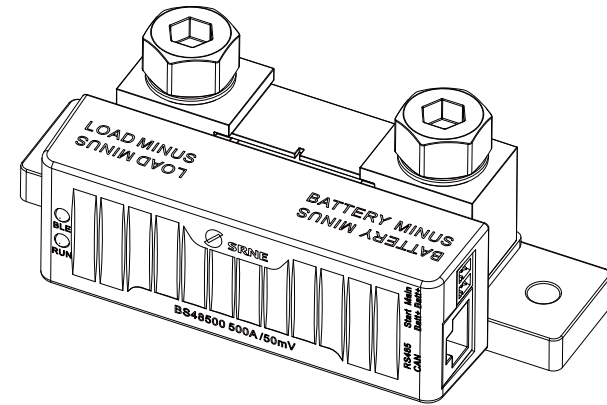


Coulomb Counter User Manual

500A 60V SmartShunt



Dear users:

Thank you for choosing our products!

Safety Instructions

- ◆ Be careful when installing battery. Wear protective goggles when installing a flooded lead-acid battery. Once in contact with the battery acid, rinse with water immediately.
- ◆ Stay away from metal objects to prevent battery short-circuit.
- ◆ Ensure the ambient environment is well ventilated, because the battery may produce acid gas when charging.
- ◆ Stay away from sparks since the battery may produce combustible gases.
- ◆ Follow the safety recommendations of the battery manufacturer.
- ◆ During outdoor installation, avoid direct sunlight and rainwater infiltration.
- ◆ As false connections and corroded cables may cause extreme heat to melt the cable insulation, burn surrounding materials and even cause a fire, ensure that the connections are tightened, and that the cables are fixed with ties to avoid loose connections due to shaking of cable on the move.
- ◆ When connecting the system, the voltage may exceed the human safe voltage. When operating, pay attention to using insulating tools and ensure that your hands are dry.
- ◆ System connection lines are selected according to a current density of no less than 5A/mm².
- ◆ During installation, it is forbidden to reverse the battery connection, as it will cause irreversible damage!

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1. Product introduction

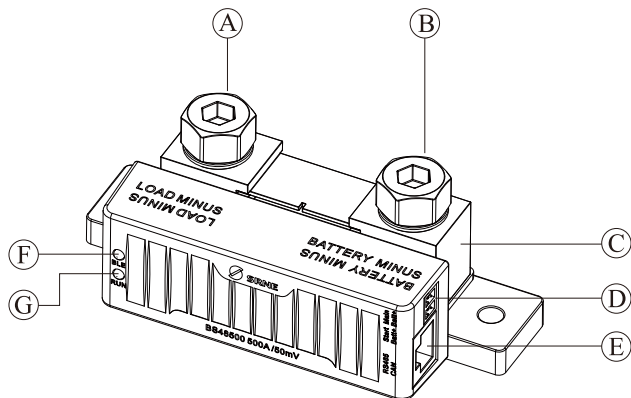
1.1 Overview

The BS series is an integrated battery coulomb meter that can be connected to the APP application via Bluetooth and can be used on a mobile phone or tablet. To facilitate reading of battery parameters, such as state of charge, remaining usage time and historical data, etc. Coulomb meter is suitable for 12V/24V/48V Sealed lead-acid, gel battery, open battery, lithium battery system, measures 500A charge and discharge current and monitors battery power status, and can also monitor Control the starting battery voltage. It is a battery coulomb counter with low power consumption, safety, reliability, high accuracy and convenient wiring.

1.2 Features

- ◆ Suitable for sealed lead-acid, gel batteries, open batteries, and lithium battery power measurement.
- ◆ Support 12V/24V/36V/48V battery system.
- ◆ Using high-precision current sampling, capable of measuring 500A charge and discharge current.
- ◆ Adopt advanced SOC algorithm to accurately measure battery power and calculate remaining battery life.
- ◆ Supports cycle count calculation.
- ◆ Support battery capacity setting.
- ◆ Supports RS485 communication with standard Modbus protocol.
- ◆ Support CAN communication function.
- ◆ Supports Bluetooth communication for viewing product operating status and battery monitoring parameters.
- ◆ Supports low SOC, low voltage, high voltage and overcurrent alarm settings.

1.3 Appearance and interface

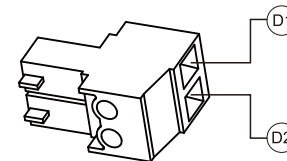


S/N	Name
A	Load negative terminal (M10)
B	Battery negative terminal (M10)
C	current divider
D	Main battery positive terminal & starter battery positive terminal
E	RJ45 port
F	Bluetooth status indicator
G	Running status indicator light

Serial number E (RJ45 port) description:

S/N	Definition
①	CAN_L
②	CAN_H
③	NC
④	NC
⑤	Power ground/signal ground
⑥	D-
⑦	D+
⑧	NC

Serial number D (main battery positive terminal & starting battery positive terminal) Description:



S/N	Name	External cable
D1	Main battery positive terminal	Red 16AWG
D2	Starting battery positive terminal	Gray 16AWG

2、Technical parameters

Parameter name	Parameter value
Product number	BS48500
Static power	≤15mA
Battery Type	Sealed lead-acid, gel battery, open battery, lithium battery
Supply voltage	6.5~60V
Rated current	500A
System voltage	12/24/48V
Battery capacity	1~9999AH
Current resolution	±0.01A
Voltage resolution	±0.01V
SOC resolution	±0.1%
Time accuracy	±1Min
Current measurement accuracy	±0.4%
Voltage measurement accuracy	±0.3%
RS485 communication	9600bps, 8, 1, None, the default baud rate is 9600bps
Bluetooth communication	Built-in Bluetooth, supports APP data interaction and OTA upgrade
CAN communication	Support RV-C protocol
Historical data	Can store the last 60 days of historical data
Working environment temperature range	- 35~ + 65°C
Protection level	IP21
Cooling method	Natural heat dissipation
Size	120*48.3*45.9mm
Weight	0.35kg

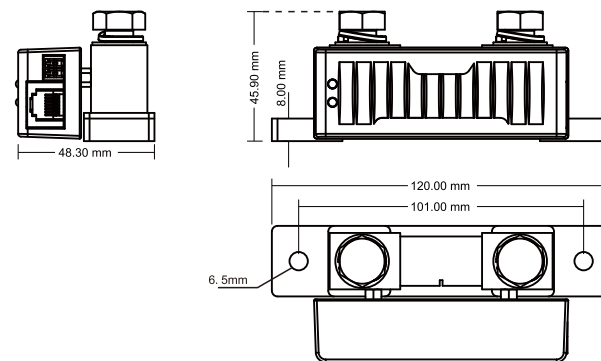
3、Installation method

3.1 Product size

Product size: 120*48.3*45.9mm

Mounting hole spacing: 101mm

Installation hole diameter: φ6.5mm



3.2 Fixed coulomb counter

- ◆ Wiring and installation must comply with national and local electrical codes. The wiring specifications must be selected according to the rated current, generally according to 5A/mm² selected.
- ◆ Note that the exposed metal part of the coulometer is the negative electrode of the battery during normal operation, and it cannot touch the positive electrode of the battery or other conductors, nor can it be connected to the earth;
- ◆ The installation location should be chosen to avoid direct sunlight, high temperatures, and places prone to water intrusion, and ensure that the area around the coulomb meter is well ventilated.
- ◆ Choose a suitable position to fix the two mounting screws on the coulometer, connect the wires according to the relevant application wiring diagram, and connect the coulometer through APP to set the parameters.

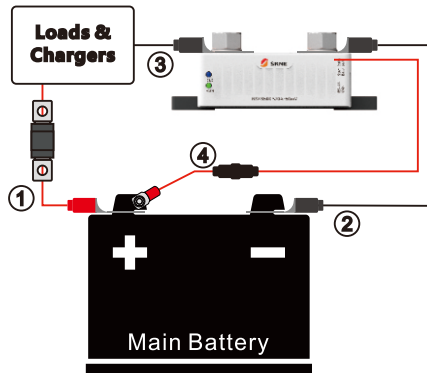
4. Typical applications

4.1 Monitoring the main battery

Connect the coulomb counter to the DC energy storage system and battery, set the coulomb counter parameters according to the actual battery parameters, and monitor the battery's state of charge SOC, real-time battery voltage and current, remaining usage time, remaining capacity, protection alarm and other information.

4.1.1 Wire as shown and described below:

- ① Connect the positive terminal of the battery to the positive terminal of the DC system in series through a suitable fuse;
- ② Connect the negative terminal of the battery to the "BATTERY MINUS" terminal (B) of the coulomb meter;
- ③ The negative terminal of the DC system is connected to the "LOAD MINUS" terminal (A) of the coulomb counter;
- ④ Connect the positive terminal of the main battery to the D-D1 port of the coulomb counter (Main Batt+) through the positive power supply line of the main battery

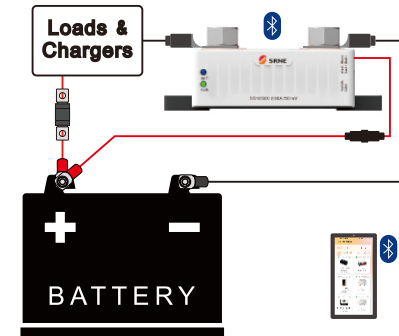


4.1.2 Connect to APP

- ◆ Download APP



- ◆ Connect to coulomb counter via APP



4.1.3 Parameter setting

- ◆ battery capacity, set according to actual battery capacity;
- ◆ Full Charge Voltage: When the battery voltage reaches the trigger voltage, and the current drops below the full charge cutoff current for a duration exceeding the full charge detection time, the coulomb counter will recognize the battery as fully charged, and the SOC will change to 100%. When the battery type is set to lead-acid or lithium battery, the coulomb counter will apply a set of widely-adopted default values. When selecting a custom battery type, these values shall be modified according to the following formulas:
Lithium Battery: Full Charge Voltage = Overvoltage Threshold - (0.2V to 0.3V)
Lead-Acid Battery: Full Charge Voltage = Float Charge Voltage - (0.2V to 0.3V)
- ◆ Discharge Cutoff Voltage: When the battery voltage drops below this threshold, the coulomb counter will register the battery as fully discharged (SOC = 0%). For preset battery types (lead-acid/lithium), the system applies industry-standard default values. For custom battery types, modify the value according to the following formulas:
Lithium Batteries: Discharge Cutoff Voltage = Under-Voltage Warning + (0.2V ~ 0.3V)
Lead-Acid Batteries: Discharge Cutoff Voltage = Under-Voltage Warning + (0.2V ~ 0.3V)
- ◆ For lead-acid batteries, this value is typically 1.25, while for lithium batteries it is generally 1. This parameter is only adjustable in Custom Battery Mode. If your battery datasheet specifies a different value, enter it in the custom battery settings.
- ◆ Full cut-off current setting, the charging current when the SOC is judged to be 100% during charging, is set according to the battery capacity, generally 4%C;
- ◆ Full detection time setting, the detection time when the SOC is judged to be 100% during charging, the default is 1min;
- ◆ Current SOC Setting: When the current SOC is known, setting the current SOC can update the SOC more accurately. If not set, the SOC will learn and update according to the internal algorithm;
- ◆ Synchronize SOC to 100%: When the battery is determined to be fully charged, synchronize SOC to 100%. If not set, the SOC will learn and update based on the internal algorithm;
- ◆ Zero current calibration: When the "LOAD MINUS" terminal (A) is disconnected, pressing calibration will record the current current value as zero current;
- ◆ Depth of Discharge (DOD): Default setting is 5%, used for calculating remaining runtime. When the battery's remaining capacity falls below (DOD × Available Capacity), the remaining runtime will display as 0.

4.1.4 Alarm setting Battery

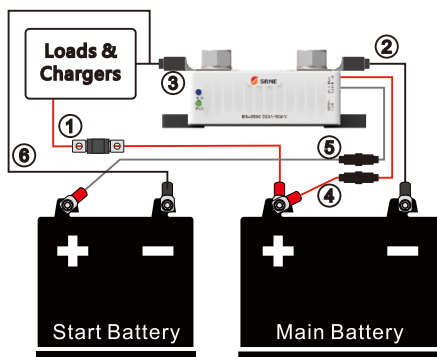
- ◆ SOC alarm: After it is turned on, the alarm is turned on when the current SOC is less than the set value, and the alarm is cleared when the SOC is greater than the recovery value;
- ◆ Overcurrent alarm: After turning on, the alarm will turn on when the current charge and discharge current is greater than the set value, and will be cleared when the current is less than the recovery value;
- ◆ Main battery high voltage alarm: After it is turned on, the alarm turns on when the current voltage is greater than the set value, and the alarm is cleared when the voltage is less than the recovery value;
- ◆ Main battery low voltage alarm: After it is turned on, the alarm turns on when the current voltage is less than the set value, and it is cleared when the voltage is greater than the recovery value;
- ◆ Start the battery high-voltage alarm: After it is turned on, the alarm will turn on when the current voltage is greater than the set value, and will be cleared when the voltage is less than the recovery value;
- ◆ Start the battery low voltage alarm: After it is turned on, the alarm will turn on when the current voltage is less than the set value, and will be cleared when the voltage is greater than the recovery value;

4.2 Monitoring the main battery and starting battery

This application adds starting battery voltage monitoring on top of monitoring the main battery.

On the basis of 4.1 wiring, add the starting battery voltage sampling line:

- ⑤ Connect the positive terminal of the starting battery to the D-D2 port of the coulomb meter (Start Batt+) through the positive sampling line of the starting battery
- ⑥ Connect the negative pole of the starting battery to the "LOAD MINUS" terminal (A) of the coulomb meter.
- ⑦ Connect to the APP and set relevant parameters as described in 4.1;

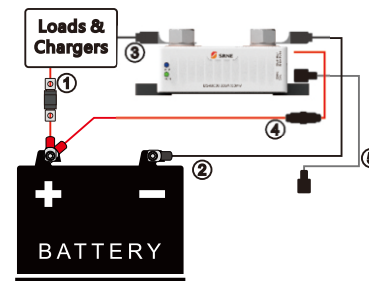


4.3 Connect to the data acquisition control unit (CU2)

This application transmits the operating information of the coulomb counter to the data acquisition control unit, and can be simultaneously checked by connecting to the data acquisition control unit through the APP view the running status of multiple devices or the entire DC system.

On the basis of 4.1 wiring, add RS485 communication line to access the data acquisition control unit:

- ⑤ Connect the "RS485&CAN" communication of the coulomb meter to the RS485 communication port of the data acquisition control unit through the communication line. (COM1 ~ COM6);
- ⑥ Connect to the APP and set relevant parameters as described in 4.1;



5. Indicator light

indicator light	Instruction method	Status description
 BLE	Always on	Connected to APP, no data transmission
	flashing	There is data sending and receiving on the APP side
	go out	Not connected to APP
 RUN	Red light always on	There is an alarm message
	Green light is always on	normal

6. Frequently asked questions and solutions

Phenomenon	Processing method
Light does not shine	Check whether the positive and negative poles of the battery and DC system are connected correctly. Is the "Main Batt+" terminal of the coulomb counter connected to the positive terminal of the battery.
Charging state of charge SOC deviation is large	Check whether the parameter settings of the coulomb counter are correct whether the coulomb counter has experienced the process from full charge to discharge to the discharge cut-off voltage. The battery needs to be fully charged periodically. Due to self-discharge characteristics, prolonged failure to fully charge the battery will cause cumulative current measurement errors.
The remaining usage time varies greatly	Check whether the parameters such as the discharge depth of the coulomb counter are set correctly.
Lithium battery SOC is inaccurate	Is there a BMS protection board inside the lithium battery for charge and discharge protection.
When fully charged, the remaining capacity of the battery is greater than or Less than the nominal capacity value of the battery	Due to the charging and discharging characteristics of the battery, the attenuation of the battery capacity, etc., the coulomb meter during the self-learning process, the capacity will learn and update under specific conditions.