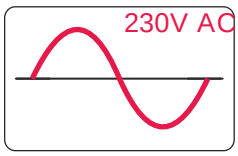
THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION 2005

STERLING
POWER PRODUCTS

110/230 v instructions
auto frequency select
110 V / 60 hz
230 V / 50 hz

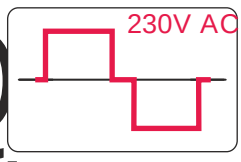
ProCombi S



2400va 3600va 5000va
1600w 2500w 3500w
continuous power
with P.F.C charger

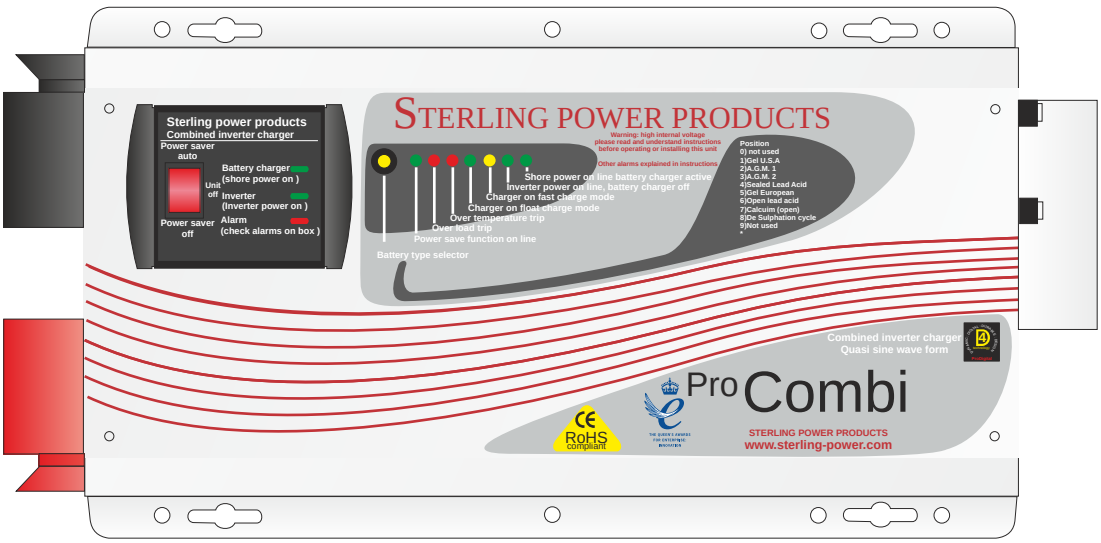
Pure Sine Wave Combined inverter chargers

ProCombi Q



2400va 3600va 5000va
1500w 2500w 3500w
continuous power
with P.F.C charger

Quasi Sine Wave Combined inverter chargers



All power sizes

English

Warranty (2 years return to factory)

CE RoHS compliant

www.mdsbattery.co.uk
0800 310 2100

DYNAMIC · DIGITAL · DURABLE · DESIGN
technology
ProDigital

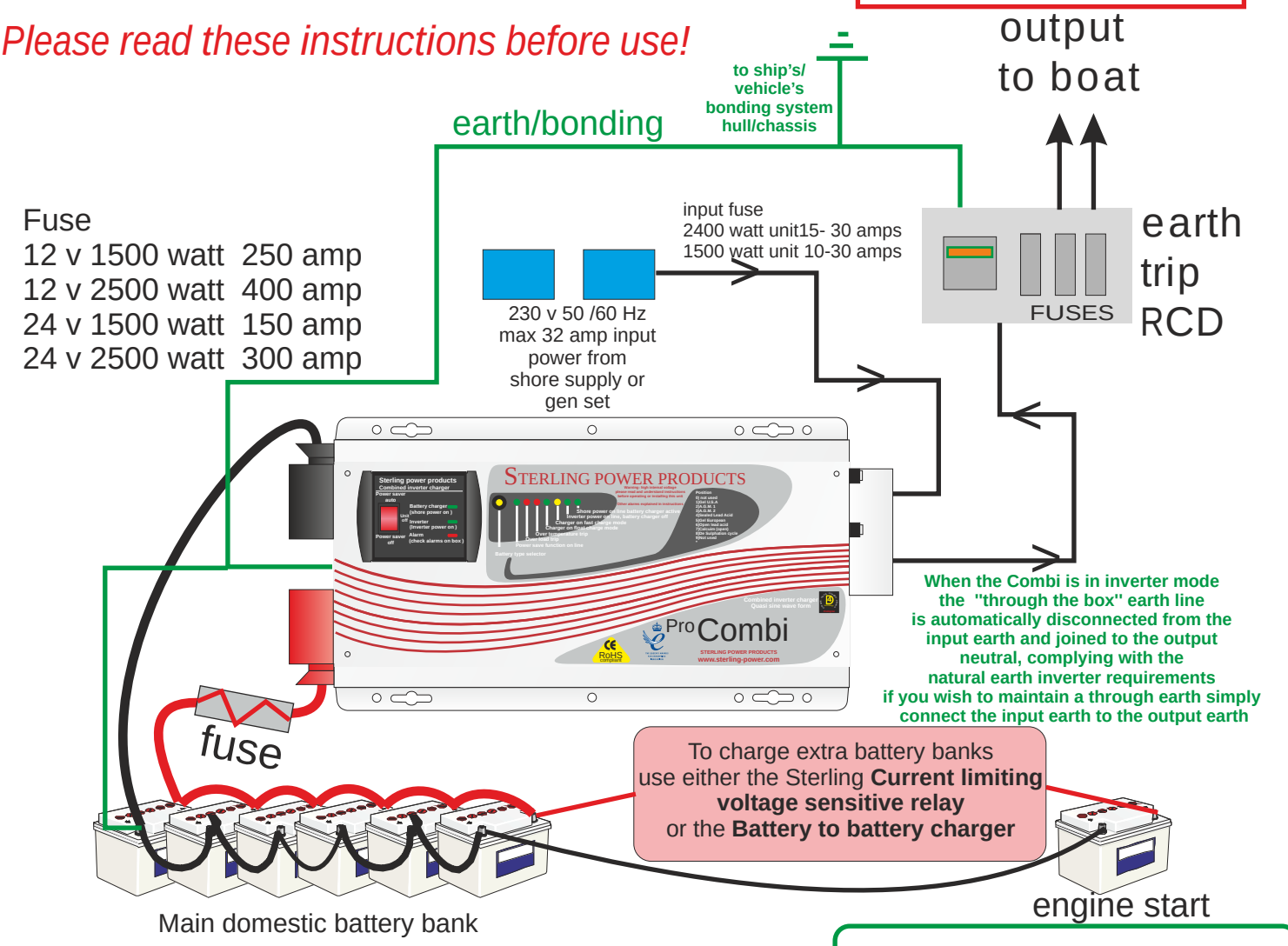
STERLING *Combined inverter charger*

12V / 24V DC >> 230V AC or 110 v models

Basic wiring for the Pro Combi S or Q

WARNING:
DO NOT OPEN UNIT
HIGH INTERNAL VOLTAGE!

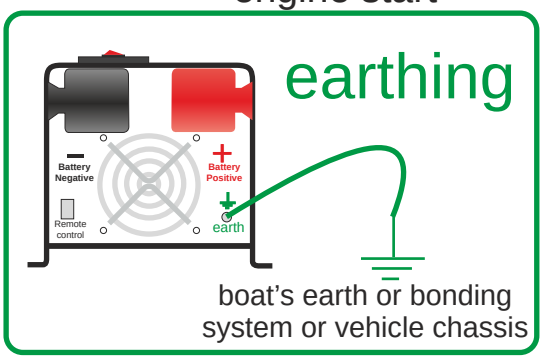
Please read these instructions before use!

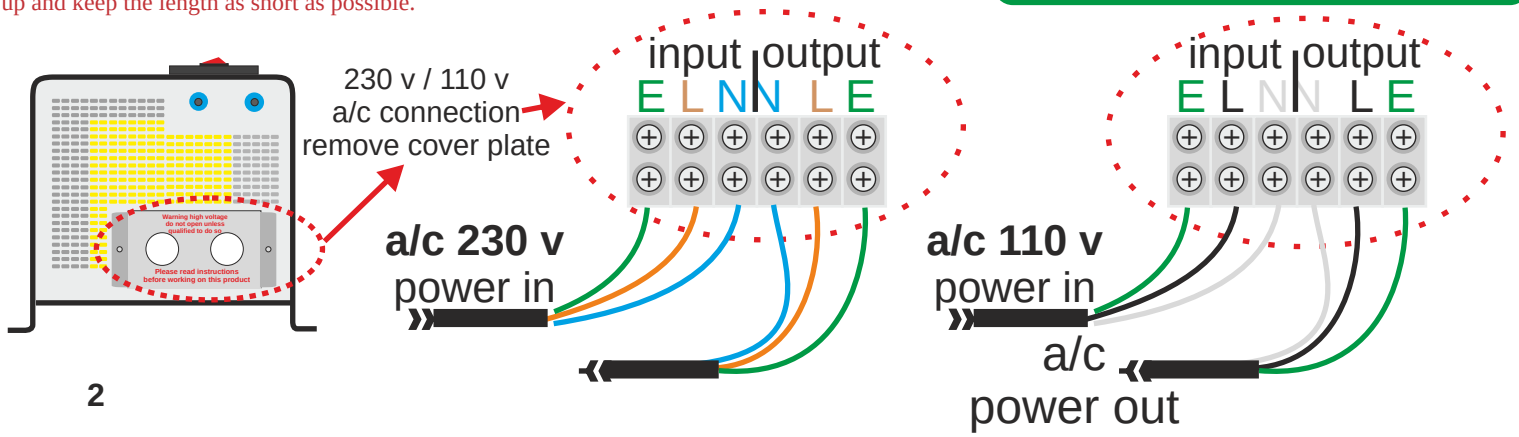


WHAT CABLE TO USE in mm sq:

A charger or inverter up to	cable run distance 0 - 1.5m	cable run distance 1.5 – 4.0m	
125-180 A	50 mm2	70 mm2	1500 watt Pro Combi
180-330 A	70 mm2	90 mm2	2500-3500 watt Pro Combi

Please note that if there is a problem obtaining for example 90 mm sq cable, use 2 x 50 mm sq, or 3 x 35 mm sq. One cable is always best but, cable is simply copper and all you require is the copper ,so it does not matter if it is one cable or 10 cables as long as the square area adds up.
Performance of any product can be improved by thicker cable and shorter runs, so if in doubt round up and keep the length as short as possible.





Check list

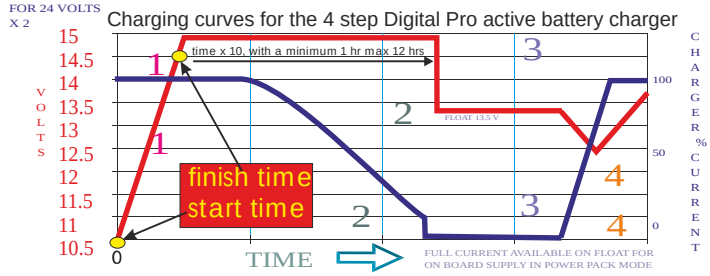
1)Ensure that the inverter has the correct d/c voltage for your boat or vehicle system. ie 12 or 24V.
2)Fit as close to the batteries as possible. The shorter the d/c cables the better. Voltage drop on long cables will effect the unit's performance.
3)Do not reverse the cables! Connect the red cable to the positive terminal and the black cable to the negative terminal of the battery. In the event of reverse polarity the unit could be totally destroyed.
4)Always use the inverter in an environment which is
well ventilated, not exposed to direct sunlight or a heat source, away from water, moisture, oil or grease, away from any highly inflammable substance, out of reach from children.
5)The output voltage of this unit must never be on your AC system at the same time as any other a/c source such as the 230V external mains line or a generator. All external power must go through the Combi.
6)Always switch on the Combi first, before plugging in any appliance.
7)Under new electrical legislation only professional electrictians should install this product.
Ensure the fitting instructions are fully understood before fitting this product.

Installation

1) Position the unit as close to the main battery bank as possible.
2) Position in a cool, dry & well ventilated space.
3) Orientation of the unit is not critical.
4) Either purchase the standard cable set from Sterling which is about 1.5 metres, or, if using your own cable, use the cable size chart provided on the installation drawing to ensure you have thick enough cable for the D/C leads. In the event of not being able to get the size requested (it can be hard to get thick cable) then simply add multiple length of thinner cable, i.e. If you cannot get 90mm cable then use 3 x 30mm cable, at the end of the day its just copper we need.
5) Fit a fuse suitable for the job, again look at the installation drawing, Sterling have a full range of high current fuses in the GANLR range of gold fuse products, ranging from 100-500 amps. On the d/c side
6) Connect the cables from the batteries to the fuse then to the unit, this way if there is a fault at the unit the fuse is already in place and this will be safe. In the event of a isolation switch being used, please ensure the rating of the switch can handle the power of the unit.
7)Ensure the unit is switched off during installation.
8) On the a/c side ensure the shore power (all external a/c sources) are totally disconnected, connect the output from the inverter to suitable Residual Current Breaker (R.C.D. for earth protection) and current over-load trips. Fuse the a/c input side depending on through power requirements, the max through power is 30 amps, so fuse at 40A (allowing also for charger consumption) if you intend to use the full through power for standard 13-16 amps throughput then a 20A fuse would be appropriate.
9) Sterling recommend Multi core tri rated a/c cable, if used on a boat or vehicle, as this is much safer where vibration is likely. Only use single solid household a/c cable if the product is being used as a power source for a house or platform free of vibration.
10) Before attempting to switch on the unit, please ensure you have selected the correct battery type on the small battery type selector switch on the front of the main box, rotate the switch to your battery type. The Progressive charge control software will automatically adjust for battery bank size and state.

Batter Type Selector, for 24V x voltages by 2

Switch setting	Boost	Float
0) to be used by factory for set up		
1)Gel usa	14	13.7
2)AGM 1	14.1	13.4
3)AGM 2	14.6	13.7
4)sealed lead acid	14.4	13.6
5)gel euro	14.4	13.8
6)open lead acid	14.8	13.3
7)calcuim	15.1	13.6
8)de sulphation	15.5 4 hrs then off	
9)not used		



The battery type and charge voltage recommendations are set out above. For 24V unit x the above by 2. Some battery types may look confusing such as gel usa and gel euro, AGM usa and AGM euro. If you find this confusion then join the club, we have had the different voltage curves supplied to us by different companies form the U.S.A. and Europe for what we seem the same product, however, it's not our call, we simply supply the options, if in doubt call your battery supplier and ask which charge voltage they want you to use for their battery type, and select the closest to it. If totally confused then use the lower voltage setting until you have had a higher voltage setting confirmed to you by whoever supplied the batteries to you.
The de-sulpation cycle on switch position 8 is marked in red because this is a very dangerous setting if you do not know what your are doing. Before even attempting to use this cycle you must clearly understand what it does and when and how you would use it.
What causes sulphation?Sulphation occurs with infrequent use of the batteries, or if the batteries have been left discharged so low that they will not accept a charge. This cycle is a very high voltage charge cycle designed to try to break down the sulphate 'crust' that is preventing the plates taking a charge and thus allow the plates to clean up and so accept charge once again.
How to use this function. (only suitable for open lead acid batteries)
1) Ensure the battery bank is totally isolated from anything else on the boat or vehicle; the high voltage applied by this setting could destroy all your electronics and other electrical equipment still connected (hence all these instructions are in red, this is a very expensive mistake).
2) Make sure the battery compartment is very well ventilated and battery caps are removed.
3) Switch the battery type selector switch to the correct position, then switch the a/c power on.
4) Because this is such a dangerous setting there is a 4 hr time out period build into the software, however, on a very large battery bank this may not be enough and the unit may need to be switched off and on again to do another cycle.

What to expect on this cycle.
I would recomend you monitor the voltage of the sulphated battery bank. When you switch on the cycle the voltage should shoot up to the full 15.5 volts very fast (within minutes) this is because the batteries cannot accept the charge (assuming they are sulphated). However, over a period of 1-2 hrs the voltage should start to drop (as the plates start to clean and the batteries start to take a charge) the voltage could drop way down to about 12.5 volts then start to rise. This shows the batteries are now taking a charge and starting to fill up. In this case it would be safe to switch the unit off and select your normal charging curve and hopefully this will bring your batteries back from the dead. You may need to repeat the process a few times. Please note this is a professional guess tool, which most times helps, but its not magic, so expect the worst and hope for the best. Never leave a system unattended when on this mode. If the battery temperature reaches above 50 deg C (i.e. if the batteries are almost too hot to touch) then stop the process).

Install remote control.

Isolate the unit before attempting this so there are no high voltages.
The local control panel on the front of the unit can also be used as a remote control, simply slide the 2 end sections off to reveal the screws holding the panel onto the main box, carefully remove the panel and disconnect it from the connection socket behind the unit.
Fill the hole on the main unit using the blank replica of the remote control unit.
Using the remote cable supplied then re-connect the panel to the unit

Combi: Operation and what to expect

1) After the unit is installed, using the panel on the front of the unit, and with the shore power (230V a/c) still disconnected, switch the unit on. The LEDs will cycle through their test routine, then the unit should go into inverter mode and 230V should be produced on the output a/c terminals (provided the batteries are over 11 volts).
2) If the above is ok, then connect the shore power to feed 230V into the combi, after a short while, the inverter should go offline, and feed the shore power through the inverter. Changeover is about 20 milli secs (so fast that you should not be able to notice it) and the battery charger should come on-line and go through it's charge sequence ending, after 1-10 hrs, with float voltage.

Common Faults:

There are numerous faults which the unit can detect and transmit the fault to you by the use of LEDs and alarm on the unit itself. The remote control gives a little help but the real fault finding can only take place at the unit. Please see the fault finding chart over the page for full information.

General specification	Pro Combi Q	Pro Combi S 1500-2500 watt	3500 w
Input Wave form:	Sinusoidal	Pure sine wave	pure sine wave
Nominal Voltage:	110 or 230 v (different models)	110v or 230v a/c(different models)	*
Low voltage trip:	90 v (110 v) .184v (230 v)+/- 4%	90 v (110 v) .184v (230 v)+/- 4%	*
Minimum engage:	95 v (110v) 194v (230 v) +/- 4%	95 v (110v) 194v (230 v) +/- 4%	*
High voltage trip:	125 v (110v) 263v (230 v) +/- 4%	125 v (110v) 263v (230 v) +/- 4%	*
High voltage re engage:	123 v (110v) 243v (230 v) +/- 4%	123 v (110v) 243v (230 v) +/- 4%	*
Max input a/c voltage:	130 v (110 v) 270 v (230v)	130 v (110 v) 270 v (230v)	*
Nominal input frequency:	50hz or 60hz auto detect	50hz or 60hz auto detect	*
Low freq trip:	40 hz for 50 hz, 50 hz for 60 hz	40 hz for 50 hz, 50 hz for 60 hz	*
High freq trip:	53 hz for 50 hz, 62 hz for 60 hz	53 hz for 50 hz, 62 hz for 60 hz	*
Output wave form:	(on by pass mode) same as input	(on by pass mode) same as input	*
Overload protection :	Circuit breaker	Circuit breaker	*
Short circuit protection :	Circuit breaker	Circuit breaker	*
Transfer switch rating :	30 amp	30 amp	30/50 a
Efficiency on line transfer mode:	96%+	95%+	*
Line transfer time :	20 ms	20 ms	*
Bypass without battery connected :	yes	yes	*
Max by pass current :	30 amps	30 amp	30/50
By pass over load current :	35 amps: Alarm	35 amps: Alarm	35/60
Inverter Specification / output		**Inverter Specification / output**	*
Output wave form:	Modified Sine Wave/ Quasi sine wave	Pure sine wave	*
Output continuos power watts	1600 2500	cont 2100w 2500 for 15 min	3500/15
Output continuos power VA	2400 3600	3100 3800	5000
Power factor:	0.9- 1.0	0.9-1.0	*
Nominal output voltage rms :	230vav	230vav	*
Max voltage rms :	260vac	260vac	*
Output voltage regulation:	+/- 10% rms	+/- 10% rms	*
Output frequency:	50hz+/-0.3hz or 60hz+/-0.3hz	50hz+/-0.3hz or 60hz+/-0.3hz	*
Transient response time:	<150ms;0% to 100% RCD load	<150ms;0% to 100% RCD load	*
Nominal efficiency :	>85%	>80%	*
Surge ratings :	1500model =4500va 2500model = 7200va	PQS1500=4500va PQS2500=7200va	*
Online current consumption at 12 v/24	12v1.8a 24v 0.9a	same	*
Power saver mode current consumption	12v0.4a 24v 0.2a	same	*
Short circuit protection:	yes, less than 3 cycles	yes, less than 3 cycles	*
Inverter Specification / input		**Inverter Specification / input**	*
Nominal input voltage :	12 or 24 v depending on model	12 or 24 v depending on model	**
Minimum start voltage :	10 v for 12 v model 20v for 24 v	10 v for 12 v model 20v for 24 v	*
Low battery alarm:	10.5v for 12 v model 21v for 24 v	10.5v for 12 v model 21v for 24 v	*
Low battery trip:	10 v for 12 v model 20v for 24 v	10 v for 12 v model 20v for 24 v	*
High voltage alarm:	15.5 for 12v model 30v for 24 v	15.5 for 12v model 30v for 24 v	*
Power saver :	below 20 watts when enabled	below 20 watts when enabled	*
Power saver :	can be switched on/off on remote control	Same switched on/off on remote	*
Charger Mode specification		**Charger Mode specification**	*
Input voltage range:	196-245 v ac	196-245 v ac	*
Output voltage:	dependent on battery type selection	dependent on battery type	*
Output current 12 v model :	1500- 40a 2500 - 50a	1500- 50a 2500 - 70a	12v100a
Output current 24 v model :	1500- 20a 2500 - 25a	1500- 25a 2500 - 35a	24v50a
Battery initial voltage for start up:	0-15v for 12 v x 2 /24v	0-15v for 12 v x 2 /24v	*
Over charge protection shutdown:	15.7 12 v x 2 for 24 v	15.7 12 v x 2 for 24 v	*
Charger curves (4 stage constant current)Battery types		**Charger curves**	*
4 step digital controlled progressive charge		**Same as Pro Combi Q**	*
Battery type / **charge v** / **float v** / **x 2 for 24 v**		**same**	*
Gel U.S.A 14.0 13.7		same	*
A.G.M. 1 14.1 13.4		same	*
A.G.M. 2 14.6 13.7		same	
Sealed Lead Acid 14.4 13.6		same	*
Gel Euro 14.4 13.8		same	*
Open Lead acid 14.8 13.3		same	*
Calcium 15.1 13.6		same	*
De-sulphation 15.5 for 4 hrs		same	*
Battery bank size:	auto detected / auto program adjusted	same	*
General Features.		**General Features.**	*
Remote control.	Front control panel removable as remote	Front control panel removable	*
Size: in mm	185 wide 180 high 430 long	Size: 185 w 180 h 430 L	
Weight:	1500w 18 kg 2500w 20 kg	Weight: 20 kg	24kg

Remote control controls

The remote control has 3 functions

1)**Auto**: should be left in this position under normal operations, this automatically converts the unit to a battery charger and passes power through the unit to the ring main when the shore power / gen set is active, then switches to an inverter when the shore power is removed.

If when on inverter and there is no load online the unit will drop from inverter on mode to power saver mode, this reduces the inverter power consumption from about 1.8 amps to about 0.2 amps (on standby 12 v) however, the unit requires a load in excess of about 30 watts to re-engage automatically.

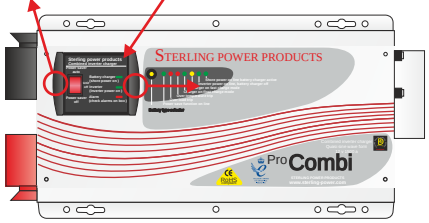
2) **Off**, the unit is off, 100% charger and inverter, no power consumption.

3)**Power saver off.** The unit is now an inverter charger (as if the auto was on) however, it will not go onto power saver mode, this is normally used for example if a mobile phone requires to be charged urgently then by switching to power saver off, the inverter will come online regardless of the load demand. it's a good idea to switch back to auto or off after the function you required is complete otherwise you will waste power with the unit being held active if there is no load on the unit.

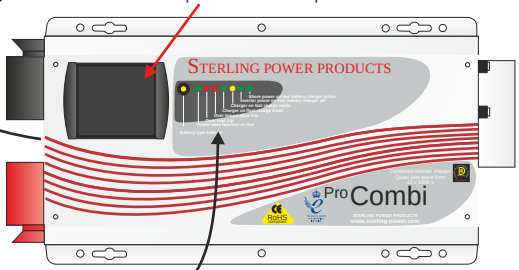
remote control installation

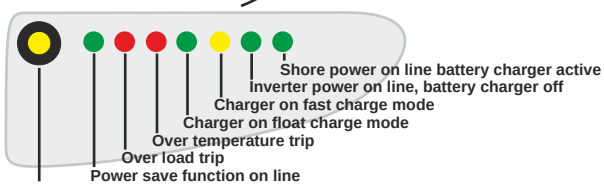
remove 4 screws holding this panel and disconnect the cable behind it

slide off the 2 small panels to reveal the screws



replace with blank panel





Indication & Fault finding chart

Status	Function	L.E.Ds on main unit							audible alarm	L.E.D.s on remote		
		●	●	●	●	●	●	●		●	●	●
Charge Function	Constant current charge					on		on		on		
	Constant voltage charge					flash		on		on		
	Float				on			on		on		
	Standby							on				
Inverter mode	Inverter on						on				on	
	Power saver on	on										
Alarms	Battery low voltage						on		beep 0.5 s every 5 s		on	on
	Battery High voltage						on		beep 0.5 s every 5 s		on	on
	Over load (Inverter mode)		on	on					beep 0.5 s every 5 s		on	on
	Over load (Line mode)		on	on				on	beep 0.5 s every 5 s			on
	Over temp (inverter mode)						on		beep 0.5 s every 5 s		on	on
	Over temp (Line mode)					on		on	beep 0.5 s every 5 s	on		on
	Over charge					on		on	beep 0.5 s every 5 s	on		
Fault Mode	Fan Lock								beep continuous			
	Battery high v						on		beep continuous		on	
	Inverter mode overload		on						beep continuous			
	Line mode overload		on						beep continuous			
	Over temperature			on					beep continuous			
	Back voltage								beep continuous			