SK12V100,SK12V100H,SK12V100P

SK12V206,SK12V206H,SK12V206PH

SK24V100

SK12V280H

Model Differences

SK12V100, SK12V206,SK24V100, are the base models with metal enclosures and bluetooth.

H suffix – includes built-in heater function

P suffix – marine plastic enclosure instead of metal

12V – nominal voltage of 12V

100, 206, or 280 – refers to battery capacity in amp hours (Ah)

※If you have any concerns or need help, please send us an email: sales@sokbattery.com
Please note, if no reply in 24 hours, it maybe went to your spam folder or please resend again.
Or give us a call at:725 765 2879 Monday-Friday 9AM – 4PM (PST)

1.0 - Before using or installation

1.1 - SOK Battery Overview/Features

● High and stable output voltage, which can effectively guarantee its output power

● High chemical stability, which can better guarantee its safety

● Super long cycle life of up to 4000 cycles at 100Amps charge/discharge current, 80% DOD at 25°C

● Maintenance free, serviceable, lightweight and easy to move

● Large charge/discharge current, up to 170amps discharge current

● Can be connected in parallel or series

● Low Self-discharge rate

● Wide operating temperature range

● Environmentally friendly & Green energy source

Built-in Bluetooth to monitor the battery status instantly through the mobile APP available on Iphone and Android smart phones.

● High security, advanced BMS (Battery Management System) protection

- Short circuit protection
- Over-current protection
- High/low temperature protection
- Over-charge/over-discharge protection

1.2 - Safety Warnings

● **DO NOT** short-circuit the positive and negative terminals of the battery (i.e. directly connecting the positive (+) and negative (-) terminals with wires or other metal objects). The resulting high current and high temperature may cause personal injury or fire

● **DO NOT** puncture the battery with nails or other sharp objects

● **DO NOT** hit, throw, or otherwise subject the battery to strong physical impact

● **DO NOT** immerse the battery in water.

● **DO NOT** use in series, parallel, or series and parallel with any other types of batteries

● **DO NOT** use or store the battery near heat and high temperature sources such as fires, heaters, etc.

● **DO NOT** put batteries on microwave ovens, high-pressure containers or induction cookers.

● **DO NOT** use or store the battery under high temperature (such as in direct sunlight or in a very hot car), otherwise it may cause performance loss, shortened service life, and function failure, and may even cause the battery to overheat, catch fire or explode

● **DO NOT** disassemble or modify the battery in any way. The battery contains safety and protection devices. If damaged, it may cause the battery to generate heat, catch fire or explode

● Use qualified and suitable LiFePO4 battery charger

● Do not directly connect to alternators or non-smart charging systems

● Keep battery away from children

● When not in storage, battery should be placed in a cool and dry environment

● High-quality and suitably sized wire should be used for connections

● In case of battery leak and electrolyte contact with eyes, rinse with plenty of clean water and seek medical attention immediately

● Under any of the following circumstances, stop using immediate and please contact us

• Battery emits peculiar smell, heat, discoloration or deformation, or any abnormal phenomenon during use

• Battery is damaged, cracked, or corroded

1.3-Checking and Bluetooth app

① When first receiving the battery, the voltage should be e ither 0V or around 13V.

• The newest model BMS has a storage mode which completely shuts off of the BMS. In this state, the terminal voltage should be at 0V and the device will not show up in the Bluetooth app device list. Charging the battery for a few seconds with a suitable LiFePO4 12V charger will get the BMS out of storage mode.

• The older version BMS does not have a storage mode and should show up in the Bluetooth app device list. The voltage should be around 13V.

② Search “ABC-BMS” in the Google Play Store or Apple App Store and install the app on your smartphone

Figure 1: ABC-BMS Bluetooth

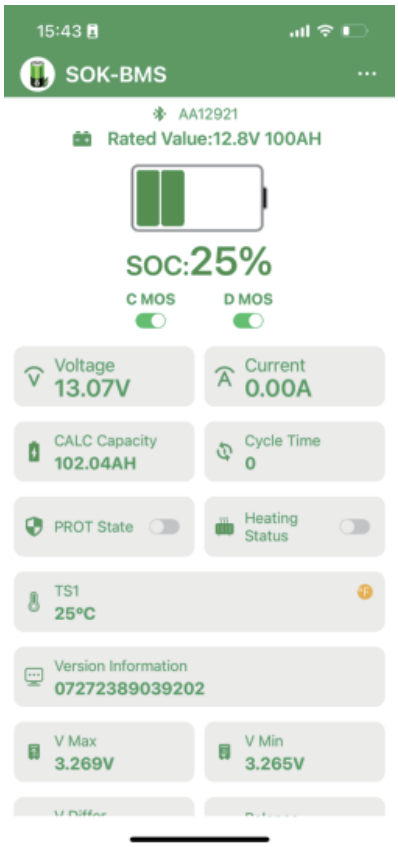


Figure MS Bluetooth

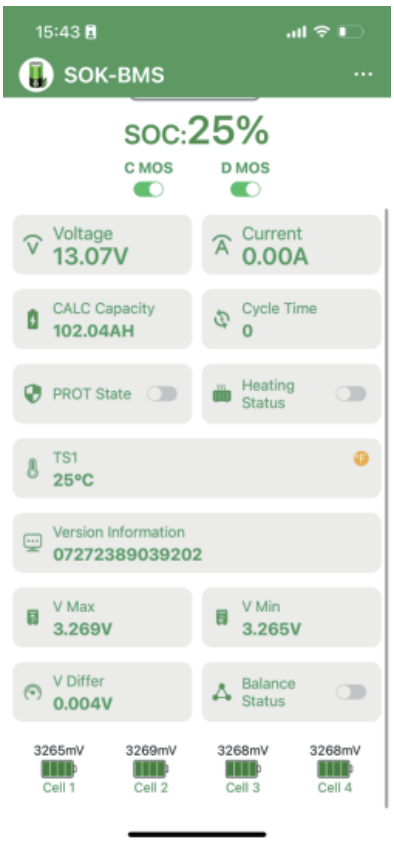


Figure 3: ABC-BMS Bluetooth

※SOC and Capacity maybe incorrect prior to cycling the battery. We suggest supplementing the app’ s State of Charge (SOC) with an external shunt. The app is best for checking the cell voltage and protection state information.

③ Using a LiFePO4 battery charger, charge the battery fully until “C MOS” indicator on the home page of the app turns off.

2.0 - Installation

Series and Parallel Configurations

Series: All SOK 12V battery support connecting in series for 24V, 36V, or 48V systems. DO NOT connect over 4 pcs in series.

Parallel: All SOK 12V, 24V, and 48V batteries support connecting in parallel for more capacity. It is recommended to not connect over 10 pcs in parallel

2.1 - Series Connection

a.24V system connection:

b.36V system connection:

c.48V system connection:

※ **Important points to note when connecting batteries in series**

a.Before connecting, individually charge all batteries fully until “C MOS” indicator on the home page of the app turns off to ensure batteries are at the same SOC.

b.Add a battery voltage balancer. Periodically check to ensure all batteries are the same voltage, especially when the bank is fully charged.

c. Pre-charge before you turn on inverter. Check this video for details:

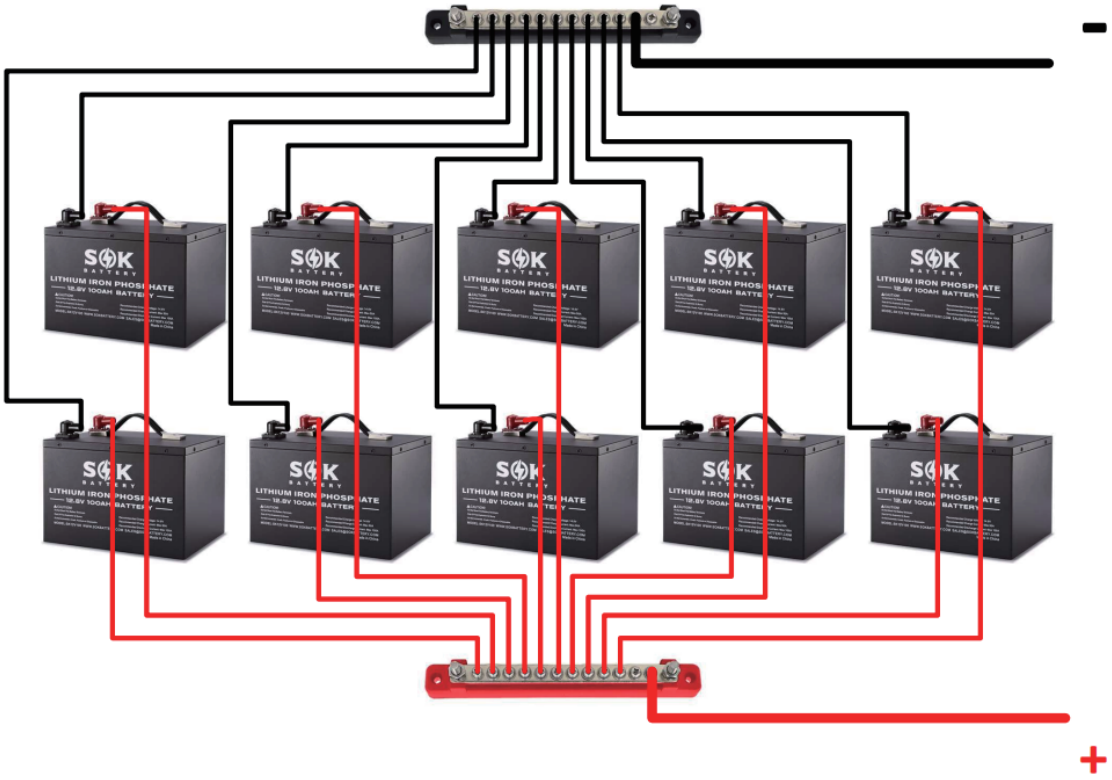
https://www.youtube.com/watch?v=ZlrtmJRfSP8&t=68s

2.2 - Parallel Connection

a.Connect 2 batteries

b.Connect 3 batteries

c.Connect 10 batteries



※ Important points to note when connecting batteries in parallel

a.Before connecting, individually charge all batteries fully until “C MOS” indicator on the home page of the app turns off to ensure batteries are at the same SOC.
b.Using the same size and length cables to connect between batteries, the best way is connect each battery with the same size and length cable to bus bar, and then connect bus bar to charger or inverter.

2.3 - Parallel & Series Connection

a.Before connecting, individually charge all batteries fully until “C MOS” indicator on the home page of the app turns off to ensure batteries are at the same SOC.

b.Add a battery voltage balancer. Periodically check to ensure all batteries are the same voltage, especially when the bank is fully charged.

c.Ensure the same size and length cable are used for all connections between the batteries.

d.Make the parallel connections first, then make the series connections

For example, to make a 36V 200Ah bank with 6 12V 100Ah batteries:

1.Connect 2 batteries in parallel (1 unit)

2.Make 2 more sets of 2 batteries (2 units)

3.Connect the 3 units in series

3.0 - Suitable Chargers

SOK lithium batteries can be charged via several different methods.

3.1 - AC to DC charger

A charger with a charge voltage of 14.4V to 14.6V is required for SOK 12V battery. A charger with a voltage of 28.8V to 29.2V is required for SOK 24V battery. Most AGM battery chargers produce charge voltages within that range and would be compatible with SOK lithium batteries .

For example:
●Victron Energy Blue Smart IP65 12-Volt 15 amp Battery Charger (Bluetooth) would be suitable to charge the SOK 12V battery.
●Victron Energy Blue Smart IP67 24-Volt 12 amp 120VAC Battery Charger (Bluetooth) would be suitable to charge the SOK 24V battery.

3.2 - Alternator or Generator

Check this video for information about charging batteries using an alternator:
https://www.youtube.com/watch?v=ZylJRjJtCR0

Check this video for information about charging batteries using a Generator.
https://www.youtube.com/watch?v=QAoorfdbefo

3.3 - Solar

When using solar to charge the batteries, an MPPT Solar Charge Controller is recommended.

How to set up an MTTP Solar Charge Controller:

https://www.us.sokbattery.com/forum/questions-answers/how-to-set-up-an-mttp-solar-charge-controller

For a single SOK 12V 100Ah, at least 300W of paneling is recommended.
For a single SOK 12V 206Ah, at least 500W of paneling is recommended.

4.0 - Bluetooth App

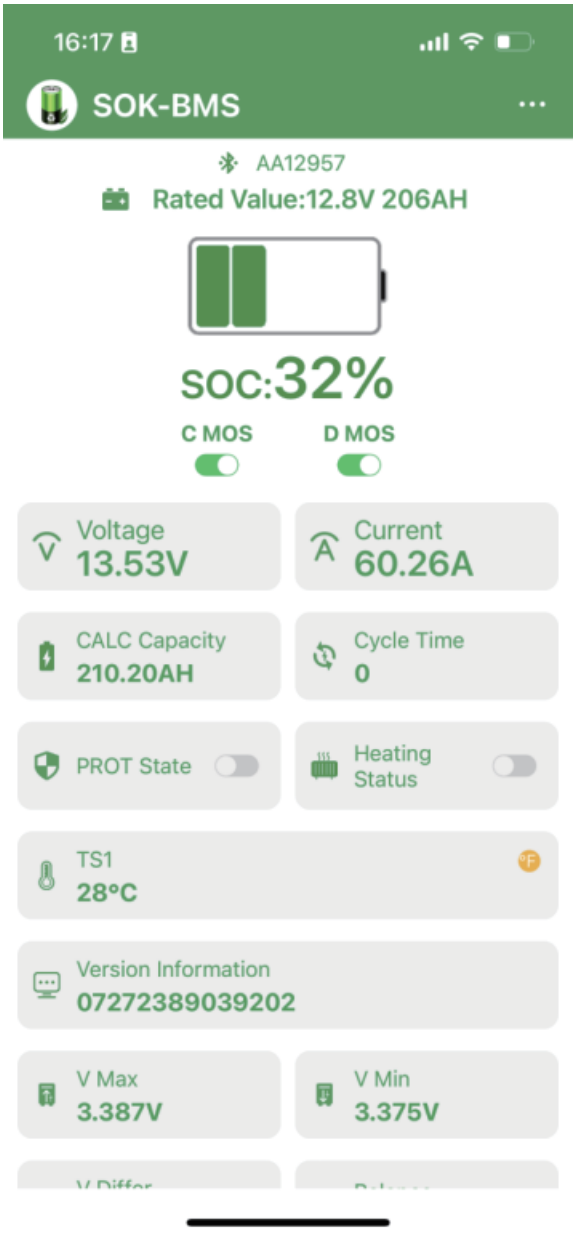


Figure 4 shows ABC-BMS home page. This page shows basic information about the connected battery, like voltage, current, individual cell voltage, software version, etc.

If the C MOS slider is green, then charging is enabled. If the slider is gray then charging is disabled and the BMS is in protection mode.

If the D MOS slider is green, then discharging is enabled. If the slider is gray then discharging is disabled and the BMS is in protection mode.

If the BMS is in protection mode, the PROT State slider will be green. To view the reason for the protection state, tap on the Menu icon (· · ·) in the top right and select PROT State to bring up the PROT State page.

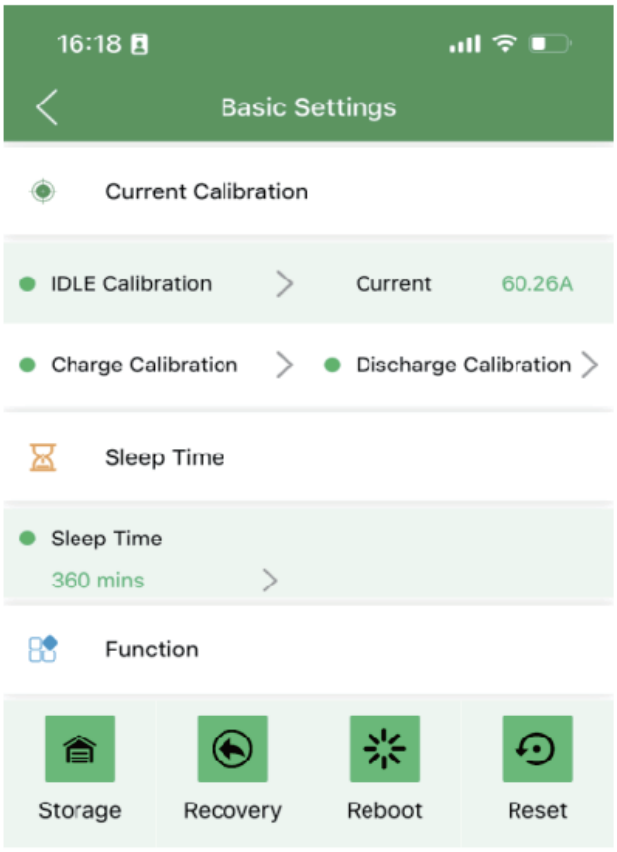


Figure 5 shows the Basic Settings page. To view this page, tap the menu icon (· · ·) in the top right, select Basic Settings, and use password 200010.

IDLE Calibration: This function calibrates the 0A point for the BMS. With nothing connected to the terminals, if the current shows a non 0A value, please perform an IDLE Calibration by tapping IDLE Calibration and selecting OK when prompted

Charge/Discharge Calibration: Factory use only.

Sleep Time: The value of time of inactivity (no charge or discharge) before the BMS enters sleep state. In this state, the Bluetooth stops broadcasting to save power. To recover from sleep, charge or discharge the battery.

Storage: Put the battery in a super low power state to minimize draining when putting the battery into storage. To recover from storage state, charge the battery.

Recovery: Force a recovery from overcurrent protection state. If the BMS shut down from an overcurrent event and recovery is not possible (e.g. there is no external power for the charger to work), this function would force the BMS to recover from that protection state.

Reboot: Reboot the BMS.

Reset: Reset the parameters to their default values (for customers, this is not necessary as the parameters are set at the factory and cannot be changed by the customer).

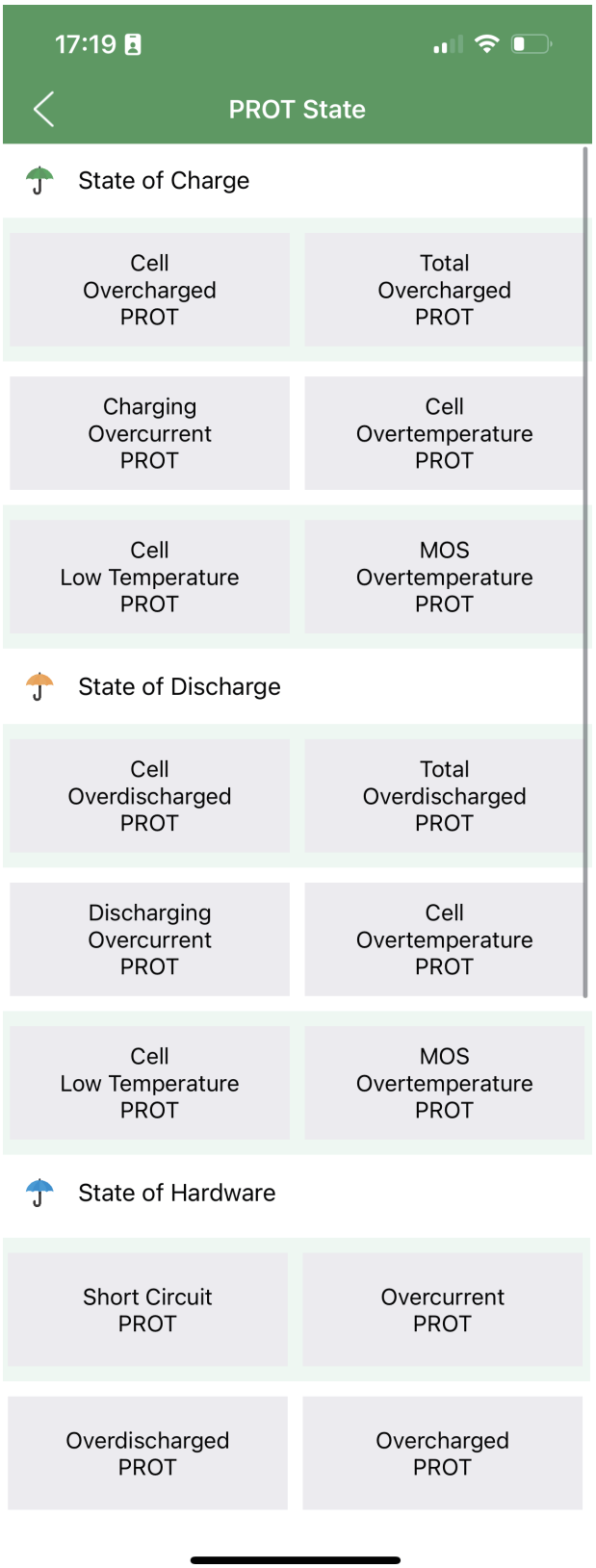


Figure 6 shows the PROT State page. To view this page, tap the menu icon (· · ·) in the top right, select PROT State. If the PROT State slider on the home page is green, this page will show the reason for the protection state.

Charge Protection States (CMOS OFF)	
Cell Overcharged	Cell voltage greater than set limit
Total Overcharged	Battery voltage greater than set limit
Charging Overcurrent	Charge current greater than set limit
Cell Overtemperature	Temperature greater than allowable for charging
Cell Low Temperature	Temperature less than allowable for charging
MOS Overtemperature	BMS temperature greater than set limit during charging
Discharge Protection States (DMOS OFF)	
Cell Overdischarged	Cell voltage less than set limit
Total Overdischarged	Battery voltage less than set limit
Discharging Overcurrent	Discharge current greater than set limit
Cell Overtemperature	Temperature greater than allowable for discharging
Cell Low Temperature	Temperature less than allowable for discharging
MOS Overtemperature	BMS temperature greater than set limit during charging
Hardware Protection States	
Short Circuit	Short circuit detected
Overcurrent	Current greater than limit set in hardware
Overdischarged	Voltage less than limit set in hardware
Overcharged	Voltage greater than limit set in hardware

The BMS has 2 steps of protection. The first step is the State of Charge and State of Discharge, which is called software protection. If the first step doesn't catch the condition, then the hardware protection catches it.

5.0 - Built-in Heat Pad Functionality

The built-in heat pad turns on under the following conditions:

- Temperature is below 0° C (32°F)
- A charger is connected and able to supply sufficient current to the pads
  - ≥ 4A for each 100Ah battery
  - ≥ 7A for each 206Ah battery

For example, on a cold evening after the temperature drops down to under 0°C (32°F), when charging the heated battery, the battery would go into low temperature protection. Charging the cells is disabled, and if the charger is able to supply a sufficient amount of current, the heat pad would automatically turn on. When the battery temperature exceeds 5°C (41°F), the heat pad turns off, and charging the cells is re-enabled.

Storage

- Charge the battery to 13.5V – 13.6V
- Turn off everything or completely disconnect the batteries

Note: Low temperature would not damage the battery's cells.

6.0 - Troubleshooting

Battery voltage 0V at terminals

BMS in protection state, or internal voltage too low for BMS to function. Charging the battery should fix this. Please see these 2 videos:

How To Wake Up A Sleeping LiFePO4 Battery

https://www.youtube.com/watch?v=TJ_Klwp-JyM

Or

How to Re-Activate a Deeply Discharged SOK Bluetooth Battery

https://www.youtube.com/watch?v=9s2nw107oBY&t=120s

Terminology

BMS	**B**attery **M**anagement **S**ystem: a device in the battery that protects the cells.
SOC	State Of Charge
CMOS	**C**harge **MOS**: transistors that allow charging. When gray, charging is disabled
DMOS	**D**ischarge **MOS**: transistors that allow discharging. When gray, discharging is disabled
LiFePO4	Lithium Iron Phosphate
MPPT	**M**aximum **P**ower **P**oint **T**racking – technique that allows for maximum power extraction from variable power sources (for example, solar or wind charging)