



# **SLA & LITHIUM battery Charging & Maintaining Instruction Guide**



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**DISCLAIMER**

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The following recommendations do not replace the regulations and standards applicable in individual countries, which should take precedence at all times.

The purpose of this document is to help you consider how best to set up a (non-industrial) charging room to be used by distributors of BS BATTERY products so that the charge in SLA and Lithium batteries can be maintained (where they are not installed in an appliance and are intended for resale).

With this in mind, it is advisable to contact the authorities in your country, to obtain expert advice, and to consult your insurer to ensure that the charging room is in compliance with all applicable regulations.

BS BATTERY Sas does not guarantee the accuracy, reliability or completeness of the information contained in this document.

Under no circumstances shall BS BATTERY Sas be held liable for any personal injury or losses (material or otherwise) resulting from the use of this information.



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## **1 Technical concepts and general product characteristics**

### **1.1 General and specific characteristics of SLA & Lithium batteries**

SLA battery range is sealed, factory-activated with a valve regulation (vent).

This valve allows some of the gases produced during use to be reabsorbed inside the battery, which removes the need for any maintenance (no water added).

As the battery is sealed, there is no risk of any spillage.

As the battery is activated at the factory, it is important to ensure the battery voltage remains at 12.4 V or higher for storage and at least 12.7 V when offered for sale. This will allow the retailer to store the battery for a few months without having to charge it.

SLA batteries must be charged using a suitable charger to prevent the battery from degrading prematurely and to stop accumulated hydrogen from being released.

LITHIUM batteries voltage must remain at 12.8V or higher for storage and at least 13 V when offered for sale. This will allow the retailer to store the battery for a few months without having to charge it. These batteries must be charged using a LiFePO4 suitable charger (or lead acid charger without desulfation step).

### **1.2 Precautions to be taken when using batteries**

- The battery casing must not be broken under any circumstances.
- Never obstruct the battery valve (for SLA).
- Once the battery has been charged, all necessary precautions must be taken during storage and handling to avoid any risk of a short-circuit.
- For SLA battery = Use a charger suitable for motorcycle batteries and with a charging current between C10 and C3 (corresponding to 10% and 33% of the battery capacity)
- For LITHIUM battery: Use a charger suitable for Lithium batteries with a max charging current of 1C (corresponding to 100% of the battery capacity). A faster charge with 2C max current is possible but must not exceed 30 minutes. The charging voltage should never be higher than 15V. If the battery seems hot when touching, stop charging.
- Allow the battery to stabilise after charging (for 2 to 3 days). If you have to test the battery just after charging, wait at least 2 hours before doing so, and ensure that =
  - o SLA battery voltage is greater than or equal to 13V
  - o Lithium battery voltage is greater than or equal to 13.4V
- Temperature and humidity can have a significant effect on a battery's discharge rate, and hence on how often it has to be re-charged. Batteries should be stored at



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temperatures between 10°C and 25°C, and the temperature during storage must not exceed 40°C. Humidity during storage should ideally be between 40% and 60%.

### 1.3 Risks description

It is important that individuals responsible for charging the batteries are made aware of the associated risks so that they can take the necessary precautions.

The risks associated with charging the batteries are as follows:

- Risk of explosion and fire (hydrogen may be released during charging)
- Risk of poisoning (related to the presence of lead and acid in the batteries)
- Risk of respiratory tract irritation (related to the presence of acid in the batteries)
- Risk of electric shock (associated with electrical equipment and batteries that are already charged)
- Risk of chemical burns (related to the presence of acid in the batteries)
- Risk of musculo-skeletal disorders (due to the weight of the batteries and repetitive movements).

## 2 Precautions

### 2.1 In the charging room

- Set aside a dedicated space for charging the batteries. If possible, separate this space from the storage area using a fire door.
- The space should be clearly marked and delimited. Access to the room should be limited to suitably qualified individuals only.
- The electrical installation should comply with all applicable standards and be certified by a suitably qualified professional.
- Do not exceed the maximum number of chargers the electrical installation can support.
- The room should be equipped with a fire extinguisher and a fire alarm system (detectors)
- Prepare a solution of sodium bicarbonate (0.1 kg/l or 1 lb/gal) to neutralise any electrolyte leaks.
- Ventilation openings should ventilate a sufficiently large area (at least 2% of the floor area). Otherwise, use a suitable mechanical ventilation system. The room should be equipped with an air inlet low down in the room and a high-level outlet. Both should provide a sufficient flow rate.
- Ensure that there are no areas high up in the room where gas (in this case hydrogen) might accumulate.
- The room should be filled with fresh air between charges.
- So-called 'intelligent' chargers (type BS10, BS15, BS30, BS60 ) should be used if possible. They should be equipped with various protective features (such as polarity reversal, short-circuit protection, automatic start when connecting and automatic stop when the battery is fully charged).



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- Do not allow any conductive objects to come into contact with the battery terminals.
- Do not allow any metal objects to be placed on top of the battery, as this may cause a short circuit.
- Ensure that all metal equipment used (e.g. hoists, metal shelves) is earthed and insulated using plastic.
- Use spark arrestors.
- Make sure that the shelves used to support the batteries are made of non-conductive materials. If this is not possible, make sure the shelves used are coated with an insulating substance (plastic or rigid cardboard) to prevent sparks from being generated.



### 2.2 Individuals handling batteries

Batteries are considered dangerous products. Any individuals charging or maintaining them must be suitably trained and wear electrically insulated gloves, safety boots or shoes, and safety goggles.

It is strongly recommended:

- to not wear clothes made of nylon, as such clothing tends to accumulate static electricity and may cause sparks;
- to prevent individuals from smoking in the charging room or wearing jewellery while handling batteries.
- to ensure that eyewash and/or an emergency shower is available in the immediate vicinity of the charging room.



### 3 Typical installation example

#### 3.1 Rack Description

Given the weight of the batteries, we recommend the use of specific table or pallet racking.

The batteries should be stored on first level, one at 90 cm (2.95 ft) off the ground, and two rows.

The master carton should be stored on the second level.

In this example, we have used the following materials:

- For the 1st floor of medium density fiberboard : 350 cm x 45 cm x 1.8 cm.
- For the 2nd floor of medium density fiberboard : 350 cm x 90 cm x 1.8 cm.
- The metal structure of the table must be able to withstand a minimum weight of 1.2 tons



Photo: Example Electric outlet use

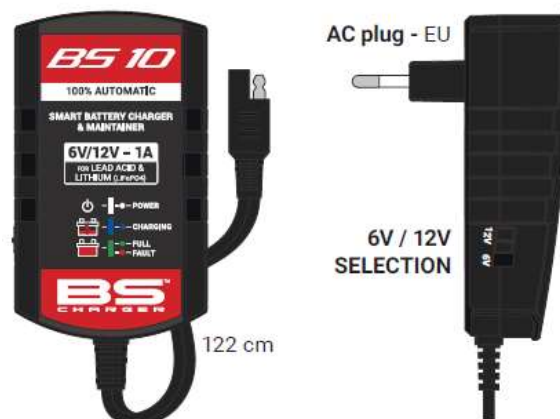


Example BS30 fixed



## 3.2 BS Chargers description

### 3.2.1 BS10 charger short description (For Lead acid & Lithium)



BS10 chargers are designed to charge **6V or 12V** SLA batteries with capacities from **2 Ah to 10 Ah** and for **12V** Lithium batteries with capacities between **2 Ah and 10 Ah**

The BS10 charger has a maximum output current of 1A.

The charger's operating temperature range is **0°C – 45°C**

The input mains voltage range is 100 – 240 VAC, frequency 50/60 Hz, **0.35 A**.

When using chargers on a table, it is recommended to store a maximum of 40 BS10 chargers on each side, with 20 chargers by level.

**The electrical connections should comply with all applicable standards and be certified by a suitably qualified professional.**



NB: BS10 chargers are designed to be connected directly to the power supply and are not supplied with a power cable. Ideally, high-level trunking should therefore be fitted for the racks.

### 3.2.2 BS15 charger short description (for Lead-acid only)



BS15 chargers are designed to charge only **12V** SLA batteries with capacities between **4.5 Ah and 15 Ah**.

The BS15 charger has a maximum output current of **1.5A**

The charger's operating temperature range is **0°C – 40°C**

The input mains voltage range is **100 – 240 V AC**, frequency **50/60 Hz**, **0.38 A**.

When using chargers on a rack, it is recommended to store a maximum of **40 BS15 chargers** on each side, with **20 chargers** by level.

The electrical connections should comply with all applicable standards and be certified by a suitably qualified professional.

### 3.2.3 BS30 charger short description (For Lead acid & Lithium)



BS30 chargers are designed to charge **12V** SLA batteries with capacities between **9Ah** and **30Ah** and for Lithium batteries with capacities between **3Ah** and **30Ah**

The BS30 charger has a maximum output current of 3A

The charger's operating temperature range is **0°C – 40°C**

The input mains voltage range is 100 – 240 V AC, frequency 50/60 Hz, **0.8 A**.

When using chargers on a rack, it is recommended to store a maximum of 40 BS30 chargers on each side, with 20 chargers by level.

The electrical connections should comply with all applicable standards and be certified by a suitably qualified professional.

### 3.2.4 BS60 charger short description (for Lead-acid only)



BS60 chargers are designed to charge and maintain only **12V** lead/acid batteries with capacities between **3Ah** and **60Ah**.



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The BS60 charger has a selectable output current 1A – 4A – 6A.

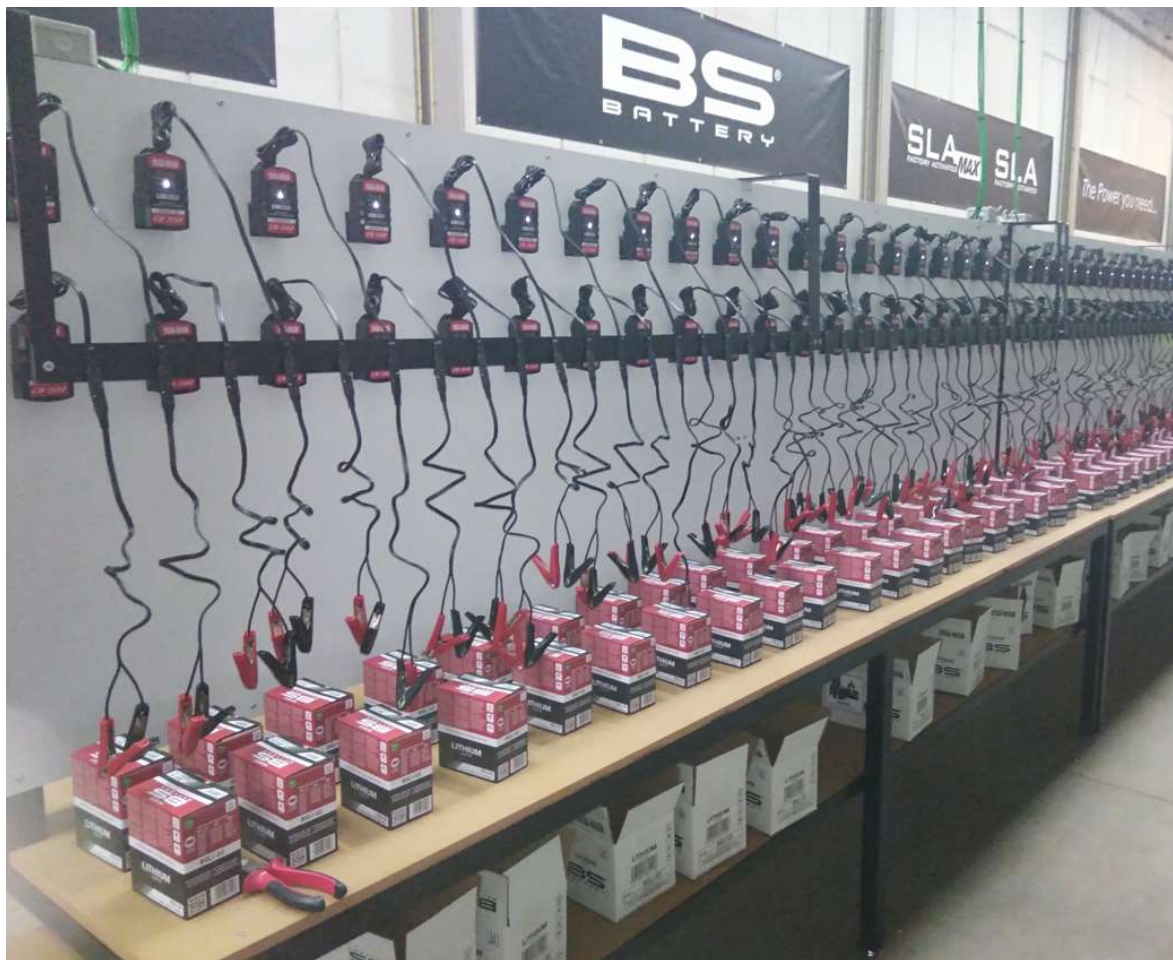
The charger's operating temperature range is **0°C – 40°C**

The input mains voltage range is 100 – 240 V AC, frequency 50/60 Hz, **1,4 A**.

When using chargers on a rack, it is recommended to store a maximum of 24 BS60 chargers on each side, with 12 chargers by level.

The electrical connections should comply with all applicable standards and be certified by a suitably qualified professional.

See picture below:





## **4 Managing battery stocks and planning charges recommendation**

### **4.1.1 Managing battery stocks recommendation.**

We recommend a combination of FIFO and batch-based stock management to help you monitor charging dates (some software programs allow you to calculate expiry dates) and storage periods.

### **4.1.2 How frequently should SLA & Lithium batteries be charged**

SLA & Lithium batteries have to be charged periodically as part of normal maintenance. The period between charges varies according to the size of the battery (see the table in Section 6 of the annex). As a guide, and **provided batteries are stored under normal conditions** they should be charged as follows:

- SLA batteries with capacities of less than 4Ah should be charged every 3 months.
- SLA batteries with capacities between 4Ah and 12Ah should be charged every 4 months
- SLA batteries with capacities between 12Ah and 14Ah should be charged every 5 months
- SLA batteries with capacities between 14Ah and 30Ah should be charged every 6 months.
- LITHIUM batteries should be charged every 6 months.

As temperature and humidity can reduce the period between charges, it is recommended to check them and adjust the charging intervals according to the environment in which the batteries are stored.

#### **Example:**

If we take a battery with a capacity of 8 Ah that is designed to be re-charged every 4 months, and if we assume it was charged in January, the next charge should be planned for May.

#### **4.1.2.1 Calculating charging time**

The theoretical charging time can be calculated by dividing the battery capacity by the charger's output.

#### **Example:**

- If the SLA battery capacity is 8Ah and the charger used is BS15 (1.5A output), the charge duration will be  $8 \div 1.5 = 5.33$  hours, which should be rounded up to 6hrs.



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- If the SLA battery capacity is 20Ah and the charger is BS15 (1.5 A output) the duration will be  $20 \div 1.5 = 13.33$  hours, which should be rounded down to 13hrs.
- If the Lithium battery capacity is 2Ah and the charger used is BS10 (1A output), the charge duration will be  $2 \div 1 = 2$  hours.

This time corresponds to the theoretical charging time for a full charge; the time required for regular maintenance charges will be shorter

### 4.1.2.2 Charging cycles.

The number of charging cycles that can be completed per day depends on the following factors:

- The manpower available to install, charge and recondition batteries.
- The number of chargers in the charging room.
- The capacity of the batteries to be charged, the bigger the battery, the longer the charge.
- The number of batteries to be charged.

A maximum of three charging rotations can be performed in a single charging room – 2 short rotations of 5hrs and one overnight rotation. For Lithium battery, you can increase battery rotation to 3 or 4 per day as the charge is faster than lead acid battery.

However, we recommend you carry out 2 rotations in the morning and one overnight. This is because carrying out 3 rotations allow a continuous working (i.e. staff dedicated to charging the batteries).

Batteries with a theoretical charging time of up to 5 hours can be charged in short rotations. Batteries with longer charging times should be charged at night.

### 4.1.2.3 Planning charges

You should aim to carry out one charge every morning and one in the evening.

If there are more short charges than night charges, you can carry out two short charges, one in the morning and one in the evening.

BS60, BS30, BS15 and BS10 chargers – these chargers switch to maintenance charging as soon as the battery is charged. For Lithium battery, there is no maintenance charge, once the Green Led lights, you can remove the battery from the charger and launch a new rotation.

Priority should be given to charging those batteries for which demand is currently highest.

**Batteries carrying the same reference number should not be charged together. Batteries on charge should be from different batches to ensure the batteries remain traceable.**

## **5 Checks and suggested operating procedure for charges**

Whether batteries are being charged or taken off charge, any individuals charging or maintaining them must be suitably trained and wear electrically insulated gloves, safety boots or shoes and safety goggles.

It is strongly recommended:

- not to wear clothes made of nylon, as such clothing tends to accumulate static electricity and may cause sparks;
- to prevent individuals from smoking in the charging room or wearing jewellery while handling batteries;
- to ensure that eyewash and/or an emergency shower is available in the immediate vicinity of the charging room.

### **5.1.1 Putting batteries on charge**

#### **Check 1: Check you have the right batteries**



Check the batch number and item references against the charging schedule



Check the charge rotation (morning or evening)



If a pallet has to be unpacked, keep the label for re-palletisation.

#### **Check 2: Precautions to be taken when opening the master carton**



If the master carton is dusty, remove the dust so as to prevent the color box from becoming dirty.



Be careful not to damage the color box when opening the master carton with the cutter

#### **Check 3: Check the charging room**



Check that the room is suitably ventilated and that the temperature is within the operating range (between 0°C and 40°C).



### Check 4: Make sure the batteries are positioned in a way that maintains traceability



Put batteries from the same lot on charge one after the other.

The last battery in the batch should be positioned at right angles to the others to mark the end of the batch.



Use the plastic tab to remove the first color box and store it in the master carton until you repack it.



Do not take the color box out by pulling the top, as it could tear.



Open the color box, taking care not to tear the cover



Pay attention to the leaflet, nuts and bolts and insulating cover(s), all of which will have to be replaced after charging.

### Check 5: Check the charger to be used and make sure it is working properly



Check the charger to be used, as shown on the charging schedule (BS60, BS30, BS15, BS10).

The **BS10** charger is recommended for lead acid batteries with capacities **from 2Ah up to 10Ah** and for Lithium batteries **from 2Ah up to 10Ah**.

The **BS15** charger is recommended for lead-acid batteries with capacities **from 4.5Ah up to 15Ah. (Not compatible with lithium batteries!)**.




The **BS30** charger is recommended for lead-acid batteries with capacities **from 9Ah up to 30Ah** and for Lithium batteries **from 3Ah up to 30Ah**.

The **BS60** charger is recommended for lead-acid batteries with capacities **from 3Ah up to 60Ah. (Not compatible with Lithium batteries!)**.


**For your own safety and to prevent damage to the batteries, it is very important to use the right charger.**



Connect the charger clamps to the battery terminals, paying particular attention to the polarity of the battery.


-  Check the charger lights to ensure that the charger is working properly (refer to the charger information sheet).
-  If a charger is found to be defective, disconnect the power supply from the charger and wrap the cables around the charger so that it can no longer be used. Inform the individual responsible for maintaining the charger so the charger can be replaced as soon as possible.
-  Once all the batteries in the same batch have been put on charge, enter the charge start time in the log.

### **Check 6: Check the whole charging room**





-  Once all the batteries to be charged have been connected to their chargers, inspect all the chargers to ensure that they are properly connected and working correctly.


### **5.1.2 Procedure for removing batteries from charge.**


#### **Check 7: Check before disconnecting the battery**

-  Check the charging schedule to make sure that the minimum charging time has elapsed.

#### **Check 8: Precautions to take when disconnecting the charger**


-  Check that the charger light is showing a full charge (green light). If not, check the information sheet for the charger concerned to find out why.
-  Disconnect the clips from the battery charger and replace the insulating cover(s) on the battery terminal(s). Make sure you observe the correct color coding for polarities (red, black).
-  Check that the bag containing the nuts and bolts is correctly positioned and is not preventing the color box from being closed.
-  Replace the leaflet correctly inside the color box.


 Close the color box and check the overall condition of the color box.


 Once all the batteries have been disconnected, enter the end time for the charge in the log.

**If the color box is damaged or incomplete, notify the relevant member of staff.**


### **Check 9: Precautions to be taken when replacing the color box in the master carton**


 Put the color boxes inside the master carton. Make sure they are all the same way up.


 Replace the removal tab around a color box.


 Close the master carton using **transparent sticky tape**.

### **Check 10: Precautions for palletisation**


 Change the pallet if it is damaged.

 Follow the initial palletising plan (number of master cartons per level, number of levels, whether it is staggered or not, etc.).

 Check that the batch label is correctly attached and that the number of batteries is the same as the number that were on the pallet when it entered the charging room.

 For batteries not packed in color boxes, remember to put the nuts and bolts back on the pallet and to position the spacers correctly between the levels.

### **Check 11: Return batteries to the 'Charged batteries for stock' zone.**

 Cover the pallet in film. Replace any protective covers and the cardboard or wooden lid wherever possible.



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## 6 Attachment

### 6.1 12V SLA BATTERY Technical Charging Data Reference Guide

Part Number	BS BATTERY Désignation	Capacity (Ah)-20Hr	Battery voltage (V)	Charger output current (A)	Estimated charging Time (Hr)	Cycle Type	Maximum charging frequency (in Month) for sale	Maximum charging frequency (in Month) for stock	Recommended charger
300756	BS SLA - BT4B-5 (FA)	2,4	12	1	3	Short	3	4	BS10
300667	BS SLA - BTR4A-5 (FA)	2,4	12	1	3	Short	3	4	BS10
300842	BS SLA - BB3L-B (FA)	3,2	12	1	4	Short	3	4	BS10
300669	BS SLA - BTX4L+/BTZ5S (FA)	4,2	12	1	5	Short	3	4	BS10
300665	BS SLA - BB4L-B (FA)	4,2	12	1	5	Short	3	4	BS10
300670	BS SLA - BTX5L/BTZ6S (FA)	5,3	12	1,5	4	Short	3	4	BS15
300671	BS SLA - BB5L-B (FA)	5,3	12	1,5	4	Short	3	4	BS15
300840	BS SLA - 12N5.5-3B (FA)	5,8	12	1,5	4	Short	3	4	BS15
300841	BS SLA - 12N5.5-4A (FA)	5,8	12	1,5	4	Short	3	4	BS15
300635	BS SLA - BTZ7S (FA)	6,3	12	1,5	5	Long	3	4	BS15
300673	BS SLA - BTX7L (FA)	6,3	12	1,5	5	Long	3	4	BS15
300672	BS SLA - BTX7A (FA)	6,3	12	1,5	5	Long	3	4	BS15
300641	BS SLA - BT7B-4 (FA)	6,8	12	1,5	5	Long	3	4	BS15
300912	BS SLA - BTZ7V (FA)	6,8	12	1,5	5	Long	3	4	BS15
300890	BS SLA - BTZ8V (FA)	7,4	12	1,5	5	Long	4	5	BS15
300843	BS SLA - BB7C-A (FA)	7,4	12	1,5	5	Long	4	5	BS15
300642	BS SLA - BT9B-4 (FA)	8,4	12	1,5	6	Long	4	5	BS15
300674	BS SLA - BTX9 (FA)	8,4	12	1,5	6	Long	4	5	BS15
300850	BS SLA - BB7-A (FA)	8,4	12	1,5	6	Long	4	5	BS15
300836	BS SLA - BB7L-B2 (FA)	8,4	12	1,5	6	Long	4	5	BS15
300636-1	BS SLA - BTZ10S (FA)	9,1	12	3	4	Short	4	5	BS30
300675	BS SLA - BB9-B (FA)	9,5	12	3	4	Short	4	5	BS30
300643	BS SLA - BT12B-4 (FA)	10,5	12	3	4	Short	4	5	BS30
300913	BS SLA - BT12-10Z (FA)	10,5	12	3	4	Short	4	5	BS30
300679	BS SLA - BT12A (FA)	10,5	12	3	4	Short	4	5	BS30
300680	BS SLA - BTX12 (FA)	10,5	12	3	4	Short	4	5	BS30
300637-1	BS SLA - BTZ12S (FA)	11,6	12	3	4	Short	4	5	BS30
300677	BS SLA - BB10L-A2/B2 (FA)	11,6	12	3	4	Short	4	5	BS30
300638-1	BS SLA - BTZ14S (FA)	11,8	12	3	4	Short	4	5	BS30
300644	BS SLA - BT14B-4 (FA)	12,6	12	3	5	Long	4	5	BS30
300681	BS SLA - BTX14 (FA)	12,6	12	3	5	Long	4	5	BS30
300760	BS SLA - BTX14L (FA)	12,6	12	3	5	Long	4	5	BS30
300837	BS SLA - BB12AL-A2 (FA)	12,6	12	3	5	Long	4	5	BS30
300881	BS SLA - BB12A-A/B (FA)	12,6	12	3	5	Long	4	5	BS30
300863	BS SLA Max - BTX14AH (FA)	13,7	12	3	5	Long	4	5	BS30
300758	BS SLA - BTX14AH/BB14-A2(FA)	14,7	12	3	5	Long	4	5	BS30
300759	BS SLA - BTX14AHL/ BB14L-A2/B2 (FA)	14,7	12	3	5	Long	4	5	BS30
300763	BS SLA - BTX16 (FA)	14,7	12	3	5	Long	4	5	BS30
300838	BS SLA - BB14A-A2 (FA)	14,7	12	3	5	Long	4	5	BS30
300882	BS SLA Max - BTX14HL (FA)	14,7	12	3	5	Long	4	5	BS30
300887	BS SLA Max - BTX14H (FA)	14,7	12	3	5	Long	4	5	BS30
300896	BS SLA Max - BTX16H (FA)	16	12	3	6	Long	5	6	BS30
300839	BS SLA - BB16AL-A2 (FA)	16,8	12	3	6	Long	5	6	BS30
300931	BS SLA Max - BGZ16H (FA)	16,8	12	3	6	Long	5	6	BS30
300932	BS SLA Max - BGZ16HL (FA)	16,8	12	3	6	Long	5	6	BS30
300688	BS SLA - BTX20 (FA)	18,9	12	6	4	Long	5	6	BS60
300766	BS SLA - BTX20CH (FA)	18,9	12	6	4	Long	5	6	BS60
300689	BS SLA - BTX20HL (FA)	18,9	12	6	4	Long	5	6	BS60
300632	BS SLA - SLA12-19 (FA)	19	12	6	4	Long	5	6	BS60
300771	BS SLA - BB16CL-B (FA)	20	12	6	4	Long	5	6	BS60
300883	BS SLA Max - BTX20HL (FA)	21,1	12	6	4	Short	5	6	BS60
300933	BS SLA Max - BGZ20H (FA)	21,1	12	6	4	Short	5	6	BS60
300934	BS SLA Max - BGZ20HL (FA)	21,1	12	6	4	Short	5	6	BS60
300770	BS SLA - BTX24HL/B50N-18L-A/A2/A3	22,1	12	6	4	Short	5	6	BS60
300860	BS SLA Max - 51913 (FA)	22,1	12	6	4	Short	5	6	BS60
300631	BS SLA - BIX30L (FA)	31,6	12	6	6	Long	5	6	BS60
300880	BS SLA - 53030 (FA)	31,6	12	6	6	Long	5	6	BS60
300884	BS SLA Max - BIX30HL (FA)	31,6	12	6	6	Long	5	6	BS60
300935	BS SLA Max - BGZ32HL (FA)	33,7	12	6	6	Long	5	6	BS60



## SLA & Lithium battery Charging & Maintaining Instruction Guide

### 6.2 6V SLA BATTERY Technical Charging Data Reference Guide

Part Number	BS BATTERY Désignation	Capacity (Ah)-20Hr	Battery voltage (V)	Charger output current (A)	Estimated charging Time (Hr)	Cycle Type	Maximum charging frequency (in Month) for sale	Maximum charging frequency (in Month) for stock	Recommended charger
300917	BS SLA - 6N6-3B/B-1	6,3	6	1	7	Long	3	4	BS10
300918	BS SLA - B49-6	10,5	6	1	11	Long	4	5	BS10
300919	BS SLA - B38-6A	13,7	6	1	14	Long	4	5	BS10
300915	BS SLA - 6N11A-1B/3A	11,6	6	1	12	Long	4	5	BS10
300914	BS SLA - 6N11A-4A	11,6	6	1	12	Long	4	5	BS10

### 6.3 Lithium BATTERY Technical Charging Data Reference Guide

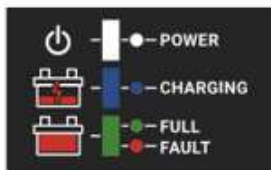
Part Number	BS BATTERY Désignation	Capacity (Ah)	Battery voltage (V)	Charger output current (A)	Estimated charging Time (Hr)	Cycle Type	Maximum charging frequency (in Month) for sale	Maximum charging frequency (in Month) for stock	Recommended charger
360101	BS LITHIUM - BSLI-01	2	12,8	1	2	Short	5	6	BS10
360102	BS LITHIUM - BSLI-02	2	12,8	1	2	Short	5	6	BS10
360115	BS LITHIUM - BSLI-02 MAX	3	12,8	3	1	Short	5	6	BS30
360103	BS LITHIUM - BSLI-03	3	12,8	1	3	Short	5	6	BS30
360104	BS LITHIUM - BSLI-04/06	4	12,8	3	2	Short	5	6	BS30
360105	BS LITHIUM - BSLI-05	4	12,8	3	2	Short	5	6	BS30
360107	BS LITHIUM - BSLI-07	5	12,8	3	2	Short	5	6	BS30
360108	BS LITHIUM - BSLI-08	5	12,8	3	2	Short	5	6	BS30
360109	BS LITHIUM - BSLI-09	6	12,8	3	2	Short	5	6	BS30
360110	BS LITHIUM - BSLI-10	6	12,8	3	2	Short	5	6	BS30
360111	BS LITHIUM - BSLI-11	8	12,8	3	3	Short	5	6	BS30
360112	BS LITHIUM - BSLI-12	8	12,8	3	3	Short	5	6	BS30
360113	BS LITHIUM - BSLI-13	8	12,8	3	3	Short	5	6	BS30
360114	BS LITHIUM - BSLI-14	3	12,8	3	1	Short	5	6	BS30



## SLA & Lithium battery Charging & Maintaining Instruction Guide

### 6.4 BS10 Charger Information Sheet (compatible with lithium batteries)

#### BS10 charger lights



6V/12V mode selected	<b>WHITE LED ON</b>
In soft start phase	<b>BLUE</b> Charging light FLASH
In charging phase	<b>BLUE</b> Charging light ON
In Float mode or Maintenance	<b>GREEN LED ON</b>

Output reverse polarity or shorted	<b>RED</b> Fault LED ON
Charging timer timed out	<b>RED</b> Fault LED ON
Battery slight sulphated	<b>GREEN</b> Fault LED FLASH
Battery heavily sulphated or cells shorted	<b>RED</b> Fault LED FLASH
6V / 12V mode incorrect selection	<b>RED</b> Fault LED FAST FLASH

#### BS10 Troubleshooting Guide

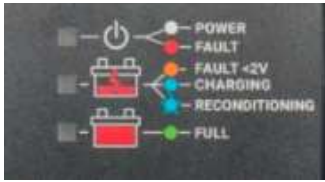
Types of Problems	Indication	Possible Causes	Suggested Solution
Charger does not work?	No Indicator lights on.	- No AC power.	- Check AC connections and make sure Power Point is switched ON.
Charger has no DC output?	Fault LED is On.	- Output is short circuited - Reverse polarity connection to Battery.	- Check DC connection between charger and battery and make sure they are not short circuiting. - Check that the crocodile clips haven't fallen off the battery. - Check that the crocodile clips / ring terminals are connected to the correct polarity.
Long charging time, Full light does not come on?	Fault LED is ON.	- Battery capacity too large - Battery is defective.	- Check the charger specification matches the battery capacity.
Long charging time, Full light does not come on?	Fault LED is Flash.	- Battery cells internal shorted, battery heavily sulphated.	- Battery cannot be charged and must be replaced.

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## 6.5 BS15 Charger Information Sheet ( **not compatible with Lithium batteries** )

### BS15 charger lights



LED	Status	Description
<b>Power / Fault LED – White / Red</b>		
White	ON	AC power is connected
White	Flash	ECO mode and no battery presented
Red	ON	Short-circuit or Reverse polarity
<b>Charge / Reconditioning LED – Blue / Yellow</b>		
Blue	Flash	Recondition / Soft start
Blue	ON	Bulk charge (C.C) mode / Absorption charge (C.V) mode
Yellow	ON	Battery is flat (less than 2V)
<b>Full LED - Green</b>		
Green	ON	The charger is at Float mode (Full)

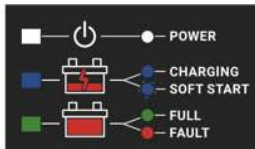
### BS15 Troubleshooting Guide

Types of Problems	Indication	Possible Causes	Suggested Solution
Charger does not work?	No Indicator lights ON.	- No AC power.	- Check AC connections and make sure Power Point is switched ON.
Charger has no DC output?	Fault RED LED is ON.	- Output is short circuited. - Reverse polarity connection to Battery.	- Check DC connection between charger and battery and make sure they are not short circuiting. - Check that the crocodile clips haven't fallen off the battery. - Check that the crocodile clips / ring terminals are connected to the correct polarity.
No Charging Current?	Fault RED LED is Flashing.	- Battery is severely sulphated. - Battery has a damaged cell. - Overheat protection mode.	- Check the Battery condition, age etc. - Battery may need replacement. - Move battery & Charger to cooler environment.
Long charging time, Full light does not come on?	Fault RED LED is Flashing.	- Battery capacity too large. - Battery is defective.	- Check the charger specification matches the battery capacity. - Battery cannot be charged and must be replaced.

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## 6.6 BS30 Charger Information Sheet (compatible with lithium batteries)

### BS30 charger lights



AC Power presented	<b>WHITE</b> LED ON
In soft start phase	<b>BLUE</b> Charging light FLASH
In charging phase	<b>BLUE</b> Charging light ON
In Float mode or Maintenance	<b>GREEN</b> LED ON

Output reverse polarity or shorted	<b>RED</b> Fault LED ON
Charging timer timed out	<b>RED</b> Fault LED ON
Battery slight sulphated	<b>GREEN</b> Fault LED FLASH
Battery heavily sulphated or cells shorted	<b>RED</b> Fault LED FLASH

### BS30 Troubleshooting Guide

Types of Problems	Indication	Possible Causes	Suggested Solution
Charger does not work?	No Indicator lights on.	- No AC power.	- Check AC connections and make sure Power Point is switched ON.
Charger has no DC output?	Fault LED is On.	- Output is short circuited - Reverse polarity connection to Battery.	- Check DC connection between charger and battery and make sure they are not short circuiting. - Check that the crocodile clips haven't fallen off the battery. - Check that the crocodile clips / ring terminals are connected to the correct polarity.
Long charging time, Full light does not come on?	Fault LED is ON.	- Battery capacity too large - Battery is defective.	- Check the charger specification matches the battery capacity.
Long charging time, Full light does not come on?	Fault LED is Flash.	- Battery cells internal shorted, battery heavily sulphated.	- Battery cannot be charged and must be replaced.

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## SLA & Lithium battery Charging & Maintaining Instruction Guide

### 6.7 BS60 Charger Information Sheet (not compatible with Lithium batteries)

#### BS60 charger lights

LED	Status	Description
<b>Battery Type LED's: CALCIUM / AGM / WET / GEL</b>		
Green	ON	Indicates which battery type is selected
<b>Charge Rate LED's: 1A / 4A / 6A</b>		
Green	ON	Indicates which charge rate / Charge mode is selected
<b>Charging Status LED's: BULK / ABSORPTION / FULL CHARGE</b>		
Full Charge Green	Flash/ON	Flashing if analysis failed or ON if fully charged - Float / Maintenance mode
Absorption Green	Flash/ON	Flashing during equalization charging or ON during Absorption charging
Bulk Blue	Flash/ON	Fast Flash - Rejuvenation / Slow Flash - Soft Start charging / ON - Bulk charging
<b>Error LED</b>		
Red	ON	Short circuit/reverse polarity or Rejuvenation failed if Bulk LED also flashing slow
Red	Flashing	Over temperature protection mode / Soft start charging timed out if Blue Bulk LED also flashing fast / Bulk charging timed out if Blue Bulk LED also ON



#### BS60 Troubleshooting Guide

PROBLEM	INDICATION	POSSIBLE CAUSES	SUGGESTED SOLUTION
Charger does not work	No Indicator lights on	- No AC power	- Check AC connections and make sure the AC Power supply is switched ON - Try a different AC Power supply which you know is working
Charger has no DC output	Error Red LED is ON	- Output is short circuited - Reverse polarity protection - Loose / bad connection to the battery	- Check DC connections between charger and battery and make sure they are not short circuited. (Touching each other) - Check that the crocodile clips have not fallen off or come loose - Check that the crocodile clips/ ring terminals are connected with the correct polarity <b>Note:</b> the charger output current is only present when connected to a battery
No charging current	Error Red LED is Flashing	- Battery is severely sulphated - Battery has a damaged cell - Overheat protection mode	- Check the battery condition, age etc. - Battery may need replacement - Move battery & charger to a cooler environment
The full/float light won't come on	Error Red LED is Flashing or Full Charge Green LED is Flashing	- Battery Ah capacity too large for the battery charger and it has time out - Battery is defective - Battery is severely sulphated	- Check that the charger specifications match the battery capacity. E.g. make sure that the battery capacity is not too big for the charger - Battery may need replacement - The selected charge rate might be too low for the battery. Switch charger off and on and try again or try a higher charge rate setting. Make sure it doesn't exceed the maximum charge limit for your battery

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