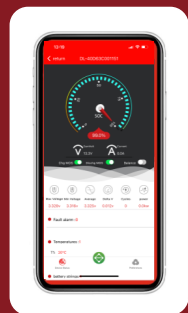




BC range of
AC to DC chargers
2 output
Live voltage output
Linear wave DC charger



Sterling Power's range of
DC to DC chargers
Live voltage output
Linear wave DC charger
Current limiting
Protects alternator + battery



Bluetooth APP -
SMART BMS
back page



12V Lithium Iron Phosphate Batteries w/ built in bluetooth BMS



Important information regarding charging our lithium batteries

- Ensure your battery charger provides a live and linear wave form voltage to wake up battery's BMS (we recommend our BC range)
- Ensure your battery charger's current output is within the C rating of the battery / battery bank.
- Ensure your battery charger's charging voltage is within the charge voltage rating.
- Ensure the series voltage does not exceed 48V. Parallel is unlimited.
- No temperature sensor is required when charging our batteries (except AL1220) as the internal BMS trips the charging circuit.





BATTERY PREFACE LITHIUM OVERVIEW

General Information

The advantages of lithium batteries are well known over conventional batteries.

- Greater energy density, providing more usable power in the same space
- Superior charge and discharge capabilities
- Improved unit safety

They are superior on every level - everyone wants them. However installing them on vehicles was not simple and required a lot of knowledge because they have a very specific envelope for their charging and discharging curves. Failure to operate within these parameters will reduce the performance ability and life of the battery.

Lithium batteries require additional care over lead acid batteries. In AMPS batteries, much of this care is solved and monitored by the BMS onboard. The BMS tries to protect the cells from allow over-voltage, over-current, short circuit damage and over/under temperature situations.

Lithium poses a risk to alternators, and as such we cannot consider warranty claims where Lithium batteries are charged directly off of an alternator (IE, Not with a battery to battery charger to protect both the alternator and the Lithium from one another). When charging lithium from an alternator source (DC/DC charge on vehicles) we require a battery to battery charger for their current limiting and isolating properties.

Due to their very low internal resistance, Lithium batteries are very easy and quick to charge. This historically would be perceived as a good thing, however, on a mechanical source like an alternator this can rapidly lead to alternators running at 100% output for extended periods of time, and imminent degradation. Current limiting chargers limited to 80% of the alternators maximum output is AMPS' recommendation for DC/DC charge.

A.M.P.S recommends the Sterling Battery to Battery charger range for its current limiting features, its ability to isolate the battery from the alternator side, its Euro-6 compatibility and its complete voltage control.

Lithium Benefits

- Capacity and performance - Lithium batteries allow, when the BMS allows it, full use of the battery capacity, as opposed to the 50% recommended depth of discharge of a lead acid battery. Their low internal resistance allows much faster charge than many other battery types and very impressive rates of discharge.
- Often significantly lighter and significantly smaller than their lead acid competition.
- Even when being discharged to significantly greater degrees than a lead acid battery, we will still expect to see between 10-20 times the service life of a lithium battery against a lead acid battery.

A.M.P.S Warranty

Each battery comes with a 5 year limited factory warranty that is non transferable.

- 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 AMPS.

- AMPS will ship the repaired or warranty replacement product back to the purchaser at the purchasers 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 at (England 01905 771771). We will make the best effort to repair or replace the product, if found to be defective within the terms of the warranty. AMPS will ship the repaired or warranty replacement product back to the purchaser, if purchased from us

Please review the documentation included with your purchase. Our warranty only covers orders purchased from AMPS. We cannot accept warranty claims from any other AMPS distributor. Purchase or other acceptance of the product shall be on the condition and agreement that AMPS Ltd shall not be liable for incidental or consequential damages of any kind. Additionally, AMPS 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.



Charging Parameters LITHIUM CHARGING

Bulk / Absorption The ideal voltage is 14.2V-14.4V. If the voltage climbs above this voltage the BMS inside the battery(s) shall simply open circuit, by which point your battery is full anyway. Likewise, when the batteries are deemed full the BMS opens the charge circuit.

There is no harm in having an hour of absorption. This may actually be beneficial if you have voltage drop down your wires from your charger to the battery(s). But, as stated above, once the battery is full the BMS disconnects the charge circuit anyway.

Float As the BMS disconnects when full, there is no need for float. However, if you wish for your battery charger to maintain a status of 'power supply', then a float between 13.6V-13.8V is fine. This is slightly higher than the resting voltage of a full battery. Therefore, if any DC loads are applied the charger shall provide power up to its current rating.

Temperature compensation / temperature trips Temperature compensation is not required. When the cells are at 0 DegC (or lower) the BMS stops any charge entering the battery. The discharge circuit remains engaged down to -20DegC. For our batteries, there is no need to fit a temperature sensor as our BMS protects the battery. The downside to fitting a temperature sensor is that the battery chargers may not provide any charge at 0DegC or lower, therefore your battery charger can not aid with providing current from any potential loads that may be running.

High Voltage cutoff 14.8V+

Low Voltage cutoff <11.0V

Charge current rating varies depending on model. Approximately 50-80% of the Ah capacity in A (0.5C-0.8C)

Discharge current rating varies depending on model. Approximately 120-200% of the Ah capacity in A (1.2C-2.0C)

Chargers / Inverters Please ensure both the charger and the inverter (charging source and load) are within the charge specs of the battery(s) that you are connect them to. When you add multiple in parallel you can multiply the C ratings of the batteries proportionately. If you exceed the charge or discharge rating of the battery(s) the BMS shall simply disconnect the charge or discharge circuit. For example, a 3KW inverter at 12V is slightly less than 300A. 2x 100Ah battery give a combined discharge rating of 300A.

Series voltage limit 48V

Parallel limit unlimited

Other Do not submerge
Do not short circuit
Do not reverse polarity
Do not expose to excess heat
Do not mishandle, drop, throw or apply force
Ensure terminals are tightly bound to the ring terminals

Orientation There is not a specific orientation for lithium battery storage. However, ensure the battery is well secured.

Storage and maintenance If you wish to store the batteries for a long period of time the recommended state of charge to store lithium batteries is approximately 50%. There is no additional maintenance required. We recommend ensuring there is always charge in the battery and ensure the battery terminals and the associated ring terminals are tight.

Spec Table

Part No	Capacity Ah	Charge V	Charge Current (max)	Discharge Current (max)	Bluetooth	series limit	Dimensions (cm) LHW	Weight (kg)	Battery Terminal
AL1220	20Ah	≤14.4V	20A	40A	no	48V	19 x 18.7 x 7.7	2	4mm M4
AL1260	60Ah	≤14.4V	50A	120A	yes	48V	28 x 17.2 x 17.6	8	T1 DIN
AL1280	80Ah	≤14.4V	60A	140A	yes	48V	26 x 21 x 16.5	11	8mm M8
AL12100	100Ah	≤14.4V	70A	150A	yes	48V	33 x 21.5 x 17	13	8mm M8
AL12120	120Ah	≤14.4V	80A	150A	yes	48V	41 x 23.5 x 17	15	8mm M8
AL12150	150Ah	≤14.4V	80A	150A	yes	48V	41 x 23.5 x 17	18	8mm M8
AL12200	200Ah	≤14.4V	150A	300A	yes	48V	53.2 x 20.7 x 21.5	22	8mm M8
AL12300	300Ah	≤14.4V	150A	300A	yes	48V	53.2 x 20.7 x 21.5	31	8mm M8
AL24150	200Ah	≤14.4V	80A	150A	yes	48V	53.2 x 20.7 x 21.5	31	8mm M8



CHARGING Recommend Battery Chargers and DC to DC charging

AC-DC Charging

AMPS AC to DC Battery Charger / from mains

To charge our lithium batteries we recommend using our very own range of battery chargers - the BC series.

Ensure, when charging your batteries, you keep the current rating and voltage rating within the specification of the batteries.

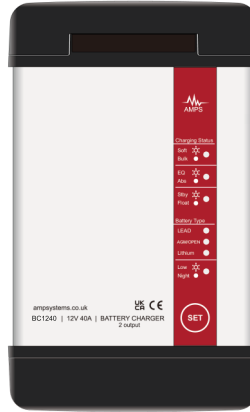
For example, the 12V 20Ah AL1220 battery should not be charged with our 12V 40A (BC1240) battery charger.

When paralleling batteries to increase Ah capacity, the charger current rating can increase proportionately. For example, 2x AL1220 in parallel can be charged with a BC1240.

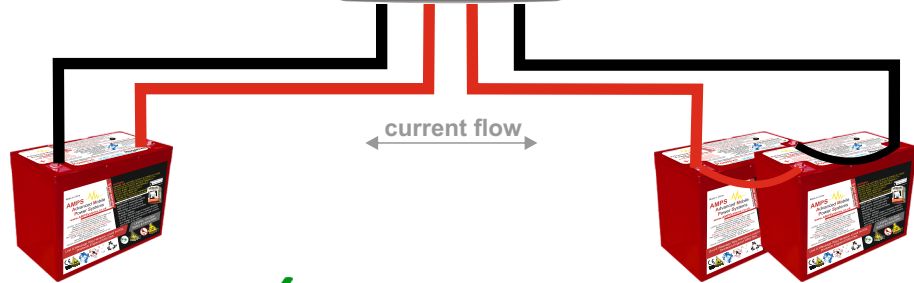
Most of our battery chargers are comfortably under the charge rating of the batteries.

If charger rating is too high, the BMS inside the battery shall trip to protect the battery.

BC1220
BC1220B
BC1240
BC1240B
BC2420B



Our range of BC chargers provide a live output voltage that wakes up the battery BMS.



- Lead acid style battery ✓✓
- AMPS lithium battery ✓✓
- Other lithium batteries ✓✓

- Lead acid style battery ✓✓
- AMPS lithium battery ✓✓
- Other lithium batteries ✓✓

DC-DC Charging

Sterling Power's DC to DC Battery Chargers - Charging when driving / cruising along

Battery to Battery Chargers / DC to DC chargers provides lithium batteries with the correct charging current and charging voltage.

As above, ensure your DC to DC charger is within the current spec of the battery(s) you wish to charge up.

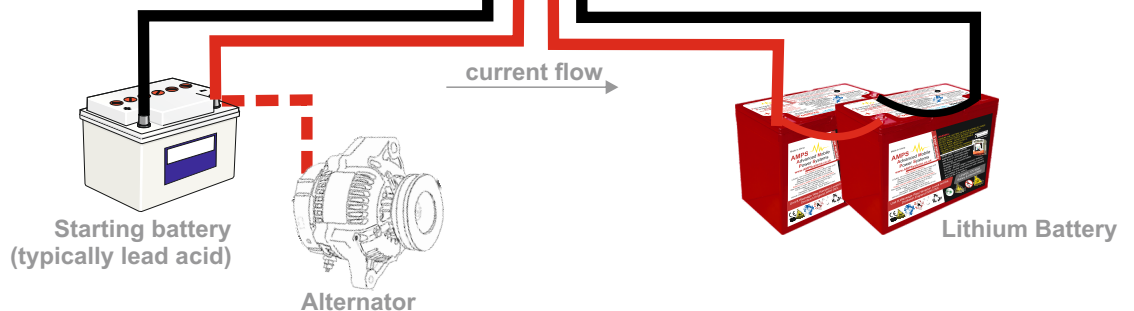
Also, ensure your DC to DC charger is ~70% or lower than your alternator's current rating. Lithium batteries are prone to asking maximum performance from your alternator - resulting in your alternator over heating.

The DC to DC chargers essentially provide appropriate current levels at the correct voltage charging profile.

BB1230
BB1260
BB1270
BB12120
& 24V derivatives



Put BB into lithium charge mode. This shall provide a live output voltage to wake up a sleeping BMS.



Starting battery (typically lead acid)

Alternator

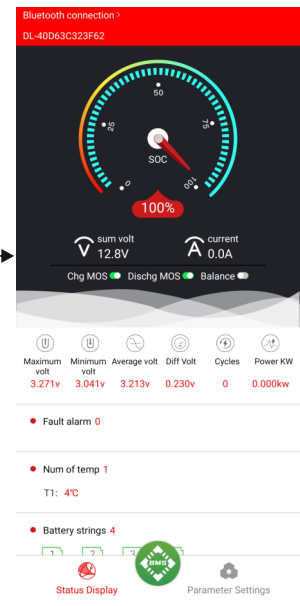
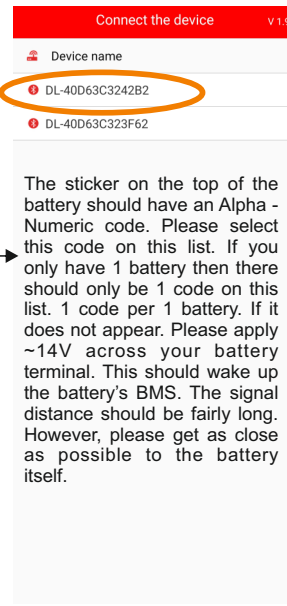
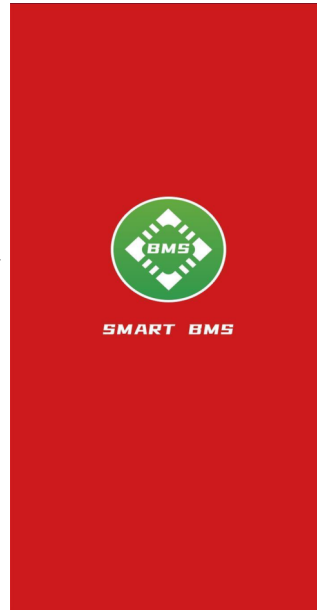
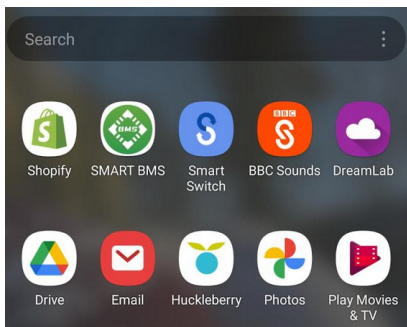
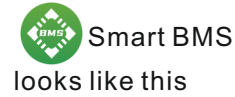
Lithium Battery



Bluetooth BMS Bluetooth BMS functions and Features

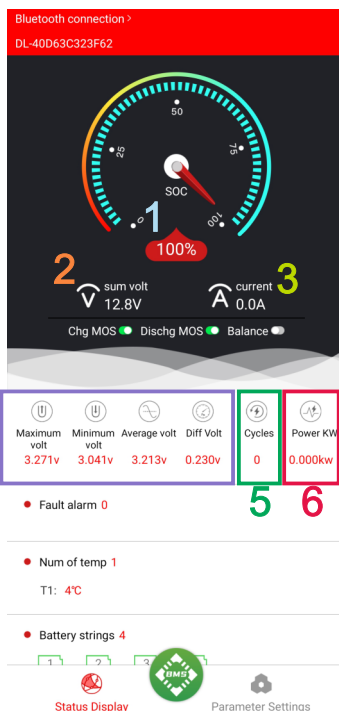
Please ensure your battery is Bluetooth compatible - there should be a round sticker on the top of the battery with a BLUETOOTH code on it. We began rolling out the bluetooth compatible models around the 2020/2021 winter period.

- 1) Please go onto the Play Store or the APP Store and download the free 'Smart BMS' app
- 2) Ensure you have Bluetooth activated on your phone.
- 3) Open the App on your phone follow the steps below:



The sticker on the top of the battery should have an Alpha - Numeric code. Please select this code on this list. If you only have 1 battery then there should only be 1 code on this list. 1 code per 1 battery. If it does not appear. Please apply ~14V across your battery terminal. This should wake up the battery's BMS. The signal distance should be fairly long. However, please get as close as possible to the battery itself.

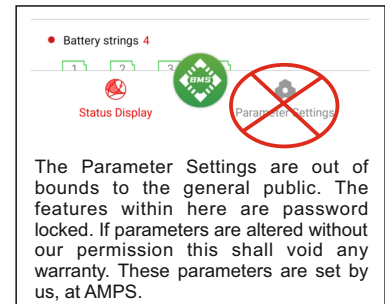
Main Status Display / What it means



This is the main Status Display of the Smart BMS. The main features that shall be of greatest interest are as follows:

- 1) SOC (state of charge) - this is given as a % figure. This is a fairly accurate capacity figure of your battery.
- 2) sum volt (total battery voltage). This is the voltage of your battery.
- 3) current. Current going into the battery shall appear as a positive number and current leaving the battery shall appear negative.
- 4) The area in purple. The battery is made up of 4x strings of 3V cells. The string that has the highest voltage is displayed, the lowest voltage displayed, the average voltage and the differential voltage. The job of the balancer is to keep the differential voltage as low as possible and during charge cycle the balance slider shall turn green, if the balancer has engaged.
- 5) Cycles. This is the number of discharge and charge cycles the battery has had. The higher the number the more the battery has been charged and discharged (used). Even if the battery is brand new this number may be 1 or 2 as it may have been tested first.
- 6) Power KW. This is a simple $P=IV$ calculation. The sum volt x the current. This gives an indication of the power being supply or drawn from the battery.

Parameter Settings (out of bounds)



The Parameter Settings are out of bounds to the general public. The features within here are password locked. If parameters are altered without our permission this shall void any warranty. These parameters are set by us, at AMPS.