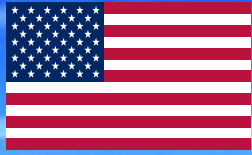


DC to AC Inverters - Automatic Battery Chargers - Combined Inverter / Charger
Advanced Regulators - Alternator to Battery Chargers, MPPT solar regs
Battery to Battery Chargers - Accessories and Components



STERLING POWER

Advanced Marine and
Automotive Power Products



Due to the very active nature of this line of products,
and the constraints placed on printing a catalogue,
please download pages from our web site during the
year from time to time to keep up with the models being launched



www.sterling-power.com & www.sterling-power-usa.com

from November 2010

2011 Edition

Introduction

Who, Where, Why and What are we about ?

Sterling Power Products is a small company owned by myself, Charles Sterling. I started out as a Marine Engineer Officer trained by British Petroleum, and worked on Super Tankers. This was a great experience; it was a little boring as these ships were new and never really broke down (they exploded the odd time but apart from that they were very reliable). So I left, and joined Canadian Pacific where I spent my time on container ships, ore carriers and other more interesting ships (more interesting from the engineering challenge point of view as they tended to be older, and therefore broke down more often). I did the running round the world thing and got into all the trouble you can imagine (ah, the good old days). I was one of the youngest people ever to hold a full seconds diesel (D.T.I.) ticket (steam and diesel) with part A and part of part B of a chief engineers ticket. But I was reluctant to spend my life running round the world from what appeared to be, one war zone to another, and where ones belief in god is directly proportional to how close that last bullet was to your head.

I have always claimed to be a reasonable engineer, and as such, try to convey not just what a product does but why you need it. I endeavour to make this as simple as possible. Please bear in mind that I answer about 90 calls a day, and have targeted the literature at people who want to understand the products, but have been unable to get access to the information. Most companies' technical information is hidden in the sales jargon, not with Sterling. We are proud of what our equipment does and see no need to cover up any flaws with glossy vague sales literature. Flaws should be designed out of products, not covered up. All companies products suffer from technical problems, the trick is to find them and design them out as quickly as possible. Being a small company with its own in house design team, our response time is at a level that larger competitors can only dream about. The end result is our products just keep getting better and better, outstripping our competitors more and more every year.

Sterling Power Products business plan is very simple. We design every conceivable performance and safety feature we can think of into our products; then we check our competitors just in case we missed something (however, we have never come across anything close). Having designed all the features we try to manufacture the products at a cost that will allow us to offer our customers a product with a high technical specification, but at the same time keeping the cost down. This is especially important when dealing with O.E.M's (Original Equipment Manufacturers, in our case boat builders). Builders want performance /safety/reliability but uppermost is price.

Technical help: At Sterling I know we have an extremely good technical help line, we try to help all our customers with good technical advice, however 9 times out of 10 when a customer feels he has a defective product the fault is in the installation or operation of the product, as a result, when you phone the technical help line there are only 3 things we are interested in, voltages, voltages, and voltages. With voltages we can help you, without voltages we are just having a conversation with little or no ability for us to help you, so please help us to help you, get a volt meter and learn how to use it or have

some one who does standing by when calling us for help, that way we can quickly and accurately identify the problem and give you the most effective solution. This by far works out better for you. This may sound blunt but we are here to help you and with voltages we can .

Index

- 1 Front cover
- 2 Introduction & Index
- 3 Water proof battery chargers
- 4 Portable battery chargers
- 5 The Ultimate Pro Charge U battery charger
- 6 Pro Charge C/D/N battery chargers
- 7 Quick check list on the above chargers
- 8 Battery Maintainers / charger plus balancers
- 9 How effective is advanced charging
- 10 Advanced alternator regulators
- 11 Features and explanations for advanced alter regs
- 12 Pro Power 500 amp distribution box
- 13 Which splitting system suits you
- 14 Alternator to battery charger
- 15 Alternator to battery charger more
- 16 Battery to Battery chargers
- 17 Battery to battery charger more information
- 18 Pro Split 0.0 volt splitting system
- 19 Pro Split 0.0 volt splitting system more
- 20 Voltage Sensitive relays inc Current limiting model
- 21 Voltage Sensitive relays more
- 22 Split Charge Diodes
- 23 Wild Side Combined Bat to Bat and MPPT solar reg
- 24 Latching relays (Voltage sensitive)
- 25 Latching relays more
- 26 Combined inverter chargers Sine and Quasi sine wave
- 27 Combined inverter chargers more
- 28 Quasi sine wave inverters Pro Power Q
- 29 Pure sine wave inverters Pro Power S
- 30 Solar regulators
- 31 Solar regulators plus Alternator protection device
- 32 Manual and Automatic 230 v /110 v ac crossover switch
- 33 Power management products
- 34 Alternators
- 35 Pneumatic Tank gauge
- 36 Budget Voltage sensitive relays plus ancillary equipment
- 37 Gold fuse and connector blocks
- 38 Zinc savers / galvanic isolators
- 39 Zinc savers / galvanic isolators more
- 40 Galvanic monitoring

Sterling Power Products Ltd Droitwich, England

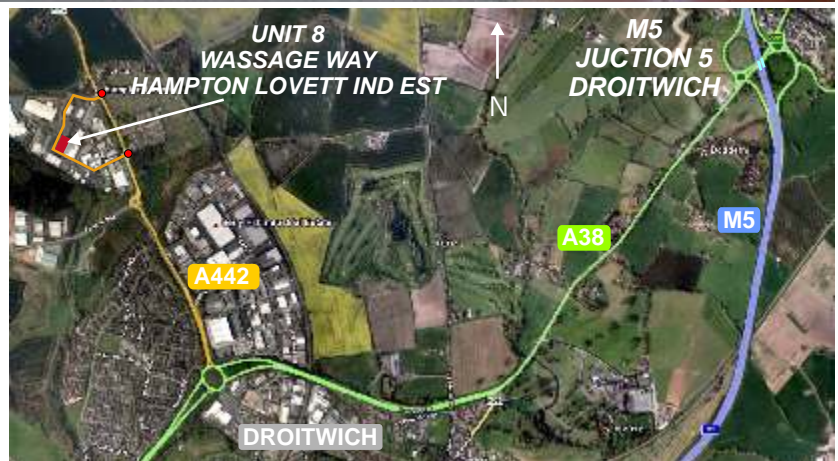
20,000 sq ft factory in Droitwich
Over £ 7,000,000.00 retail stock held
at any one time ensuring product
availability and speed of delivery.

www.sterling-power.com

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Pro-Sport. 5 and 5/5 (10)

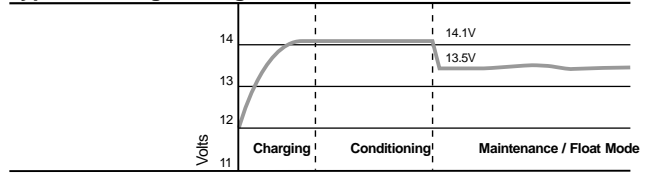
Totally waterproof (IP 68) , 3 stage Battery Charger



5/5 model
1 x 12 v 10 amps
2 x 12 v 5 amps
1 x 24 v 5 amps

5 model
1 x 12 v 5 amps

Typical Average Voltage



Pro Sport 5 is 1 x 12 v 5 amp output

Pro Sport 5/5 is 2 x 12 v 5 amp totally isolated outputs, can be used as 1 x 12 v 10 amp, 2 x 12 v 5 amp, or 1 x 24 v 5 amp

Epoxy filled for waterproof and vibration proof aspects

Pre wired with 1.5 meters d/c and a/c cables

d/c cables pre fused and come with gold plated ring terminals ring

Pro Sport 5 and 5/5 water proof battery charger 230 v a/c 50 Hz only

Voltage d/c	Amps	Outputs	Size L x W x D mm	Weight kg	Part nos
12	5	1	75 x 150 x 65	2.5	PS125
12/24	12v 2 x 5 (1 x 24v x 5) or 12 V 1 X 10 amp	2	230 x 130 x 90	3.5	PS1255

Pro Sport 8-20 amp
Pro Sport PFC
Pro Sport 5-55
1 amp

●	●	●	Molded Plastic case
●	●	●	Extruded aluminium housing.
●	●	●	Fully waterproof to (IP 68) standard .
●	●	●	Both pos and neg fully isolated that enables the unit to charge 12 or 24v batteries.
●	●	●	Adaptive charging, ensures max charge in the batteries.
●	●	●	Lead acid / sealed (AGM/Gel) battery selectable for maximum performance
●	●	●	Preset fixed non selectable battery type for gel, sealed, AGM, and open lead acid
●	●	●	Dynamic thermal output control. Reduces power rather than over heat
●	●	●	LED power and charge indicators.
●	●	●	Built-in protection distributed-on-demand. Power Pack mode
●	●	●	3 stage charging curve.
●	●	●	Pre wired waterproof loom for easy installation.
●	●	●	Pre fused and gold plated terminals
●	●	●	12 and 24 v application (except Pro Sport 5)
●	●	●	2 -3 x isolated outputs (except Pro Sport 5)
●	●	●	110 & 230 volt a/c auto

Ignition protected,
ideal for petrol boats

Ideal for sports boats or equipment
where the charger will be exposed
to water wash down such as a
power hose or petrol fumes



Advice: We recommend to use waterproof battery chargers where the waterproof aspect is a priority. For all other applications we recommend our digital control units (please refer to page 4) which are lighter and have a superior performance.

AQUANAUTIC Waterproof range



12 V 8 - 20 AMP

8-20 amp
24 V 4 - 10 AMPS

Power Factor Corrected
110-230 v a/c auto 40-70 Hz

Waterproof battery charger 230 v a/c hz only

Voltage d/c	outputs	Amps	Size L x W x D mm	Weight kg	Part nos
12	1	1	60 x 60 x 60	0.5	121CE
12 & 24	2	8 at 12 v 4 at 24v	170 x 180 x 65	3.6	PS1208
12 & 24	2	12 at 12 v 6 at 24v	210 x 180 x 65	3.6	PS1212

AquaNautilus PFC 110-230 v auto

Voltage d/c	outputs	Amps	Size L x W x D mm	Weight kg	Part nos
12	1	20	290 x 170 x 65	3.8	PSP12201
12 & 24	2	20 at 12 v 10 at 24v	290 x 170 x 65	3.0	PSP12202
12 & 24 & 36	3	20@12v 10@24v 6@36v	290 x 170 x 65	3.2	PSP12203



1 AMP waterproof float charger ideal for jet ski, small boats, bikes, lawn mowers etc. single output

Portable Global Smart Charger with auto repair program

The new micro processor controlled small portable charger can now be used anywhere in the world. It not only gives you all the latest pulse charging and built in de-sulphation but is also truly global, with 100-230 volt 50/60 Hz ac input, putting the product in a class of its own.

Features and benefits of this portable charger are:

Universal AC Input (100V to 240V): can be used anywhere in the world, truly global charging.

Suitable for all types of lead acid batteries: Wet, GEL, AGM, Calcium.

Simple 3 touch screen selections with intuitive iconic LED indications: Simple to use 3 charge modes, small battery, large battery and 'cold charge', ideal for low temperature battery charging, of de-sulphation, and also for the new calcium batteries where a higher voltages is required to charge the batteries.

Microprocessor control multi -stage charger with pulse absorption and float charge: fast charge but safe floating for long term operation.

Checks if a battery is faulty, the processor can automatically identify if a battery is beyond repair and flashes a warning light to inform you it needs replacing.

Repairs faulty batteries (if recoverable), if the battery is found to be faulty, but repairable, the unit will automatically identify the fault and inject high voltage short DC pulses until the battery is repaired, an LED shows the charger is on repair mode.

Defective battery identification, if, after 8 hours on the repair mode, the battery is deemed unrepairable then an LED will flash to inform you that the battery is beyond help and needs replacing.

Three charge modes, when the battery is found to be suitable for a charge then the charger will bulk charge, then pulse width absorption charge and finally float charge, the unit can then be left on permanently.

Soft start charging: if the battery is found to be heavily depleted then the smart charger will start at a low pulse current until the battery has reached a level where it can then absorb the full charge power

50% power reduction mode: for small batteries under 30 amp hours

Cold weather 14.8 V (x 2 for 24 V) charge mode option

Two interchangeable connection leads with clamps and eyelet terminals.

Thermal control, regulates charge current in hot conditions.

No connection spark, there is no output voltage until the battery is connected.

Electronic reverse polarity protection with LED warning.

40 hours 'time out' to avoid any possible problems.

Short circuit protected.

Thermal protection, reduces power and switches off if too hot.

Specification A/C input range 100-240 V

A/C frequency 47-64 Hz

Full load 1.3 amps@230 V A/C

Max power 70 watts

Optimum Efficiency >81%

Max D/C current 5 amps

Charge voltage for sealed battery 14.4 V x 2 for 24 V

Low temp/calciium mode 14.7 V x 2 for 24 V

Float mode high level 13.5 V x 2 for 24 V

Float mode low level 12.8 V x 2 for 24 V

Protection: overload, short circuit, over temperature, reverse polarity, no spark, short circuit, 40 amp time out.

Construction Pol-carbonate casting, water resistant

Approvals EN 60335, EN55014, IP45 body only

Weight 0.4 Kg

Dimensions 150x60x30 mm



Global Smart portable battery charger					
Plug type	Voltage a/c	Voltage d/c	Amps	Weight kg	Part nos
British	110-230	12	5	0.4	GS125B
Euro	110-230	12	5	0.4	GS125E
USA	110-230	12	5	0.4	GS125A
British	110-230	24	2.5	0.4	GS243B
Euro	110-230	24	2.5	0.4	GS243E
USA	110-230	24	2.5	0.4	GS243A

8 LED information panel

Portable multimeters

No Batteries
Wind up to use



Do you ever find yourself needing a multimeter, which you know you have somewhere and when you find it the batteries are flat? Well, never again, this new product has no batteries so you can leave it as long as you like. Simply wind the handle 2 times for about 2 minutes use or wind for about 10 seconds for about 10 minutes use.

The product is high quality and extremely well equipped with all the features and functions required for general use.

Code

WUVM

GENERAL SPECIFICATIONS

Display 46 mm x 23 mm large LCD
 Measurement AC, ACA, DCV, DCA, ohms, continuity
 beeper, Hz, %, Capacitance, Diode, Data hold.
 Range selection Auto ranging with manual selecting.
 Data hold to freeze the display reading
 Dimensions 152 x 78 x 45 mm
 Weight 350 g
 Includes red and black test leads plus instruction manual
Electrical Specification
 D/C voltage
 Range Volts 400.0 mv - 1000 v D/C
 Accuracy +/- (1% + 3d)
 Input impedance 10 M Ohm
 D/C & A/C current
 10 A - 400 mA

Overload Protection Fuse
 Ohms
 400-40 M ohm
 Capacitance
 40nF-100 nF
 Frequency
 4 Hz - 4 MHz
 Diode
 (forward voltage , VF)
 Range 4 V DC
 Resolution 0.001 V
 Test voltage 1.6 v DC
 test current 1 +/- 0.6 amps
 Continuity Beeper
 Beep if resistance less than 100 ohm
 response time < 100 ms

The Ultimate Battery Charger- Power Pack Pro Charge U



Pro Charge Ultra 80-270 V 40-70 Hz a/c input					
D/C voltage	Amps	Number of outputs	Size L x W x D mm	Weight kg	Part nos
12	10	2	260 x 215 x 90	2.0	PCU1210
12	20	3	260 x 215 x 90	2.0	PCU1220
12	30	3	260 x 215 x 90	2.0	PCU1230
12	40	3	260 x 215 x 90	2.0	PCU1240
12	50	3	315 x 215 x 90	3.0	PCU1250
12	60	3	315 x 215 x 90	3.0	PCU1260
For larger current requirements simply add 2 or more units together.					
24	20	3	260 x 215 x 90	2.0	PCU2420
24	30	3	315 x 215 x 90	3.0	PCU2430
Remote control plus 10 metres of cable			110 x 68 x 20	0.05	PCUR

12v 10 amp to 40 amp
24 v 20 amp

Local Information Centre
32 x LED display panel
2 x LED digital meters
1 x digital power meter

12v 50 amp & 60 amp
24 v 30 amp

**Awarded
Premium
Product
from
SAILING
TODAY**



REMOTE CONTROL (OPTION)

110x 68 x20 mm
including
10 metres of cable
Unique remote housing
can be surface mounted,
recess mounted or
flush mounted

12 v 60 amp model, all other units pro rata

Input voltage range	80-270 v 40-70 Hz
Power Factor at 230 v	0.976
Efficiency	90.4%
Full load current (110/230v)	9.8/4.6 amps
Ripple noise (R.M.S.)	14mV
Ground leakage	0.5 mA
Generator/ mains power required to run unit (watts)	
12 v 20 amp approx	350 watts
12 v 30 amp approx	500 watts
12 v 40 amp approx	600 watts
12 v 50 amp approx	750 watts
12 v 60 amp approx	900 watts
24 v 20 amp approx	600 watts
24 v 30 amp approx	900 watts
voltmeter accuracy	+/- 1%
ammeter accuracy	+/- 1%

**EN61000-3-2
EN61000-3-3
EN50081-1
EN60335-2-29**

With our years of experience in this market we thought of everything we could possibly think of and combine it all into this product range, resulting in the **Ultimate Battery Charger**. However do not take our word for it , this was recently confirmed on its first competitive test with Sailing Today Magazine where it won **Premium Product** against the toughest competitors (Mastervolt and Victron plus others) and was described as “ **This has to be the most flexible marine charger on the market today** “, closely followed by the innovation award at **IBEX 2010**, the largest International Boat building EXhibition in the USA and it has just been released onto the market for about 7 months.

New features on this product surpassing that of standard battery chargers include :

- 11 pre-programmed battery curves including LiFePO₄.
- 1 custom set, can be set from charger , unlike our competitors there is no need for a computer to do this operation , all can be done from the front panel.
- 2 x digital metres for amps and voltage measurement. and 32 LED information display
- 1 x power metre to show what reserve power left in the unit.
- PFC, active, up to 0.99 PF, ensuring efficient power conversion, up to almost 90% as opposed to about 60% for older, non PFC technology.
- New synchronised rectification output as opposed to diode output, giving up to an extra 9% efficiency.
- De-sulfation auto cycle built in to software.
- New, low activity, standby mode to increase battery life.
- Battery health program every 7-10 days .
- Multiple speed fan control. This reduces unnecessary fan noise experienced by the customer, even though the new extreme efficiency reduces the need for fans. At high ambient temperatures (40-50 deg C) however, fans would still be required to ensure operation.
- Primary (processor digitally controlled) and an emergency backup secondary (analogue controlled) high voltage trip.
- 32 LED information panel to ensure maximum information transmitted to owner.
- Internal scan and systems check to ensure product is okay.
- Remote control option,
- Small footprint and light weight .
- Include battery temperature sensor to give temperature compensation and high temp trip .
- As with all our marine chargers all metals used are non ferrous or heavily protected, so no corrosion
- % power reduction to allow unit to work with restricted power available (available on local control or remote control panel),
- Conforms to A.B.Y.C. drip test, is water proof from water directly dropped on to the top of the unit (+/- 17 deg) if installed correctly (vertically)

3 output battery chargers

4 Step Constant Current progressive battery chargers/ Power packs

Pro Charge C



12 v 10, 20, 30 amp
24 v 20 amp

D/C voltage	Amps	Number of outputs	Size L x W x D mm	Weight kg	Part nos
12	10	2	240 x 165 x 60	1.5	PC1210
12	20	3	240 x 165 x 60	1.5	PC1220
12	30	3	320 x 165 x 60	2.0	PC1230
24	20	3	320 x 165 x 60	2.5	PC2420

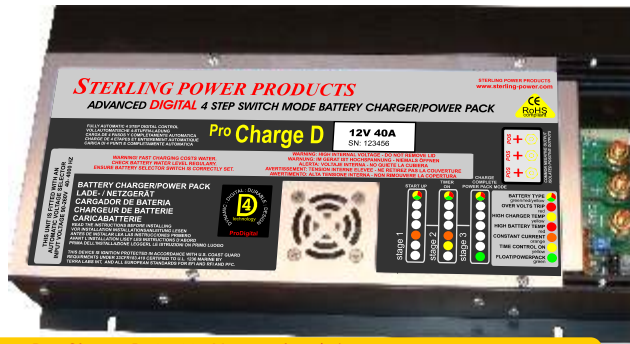
The international range has proven to be one of the most successful on the market due to its price, extremely small footprint and performance. This 3 output unit accepts multi input voltage (80V-300V) and frequency (40Hz-400Hz) is ideal for a smaller boat.

- 1) 4 step *adaptive* battery charging.
- 2) Programmable for gel, open lead acid, sealed, maintenance free and AGM batteries.
- 3) Automatic universal 110/230 volt 50/60Hz input tolerance.
- 4) Power pack function.
- 5) 3 isolated outputs (except the 10 amp , only 2 on that model).
- 6) Low cost, high performance ratio.
- 7) New 3 stage R.F.I. filter for even lower radio interference.
- 8) 24kt gold plated output terminal.

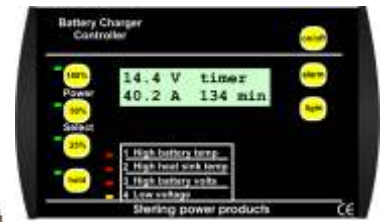
ProCharge D 12 v 30, 40, 50 amp

24 v 25 amp

Includes
1 x battery
temperature
sensor



Incl.
gold output fuse



Remote control
(optional extra)

This well established unit has all the power benefits of the standard system are retained with the control, safety and information aspects upgraded beyond recognition. The latest benefits offered by digital *adaptive* control are highlighted in the Quick Check on the opposite page (page 5) and should be studied. Digital management ensures more accurate control, more battery information type storage in the software, more real time calculations to be done to ensure the best charge, more information is also available in the control chip which can then be displayed on the new remote control and information panel that is supplied as an option in the small range but as standard in the large range.

D/C voltage	Amps	Number of outputs	Size L x W x D mm	Weight kg	Part nos
12	30	3	340 x 195 x 60	3	1230CED
12	40	3	340 x 195 x 60	3	1240CED
12	50	3	340 x 195 x 60	3	1250CED
24	25	3	340 x 195 x 60	3	2425CED
Remote control unit				0.25	CEDRC

ProCharge N

Includes
1 x battery
temperature
sensor



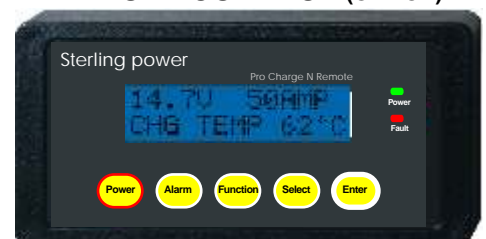
12 v 40, 50, 60 amps
24 v 35 amps
Twin installation up to 6 outputs
12 v 120 amps
24 v 70 amps



aluminium A frame

This product's impressive extra feature list can be seen on the next page. The units can, of course, be used individually. For applications where that extra power is required, however, or even when extra outputs are needed (for example a larger boat could have 2 engine starter battery banks, main domestic bank, bow thruster bank and a generator battery), you can simply connect one output from each charger directing both chargers power into the domestic bank and feed the other 4 battery banks with the 4 remaining outputs. This also reduces the cable diameter required as the 4 smaller battery banks are only capable of receiving 1/2 the power of the larger battery bank. A special aluminium A frame has been designed to support 2 units in a small foot print. To enhance this ability even more a special power balancing box was designed specifically for the major American boat builders who wanted more economic power, they found that they preferred the small size of the twin system and, of course, the redundancy factor in case of a problem. If the higher power option is required, then the frame is simply a neat way to combine units together, the chargers are bolted to the pre made frame and the frame is secured to the bulkhead for a neat finish.

REMOTE CONTROL (OPTION)



D/C voltage	Amps	Number of outputs	Size L x W x D mm	Weight kg	Part nos
12	40	3	440 x 200 x 100	5	PCN1240
12	50	3	440 x 200 x 100	5	PCN1250
12	60	3	460 x 200 x 100	5.5	PCN1260
24	30	3	460 x 200 x 100	5.5	PCN2430
Aluminium A frame to support 2 chargers			525 x 190 x 210	1	PCNA
Dual control box to balance twin installation				0.1	PCND
Remote control panel plus 10 metres cable			105 x 55 x 16	0.1	PCNR

STERLING QUICK CHECK LIST

Check these functions against our competitors
Blue is a performance feature and Red a safety feature

Pro Charge C
Pro Charge D
Pro Charge N

	Pro Charge C	Pro Charge D	Pro Charge N
Adaptative charging	●	●	●
3 isolated outputs	●	●	●
Automatic 110/230 volt selector	●	●	●
Power pack mode	●	●	●
Multiple input frequency from 40-400 hz	●	●	●
Thermostatically controlled fan cooling	●	●	●
4 step constant current charging	●	●	●
High ambient temperature rated	●	●	●
4 different battery type selector	●	●	●
Automatic battery bank size and state sensing	●	●	●
3 stage R.F.I. filter	●	●	●
3 led output display information panel	●	●	●
High heat sink temperature trip	●	●	●
24kt gold plated output terminal post	●	●	●
Reverse polarity protected (with fuse)	●	●	●
Over load protected	●	●	●
Short circuit protected	●	●	●
Sturdy aluminium construction	●	●	●
Small foot print, low profile	●	●	●
U.L and ABYC, certificated	●	●	●
Can be used in parallel operation	●	●	●
Digital software control	●	●	●
Battery temperature sensing and compensation	●	●	●
High battery voltage trip	●	●	●
High battery temperature trip	●	●	●
Negative fused externally (ABYC. Requirement)	●	●	●
Auto power reduction in event of high temperature	●	●	●
7 LED output display information panel	●	●	●
Automatic 10 day de-sulphation cycle	●	●	●
Remote control socket for optional remote panel	●	●	●
Safety time out circuit	●	●	●
7 battery type selection	●	●	●
Calcium battery cycle included	●	●	●
De Sulphation cycle selector	●	●	●
10 LED information display	●	●	●
10 LED current bar display on charger	●	●	●
Voltage balancing control circuit	●	●	●
Parallel balancing ability	●	●	●
Extra features offered with the remote optional	●	●	●
Remote switch on/off	●	●	●
Manual power reduction selector	●	●	●
Auto memory power lock on setting	●	●	●
Delay start up to enable power setting change	●	●	●
2 line 16 bit L.C.D. display screen	●	●	●
High charge rate timer countdown	●	●	●
Auto cycle all information with manual screen lock	●	●	●
Displays all alarm functions	●	●	●
Display, volts, amps, temperatures etc	●	●	●

Adaptative Charging.

This is where the charger control circuit can increase or decrease the charging profile depending on the state and size of the batteries, low cost fixed chargers do not have this ability

3 isolated outputs:

The charger has 3 outputs enabling 3 different battery banks to be charged at the same time.

Automatic 110/230 volt selector:

The in built system enables the charger to be automatically used on a wide voltage range from 80-300 volts A/C.

Power Pack Mode

This is an absolutely critical aspect of any charger, the term battery charger is used when asking for this type of product, however, the term Power Pack is much more important as this is the ability of the unit to supply the D/C needs of the boats system after the batteries are charged, i.e. this product can run the boats d/c requirements (to the max amps of the unit) with no batteries on board.

Multiple input frequencies from 40-400 Hz:(switch mode design)

Self-explanatory, the unit is able to work on all worldwide A/C input frequencies.

Thermostatically controlled fan cooling:

The unit monitors the unit temperature and controls the fans; this reduces any unnecessary fan noise from the charger and enables the unit to operate at high ambient temperatures

4 step constant current charging.

All modern chargers should be constant current chargers as opposed to the old fashion constant voltage chargers, constant current chargers will charge over 10 times faster and should but about 30-40 % more charger into the batteries

High ambient temperature rated:

Many boat builders expect the chargers to work at full power continuously at 40 deg ambient, few chargers in Europe meet this ABYC requirement - we do.

4 Different battery type selector :

There is more than one battery type; most chargers do not offer different programs for different battery types. Failure to offer an option will result in either overcharging some battery types and sulphating others. The Sterling offers charging curves for open lead acid batteries, traction batteries, sealed batteries, gel batteries and A.G.M batteries.

Automatic battery bank size and state:

No need to program in the battery bank size as the digital software can work that out itself.

3 stage R.F.I filter:

In order to meet C.E. requirements for radio frequency Interference a three-stage filter is used to ensure that not only is the standard reached but also that we fall well above the standard legally required.

High heat sink temp trip:

In the event of extreme temperature the battery charger will switch off at 70 deg C

24kt gold plated output terminal posts:

Over a period of time brass corrodes in salt air making poor connectors, we have all seen the green paste that forms around battery terminals etc. All Sterling connection posts are solid brass and are 24kt gold plated to eliminate this and ensure better connections.

Overload protected:

The unit cannot be overloaded and so engine or bow thrusters etc can be used while the charger is in operation without damage to the charger

Short circuit protected:

As stated the charger can be short-circuited with no adverse results.

Sturdy Aluminium construction.

All sterling chargers make good use of strong aluminium body , both to ensure heat is removed from the product and also to add strength to the product. Plastic just will not do the job.

Digital software control

There are 2 ways to control electronic processing, Analogue (hardware control) and Digital (soft ware control). Hardware control is where the voltage sensing and processing are all done via transistors and electronic hardware. This is fine as long as the information to be processed is kept simple. Sterling leads the field in this type of controller but has found that when upgrading from our previous model, it required so many extra features to keep up with new battery types and alternator types etc, which makes a hardware version impossible to make. Digital control (software): This uses lines of computer code, digitally burned into a memory processor in the battery chargers. This means that very complex information and mathematical processes can be processed, which would be impossible for the hardware system to do. It is the next generation of control and more and more you will see the term digital control appearing on different products. Digital control offers so many extra features at no extra cost (see below) and accuracy beyond the ability of the analogue version.

Battery temperature sensing and compensation:

The Sterling Digital comes complete with a battery temperature sensor, which is automatically set to one of the temperature compensation set by your battery type selector switch.

High battery voltage trip:

Things do go wrong no matter how hard we try so in the event of the regulator control failing, then any voltage above what the software is expecting will shut the battery charger down and display the fault.

High battery temperature trip:

It always amazes me how many companies sense battery temperature and compensate the charger voltage against temperature, but in the extreme event of total battery failure when the battery is going to boil, the battery charger will not switch off. The Sterling processor not only senses the temperature but will shut down the charger in event of total failure and display the fault condition.

Auto Power reduction in event of high temperature.

Because it is best to get as much power as possible at high temperature, in extreme high temperature or cooling fan failure, if the heat sink reaches 65 deg C then the output current of the unit will be systematically reduced to prevent the high temperature trip being activated at 70 deg C, its better getting something than nothing.

7 LED output display information panel:

High charger rate, timer activated, battery type (3 colours), float mode, high battery temp trip, over voltage trip.

Automatic 10 day de-sulphation cycle:

The good thing about a constant current charger is that it de-sulphates the battery plates ensuring maximum life from the batteries. However, this only works if the charger is switched on/off regularly (i.e. every time you disconnect and reconnect the charger the plates are subjected to a de-sulphation cycle). The problem is that some boats or standby equipment may be rarely used.

For example: a boat could be moored all year and never leave the pontoon, or a stand by generator with the charger on all the time. In these cases the de-sulphation cycle would only happen once and the batteries would eventually sulphate causing premature destruction.

However the Sterling software has a 7 day timer which in the event of inactivity will automatically run a de-sulphation cycle keeping your plates clean.

Remote control socket:

The unit has the ability to be connected to a digital L.C.D. information and control panel.

Safety time out circuit, in the event of defective batteries , and the charger is unable to complete its charger cycle, the unit will drop to a low float voltage after 10 hrs to reduce the damaged to batteries

7 battery type selection: The new control takes into account many more battery types than the normal units

Calcium battery cycle included: the new calcium batteries require charge voltage way above any normal chargers ability, failure to reach these voltages will damage the batteries.

De-sulphation cycle selector. This unit has the ability to manually select a de-sulphation cycle , only to be used where batteries are sulphated or extremely discharged and require "bringing back to life"

Voltage Balancing circuit. Multi output chargers can sometimes in extreme conditions under charge batteries due to voltage imbalance, This unit has a separate control circuit to ensure all the batteries being charged remain within the voltage parameters set down in the cycle program selected.

Remote switch on/off: ability to switch the unit 'on' and 'off' from the remote panel

Manual power reduction selector: Some marinas offer only limited shore power; as a result high power battery chargers will not work. It therefore becomes necessary to reduce the out power of the charger to enable it to operate from the shore power. This remote offers the ability to select 100%, 50% or 25% power to deal with the lowest shore power supplies. It is best to have some power than none, this feature is also good if an onboard generator is used, i.e. you may want say a 100 amp charger for the onboard generator to charge the batteries fast but the local berth cannot support such a large charger. In this case the charger could be reduced to 25 amps when returned to the marina berth.

Auto memory power lock on setting : If reduced power is selected the software remembers the setting so in the event of removing the shore power the charger will start up on the reduced setting next time.

Delay start up to enable power setting change: In the event of a boat entering a marina and only a low power supply is available, if the last time the charger was used then the charger would start up on high power and trip the shore supply. To overcome this problem when the charger is started, the software counts down 30 seconds before automatically starting the charger on the last setting. This gives the operator ample time to reduce the power if required on the remote control.

2 line 16 bit L.C.D. display screen: As described above a large information screen is use which has an on/off switch for the background light.

Auto cycle all information with manual screen lock: Due to the large amount of information being displayed, it is not possible to fit it all on the screen. As a result the screen automatically scrolls through the screens. However you may wish to monitor one screen in particular, in this case simply push the lock button to lock that screen on.

Battery - Battery Charger / Maintainer

Low power
Mirror Charger

12-12 v 3 amp
12-24 v 1 amp

24-24 v 2 amp
24-12 v 1 amp

IP 65 waterproof
Ignition protected

Save money on batteries and stop them from being destroyed by discharging. A flat battery means you need an expensive replacement .

The auxiliary battery charger maintainer is simple to install and is a low cost product. It is designed to enable extra battery banks on a boat or a camper van to be kept topped up from a separate battery bank which has, for example, a battery charger / wind gen/ solar cell connected to it .

Why use this product instead of a voltage sensitive relay?

A voltage sensitive relay is great where a large current flow is required but it takes a relatively large amount of power to hold in a relay. This is power you cannot afford if you are only producing low current, also if the other battery you are charging is an engine battery then the starting current that will be present on engine start up will cause problems through the relay, unless it's current limiting. The battery maintainer uses FETs instead of relays and as such uses very little power itself. (less than 1 mA) Therefore the power generated, for example in a solar cell, can be passed through with little loss. Also the maintainer is current limiting so the high load on starting would not affect it. Relays also have a limited life cycle and on low power generation a relay could be clicking 'on' and 'off' all day. However, with a FET control system there is no physical contacts to wear out and no noise produced.

How does it work?

This unit is activated when the main battery has reached about 13.3 volts and allows excess power to be transferred from the primary charging system to charge/maintain an auxiliary battery bank.

Please note that this product has no fast charge / boost ability but simply mirrors the input voltage with a small voltage drop (depending on the current flow), the final charge voltage would be around 0.2 volts lower than the primary charge voltage. This is more than enough to keep a battery topped up and supply any small loads, such as: the battery internal discharge and the engine management system discharge (up to about 1 amp continuous) . This product should not be used on a battery with a sustained heavy discharge or drain as it does not have the ability to pass high currents, for higher currents see the **Voltage Sensitive Relays** or the **Battery to Battery Chargers** sections of the catalogue.

This maintainer has the ability to charge and maintain the charge, even if the battery is low (in a long time frame for example a 100 amp battery at 50% discharge could take about 1-2 days) it would never do this if the current discharges from that battery is in excess of 2 amps

Examples of where one would use this type product successfully:

1) **Boats** , if there is only 1 charger on board on the domestic system (such as a combination / inverter charger) then this could be used to connect from the domestic battery bank to the generator battery, or engine starter batteries to maintain there charge state when the combi charger is 'on'. Or you may have a 24 v main battery but a 12 v generator, or a 12 v main battery with a 24 v gen (the list is endless)

2) **Camper vans**, where the camper van has a mains battery charger on the domestic battery but none on the engine start battery; if the vehicle is left for over a few weeks the engine start battery can be discharged through the engine management (E.C.U.) system or if a tracker is fitted, this will also drain the system. The product will keep the starter battery charged and will maintain a reasonable current to cover the losses due to the electronics on the engine starter battery and keep the vehicle in a ready condition (as long as the battery charger is on the domestic battery system, or there is surplus power provided by a solar cell/wind turbine)

Maybe your camper van has a small generator on it, or the vehicle is 24 v and the gen battery is 12 v.

3) **Solar / wind top up**, you may have a solar cell or a wind turbine on the main battery bank and again wish to share the surplus power from this device to other batteries ,thus maintaining them at a ready condition.

Specification

Power consumption in off line/standby is 0.001 amps approx 1 amp hr every 40 days.

Power consumption online (normally not important but only important if a low power solar cell is being used) = 1 ma

A solar cell in excess off 1 watt would work through this without a problem .

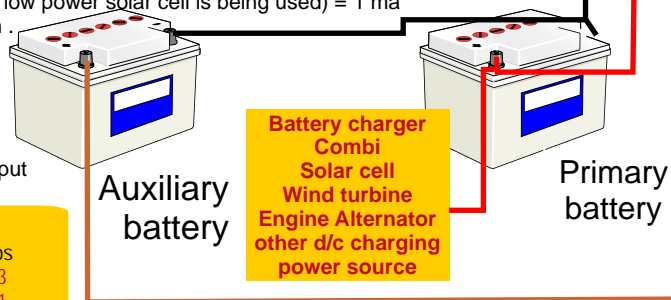
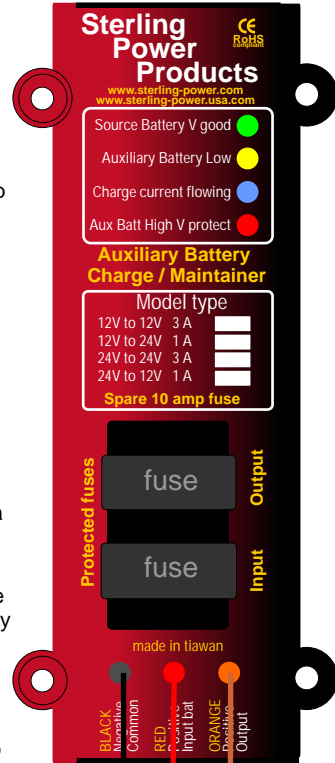
High voltage trip 15 v on aux battery bank (x 2 for 24 v), high temperature lock down at 80 deg C.

Aux battery 'low voltage' warning LED on if aux bat below 12.6 v and 'off' above 12.7 volts

Voltage required to activate the device 13.3 v input

Voltage at which point the device switches off and on to standby 12.9 v input

Reverse polarity protected (fuse)



Battery maintainer / charger inc 1 metre of cable					
Input V d/c	Output V d/c	Amps	Size L x W x D mm	Weight kg	Part nos
12	12	3	140 x 45 x 40	0.25	BM12123
12	24	1	140 x 45 x 40	0.25	BM12241
24	24	3	140 x 45 x 40	0.25	BM24241
24	12	1	140 x 45 x 40	0.25	BM24121

Battery Balancer and Defective battery identification



model shown, 36 volt 3 x 12 v battery bank

This product is designed to balance battery banks in series , which may not be perfectly balanced and as such will prematurely be destroyed because they are not identical and there may be a slight internal resistance difference between each battery. If the batteries are balanced during the charge and discharge phase then they will last longer. Also, when a battery is detected as defective, it is clearly identified, enabling the operator to replace the correct battery before It is too late and all batteries end up getting destroyed. This unit can easily pay for itself many times over in its lifetime.

Suggested applications : 24 v starter battery bank on a boat or vehicle, 24 or 36 volt trawler motor bank on small electric outboard motors

Battery Balancer / defective battery identification				
Battery Bank V d/c	Bank Make up	Size L x W x D mm	Weight kg	Part nos
24	2 x 12 v	140 x 45 x 40	0.25	BD242
36	3 x 12 v	140 x 45 x 40	0.25	BD363
12	2 x 6 v	140 x 45 x 40	0.25	BD122
24	4 x 6 v	140 x 45 x 40	0.25	BD244

How effective is advanced battery charging?

I am asked all the time 'do i really need advanced charging on my batteries?' What effect does a split charger diode have on charging? what % improvement will our products have on a system? Will the extra fast charging boil my battery? Will it excessively gas the battery? what effect, in real terms, can i expect? Most of the question stem from old wives tales rampant in this market, the idea behind this article is to lay to rest any and all of the old wives tales and offer the facts. Remember the below results are extreme and meant to show just how hard you can charge an open lead acid battery with no adverse effects. The results were all data logged and were 100% real and reproducible, they are not guess work nor are made up.

Voltage versus current absorbed test

Part 1: The effect of voltage on battery charging

There is no magic with advanced charging systems, in effect, all they do is increase the differential voltage between where the battery is and the charge voltage. In other words the higher voltage that is applied to a battery the faster it will charge. However, on the down side if you do not control that higher voltage after the charge then you will damage the batteries. This simple experiment will show you the direct relationship between actual voltage applied to a battery and the current (amps) being absorbed by it. This will give you some idea how your system can be improved and where the problem may lie.

This information is 100% accurate and can be reproduced on any test bench at any time.

The test is very simple and not open to miss interpretation. We will use a simple 100 amp hr lead acid, so called 'leisure battery', a low cost, nothing fancy battery. All we have done is to discharge the battery to about 50%, then connect it to a 180 amp regulated power supply. We will simply present the battery a starting voltage of 13.2 volts and see how much current it will absorb from the power supply, then we will simply ramp up the power supply voltage and measure the extra current absorbed as the voltage increases.

For example, the red line shows that when the battery was 50% full at 13.2 volts the charge current was 35 amps and at 14.8 volts the charge current was 160 amps, an improvement off about 457%. However, the black line on the graph which was taken when the battery was about 70-75% full shows that, at 13.2 volts, the current was about 1 amp (showing that, at 13.2

volts, the battery was full (in its opinion). Where, as at 14.8 volts we were still putting in about 60 amps, a charge improvement of 6000% (rather an improvement).

Why the specific voltages?: The voltages chosen are real voltages which one would expect to see in real life.

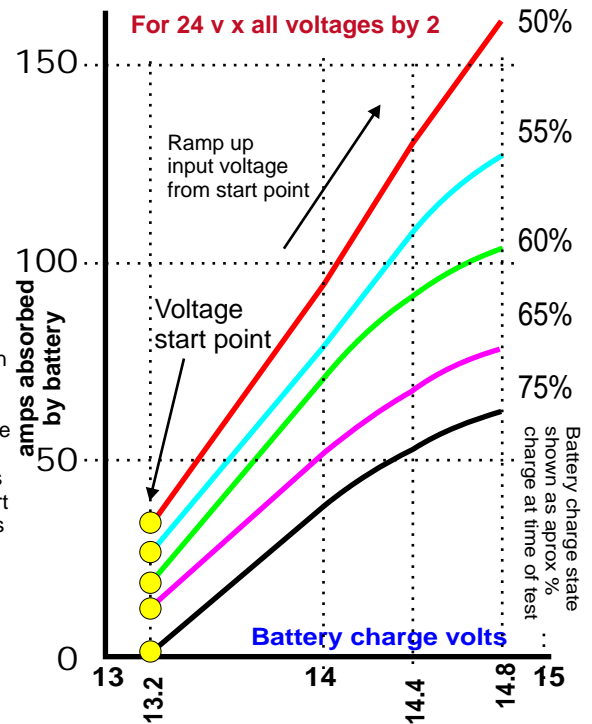
13.2 volts: this voltage appears in 2 main circumstances.

a) If you use a split charge diode then one would expect this sort of voltage at the battery.
b) Most alternators now have a built in temperature compensator on their regulator. When the engine room heats up (especially on a vehicle) then the assumption made by the alternator manufacturers is that the battery should be full. So, as the warm air in the engine room is pulled past the regulator, the voltage from the alternator is reduced, the end result is we have seen standard vehicle alternators start off at 14 volts and drop to 13.2 volts in vehicles (with the bonnet down) after about 20 minutes. This is okay for the starter battery but will ensure your secondary batteries never charged (as per the graph).

14.0 volts: this is where most alternators start from, and is a standard expected alternator voltage from an alternator.

14.4 volts: This is the voltage used to charge sealed lead acid batteries to prevent gassing.

14.8 volts: This is the voltage that one can push up to in open lead acid batteries without any damage to ancillary equipment (which will be connected to the battery at the same time). Apart from the obvious increase in charge rate this prevents and removes sulphates from the batteries. **For 24 v x all voltages by 2**



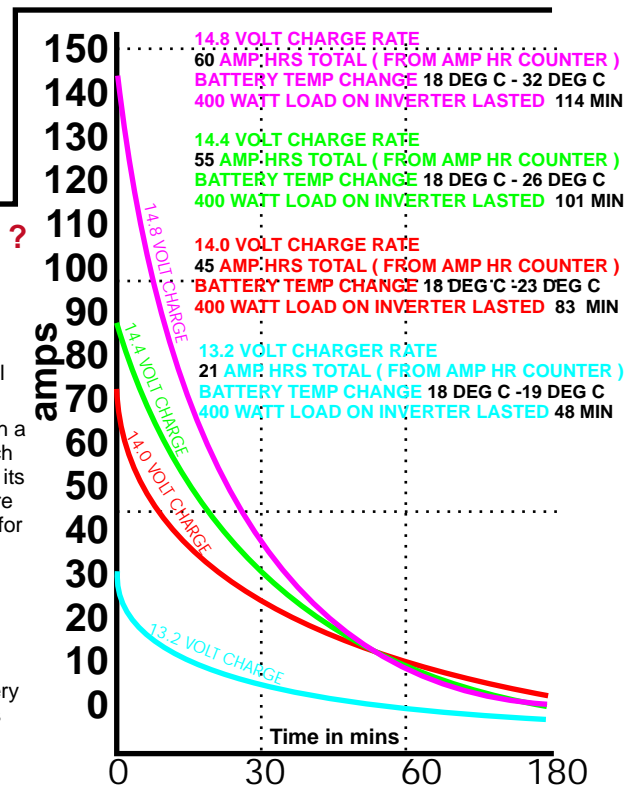
How much extra power is actually absorbed into the battery?

Having established the dramatic charge improvement which a battery can achieve with the increase in voltage, the many sceptics amongst us will now say 'the battery will charge faster,' but you will gas the battery profusely, you will over heat it and boil it, and all the extra current going into it is not being stored, it is simply being gassed off. Therefore the apparent fast charge is a waste of time. All you have done is wreck the battery. These all appear valid points yet are all prolific rumours. Now, lets see if they are true or simply the old wives tales.

Part 2 will this fast charge rate cause problems with test 2 we take 4 x 100 amp identical lead acid batteries, as per the above test. We connect all 4 together and discharge them to the same level. Then we will charge one at a time (using a 200 amp regulated power supply) and over a 1.5 hr period and see how much charge in the form of amps are absorbed into the battery and using an amp hr counter we can measure the actual amp hrs which have passed into the battery. After the battery has completed its charge cycle at the allocated voltage we will then see if the amps are actually in the battery as storage amps. We do this by

discharging the battery through an inverter with a 400 watt light bulb load and time how long each battery can run the load after it has completed its charge cycle. If the amp hr counter shows more amps going into the battery and the load runs for a longer period of time, then the amps must have been stored in the battery. We will also measure the battery temperature before and after the charge run to see if the battery is in danger (50 deg C is when a battery starts to have problems) of over heating and boiling. The battery caps were removed from the battery cells to inspect the plates to ensure there was no excessive gassing, **which there was not.**

For 24 v x all voltages by 2



Answers to the questions based on actual facts:

- 1) **Will the fast charge rate also put more into my batteries?** One can clearly see that on the 13.3 volt charge only 21 amp hrs were put into the battery as opposed to 60 amp hrs with the 14.8 V charger. An improvement of about 300%.
- 2) **Did this 300% improvement actually go into the battery or was it simply lost in heat and gas?** The inverter discharge test clearly shows that the 13.2 volt battery ran the inverter for 48 minutes, whereas as the 14.8 volt test ran the inverter for 114 mins, a clear 230% improvement. So yes, the extra amps was being stored in the battery, and was consumed by the inverter as this was the only place the inverter could get the power from.
- 3) **Will the high charge rate boil my batteries?.** One can see the rise in the battery temperature at 14.8 volts was from 18 deg C to 32 deg C, well inside the 50 deg required before there are any problems. Also bare in mind that this test was charging a 100 amp hr battery at 150 amps, in real life with 4 x 100 amp hr batteries you would need a 500 amp alternator or battery charger to be able to reproduce this test run, so its unlikely that one would have a charging source that good
- 4) **Is it possible to put a lot of power into a battery in 1 hr?** The graph clearly shows that the bulk of the power absorbed by the charger was in the first hour. So, obviously, the battery was comfortable with this as the temperature rise was well within the battery's limits.
- 5) **A 100 amp hr battery gives 100 amps output?.** Simply not true, even with the best charger, at least 40% or 40 amp hrs tends to be of no use in a battery.
- 6) **Are there any other benefits from this fast charging.** Yes you also de-sulphate the batteries, this dramatically increases the life of the batteries and reduces the running hours of your engine and fuel costs associated with the charging of the batteries. In fact there are no down sides to this process.

Conclusion: Its quite clear that all the fears are old wives tales. Now all you have to do to harness this information is to add a computer program to store the charging curves, allow the software to control the charge of your batteries, and then 'hey presto', welcome to the world of advanced digital charging from Sterling Power Products.

Universal Advanced Digital Alternator Regulators

Please note

Advanced regs are not suitable for modern vehicles / boats with integrated Engine Management Systems as they increase the alternator's voltage and this can be interpreted by the management system as a fault on the alternator.

Please use an Alternator to Battery Charger or a Battery to Battery charger for these applications

The Problem with standard systems : Standard alternators are not designed to be good battery chargers; they are designed only to charge an engine start battery sufficiently to start the engine. Because of this inherent weakness, a more advanced regulator is required that in effect converts an alternator from a constant voltage battery charger to the latest 4-step progressive constant current battery charger (see battery charger graphs). Because of this improvement in the alternator control system, these regulators dramatically enhance the alternator's charge rates by between 200-2000% depending on how poor the original system is.

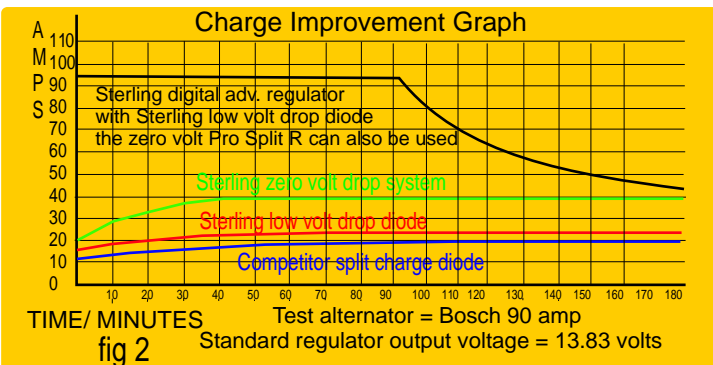
The Sterling Regulator is designed to charge batteries as fast as possible and to their maximum capacity without damage to the batteries or alternators.

What To Expect From An Advanced Regulator:

- 1) Maintains maximum performance of an alternator's power curve within a preset envelope as defined by battery manufacturers.
- 2) Batteries charging 4-20 times faster. (depending on original system)
- 3) Enables 25-35% extra useful power to be stored in batteries. A conventional alternator will only charge the battery to a max of about 75% and at about 35% remaining capacity the low voltage level renders it useless. This means that, of 100 amps of battery capacity, only about 35 amps are available to be used. An advanced regulator will fully charge the battery giving an extra 25% capacity that this increases the useable available power by about 70 -80 %.
- 4) Battery plates kept free from sulphate damage resulting in longer life.
- 5) Due to the built in safety features, in the event of incorrect installation the unit will switch itself off.
- 6) Reduces needless running hours on the main engine.
- 7) Compensates for voltage drops resulting from long cable runs, ammeters, diodes and other general wiring associated problems.
- 8) Automatically converts a machine-sensed alternator to a permanent battery sensed alternator.

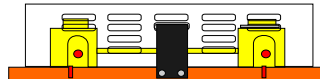
SAFETY FIRST: The Sterling Advanced Regulator is full of safety features to prevent damage to your system. In the event of incorrect installation or a fault developing on the boat or vehicle, the high voltage trip picks up high voltages at the batteries and the alternator and switches off the advanced regulator (the field circuit is disconnected totally from the control via an internal relay).

The Test: Using a standard 12V, 90 amp Bosch alternator fitted to our test bench, and rotated at a constant speed, the following test was undertaken. 4 x 100 amp "leisure" batteries were used, they were split into 2 battery banks, one for engine start and three for domestic. The engine start battery was fully charged (to copy that in real life) and the 3 x domestic batteries were discharged until such time as one of our 1800 watt inverters tripped out on low voltage. To make the test fair we linked 9 batteries together to make one larger battery bank then discharged them all to exactly the same level, then at random three batteries were selected and used for each test. The idea was to see how many amps could be replaced into a 300 amp battery bank. Bank discharged to a level one would expect in real life (ie. about 50-60% empty) over a 3 hour period, and to display the results in as simple a way as possible to highlight the difference between all the different options and why an Advanced Regulator is a necessity not a gimmick.



REMOTE CONTROL

(OPTION For Pro Reg S and U only)

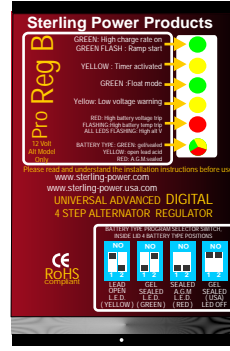


200 amp shunt

Shunt for Pro Reg U
Part nos

- 200 amp shunt S200A
- 400 amp shunt S400A

Remote Control for Pro Reg S & B only	Voltage d/c	Size L x W x D mm	Weight kg	Part nos
	12 & 24	110 x 69 x 20	0.04	ARRSU



Pro Reg B Advanced alternator regulator	Voltage d/c	Size L x W x D mm	Weight kg	Part nos
	12	120 x 70 x 45	0.4	AR12VD

12 v only

new model upgrade can run up to 300% more field current with no heat rise

Pro Reg B

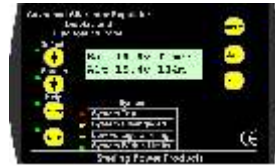
Inc battery temperature sensor and 1 metre of cables.

Please check all the features on this model on next



Battery Temp Sensor

Pro Reg D Advanced alternator regulator	Voltage d/c	Size L x W x D mm	Weight kg	Part nos
	12 & 24	180 x 90 x 55	0.5	PDARR
	Remote control	170 x 90 x 40	0.25	PDARR



(Optional Extra)

new model upgrade can run up to 300% more field current with no heat rise



Includes two temperature sensors

1 model 12 v and 24 v one model



IP 66, Waterproof Ignition protected

The new Pro Reg S and U are the next generation of advanced regulators, offering those extra features we deemed important based on our previous 15 years experience in this market.

The new style housing offers dust and water protection, along with the latest technology eliminates the need for fan cooling. All the extra features are explained on the next page

Pro Reg S

Includes two temperature sensors

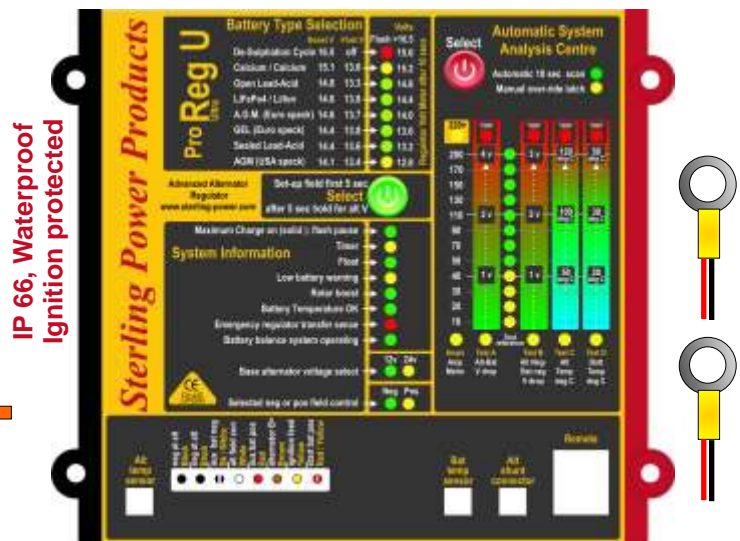


Pro Reg S Advanced alternator regulator	Voltage d/c	Size L x W x D mm	Weight kg	Part nos
	12	140 x 113 x 45	0.4	ARS

12 v only

The Ultimate universal Advanced regulator with Automatic System Analysis Centre

Pro Reg U



IP 66, Waterproof Ignition protected

Pro Reg Ultra Advanced alternator regulator	Voltage d/c	Size L x W x D mm	Weight kg	Part nos
	12 & 24	160 x 140 x 45	0.45	ARU

12 & 24 v

Pro Reg

	B	D	S	U
Digital software control with slow start	●	●	●	●
Dynamic Progressive battery charging	●	●	●	●
Can be used in parallel (recommended) or stand alone regulator	●	●	●	●
Programable for different battery types	●	●	●	●
Single unit fits 99% of alternators and all battery types	●	●	●	●
Charges to 4 step progressive constant current charging curves	●	●	●	●
Self diagnosing fault system	●	●	●	●
Totally isolates the advanced regulator in fault condition	●	●	●	●
Information 6 LED display	●	●	●	●
Battery Temperature sensing	●	●	●	●
High battery temp trip	●	●	●	●
High battery voltage trip	●	●	●	●
High alternator voltage trip	●	●	●	●
De-sulphation ability on open lead acid batteries	●	●	●	●
In event of failure auto return to standard alternator regulator	●	●	●	●
Can be used with or without the temperature sensor	●	●	●	●
Monitors for excessive neg voltage drop and trips	●	●	●	●
Protects batteries if temperature sensor open circuited	●	●	●	●
Protects batteries if split charge relay/diode fails open	●	●	●	●
Protects batteries if advanced reg fails closed	●	●	●	●
Protects batteries if battery sense wire falls off	●	●	●	●
10 LED display		●		
12 or 24 v operation		●		●
Remote control option		●	●	
Alternator temperature sensor and disengage		●	●	●
IP 68 waterproof & ignition protected			●	●
7 battery types with 5 step charging curves			●	●
Battery type LED converts to voltmeter after start up			●	●
Reg bypass for max rotor boost			●	●
If used in stand alone mode , transfers from adv reg to standard if fault			●	●
20 LED information display			●	●
Battery balancing to help compensate for diode voltage distortion				●
44 LED display panel				●
Extra LED voltmeter readings for all scanned safety parameters				●
Manual or auto scan operation				●
Ammeter up to 250 amps (reading) higher current ok but no reading				●

Advanced Regulator features explained in more depth:

Digital software control with slow start :

Digital control (software) uses lines of computer code, digitally burned into a memory processor in the Advanced Regulator. This means that very complex information and mathematical algorithms can be processed that would not be possible with an analogue hardware system. The unit ramps up the current over a short period of time to reduce the chance of alternator belt slip.

Dynamic progressive battery charging: this is a term used to explain that the internal software calculates a different charging regime every time it is used as the battery state etc. is never the same. Older systems simply used fixed trimmers which were not able to distinguish different battery types or sizes.

Can be used in parallel or a stand alone reg. This unit can be used as a stand-alone regulator as well as in parallel with the original regulator. Sterling believes that, where possible, to leave the existing regulator in place this offers the Sterling Reg a fall back safety position in the event of it failing.

Programmable for different battery types:
Most other manufacturers fail to recognize the fact that the world has more than one type of battery. There are now four main groups, open lead acid/traction, sealed /gel, gel (Europe) and A.G.M. To optimise charging for each of these battery types there are four totally different charging curves, temperature curves and safety criteria with each battery type.

Single unit fits 99% of alternators:
The reason for this is very simple, if you check other makes, you can find 12-15 different models to cover what the Sterling will do with 1. The problem with this is the public must supply correct information about their alternator and batteries to ensure they receive the correct Advanced Regulator.

Charges to 4 step constant current progressive charging curves.
All good battery chargers are constant current with 3 - 4 step charging curves. This method is recognized as the best charging type so why expect anything less from your alternator- in most cases the primary battery charging source. The Sterling Advanced Regulator converts your basic constant voltage alternator into a modern 4 step constant current battery charger, it's that simple.

Self diagnosing fault findings:
The performance and benefits of an Advanced Regulator are beyond dispute, however, an Advanced Regulator which has been incorrectly installed or fails, can have devastating effects on a boat. It will destroy the batteries and could easily set fire to cables.

Sterling takes all this into account and recognizes that some boats on which these regulators are used have poor wiring and other faults. Because of this we scan the system every two seconds and if all the parameters are not within our pre-set values then the unit will switch 'off' and signal a fault. This, in my opinion, is the most important aspect of this type of device, a point not shared by our competitors.

Totally isolates the regulator in a fault condition:
This is very important and not fully understood by the public. All regulators can fail for different reasons. If an Advanced Regulator fails closed then the alternator will work at full power and destroy everything around itself. Simply turning the regulator 'off' will have no effect, so in the event of a Sterling system failing or tripping, for whatever reason, we physically break the field wire guaranteeing that the Advanced Regulator will stop working.

Information L.E.D. display:
Most Advanced Regulators have no real information being transmitted to the operator and as a result one has no idea what is going on. Depending on the model we give the operator as much information as possible as to what is

happening with the product and the installation system in general.

Battery temperature sensing:
One battery temperature sensor is supplied with the unit. This will adjust the output charging curves with the ambient battery temperature.

High battery temperature trip:
Most Advanced Regulators monitor the battery temperature to perform the task as explained above, but what is the point of monitoring the temperature if in the event of a battery going over temperature you do nothing about it? Sterling software will pick up the high temperature and in the worst case of a battery exceeding 50 deg C , will switch 'off' the Regulator and display a warning.

High battery voltage trip:
In the event of the battery voltage going too high the unit will switch the regulator 'off' and display a warning.

High alternator voltage trip:
This is the most common trip used. In the event of poor wiring, incorrect installation, or any fault in the system, the alternator voltage will rise too high; the unit will trip out and display a warning.

De-sulphation ability on open lead acid batteries:
In order to prevent and even de-sulphate lead acid batteries a regular charge cycle exceeding 14.4 v (x 2 for 24 v) will remove the sulphate from a battery bank and so prolong its life expectancy.

In event of failure auto return to standard regulator:
There are many good reasons to leave the standard regulator in place, one of them being that, in the event of a Sterling failure or any trip condition of the advanced regulator, your standard regulator will automatically take over and allow the journey to continue but at a lower charge rate. If your Advanced Regulators does not offer this feature then you will lose the use of the boat during any failure.

Can be used with or without temperature sensing:
Some people don't want to fit temperature sensors, the choice is yours, the software will pick up if you use it or not and control accordingly. Most other makes insist a temperature sensor be fitted.

Protects batteries if temperature sensor open circuited:
A big problem with temperature sensors (why people don't like fitting them) is that they are on a battery. If someone changes the batteries and breaks or open circuits the temperature sensor wire, most Advanced Regulators will destroy your batteries by over charging them. Not so with a Sterling. In the event of a failure of a cable break the Sterling software will pick it up within 2 seconds and return to the default settings and carry on safely. It will also protect batteries if split charge relay/diode fails open circuit.

A common fault when fitting an Advanced Regulator is the old split charge diode or relay that is not up to handling the new performance, resulting in a regulator to fail. This will result in the destruction of the other battery bank, as the battery sense wire will be isolated from the alternator (but not with a Sterling, again our software jumps in and saves the day).

Protects batteries if advanced regulator fails:
In the unlikely event of the Advanced Regulator failing then most regulators will fail closed and destroy all your batteries (would it surprise you to know that the Sterling software will jump in and save the day again?).

Alternator temp monitoring and disengagement:
This unit can monitor the alternator temperature and switch off the control unit in the event of high alternator temperature. The Advanced Regulator will automatically re-engage when the alternator cools down.

Reg bye pass for max rotor performance:
There is a voltage drop across any regulator, thus reducing the max voltage drop possible across a rotor and so reducing the possible output power available from the alt, the new reg bypass removes all voltage drop restrictions and so maximising the power from the alt under maximum demand conditions.

If used in stand alone mode, transfers from adv to stand ref in fault.
This new innovative feature offers a new backup in event of problems, for example: if the advanced reg is used as the only regulator and a split diode or relay fails, the advanced reg would pick up the dangerous high voltages associated with this event and shut the system down. This will save the equipment but could leave you stranded as the alternator would no longer work. However, this new system, when detecting such a fault recognises that the primary electrical route to the auxiliary battery bank may have been compromised or destroyed. The electrical route to the engine battery bank may well be intact, so rather than shut the system down the new unit transfers the regulator control from the Aux battery bank (under advanced control) to a default condition at the b+ at the alternator, there will be no advanced charging effect but it will get you home.

Battery balancing to help compensate for diode voltage distortion:
When split charge diodes are used with advanced regulators, a lot of current is forced into the large empty aux battery bank and the full small engine battery will have a lot less current flow and so lower voltage drop across the diode. This can push up the voltage on the engine start battery beyond the batteries limits and may cause the battery to excessively gas. The balancing system tries to pull down the surface voltage of the engine battery to reduce this effect .

Manual or auto scan operation:
There are so many factors required for an advanced regulator to safely operate that we monitor them all the time, however, we have never had the ability to display this operation to the public before, and, as such, anytime there are problems with advanced regulators. We are always on the phone with customers running through voltage checks to help them find the problems with their systems. 99 times out of a 100 it's their installation, poor wiring, long cable runs, dirty connectors, thin cables, defective relays, diodes, rotary switches etc. They all contribute to our product disengaging itself in order to protect your installation. This new feature is as much for our benefit as yours, it shows all the parameters which are monitored and how close your system is to the alarm/ trip preset parameter. This allows you to ensure your system is up to scratch and that it can safely deal with this new enhancement.

High Power Distribution and Fuse Box

Up to 500 amps

This new product is designed to ensure your D/C electrical distribution system on boats and specialist vehicles is both very safe and compact. The clear plastic cover makes it easy to see the green L.E.D.s indicating live circuits and the red L.E.D.s indicating failed circuits. In the event of concerns about excess power being used by the L.E.D.s a simple link can be removed to kill all the green L.E.D.s (that would otherwise be on all the time) but leave the red (fuse blown warning) L.E.D.s active (but only on in a fault condition). Other interesting features include an alternator fail safe blow fuse. The alternator fuse can safely blow but offer the alternator an emergency link to prevent the alternator's regulator from being damaged due to the loss of a battery link. This output can also be used for other purposes if not being used for an alternator.

The unit has been designed with 2 main markets in mind:

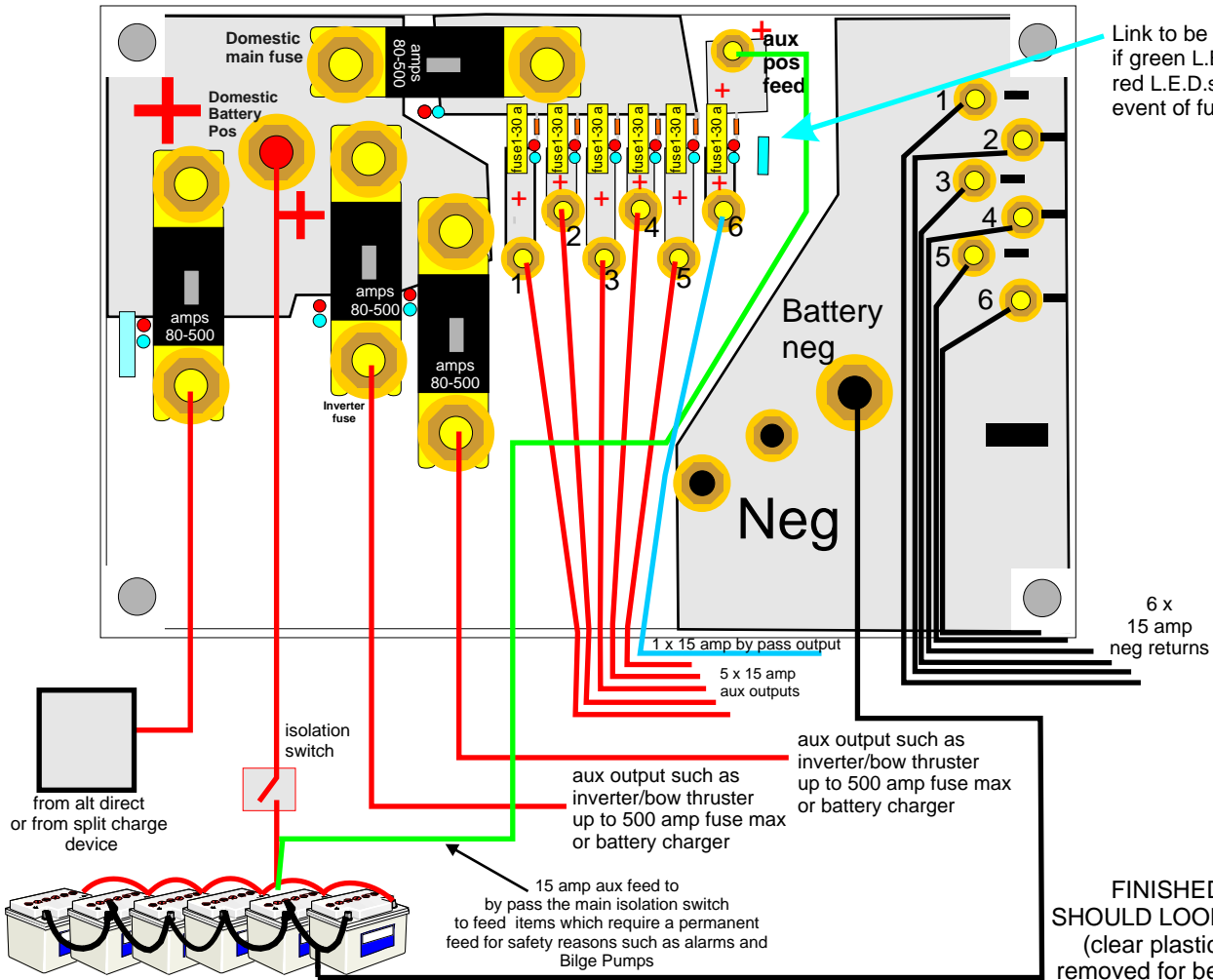
1) Retail market: for existing boats/specialist vehicles, this box can bring your old system up to a much more modern and safer specification. Fit close to the domestic battery bank and all your fuses are now inside the recommended distance for modern safety standards. It also puts all your fuses in the same area and allows easy testing of faulty circuits.

2) O.E.M. market: if used on a system from scratch, this will reduce the wiring time of any system, replacing the need for many individual parts

needing to be fitted and connected whilst also standardising the wiring arrangements saving a lot of time and money.

Key features include

- 1) 3 x ANL fused outputs from 80-500 amp ability (fuses purchased extra, see our gold ANL range for the fuse required).
- 2) 5 x 15 amp continuous outputs with 30 amp fuses (supplied) with one 300 x fuse supplying that section
- 3) 1 x 15 amp 'maintained' output with 30 amp fuse, extra aux d/c feed position to bypass main feed in event of ancillary equipment requiring a permanent feed even if the main battery bank is isolated, such as alarms or bilge pumps.
- 4) Emergency alternator link in the event of the alternator fuse blowing (this prevents the alternator being damaged).
- 5) Green L.E.D.s to show the circuit is live (L.E.D.s on all the time when battery not isolated, can be switched 'off', if preferred, by removing a link).
- 6) Red L.E.D.s to show when fuse has blown (only on when fuse has blown).
- 7) Cable guides for the low power cables, plus cable ties to be tightened when wiring complete to keep wires tidy and secure.
- 8) Small footprint very compact design
- 9) Most negatives returned to box to enable easy circuit checks



FINISHED UNIT SHOULD LOOK LIKE THIS
(clear plastic cover lid removed for better picture)

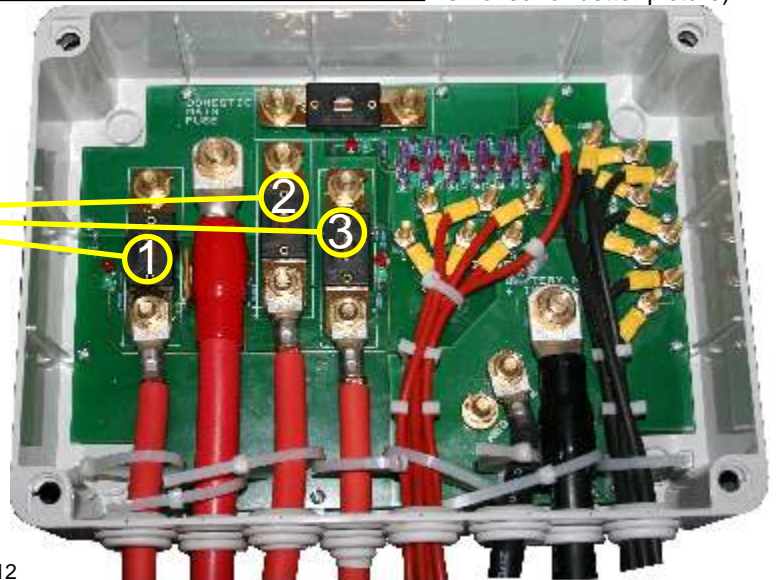
Main domestic battery bank

D/C High Powered Fused Distribution			
Size	Weight	Code	Price inc vat
300 x 220 x 120 mm	1.5kg	PPD500	

3 optional GANL fuses required, please select the required sizes



Fuse	Code
80 amp	GANL80
100 amp	GANL100
150 amp	GANL150
200 amp	GANL200
250 amp	GANL250
300 amp	GANL300
350 amp	GANL350
400 amp	GANL400
500 amp	GANL500



Which split charging product suits your needs?

Sterling has, what appears to be a bewildering array of split charge products, however, where as there is no question there is an overlap with some product lines each has a function or a price point which makes it more suitable for specific operations.

At the end of the day, as with most things, it comes down to cost, the more expensive the product the more it does for you. However there is no need to waste money on a product if not required.

First of all, the products fall into 2 distinct categories, those which boost charge (active charging system) and those with passive simple splitting systems and have no actual enhanced or fast charging ability, however their efficiencies may vary even though they are not active. So, the first question you need to answer, do you want to charge at your normal alternator charging rate or do you want to charge 5 times faster and put over 2 x the amount of useful power into your battery bank, in this case you want to boost charge (see the article 'fast battery charging' on page9)

I will take each product and explain what it's good at and what it's not so good at, also give it marks out of ten.

Product cost 1 = low cost 10 = high cost

Performance 1 = low performance 10 = high performance

Ease of installation 1 = hard 10 = easy

Split Charge products:

Split charge diode: Historically, split charge diodes have been the product of choice by most OEMs as they are very safe and easy to install. However, they suffer badly from high voltage drop across the product (up to 0.9 V) resulting in appalling charge performance (see page called 'fast battery charging'). However, if used in conjunction with an advanced alternator regulator (which over comes the voltage drop) then it goes from a poor product to a great product, most certainly not recommended to use by itself. **Cost 1, install 10, Performance 1,** (if used in conjunction with advanced reg then performance 9, highly recommended) *example: 90A alternator to charge 3 battery banks use a 120A diode, 1 input 3 outputs*

Ignition feed relay: 0 volt drop (which is good) ideal for splitting or adding a second battery bank where the alternator current is lower than the relay rating and there is no heavy loads on the secondary battery system in excess of the relay rating. It can only be used with an engine/ alternator (the relay must be larger than the alternator rating). **Cost 2, Install 9, Performance 5,** *example 60A alternator, charge 1 extra battery bank, Pro Connect IF 80A no secondary DC surge loads in excess of 80A (N.B increase relay size in the event of higher surge loads)*

Voltage sensitive relay: easier to install than an ignition feed relay, can be used with engines / alternators and with other charging devices such as combis or battery chargers (to charge other battery banks). There are the same current limitations as the ignition feed relay, alternator / battery charger / combi (larger rating of any charging device). The relay rating must be higher than the alternator rating and no loads must be larger than the relay rating on the aux battery's system. This is to prevent high current draw through the relay as there is no over current protection, lack of over current protection can cause the relay to weld close or vaporised open. **Cost 3, install 10, performance 5,** *example 90A alternator, 120A combi battery charger, Pro Connect VSR 160A no secondary DC surge loads in excess of 160A (N.B increase relay size in the event of higher surge loads)*

Current limiting voltage sensitive relay: All the benefits of the voltage sensitive relay but with current limiting protection, as such does not matter what the auxiliary load is, any attempt to pull excess current through the device will limit the current down. This will solve the overload problem suffered by normal voltage sensitive relays but keeps all the good sides. **Cost 6, install 10, performance 5** *example 90A alternator, 120A combi battery charger, Pro Connect VSR 160A no surge load limitation. N.B, The VSR and CVSR can also be used to increase the number of outputs on an alternator to battery charger or battery to battery charger.*

Latching relays: Not only 0 volt drop but almost 0 amps to operate the unit (0.001 amps), this means the relay can be used both for heavy charging applications such as alternators, but, can also be used for very low charging applications, such as solar or wind. Other applications are open to this device other than charging. For instance, battery protection used to prevent expensive batteries discharging too much and destroying them. **Cost 5, install 10, performance 5,** *example 70A alternator, 50A battery charger and 10A solar cell, use an 80A latching relay (assume no secondary DC surge loads in excess of 80A, increase relay size in the event of higher surge loads)*

Pro Split R: A great unique product allowing 0 volt drop but also a much more sophisticated management system and protection system. It has the ability to disconnect a full engine start battery to prevent the full battery voltage slowing down the alternator regulator's output and so ensuring the absolutely maximum performance from the standard alternator, while still protecting the engine start ability, simply nothing better. **Cost 6, install 9, Performance 7,** *(this is the best performance achieved without any boosting, to achieve performance 10 for older alternators use the advanced regulators, N.B. Due to the zero volt drop of this product it can also be used on the output of an alternator to battery charger or battery to battery charger to increase the number of battery banks to be boost charged.*

Advanced charging products (active boost) - please read 'fast battery charging' to see why active boost is so important and highly recommended to fully charge batteries fast and to reduce engine running time.

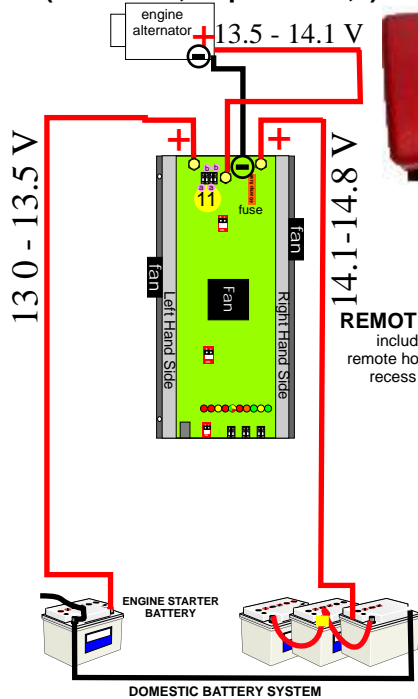
Advanced alternator regulator: Historically, the way to boost the output charge performance from the alternators, was to use advanced alternator regulators. These are not suitable for modern vehicles or boats due to tampering with the standard alternator and so causing warranty problems and can also cause confusion and problems with the electronic control units (ECU) on engine management systems. They are excellent for older boats and vehicles with no ECU and are still prolifically used and sold. They do not have a built in splitting system and, therefore, if extra batteries banks are required to be charged one should, ideally use in conjunction with a pro split R. Yet, any of the other splitting products will work **Cost 2, Install 2, performance 10.**

Battery to battery charger: Has no connection with the standard engine charging system and, as such, is extremely easy to install and does not affect any vehicle/boat warranties. This gives full boost / charge effect **Cost 3, install 10, Performance 10**

Alternator to battery charger : Combines the boost charge with a splitting system, allows the engine battery to be charged at one voltage whilst boost charging the other battery bank, **Cost 2, Performance 10, install 9,** *by using the ProSplit R or other devices battery bank number can be increased from the standard 2 battery banks. Example 70A alternator, 2 battery banks (engine start + domestic) use the 80A alternator to battery charger. Example 2, two alternators 1 @ 120A and 1 @ 60A, total = 180A. Use the 210 A alternator to battery charger and put both alternators onto the input.*

Alternator to Battery chargers

System wiring, single or twin alt (minimum, requirement,)



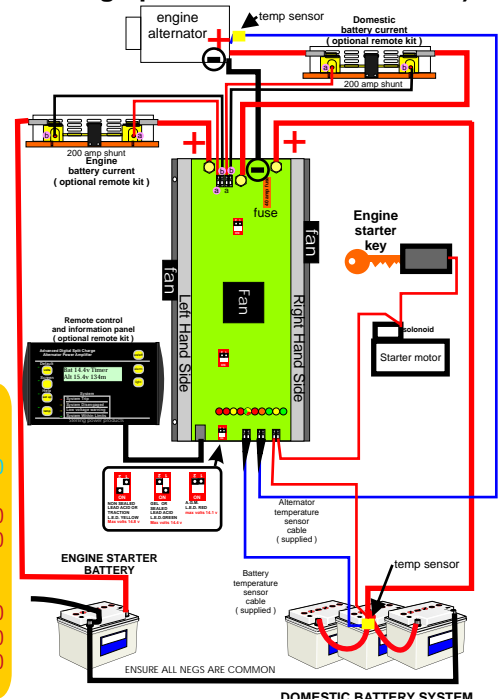
Not just a new product but a whole new concept All the performance of an advanced alternator regulator without all the fitting



REMOTE CONTROL (OPTION) including 10 metres cable Unique remote housing can be surface mounted, recess mounted or flush mounted

Alternator to Battery chargers					
D/C voltage	Max Alt amps	Size L x W x D	Weight	Part nos	
12	80	250 x 180 x 70	2.5	AB1280	
12	130	350 x 180 x 70	2.5	AB12130	
Remote for above products in Blue (pc shunts) ABNRC					
12	160	250 x 280 x 70	3.5	AB12160	
12	210	250 x 280 x 70	3.5	AB12210	
24	60	250 x 280 x 70	3.5	AB2460	
24	100	250 x 280 x 70	3.5	AB24100	
24	150	350 x 280 x 70	5.0	AB24150	
24	200	350 x 280 x 70	5.0	AB24200	
Remote for above product inc 2 x 200 amp shunts ABRC					

Full system wiring single or twin alt (including optional remote kit if used)



Charge your batteries over 5 times faster, input 50% extra power plus de-sulphate the batteries and make them last longer.

Can be used with 2 alternators

Available in 80 / 130 / 160 / 210 amp models

This is a 100% unique product, not available anywhere else in the world, and totally designed and conceived by Sterling in order to overcome all problems experienced now and anticipated in the future with standard advanced alternator regulators. This following explanation is to help understand what it does and where it should be used and should not in any way be taken to demean any of the other charging products we manufacture. The Digital Advanced Alternator Regulator offers the best low cost technical solution to maximise the performance of your alternator ensuring *adaptive charging*. There are, however, applications and markets that require a different approach to increasing the alternator performance; without all the work and expertise required to install a regulator.

Issues with advanced alternator regulators are:

The main problems with all standard advanced regulators are:

- 1) **Relatively difficult to install.** This prevents semi skilled personnel from fitting .
- 2) **Requires the removal of the existing alternator to work on it.** This is not always easy to achieve and can add many hours of awkward work to an otherwise simple installation.
- 3) **Requires extra cables to be run on the boat or vehicle.** Again this can appear a simple thing, until a few hours work is required to pass a cable through a bulkhead .
- 4) **Warranty on new engines:** some engine/vehicle dealers raise warranty issues if a new alternator is modified to fit an advanced regulator, with this product, the alt is not tampered with.
- 5) **E.C.U. problems** Many new engines have E.C.U.'s (electronic control systems) on their engine management systems, any attempt to fit an Advanced Regulator will result in alarms going off (mostly in vehicles, motor homes and the latest marine engines). This new system ensures the main vehicle/boat voltage remains within the E.C.U.'s programmed parameters and allows the extra battery bank to be charged at the higher voltages needed to achieve fast charging.
- 6) **Total Package** 95% of installations using an advanced alternator regulator also have some sort of split charger system. This product already has this split charge system built in to it.

How do we do this.

Well, in theory, it is very simple. With an advanced regulator which connects to the alternator's regulator, we override the standard alternator regulator and we push the alternator's voltage up to increase the voltage at the batteries . This results in a massive charge improvement at the batteries.

With the alternator to battery charger we do the reverse. We put a load on the alternator to pull the alternator voltage down. This fools the alternator into thinking that there is a major drain on the system and as such the standard regulator works at full current. However, the voltage is pulled down to a totally useless voltage for charging batteries. So, the new system takes in this high current, but low voltage, and amplifies the voltage to charge the auxiliary battery bank at a much higher voltage than the base system voltage. In order to achieve the fast battery charging, the software control program and settings for this product are the same as for our digital battery chargers and our digital advanced alternator regulator.

When would I use a Digital Split power amplifier as opposed to a Digital Advanced Alternator Regulator?

- 1) If you are a boat builder or vehicle builder and labour costs are a critical issue, then this unit wins hands down. It requires only one extra wire (a negative) to the unit, the other power cables will already be standard. The only wires required for this unit are the alternator in and domestic + engine battery out.
- 2) If you are worried about the time and effort that it takes to fit an advanced regulator, then this unit will win. If you already have a split charge diode installed then the fitting for this unit will be about 15 mins.
- 3) If you have a voltage sensitive base platform (i.e. a car or van with an E.C.U. with high voltage alarms) then this is a must.
- 4) If you have warranty issues with a new engine, then this unit simply does not touch the alternator, as a result there is no warranty conflict.
- 5) If you are worried about finding a competent electrician abroad, or concerned about the fitting costs of an advanced regulator, then this is the solution.

This new product incorporates a split charge system to charge 2 battery banks. However, on the domestic battery bank channel only, there is a unique voltage amplifier. This ensures the alternator works at its maximum output (it could also be used on a single output battery charger or other current limited power source) and increases the voltage of the domestic line (with software digital control) up to 14.1 volts (for A.G.M) 14.4. (for gel) and 14.8 for open lead acid/traction. The same advanced program is used in the very successful Digital Advanced Regulator. Also please note that in the event of this product failing, it will fail safe, ensuring your alternator continues to charge the system (but at a reduced rate) to get back home. The unit is also fail safe, in the event of a problem the unit will still charge but at a reduced rate.

What other uses for this product?

This product could be used on any other product which has a current limit on it. For example, if you have an old fashioned constant voltage transformer based battery charger (or a constant current with low preset voltage controls and poor timer performance) which does not work very well, then simply attach this to the output of the old battery charger, and you will have the latest digital controlled 4 step charger, with all the programs, remote control and split output of the latest chargers on the market. Plus, at least a performance increase of about 500% (charger must not exceed the current rating of the device purchased).

Extra Features built into the system for use if required:

- 1) Battery temperature sensing.
- 2) Alternator temperature sensing. This disengages the unit in the event of the alternator temperature getting too high, it then re-engages the unit when the alternator cools down.
- 3) Battery sensor: the system battery sensor is built into the unit and is connected to the battery thus improving the performance slightly in the event of long cable runs.
- 4) Ignition start. Some alternators require a voltage on the alternator to start up. A split diode will prevent such an alternator from working. However, there is a built in device to overcome this problem in the event of such an alternator type being used.
- 5) The remote control. This offers full set-up information, plus voltages and temperatures of all the relevant places, as per the digital alternator regulator.
- 6) Current measurement. This unit, as standard, does not measure current. However, if the optional remote control is purchased it can measure the current to the domestic system (on both remote models). The remote on the 160-210 amp models can also measure the alternator and starter battery currents it comes complete with 2x pre wired shunts that enable 2 currents to be monitored and the third current to be derived from the first two using the embedded software. The end package is a very simple and easy to instal with all the performance and safety features of the most expensive Advanced Alternator Regulator, but with an extremely simple and convenient installation method.

What do I expect to see from this unit and why?

The illustration below shows results from bench tests representing a typical split charge system with an engine battery of 100 amp hr (standard lead acid) and a domestic battery of 3 x 100 amp hr (standard lead acid). The engine battery was discharged to 11 volts (about 10 engine starts) and the domestic bank to about 11 volts (will no longer run an inverter and is about 60% empty). The alternator used was a Bosch 90 amp with a standard 13.9 volt (variable) regulator. The unit battery type is programmed to open lead acid. There are 2 graphs, one is the current delivered into the batteries, and the other is various voltages measured on the system.

System voltage graph:

The key points to pick up on here are:

The yellow trace (alternator voltage into the unit) clearly shows the system doing its job. It is designed to pull this voltage down a little to enable the standard alternator regulator to produce its full current- you can clearly see that the standard alternator voltage is at position 4 on the voltage curve, however, the input voltage has been pulled down to position 5, the effect on the alternator output current is full output at position 8 - 9, this is where you can clearly see the standard alternator current without the advanced charging system taper down fast from 80

- 30 amps over the same time (from position 2-3). The advanced charging equates to about 70 amps improvement over the standard non assisted alternator.

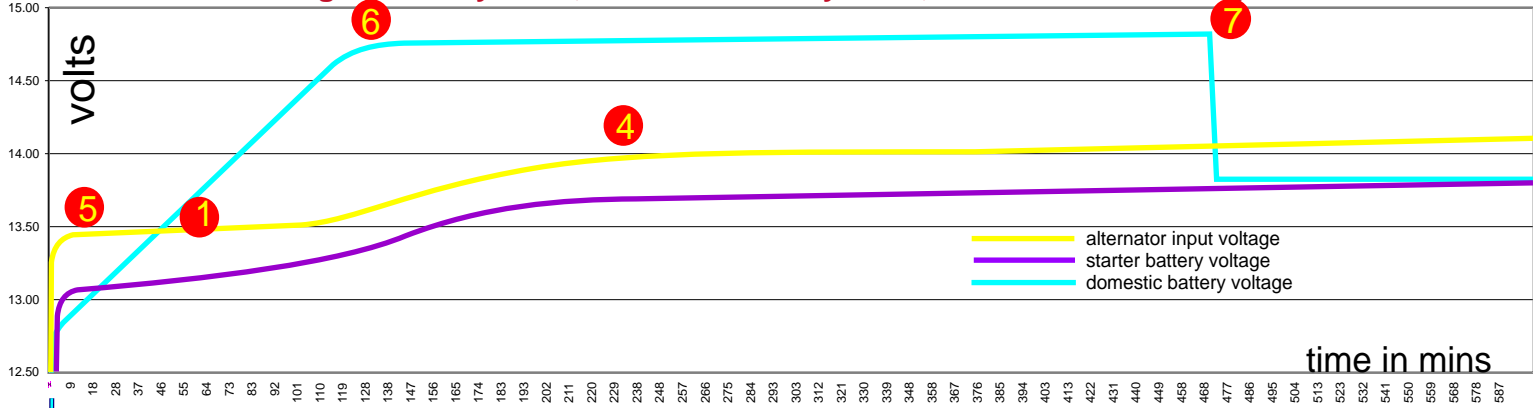
Position 1: This is the most interesting stage where the magic is at work, the point where the domestic battery voltage exceeds the alternator input voltage, this is what the advanced charging process is all about.

The current graph. The domestic current graph clearly shows the constant current charge between points 8-9, at position 9 the current starts to taper off until it reaches position 10. The accuracy of the software can be seen when the voltage drops from the high voltage charge to the constant voltage charge (float), the current only dropped 5 amps, (at position 10) showing without doubt that the software program was spot on, the batteries could not accept any more positive charge and were clearly full. The high charge voltage is maintained between voltage positions 6-7 at 14.8 volts.

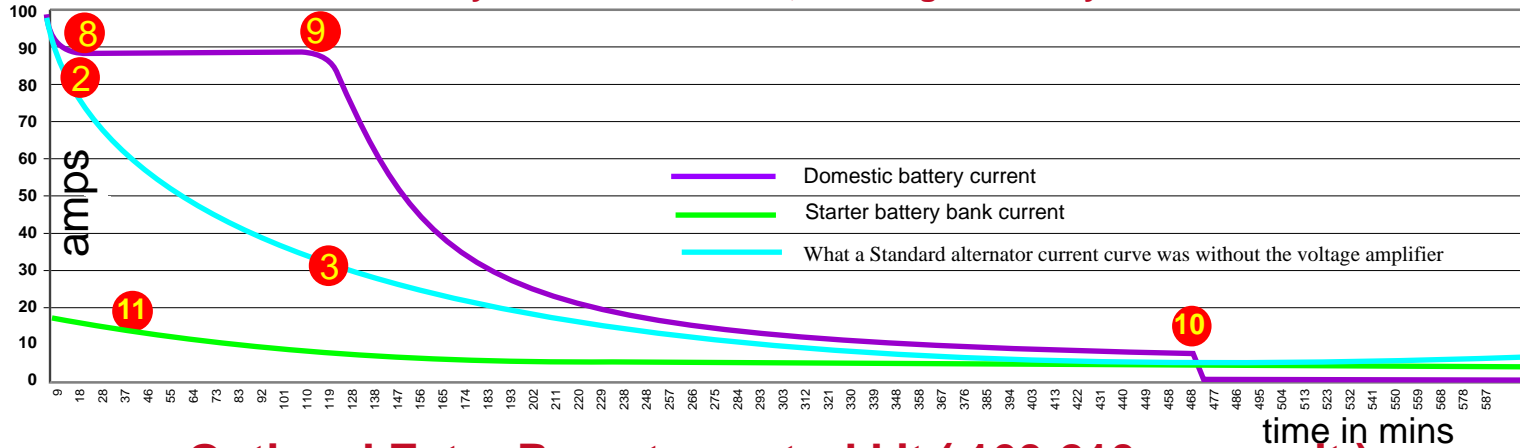
Engine priority

Position 11 shows that through the whole process the engine battery continues to charge and is not deprived of its charging voltage, the engine battery performance is the most important, as, at the end of the day it must be able to restart the engine.

Engine battery bank, domestic battery bank, and alternator voltage curves

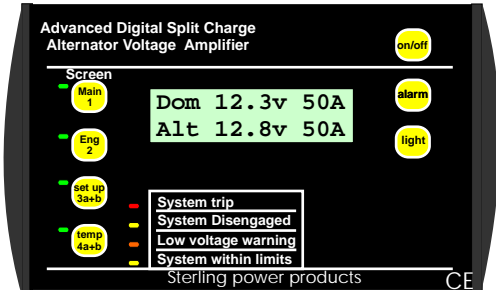


Domestic battery bank current curve, with engine battery bank current curve



Optional Extra Remote control kit (160-210 amp unit)

Included parts: the remote panel, 10 metres of pre-wired link cable and 2 x 200 amp pre-wired shunts. The 2 x shunts enable 2 x real currents to be measured and 1 x current calculated in the software the 3 x currents to be measured, accuracy +/-5%



Screen 1:

Push the button marked Main 1, this is the main screen and the best one to leave the unit on. It shows the domestic battery voltage and current, also the alternator output current

Screen 2:

Push button marked Eng 2. It shows the engine battery voltage and current. This screen also shows the elapsed time.

Screen 3a:

Push button marked Setup 3a+b: There are 2 screens on this button. Push once for screen a, then again for screen b.

Screen a shows the system setup, this refers to the domestic battery only

Screen 3b:

Push button marked Setup 3a+b: There are 2 screens on this button. Screen b shows the effective boost being delivered at this time and ranges from 0% (during the rest periods and on float) to 100 % when system on full power

Screen 4a:

Push button marked Temp 4a+b: There are 2 screens on this button. Push once for screen a, then again for screen b.

Screen a shows the alternator temp and the domestic battery temp. If the temperature sensors are not fitted it will default to 20 deg C

Screen 4b:

Push button marked Temp 4a+b: There are 2 screens on this button. Push once for screen a, then again for screen b.

Screen b shows the box heat sink temperatures, LHS stands for left hand side, guess what RHS stands for.

Dom 12.3v 50A
Alt 12.8v 50A

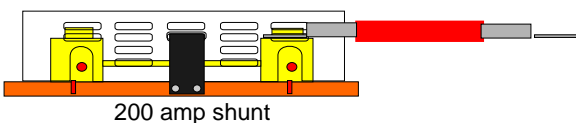
Start 12.7 4A
Timer: 134 m

System set: 12v
Bat Type : Wet

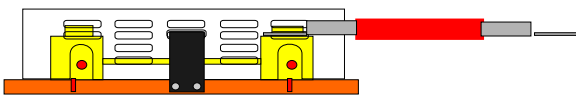
Alt Controller
Power 13% Boost

Alt Temp + 20C
Bat Temp + 20C

Case LHS + 17C
Case RHS + 23C



200 amp shunt



200 amp shunt

This increasingly popular device has a massive amount of applications never before undertaken, from charging your caravan battery, golf trolley, while driving along in your car, to charging large battery banks in lorries or boats. The key thing about this product is the ease of installation and the fact it does not work nor change anything on the standard engine/ vehicle system and as such does not raise any warrantee or installation issues.
Fully programmable for different battery types .

Why do I need the d/c adaptive battery charger?

By now you will appreciate that the best way to charge a battery is using a 4 step battery charging curve (that cannot be achieved from a standard alternator) . This system enables one to simply attach the unit to a standard engine battery and it will fool the alternator into working at it's maximum ability and ensure all it's surplus power is used to charge the auxiliary battery bank to it's maximum. This system is designed to use only the surplus power and ensures that at all times the power required to run the primary system (the vehicle system or the boat engine) is not affected. The surplus power is converted into a higher voltage and used to charge a secondary battery bank using a digitally controlled programmable 4 step charging curve as per all the other high charge products Sterling makes.

What performance improvements would I expect ?

In a nutshell it charges your extra battery system about 5 times faster than it would otherwise charge. However, in the case of things like caravans this could easily increase 20 fold. This also, at least, doubles the useful power subsequently available, and increases battery life by de-sulphating them.

For best effect, use open lead acid batteries, avoid gel, sealed and A.G.M. batteries (see 'which is the best battery' article in the brochure).

Advantages of this unit.

- 1) **Installation:** it does not get any easier, simply connect to your starter batteries and to your domestic battery, job done, makes for easy and low cost installation.
- 2) **No direct connections to the standard engine alternator** , or to the outboard (if used on an outboard), thus, on new installations there is no extra wiring for a split charge system.

3) **Ensures the engine battery system is not interfered with.**

4) **Multiple units can be used**, for example, if you have a 60 amp alternator, and 3 battery banks (engine, domestic, and bow thruster) then 2 of these can be used to run the bow thruster and the domestic system. The internal programs will adjust their charge patterns to accept the other unit and ensure only the excess power is used and the primary system is not placed in jeopardy.

5) **Ensures there is no voltage rise on the engine management system** , to ensure no alarms nor damage to the system, be it an outboard, a car, a boat or a camper van

6) **No vehicle warranty issues as you are not connected to the main system**

How does it work?

The unit monitors the engine start battery, the unit will not start until the battery voltage exceeds 13 volts then it waits for 150 seconds, this ensure that some charge is replaced after engine start. It then pulls the engine battery down to no less than 13.3 volts, this enables the engine battery to still receive a charge and ensures the alternator works at its full potential. This further ensure the engine battery is okay.

Other features included in this system are remote control option, alternator temp sensing (for larger models) , battery temp sensing, ignition feed (if required) , automatic start and shutdown.

7) **Voltage reduction : (new model only)** Another major key advantage of this unit is that not only can it boost the voltage up on the output but it can also reduce the voltage on the output, (so why do I need this feature) the truth is in most applications you do not, however on some modern engines, due to the introduction of calcium batteries the alternator manufactures have increased the standard regulator's voltage to punch through the calcium in the batteries. There are now many alternators fitted with exceptionally high output voltages, for example, there are some common (on boats) Hitachi alternators which are fitted with regulators which are 14.6 v +/- 0.2 volts , we have certainly seen these alternators produce up to 14.8 v and we have even seen some car alternators reach 15 v on first start up , this is great if you have open lead acid batteries but fatal to an AGM, Gel or sealed battery. So, in this case, it is necessary not to boost the voltage of the alternator but to reduce its voltage. This new generation of battery to battery chargers do both, so, in effect, we do not care what the alternator voltage is, it can be between 13.5 volts to 15 volts we will deliver the correct charge and float voltage to your expensive domestic battery bank.

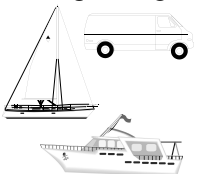


Help hints on which product would suit which use

16 amp model (waterproof) Applications for the 16 amp model include : **Small outboard motors** up to about 30 hp with magneto charging systems, small **portable generators** sets with 12 v auxiliary charging systems which are very ineffective, charging **electric wheel chairs** in transit, charging **electric golf trolleys** in the boot of cars, **starter battery banks** from larger main battery banks such as on a boat from a combi, charging **caravan batteries** via an aux power point on a car while car is driving along (charger about 20 times faster than normal) **charging batteries up to about 80 amp hours.**



30 amp model :(waterproof) Camper or work van with alternator up to about 60 amps auxiliary systems, larger marine **outboards engines** with alternators up to about 40 amps, Bow thrusters, anchor winch battery banks, **battery banks up to about 150 amp hrs**



60 amp model:(waterproof) Camper or work vans/ boats with alternator up to about 80 amps and battery banks about 100-300 amp hrs

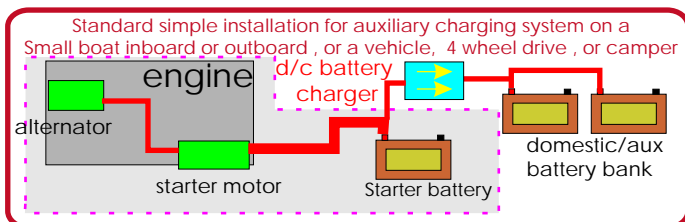
100 amp model: Camper or work vans/ boats with alternators over 120 amps and 100-500 amp hrs + battery bank

150 amp model : Extreme charging for alternators over 200 amps and battery banks 300 -1000 amps

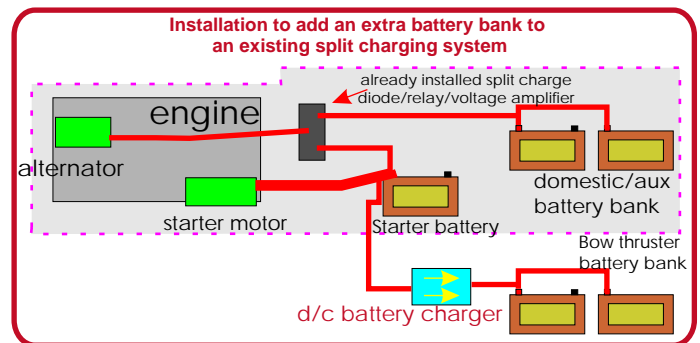
We also offer a range of 12-24 volt, 12-36 volt, 24-24 v, 24-36 v 24-12 v

The dotted line shows the original system and shows how simple it is to connect the bat-bat charger

This unit can be used to charge extra battery banks from Boat Inboard engines, boat outboard engines vehicle engines (cars/lorries/vans) caravans, camper vans and Generator engines.



This is the most common and simplest installation and is simply connected to the starter battery. In order to connect up the d/c battery charger all you do is connect one wire from the auxiliary battery banks to the starter battery, the starter battery stays between 13-14 volts (within its limits) and the domestic battery goes up to 14.4.-14.8V. In order to put a good fast charge into the auxiliary batteries, this is especially good if the battery bank to be charged is not close to the starter battery and things like bow thrusters or batteries in the boot of cars or lorries.



This option shows a typical split charge system on any boat or camper vehicle, already installed and that has been using advanced alternator regulators or any other advanced charging system. Assume that then an extra battery bank is required, such as a bow thruster, radio battery bank or a generator. For ease of installation simply drop on a d/c battery charger.

145 mm Long, 110 mm Wide, 120 mm Tall

Battery to Battery chargers						
D/C Input voltage	D/C output voltage	Amps in	Water proof	Size L x W x D	Weight	Part nos
12	12	16	yes	145 x 110 x 120	3	BBW1216
12	12	30	yes	145 x 110 x 120	3	BBW1230
12	12	60	yes	145 x 110 x 120	3	BBW1260
12	12	90	yes	TBA		BBW1290
12	24	60	yes	145 x 110 x 120	3	BBW122460
Remote control				52mm diameter		BBRCN

Due to the very active nature of this line of products, and the constraints placed on printing a catalogue, please download this page from our web site during the year from time to time to keep up with the models being launched

IP68
Electronics
Fan not IP68



New model, not just a booster but a reducer as well giving full charge control regardless of alternator voltage .

Available
earliest **April 2011**

Remote control allows access to all the relevant information, the panel comes complete with a 10 meter telephone type extension lead. The meter is in a standard 450 mm threaded housing. This is an optional product and is not required for the operation of the main products



Remote control: diameter 52mm (optional extra)

- Remote control functions
- 1) Input voltage from battery
 - 2) Output voltage to battery
 - 3) Input current to battery
 - 3) Water proof display, encapsulated electronics
 - 4) Screen colour change for alarm/charge/ok state
 - 5) Battery and alternator temp reading
 - 6) Buzzer alarm and override function
 - 7) Information scroll option
 - 8) Back light option
 - 9) Little power consumption when on sleep

This new next generation compact model incorporates IP68 (full waterproof) for the main product, however, the fan is external to the product and is not IP68. In the unlikely event the product gets completely immersed in water and the fan destroyed the fan is a standard 40 mm fan on a 2 pin connector and can easily and cheaply be replaced, the main unit would not be damaged.

The unit has an internal magnetic programming ability with the magnet being in the lid of the product so as not to lose the magnet. The magnetic programmer can be used to simply select 1 of 5 battery types to ensure you can charge the battery bank correctly (AGM, sealed lead acid, open lead acid, calcium, and lifep04(lithium)).

A unique option on the 16 amp Battery to battery version is the ability to remove the internal input voltage control regulation, this allows the unit to operate at much lower input voltages enabling a lot more power to be drawn down long cable lengths, Ideal for things like caravans where the large cable voltage drops would fundamentally reduce the ability of the product to do its job to the maximum, this allows the unit to "pull" the cable voltage way down to about 8 volts (as opposed to 13.3 volts) to pull as much power as possible down the line (**Warning** : this option should only be used in conjunction with a ignition activated line feed from the vehicle, so that when the vehicle is switched off the product will no longer be able to feed from the starter battery, this should only be used when engine is on to avoid flattening the starter battery. This function is best suited for tow caravans only).

Fully adjustable for battery type and other functions

Encapsulated electronics, fully waterproof Thermostatically controlled fan cooled for smaller footprint Fan not IP68 , however designed to be easily replaced in the event of a failure

inc
2 meters
pre wired cables
with fuses
waterproof



Patent pending Number 07108091.5



inc 2 x temp sensors
1 x battery and
1 x alternator

New 12v 100 amp
24 v 60 amp available
april 2010



REMOTE CONTROL (OPTION)
including 10 metres cable Unique remote housing
can be surface mounted, recess mounted or flush mounted



inc 2 x temp sensors
1 x battery and
1 x alternator

optional
remote control



Battery to Battery chargers						
D/C Input voltage	D/C output voltage	Amps in	Water proof	Size L x W x D	Weight	Part nos
12	12	30	yes	230 x 135 x 65	3	BBW1220
12	24	30	yes	230 x 135 x 65	3	BBW1224
12	36	25	yes	230 x 135 x 65	3	BBW1236
No remote control for the above						
12	12	50	no	200 x 270 x 70	3	BB1245
12	12	100	no	190 x 100 x 70	1.5	BB12100
24	24	30	no	200 x 270 x 70	3	BB2430
24	24	60	no	190 x 100 x 70	2	BB2460
Remote control for items in blue						
12	24	50	no	200 x 270 x 70	3	BB122450
24	12	25	no	200 x 270 x 70	3	BB241225
Remote control for items in red						
					0.05	BBRC

ProSplit R

Zero Point Zero Volt Drop Intelligent Digital Alternator Power Distribution System.

This product uses a micro processor to monitor the multiple battery bank outputs which are to be charged by an alternator; it ensures the batteries are all charged in conjunction with each other and prevents any back feed through the device in the event of high loads on one battery bank. The system also has the ability to disconnect the alternator and individual battery bank outputs in the case of problems caused by the alternator or other power items in the system. It does all this and still offers only a max voltage drop of less than 0.01 volt, much less than any so called 0 volt drop mosfet / diode system. Many so called 0 volt drop systems simply do not come close, the Mastervolt battery mate is as high as 0.6 volts at full power (where it counts) while the Sterling is at 0.09 volts, a 500% performance improvement over the Mastervolt Battery mate unit and about 1100% over a standard diode.

Faster battery charging: Apart from the obvious charging benefits of the 0 volt drop across the unit which dramatically helps battery charging from the standard alternator, the Pro Split R has another unique feature to boost this ability even more. The main problem with split charge systems is that they are trying to charge 2 battery banks (or more). Usually one is already almost full (the engine battery) while one is empty (the domestic battery bank). The problem is that when you try to charge the 2 batteries with conventional splitting systems the higher voltage from the full engine battery fools the regulator on the alternator into thinking that the combined battery states are in fact better than they actually are. The trick is to isolate the engine battery (when its safe to do so) so, the only voltage presented to the standard regulator is the empty domestic battery. This ensures a one on one charging experience between the empty battery and the alternator regulator which dramatically improves the regulator's charging performance into this battery bank. Then, when it's prudent to do so, we re-engage the engine starter battery at a level where it does not affect the maximum charge ability of the regulator.

How does the unit work

This unit on the surface looks like a simple device, however, this is a very complex software control device. Under normal operation the unit has a simple operating mode. Being engineers we are not only concerned about normal operation conditions, we also like to build into our products as much safety and control as possible to both protect your electrical system and to ensure the available power is directed to where it is required most.

What is the problem? Voltage drop across splitting systems (such as diodes) will cause poor performance when trying to charge batteries. This can be easily compensated for by using things like advanced alternator regulators or battery sensed alternators, however this, in itself, can cause problems (particularly with prolonged use and sealed batteries such as AGM and gel) with other batteries in the circuit, i.e. an over charge can take place, as explained in the diagrams below. All boats have at least two battery bank outputs, some have three. These tend to be the engine start battery, the domestic battery bank (please note that if you join three or four batteries together in your domestic battery bank it is still one battery), and the bow thruster battery. Having introduced 2-3 battery bank outputs onto your boat, the problem then is how do you charge them from one alternator source (or two alternators which I will discuss later).

Example 1 shows a typical split charge diode installation with a standard alternator with no advanced regulator nor battery sensing reg. The test assumes an 60 amp alternator, the diode is 70 amp rated and there is an average cable between the alternator and the battery bank. The alternator voltage is assumed to be about 14.2 volts, however, in real life this could vary from 13.9-14.8 volts depending on the manufacturer and the internal regulator fitted to the unit. Important to note on example 1 is the fact that the alternator produces 14.2V at the alt but, by the time it gets to the domestic battery, there is only 12.8V

left, this is an appalling voltage and would result in you having extremely bad charge performance at your battery bank. However, note that the engine battery is at 13.6V (this higher voltage is not an issue in this case but the phenomenon will cause a problem in later examples) this is because at 60 amps the voltage drop across the diode to the domestic battery is 1 volt, however, because the starter battery is almost full it is only drawing a few amps from the alternator and so its voltage drop is only going to be about 0.4 amps (remember the voltage drop across a diode is not linear it is proportional to the current flow, i.e. the more current flow through a diode the greater the voltage drop). Conclusion in example 1, there is no danger to anything but there is an appalling low charge voltage presented to the batteries making the charging system grossly ineffective.

Example 2 is replacing the standard regulator with a battery sensed regulator, this in effect, says to the alternator, give me 14.2 volts at the domestic battery bank (or at the end of the battery sensed cable) regardless of what voltage the alternator has to produce to achieve this goal. This will improve charge at the domestic battery a great deal, i.e. you can see that the voltage will rise on the battery from 12.8 V in example 1, to 14.2 V in example 2. However, when the voltage is checked through the system (and taking into account the voltage drops across the diodes) the engine battery voltage is now 15.2 V, this would rise even more if the cables were longer i.e. if you had 4 or 5 meters of cables then the voltage drop in the cables could be up to 1 volt, this would drive up the starter battery by another 1 volt etc. Conclusion- the starter battery should be open lead acid type as it is going to gas a little. In the short term the batteries would simply gas a little, and a regularly maintained battery would be ok. However, with a sealed, gel or AGM type any gassing could damage this type of battery.

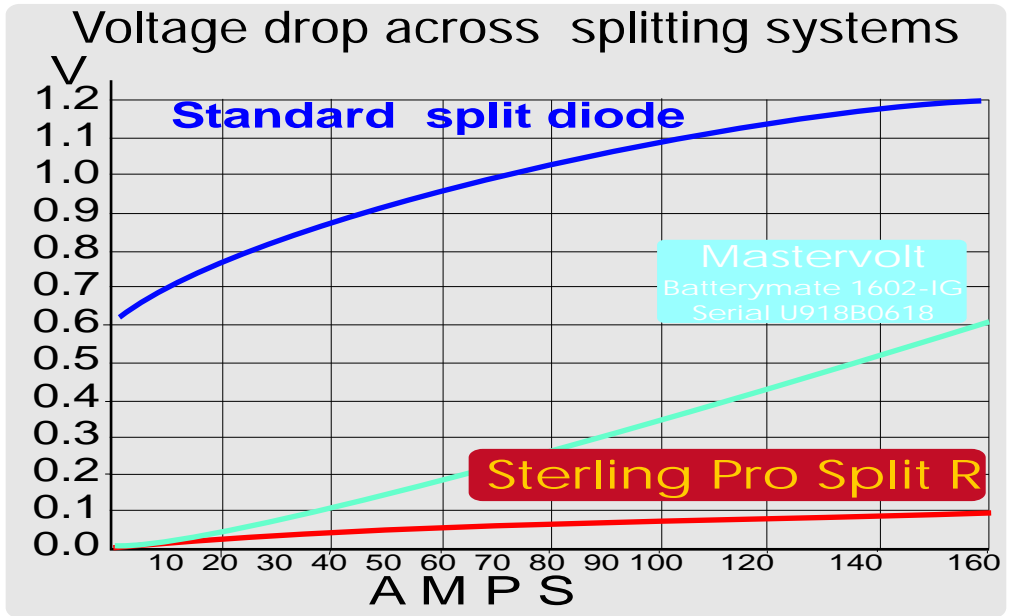
Example 3 is pretty much the same as example 2 except a modern advanced regulator will push the batteries up to 14.8 volts and in some cases the new calcium batteries could go as high as 15.1 volts. This simply adds another 0.6 volts onto example 2 with the same conclusions only worse.

The solution: Example 4 If the voltage drop across the splitting device could be eliminated then there would be no excessive rise in voltage on the starter battery. This way the gassing/high charge rate of the secondary would be the same as the domestic battery bank and under control. This would prevent excessive gassing taking place and causing excessive water loss in the starter battery. It also has many added features associated with this new technique.

Other advantages of the Zero Volt Drop Intelligent Alternator Distribution System

- 1) distributes the most power to the battery bank which demands it.
- 2) isolates a battery bank when there is any attempt to back feed the power from the full battery bank to a more demanding battery system.
- 3) Isolates full batteries to ensure empty batteries can charge faster from a standard regulator maintaining the engine start battery requirements as paramount.
- 4) isolates the main alternator from all the batteries in the event of a failure of the alternator's own regulator. This prevents the batteries from boiling.
- 5) isolates any battery bank which tries to back feed a high voltage from a different source. i.e. if there was a defective battery charger on one battery bank trying to back feed into another battery bank then the unit would disconnect that battery bank to save the others.
- 6) L.E.D. display shows which channels are in use and which are not.
- 7) overload design, for example, our model rated for a 180 amps is actually continually rated for 240 amps with overload in excess of 2000 amps
- 8) fail-safe, in event of unit failure the engine start battery and alternator remain connected, ensuring the safe running of the boat/vehicle. It prioritizes the engine start battery charging over all other battery bank outputs.

Competitors products: various other companies claim they have 0 volt split charge systems, however the so called transistors / mosfet's splitters when under load are only about 50% better than the standard low cost diodes, where as the Sterling is 90% better. We have a 0.09 volt drop under full load conditions as opposed to 0.6 V which the Mastervolt product has, making our product over 500% more effective. Plus, we offer all the extra functions as described above, which the transistor/ mosfet products simply cannot achieve.



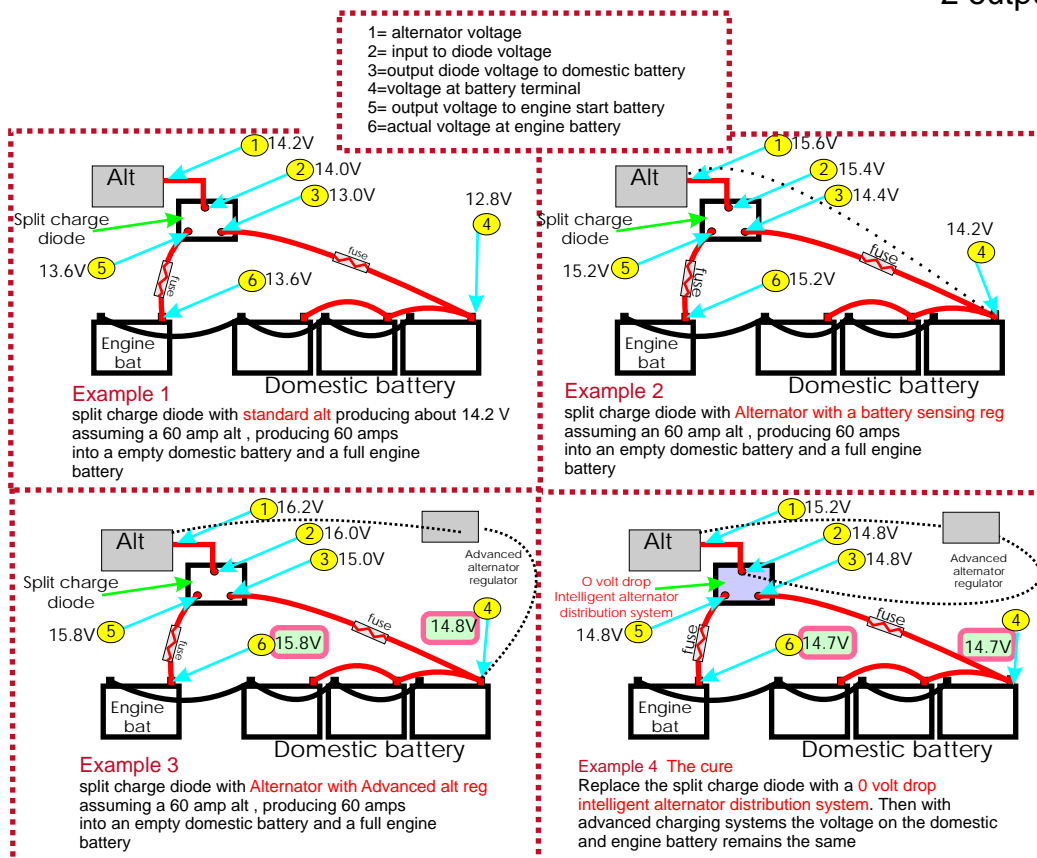
For 2 or more alts either use the twin unit or multiple alternators can be used on the single inputs as long as the total amps of the combined alternators does not exceed the rating of the product

Pro Charge Ultra 80-230 V 40-70 Hz A/C input					
D/C voltage	Max Alt Amps	Battery banks	Size L x W x D mm	Weight kg	Part nos
12	120	2	150 x 80 x 120	0.6	PSR122
12	180	2	150 x 80 x 140	0.7	PSR182
12	250	2	150 x 80 x 155	0.9	PSR252
12	120	3	150 x 80 x 130	0.9	PSR123
12	180	3	150 x 80 x 150	1.0	PSR183
12	250	3	150 x 80 x 180	1.3	PSR253
Twin 12	2 x 130	4	150 x 80 x 295	1.8	PSRT134
24	60	2	150 x 80 x 120	1.8	PSR62
24	100	2	150 x 80 x 140	0.6	PSR102
24	150	2	150 x 80 x 165	0.7	PSR152
24	240	2	150 x 80 x 250	1.2	PSR242
24	60	3	150 x 80 x 150	0.7	PSR63
24	100	3	150 x 80 x 175	1.0	PSR103
24	150	3	150 x 80 x 220	1.3	PSR153
Twin 24	2 x 80	4	150 x 80 x 295	1.8	PSRT84

twin alternator unit 4 output



Point zero volt drop / IP66 waterproof



Relay Charging relays inc: Ignition Feed, VSR and CVSR

Pro Con IF Ignition Feed relay unit

IP68
Waterproof

Available in 12 V : 80,160 & 240 amps
24 V : 50,100 & 150 amps

Ignition feed/D+/signal feed relay:

This range of low cost low signal activated relays is the simplest in the range, it offers the ability to link together as many battery banks as you wish and therefore charge different battery banks on a boat/vehicle when the engine is running.

Ideal applications: Boats with outboard motors and simple cabin batteries with no heavy loads on the cabin batteries, small vehicles/boats with auxiliary battery systems with low loads on the auxiliary battery bank which are not in excess of the rating of the relay so as not to overload the relay circuit.

Its limitations: There is no current limit with this type of device, so avoid using it on a system which have a high secondary battery load, such as a big inverter, anchor winch or bow thruster, as the surge currents associated with this type of equipment can destroy the unit (see current limiting relays for this application).

Starter battery interlock, this unit has the ability to interlock with up to 2 engines starter motors to ensure the relay is inactive when starter motors are engaged, thus protecting the relay and avoiding fuses blowing.

Start up time delays: a 30 second start up time delay prevents the relay coming on while the engine is being started, again protecting the relay circuit and preventing fuses blowing and damage to the relay.

Advantage over a standard relay. A standard relay has an activation feed via a cable. This feed takes about 0.5 amp to run, which adds the 0.5 amp to where you are taking the feed from, either the d+ on the alternator or key switch or oil pressure switch. This can place enough extra load on these circuits to cause a problem. There is also the secondary problem of voltage drop in the ignition feed cable affecting the relay. The Sterling IF product overcomes this by only using the ignition feed as a signal and takes no power from the ignition feed wire. The signal then activates an internal control system, which in turn activates the relay from main power circuit internally. This also has the advantage of not suffering from voltage drops in the feed line and allows the relay to run cooler. This unit is also water proof and in a much safer package form. The package also contains anti-spark protection to help reduce the effect of back EMF from open circuiting the relay under heavy loads, without this relays will weld close if the unit is switched off under high current pass applications. The connection terminals are also high quality brass nuts and bolts gold plated and not poor quality crimp connectors which are not suitable for high sustained current flow.

Pro Con VSR Voltage Sensitive Relay 12/24 auto select plus fine adjust

IP68
Waterproof

Available in 80,160 & 240 amps

12/24 auto select

Voltage Sensitive activated Relays:

This product would be regarded as the next level up from the signal feed relay (as above), the main difference being that it is totally automatic- this relay does not require an ignition feed to operate, it works on monitoring the input voltage to the device (usually the starter battery or battery bank with other charging source such as a battery charger or wind gen), when this voltage exceeds 13.3 volts the processor makes the assumption that the alternator/battery charger or other power device is active and as such it will automatically engage the relay to connect the main battery bank to the auxiliary battery bank and so charge the aux battery. Conversely, when the voltage drops below 12.9 volts the processor in the relay assumes that either the engine has been stopped or the load on the aux battery is pulling the starter battery down too much and for safety reasons it should be isolated. In a nut shell this is easier to install than the above and is smarter, however, it has some of the same limitations as the standard signal relay.

Ideal applications: See the above signal relay applications. Also ideal for charging a secondary battery bank from a battery charger which has only one output such as combined inverter charger. The starter motor interlock connection prevents the starter motor current being pulled through the relay and damaging the relay.

Its limitations: See the above limitations for the signal relay. Another major problem with standard relays is their ability to switch off under high load. The main job of a voltage sensitive relay is to sense any major current being taken out of the starter battery (primary) and to stop it. For example, if we take a typical 12V boat system with an 80 amp alternator and install a standard 80 amp VSR on the engine starter battery bank to charge the secondary battery (domestic battery bank, anchor winch or bow thruster battery bank). On engine start up the alternator will raise the voltage on the starter battery and this will engage the relay to charge the secondary battery bank (so far so good). However, for the sake of argument say the secondary battery bank is discharged (ie first thing in the morning) and then someone switches on a 2000 watt inverter, or a bow thruster or the anchor winch, these items will attempt to draw 200 amps + from the secondary battery bank. However, because the secondary battery is nearly empty, the load (the 200 amps) will automatically attempt to draw this current from the highest voltage source which, in this case, would be the starter battery bank. Obviously we do not want this to happen as we do not want to drain the starter battery or burn out the 80 amp relay or even worse set fire to the cables because you are now trying to pull 200 amps plus down these cables. In theory the large current flow through the VSR will drop the starter battery voltage and so trigger the relay to open circuit and so switch off this circuit stopping the drain and saving the day. However, a relay has 3 main ratings, for example an 80 amp relay can take 80 amps all day no problem, (hence its continuous rating) and has a short term overload of about 400 amps for about 1/10th sec. It has a third rating, however, that is much more important; that is the maximum current it can open circuit at. The assumption by the public is that an 80 amp relay can open circuit at 80 amps, but that is not so, it has an open circuit current rating of about 30-40 amps. And so the problem becomes apparent, the high load on the secondary battery system (in the above example) causes an instant load of 200 amps + on the relay (that's ok, it can deal with this for a split second) then the control circuit attempts to open the relay to stop this discharge, then BANG you open the relay with 200 amps going through it (with an open circuit rating of about 40 amps) and so you cause a large back E.M.F. If you're lucky, it will vaporise the contacts blowing them in to small pieces and open circuit the relay destroying the product. To reduce this effect, Sterling puts anti back E.M.F. spark reducers on all relay products.

Adjustable: This unit comes factory set to bi directional activation and can be fitted with no adjustments required to operate as a Voltage sensitive relay straight out of the box, it is auto voltage adjustment so it can be fitted to a 12 or 24 v circuit however the following things can also be adjusted if desired.

Unit directional activation:

Function 1. Charging activated by starter battery voltage increase (engine on) This is the most common setting and the factory default setting. This setting also does not have an ignition feed requirement. This connects the primary and secondary banks based on a voltage in excess of 13.3V being sensed on the primary battery only (the engine starter battery). The 2nd battery bank, once connected would only disconnect when both battery banks drop below 13.0 volts on both sides. The 13V safety threshold is still activated to protect and separate the batteries if, or when, the drain that invoked this function (voltage drops below 13 volts) once the unit has tripped, will not re-engage until the voltage on the primary battery bank (the engine start) has exceeded 13.3 volts again. **No ignition feed required on this setting**

Function 2. Charging either way (bi directional), based on a voltage rise on either side of the unit (default setting) This function will close the relay at 13.3 volts sensed on either side of the relay, a good example of this would be the use of a combi inverter charger on the domestic battery bank, because most combi's only have a single output charging line (to the domestic battery bank) then with this function the unit will charge from the combi to the starter battery bank (in effect giving you 2 outputs from the battery charger) when the combi is on, but also charge from the alternator to the domestic battery bank when the combi is off. In either mode the unit still has the 13.3V on and 13V off mode and the current limit function. **No ignition feed required on this setting**

Function 3. Charging batteries one way only This function allows a charge to flow from the alternator, or battery to battery charger, or any other charging source to a secondary battery bank, but only when the engine is running. In effect this mode only allows current flow from the primary source to the secondary, and will continue to flow until either there is an overload threat or a low voltage threat to the primary battery or the engine is shut down. This function requires an extra wire to the unit, an ignition feed, that informs the unit if the engine is running or not

Voltage parameter activation: Voltage activation and deactivation parameters can be adjusted using the setup command

Auto 12/24 v selection, the unit will auto select the system voltage using the following, if it senses 4 to 16 volts it will lock to 12 v, if it sees 16-30 volts it will lock to 24 v. if for some reason the input voltage is very low (in the case of an empty 24 v system) then the product can be disconnected and allowed to re-engage, once locked the product will hold that setting until fully isolated again.

Both the VSR and the CVSR is unit is fitted with the latest active progressive disconnect algorithm to ensure that the batteries can charge even where large differential voltages exist. As such there will be various time delays between what the customer has pre set as the turn off voltage point and the product actually turning off. The time delay will reduce the lower the voltage is below the programmed disconnect voltage.

Pro Con CVSR Current Limiting Voltage Sensitive Relay 12/24 auto select

IP68
Waterproof

Available in 70,140,210 & 280 amps

12/24 auto select

Current limiting Voltage Sensitive Relays: This range have all the adjustment abilities as per the above Pro connect VSR

These relays have built in current limiting, in a nutshell you can do what ever you want with them, if you overload them they simply switch off safely. The trick with a relay is not to open circuit when it is overloaded, but to remove the load, then open circuit the relay within its rating. With a current limiting VSR in an overload situation such as the example in the section above (Voltage Sensitive Relays) the 200 amps will surge through the relay for a split second (within the relay's capability), then the built in current limiting device will see this overload and reduce the current from the dangerous 200+ amps to a very safe 6 amps, the relay will then safely open circuit with a 6 amp load and not a 200 amp load, and so protect the relay and your installation. Once the high load demand has been removed then the relay is safe to re-engage and continue doing its job.

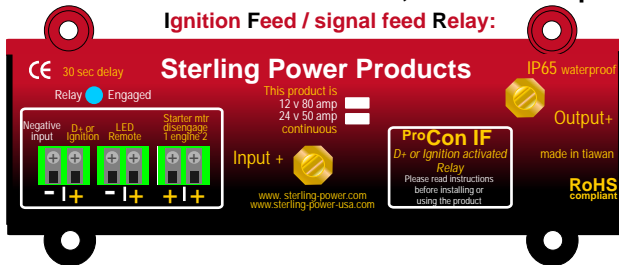
ALL Inc rubber boots



Stud sizes
80 amp = 5 mm
160 amp = 8 mm
240 amp = 10 mm

Pro Connect IF 80,160 & 240 amp

Ignition Feed / signal feed Relay:



Ignition / Signal feed Relays				
D/C voltage	Amps	Size L x W x D mm	Weight kg	Part nos
12	80	140 x 60 x 40	0.025	IFR1280
12	160	140 x 60 x 40	0.030	IFR12160
12	240	140 x 70 x 40	0.030	IFR12240
24	50	140 x 60 x 40	0.025	IFR2450
24	100	140 x 60 x 40	0.030	IFR24100
24	150	140 x 70 x 40	0.030	IFR24150

IP68
Waterproof

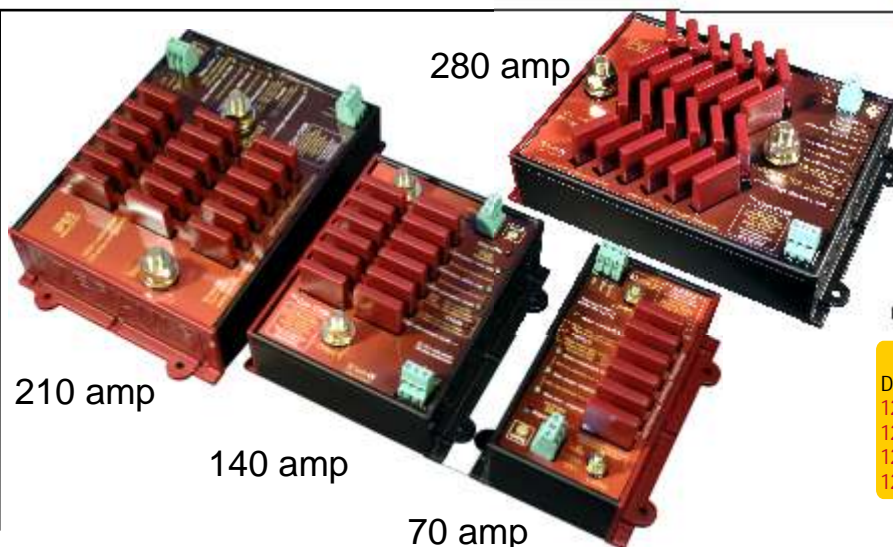
Pro Connect VSR 80,160 & 240 amp Voltage Sensitive Relays

Voltage Sensitive Relays (adjustable)				
D/C voltage	Amps	Size L x W x D mm	Weight kg	Part nos
12 & 24 auto	80	140 x190 x 40	0.1	VSR80
12 & 24 auto	160	140 x180 x 40	0.2	VSR160
12 & 24 auto	240	140 x200 x 40	0.25	VSR240



IP68
Waterproof

The VSR and CVSR unit is fitted with the latest active progressive disconnect algorithm to ensure that the batteries can charge even where large differential voltages exist. As such there will be various time delays between what the customer has preset as the turn 'off' voltage point and the product actually turning 'off'. The time delay will reduce the lower the voltage is below the programmed disconnect voltage .



C.V.S.R ratings

Continuous operating current of the VSR at 30 deg C = 80 amps
Continuous relay operating current at 90 deg C =70 amps
Instant overload current = 650 amps
Current limit after shut down current = 6 amps
At rest power consumption less than 1mA

IP68
Waterproof

Pro Connect CVSR 70 - 280 amps

Current limiting Voltage Sensitive Relays

Current Limiting Voltage Sensitive Relays (adjustable)				
D/C voltage	Amps	Size L x W x D mm	Weight kg	Part nos
12 & 24 auto	70	140 x120 x 40	0.1	CVSR70
12 & 24 auto	140	140 x140 x 40	0.2	CVSR140
12 & 24 auto	210	140 x180 x 40	0.25	CVSR210
12 & 24 auto	280	140 x180 x 40	0.25	CVSR280

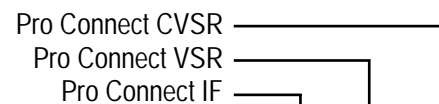
Which model suits my needs best ?

1) The first part is easy, what is the max size of your alternator or charging device. I.e. do you have a 90 amp alternator or a 100 amp battery charger charging the primary battery bank. This means that the secondary battery could be subjected to at least that load, so, the relay must be able to comfortably handle that sort of current continuously. It would be wise to give the relay a good 10-20% comfort zone, i.e. always up-size the relay if the charging source and relay are the same, for example, if you have an 80 amp alternator, combi or battery charger with an 80 amp relay then go to the 160 amp relay option to be safe.

2) Next its cost of installation and ease of installation. If you are fitting the unit and access to ignition feeds is simple then the **Ignition Feed** system should be entertained, however if not then the **Voltage Sensitive Relay** version is much simpler to fit and totally automatic, and has a lot more functions.

3) Do you need to vary which side of the relay activates the unit, or even ensure the unit is isolated (via ignition feed, or even adjust the standard voltage parameters, all this is possible on the **Voltage Sensitive Relay**)

4) The last, but most important aspect is safety. The most important thing here is to establish what the maximum possible load is that could be placed on the secondary battery bank when the relay is engaged, i.e. a large inverter/anchor winch, bow thruster. Remember that every load you put on, the secondary battery will have a % of this load transferred to the primary battery depending on how full the secondary battery is. This could range from a few percent to 100 percent, so, it is important that the relay system can deal with this high load without damage. If there are large potential loads such as hundreds of amps then the only way to do this is using a **Current Limiting Voltage Sensitive Relay** because when exposed to excessive currents, the current limiting models simply and safely shut down until the excessive current is removed, i.e. switched off, then it can automatically re-instate itself and carry on after that large surge load has stopped. This removes the need for excessive cabling and ensures a safe installation with less reliance on fuses for protection.



Sterling product features check list

0.01 volt drop	●	●	●
Ignition feed (not always required)	●	●	●
Water proof to IP65	●	●	●
SAEJ1171 ignition protected	●	●	●
High overload surge rating	●	●	●
Back Emf spark arrester	●	●	●
1 LED information display	●	●	●
Remote LED connection	●	●	●
No ignition feed voltage drop	●	●	●
Suppression diodes across relay to prolong life	●	●	●
Time delay to prevent engine starter damage	●	●	●
Single & Twin Starter motor disengage connections	●	●	●
12 V and 24 V automatic selection	●	●	●
Extremely Low Quiescent current approx 1 ma	●	●	●
Custom Voltage adjustment parameters available	●	●	●
Active progressive disconnect algorithm	●	●	●
Automatic voltage activation	●	●	●
Automatic voltage de activation	●	●	●
Protects primary battery from discharge	●	●	●
Emergency auxiliary forced activation	●	●	●
High battery voltage trip protection	●	●	●
5 LED information display	●	●	●
5 alarm functions and safety trips plus information	●	●	●
Adjustable relay trigger side operation	●	●	●
Short circuit protection (prior to engagement)	●	●	●
Current limiting protection	●	●	●

Split charge Diodes & Battery De-Sulphation device

All boats have at least two battery banks, some have three. These tend to be the engine start battery, the domestic battery bank (please note that if you join three or four batteries together in your domestic battery bank it is still one battery), and the bow thruster battery. Having introduced 2-3 battery banks onto your boat, the problem then is how do you charge them from one alternator source (or two alternators which I will discuss later). There are four various options employed by boat builders, below are the options with a short explanation giving both the positive and negative aspects.

1) Rotary switch. This method is very dated and not very common on boats. It is recognisable as a large circular switch with four marked positions on the switch. It is marked, off, 1, 2 and both. The good side of this system is that it is easy to install. The bad side is that it needs constant human intervention to ensure it works. Failure to operate it correctly will result in all batteries being discharged or not being charged correctly and possible damage to the alternator. They also tend to suffer failure if large prolonged current is passed through them. The spring in the switch can over-heat and loses its tension; this leads to an exponential break down of the switch that manifests in heat. When these switches fail they tend to melt the plastic case (if you are lucky). Simply check the temperature of the switch every so often by touching the back - it should be cold.

2) Split charge relay. This system is both dated and extremely dangerous, and more than likely will make your boat fall short on CE requirements, especially if an inverter is used or a bow thruster. The good side is, that it is easy to fit and requires no alterations to the standard engine system, but, it merely connects the domestic battery bank to the engine battery via a relay, which is energised when the engine starts.

The bad side (and the very dangerous side) is that a relay is prone to over loading. Say, for example, you have a 70 amp relay on your system and a 55 amp alternator, all seems great, but if you fit a 1500 watt inverter which can draw 150 amps and one morning the domestic battery is flat. So, you start the engine to charge the domestic batteries, the 70 amp split charger relay will come online to enable the alternator to charge the domestic battery bank. Then you load your inverter to 150 amps, the 150 amps will not be drawn from the domestic battery because it is flat but can be drawn from the engine battery (which is full). That means you will draw 150 amps up the split charge cable and through the 70 amp relay. If you are lucky you will destroy the relay, if you are not so lucky then you will set fire to the cross over cables, hence the dangerous aspect. The system must be suitable for the purpose for which it is installed and this is clearly not. Be warned about split charger systems using relays. If using relays it is important to have a massive overload ability

3) Split charge diodes: By using a set of diodes on a heat sink, one can ensure no

back feed through the diode, thus ensuring that high currents from other battery banks do not flow up the charge lines and cause a fire. This is the most common method by far employed round the world and is the standard in the USA, for 3 reasons, safety, safety and safety, by the way did I say safety? However, all is far from perfect. The big downside with a split diode system is the voltage drop across the diode (in the order of 0.8-1.2 volts). This dramatically reduces the charge rate of the alternator on average by about 70%, however, this can easily be over come using products such as the Advanced Alternator regulator in conjunction with the Split Diode.

4) 0 volt-splitting systems: These are electronic devices using a control circuit and driving mosfets. The end result is a very low voltage drop across the splitting system (in the order of 0.04 -0.6 volts) but no reverse current flow is permitted due to the operation of the mosfets. However, on standard marine engines it is much more effective to employ the lower cost diode where an advanced regulator is fitted, (see performance).

5) 0.0 volt splitting system, The new Pro Split R from Sterling has a voltage drop about 1/10 that of a split charge diode and 1/5 that of a 0 volt drop mosfet system. See Pro Split graph below.

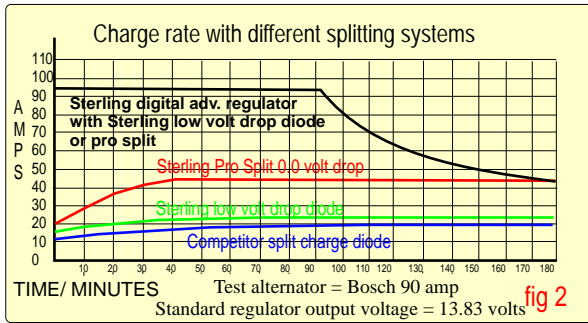
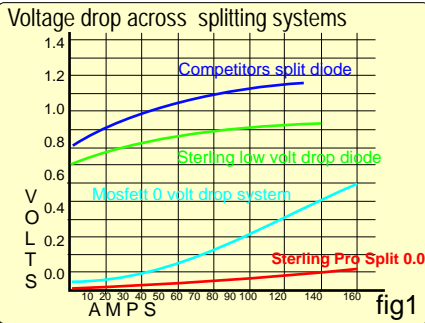
Conclusion: Test 1: From fig1 we can see the voltage drop across different splitting systems. This directly relates to the ability to charge the batteries, the larger the voltage drop across the device, the less effective the batteries charge.

Test 2 shows the clear advantage of using advanced regulators in conjunction with a conventional split charge diode. The advanced regulator automatically compensates for the voltage drop across the diode, plus the high charge 4-step program further increases the charge rate. The illustrated tests were on a 300 amp hour battery bank, but can easily be extrapolated to 400 amps plus.

The best low cost system clearly is a standard low cost split charge diode (for safety and cost) or the new Pro Split R and an advanced regulator on the alternator to compensate for the diode faults and charge at the constant current charging curves. This, not only charges 2-3 times faster (on a good installation, but much higher on a bad one) but puts about 100% more useful power into the batteries.

The best system but a bit more expensive is the new Pro Split (see next page)

For a twin alternator system, the ideal system is: on the largest alternator, fit direct to the domestic battery bank and attach an Advanced Regulator to that alternator. On the smallest alternator split this with a split charge diode between the engine battery and the domestic (and any other battery bank) and add another advanced regulator to it. This gives maximum charge rate to the domestic batteries.



Split Charge Blocking Diodes 70-200 amps, 2-3 outputs

Sterling Power has developed a range of low cost split charge diodes. These diodes have enhanced performance over conventional diodes and at a lower cost. The difference is in the devices. All other split charge diode manufacturers use conventional alternator diodes, which at low current flow have about a 0.93 voltage drop. When the full rated current of these diodes is approached, the voltage drop increases to about 0.95 volts. This results in excessive heat and power loss across the diode. For example: A conventional one alternator in and two battery bank out, tested against a Sterling unit had the following results:

CONVENTIONAL SPLITTERS					STERLING SPLITTER				
AMPS PASSED (A)	30	50	60	70	30	50	60	70	
VOLTAGE DROP	0.93	0.95	0.97	1.1	0.78	0.75	0.74	0.74	
POWER LOSS (W)	27.9	47.5	58.2	77	23.4	37.5	44.4	51.8	

Low voltage drop split charge diodes			
Alternator inputs	Battery banks	Max alt current	Code
1	2	70	D70A2
1	3	70	D70A3
1	2	90	D90A2
1	3	90	D90A3
1	2	130	D130A2
1	3	130	D130A3
1	2	160	D160A2
1	3	160	D160A3
1	2	200	D200A2
1	3	200	D200A3

The Pro Pulse is designed to connect to a 12 V battery bank. This unit reverse feeds a small electrical pulse back into the battery which prevents and also reverses sulphation on the battery plates. By keeping the plates clean and free from sulphation the battery stays fresh and responsive to charging and discharging. If you have been replacing batteries because they are not holding their charge then in most cases the battery is, in fact, in good condition except the plates are sulphated. Sulphation acts like a waterproof coating over the plates preventing the plate area effected being active and contributing to reduction in the battery cell performance. The solution is to remove this sulphation and expose the plate to the battery process again. The Pro Pulse should be fitted to any battery bank to ensure that sulphation is not only prevented but also reversed and so prolong the life and performance of the battery bank.

This device is not required if you have a Pro Digital battery charger or any other advanced Sterling charging product connected to your batteries as they have a de-sulphation cycle built into their software program.

This is not a battery charger and it cannot actually charge your batteries it is a de-sulphation device.

Battery De-sulphation & maintenance device

Connects direct to battery

No external power source

Reverse feeds high frequency pulse

Battery to blow sulphation off the plates

Prolongs battery life by up to 100%

Rejuvenates older batteries

Sharpens battery response to accept faster charge

Preserves cold start performance

Suitable for use on all vehicles and boats

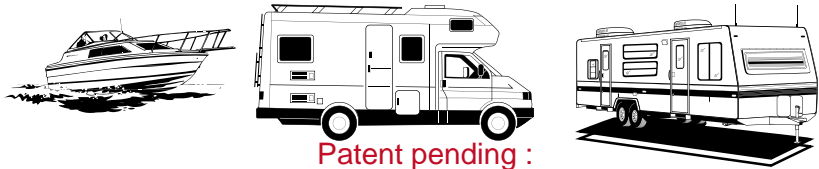
Pro Pulse De-Sulphation unit	
Size	Code
100 x 90 x 30 mm	PP12V



e13 12 V unit for 24 V use 2 x 12 V

Combined Batt. to Batt. charger and MPPT solar reg

IP68



Patent pending :

Wildside

**Combined:
Battery to Battery Charger
MPPT Solar Regulator
Twin Solar Output**



What is the Wildside range?

The Wildside range is a unique total package integrating the best MPPT solar regulator with a Sterling Battery to Battery Charger ensuring not only the maximum charge into your batteries when mobile (Battery to Battery charger) but harvesting the maximum power from your solar cells when stationary. Where required, both power sources will also seamlessly integrate when the total power can be used with extremely low quiescent current. Other benefits include the fact that the solar cell is diverted from the engine battery bank (when full) to your secondary battery bank with the engine battery set as the priority (not applicable if fitted to a caravan), also if there is a battery charger on your secondary battery bank it will also charge your primary battery bank through the system. It is also extremely easy to install and set up. This unit has all the battery type selection and adjustments as per the standard batt. to batt. and MPPT solar regs.

Battery to Battery charger. If you do not know what advantages a battery to battery charger offers you over a conventional charging system please read the previous information on Battery to Battery chargers.

Solar regulator : (Type MPPT) If you do not know what advantages a Maximum Power Point Solar regulator offers you over a conventional solar regulator please go to the previous pages marked solar regulators to see what this has to offer. The unit will charge both the engine start battery (as the primary) so it covers all engine management losses during the winter and long lay ups. Any surplus power is directed into the secondary/domestic battery bank as and when the primary battery is taken care off. The engine starter battery is regarded as the primary for obvious reasons.

This product is ideal for the caravan, camper van and yacht market where solar cells are regularly used and where a high performance solar regulator is required along with a battery to battery charger.

This unique products saves a lot of time and money on installation and duplication of technology.

Note the maximum continuous refers to the current the unit will process, i.e. if you fitted a 16 amp unit with a 50 amp alternator or battery charger the unit would only process 15 amps, no damage would be done to the unit as the product is current limiting and would simply not allow more current through (not a wise choice).

Note that the minimum solar cell power refers to the maximum power the system will process, the cell array can be larger without damaging the product, as it is very unlikely that a solar cell will achieve the full power on a normal installation. If, for example, you had 300 watts on a 180 watt unit on a perfect day we would only process 180 watts maximum. However, on a less than perfect day and the power generated drops below 180 watts then that would be processed.

Which product suits your needs?

This is a little daunting, however, bare in mind getting it wrong will not result in damage to our product as it is current limiting. To match the product against your requirements you need to take various factors into consideration:

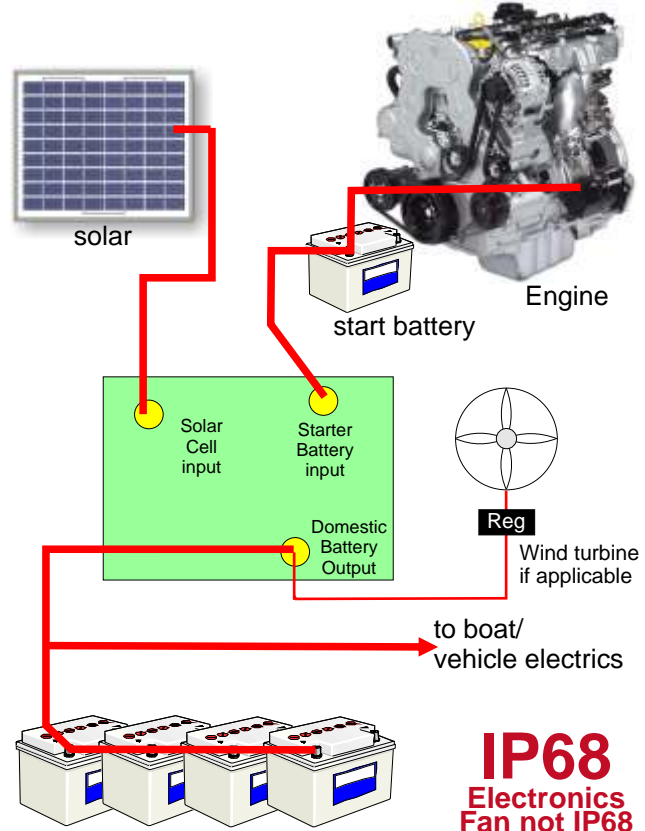
- 1) What is the maximum power of your alternator in amps? We will use 90 amps for this example.
- 2) What is the size of your secondary battery bank, we will use 200 amp hrs for this example.
- 3) What is the size of the solar cells. (if the solar cell's power is lower than the product rating then the solar cell power does not matter, i.e. If we conclude that we need a 60 amp Wildside (based on alternator size and battery bank size) which can support up to a 700 watt solar array then the solar cell size, if below that, is okay or even a little above it. However, if the solar cell array is 1000 watts + then the 60 amp model would not maximise this and it would be best to use the 100 amp version as the solar power is so great as to make the alternator size not the primary / predominate power supply.

Things to bare in mind:

- 1) There is only so much you can fast charge into a battery, an open lead acid allows a fast recharge, gel, not so much. so, for a fast recharge, of say a 100 amp hr battery, there is not much point in trying to put more than about 30 amps into it (you could try 500 amps if you had it but the battery would simply not accept this current and reduce to 30 amps within a second or two). Therefore, with a 200 amp hr battery there is no point having much more than about a 60 amp unit as it would simply be wasted even if you had a 150 amp alternator. However, if, in the future you saw the time when you might put on a larger battery bank then it would be prudent to fit the 90 amp version as when the larger battery bank was installed then this unit would deliver that extra power effectively etc .

- 2) Down sizing is okay, for example: if you only have a 50 amp alternator on a vehicle or boat there is no point fitting a 100 amp unit as the most you will process is the 50 amps from the alternator as that is the limiting factor. In order to save money we would recommend rating the unit you require at a lower rating than the alternator output. Simply because you may, for example, have an 80 amp alternator, but at cruising speed or low RPM you may only produce 40 amps so the 60 amp model would be great for that size. However, you may only have 1 x 80 amp battery bank to charge, in which case the 60 amp would be too big to utilise that power, thus, a 16 A or 30 A would be ok.

I accept the above is some what confusing, however, if in doubt and the budget is not a problem biggest is usually best.

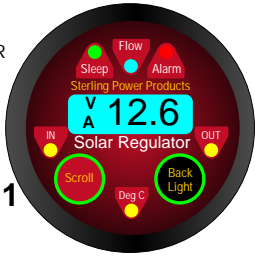


**IP68
Electronics
Fan not IP68**

Remote control

OPTION, 52 MM HOLE CUT DIAMETER

**Check web site
for launch dates
expected FEB 2011**



Remote control features

- 1) Ammeter
- 2) Voltmeter (in and out)
- 3) Alarm buzzer (with ability to isolate)
- 4) Background light
- 5) Background light changes colour for different events i.e charging, discharging , warning ,etc



Voltage	Continuous Current	Quiescent Current mA	Recommended cell power W	Battery Bank size (domestic)	Size	Weight	Part number
12 V	16 amps	1 ma	250 +	up to 150 Ah	145 x 110 x 120	0.8kg	WS1216
12 V	30 amps	1 ma	450 +	up to 300 Ah	145 x 110 x 120	0.8kg	WS1230
12 V	60 amps	1 ma	800 +	up to 600 Ah	TBA		WS1260
12 V	100 amps	1 ma	1400 +	up to 1000 Ah+			WS12100
				Remote control hole diameter 50 mm			RWS

Pro Latch R

IP68
waterproof

**Suitable for use as one of the following: 1) Split charger (VSR) relay
2) Battery protect relay (over discharge and over charge) 3) Engine Start Protect relay**

Latching relays versus conventional relays.

So, what's the big deal with latching relays. To understand this you must understand the fundamental internal / operational differences between a conventional relay and a latching relay .

A conventional relay (such as ones used in cars to switch on your lights or control power distribution on boats etc.) These are by far the most common forms of relays produced, they are very reliable and relatively low cost. They are, in effect, a switch which uses a magnetic force to activate and hold the switch in position, this means that the relay itself consumes power to maintain the magnetic field and holds the circuit online (or off line in some cases). If a powerful engine alternator or other powerful generating device is being used, while the relay is active, then the load used by the relay is so small that it is almost irrelevant (which is why they are used). For example, a standard 80 A (amps), 12 V (volts) relay would consume about 450 mA (when active) which is 0.45 A. As you can see, if you have an engine with a 70 A alternator output the consumption of 0.45 A for the relay is of no real importance, however if you switch the engine off but still require the relay to operate (i.e. if instead of a 70 A alternator source you have a 60 W (Watt) solar cell which is about 4 A on a good sunny day and about 0.4 A on a normal day) then the 0.45 A being consumed by the relay becomes a big deal indeed, it almost renders the solar cell useless. **So lets do the maths : with the engine off, a single conventional relay will consume in 1 day 0.45 A x 24 hrs =10.8 A . Per week = 75.6 A** and that's just 1 relay, this is why standard relays cannot be used in power-down situations (i.e. engine off) unless a reasonably powerful charging source is in action (i.e. engine alternator or battery charger) .

A latching relay works in a completely differently way, instead of using power to "stay on " it locks into position, so no matter if the circuit is 'on' or 'off' it engages a locking device (latch) which consumes no power to hold that position. On the down side they cannot be used straight out of the box like a standard relay. This is because they need a control circuit to work the internal latching device. It only needs a short burst of power to pull the contacts from one side to the other then the power must be removed, this, in itself, needs a control circuit. So, even though the relay itself is over 4 times the price of a standard relay it still needs even more cost attributed to it for the active electronic control circuit required to operate it. On the up side, the latching relay consumes no power when 'on' or 'off' other than what the monitoring / control circuit uses (internal mini computer with software). It is therefore absolutely vital to get the control circuits power consumption down as low as possible, some of our competitors use in the region of 4-12 mA. On the other hand, Sterling are down to about 0.5 mA which is 0.0005 A consumption. **So lets do the maths : with engine off our latching relay with active control circuit will consume 0.0005 x 24hrs = 0.012 amp per day which is 0.084 A per week** . Compared to a standard relay which uses 75.6 A in a week a latching relay system will use nearly 1000 times less, and this is for only 1 relay, what happens if you need 2,3 or 4 on a larger installation, clearly this latching relay is the only sensible choice if solar or wind is used to supplement the main alternator charging system.

Now you understand what latching relays do and how they work this opens a whole new field for control systems on boats/vehicles where circuits need to be disengaged or engaged using a low power consumption control circuit with minimal impact on your power consumption of the system (to isolate a battery when the battery is nearly empty to prevent the loss and destruction of the battery bank). Other uses may be on a small vehicle where you only have a starter battery and you wish to ensure any ancillary devices such as a fridge or TV on a lorry will not drain the starter battery beyond the ability of the battery to start the engine (**engine start protection mode**). Both the above applications use the same technology and demand minimal power consumption by the control relay. However, the program to run either application (internal software control) would be diametrically opposed and could not be used for the same function. This is why, with a clever device in the Sterling Pro Latch-R, the program control can be selected for which application / option you wish to use the device for when the product is being installed. This makes the unit very flexible. The unit can be adjusted to the three different modes as described below.

12V or 24V is automatically selected by the product, on power-up the unit will select the highest voltage connected to IN or OUT and use this to determine the voltage of the system. If less than 16.5V the unit will power up as 12V, if more than 17V the unit will power up as 24V.

Fine voltage key trigger point adjustments, each function has factory preset voltage trigger points which are suitable for the vast majority of applications, however, some people like to have their own personal trigger points. As such, the trigger points can be adjusted using the magnetic swipe, no other tools are required. The product comes pre set for each function and we would expect 95% of all applications to fall into the pre set, however there is a digital , magnetic swipe set up adjustment ability from 10.7V-14.8V for on voltages (x 2 for 24V) and 10.4 - 14.5V for off voltages (x 2 for 24V), these adjustments tend to be used for the likes of lithium batteries where the parameters fall a little outside conventional lead acid settings.

1) Charging Mode (Voltage Sensitive Relay) (default voltage setting , on 13.3V, off 13.0V x 2 for 24V) : A conventional split charge relay suffers from high power consumption to run itself. If used solely for charging a system with an alternator the power used by the relay is insignificant and as such irrelevant compared to the power generated. However, if after the engine is switched 'off' and there are solar cells or wind charging systems in the boat/vehicle then the ability to charge other battery banks becomes very important. Therefore, the power consumption of the splitting device becomes extremely important and so the latching relay comes into a world of its own. There is no limit to how many battery banks that can be charged; on boats there could be as many as 2-5 battery banks, simply use the appropriate number of latching relays to charge all the battery banks either from a high power or low power charging source. An *instant starter disengage circuit* is built in to prevent starter motor high current surge damaging the product. This open circuits the relay between activating the starter motor and the bendix engaging the fly wheel. On *Charge Mode* the unit is preset for either side activation, i.e. which ever side of the relay reaches the trigger voltage first will activate the relay, this means, for example, that if the unit is used as a charging relay between an engine battery and a domestic battery it will latch when the alternator is active. Additionally, if there is a solar cell/ wind gen / battery charger / combi on the domestic battery bank it will also activate the relay and charge the engine battery bank.

2) Battery Protection Mode:(default setting, 'off' 12.0V, 'on' 12.3V x 2 for 24V) The battery protect system, protects a battery bank from premature and expensive destruction due to deep discharge or over charging. It only takes one accidental deep discharge of a battery bank to destroy that battery bank, a very expensive mistake indeed. This is most common on things such as hire boats or hire equipment, such as: electric cherry pickers where the hirer tends not to treat the equipment with the respect it deserves. This leaves the owner with a large battery replacement bill. The battery protection relay disconnects the batteries at a preset limit in order to protect the battery bank. The unit has a built in warning system, i.e. it will switch the power **off** for 10 secs then back **on** for 1 min to give a reasonable warning to allow the operator time to complete a process, such as: start the engine or activate a battery charger to take place to help the situation (i.e. recharge the batteries). This could happen on a boat late at night so the extra minute allows some one to start the engine to recover the batteries. For extra safety, the optional remote control gives the option to override the trip for 1 min in the case of emergency. Remote isolation mode: by using the remote control the battery bank can be manually isolated if required.

3) Engine Start protection mode:(default setting 'off' 12.4V & 'on' 12.6V) This mode is designed to allow products to be safely run from an engine starter battery and to disconnect the product at such a stage as to allow the engine starter battery to retain enough power to ensure the engine will start. Ideal applications for this product are things such as tail lifts on lorries, mobility vehicles, over night lorries with d/c equipment or small inverter used on vans etc., where the addition of a split charge system and an extra battery bank may not be warranted nor feasible (obviously there are many more applications for these products). The product will then be automatically re-engaged when the engine is started and/or the battery charged.

Optional remote control for the above products, features include : LCD displays can be selected to show input voltage or output voltage . Other alarms/information displayed via LEDs would be: High voltage trip alarm (showing if fault on input or output) alarm set at 16V (x 2 for 24V) , Relay engaged or disengaged - Emergency over ride function (hold select button for 5 sec to give 1 min override) - Audible alarm function disengage (especially boat or camper vans would not want alarms going off at 4 in the morning) - Background light on/off (background light changes colour with cycle, red = warning, blue for on line, green for offline - Sleep mode indicator - 1 min safety/ latch over-ride ability.

Remote control allows access to all the relevant information, the panel comes complete with a 5 meter telephone type extension lead. The meter is in a standard 50 mm threaded housing. This is an optional product and is not required for the operation of the main product.

52 mm hole cut



Remote control

Remote control functions

- 1) Input voltage
- 2) Output voltage
- 3) Optional water proof display, encapsulated electronics
- 4) Various over ride to allow lights to be switched on for safety (only available with remote)
- 5) Sleep: power saver function
- 6) Audible alarm stop
- 7) Audible alarm disconnect
- 8) Back light option on/ off
- 9) Background light colour change depending on function.
- 10) Relay circuit opened or closed indicator
- 11) High voltage trip alarm and low voltage warning

IP68

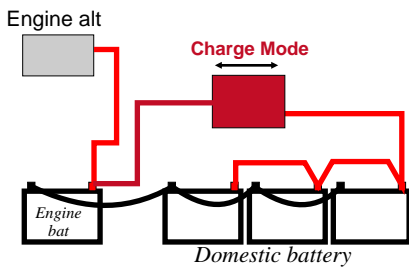


85 mm x 90 mm x 80 high

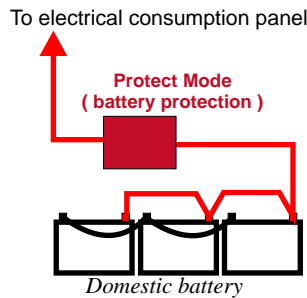
Part Number	Continuous Current	Max Interment Current	Quiescent Current ma	Input voltage	Output stud	Pre set voltage (can be adjusted if required)		
						Battery protect	Starter Protect	Charging mode
LR80	80	500	0.5	12/24 auto	6 mm	Off 11v on 13v	Off 12.4 on 13v	on 13.3 off 12.9
LR160	160	1000	0.5	12/24 auto	8 mm	Off 11v on 13v	Off 12.4 on 13v	on 13.3 off 12.9
LR240	240	1500	0.5	12/24 auto	8 mm	Off 11v on 13v	Off 12.4 on 13v	on 13.3 off 12.9
LRR	Latching relay remote with 5 metres of cable , for longer use standard telephone cable extension							

Examples of different common applications

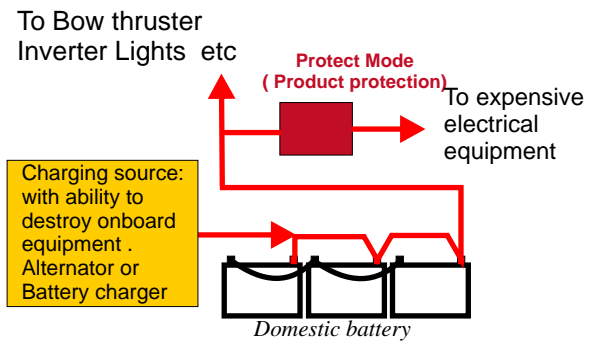
Voltage sensitive charging relay



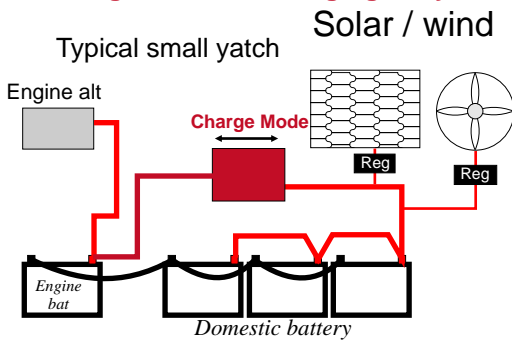
Battery protection



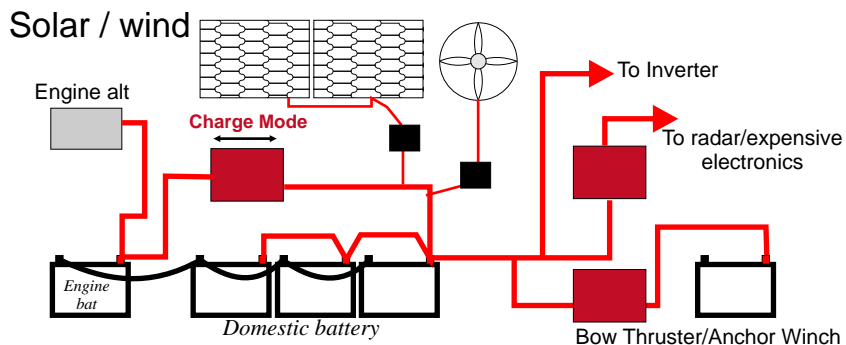
Product protection mode



Voltage sensitive charging relay



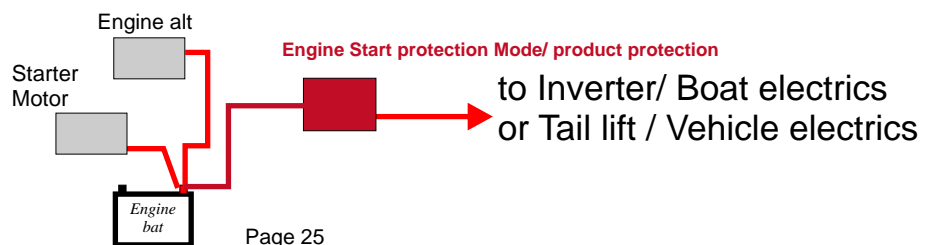
Multiple use on small boat



Switching algorithm information:

All the 3 applications are not a simple 'on' / 'off' software control device, as a result, for convenience and ease of explanation, all control voltages are described as a specific voltage which are, in fact, a mean voltage which has a time and history element to the software algorithms. A different algorithm exists for each product and switching point in order to prevent unnecessary 'on'/off' cycles where none are really required. Some control voltages, such as high voltage protection trips, are instant but all the others are not .

Engine Starter Battery Protection Mode



1600, 2500 & 3500 Watt

Standard Features:

- 30 amp through current
- P.F.C. (power factor correction)
- Inc remote control with 10 metre cable
- 4 step progressive charging
- 8 battery type selector

Earth - Natural link when on inverter mode to comply with latest regulations

The new Pro Combi range are designed to be very competitive, no frills, high performance, and value for money products, presented in a simple, easy to install and use style.

If you require power assist, parallel connection, three phase output functions or any other enhanced combi features then this range is not for you. If you're not familiar with these things this ProCombi is perfect for you.

Modern combis are getting more and more complex, with each company trying to out do the next with abilities beyond the understanding and requirements of most people. This detracts from the combi's main strength of being easy to install and easy to use. There is, no doubt, a market for all the sexy functions but the vast majority of combi users simply do not need them and never will. Most people simply require the unit to act as a high performance constant current battery charger when on mains power then cross over to act as an efficient inverter when on battery - and that's it!

The problem with enhanced functions is, even if they are not used, they eat up valuable power. The more functions on a product running (even though you do not use them) the higher the quiescent current on the inverter (the current the unit uses itself to operate). Complex combis at 12V can use as much as 9.5 amps, whereas, Pro Combi can use as little as 2 amps.

Also, a lot of the expensive combis do not even have a power save function which can drop the combi power consumption to as little as 0.2 amps when off load, some combis continue to consume 2 amps + even when there is no load

Sterling has reversed this trend with this Pro Combi range by stripping away the unnecessary features from a complex combi saving money. The end result is a simple, straight forward product that does what you think it should. Using our years of experience in this market we have tailored the product range to suit 90% of people purchasing Combis.

How to compare model ratings with other Combis: Watts vs VA: the truth

The most significant issue to be aware of is how output ratings are massaged to appear better than the competition. You might be excused for thinking that a unit with '3000' written on it, for example, means that it will deliver 3000 watts continuously. This is not necessarily the case if you look at the small print.

Have you ever found it strange that the product you want to run (i.e. the hair dryer, washing machine, TV, etc.) has the power consumption shown in watts, yet the inverter/ generator companies give you the rating in VA, and when you put your 1000 watt product on a 1000 VA inverter it does not work. In the small print you find out that the 1000 VA inverter is only 700 watts for 10 mins then it over heats- this simply cannot be right.

In the eyes of the unknowing consumer, rating a power product in VA is a simple way of using meaningless figures to confuse and make performance appear better than it really is. Unfortunately this practice is still allowed in Europe (European standards committees are looking into this practice) unlike the USA where there are recognised standards (eg ABYC) and you can be sued for publishing misleading information and incorrect ratings. The only true rating, without confusion, is in watts, using a simple resistive load with unity power factor, such as an electric heater / standard light bulb, etc. This method gives a lower correct figure, however, it is not what the marketing teams involved in promoting power products want to see.

Take, for example, a 3000 Victron Multi that is perceived by the public to be 3000 watts continuously rated. If, however, you read the Victron specification for watts at 40degC the actual power is 2200Watts. The Sterling 2500W Combi delivers 2300Watts which in fact makes it a more powerful unit. This distortion is not limited to Victron, unfortunately most, if not all, the European manufacturers push model figures to the realms of fantasy in spiralling competitiveness and in order to confuse and impress the public who believe that these figures are actual continuous power rating. Page 26

Now fitted with new TX transformer
50% less quiescent current



230v 50 hz
auto select 50 or 60 hz
110v 60 hz
auto select 50 or 60 hz



Winner Sailing Today Best Buy in Combi Test against Victron, Mastervolt & Studer (2008)

- EN61000-3-2
- EN61000-3-3
- EN50081-1
- EN60335-2-29

Furthermore, the effects of temperature and the duration of duty (i.e. how long a load is maintained) can also be used to manipulate ratings. It is much harder for a unit working in 40degC ambient temperature than in 25degC, just as it is harder to run at a higher load for extended periods. Therefore, a unit rated for short periods at a cooler temperature will also appear more powerful.

To illustrate, taking data published by Victron Energy and Mastervolt, the following comparison can be made:

Model/product	Public perceived power	True Cont. Watts @ 40degC
Victron Phoenix MultiPlus 12/3000/120	3000W	2200Watts
Mastervolt Mass Combi 12/2500-100	2500W	Not stated
Sterling Pro CombiS or Q 12/2500	2500W	2300Watts
Victron Quattro 12/5000/200	5000W	12 V / 3000Watts
Sterling 3500 combi	3500W	3300Watts

The simple truth of the matter is VA means nothing. If you want to know how much power your inverter is going to give you then ask for the rating in watts at 40 deg C, all the other ratings should be kept for the comic books where they belong. ProCombi has the lower value in the model name but, in fact, is the more powerful of the bunch when like for like ratings are compared making it even better value for money than you thought! With the Sterling unit you get what you think you should be getting, and it does what it says it does on the box.

The sooner ratings have a legal recognised standard like the U.S.A. the better for everyone.

Pro Combi Q quasi sine wave 220 v 50 Hz Euro Standard

D/C voltage	Power at 25 deg C (watts)	Part nos
12	1600	PCQ121600
12	2500	PCQ122500
24	1600	PCQ241600
24	2500	PCQ242500

Pro Combi S pure sine wave 220 v 50 Hz Euro Standard

D/C voltage	Power at 25 deg C (watts)	Part nos
12	1500	PCS121500
12	2500	PCS122500
12	3500	PCS123500
24	1500	PCS241500
24	2500	PCS242500
24	3500	PCS243500

European use
230 V 50 Hz

Pro Combi Q quasi sine wave 110 v 60 Hz USA Standard

D/C voltage	Power at 25 deg C (watts)	Part nos
12	1600	UPCQ121600
12	2500	UPCQ122500
24	1600	UPCQ241600
24	2500	UPCQ242500

Pro Combi S pure sine wave 110 v 60 Hz Euro Standard

D/C voltage	Power at 25 deg C (watts)	Part nos
12	1500	UPCS121500
12	2500	UPCS122500
12	3500	UPCS123500
24	1500	UPCS241500
24	2500	UPCS242500
24	3500	UPCS243500

North America
110 V 60 Hz

What does the Pro Combi range offer?

On the battery charger side

- 1) 4 step constant current battery charging
- 2) 8 pre set battery type selector plus de-sulphation
- 3) powerful charge rate
- 4) **will charge even with totally flat batteries**
- 5) **PFC**, draws about 30% less power than conventional units

On the crossover side

- 1) 20 m/s crossover time, will not to lose any equipment due to power loss
- 2) 30 amp through current ability on all models
- 3) twin 30 amp / single 50 amp on the 3500 watt models

On the inverter side

- 1) high overload ability
- 2) high temperature rating
- 3) low quiescent current
- 5) power saver mode to automatically reduce power
- 6) allows through power even with no batteries connected
- 7) natural earth link to enable RCD breakers to work

On the remote control

- 1) ability to switch the unit on/off
- 2) ability to select or de select power saver mode

General specification

Input Wave form:	Pure sine wave	
Nominal Voltage:	Input 230 v a/c	110v USA
Low voltage trip:	184v+/- 4% Euro	92v USA
Minimum engage:	voltage 194v +/- 4%	97v USA
High voltage trip:	270v +/- 4%	128v USA
High voltage re engage:	253v +/- 4%	122v USA
Max input a/c voltage:	270 v rms	135v USA
Nominal input frequency:	50hz or 60hz auto detect	
Low freq trip:	47 hz for 50 hz, 58 hz for 60 hz	
High freq trip:	53 hz for 50 hz, 62 hz for 60 hz	
Output wave form:	(on by pass mode) same as input	
Overload protection :	Circuit breaker	
Short circuit protection :	Circuit breaker	
Transfer switch rating :	30 amp	
Efficiency on line transfer mode:	96%+	
Line transfer time :	20 ms	
Bypass without battery connected :	yes	
Max by pass current :	30 amps	
By pass over load current :	35 amps: Alarm	
Inverter Specification / output		
Output wave form:	Modified Sine Wave/ Quasi sine wave	
Output continuous power watts	1600	2500
Output continuous power VA	2400	3600
Power factor:	0.9- 1.0	
Nominal output voltage rms :	230vac	110v USA
Max voltage rms :	260vac	110v USA
Output voltage regulation:	+/- 10% rms	
Output frequency:	50hz+/-0.3hz or 60hz+/-0.3hz	
Transient response time:	<150ms;0% to 100% RCD load	
Nominal efficiency :	>85%	
Surge ratings :	1500model =4500va 2500model = 7200va	
Online current consumption at 12 v/24	12 v 2a 24v 1 amp with new TX tran	
Power saver mode current consumption	12 v 0.4 24v 0.2	
Short circuit protection:	yes, less than 3 cycles	
Inverter Specification / input		
Nominal input voltage :	12 or 24 v depending on model	
Minimum start voltage :	10 v for 12 v model 20v for 24 v	
Low battery alarm:	10.5v for 12 v model 21v for 24 v	
Low battery trip:	10 v for 12 v model 20v for 24 v	
High voltage alarm:	15.5 for 12v model 30v for 24 v	
Power saver :	below 20 watts when enabled	
Power saver :	can be switched on/off on remote control	
Charger Mode specification		
Input voltage range:	196-245 v ac 96-130 v ac USA	
Output voltage:	dependent on battery type selection	
Output current 12 v model :	1600- 40A 2500 - 55A	
Output current 24 v model :	1600- 20A 2500 - 25A	
Battery initial voltage for start up:	0-15v for 12 v x 2 /24v	
Over charge protection shutdown:	15.7 12 v x 2 for 24 v	
Charger curves (4 stage constant current)Battery types		
4 step digital controlled progressive charge		
Battery type	charge V	float V x 2 for 24 V
Gel U.S.A	14.0	13.7
A.G.M. 1	14.1	13.4
A.G.M. 2	14.6	13.7
Sealed Lead Acid	14.4	13.6
Gel Euro	14.4	13.8
Open Lead acid	14.8	13.3
Calcium	15.1	13.6
De-sulphation	15.5 for 4 hrs	
Battery bank size:	auto detected / auto program adjusted	
General Features.		
Remote control.	Front control panel removable as remote	
Size:	in mm 185W 180H 430L (1600, 2500)	
Weight:	1600w 18 kg 2500w 20 kg	

General

- 1) removable local panel to give remote control with warning and function LED
 - 2) remote on/off plus remote power saver on/off
 - 4) 10 metres remote cable
 - 5) almost 20 alarms / warnings / information
- There are 2 main models the **Pro Combi Q** (for **quasi-sine wave**) and the **Pro Combi S** (for **pure-sine wave**)

So the simple question is, what best suits your needs?

Pro Combi Q, (quasi-sine model) suitable for most installations, where you would use a microwave, fridge, hair dryer, vacuum cleaner, kettle, computer, etc. The vast majority of products will run on quasi-sinewave. Hi Fi could have a buzz on the speakers and older non flat screen TVs may have a line on the screen. It is not possible for us to say what item may have a problem, if any.

Pro Combi S (pure sine wave model) where all the above plus washing machines, bread makers, thyristor controlled equipment are used - then sine wave is required.

To make the choice even simpler we have 6 months exchange/upgrade policy. If you purchase a Pro Combi Q and find there is some equipment that you cannot run due to the Quasi Sine wave and require Pure Sine wave, Sterling are happy to up-grade your quasi-sine unit for Sine wave with the only cost being the difference between the 2 products (unit must be sent direct to Sterling and in good condition). Offer applies dealing direct to the factory only.

Pro Combi S

Input Wave form:	Pure sine wave	
Nominal Voltage:	Input 230 v a/c	110v a/c USA
Low voltage trip:	184v+/- 4%	92v a/c USA
Minimum engage:	voltage 194v +/- 4%	95v USA
High voltage trip:	253v +/- 4%	126v USA
High voltage re engage:	243v +/- 4%	121v USA
Max input a/c voltage:	270 v rms	135v USA
Nominal input frequency:	50hz or 60hz auto detect	
Low freq trip:	47 hz for 50 hz, 58 hz for 60 hz	
High freq trip:	53 hz for 50 hz, 62 hz for 60 hz	
Output wave form:	(on by pass mode) same as input	
Overload protection :	Circuit breaker	
Short circuit protection :	Circuit breaker	
Transfer switch rating :	1500-2500 w = 30 amp the 3500 w= 50 amp	
Efficiency on line transfer mode:	95%+	
Line transfer time :	20 ms	
Bypass without battery connected :	yes	
Max by pass current :	30 amp	
By pass over load current :	35 amps: Alarm	
Inverter Specification / output		
Output wave form:	Pure sine wave	
Output continuous power watts	continuous 1500 / 2500 / 3500	
Power factor:	0.9-1.0	
Nominal output voltage rms :	230vac	115v USA
Max voltage rms :	260vac	130v USA
Output voltage regulation:	+/- 10% rms	
Output frequency:	50hz+/-0.3hz or 60hz+/-0.3hz	
Transient response time:	<150ms;0% to 100% RCD load	
Nominal efficiency :	>88%	
Surge ratings :	PQS1500=4500va PQS2500=7200va	
Online current consumption at 12 v/24	12 v 2a 24v 1 amp with new TX transformer	
Power saver mode current consumption	12 v 0.4 24v 0.2	
Short circuit protection:	yes, less than 3 cycles	
Inverter Specification / input		
Nominal input voltage :	12 or 24 v depending on model	
Minimum start voltage :	10 v for 12 v model 20v for 24 v	
Low battery alarm:	10.5v for 12 v model 21v for 24 v	
Low battery trip:	10 v for 12 v model 20v for 24 v	
High voltage alarm:	15.5 for 12v model 30v for 24 v	
Power saver :	below 20 watts when enabled	
Power saver :	Same switched on/off on remote	
Charger Mode specification		
Input voltage range:	196-245 v ac	
Output voltage:	dependent on battery type	
Output current 12 v model :	1500 - 40A 2500 - 70A 3500 - 100A	
Output current 24 v model :	1500 - 20A 2500 - 35A 3500 - 50A	
Battery initial voltage for start up:	0-15v for 12 v x 2 /24v	
Over charge protection shutdown:	15.7 12 v x 2 for 24 v	
Charger curves		
Same as Pro Combi Q		
same		
same		
same		
same		
same		
same		
same		
same		
same		
same		
same		
General Features.		
Remote control.	Front control panel removable as remote	
Size:	185W 180H 430L (1600, 2500) 227W 180H 512L (3500)	
Weight:	1500w 20 kg 2500w 20 kg 3500w 24kg	

General opinion over the last few years was that the quasi-sine wave inverter was dead and the pure sine-wave inverter would rule the world (an opinion not shared by Sterling). Sales of quasi-sine wave inverters have continued to out-grow sales of pure sine-wave, proving that there is plenty of life left in this technology. The principle reason is that most of the equipment such as mobile phones, TVs, drill chargers and all that type of equipment which used to have a problem working with quasi-sine wave tends to now work fine on quasi-sine as the effected equipment tends to use a switch mode power supplies in the design which works fine with quasi sine wave. This meant that rather than the problems getting worse over the years the problems have diminished, however, this is not to say that the odd microwave, drill, vacuum cleaner would not work (if there is a thyristor control circuit employed then this can still be an issue) but there is no question this is becoming more rare as the years go past, plus, it usually is a lot cheaper to replace a £35 microwave to a different model which will work rather than spend £700 on a sine wave model to make it work.

Sterling has invested in a new range of quasi-sine inverters because they are smaller, lower cost, offer better performance, are more efficient and more reliable than sine-wave. We, at Sterling, have always found the quasi-sine wave inverter more than adequate for general requirements in boats and vehicles. There is still the odd appliance, such as washing machines, where quasi-sine wave inverters simply do not work but all in all they do a great job - especially considering their cost. With this in mind, we have made a new range of DIGITAL quasi-sine inverters called the **Pro Power Q**. The idea behind this was to push forward this technology and bring in some new features. The most obvious change in this new inverter is its style, tough aluminum extrusion with great looking plastic end caps. Euro and British sockets are on all this range, enabling the unit to be compatible across Europe without problem. The new extrusion design has allowed us to reduce the size of the 1000-2500 watt units by nearly 40% but still offer their full power and even better performance over the previous models. If you also require a battery charger then look at our new **Pro Combi Q** range.

**ALL THESE INVERTERS ARE
e marked to 95/54/EC**



150 watt oval style is available in 2 versions
112150 = this model is the most popular with a universal socket which can be used for all different plugs round the world.
112150CT = this model has a British socket on one side and a German style socket on the other, this unit tends to be used where companies want to have the inverter standard rated as a mains power source, where in actual fact it is an isolated power supply.

**1000-2700 watt
inc remote control
and 10 mtrs cable**



New turbo coke can inverter:
 The popular 100 watt inverter which can lie flat or fits in a standard coke can holder in cars / lorries / boats now has a new big brother which keeps the same convenient style and application, but now has an internal fan to keep it cool. The end result is that it can produce a comfortable 170 watts. The new turbo model is about 20 mm longer and requires either an open cup holder or a cup holder with at least 5 mm larger diameter than the unit to allow the fan enough room to let the air flow through the product.



I12100

**I12170T
Fan cooled 200 watt**

The quasi sine wave inverter is by far the most popular for the above reasons. All Sterling inverters are continuously rated, with all the usual overload, over voltage and low voltage cut outs, all the inverters come with cable and 24 kt gold connectors, in order to prevent battery terminal corrosion. Available in 230 volts for UK and Europe and also 110 volt for building sites / off vehicle use or for equipment supplied on boats made in the USA (not suitable for washing machine / some bread makers)

230 v 50 hz Quasi Sine wave inverters						
Socket type	Voltage d/c	Power(continuous)	Size L x W x Dmm	Weight	Part nos	
Universal	12	100 watts	65 dia 145	0.2	I12100	
Universal	12	150 watts	100 mm oval 145L	0.3	I12150	
British/Euro	12	150 watts	100 mm oval 145L	0.3	I12150CT	
Universal	12	200 watts	65 dia 145	0.3	I12170T	
British/Euro	12	350 watts	120 x 150 x 65	1.0	I12350	
British/Euro	12	600 watts	150 x 150 x 65	1.3	I12600	
British/Euro	12	800 watts	180 x 150 x 65	1.8	I12800	
1000-2700 watt Inc Remote control and 10 metres of cable						
British/Euro	12	1000watts	180 x 250 x 100	2.0	I121000	
British/Euro	12	1800watts	270 x 250 x 100	4.0	I121800	
British/Euro	12	2700watts	370 x 250 x 100	5.0	I122700	
5000 watt inc remote control , not compact design as above						
British/Euro	12	5000watts	700 x 250 x 250	10.0	I125000	
New High power versions no remote						
Hard wired	12	4000watts	510 x 230 x 155	7.0	IH124000	
Hard wired	12	5000watts	510 x 230 x 155	7.5	IH125000	
24 v versions						
Universal	24	100 watts	65 dia 145	0.3	I24100	
Universal	24	150 watts	100 mm oval 145	0.3	I24150	
British/Euro	24	150 watts	100 mm oval 145	0.3	I24150CT	
Universal	24	200 watts	65 dia 145	0.3	I24170T	
British/Euro	24	350 watts	120 x 150 x 65	1.0	I24350	
British/Euro	24	600 watts	150 x 150 x 65	1.3	I24600	
British/Euro	24	800 watts	180 x 150 x 65	1.8	I24800	
1000-2700 watt Inc Remote control and 10 metres of cable						
British/Euro	24	1000watts	180 x 250 x 100	2.0	I241000	
British/Euro	24	1800watts	270 x 250 x 100	4.0	I241800	
British/Euro	24	2700watts	370 x 250 x 100	5.0	I242700	
5000 watt inc remote control , not compact design as above						
British/Euro	24	5000watts	700 x 250 x 250	10.0	I245000	
New High power versions no remote						
Hard wired	24	4000watts	510 x 230 x 155	7.0	IH244000	
Hard wired	24	5000watts	510 x 230 x 155	7.5	IH245000	
110 v models for UK building sites with remote control and Engine interlock						
Yellow 16 amp	12	1800watts	270 x 250 x 100	2.0	A1121800	
Yellow 16 amp	12	2700watts	370 x 250 x 100	4.0	A1122700	
Yellow 16 amp	24	1800watts	270 x 250 x 100	2.0	A1241800	
Yellow 16 amp	24	2700watts	370 x 250 x 100	4.0	A1242700	

ADVANCED DIGITAL PURE SINE WAVE INVERTER (high quality telecom spec) 150 watt - 2000 watt conventional stand alone inverters 3000 watt with 30 amp a/c crossover switch

We have developed the new Sterling pure sine wave, heavy-duty inverter with very high quality wave form, because most sine wave inverters will not run some sensitive equipment. This inverter ensures all electrical products run at their very best. This model is of telecom output standard, and simply the best. It removes all problems linked with even the so called best pure sine wave inverters. It works perfectly with all sensitive equipment which even so called pure sine wave can cause problems with.

The 2000-3000 watt unit is capable of running a standard washing machine and all thyristor controlled devices which cannot be run by quasi-sine. However, if there is a washer dryer then the 3000 would be best. The units all come with a standby circuit which offers a 0.2 amp consumption with no load and a low online loss of about 1.2 amps if power saver is not engaged.

The remote control is a standard feature that comes complete with a 10 metre connecting cable.



1500/2000 watt
inc remote control

350 watt



200 watt



700/1000 watt

230 v 50 hz Pure Sine wave (telecom standard wave form)					
Socket type	Voltage d/c	Power(continuous)	Size L x W x D mm	Weight	Part nos
Universal	12	200 watts	230 x 120 x 75	1.4	SI12200
Universal	12	350 watts	230 x 120 x 75	1.7	SI12350
British/Euro	12	700 watts	290 x 175 x 80	3.5	SI12700
British/Euro	12	1000 watts	340 x 175 x 80	4.1	SI121000
with remote control (below)					
British/Euro	12	1500 watts	390 x 300 x 100	3.5	SI121500
British/Euro	12	2000 watts	390 x 300 x 100	3.5	SI122000
with remote control (below)					
Universal	24	200 watts	230 x 120 x 75	1.4	SI24200
Universal	24	350 watts	230 x 120 x 75	1.7	SI24350
British/Euro	24	700 watts	290 x 175 x 80	3.5	SI24700
British/Euro	24	1000 watts	340 x 175 x 80	4.1	SI241000
with remote control (below)					
British/Euro	24	1500 watts	390 x 300 x 100	3.5	SI241500
British/Euro	24	2000 watts	390 x 300 x 100	3.5	SI242000
With a/c automatic 16 ms crossover 30 amp a/c					
Hard Wired	12	3000 watts	510 x 280 x 190	14.5	SI123000U
Hard Wired	24	3000 watts	510 x 280 x 190	14.4	SI243000U

ONBOARD ENTERTAINMENT EQUIPMENT INVERTER 400 watt, Pure sine wave (low frequency) With auto cross over switch (U.P.S. FUNCTION)

Dedicated for use with AV systems these models have particularly low levels of noise emissions to which very sensitive equipment can be susceptible. The auto crossover function means that when power is transferred from inverter to another available source, there is no loss of power to the appliances. As a result there is no interruption to operation and clock settings etc are preserved.

Output continuous power 400 watts
Surge rating (5 seconds) 800 watt
Output voltage 230 volts +/- 3 volts
Efficiency 88%
Power draw in stand buy 0 amps



includes
d/c input cables
a/c input cables
plus
remote and 10 meters
cable



230 v 50 hz Pure Sine wave (telecom standard wave form)					
Socket type	Voltage d/c	Power(continuous)	Size L x W x D mm	Weight	Part nos
Universal	12	400 watts	250 x 100 x 85	5.5	SI12400
Universal	24	400 watts	250 x 100 x 85	5.5	SI24400

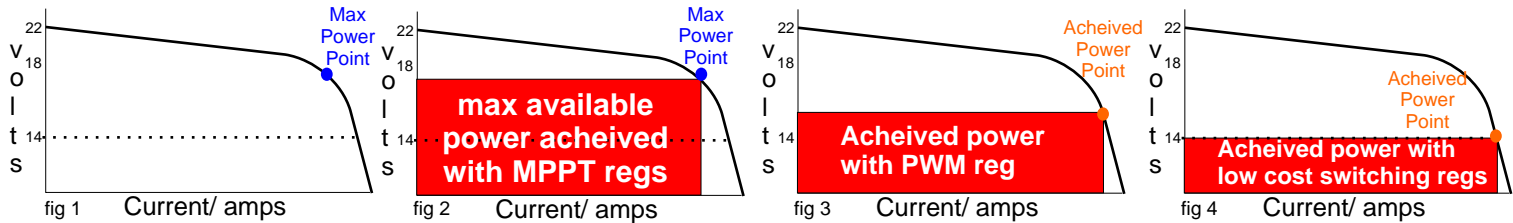
Good Solar cells are very expensive and people who buy and use them want the maximum power they can possibly get from their investment. In order to make an informed decisions as to which type of solar regulator you need then you must understand how a solar cell performs and what is the difference between the 3 main groups of solar regs. As with most things in life, you get what you pay for, a typical 20 A / 12 V solar regulator can vary in price from £20 - 200+, why? Is the £20 as good as the £160 or at least nearly as good or is it a total waste of money?. Its extremely important to know which technology you purchase.

How does a solar cell work and what are the important operational features? . (please note all Sterling regs are waterproof)

As a solar cell is a current making device at a given voltage, the important thing to remember is the basic formula: **Power (watts) = amps x volts.**

Therefore, to get the maximum power out of a device you must have as many volts and amps as possible. If the voltage was allowed to reduce, then the performance and hence the power manufactured by the cells drops off, and same for the amps. Maintaining maximum volts and amps is absolutely critical to achieve maximum harvesting potential of a solar cell .

In order to achieve maximum power form a solar sell we must find its **Maximum Power Point (MPP)** on the solar cells power curve. This is the ideal point where one can best obtain the most power from that solar cell. **Figure 1** is a typical solar power curve which would have an open circuit voltage of about 22 V but a best power performance voltage at about 17 V. In order to maximise the available power from the solar cell one must maintain the maximum power point and not allow the voltage to drop. The only way to achieve this is to make sure that the solar cells voltage is allowed to float free of the restrictions placed by the battery voltage. I.e. the battery voltage maybe 13.5 V but the maximum power point could be 17 V and, if the solar cell voltage is allowed to be pulled down to



the battery voltage (fig 3 below) you can clearly see that a lot of the positional power which is actually available (fig 2) is in fact not able to be manufactured and as such the achievable power is vastly reduced. **Figure 2** shows the amount of power which can be obtained (in red) which is the maximum volts x amps if the cell was free from the battery restrictions (12 v) and allowed to rise up to its ideal operational voltage (17 V) . However, if the battery's voltage is allowed to pull down the solar cell voltage, such as the case in low cost PWM (fig 3) or Switching regs (fig 4) they have a direct connection between battery voltage and the solar cell voltage and thus limiting the performance of the solar cell, only achieving 50% (if even) of the potential of the solar cell itself. So, as you can see, to use a low cost regulator on an expensive solar cell can be a waste of money and you will lose 50% of the cells ability, this is a false economy except is limited applications , it's a bit like buying a Ferrari and putting tractor wheels on it, all the potential of the Ferrari would be neutralised.

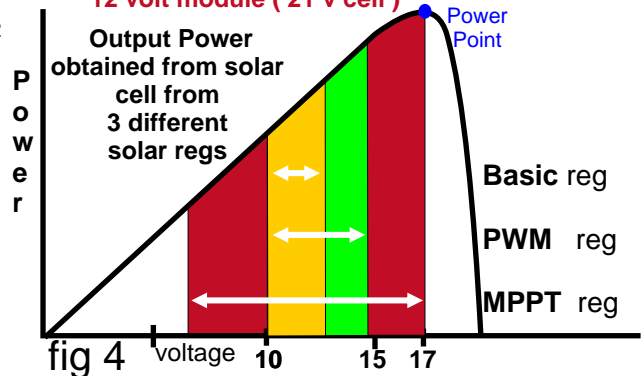
Other key things to think about with solar regs.

Remember a solar cell only works for about ½ a day (if even) . However, the solar regulator works for 24 hours regardless of whether the solar cell is producing power or not (night or cloud cover). So, the key question is, **what power does the regulator use to exist (we call this the quiescent current)?**. With most solar regulators this averages from 25-50 mA (on a 12V system). That means, for example, a 50 mA drain over 1 years is about 430 amp hours. However, at Sterling, we try to keep the quiescent current below 1 mA, this means the loss in current over the year would be more in the region of 8 amps not 430 amps. Therefore, 422 amp hours, which would otherwise have been wasted running the regulator can effectively be harvested and passed into the battery system. Low quiescent power consumption is achieved by the use of a more expensive micro processing chip set, some manufactures are reluctant to spend the money on this type of device. Obviously other features which are of vital important are 4 step battery charging and the ability to select the different battery types being charged. This ensures the best charging curves for the battery and also prevents damage to battery bank.

3 main types of solar regulators.

1) **Basic regulators.** These are simple switching devices which switch between 2 voltages, typically they come on at about 12.9 volts at the battery and switch off at about 14 volts (x 2 for 24 V) , this is effective at covering power loss from the battery but will not charge well or effectively use the maximum power potential form the solar cell, which for a lot of applications is absolute fine. Ideal for low cost 10-100 watt low quality solar cells. The ideal use for this type of reg is, for example, if you had a motor home or a small boat on a swinging mooring and a small solar cell who's only job was to keep the starter battery topped up when vehicle / boat is not in use, then this product is perfect, a low cost cell and low cost switching regulator will do the job. However, if you have a good quality, expensive solar cell, who's job is to effectively and efficiently contribute useful power into a system then this type of regulator would be a very poor choice indeed, as such we limit the range of this product as to use this technology on larger cells simply makes no sense . **Advantage:** very low cost. **Suitable for:** Low cost cells where the objective is simply keeping a relatively inactive battery topped up (such as a starter battery) as opposed to contributing useful power into a system. **Disadvantages** , very ineffective at maximising the harvest from a solar cell. **(Please note the Yellow section on the Power curve graph)**

Power Curve for a standard solar cell 12 volt module (21 v cell)



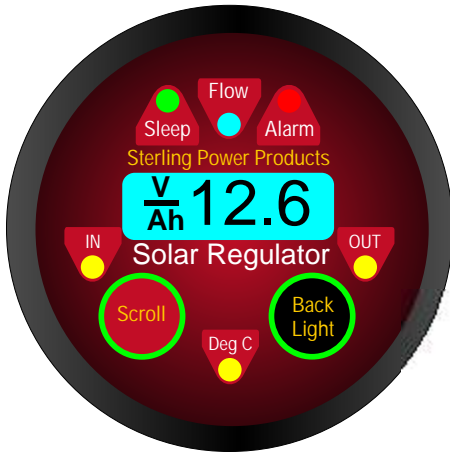
2) **PWM.** Pulse Width Modulate regulator. (mid range cost, mid range performance) this type of regulator is still connected to the battery bank and is still under the influence of the battery voltage. However, the pulse width modulation allows the cell voltage to rise a bit further but it is still restricted because of its direct connection to the battery bank. Its performance is better than the basic regulator type but still falls short of achieving the maximum available power. The lower the battery voltage (i.e. a battery could drop to 11 volts), where maximum power is required, the less efficient this product is. This can be seen in **figure 4**, where by as the voltage drops the power does also. Other weakness with PWM controllers is the fact that solar cells open circuit voltage changes with temperature. The colder the cell is, the higher the open circuit temperatures and vice versa, this is important to ensure that the large voltage swings from the solar cell are within the rating of this type of product. This type of regulator is not recommended for use with 'on grid' systems as there is still significant inability to achieve maximum power. They are best used on 'off grid' systems. **Advantage:** Mid range harvest return from the solar cell, works fine especially in good sun conditions, **Disadvantage:** no boost ability so not good in lower light (Northern European use) , **Please note on Power curve graph, the power harvested would be the Yellow plus the Green section.**

3) **MPPT.** Maximum Power Point Tracking regulators: (latest technology and most expensive type) up to 40% improvement on top of the PWM, which is about 70% on top of the basic unit. These, in effect, disconnect the solar cell from the battery bank to allow it to 'run free of the battery' and obtain its best performance. This means, in effect, you have 2 separate units, the solar cell side, which is allowed to operate free from the battery voltage restrictions, so the software can continually track and determine the most effective maximum power point that the cell can achieve at that moment in time, depending on weather and other environmental factors, such as temperature. That side of the product is 100% geared to maximize the harvesting of the suns energy. This also allows for different cell ratings to be used with different voltages and high temperature swings with no adverse effects and no setup required. The big advantage of the MPPT is that the battery and the solar cell are not directly connected. This allows the battery charging side of the regulator free to concentrate on the battery / power requirements and effectively use the power available from the solar cell. The power is delivered to it via a highly efficient power conversion process, which not only maintains the max power point (MPP) in the higher voltage levels (when the sun is out) but continues to generate power even under low light conditions when the MPP is below the battery voltage (see fig 4) as the MPPT has a **voltage boost function**. This boost functions allows the device to effectively absorb that last little bit of power that can be obtained from the solar cell. Not only is this an effective function on a day to day basis, but, over time, if the cells become damaged, dirty or less efficient the MPPT continues to pull the power when a normal reg will have long since stopped working. Unlike a PWM regulator, an MPPT can be used with 'on' or 'off' grid systems. This system is also easy to install as there is no setup depending on different cell types or environmental temperature, making it totally automatic .

Advantage: Maximum performance from cell, low light / dirty cell operation when all other units have become ineffective. **Absolutely necessary for:** Large solar cells 100 watt + where every bit of possible power is required to be harvested, from 100 watt - 1000 watt **Disadvantages** , higher cost. **Please note on the Power curve graph the this technology will harvest between the Red, Yellow and Green sections**

Remote control allows access to all the relevant information, the panel comes complete with a 10 meter telephone type extension lead. The meter is in a standard 450 mm threaded housing. This is an optional product and is not required for the operation of the main products

remote control



52 mm hole cut

Small Switching Regulator



70mm x 70mm x 60mm H

Solar remote control readings

- 1) Input voltage from cell
- 2) Output voltage to battery bank
- 3) Current generated flowing to battery bank
- 3) water proof display, encapsulated electrc
- 4) 24 amp hr manufactured
- 5) Unit temperature
- 6) Sleep over ride for information
- 7) Information scroll option
- 8) Back light option
- 9) Little power consumption when on sleep
- 10) Power manufacturing Flow indicator
- 11) Battery Temperature



solar



PWM & MPPT

150 mm Long x 110 mm Wide 120 High

Switcher Reg continuous	Max solar cell Power Watts	Max solar cell open circuit voltage	Quiescent current Draw in ma	4 step Charging	Battery Type selection	Remote Option	Sterling Part Number
12 v 2 amp	70	30 v	0.0 mA	no	no	no	SB122
12 v 10 amp	160	30 v	0.5 mA	no	no	no	SB1210

PWM (Pulse width modulated)							
12 v 15 amp	160	30 v	<1mA	yes	yes	yes	SPWM1215
12 v 30 amp	320	30 v	<1mA	yes	yes	yes	SPWM1230
12 v 60 amp	680	30 v	<1mA	yes	yes	yes	SPWM1260
12 v 90 amp	1000	30 v	<1mA	yes	yes	yes	SPWM1290
24 v 10 amp	250	60 v	<1mA	yes	yes	yes	SPWM2410
24 v 30 amp	700	60 v	<1mA	yes	yes	yes	SPWM2430
24 v 50 amp	1100	60 v	<1mA	yes	yes	yes	SPWM2450

MPPT (Maximum Power Point Tracking)							
12 v 15 amp	160	30 v	<1mA	yes	yes	yes	SMPPT1215
12 v 30 amp	320	30 v	<1mA	yes	yes	yes	SMPPT1230
12 v 60 amp	680	30 v	<1mA	yes	yes	yes	SMPPT1260
12 v 90 amp	1000	30 v	<1mA	yes	yes	yes	SMPPT1290
24 v 10 amp	250	60 v	<1mA	yes	yes	yes	SMPPT2410
24 v 30 amp	700	60 v	<1mA	yes	yes	yes	SMPPT2430
24 v 50 amp	1100	60 v	<1mA	yes	yes	yes	SMPPT2450

Remote control option for PWM and MPPT only SRC

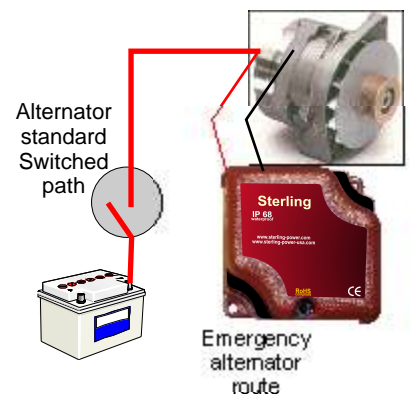
Alternator open circuit protection device

IP68

Alternator protection unit

One of the largest destroyer of alternators in the marine world is when a cable comes lose or a fuse blows or an engine is electrically switched 'off' when the engine is running, all these things cause an alternator to be disconnected from the battery while running, this, in turn, causes a massive spike in the alternator which, in turn, can easily destroy the alternator regulator and any other advanced regulators in use, the resulting bills can easily run into the hundreds of pounds, to avoid this, this simple device protects your alternator from that spike offering a simple safe emergency route for that spike to be discharged giving full protection to the alternator regulator with no back feed up the device. This unit is simple and easy to fit with no intrusion on the standard system. The unit does not carry the main current so only light wiring is required. This unit works in conjunction with any alternator or splitting device suitable for 12 or 24 v alternators:

	Size	Weight	Part nos
Alternator protection device(12v)	90 x 90 x 60 H	0.25	APD12
Alternator protection device(24v)	90 x 90 x 60 H	0.25	APD24



Automatic / Manual a/c Power selector switch

3 input 32 amp 110/230 v a/c auto selector with remote control



Make your own combi tailored to your needs

Generator

(UP TO 8000 WATT CONTINUOUS
32 AMP 230 VOLT A/C , FUSED ,OR OTHER SOURCE)

Inverter

(UP TO 8000 WATT CONTINUOUS
32 AMP 230 VOLT A/C ,FUSED, OR OTHER SOURCE)

Shore Supply

(UP TO 8000 WATT CONTINUOUS
32 AMP 230 VOLT A/C , FUSED, OR OTHER SOURCE)

Boat/vehicle electrics

Pro switch 32 amp 110-230 v a/c auto crossover

Description	Part nos
Main control box	AC32A
Extra 230 v 20 amp contact relay	CON1

The new simple power selector offers many new features not available on the older 16amp crossover switch, due to its digital control system.

- 40 amp internal contractors** : Switches live and neutral with a 0.25 sec time delay between switch 'off' and 'on', to prevent wave doubling of the voltage and destroying sensitive equipment.
- Multiple internal power sources** : The system powers itself from each attached power supply; and not from the boats/vehicles D/C system. This is to ensure the system will work even if your batteries are flat. There is no point having an A/C selector switch powered from the D/C system, because if the D/C system fails then you cannot switch the system onto charge the batteries. The Sterling system obtains its control power from each input source, so preventing this problem.
- Sequential switching** : The unit has a simple operation mode; channel 1 is the priority, then channel 2, then 3. In other words if you allocate the inverter to channel 3 then plug in the shore power on channel 1, the switch will automatically switch the system to the shore power etc.
- Lock out circuit** : It is assumed that channel 3 would be your inverter (it could be another power supply depending on how you wire the system up). With a lower power inverter you may not wish your immersion heater or battery charger to work when the inverter is on line; so connected to this circuit is a small relay which can break the control circuit on an external contactor /relay block. This then allows you to wire the battery charger and

- immersion heater to a separate connector block, preventing these items being online when the inverter is operational.
- Remote control** : The remote control will tell you which circuit is the current power circuit; and, if the light is flashing, then it will also show if power is available on another circuit. There is also a fault light.
- Faults / Reverse polarity check**: The unit will show if there is a reverse polarity on channel 'A' which is assumed to be the shore supply system.
- Internal fuses** : The control box has 6 internal fuses; one on each live and neutral, so that even in the event of a reverse polarity the neutral line is also fused for safety reasons.
- Remote on/off**. This switch enables the shore power to be switched 'off' (the priority circuit) in the event of the shore power not being powerful enough to do a specific job, for example, if your shore power was limited to say 5 amps (about 1.2 KW) but your immersion heater/washing machine may be 3000 watt, you may wish to shut down the shore supply and allow the more powerful inverter or an onboard generator to do the job.
- 230 V or 110 V** or a mixture of each can be used at the same time, ensuring operation in all the worlds different power supply conditions.
- Other features** includes a 10 sec time delay on the generator line to allow generator start up.

230 V manual 16-30-50 amp 3 way cross-over switch

ideal where 3 power sources are used such as inverters, shore power and generators on a boat/vehicle

Easy to install
Front panel waterproof
Easy to use
Supplied with 2 shafts
for thin panel mounting
and 1/2" panel mounting



Pro switch 32 amp 110-230 v a/c auto crossover

Input sources	Output	Continuous Amps	Max Voltage	Number of poles	Part nos
3	1	20	300	3	SC20A
3	1	32	300	3	SC32A
3	1	50	300	3	SC50A

Power Management Panel 4 X AMPS , 4 X VOLTS, AND 1 X Amp Hr Counter

The latest software driven Power Management Panel is an extremely effective unit designed to monitor and display all the vital electrical information on an average boat. This enables important (potentially expensive) decisions to be made regarding faults and general on-board D/C electrical power management. The information obtained also helps any third party engineer to identify problems.

The operation of the panel is based on 100 mV shunts. Shunts enable all current measurement to take place remotely from the instrument clusters, thus removing all the voltage drop and R.F.I. problems associated with running heavy duty cables up to a control panel and navigation instruments.

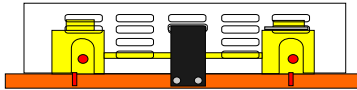
The new panel has a built in amp hour counter on one channel, and in total enables 4 different amp readings, 4 different volt readings, and one

amp hr counter. **The shunts of the system can be fitted in negative or positive cables (unlike most others).** The counter counts the amps going into and out of the battery system. The amp hour counter setup and function are completely automatic and requires no intervention from the user.

The background light ensures perfect legibility in daylight, direct sunlight and at night. Each panel comes complete with a 200 amp shunt, (up to 3 extra shunts may be purchased) and a list of labels for the panel front. The plastic box can either be surface or flush mounted by using the new parts.

Power Consumption = 0.5 mA off/0.7 mA on
 Max readable current = 199 A D/C
 Max display volts = 199 V D/C
 Safe to over 1000 amp surges
 L.E.D. Background light.
 amp hr ctr up to 7999 amps
 Screen = 16 digit 2 line L.C.D.
 Back light/switched
 Accuracy = + or - 1%

Extra Shunts available, 200 + 400 amp,

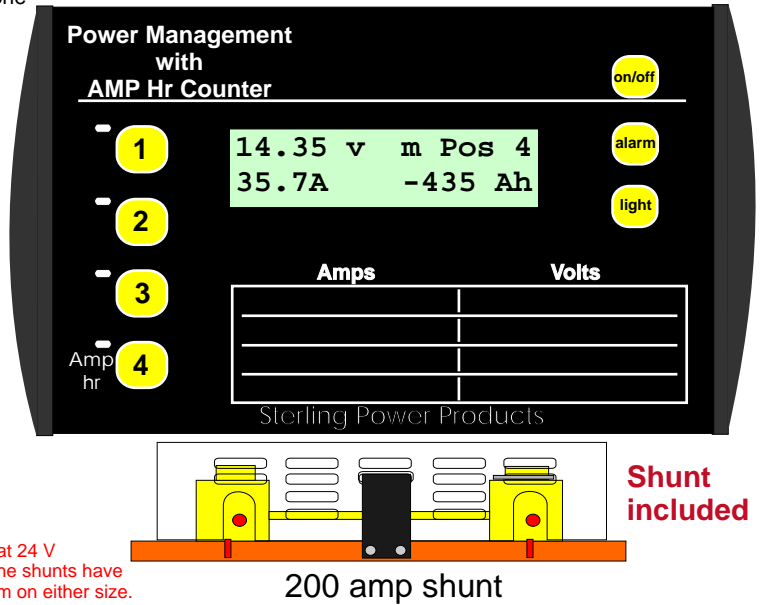


200 amp shunt = 200Lx40Wx50H
 400 amp shunt = 260Lx55Wx50H

Power Management Panel with Amp Hour Counter
 (Includes 1x 200 amp brass shunt)

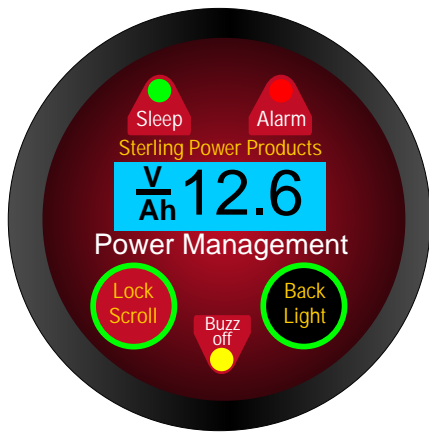
Power Management Panel			
D/C voltage	Size L x W x D mm	Weight kg	Part nos
12 & 24	170 x 90 x 40	0.25	PMP1
Extra 200 amp shunt			S200A
Extra 400 amp shunt			S400A

A 200 amp shunt is suitable for inverters up to about 2000 watts at 12 V / 4000 at 24 V the 400 amp shunt is suitable for inverters up to about 4000 watts at 12 volts. The shunts have a very high instant load ability, i.e. 1000 amps to start an engine etc. is no problem on either size.



Amp -Volt-Amp hr counter

IP68



52 mm hole cut



300 amp and 400 amp model
 145mm x 80mm x 90mm high

Key Functions over competitors:

By use of intelligent shunts, this unit can be used on Negative or Positive cables making the unit extremely flexible, epoxy encased for water protection and anti vibration. LCD screen independently supported for strength.

Functions:

- 1) Voltmeter 0.1-35 v
- 2) Ammeter 0.1-999 (depending on shunt)
- 3) Amp hr counter up to 999,
- 4) Suitable for up to 2000 amp hrs battery bank (1200 amp hours for lithium)
- 5) Power consumption on sleep (unit still counting) = < 1mA
- 6) Power consumption active (screen working no back ground light) = < 2mA
- 7) Power consumption with background light = 10mA
- 8) Back ground light changes colour depending on activity.
 Green (within parameters) Blue (charging)
 Red (low battery requiring attention)
- 9) Adjustable buzzer alarm , can be deactivated
- 10) Comes preset to use with no adjustments
- 12) Fully adjustable, alarms and warnings
- 13) Readings can be locked or allowed to scroll
- 14) Background light switchable
- 15) 12/24 v unit auto

Intelligent shunt: Rather than putting the brains of the operation in the remote multimeter the intelligent shunt process all the information at the shunt. This ensure accurate digital streaming upto the remote control ensuring no corruption of the data; this also reduces the size of the remote control .

Specification:

12-24v base voltage
Quiescent current:
 with no display active (sleep mode)
 with display active
 with display active and background light
 Voltmeter 0-36v
 ammeter 0-999 amps
 ammeter accuracy between:
 0-1 amp 0.1 amp resolution
 10-100 amps 1 amps
 100-888 10 amps
 Amp hr capacity 999 amp hrs, suitable for up to 1800 amp hr battery bank
 Amp hr accuracy +/- 2%

Product	Continuous current	Overload ability	Part Nos
Panel Meter (no shunt)			PM1
100 amp shunt	100 amps	400 amps	PMS100
300 amp shunt	300 amps	900 amps	PMS300
400 amp shunt	400 amps	1500 amps	PMS400
Panel meter with 100 amp shunt			PM100

High power performance alternators

12 v 200 amp

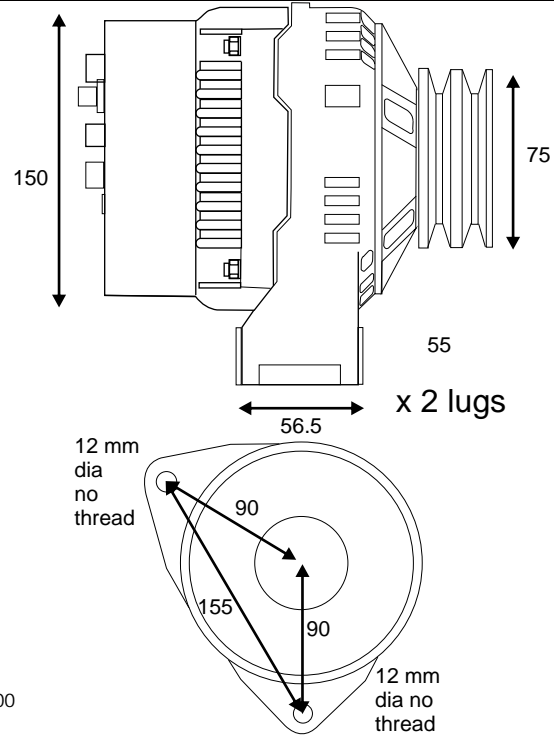
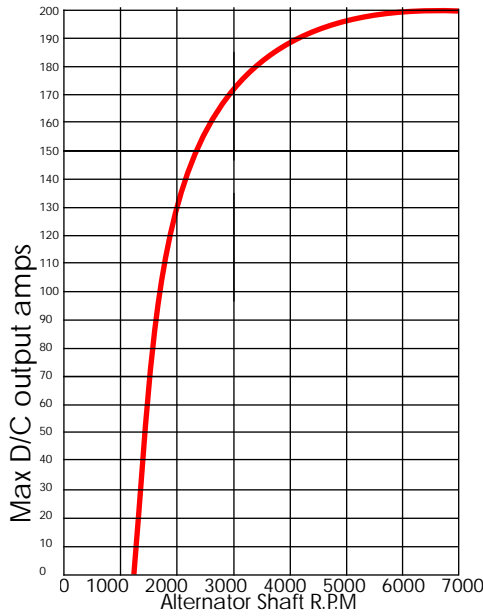
GOOD LOW R.P.M. PERFORMANCE

Description

12 v 200 amp alternator with standard reg
12 v 200 amp alternator with standard & PDAR

Part nos

AL12200
AL12200PDAR



12 v 145 amp

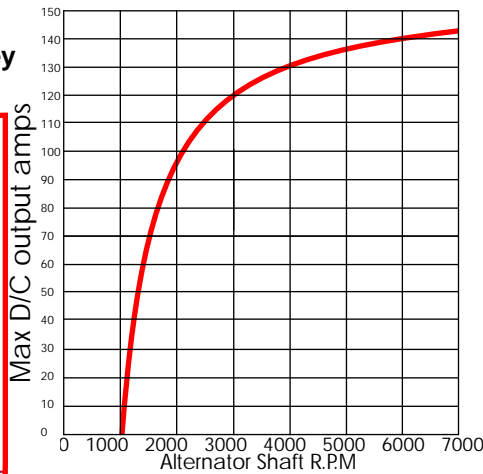
GOOD LOW R.P.M. PERFORMANCE
alt supplied with multi v and twin v pulley
photo shows multi v



CS144 Delco



PDAR
DIGITAL 4 STAGE
ADVANCED
ALTERNATOR
REGULATOR

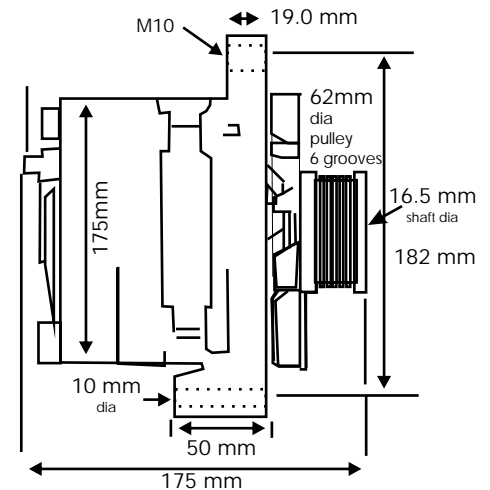


Description

12 v 140 amp alternator with standard reg
12 v 140 amp alternator with standard & PDAR

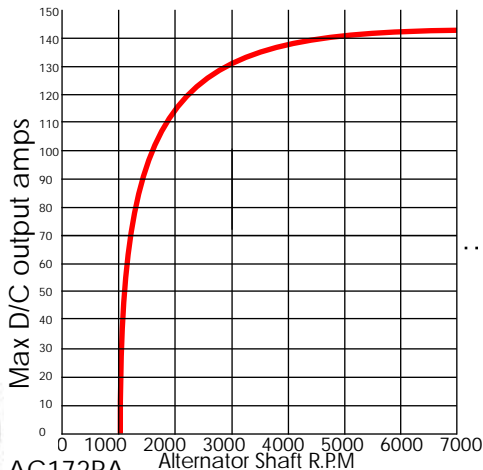
Part nos

AL12140
AL12140PDAR



24 v 140 amp

GOOD LOW R.P.M. PERFORMANCE



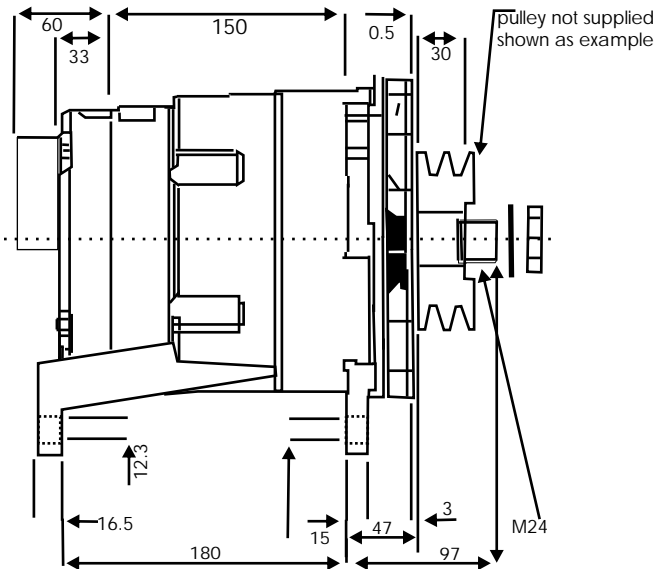
AC172RA
Bosch 0120 689 520
Prestolite 1277640
Equivalent product part numbers

Description

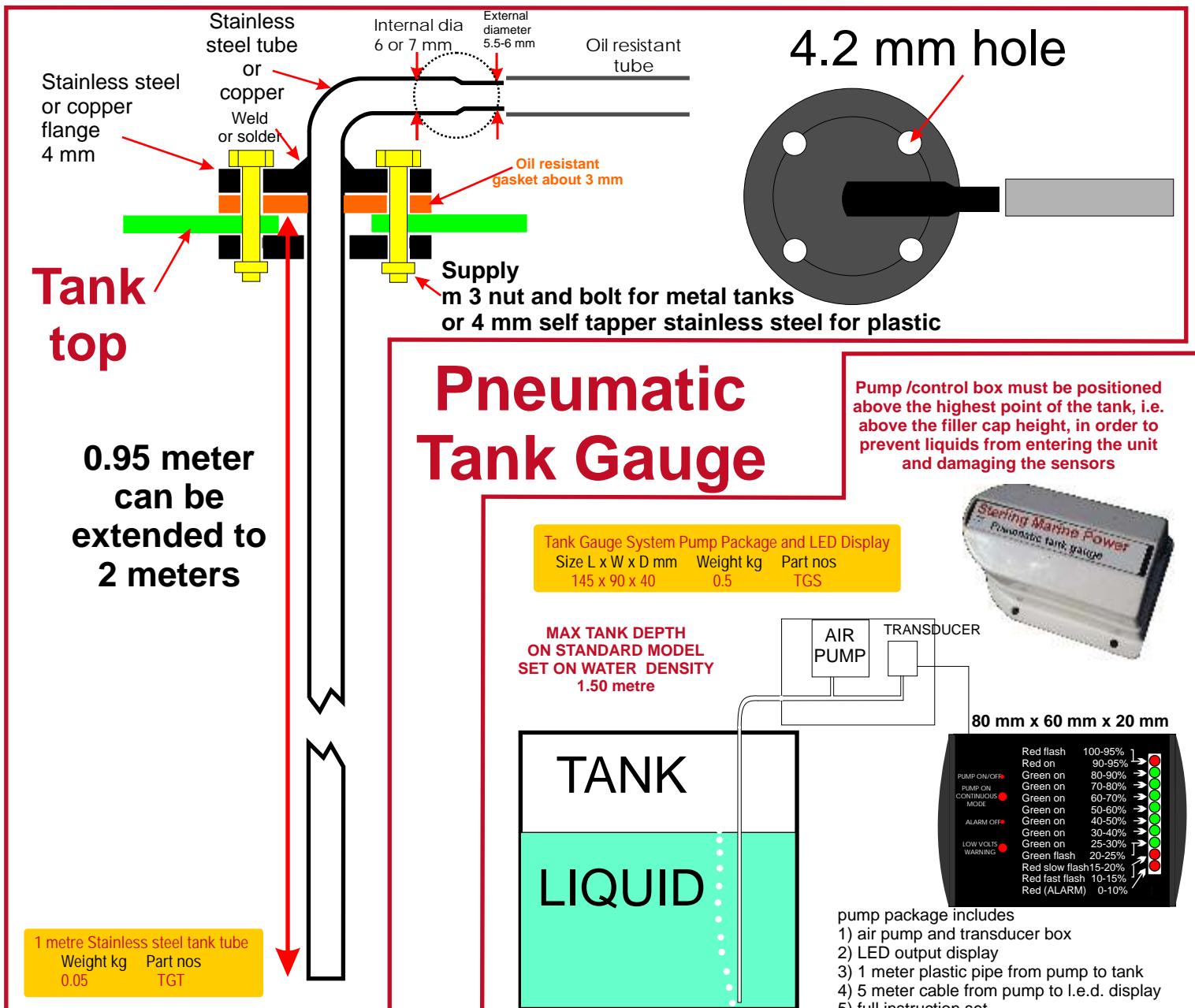
24 v 150 amp alternator with standard reg
24 v 150 amp alternator with standard & PDAR

Part nos

AL24140
AL12140PDAR



Pneumatic tank gauge system



The problem:
Most boats suffer badly from unreliable tank level gauges, this is a particular problem with dirty water tanks. The main problem is the corrosive nature of the salt water in the tank and the fact that float meters are damaged in the tanks.

The solution:
The measuring device must not be effected by the movement or the corrosive nature of the fluid it is measuring. The best way to achieve this is the way ships and other quality tank meters work by using pneumatics. This has always proved too expensive to miniaturize for leisure craft use until now .

How does it work?
The new Sterling gauge works on a very simple principle. If you put a small tube to the bottom of any liquid, then pump air through the tube to remove all the fluid from it, then the atmospheric pressure or back pressure on the liquid is directly proportional to the depth of the liquid (taking density into account). For this to work, we need a simple pipe (approx 2-3 mm diameter) from the top to the bottom of the tank, then pump air through the pipe and measure the back pressure of the air (the transducer) and display it on a display panel. Simple? Well not that simple, we need a compressed air pump with a complex software program control to reduce power consumption to milliamps and to return a highly accurate reading, all at a sensible cost .

The Sterling Tank Gauge is a fully programmable system, where you program in the following information, 1) tank depth 2) fluid density (water, diesel, dirty water, petrol) 3) operation mode (i.e. a water or fuel tank would require the alarms etc to go off when the tank is empty, but a dirty water tank would require its alarms when it is full) with these three pieces of information simply connect the unit to a pipe which is about 10 mm off the bottom of the tank and the L.E.D. display will give a good indication of the depth. For a more accurate analysis the L.E.D display can be connected to the optional L.C.D display which will scan up to 8 tanks and display the depth in % full in rotation, when the fill button is pushed on the tank, for example tank 6, then the L.C.D. display will lock onto that channel.

The system must only be used where the pump sensor unit can be fitted above the level of the highest point on the tank system, i.e. above the height of the deck filler system or a U bend in the tube going above the filler, i.e. in an over fill condition liquid must not run into the unit.

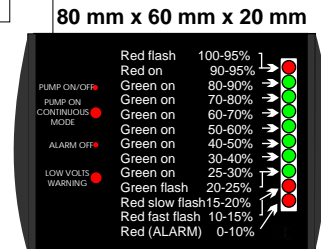
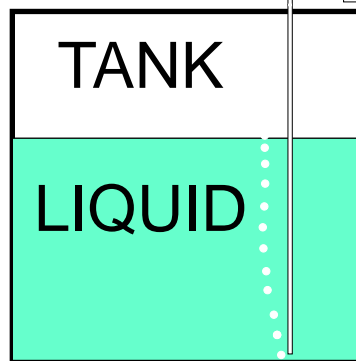
Quick check list

- !No moving parts in the tank
- !No electricity in the tanks
- !Cannot stick corrode or jam up
- !Not effected by any corrosive fluid
- !Easy to replace or repair if faulty
- !No need to test (set up in software program)
- !Very accurate
- !Alarms adjustable both ways
- !Set for water, diesel, petrol, sea water
- !Voltage 8-32 volts
- !Self cleaning
- !Local and remote readings

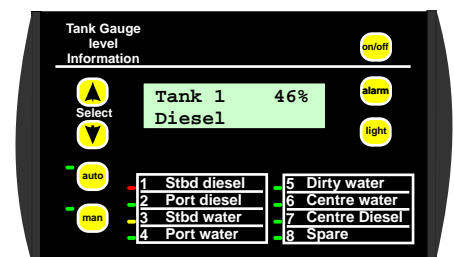
Pump /control box must be positioned above the highest point of the tank, i.e. above the filler cap height, in order to prevent liquids from entering the unit and damaging the sensors



MAX TANK DEPTH ON STANDARD MODEL SET ON WATER DENSITY 1.50 metre



- pump package includes
- 1) air pump and transducer box
 - 2) LED output display
 - 3) 1 meter plastic pipe from pump to tank
 - 4) 5 meter cable from pump to l.e.d. display
 - 5) full instruction set



- Multi tank gauge kit includes
- 1) 8 tank LCD reader / scanner panel
 - 2) selection of sticky labels with tank names
 - 3) 2 x 10 meter cables for 2 tanks
- extra tank cables can be purchased

Tank L.C.D. Display Scanner Unit
Size L x W x D mm Weight kg Part nos
90 x 60 x 20 0.2 TGM
Extra 10 metre of cable for pumps TGL10M
Extra 5 meter of cable for pumps TGL5M

Voltage sensitive relay

Modern VSR must be adjustable to deal with the different voltage characteristics of different battery type, standard lead acid batteries have a low surface voltage of about 12.8 volts meaning the standard voltage sensitive relays are fine for this application, and the default setting is set for this battery type. However AGM, Gel and Lithium batteries have a much higher surface which will require adjustment, their voltage is as high as 13 volts, this makes stand relay setting incorrect and will require the thresholds to be adjusted up. This new lower cost unit allows adjustment using a unique magnetic lid and a reed switch allowing the unit to remain IP68 but give the operator total flexibility. This unit is fitted with the latest on/off algorithms to prevent unnecessary switching, and has an extremely low quiescent current on less than 1 ma

What size of relay do I require.

To match a relay to your system the important things are

- 1) Ensure the amp ratings of the relay 10 - 20 % larger than the largest charging source,
- 2) Ensure no load on the secondary battery bank exceeds the rating of the relay when on, in the event of having a large load such as a 2000 kw + inverter, anchor winch or bow thruster then please look at our range of **Current Limiting Voltage** sensitive relays to deal with these high loads .

If the relay is to be used on a battery bank with a solar cell which is required to charge other batteries when the engine/battery charger is off then please look at the **Latching Relay** products as this is more suitable for that operation



88 x 90 x 90 high

Preset voltage on 13.3
off 13
Quiescent current 0.001 amps
Online current 0.2 amps

Product	Continuous current	Overload ability	Part Nos
80 amp 12/24v	80 amps	200 amps	VSRB80
160 amp 12/24v	180 amps	400 amps	VSRB160

Key features

- 1) 12/24 v auto select
- 2) IP68 waterproof
- 3) Factory pre set but fully adjustable on 13.3 off 13.0 (x 2 for 24 v)
- 4) Magnetic lid for voltage adjustment
- 5) On adjustable range 11-15 v (x 2 for 24 v) off adjustable range 10.5 - 14.7 (x 2 for 24 v)
- 6) Force select ability to override auto control

Ancillary equipment

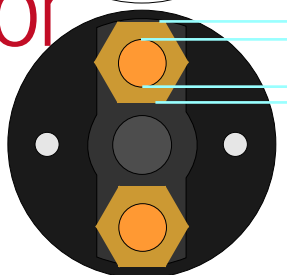
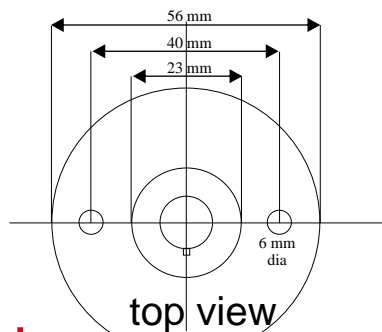
200 amp continuous
1000 amp overload
water proof cover
rubber boots for main cables
2 keys



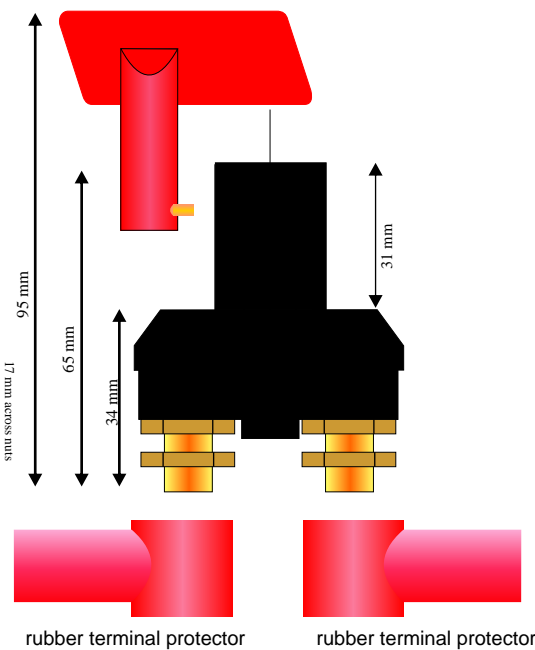
200 amp Battery isolator Pro Isolator	D/C amps	Weight kg	Part nos
	200	0.1	IS200

Pro Isolator

pre-boxed ready for shelf



bottom view



rubber terminal protector

rubber terminal protector

Electrical Specification: Meets IEC 1010 CAT111
D/C voltage 0-200 volts overload protection 600V
A/C voltage 0-500 volts overload protection 600V
D/C current 0-600 amps overload protection
A/C current 0- 600 amps overload protection
Resistance 0-200 ohms overload protection 400V
Continuity beeper
Data hold function
A/C frequency response from 40-400 Hz
A/C speck tested on sine wave 50/60 Hz
Compact yet heavy duty



D/C Clamp metre

D/C Voltage Probe & Diagnostics Tool

At first glance this low cost D/C voltmeter looks like any other one available anywhere, however, on closer inspection you will see it is not. Standard voltage probes only go to 14 volts and is unable to inform you if the advanced charging cycle is in progress or a system has failed and is overcharging your system. The extra 2 LED's are preset to give more useful information than the very limited standard ones. This is a Sterling product and is not available anywhere else. Available in 12 and 24 volt versions.



D/C Voltage Probe and Diagnostic tools			
D/C voltage	Size L x W x D mm	Weight kg	Part nos
12	100 x 20 x 15	0.25	TM12V
24	100 x 20 x 15	0.25	TM24V

D/C clamp metre plus multi meter		
Size mm	Weight kg	Part nos
160 x 35 x 25	0.1	CLAMP1

BATTERY TERMINALS sets (come in pairs)



All products are precision machined from solid brass with a 24Kt gold finish. Do not confuse with lower cost zinc-lead alloy die-casting.

GBT-600PN	GBT-1000PN	GBT-100PN	GBT-700PN
8 mm bolt 80g	10 mm bolt 100g	8 mm bolt with WING NUT 110g	10mm CABLE CLAMP 95g

SOLID BLOCK POWER DISTRIBUTION



Ideal for negative returns

GPB-102468	GPB-1044	GPB-2488
CABLE DIAMETERS 1 X 12 mm 2 X 10 mm 6 X 8mm 407g	CABLE DIAMETERS 1 X 12 mm 4 X 10 mm 431g	CABLE DIAMETERS 2 X 10 mm 8 X 8mm 232g

FUSE BLOCK SERIES FUSE TYPE AMT RANGE 20-80A 0-32 V MAX



Ideal for fused high current positive distribution fused outputs

GMFB 4848	GMFB 3448	GMFB 2828	GMFB 1428
4 X 6mm IN AND FUSED OUT 320g	3 X 10 mm IN (SOLID) 4 X FUSED 6mm OUT 320g	2 X 6mm IN AND FUSED OUT 170g	1 X 10 mm IN 2 X 6 mm OUT 170g

FUSE BLOCK SERIES FUSE TYPE ATQ RANGE 3-35A 0-32 V MAX



Ideal for lower current positive distribution fused outputs

GATC 4848	GATC 3448	GATC 2828	GATC 1428
4 X 6 mm IN AND FUSED OUT 220g	3 X 10 mm IN (SOLID) 4 X 6 mm FUSED OUT 223g	2 X 6 mm IN FUSED OUT 115g	1 X 10 mm 2 X 6 mm FUSED OUT 115g

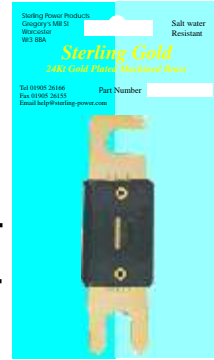
FUSE BLOCK SERIES FUSE TYPE AUE 1-80A 0-32 V/125V/250V



Positive fuse distribution where ignition protection regulations apply for R.C.D or U.L directives

GFB 3448	GFB 4848	GFB 2828	GFB 1428
3 X 10 mm IN (SOLID) 4 X 6 mm FUSED OUT 410g	4 X 6 mm IN 4 X 6 mm FUSED OUT 371g	2 X 6 mm IN 2 X 6 mm FUSED OUT 203g	1 X 10 mm IN 2 X 6 mm FUSED OUT 228g

24Kt Gold Plated



* All pre-packed *

* All pre-packed *

SINGLE FUSE BLOCK SERIES FUSE TYPE ANL 60-500A 0-32 VOLT



Used for large inverter's, bow thrusters, engine feeds and any other high current application

Waterproof unit UL approved

GANL 1	GANLW 1
1 X 12 mm IN 1 X 12 mm FUSED OUTPUT 290 g	1 X 12 mm IN 1 X 12 mm FUSED OUTPUT 340 g

SINGLE IN LINE FUSE HOLDERS FOR AUE FUSE



GFH-04-1	GFH-168	GFH-80
Single AUE fuse holder 10mm cable with eye Bolt for battery terminal 50g	Single AUE fuse holder 10 mm cable in and fused out 50g	Single AUE fuse holder suitable for ring terminals comes with 80 amp fuse plus spare fuse in internal holder can be used with all AUE fuses 50g

NEW RING CONNECTOR TYPE



GMFBR	GFBR	GANLR	GPRB
4 X Holder for RESET FUSE and AMT fuse range	4 X holder for AUE fuse range	Fuse holder with ring terminals for GANL fuse	Solid connector block with ring terminal connectors

FUSE SERIES 24 KT GOLD PLATED



ATQ /? AMPS	GANT /?AMPS	GAUE /?AMPS	GAUE-L /?AMPS	GANL /?AMPS	GF?AM
3A VIOLET 5A TAN 10A RED 15A LT BLUE 20A YELLOW 30A LT GREEN 35A PURPLE	20A YELLOW 30A LT GREEN 40A ORANGE 50A RED 60A LT BLUE 70A TAN 80A CLEAR	2A 4A 6A 10A 15A 20A 25A 30A 40A 50A 60A 70A 80A	Built in light which lights up when fuse blown 2A 20A 4A 25A 6A 30A 10A 40A 15A 50A 60A	Mica window 80A 250A 100A 300A 150A 350A 200A 400A 500A	RESET FUSE (MANUAL) NOT GOLD PLATED 5A 10A 15A 20A 30A

THE PROBLEM:

Recent interest in damage done to boats due to the 230V shore mains has highlighted the need to fit a galvanic isolator to your boat.

In order for modern boat builders to comply with modern CE standards such as EN ISO 13297 they must fit the shore earth wire to your boats bonding system which is also connected to the hull / anodes / fuel tanks / engine blocks / shafts / propellers / stern tubes / rudders / rudder glands / water intakes / etc. This ensures that any 230V mains faults will operate the R.C.B on the boat in order to save your life.

The down side of these standards is that electrically speaking your boat is now connected to the rest of the boats in the marina and any other metal structures in the area. Electrically speaking they become one and the same. If you follow the earth line you can see everything bonded to the earth, this includes your boat, the one next to you, metal work etc. This results in two main problems.

1) Any earth problem on any boat or shore earth will increase the voltage in the common earth cable and dissolve- adversely effecting your boat by dissolving your anodes at an alarming rate (this could result in the total loss of all the metal on the boat below the waterline)

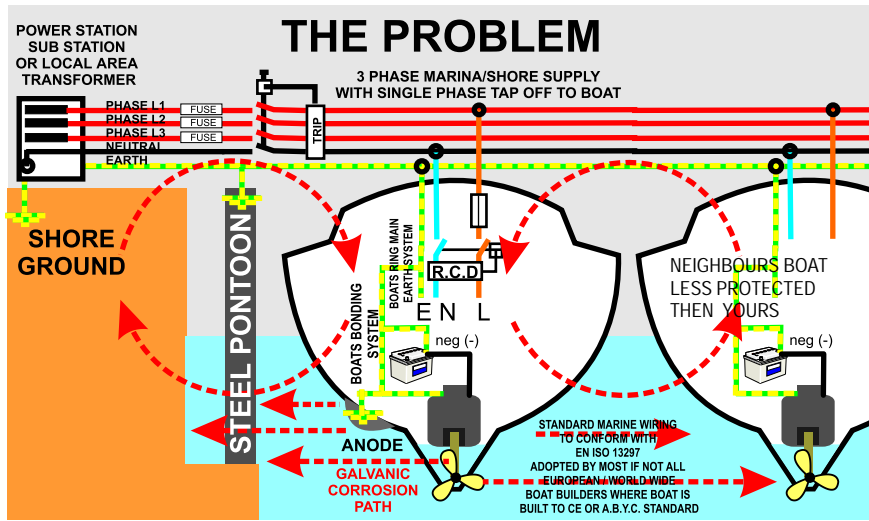
2) Because all the boats are now one, if you have a zinc anode on your boat, but the boat beside you does not or even worse, the marina has not put anodes on its structures (metal pontoons etc) then your boat's zinc (or aluminium / magnesium) will protect all the structures and boats around you, resulting in dramatic zinc loss and expensive lift-outs to replace the zinc. For boats on inland waterways, if you have a magnesium anode and everyone else has zinc or no anodes at all, your magnesium anode will protect all.

THE SOLUTION:

The trick is to maintain the continuity with the earth to ensure the safety of your life but remove the continuity with the shore power for the safety of your boat. The solution is very simple. By installing a Galvanic Isolator / Zinc Saver we maintain a good earth link with the shore, but prevent any stray currents coming up the earth line and damaging the boat. The isolator is in theory a simple device but it has to be built to a stringent specification and tested by an independent test house to ensure they comply with the relevant standards, be it the less stringent CE standard or the more stringent American Boating and Yachting Council standard. This means in a major fault condition it can carry its rated current for 24 hrs without exceeding 90 deg C on the heat sink. The Galvanic Isolator has the following extra features:

TOTAL PROTECTION:

Recent upgrades in the new A.B.Y.C. have removed the need for a monitoring system on the zinc saver as long as, if the unit was to fail (which in the excess of 500,000 of the older version sold with 0% failure rate), the internal devices must fail in such a way as to continue to ensure the safe connection of the earth circuit. Having spent a lot of money on a new mono silicon block to ensure the unit will perform as per the new specification and many hrs testing by UL laboratories, the new Pro Save FS (see next page) is now fully certified as a fail safe device and as such no longer needs any monitoring system. This ensures a simpler and lower installation cost for this new product.



ProSave A



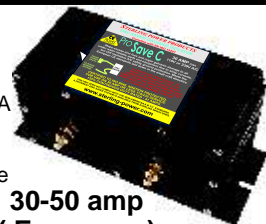
By far the most common used device in Europe, complies with all the requirements, and is also low cost and very effective.

16-30-50 amp (European) 16 amp version

Galvanic Isolators / zinc savers Standard euro version			
Amps	Size mm	Weight kg	Part nos
16	120 x 100 x 90	1.0	ZS16A
30	220 x 120 x 100	1.5	ZS30A
50	220 x 165 x 100	1.8	ZS50A

ProSave C

Looks the same as the Pro Save A except has an internal 25,000 uF 2.5 V capacitor to raise the performance of the unit in extreme A/C leakage conditions.

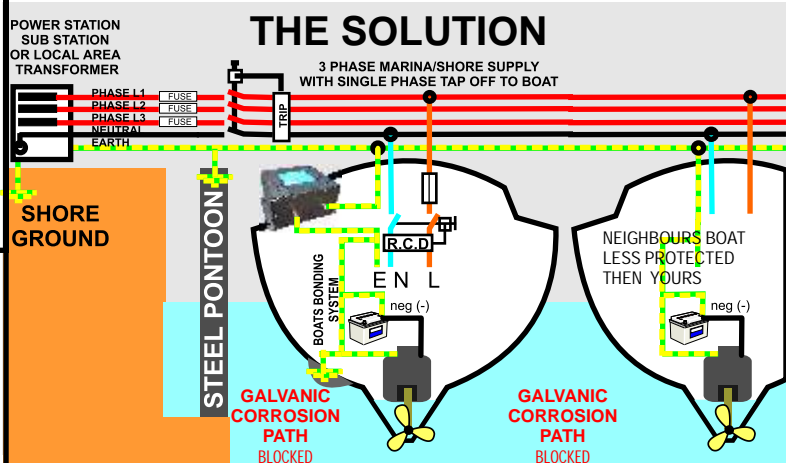


INTERNALLY INSTALLED
25,000 uF
2.5v

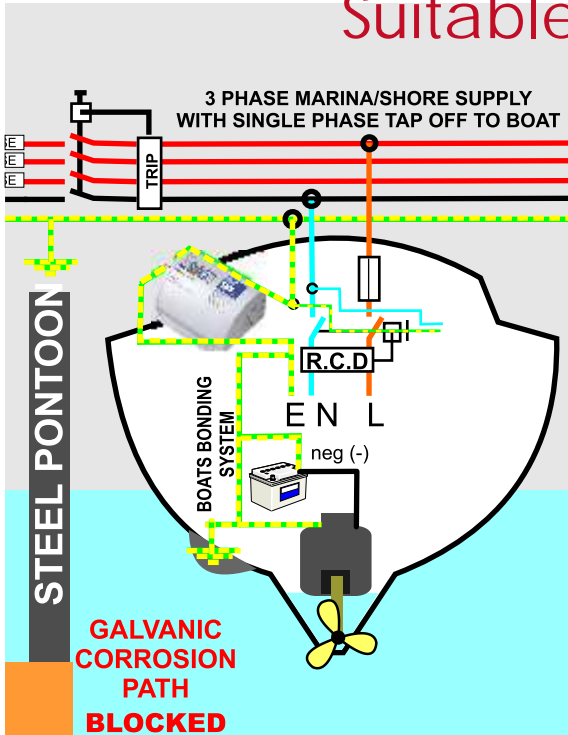
30-50 amp (European)

Galvanic Isolators / zinc savers standard euro version with Cap			
Amps	Size mm	Weight kg	Part nos
30	220 x 120 x 100	1.5	ZS30C
50	220 x 165 x 100	1.8	ZS50C

Suitable for use in Europe and the rest of the world except the U.S.A if ABYC compliance is required..



Pro Safe FS 30 & 60 amp Fail Safe to the latest A.B.Y.C specification tested by UL Suitable for use in the U.S.A.



UL Certified
205007

ProSafe FS installs easily and does not require a dedicated monitor to verify the operational status of the galvanic isolator as required by non FailSafe Certified galvanic isolators.

ProSafe FS 30 & 60 are built on robust FlatPack semiconductor platforms ensuring that in the event of a failure, the failure is safe by not compromising the ground continuity on-board when connected to AC shore power.

ABYC A-28 July '08 Compliant and Fail Safe Certified Certified by Underwriters Laboratories (UL). Insures shore power safety ground wire is maintained through the isolator.

Flat Pack High Power Semiconductors
Robust high power diodes allow the FS Series to meet the new FailSafe criteria for conducting inrush currents of 5,000 amps for the required duration period.

Innovative Design

The FS 60 will cool itself in the event it must conduct current insuring cooler operation in this mode.

Ignition Protected

Meets ISO 8846 and can be mounted within an engine compartment

Gold Plated Terminations

LATEST A B Y C PROTECTION

120/240 VAC / 30A max/ 50 or 60 HZ



For 30 Amp Shore Cord Applications

120/240 VAC / 60A max/ 50 or 60 HZ



For (1) 50 Amp or (2) 30 Amp Shore Cord Applications

specifications:

shore cord inlet compatibility	Single 15,16,20 or 30
ratings VAC/Max AMPS/Hz	120/240 VAC/41A 50 or 60 HZ
max unit temp	50 deg C
size L x W x H mm	175 x 185 x 65
weight kg	1.5 kg

Galvanic Isolators / zinc savers Fail Safe New ABYC

Amps	Size mm	Weight kg	Part nos
30	175 x 185 x 65	1.5	ZSFS30
60	190 x 165 x 95	1.8	ZSFS60

Specifications:

shore cord inlet compatibility	Single 50 or dual 15,16,20 or 30
ratings VAC/Max AMPS/Hz	120/240 VAC/41A 50 or 60 HZ
max unit temp	50 deg C
size L x W x H mm	190 x 165 x 95
weight kg	1.8 kg

Galvanic monitoring and detection

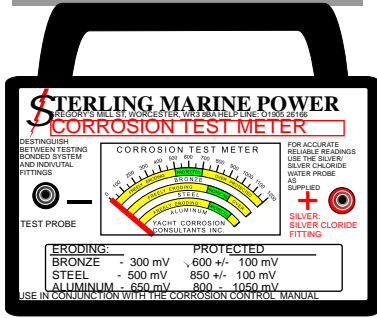
Yacht Corrosion Monitoring Equipment

This equipment highlights any electrical and electrolytic problems which will cause expensive corrosion on a boat

Yacht Corrosion Test Meter and Workbook

Corrosion Test Kit comprises of an easy to follow instruction manual, which includes survey report documents. The kit also includes the required test meter and silver/silver chloride test leads. The portable meter is the only way to test each individual item on the boat (overboard bronze skin fittings, bronze valves, rudders, prop shafts, etc). Having tested the individual fittings, the survey report will clearly show if your boat is completely bonded correctly or if there are problems with your bonding. **The unit also shows up if there are stray D/C or A/C currents on the boat which can cause horrendous damage very quickly.** The kit should be used every 6 months on a boat to ensure the anodes are still working and all the bonding cables are correct.

Where continuous onboard monitoring is required see Onboard Yacht Corrosion Monitor below.



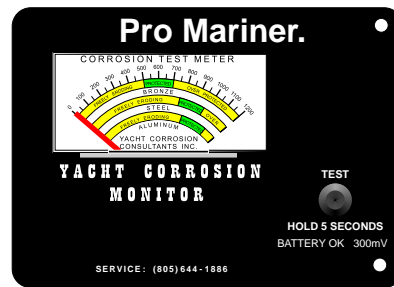
The Analog Corrosion Test Meter is supplied complete with:-
 20ft red lead with essential Silver/Silver chloride half cell
 10ft black lead test probe
 This easy to read meter finds all corrosion problems instantly.
 Scale needs no interpretation Green=Good
 Yellow=Bad.

Product Code
 Corrosion test metre and book CTMB

Yacht Corrosion Meter

Yacht Corrosion Meter

This onboard, panel mounted meter monitors galvanic voltage and is suitable for boats up to 65ft. It instantly confirms adequate protection or identifies damaging corrosion voltages. Simple yellow and green scale monitors the voltage. Supplied with Silver/Silver Chloride half-cell sensor. Gives clear indication if anodes need to be replaced and instantly picks up any problems with shore power, earth leaks etc. The unit permanently monitors your bonding cable, using a Silver / Silver chloride through hull reference point. This product should be used after the survey system (above) confirms that your bonding system is correctly connected to all your fittings



Silver silver anode though hull fitting



Product Code
 Yacht Corrosion Monitor CYM

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 Tel +44 1327 312233

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 Par Moor Road
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 info@sterling-power-usa.com

2 YEAR GUARANTEE: RETURN TO FACTORY IF IN THE FIRST 2 YEARS YOU HAVE A FAULTY STERLING PRODUCT, THE PRODUCT SHOULD BE RETURNED DIRECT TO STERLING (TO SPEED UP THE HELP PROCESS) AND WE WILL ENDEAVOUR TO REPLACE THE PRODUCT OR REPAIR IT WITHIN 24 HRS AT THE FACTORY. STERLING CANNOT BE HELD RESPONSIBLE FOR THE RETURN CARRIAGE OR ADDED WORK.
 LIFE TIME REPAIR POLICY AFTER 2 YEARS IF IT IS UNECONOMIC TO REPAIR THE PRODUCT THEN A SPECIAL DISCOUNT WILL BE OFFERED ON A SIMILAR PRODUCT AT THE FACTORY'S DISCRETION. THIS ONLY APPLIES AT THE FACTORY.

www.sterling-power.com
www.sterling-power-usa.com

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