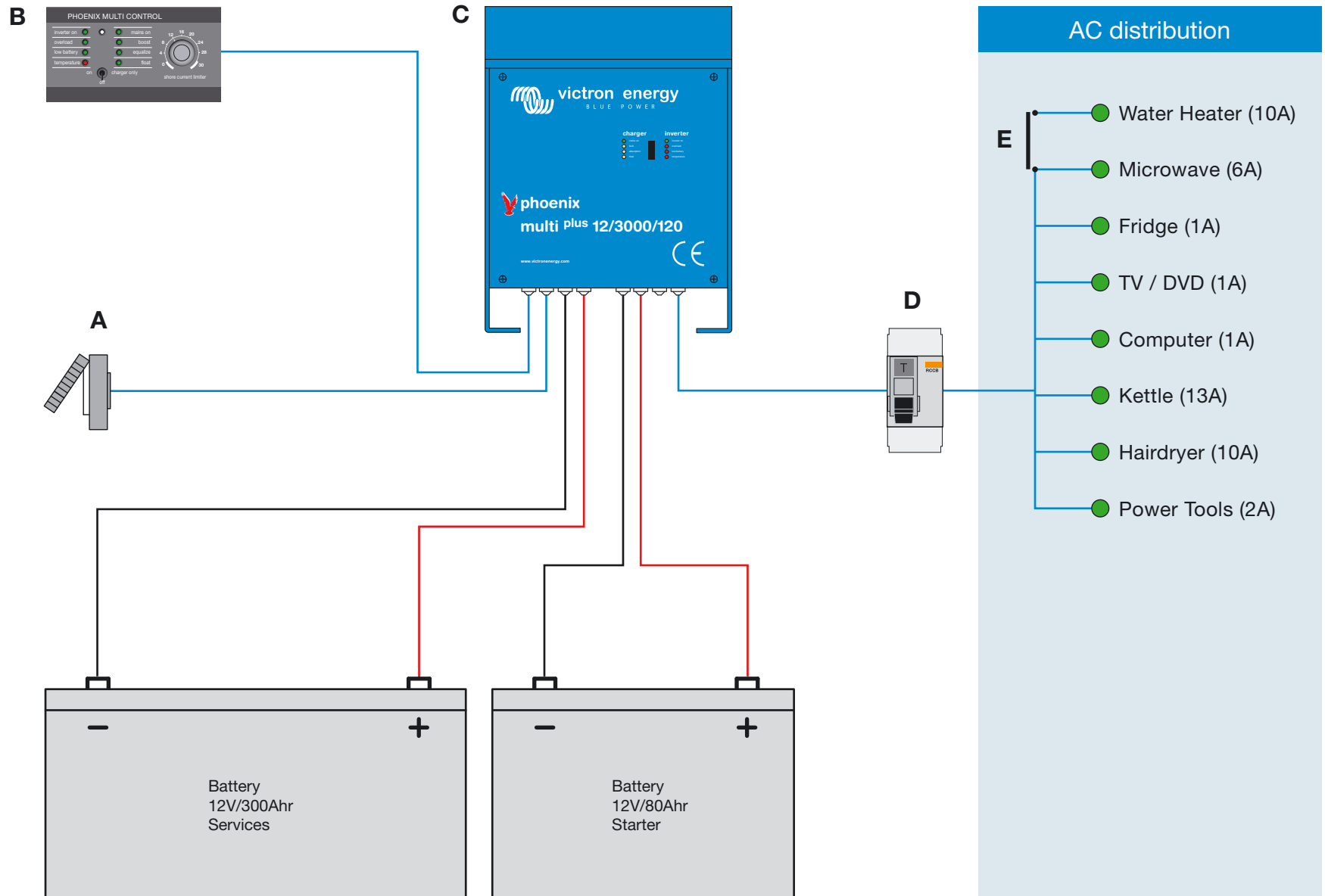
A Mains power

B Phoenix Multi remote panel

C Phoenix MultiPlus

D RCB

E Load shedding relay



How it works in practice

Typical Installation

The example to the left shows a typical installation, where the operator wants the convenience of mains power available at all times.

When you connect your vehicle to mains power (A). The mains power supplies the MultiPlus (C). The MultiPlus checks that the power is of a suitable voltage and frequency and then feeds the mains power to the circuits and uses mains power to charge the batteries.

Power Control

Mains power is often available at a limited amperage. The optional remote panel (B) allows the user to inform the MultiPlus of the mains power limit, the MultiPlus will then control the charging output to work within the limits of the mains. As more power is used for circuits the charger output automatically reduces to avoid overload.

Power Assist

With a MultiPlus, power management goes one step further. In the event that the loads exceed the available mains power, the inverter function works in parallel with the mains connection to boost the total energy available and avoid overload. This works just the same with a generator.

MultiPlus Compact

The MultiPlus is available in standard and compact format. The compact model is available up to 1600VA and shares all of the same features as the standard version except that it is supplied in a smaller enclosure. The compact versions also benefit from having battery cables supplied and plug-in connections for mains power in and out – so installation is as straight forward as can be, straight out of the box.

Away from mainspower

When the vehicle is disconnected from mains power, the MultiPlus reacts instantly and continues to supply AC power to the circuits using the inverter function.

Non inverter circuits

Not all appliances are appropriate for running from the inverter when there is no mains power because of the draining effect they would have upon the battery. These items can be on a circuit that is fed via a 'load shedding' relay (D). All MultiPlus models can be programmed to operate such a relay and the EasyPlus even has the device built in. This is another innovative feature of the MultiPlus product range.

Endless possibilities

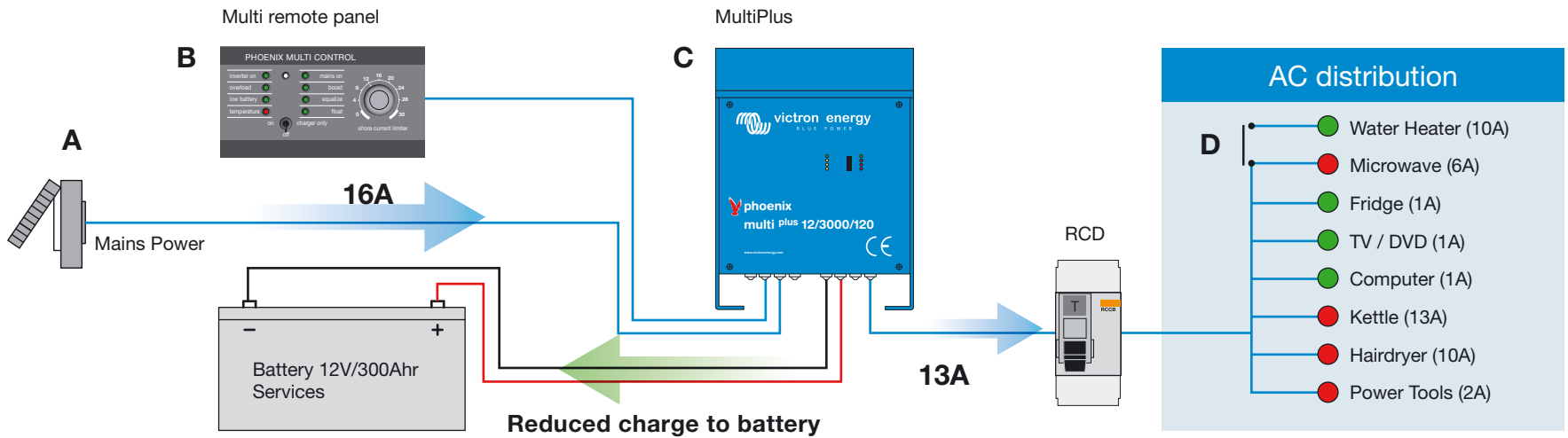
The working example described relates, of course, to a vehicle but you will find the MultiPlus is put to work the world over in a hugely diverse spectrum of applications. From power in sailing yachts on the oceans and game lodges on safari to providing essential power back up for traffic management systems or supplying medical equipment in ambulances. Some of the more typical applications are highlighted below:

- Specialist vehicles & motor homes
- Emergency vehicles
- Sailing yachts, motorboats and commercial craft
- Emergency and back up power
- Telecommunications & telemetry power supply
- Remote buildings
- Medical, military and scientific
- Alternative energy systems



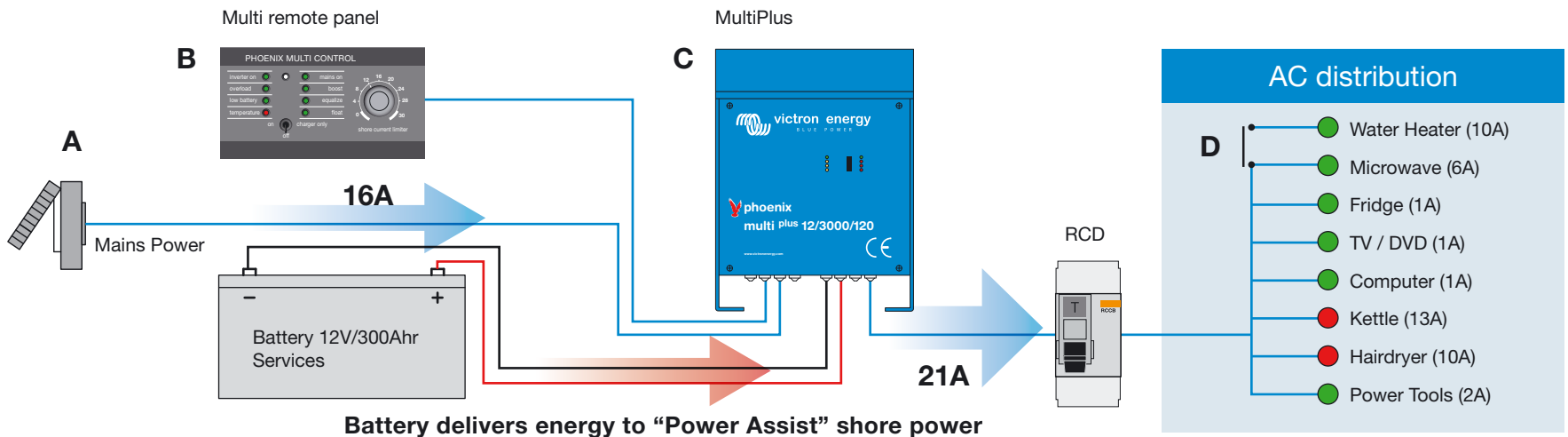
Power control[®]

Battery charger reduces its output, if required, to avoid overload of supply when consumption is high.



Power Assist[®]

Inverter boosts mains power, if required, to avoid overload of supply when consumption exceeds supply.



Phoenix EasyPlus



For the more straightforward applications we have taken the 'everything in one box' concept to its ultimate end in the form of the EasyPlus.

This model has everything you get from a MultiPlus with the addition of an in-built RCD and MCB's for AC power distribution. So you no longer need a separate circuit breaker panel. With battery cables fitted and the AC connections being plug-in (as for all compact models) installation could not be any easier!

The EasyPlus truly is a complete power system in one box.

Accessories

A range of accessory items are available to enhance the function of your MultiPlus.

Remote control panels

The Phoenix Multi Remote Panel provides control and indication of the unit at a remote point and connects, using a network



patch lead, to the unit. As an alternative, remote control is available through the VE.Net panel that can also be used to display battery information and even control your generator.

Phoenix Duo Multi Control Panel

This clever remote panel allows you to set 2 different AC power limits, one for mains power and one for the generator.

Parallel & multi-phase connection kits

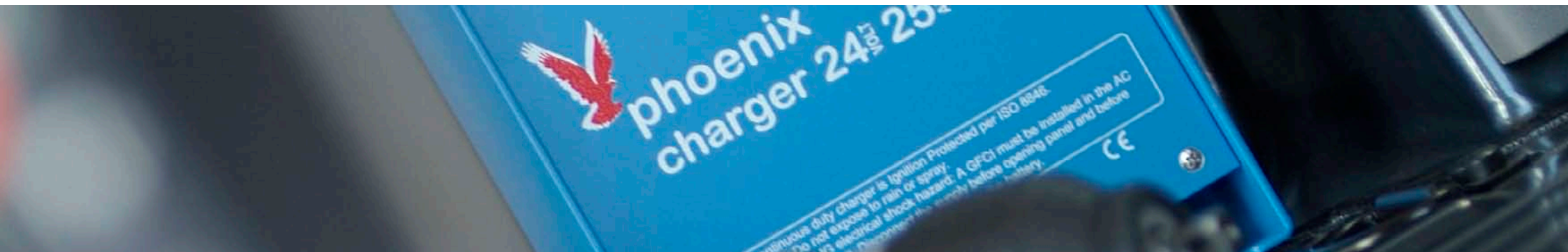
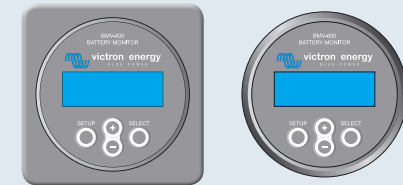
Cable kits are available for connection of units in parallel or for configuring systems in multi phase format.

VE configure set-up software

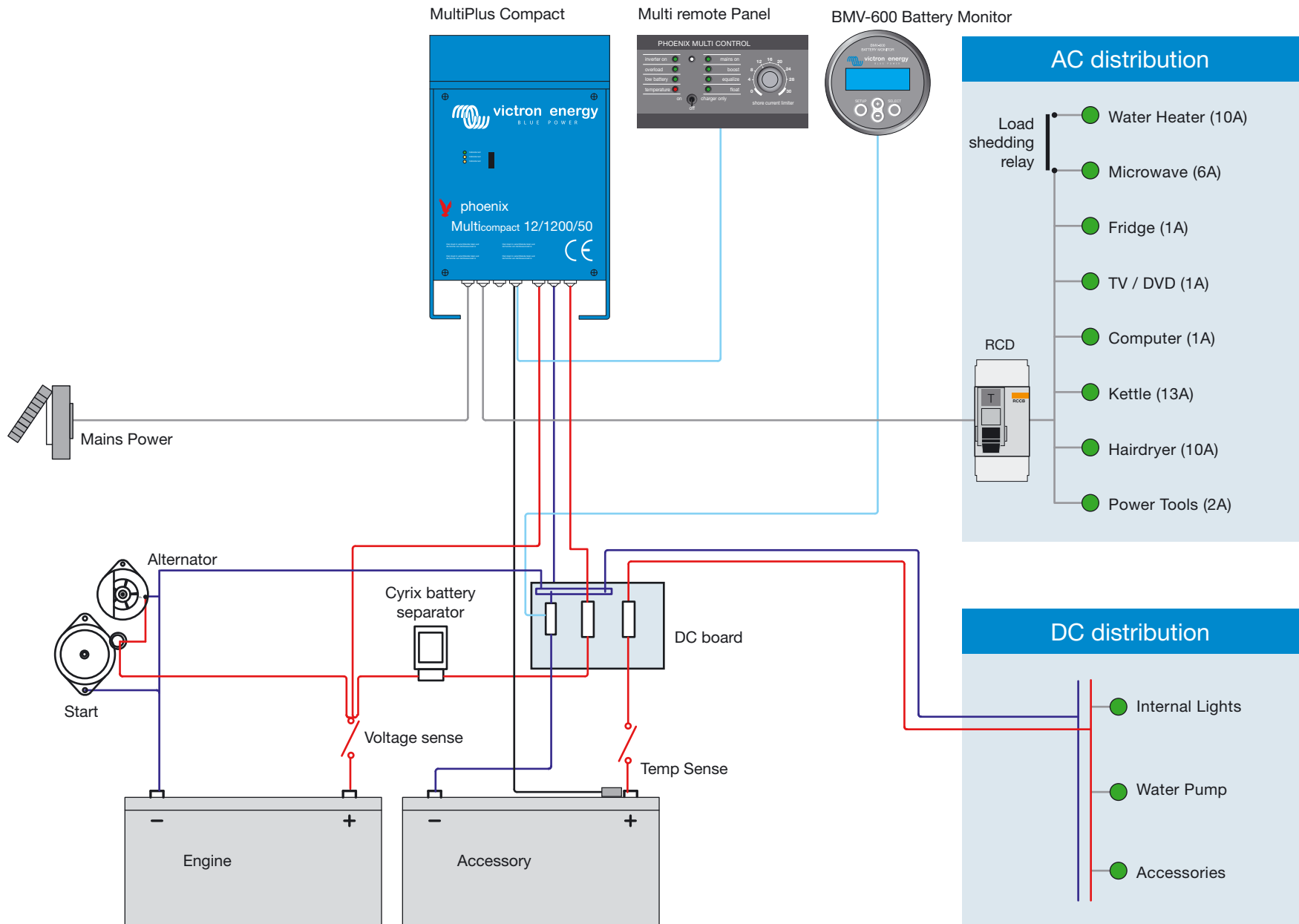
To enable fine tuning of your MultiPlus, VE configure software is available that provides the means to easily adjust parameters and control specific features such as manipulating the battery charge characteristics or for working with certain portable generators. This powerful tool is not for everyone, however, so discuss with your distributor how best to make use of this facility.

Battery monitoring

The BMV 600 is an ideal means of monitoring the state of charge of your battery. It will provide voltage, current and capacity information and much more besides. An equally effective means of obtaining this information is with the VE.Net monitoring module linked to the VE.Net panel (mentioned previously).



Typical system with MultiPlus Compact and mains power



Programmable, Adaptive[®] 4-stage Battery Charging

'The ultimate battery charger'

As a battery charger, the MultiPlus offers the ultimate in programmable sophistication. The four stage 'adaptive' charge characteristic, unique to Victron Energy, ensures that each and every charge cycle delivers exactly what the battery needs. Using 'VE configure' set up software it is possible to modify charge characteristic and parameters to suit any type or size of battery.

Adaptive 4-stage charging

The MultiPlus identifies how much energy remains in the battery at the beginning of each cycle. The charge parameters are then adapted to deliver exactly what is needed; no more and no less. This process ensures fast and complete charging without causing damage through overcharging. Properly charged batteries will last much longer as well as giving you more useable energy.

Battery storage/Reduced float

The fourth and final stage in the charge cycle is termed 'battery storage' or 'reduced float'. When the battery is full and no

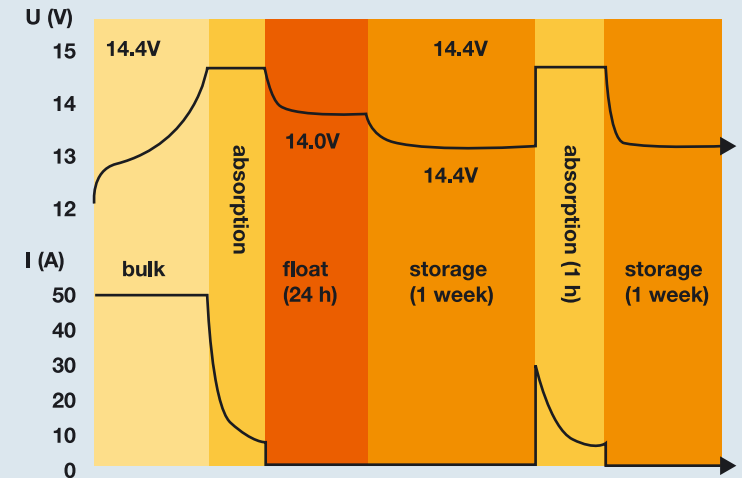
power being used, the MultiPlus assumes the system is in storage. This is a very low charge level that prevents the battery from discharge whilst minimizing the risk of gas being produced. Periodically, the charger will provide a short boost charge to keep the battery in perfect condition regardless of how long the system is left in storage.

Battery safe

At the point at which the charger reaches maximum power output, the greatest risk of overcharging exists. Battery safe mode is a special feature that checks the increase in power to prevent overcharge.

Perfect for every battery type

Using VE configure software, a MultiPlus can be tuned to suit any type or size of battery. Either by choosing from a selection of most common pre-set battery types or by making custom adjustments it is possible to set the Multi's charge profile exactly as you want.



Bulk mode

maximum power delivery for rapid charging

Battery safe

rapid charge is checked to prevent over charging

Absorption mode

accumulated charge is absorbed into the plates

Float mode

the remaining charge is gently applied until the battery is full

Storage mode

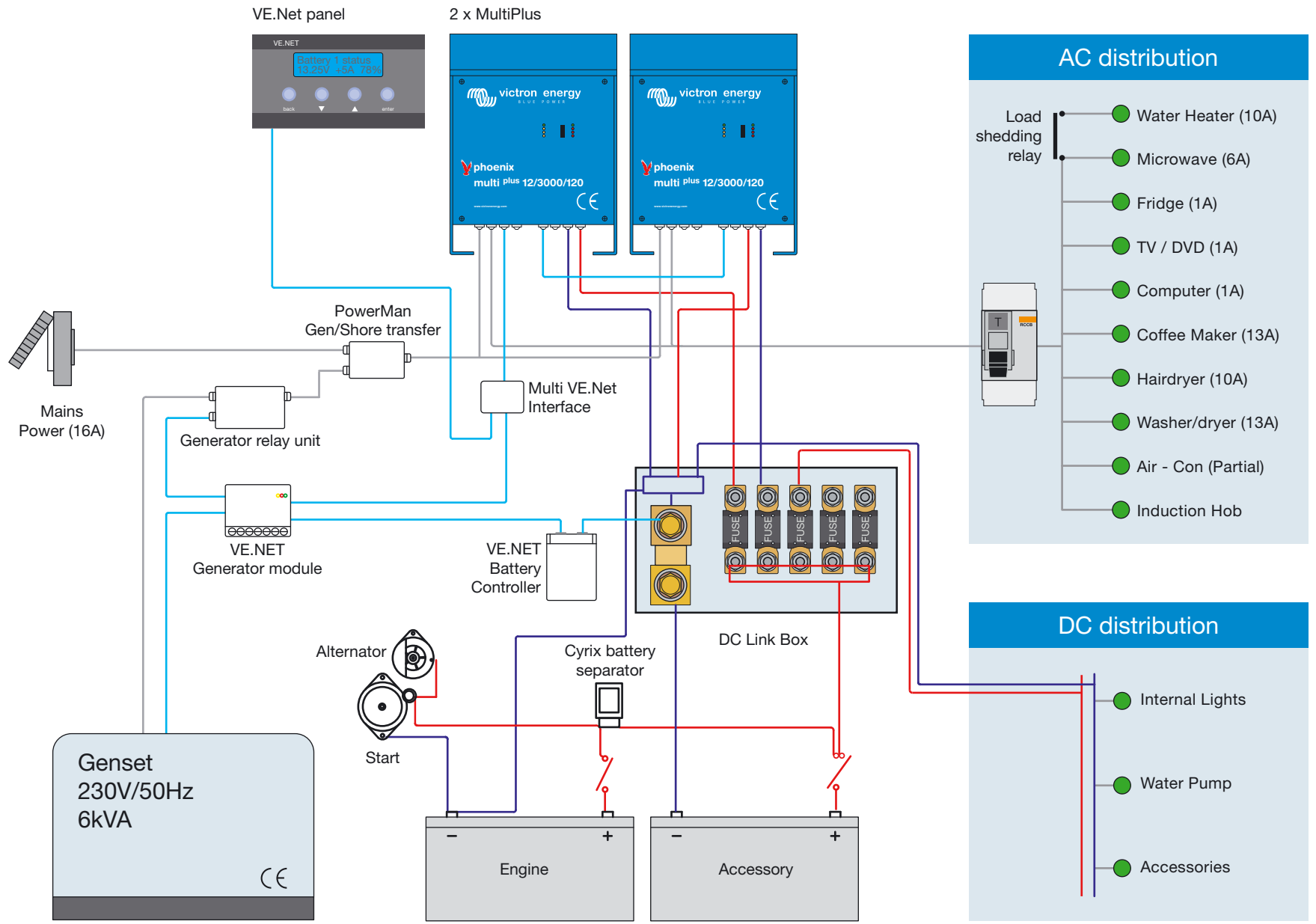
after an extended period of inactivity, storage mode is initiated

Other standard features

The Battery temperature sensor enables the Multi to account for changes in temperature that affect the characteristics of the battery. Remote voltage sensing compensates for any losses in the connection to the battery. An auxiliary 4 Amp output is provided and ideal for maintaining an engine battery.



DC/AC system 2xMultiplus & 6kVA AC genset with VE.Net Max 11kVA



Total Power Management

The way that 230V power is used is irregular; sudden bursts of very high demand (such as when the air-con kicks in), short periods of substantial power use (such as when the washing machine or oven is on) and then long periods when very little power is being used. As more and more equipment is used on vehicles, these irregular characteristics become more difficult to contend with.

High peak power

One way that the MultiPlus is particularly good at dealing with these conditions is that it can deliver more than double rated output to deal with those sudden bursts in demand. The rugged inverter technology means that such performance is delivered without paying a penalty in weight or dimensions.

Power assist

The ability to temporarily supplement the power available from mains or generator is another way the MultiPlus can help manage power needs. By adding power, far more can be achieved with connection to limited capacity mains supply. Equally, there is no longer a need to oversize a generator just so that it can deal with the peak power demanded by an air-con at startup.

Parallel connection

The larger models in the MultiPlus range can be connected together to increase the total power available. When this feature is combined with those mentioned above great things can be achieved with dramatic reductions in generator size and the ability to be free of the restriction of limited mains power. Now you can use power on the move in the same way you do at home – without thinking about it!

The chart below illustrates how power might be typically used in larger vehicle applications showing the peaks in demand and the average power consumption. In this case, what would have been a 10kVA generator is replaced by a 6kVA set. The Power Assist feature of the MultiPlus 24/3000/70 is available to deal with the peak loads and batteries are charged when spare power is available. When power demand is low the generator is not needed at all and the MultiPlus silently delivers the power that is needed.

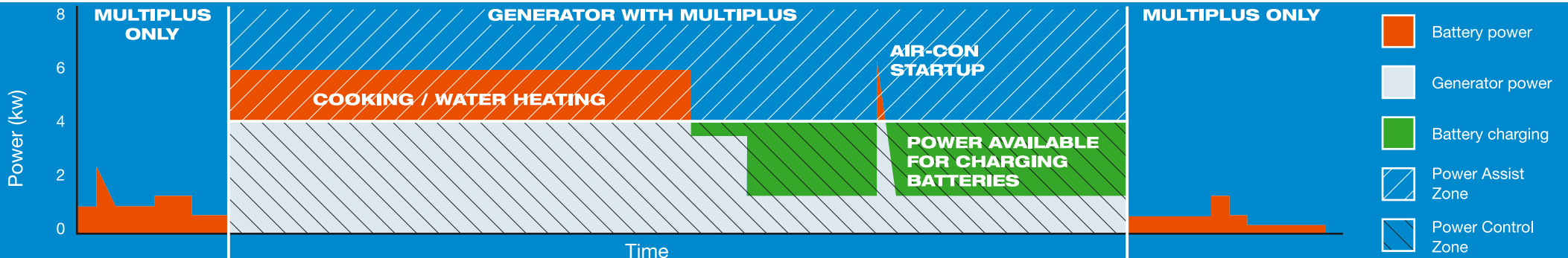


VE.Net - total power management

For the ultimate in monitoring and control of your power system, VE.Net represents the state of the art. As a truly integrated solution, VE.Net provides the following components:

- **VE.Net panel** - multi character display and interface panel
- **Battery Controller** - full function battery monitoring module (any number can be connected to network).
- **Generator control** - full monitoring and control of your generator including auto start/stop functionality.
- **Connectivity module** - enables full access to system status and control remotely through the internet. This module also provides fully detailed geographical positioning.

VE.Net can also be integrated with any number of other devices including a PC, power distribution systems and / or senders and alarms. Your imagination is the only limit to what is possible.



Phoenix MultiPlus 12 Volt	C12/800/35	C12/1200/50	C12/1600/70		C12/2000/80	12/3000/120
Phoenix EasyPlus 12 Volt				C12/1600/70		
Phoenix MultiPlus 24 Volt	C24/800/16	C24/1200/25	C24/1600/40		24/2000/50	24/3000/70
Phoenix MultiPlus 48 Volt						48/3000/35
PowerControl	yes	yes	yes	yes	yes	yes
PowerAssist	no	yes	yes	yes	yes	yes

INVERTER

Input voltage range (v DC)	9,5-17volts 19-33volts 38-66volts					
Output	output voltage 230 VAC+/-2% frequency 50Hz +/-0.1%					
Cont. output power@25°C (VA)	800	1200	1600	1600	2000	3000/3000/3000
Cont output power@25°C (W)	700	1000	1300	1300	1600	2500/2500/2500
Cont output power@40°C (W)	650	900	1200	1200	1450	2000/2000/2000
Peak power (W)	1600	2400	3000	3000	4000	6000/6000/6000
Maximum efficiency (%)	92/94	93/94	93/94	93	93/94	93/94/95
Zero-load power (W)	4,5/6,0	4,5/6,0	4,5/6,0	4,5	4,5/6,0	4,5/6,0/7,0

CHARGER

AC Input	Input voltage range 187-265 v AC Input frequency 45-55Hz Power Factor: 1					
Charge voltage "absorption" (v DC)	14,4 / 28,8 / 57,6 (can be programmed for custom requirements)					
Charge voltage "float" (v DC)	13,8 / 27,6 / 55,2 (can be programmed for custom requirements)					
Storage mode (v DC)	13,2 / 26,4 / 52,8 (can be programmed for custom requirements)					
Charge current house battery (A)	35 / 16	50 / 25	70 / 40	70	80 / 50	120 / 70 / 40
Charge current starter battery (A)	4					
Battery temperature sensor	yes					

GENERAL

Transfer relay capacity	16 A	16 A	16 A	16 A	30 A	16 A (30A option)
Multi purpose relay driver or relay	relay driver	relay driver	relay driver	relay driver	relay	relay
Protection	a,b,c,d,f,g,h				a - h	
Common Characteristics	Operating temp. range: 0-50°C (fan assisted cooling). Humidity (non condensing): max 95%					

ENCLOSURE

Common Characteristics	Material and colour: aluminium (blue RAL5012)		Protection category: IP21			
Battery-connection	Battery cables of 1.5 meter				M8 studs	
230 v AC-connection	G-ST18i connector				screw-clamp 2.5mm	
Weight (kg)	8	10	10	12	12	18
Dimensions (hwxwd in mm)	375 x 214 x 110mm			510 x 214 x 110	520 x 255 x 125	362 x 258 x 218

STANDARDS

Safety	EN 6035-1, EN 60335-2-29					
Emission / Immunity	EN55014-1, EN 61000-3-2 / EN 55014-2, EN 61000-3-3					
Automotive Directive	95/54EC					

Protection key:

a) output short circuit
b) overload

c) battery voltage to high
d) battery voltage to low
e) battery reverse polarity detection

f) 230 v AC on inverter output
g) input voltage ripple too high
h) temperature to high



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SAL064160020- (10/07)

