

# SBC-8188 / 8288 Smart Charger

## User's Manual



Keep this manual in a safe place for quick reference at all times.

This manual contains important safety and operation instructions for correct use of the battery charger.

Read through the manual and pay special attention to the markings and labels of the charger, battery and equipment connected to the battery system.

Pay special attention to **WARNING & PRECAUTIONS** used in this manual.

## **WARNING:**

**Failure to heed this warning may cause injury to persons and damage to Equipment.**

## **CAUTION:**

**Failure to observe this warning may result in damage to equipment and improper functioning of the Charger.**

### **WARNING:**

- *The charger is **not** designed for any life saving application.*
- *The charger is designed for in-door use. Protect the charger from ingress of water.*
- *This charger is made to charge only properly sized lead acid batteries and Lithium Fe PO4 (LFP).*
- *Don't recharging non-rechargeable batteries.*
- *Charging other types of battery or under-sized lead acid batteries may cause fire or explosion.*
- *Install the charger in accordance with all local codes.*
- *Do not use the charger if it has been dropped or damaged.*
- *Do not remove casing of the charger, there is no user -serviceable parts inside.*
- *Do not charge the battery on boats. Remove the battery and charge on shore.*
- *Never attempt to charge a frozen battery.*
- *Never attempt to charge a damaged battery.*
- *Wear protective goggles and turn your face away when connecting or disconnecting the battery.*
- *Never place the charger on top of a battery.*
- *Never smoke, use an open flame, or create sparks near battery or charger during normal charging operation as batteries may give out explosive gas.*
- *Operation as batteries may give out explosive gas.*
- *Do not charge batteries in an enclosure (box- in) due to possible explosion of entrapped explosive gas.*
- *Use of accessory not recommended may cause risk of fire, electric shock.*
- *Disconnect the mains supply before connecting or disconnecting the links to the battery.*
- *If the charger does not work properly or if it has been damaged, unplug all connections.*

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## **Introduction**

A high power smart charger designed for fast & safe charging of Lead Acid and LiFePO<sub>4</sub> batteries with optional WiFi / Bluetooth connectivity for remote monitoring of charging status of battery. The advanced Micro-processor control allow specific charging profile for Lead, AGM and LiFePO<sub>4</sub> battery from 16AH to 200AH.

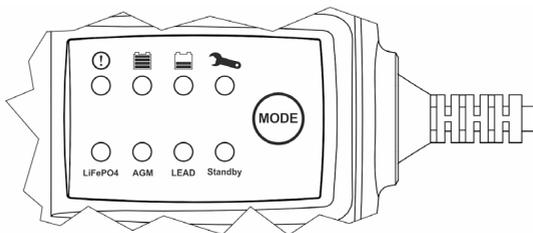
## **Features**

- \* Microprocessor Control with different charging profiles for Lead Acid based & LiFePO<sub>4</sub> battery.
- \* One button selection of battery types then set and forget operation.
- \* Microprocessor constantly monitors the battery status to deliver the right amount of charge.
- \* Thermal control regulates charging current in hot or enclosed environment.
- \* Charger can be connected for long period of time to battery without overcharge or drying out of the battery.
- \*\* For Lead Acid based battery:-
  - A. Cold & normal temperature charge selection for Lead & AGM type.
  - B. Initial qualifying checks, with auto-repair (max. 8 hour) for sulphated battery or soft-bulk for deeply discharged battery, then full bulk , pulse absorption and free float charge stages.
- \*\* Special charging profile for LiFePO<sub>4</sub> battery: soft-bulk, bulk then free float stage. No auto-repair.
- \*\* Extensive Protections: spark proof, short circuit, reverse polarity.
- \* Supplied with 2 exchangeable leads with clamps & eyelet terminals.
- \*\* There is a WiFi or Bluetooth version of same charger to for remote monitoring of charging status of battery on smart phones.

## **Safety**

- In the event of persistent rising temperature, charger will shut down its output with warning led.
- Spark free - charger only starts charging when it is connected to a suitable battery so no spark during first contact with battery terminal.
- Maximum repair charge period is 8 hours and charger will indicate battery is defective.
- Convection cooled with thermal regulation to lower the charging current till unit's temperature drops.
- Over Voltage Protection-Charger will shut down when output senses higher than 16.5V & charger recovers when fault disappears.
- Auto shut down when Bulk & Absorption charge is over 40 hours to avoid waste of energy on defective battery.
- Reverse Polarity & Short Circuit Protection with warning LED, charger returns to normal when fault is cleared.

## Operation



Display	Indications
<b>Standby</b>	<p><b>Standby Mode</b>  <b>Steady light on:</b> AC connected but charger not yet connected to battery  <b>Blinking light on:</b> Battery connected, charger ready for battery selection. User has one minute to select battery before charger returns to last selected battery type.</p>
	<p><b>Check &amp; Repair Mode</b>  <b>Steady light on:</b> For a few seconds for normal battery while charger checking on battery condition. Steady light on: for longer than a minute, charger in desulphating repair charging <b>ONLY FOR LEAD BATTERY</b>  <b>Steady light on:</b> For longer time, charger in *desulphate charging.  <b>Blinking light on:</b> When connected to battery showing the battery is not suitable for charge.  <b>Blinking light on:</b> Charger in charging mode longer than 40 hours or more than 8 hours in desulphating repair charging of LEAD battery.</p>
	<p><b>Alarm Warning:</b>  The alarm warns charging faults check following possible causes  <b>Steady light on:</b> output connection in reverse polarity or short circuit protection causing no charging/ output shutdown.  <b>In group of 2 flashes pattern:</b> Output over-voltage protection &amp; output shut down.  <b>In group of 3 flashes pattern:</b> charger over-temperature protection &amp; output shut down.</p>
	<p><b>Charge Mode: battery Not Full</b>  <b>Steady light on:</b> Charging in progress, may be in sulphating, soft start bulk, bulk &amp; absorption.  Battery is less than 70% full and may be in any of the above charging stage.</p>
	<p><b>Float Charge Mode: battery Full</b>  <b>Steady light on:</b> Charger is in Float mode/ Maintenance pulse mode.  Battery is fully charged.</p>
<b>LEAD</b>	<p><b>Steady light on:</b> charge battery at room temperature  <b>Blinkering light:</b> charge battery at cold temperature</p>
<b>AGM</b>	<p><b>Steady light on:</b> charge battery at room temperature  <b>Blinkering light:</b> charge battery at cold temperature</p>
<b>LiFePO4</b>	<p><b>Steady light on:</b> charge battery at room temperature</p>

## **Connection & Selection of Battery Type**

Plug in the charger to AC mains (200- 240V) wall socket.

The display LED light up one by one as charger goes through a series of self checks. Then all lights are on together and all LEDs are off to indicate the end of self checks except the "Standby" indicator. There is no voltage at the output terminals to safeguard the user.

Connect the red output lead to the positive terminal of the battery and the black lead to the negative terminal.

The last used battery type LED is solid on and the "Standby" LED blinks to indicate that the charger is now ready for a new selection of battery type.

User has 1 minute to select the new battery type. If no selection is made, the battery charger will revert back to its last used battery type at the end of one minute waiting time and the Standby LED becomes solid.

There are 5 charging modes to select: LEAD/ LEAD COLD/ AGM/ AGM COLD/ Lithium FePO<sub>4</sub>. The Cold Charge has a higher voltage applicable for LEAD & AGM battery in cold weather.

Select the desired battery type by quick presses on the Mode button within 1 minute.

Each quick press will change selection cyclically as shown by the LEDs in following cyclic manner.

"LEAD" → " LEAD cold (flickering led)" → "AGM" → "AGM cold (flickering led)" → "Lithium Fe P0<sub>4</sub>" → "LEAD".

### **Note: There is no cold temperature setting for Lithium Fe PO<sub>4</sub>.**

Once the Standby LED stops flickering and becomes solid, the charging operation starts and Mode button becomes inactive to prevent any new battery type change.

**\*\* To change the battery type during a charging operation either switch off the AC or reconnect the battery and select the new battery type after self check.**

### ***LEAD & AGM Battery***

After selection of battery type to LEAD or AGM The Charger first checks the battery's

condition ,Charger will then enters into  "Charge Mode" and finally to the  "Float/ maintenance Mode" when battery is fully charged.

### ***Charging Stages for LEAD & AGM***

**Bulk:** This charges the battery up to about 80% full.

**Soft Start Bulk:** when battery is detected to be heavily discharged , charger will only deliver 4A current until battery becomes ready to go normal bulk charge stage. The charger delivers max 8A constant current until the battery voltage rises to a threshold values. There is a thermal control in gradual decrease of charging current at high operation temperature.

**Absorption:** PWM charges to 100%. The terminal voltage is kept constant at set level. Battery charger delivers current pulses to the battery in varying pulse periods. When the rise time of pulses decreases to a set value, charger switches to Float Mode. The maximum total charging time of Bulk and Absorption is 40 hours at which the charger will shut down.

**Float:** PWM maintenance charging and cycle charging.

In this mode the charger does not deliver current when battery voltage is above a set voltage. When battery voltage drops below the set voltage, charger will deliver small current until the battery voltage rises to about 13.5V. Then the maintenance charging cycle repeats. In the case of battery voltage drops more than 12.2V due to external load or otherwise, the charger will start a new charging cycle of Bulk, Absorption and Float.

## **Check Mode and Desulphate Charging for LEAD BATTERY**

The desulphate charging can recondition slightly sulphated LEAD battery only.

- A. In the case the “Check Mode”  indication and the STANDBY LED are steady on for longer than a minute, the charger is in desulphate charging. After some time, if desulphation of the battery is successful, the charger will switch to normal charging and the “Check Mode”  and STANDBY LED are extinguished.
- B. If the desulphate charge fails to recondition the battery after 8 hour, the “Check Mode” blinks. The battery should be replaced. The maximum desulphate charging time is 8 hours.

## **Charging LiFePO4 (LFP) battery**

Caution: Never charge LFP battery when its temperature is below 0°C.

There is a special charge algorithm and treatment for Lithium FePO<sub>4</sub> (LFP) batteries to ensure safe and optimal charging adaptive to the special chemistry of the battery which is quite different to Lead Acid battery.

There are only two active charging stages namely Bulk at the end of Bulk charge is the inactive (no charging current) Float (Standby) Stage.

There is no PWM Absorption and Repair charge stage for LFP.

## **Check Mode and Unchargeable battery**

- A. If the Check Mode blinks before or after pressing the Mode button then the battery is not suitable for charging. Check the battery connections, clean battery terminals to double confirm if the battery is not really suitable for charging.
- B. The Check Mode also blinks after 40 hours in Bulk and or Absorption Stage charging until battery is removed. This safety time feature is to avoid charging faulty battery which cannot hold charge.

## **Alarm and Faults**

The Alarm indicates faults and charger does not give any output power.

Once the fault has been corrected charger will continue to operate normally.

## **The alarm warns charging faults check following possible causes:**

- A) Steady light on: output connection in reverse polarity or short circuit protection causing no charging / output shutdown.
- B) In group of 2 flashes pattern: Output over-voltage protection & output shut down.
- C) In group of 3 flashes pattern: charger over-temperature protection & output shut down.

## **Interrupting the charging process**

When there is a power outage, the battery charger will resume charging at its last selected battery type upon the return of mains AC power.

The charger will automatically continues to complete the charging process.

## Specifications

<b>Models</b>	<b>SBC-8188</b>	<b>SBC-8288</b>
<b>AC Input</b>	200-240V, 50/60Hz~, 1.7A Max.	
<b>Maximum Output Charging Current</b>	8A	4A
<b>Max. Power</b>	115W	
<b>Efficiency</b>	>78%	
<b>Maximum Output Charging Current for LEAD/ AGM/ LiFePO4</b>	8A	4A
<b>Absorption Voltage (LEAD/ LiFePO4)</b>	14.4V	28.8V
<b>Absorption Voltage (AGM)</b>	14.7V	29.4V
<b>Absorption Voltage for LEAD (Low Temp. Mode)</b>	14.7V	29.4V
<b>Absorption Voltage for AGM (Low Temp. Mode)</b>	15.0V	30.0V
<b>Construction</b>	IP 20, Poly-carbonate casing	
<b>Accessories</b>	Detachable leads with crocodile clips and leads with ring terminals	
<b>Protection</b>	Overload, Short Circuit, Over Temperature, Reverse Polarity, No Spark for Battery Connected and Short Output.	
<b>Cooling System</b>	Natural Convection	
<b>Approvals</b>	CE EN 55014, 60335, 62233	
<b>Dimensions (LxWxH)</b>	225x80x50mm	

**\*SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE\***