

## Display Screen Back Light

The display screen backlight serves as an indication if your battery is charging or discharging. Upon powering up the meter the Blue backlight will turn on. If there is no charging or discharging current, then the backlight will turn off after 5-7 seconds. The backlight will turn on, and will remain on, when the shunt detects a load and the battery is being discharged. When the battery senses a charging current, the backlight will then begin to slowly pulse on and off while a charging current is detected. EXCEPTION: If charging and discharging is happening at the same time, then the higher current of the two will determine if the screen remains solid or pulses.

## Backlight Brightness

The backlight brightness can be adjusted up or down at any time by pressing  $\Delta$  or  $\nabla$ .

## Specifications

**Operating Voltage:** 8-80VDC

**Standby Current (backlight on):** 6.0mA

**Standby Current (backlight off):** 0.5mA

**Sleep Power Consumption:** 0.05mA

**Voltage Acquisition Accuracy:**  $\pm 1.0\%$

**Current Acquisition Accuracy:**  $\pm 1.0\%$

**Capacity Acquisition Accuracy:**  $\pm 1.0\%$

**Backlight Turn-On Current:** 100mA

**Range of Battery Capacity Values:** 0.1 – 9999.0 Ah

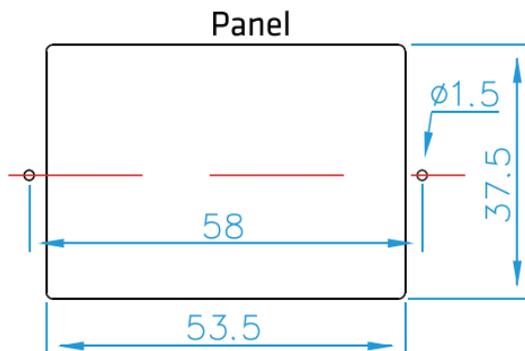
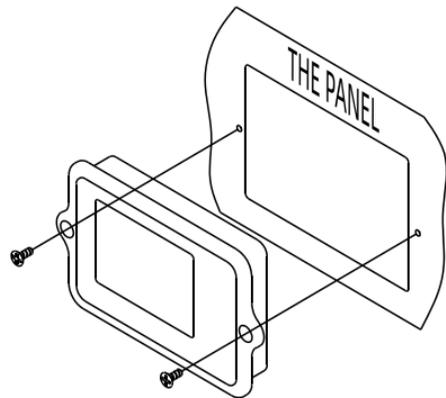
**Amperage Range:** 0-500A

**Temperature Range:** 14 to 140 °F (-10 to 60 °C)

**Warranty:** 1 Year

## Panel Mounting

The display will mount in a rectangular opening measuring 53.5 x 37.5 mm and is held in place by (2) 2mm self-tapping tapered flathead screws. For mounting instructions please refer to the diagram below:



## Troubleshooting

### My screen will not power on:

- Make sure that your power connection is secure and wired in the correct orientation. The B+ terminal should be tied direct to the Positive (+) terminal of your battery.
- Also check the shielded data cable connection. Make sure it is fully inserted to both the shunt and the rear of the display.

### My battery's capacity is not correct, or not reading at all:

- Repeat the Battery Parameters Setup and Battery Capacity Confirmation instructions. Make sure you remember to set the batteries full capacity at the end of the capacity confirmation instructions.

### The backlight is flashing when discharging, and solid when charging:

- The shunt is wire in backwards. Make sure the B- is wire to the Negative (-) battery terminal, and the P- is wired to your output and charger Negative (-).

### My meter is not measuring one of my discharge loads or charging currents:

- Make sure the device is not wired direct to the batteries Negative (-) terminal. All device loads and charging sources Negative (-) wires need to be wired direct to the P- terminal of the shunt. All currents will need to flow through the shunt to be measured.

## Support

For technical assistance, please contact:

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# Powerwerx

## Precision Battery Status Monitor User Manual



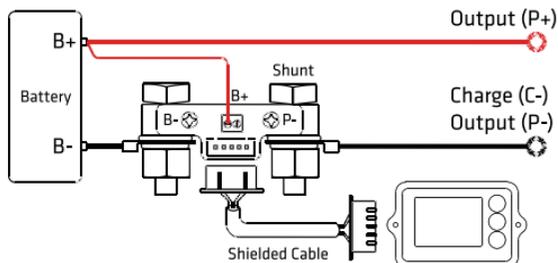
## Introduction

The Powerwerx BSM-500 is a precision battery status monitor that acts like a fuel gauge for your battery. The meter accurately measures your batteries state of charge (SOC) and will display your current battery capacity (Ah remaining). The meter will also show Battery Percentage, Remaining Time (to full Charge or Discharge), Volts, Amps, and Watts. The BSM-500 can be used with Lithium Iron Phosphate, Lithium, Lead Acid, AGM, and Nickel Metal Hydride batteries with a voltage range of 8-80V.

## Wiring Instructions

1. Begin by connecting the B- terminal on the shunt to the negative (-) terminal on your battery. Next, you will attach all negative loads and charging sources to the P- terminal of the shunt. It is important that all current, including charging currents, flow through the shunt and are connected direct to the P- terminal. Any loads or charging currents connected direct to the batteries negative (-) terminal will not be measured by the shunt.
2. Install a series connection (18-22AWG) from your batteries Positive (+) terminal to the B+ terminal on the shunt. This connection is what will power the display.
3. Connect the shielded data cable to the data connectors on the shunt and the rear of the display monitor. The meter will immediately power on if installed correctly.

## 100A/350A Shunt Wiring Diagram

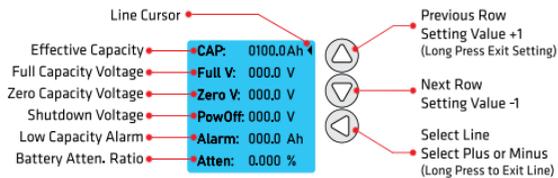


**WARNING:** The shunt is to be wired as shown in the diagram only. Make sure to thoroughly follow all wiring instructions. Wiring the shunts B- or P- terminal direct to a Positive (+) circuit can cause irreversible damage to the BSM-500, and could cause permanent damage to your battery and/or equipment.

## Battery Parameter Setup

After you have installed the shunt and have connected your display, you are now ready to enter battery parameter settings:

1. Press and hold  $\triangleleft$  to access the battery parameters screen.
2. Use  $\triangle/\nabla$  to select which parameter you plan to update.
3. Press and hold  $\triangleleft$ . The first numeral will begin to flash, and you can input the correct amount. Press  $\triangleleft$  to move to the next numeral to the right. You will then use  $\triangle/\nabla$  to increase or decrease that value. When you are finished inputting that value, press and hold  $\triangleleft$ .
4. You can then proceed to updating the next value. When you have completed updating values, to return to main screen you can press and hold  $\triangle$  or wait for 60 seconds, and the meter will return to the main screen.



**CAP:** Battery Capacity in Amp Hours (Ah)

**FULL V:** Battery Voltage when the battery is charged to 100%

**EMPTY V:** Battery voltage where your capacity is considered to be 0%. CHECK YOUR BATTERY MANUFACTURERS RECOMMENDED LOWEST OPERATING BATTERY VOLTAGE (You can always set this parameter slightly higher to help prevent discharging your battery too low).

**PowOff:** The backlight and LCD display will turn off when the voltage drops below this value.

**Alarm:** Low battery capacity indicator. The battery capacity value will begin flashing when the batteries capacity drops below this value.

**Atten:** Battery attenuation ratio. Does not need to be programmed.

## Battery Capacity Confirmation

The final step is to confirm your batteries capacity. If your battery is relatively new, proceed to charge your battery until full. Once the battery is fully charged, you will then proceed to press and hold  $\triangle$ . This will confirm the batteries capacity, and the unit will be fully programmed and ready for use.

If the capacity of your battery is unknown, or if the battery is older and has several hundred charge cycles, then you will need to measure the batteries current capacity. To do this, you will first need to discharge your battery until it is at 0% capacity (REFER TO YOUR BATTERY MANUFACTURERS SPECIFICATIONS). Next, proceed to press and hold  $\nabla$ . This will set the current capacity as your batteries baseline for 0%. You will then proceed to charge your battery up to a full state of charge. After your battery is charged, you will then want to compare the measured Ah capacity to your batteries advertised capacity. If the measured value is close to the advertised capacity of your battery, then you can press and hold  $\triangle$  and set this as your batteries fully charged capacity. If you have a large difference from the advertised Ah, then you will want to update the battery capacity (CAP) to match the measured Ah capacity. After you have updated the CAP, you can then press and hold  $\triangle$  to confirm this as your batteries new full state of charge. Your meter is now ready for use.

## Low Battery Voltage Mode

The low battery voltage setting can be used to minimize the amount of power consumed by the display. The display backlight and LCD display will turn off when your batteries voltage drops below the value entered for PowOff. To turn the screen back on momentarily you can press any of the buttons on the right. The screen will not return to normal function until the battery's voltage increases above the PowOff setting. To disable this function, set the PowOff value to 0 Volts.

## Battery Capacity Alarm

The battery capacity alarm acts as an early warning when your batteries capacity is getting too low. When your batteries remaining capacity drops below the value entered in the Alarm setting, the capacity value on the display will start flashing. The value will stop flashing when the battery has been charged, and the capacity is higher than the entered Alarm value. To disable this function, make sure that the value for Alarm is set to 0 amp hours.

## Display Parameters

- **Percentage (%)** – The percentage will display your batteries current state of charge (SOC). Percentage is displayed from 0% (empty) to 100% (full).
- **Amp Hour (Ah)** – The present state of charge (SOC) calculated in Amp Hours (Ah). NOTE: The capacity of the battery being monitored will need to be programmed prior to use.
- **Battery Symbol (battery cell symbol)** – The battery symbol is metered as a graph for current state of charge (SOC).
- **Timer** – The timer will indicate the remaining amount of time left until zero capacity based off the current rate of discharge. When charging, the timer will indicate the amount of time left until full state of charge.
- **Volts (V)** – Indicates the current battery voltage.
- **Amperage (A)** – Shows the current amperage being used for discharge, or the charging current being supplied.
- **Watts (W)** – Shows the current watts being used for discharge, of the charging wattage being supplied.

