

STERLING POWER

languages



Waterproof Battery to Battery Charger 60A-180A models - User Manual



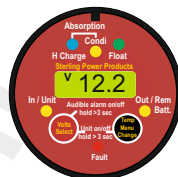
BBW1260 60A 12V to 12V



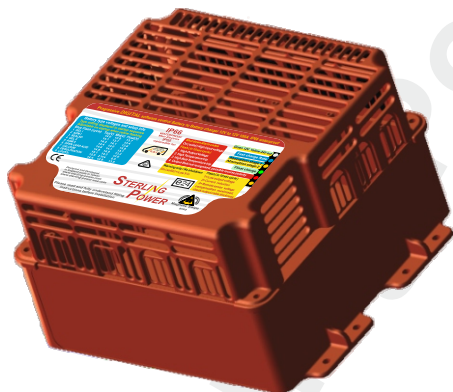
BBW12120 120A 12V to 12V



Smart Alternator
Regenerative
Braking Friendly



Optional
remote control
instructions inside



BBW12180 180A 12V to 12V
New model from March 2015
For latest instructions regarding
this model refer to
sterling-power.com

IP68
Waterproof
Electronics
Fan is IP65



e24

1 x temp sensor

Magnetic field warning:

There is a small magnet fitted in the lid of this product under the label marked 'magnetic area'. With the vast majority of installations this will have no effect on anything, however, this magnet may influence a magnetic susceptible product such as a magnetic compass. Please check your magnetic sensitive products after installation of this device. If there is an adverse effect then you can peel back the lower section of the label on the lid of the product and remove the magnet.

Revised
February 2015



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Battery to Battery Charger series

Background

Thank you for purchasing the most advanced and powerful battery to battery chargers currently available in the world today. Please do not underestimate the affect this device will have on a conventional DC charging system. It is important to understand that your existing cables and layout **may not** be up to dealing with the extra performance from the alternator. You'll need to ensure your alternator cables can deal with the actual rating of the alternator and the cable run lengths.

Why do I need the Battery to Battery charger?

It is becoming increasingly more common knowledge now that the best way to charge a battery is using a 4 step battery charging curve. This cannot be achieved from a standard alternator. This system simply attaches between 2 battery banks: a starter/engine battery and a secondary battery (domestic / house) battery bank. It essentially tricks the alternator into working at the maximum rating of the charger. This system is designed to use only the surplus power. It ensures at all times, that the power required to run the primary system of the vehicle or boat is not compromised. This surplus power is converted into a higher voltage and is used to charge a secondary battery bank using a digitally controlled programmable 4 step charging curve. This unit is also totally isolated, thus, the starter battery cannot discharge through this system, even in the event of the unit failing.

How does the unit work?

The unit monitors the engine start battery. This unit will not start until the battery voltage exceeds about 13.3V (x2 for 24V). After that, it pulls the engine battery down to no less than 13.3V. This enables the engine battery to still receive a small charge and ensures the alternator works at its full potential. The unit takes the 13.3V into the control box and then boosts this up to a maximum of 15.5V (selectable

chemistry profiles between 14.0-15.5V - consult battery manufacturer). A rule of thumb: Higher voltages result in faster charging and lower voltage result in slower charging. After a period of time, calculated by the software, when the auxiliary batteries are full, the system will float the batteries at approximately ~ 13.5V (x2 for 24V). It always ensures the engine battery comes first.

Other features included in this system are battery temperature sensors, remote battery sensors and a fully automatic sleep sensor, which switches the unit off when the engine has stopped. A remote panel is available as an optional extra.

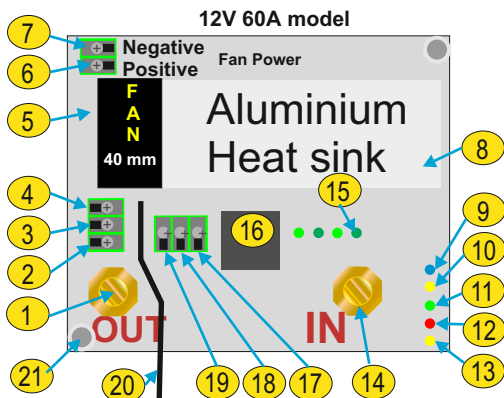
Advantages of this unit.

- 1) **Installation:** Simply connect between two battery banks (e.g. starter and house).
- 2) No direct connections to the standard engine alternator or to the outboard. Thus, on new installations there is no extra wiring for a split charging system.
- 3) This unit ensures the engine battery is kept full to start the vehicle while using as much surplus power as possible to boost into the auxiliary system.
- 4) **Multiple units can be** used, for example, if you have a 100A 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. Their internal programs will adjust their charging patterns to accept the other unit. The unit shall 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. Likewise, it ensure no alarms nor damage to the main system - be it an outboard, a car or a boat.
- 6) There are **no vehicle warranty issues** as you are not connected to the main engine management system.
- 7) This charger **isolates both battery banks** and prevents any feedback through the unit.
- 8) **Compensates for large voltage drops** in long cable runs with the use of a sense cable.
- 9) Can both **boost charge or voltage reduce**, if required. Sometimes alternators sustain a voltage that is too high for the batteries, this unit drops the voltage down

Current limiting feature

The ability to **current limit** is a very important aspect of this product's design. Being able to limit the current to the rating of the product (60A/120A/240A) is advantageous as it protects the DC wiring system from large surges from bow thrusters or large inverters. These surges can often exceed the rating of the wires, fuses, relays and diodes in the system causing permanent damage. If you can limit the current to 60A, for example, you can rate your relays, diodes, fuses to 80A. If your inverter / bow thruster takes a surge of 300A only 60A can be drawn down the DC cable, instead of 300A.

12V 60A model



Key

- 1) Main positive DC power output to auxiliary battery.
- 2) Low Voltage (regenerative braking) -> join with 4) (optional)
- 3) Ignition feed
- 4) Auto operation (choice) -> join with 3)
- 5) 12V 40mm DC fan (replaceable item if destroyed)
- 6) Positive feed for DC fan
- 7) Negative feed for DC fan
- 8) Aluminium heat sink
- 9) **Blue LED** - Fast charge mode, (max charge / current).
- 10) **Yellow LED** - 2 stage absorption mode. 1st stage is at high voltage output (yellow and blue LEDs). 2nd stage is mid voltage output (yellow and green LEDs).
- 11) **Green LED** - charge complete, unit on float voltage.
- 12) **Red LED** - unit shutdown. **These are dangerous alarms and will shut the system down.**

Shut down alarm codes - there are 5 shutdown alarms, these actually shut the product down and require the charge to be stopped to reset the product. The fatal shutdown alarms will not auto reset until the engine is switched off and the input voltage drops below 13.3V for a few minutes. Then, the system will reset, it is important that the fault be rectified before restarting the engine.

(LED state: x2 for 24V)

Red LED unit shutdown, LED state:

On (solid) High input voltage.

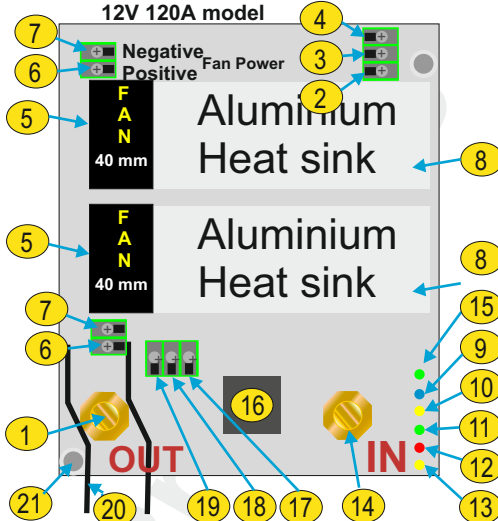
1 x Flash = High output voltage, this could be caused by a product malfunction or possible high voltage feedback from other charging sources on the output battery bank.

2 x Flash = High temperature trip, the unit has overheated, this could be due to a fan failure or simply installed in too hot an environment. It is unlikely under normal operations and the unit has a temperature / performance reduction algorithm in the software to prevent this from tripping.

3 x Flash = High Battery Temp trip, in event of a battery overheating (unlikely under normal operations). Nevertheless, this unit has a temperature / performance reduction algorithm in the software to prevent unnecessary over charging when battery is hot.

4 x Flash = Out Batt not recognised, possible reverse polarity. The unit will not engage, this is a safety protection circuit. If the installation is new then check the battery is not reverse polarity, or, if the battery is below 4V the unit will not recognise it. In this case it may be necessary to jump start the second battery from the first battery.

12V 120A model



13) **Yellow LED** - this is an information only LED

WARNING alarm codes - there are 4 alarm codes, these are just warnings but will not shut down the product.

(LED state: x2 for 24V)

Yellow LED unit WARNING, LED state:

On (solid) Low input voltage, check alternator / charging is >11.0V

1 x Flash = Low output voltage.

2 x Flash = Boost reduction, product getting too hot or reduced via the RC. If not via RC, check the environment in which the product is installed. Maybe too hot.

3 x Flash = Remote sense voltage compensation maximised (only relevant if the remote sense cable is used). Check output cable thickness. For safety reasons the remote sense has only the ability to increase the voltage from the product by 1.5V to compensate for output cable's voltage drop (any more than this could over heat cables). The cable is too thin or the run too long for us to fully compensate for the drop. There is no problem as far as safety is concerned just a loss in potential performance ability of the product. To fix this, check your cable thickness and length is suitable for the current used.

4 x Flash = high differential voltage between input and output voltage, may have an extremely low output battery or a very high drain on it.

N.B WARNING do not shut the product down. It gives warnings in a 10 second cycles like that of the **shutdown**.

14) Main DC input from starter battery.

15) Green LED for 12V unit, yellow for 24V units on when active.

16) Remote control connection.

17) Remote battery sense wire to compensate for voltage drop in cable (optional , does not need to be used).

18) Battery temperature sensor, optional fit, if not used product will work on default of 20 deg C setting.

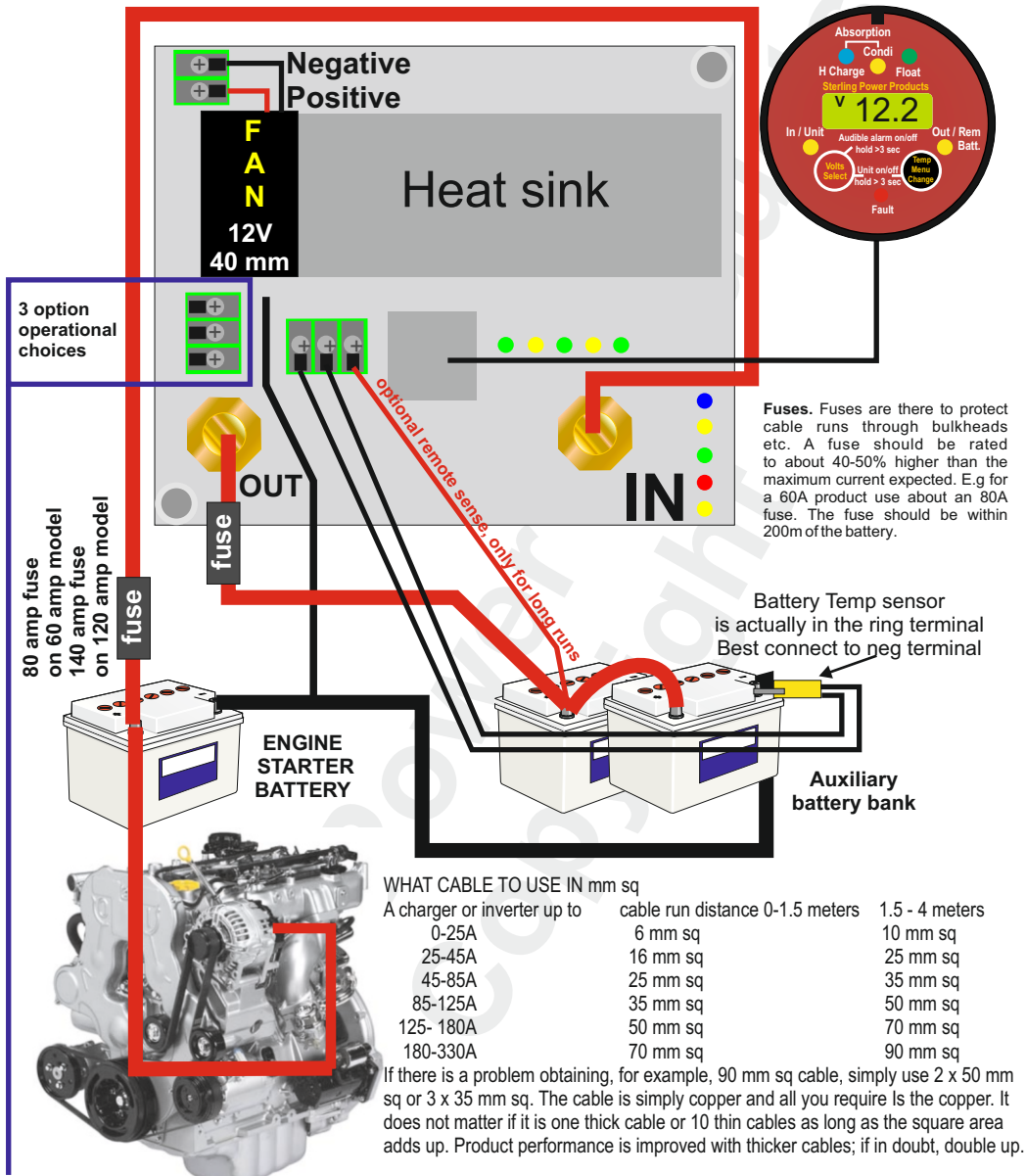
19) Battery temperature sensor, optional, if not used product will work on default of 20 deg C setting.

20) Unit negative

21) M4 stainless steel insert for lid.

Basic Battery installation drawing

optional
remote control



Determines operational mode for unit

- 1) Automatic operation
- 2) Ignition feed
- 3) Regenerative braking ignition option.

See next page for information regarding setup and application

Installation

Set this unit as you would any other high power battery charger. Fit it as close to the starter batteries as possible in a cool, dry and well ventilated space. As with the most ideal conditions on a boat, the cool well ventilated part is a bit of wishful thinking. With this in mind you may notice that the unit comes with a heat sink and a cooling fan.

If you have to fit it in a hot engine room then it should be okay but try to fit it low down on the bulk head as it will be a little cooler there than at the top of the engine room.

Wiring, refer to simple diagram on previous page (page x): connect the output positive cable first (to the house / domestic, for example). Then, the input positive cable (starter battery), then the negative (common negative). Remember the unit is voltage sensitive. Thus, If the input voltage is above 13.3V (due to alternator, generator or charger) the unit shall start and begin boosting - you can eliminate the voltage sensitive aspect by adding an ignition fed cable (refer to next page for operational modes).

Setup routine:

- 1) All LEDs will come on to confirm the LEDs are okay.
- 2) The fan will ramp up in speed to confirm the speed control is okay.
- 3) All LEDs and fans off.
- 4) Blue LED will flash 1-9 times to show what the unit battery chemistry is actually set to (depending on battery type as per label). If you are happy with this setting then do nothing, if you are not happy then simply wait and the yellow LED will start to flash.
- 5) The yellow LED flashes (for approximately 5 seconds), then, during this time frame you must start the battery chemistry adjustment procedure using the magnetic swipe area in the lid of the unit (read below for additional information). This is the only window of opportunity available to adjust the battery type on the unit. After the yellow light stops flashing the unit is locked into that battery type. If you fail to set the product up to the correct battery chemistry the first time and need to try again, do not worry. To reset the system to try again, simply remove the positive input cable or the negative cable (i.e. "kill the power to the product") and on re-attachment the startup procedure will start again. Do this as many times as it takes to get the correct battery chemistry setting.

Programming the battery chemistry type for the output battery (typically house, domestic, auxiliary)

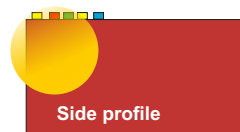
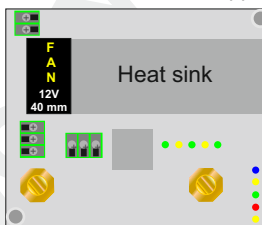
During setup procedure the yellow LED will fast flash for 5 seconds, during this time is your window of opportunity to adjust the battery type. With the lid removed and in your hand swipe the magnet (built in) against the area as marked on the drawing. Simply hold the lid magnet against the box in this area. if you have made correct contact with the magnetic internal switch (during the 5 seconds the yellow is flashing) the yellow LED will go off and the red LED will flash (hold this area) this shows you have "hit the spot" (magnetic switch) and you are now ready to adjust.

Please note, as soon as you do this, any pre-stored battery type setting is removed and we start from battery type 1 (GEL USA refer to table on the RHS).

To adjust, remove the lid from the magnetic swipe area, the red light will go out (to show you have lost attachment with the reed switch) and the blue LED will flash once. This shows the unit is now set to battery type Re-swipe the magnet, for the second time, and the red LED will come back on. Remove the magnet and wait, the blue LED will flash twice. You are now on battery type 2 (AGM see below). Continue this procedure until you reach the number of flashes you require. On reaching your number then simply wait about 15 seconds and wait for the unit to show 2 LEDs (green and red) and it will lock that setting. The unit then restarts the start up sequence which will show the new battery setting (number of blue flashes). At this point yellow flashing LED will come on and you are given the opportunity to adjust, if still not correct. If content, then ignore, leave alone and allow the setup to complete and the unit shall store the settings.

- 1) Select the battery type on your auxiliary battery system. The input battery chemistry is of no relevance to this process.

Remember it is the voltages which are more important than our battery types. After installation test the voltage from the unit is the desired voltage. **Ensure you remove at least 1 wire from the battery temperature sensor as the product voltage may be higher (if in cold climate) or lower (if in warm climate) than the pre conceived voltage.** *The voltage requirements of the battery company will override our recommendations as it is them who are supporting the battery warranty.*



Magnetic swipe area
the magnetic reed switch is behind the plastic case in this area

Flash#	Battery Chem	Top(V)	Mid(V)	Float(V)
1	GEL I	14.0	13.8	13.7
2	AGM I	14.1	13.7	13.4
3	SEALED	14.4	14.1	13.6
4	GEL II	14.4	14.0	13.8
5	AGM II	14.6	14.1	13.7
6	OPEN LEAD ACID	14.8	14.0	13.3
7	CALCIUM	15.1	14.3	13.6
8	DESULPHATION	15.5	N/A	N/A
9	LiFePO ₄	14.4	13.8	13.8

LiFePO₄ cells must only be used in conjunction with a Battery Balancing System. N.B. Reverse Polarity protection has been disabled in lithium profile.

***Voltages shall be 0.1V higher for the first 3 mins.**

To setup battery type: (from first install) the input negative and follow the same instructions. battery must be over 10.0V x 2 for 24V.

Please choose your battery type before installing so you are ready for the setup. If the unit is already installed then there is a slight change at the start of the instructions. The unit default setting is sealed lead acid 14.4V (28.8V for 24V).

Have the lid ready, observe the 'MAGNETIC SWIPE' area of the lid. There is a small magnet in that area in the lid, you will need to hold the lid in such a way as to simply push that area on the label to the area indicated on the main box (beside the LEDs). There is a magnetic switch located behind the plastic in the main box which reacts to the magnet in the lid (do not remove the magnet from behind the lid label).

As soon as you connect the input live and negative on the unit (assuming battery is over 10V x 2 for 24V) the setup routine will start. The routine is as follows (please note with the DC output disconnected due to the reverse polarity safety device, the output of the unit is not live, so, although the setup routine will be active the unit will not work fully until the DC output cable is connected to an output battery bank).

To adjust a previously installed unit to a different battery chemistry simply remove the input positive or

Battery type information:

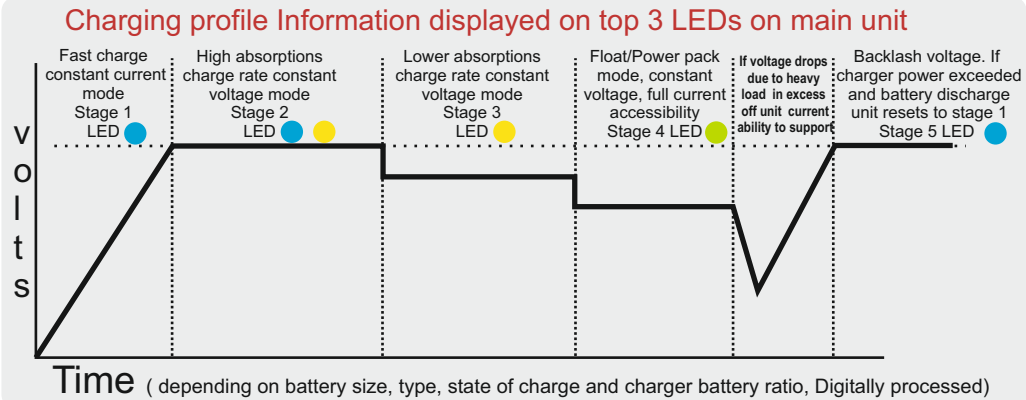
Non sealed lead acid or open lead acid batteries, where you can unscrew the lid of the battery and are able to be topped up with water, these are by far the best type for fast charging and long life (max voltage 14.8V).

Gel / Exide spec. This program is, as per the recommendation of Exide, set at a voltage of 14.4V for about 10-12 hours. The unit then drops to float.

Gel U.S.A. spec. For some reason, unknown to us, the American gel manufactures want a different charging profile than the European ones. Don't ask us why, if in doubt ask the battery supplier. Gels have a max charging voltage of 14.1V.

Sealed lead acid / A.G.M. This is set to a maximum charge voltage of 14.4V with a software program to match most of these battery types, some AGM batteries only want 14.1V, if so, set the unit to the American gel setting. If in doubt ask the battery supplier.

LiFePO₄ cells must only be used in conjunction with a Battery Balancing System. N.B. Reverse Polarity protection has been disabled in lithium profile.



Blue LED flash and Switch position		Battery Chemistry selection				
		Charge volts	Absorption volts	Float volts	Min Boost mins	Max Boost mins
1) Gel I		14.0	13.85	13.7	60	600
2) AGM I		14.1	13.75	13.4	60	480
3) Sealed		14.4	14.15	13.6	120	480
4) Gel II		14.4	14.0	13.8	720	1440
5) AGM II		14.6	14.1	13.7	60	480
6) Flood/open		14.8	14.0	13.3	60	480
7) Calcium		15.1	14.3	13.6	60	360
8) De-sulphation		15.5	0	0	240	240
9) LiFePO ₄		14.4	13.8	13.8	30	30

Note: Actual voltage shall be 0.1V (100mV) higher within the first 3 minutes

Unit operational mode

Standby, sleep and off modes

Standby - only happens when in ignition mode, when the ignition is off and the input voltage is above 13.3V. Blue LED flashes continually and 4x green LEDs are lit. To get out of standby turn ignition on and ensure above 13.3V on the input.

Sleep - the unit goes into sleep mode when a low input voltage threshold has been breached. This varies between functions. Typically, when the input voltage drops below 13.0V the unit enters sleep mode after a 120 second delay. The blue LED flashes once for 10ms every 60 seconds.

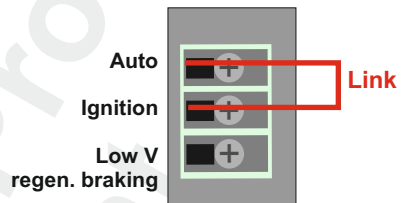
Off - to remove power from unit completely remove negative or positive input cable. There is no 'off' function *per se*. Removing power **will not** reset the settings on the charger.



1) Automatic activation (default setting).

This is the mode most people will use. The product comes with the auto and ignition linked together. This means that there are no external activation requirements for the product. When the input voltage goes above 13.3V (alternator or battery charger is working) then the unit will simply engage and boost the output. When the input voltage drops below 13.0V but above 12.2V the unit shall remain on (boost) for another 120 seconds. If the input voltage remains between 12.2V and 13.0V for more than 120 seconds the unit shall go into sleep mode. If the input voltage drops below 12.2V within this 120 second time frame the unit shall immediately go into sleep. If input voltage is then to rise immediately to between 12.2V and 13.0V the 120 second timer shall continue. To get out of sleep mode an input voltage of 13.3V+ must be reached. To reset the 120 second timer the input voltage must exceed 13.6V for over 5 seconds. If this threshold is not met then sleep mode would resume immediately if the voltage drops below 13V again.

This mode complements Regen. Braking / SmartAlts.



1) Automatic activation (default setting) automatically on at 13.3V. Off 120 seconds after input voltage drops below 13.0V and above 12.2V. Sleep mode deactivates at 13.3V+. 120 second timer reactivates at 13.6V+ for 5 seconds

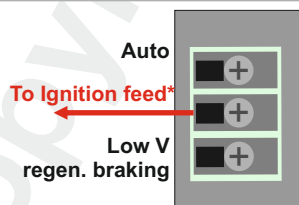
2) Ignition feed activation (with automatic on/off)

This mode is a basic ignition feed. There is no 120 second timer. When you have a live ignition feed (~12V). The unit simply activates when the input voltage is 13.3V+. It shall then enter sleep mode if the input voltage drops below 13.2V. If live feed is turned off the unit enters sleep. To turn unit on again, turn on live feed and ensure input voltage is above 13.3V+, there will be a 10 second delay.

When you would use this feature?

If the starter and house bank are connected via a voltage sensitive relay (as well as this charger) whereby a high voltage (13.3V) is relayed from the house bank back to the starter bank this charger shall remain on, thus, ultimately depleting both batteries.

This mode does not complement Regen. Braking /



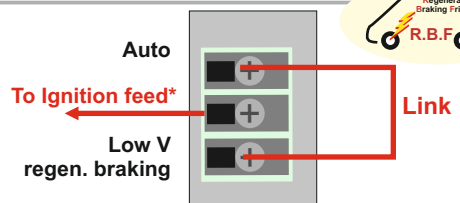
2) Ignition Feed Activation. With live feed (~12V) the unit turns on at 13.3V+ input voltage. Goes into sleep when below 13.2V. When live feed is removed the unit enters sleep. Unit turns on again when live feed is re-established and input voltage is 13.3V+ (there is a 10 second delay).

3) Regenerative braking Ignition feed activation.

This mode is similar to 2) (above). Ignition feed to ~12V and link Auto w/ Low V. Initial activation input voltage is 13.3V. However, the sleep voltage is below 12.2V. If ignition feed is cut at any voltage the unit enters sleep. To get out of sleep the live feed must be re-established and the input voltage must be above 12.2V - 10 second delay.

This mode complements Regen. Braking / SmartAlts.

WARNING - This mode could potentially drain battery.



3) Regenerative braking Ignition feed activation. Initial input voltage 13.3V+ to activate. Below 12.2V unit enters sleep. Above 12.2V unit is on w/ ignition feed live - 10 second delay.



Miscellaneous information

Battery temperature sensing:

Simply connect one of the enclosed temperature sensors to a battery terminal post (negative or positive) and to the 2x small terminals marked battery temperature. There is no polarity on these wires. The output voltage will be reduced in accordance with manufacturer's battery charging temperature curves and, in the event, of the battery temperature increasing due to battery failure. If it exceeds 60 deg C, which is a major problem, the unit will switch off the charging.

There is a power / temperature reduction algorithm which will reduce the units output if the temperature rises to:

Battery Temperature: 65 degC

Charger Temperature: 90 degC

Start up and test procedure (x2 for 24V)

When the unit is first connected, it will run the start up procedure as long as the battery is above about 6V. After the start up procedure (if the input voltage is still low) the unit goes into sleep mode (all lights off). The unit will remain in sleep until the input voltage exceeds 13.3V (x 2 for 24V) this then activates the unit.

On normal operation: when input voltage over 13.3V (x 2 for 24V).

The blue LED will light up showing constant current charging, then after 1-8 hours (depending on state of batteries etc. The blue and yellow indicating absorption time 1 then yellow indicating absorption time 2, then green for float (battery charged).

If on start up nothing happens:

Test the battery voltage. It should be above 13.3V, to see the unit working start up the engine and ensure you are getting at least 13.5V at the battery. If you are getting at least 13.3V (at the unit) and there is nothing working then the unit is defective. If you are not getting 13.3V then the fault is on your power supply.

Fan replacement.

The main electrical box is IP68 i.e. it can be totally submerged in water. However, the fan is IP55 which cannot, so, in the event of the fan being destroyed simply replace it. These small 40 mm fans are easily found and are low cost to replace. Simply fit the correct DC voltage (marked on the fan fitted) and replace the unit.

What is regenerative braking?

Regenerative braking fix (function 3)

A new, very serious, issue for auxiliary charging systems has now been introduced in a lot of vehicles and small vans, it is called **regenerative braking**. It is a great idea as far as the primary vehicle is concerned as it adds extra MPG to the vehicle's specification. However, it is an

unmitigated disaster as far as the auxiliary battery charging system is concerned.

In order to increase efficiency of vehicle's fuel consumption, on vehicle's start up, the idea is to only charge the battery with enough power to safely restart the engine. Once this has been achieved after a few minutes then the alternator drops its voltage from about 14.8V to about 12.6V leaving "space" in the battery. The idea is that, at 12.6V, the alternator has sufficient voltage to power the engine systems without accessing the battery power, yet, not enough voltage to charge the battery fully.

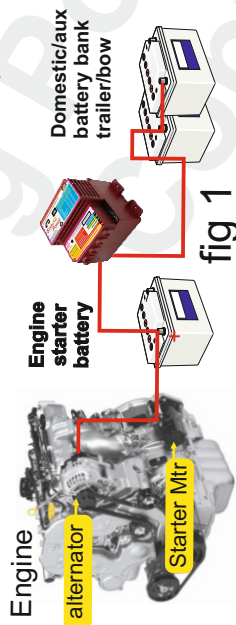
When the brakes are applied on the vehicle the alternator's voltage ramps up quickly to boost large amounts of power into the space left in the battery. This loads up the alternator which helps out the vehicle's braking and adds a spurt of power to the batteries. Once the braking is removed then the voltage drops again and that "free" power boosted into the batteries is then used by the vehicle. Once it has used up the 12.6V the alternator simply takes over. This is great for the primary vehicle and does what it says it does but means the auxiliary battery system simply cannot get effectively charged.

The solution is our new Battery to Battery charger. As mentioned, it has both an auto setting and an ignition setting. If you have a regenerative braking system simply select the ignition setting and, even when the vehicles electrics drops to 12.6V (or lower), we simply take that voltage and boost it up into your auxiliary battery system ensuring steady power charging regardless of the vehicle's voltage variations.

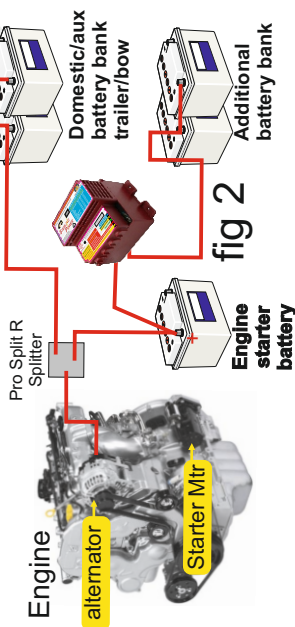
Application ideas

This unit can be used to charge extra battery banks from the boat's Inboard engines, outboard engines, vehicle engines (cars/lorries/vans) and generator engines.

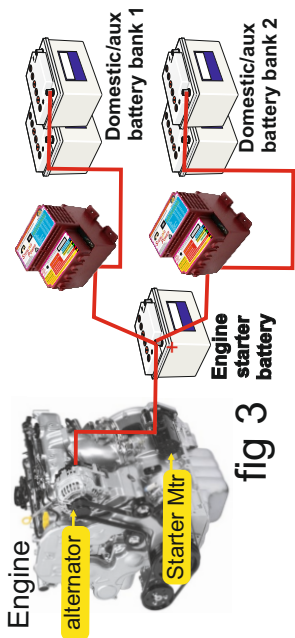
Standard simple installation for auxiliary charging system on a Small boat inboard or outboard . Van, car, 4 x 4 , or campervan.



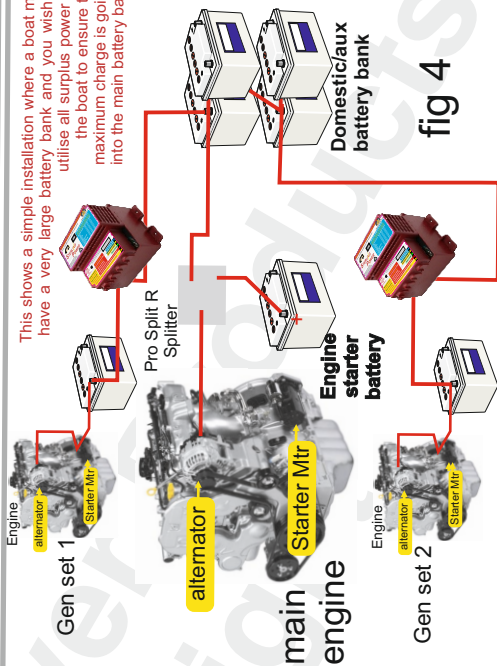
Installation to add a extra battery bank to a already existing split charging system, ie a bow thruster battery bank



Simple installation if you wish to charge 2 x extra battery banks



This shows a simple installation where a boat may have a very large battery bank and you wish to utilise all surplus power on the boat to ensure the maximum charge is going into the main battery bank



Other application ideas see fig 1-4 (previous page)

Fig 1: Most common installation, simply connect the charger between the starter battery and the secondary (house/bow thruster) bank. The starter battery stays between 13-14V and the secondary goes to 14.1V-15.1V. This setup is especially good when the secondary battery is distant from the starter, like a bow thruster.

Fig 2: This option shows the use of the charger in conjunction with a split charging system. Here an additional battery bank is present, simply drop the charger between secondary battery and this additional

battery. The charger can also transform a single output charger into a dual output.

Fig 3: This option shows a situation on many boats or camper vehicles where there may be 3x battery banks. Simply put 2x chargers on, and they will ensure both banks are catered for. It is immaterial if one bank is further away than another.

Fig 4: This option focuses on charging a large house bank from multiple charging sources. Whether the charge comes from a generator, engine or old single stage battery charger a battery to battery charger shall provide a much improved charging rate from these sources to the extensive house bank.

Remote control panel (see next page)

1) Voltage select.

Pressing this button allows you to view 3 voltages:

- a) Input voltage to unit (indicated by yellow LED 2 on).
- b) Output voltage from unit (yellow LED 7 on).
- c) Voltage at end of remote sense wire (if used) indicated by yellow LED 7 flashing.

2) In conjunction with the remote panel voltage button 1, If on, this showing the voltage reading displayed is the input voltage. If in conjunction with temperature button 8, this shows unit temperature.

3) LCD screen showing digits. Also, red screen = WARNING. Green screen all ok. Blue = Charging.

4) LED 4-5-6 emulate the 3 charge indicators on the main box, 4 (blue) = constant current.

5) Absorption.

6) Float.

7) In conjunction with Voltage button 1. If on, this is showing that the voltage reading displayed is the output voltage. If flashing then the voltage displayed reading is the voltage at the end of the remote sense cable, if used. In conjunction with temperature button 8, display shows battery temperature.

8) Temperature information selection, by pushing this button you can select 2 temperatures:

a) Unit temperature indicated by LED 2 and screen showing 'C' for degrees Celsius or 'F' for degrees Fahrenheit, depending on your setup.

b) Battery temperature indicated by LED 7 on selection and screen showing 'C' for degrees Celsius or 'F' for degrees Fahrenheit, depending on your setup.

9) Fault, reference light on will also show a fault number on the screen, please reference this number against the fault.

E01 = High voltage input

E02 = High voltage output

E03 = High unit temperature

E04 = High battery temperature

E05 = No output voltage

Preset voltages: (x2 for 24V models).

Minimum input voltage the unit will run at 13.0V.

Switch off and sleep mode happens below 12.8V for at least 15 minutes.

Power consumption on sleep mode is 5 mA (0.005A).

Maximum input voltage trip 15.5V.

Maximum output voltage trip 15.5V.

All voltages refer to a default temperature of 20 deg C.

If the battery temperature sensor is fitted these voltages will be less dependant on the battery temperature.

WARNING

If all LEDs flash and the fan is running, there is a fault and the unit needs to be disconnected and returned to factory.

WARNING

The battery temperature sensor adjusts the charger voltage according to the temperature on the batteries. The voltage will be higher or lower than the default value. In case of very low temperatures, the voltage could exceed 15V easily. Check your equipment if it is capable. Or else, disconnect the temperature sensor.

Technical data:

Input voltage range: 11 - 16VDC

Output voltage range: 13 - 15.1VDC

Maximum input current: 60A +/- 10%

Min. Input Voltage to Charge/Boost:

13.3V (default)

12.2V (regenerative braking)

Unit sleep mode: 0.2V below Input Voltage

High Input Voltage Alarm: 16.0V

High Output Voltage Alarm: 16.0V+ Temp compensation

High Unit Temperature Alarm: 100°C

High Battery Temperature Alarm: 55°C

High Voltage Drop Alarm: > 1.5V between out + battery

Low Input Voltage Warning: 11.0V

Low Output Voltage Warning: 11.0V

Minimum Output Voltage: > 4.0V

Battery Temperature Compensation: 18mV/°C

High Battery Temperature Alarm: 55°C

High Voltage Drop Alarm: > 1.5V between out + battery

Low Input Voltage Warning: 11.0V

Low Output Voltage Warning: 11.0V

Minimum Output Voltage: > 4.0V

Battery Temperature Compensation: 18mV/°C

Volts Select Button

Quick guide:

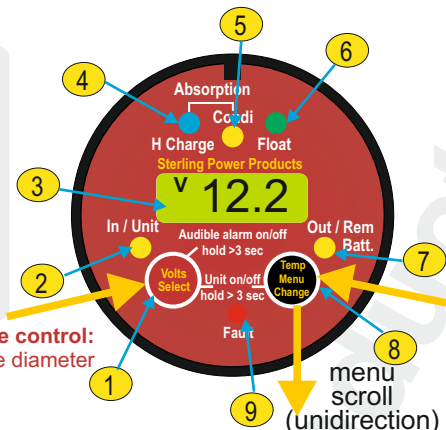
Quick press = back light on.

Short hold = switch between

voltages you want to select

long press switch buzzer on/off (temporary).

(more detailed information below)



Temp Menu Change button

Quick press = back light on.

Short hold = switch between temperatures.

Long press = Menu + setup + sel display

(more detailed information below)

Remote Control

The home screen displays the output voltage from the unit.

If 'crc' is displayed at any point, simply ignore, continue as you were, all this mean is that the remote has received a corrupt readout signal from the charger (merely momentary). Please note, for 24V only operations you setup as 12V. I.e. if you want to set a voltage, for example, 26V you set in the parameters for 13V.

Remote Buttons: Left Button (Volts Select). Press button for output voltage. Press button again for remote sense voltage. If remote sense voltage cable is not connected then the display is 0.0V (with a red backlight). Press button again to revert back to home screen input voltage. Hold button for 4 seconds to set alarm to 'off', repeat procedure to turn alarm to 'on'.

Right Button (Temp Menu Setup). Press button for unit temperature. Press button again for battery temperature (via batt temp sensor). If sensor is not attached then the reading shall be **nc** (non compliant). Press again to view unit temperature.

To access the menu and adjust parameters:

To access the menu and adjust the parameters press and hold the right button (Temp Menu Setup) until **SEL** appears (approximately 5 seconds), then let go. **bPc** shall appear and you can now scroll through all of the 18 parameters unidirectional using the right button only. You can enter whichever parameter you wish by pressing the left button (Volts Select). Certain parameters are adjustable, the majority are, however, just a read out. Refer to the chart below.

To exit from the menu, holding down both left and right buttons simultaneously will result in **END** appearing on the screen. This shall ultimately revert back to the home screen.

Setup - Menu: To eject from menu simply do nothing for 10 sec it will jump out

"bPc"	SEL	"bPc" display boost current in percent.
"btY"		"btY" displays battery profile type (0-9). This number denotes which charging profile the charger is set to. (Ref: table labelled 'Battery Chemistry Selection' on).
"coU"		"coU" displays cut off voltage (the voltage at which the unit stops boosting) (13.4V)
"loU"		"loU" display input / output base voltage (12/24V).
"C/F"		"C/F" change from celcius to fahrenheit or back* (default = celcius). Press right button to change between Fahrenheit (FAH) and Celsius (cEL).
"buC"		"buC" turn Buzzer on / off* (default = on). Left button for off and right button for on .
"Asc"		"Asc" Autoscrol on / off (default = off). Left button for off and right button for on .
"con"		"con" change contrast* value from 0 to 7 (default = 3). Left button down and right button up .
"bLc"		"bLc" change backlight colour*. off <- auto -> green -> red -> blue (default = auto). To change right button goes from off -> blue and left button goes blue -> off .
"bLt"		"bLt" change backlight time*. 1 - 600 seconds, 0 = always on, (default = 60). Right button goes up the values, left button goes down the values. Hold button to accelerate.
"br9"		"br9" change voltage from red to green backlight* 8.0 - 13.3V (default 12.4V). Press right button to increase value, press left button to decrease value. Hold to accelerate.
"b9b"		"b9b" change voltage from green to blue backlight* 12.4 - 16.0V (default 13.4V). Press right button to increase value, press left button to decrease value. Hold to accelerate.
"LEd"		"LEd" change LED on time 1 - 600 seconds, 0 = always on, (default = 60). Press right button to increase in value, press left to decrease in value. Hold button to accelerate.
"uld"		"uld" display Unit ID.
"uSW"		"uSW" display unit software version.
"rSW"		"rSW" display remote software version.
"Loc"		"Loc" Lock unit lock code = 1 to 999 (default = unlocked). WARNING This mode shall lock the unit by virtue of a pass code, be careful. Press right button to increase value, press left button to decrease value. Please release button when on the number you require, the software shall store this number, then the display shall read: loc -> on -> #. # = number you have stored. To remove loc , return to loc and re-enter the number, release buttons and the display should read: loc -> off (green backlight). Please make a note of this loc code here: _____.
"rSt"		"RES" Reset to default values*. Left button NO, right button YES. Let go when on YES to reset.

* = only possible

if not locked

* = only possible if not locked

Customer Service & Warranty

Your 100 % satisfaction is our goal. We realise that every customer and circumstance is unique. If you have a problem, question, or comment please do not hesitate to contact us. We welcome you to contact us even after the warranty and return time has passed.

Product Warranty:

Each product manufactured by Sterling Power comes with at least a 2 year limited factory warranty. Certain Products have a warranty period of time greater than 2 years. Each product is guaranteed against defects in material or workmanship from the date of purchase. At our discretion, we will repair or replace free of charge any defects in material or workmanship that fall within the warranty period of the Sterling Power product. The following conditions do apply:

- **The original receipt or proof of purchase must be submitted to claim warranty. If proof cannot be located a warranty is calculated from the date of manufacture.**
- **Our warranty covers manufacture and material defects. Damages caused by abuse, neglect, accident, alterations and improper use are not covered under our warranty.**
- **Warranty is null and void if damage occurs due to negligent repairs.**
- **Customer is responsible for inbound shipping costs of the product to Sterling Power either in the USA or England.**
- **Sterling Power will ship the repaired or warranty replacement product back to the purchaser at their cost.**

If your order was damaged in transit or arrives with an error, please contact us ASAP so we may take care of the matter promptly and at no expense to you. This only applies for shipping which was undertaken by our company and does not apply for shipping organised by yourself. Please do not throw out any shipping or packaging materials.

All returns for any reason will require a proof of purchase with the purchase date. The proof of purchase must be sent with the returned shipment. If you have no proof of purchase call the vendor who supplied you and acquire the appropriate documentation.

To make a claim under warranty, call our customer care line number can be found on www.sterling-power.com and www.sterling-power-usa.com. We will make the best effort to repair or replace the product, if found to be defective within the terms of the warranty. Sterling Power will ship the repaired or warranty replacement product back to the purchaser, if purchased from us in England or USA.

Please review the documentation included with your purchase. Our warranty only covers orders purchased from Sterling Power. We cannot accept warranty claims from any other Sterling Power distributor. Purchase or other acceptance of the product shall be on the condition and agreement that Sterling Power USA LLC and Sterling Power LTD shall not be liable for incidental or consequential damages of any kind. Some states may not allow the exclusion or limitation of consequential damages, so, the above limitations may not apply to you. Additionally, Sterling Power USA and Sterling Power LTD neither assumes nor authorizes any person for any obligation or liability in connection with the sale of this product. This warranty is made in lieu of all other obligations or liabilities. This warranty provides you specific legal rights and you may also have other rights, which vary from state to state. This warranty is in lieu of all other, expressed or implied.

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