PROJECTA

BATTERY MONITOR KIT

P/No. BM500-BT

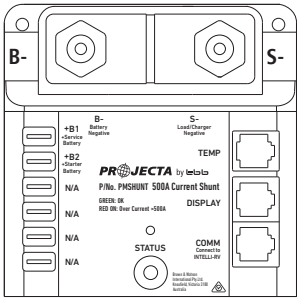
INTRODUCTION

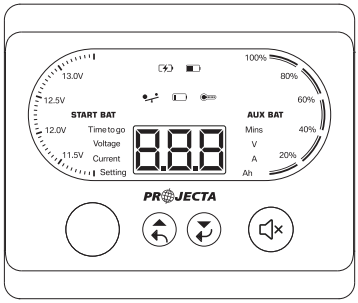
BM500-BT Bluetooth Battery Monitor Kit is comprised of the two following devices:

- 500A Smart Shunt
- Bluetooth Battery Monitor

BM500-BT Features:

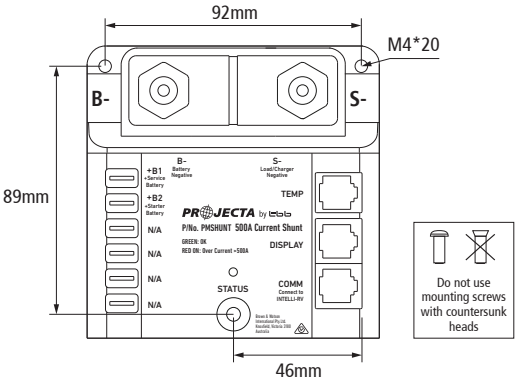
- Rated to measure current up to 500A
- Compatible with 12V DC, 24V DC or 48V DC batteries
- Compatible with AGM, GEL, WET and Lithium batteries
- Built-in Bluetooth™ allows users to connect to BM500-BT via Andriod or iOS app
- Contact ratings 2A@30V DC or 0.5A@125V AC
- Measurement accuracy:
  - Current: +/- 0.4%
  - Voltage: +/-0.3%
- Supports CAN and RS485



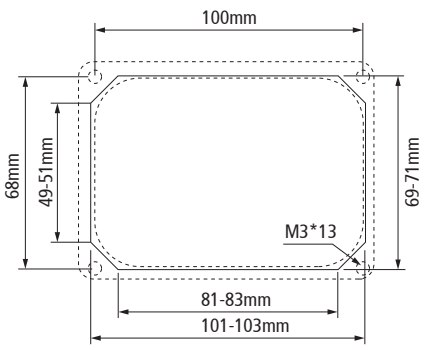


INSTALLATION GUIDE

500A Smart Shunt

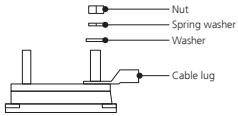


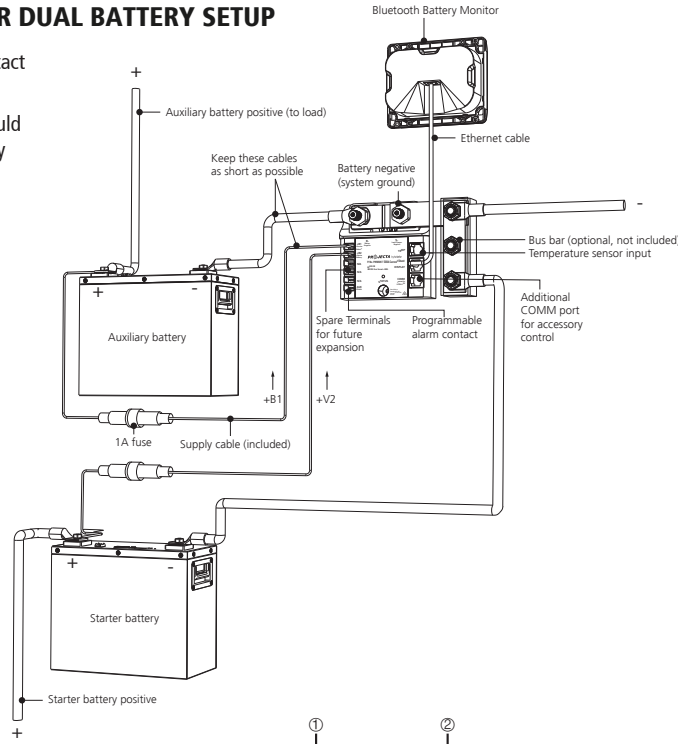
Bluetooth Battery Monitor



CONNECTION DIAGRAM FOR DUAL BATTERY SETUP

- The nominal current for the dry contact is 2A@30V or 0.5A@125V
- The battery temperature sensor should be connected to the auxiliary battery (any terminal)
- Please ensure the connection is fastened as below picture
- Assembly sequence of nut, washer and cable lug:





BM500-BT

CONNECTORS AND TERMINALS

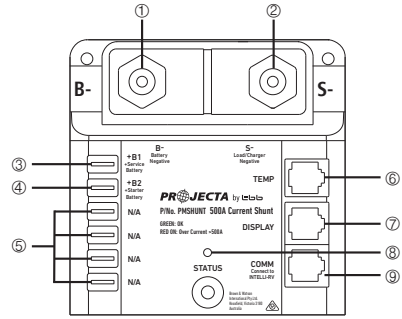


Table 1: Connectors and terminals of BM500-BT

NO.	Print	Description
1	B-	Auxiliary battery negative input terminal
2	S-	DC loads negative input terminal
3	+B1	Auxiliary battery positive input terminal (use supplied fused red cable)
4	+B2	Starter battery positive input terminal
5	N/A	Terminals not used
6	TEMP	Temperature sensor cable input
7	DISPLAY	Bluetooth™ battery monitor cable input
8	Status	LED indicator (See Chapter 2.3)
9	COMM	485 and CAN communication port (See Chapter 2.4)

Table 2: Condition/logic for alarm and dry contact

Alarm or protection condition/logic		Alarm or protection value		Resume value		Setting step
		Default	Range	Default	Range	
0	No condition	--	--	--	--	--
1	Auxiliary battery voltage low	10.5V	7.0V~95.0V	11.0V	7.0V~95.0V	0.01V
2	Auxiliary battery voltage high	16.0V	7.0V~95.0V	15.5V	7.0V~95.0V	0.01V
3	Auxiliary battery SoC low	20.0%	0~99.0%	30.0%	0~99.0%	0.1%
4	Time to go low	1800 sec.	60~86400 sec.	3600 sec.	60~86400 sec.	1 sec.
5	Over-current (charge)	10A	1A~600A	9A	1A~600A	0.01A
6	Over-current (discharge)	-10A	-1A~600A	-9A	-1A~600A	0.01A
7	Auxiliary battery temperature low	0℃	-20~+50℃	1℃	-20~+50℃	0.1℃
8	Auxiliary battery temperature high	40℃	-20~+50℃	39℃	-20~+50℃	0.1℃
10	Starter battery voltage low	10.5V	7.0V~95.0V	11.0V	7.0V~95.0V	0.01V
11	Starter battery voltage high	16.0V	7.0V~95.0V	15.5V	7.0V~95.0V	0.01V
12	2nd Starter battery voltage low	10.5V	7.0V~95.0V	11.0V	7.0V~95.0V	0.01V
13	2nd Starter battery volt high	16.0V	7.0V~95.0V	15.5V	7.0V~95.0V	0.01V

LED INDICATOR

Table 3: LED indicators

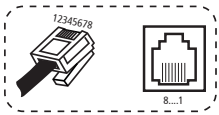
Status	Status flash interval	Description
Power on initialization state	Alternating red and green	Power on initialization state. When powering BM500-BT, ensure the battery isn't being charged or discharged
Operation	Green flashing	Normal operation
	Red flashing	Alarm (See Table 2)
	Red on	The charge or discharge current of the auxiliary battery exceeds 500A

COMM PORT

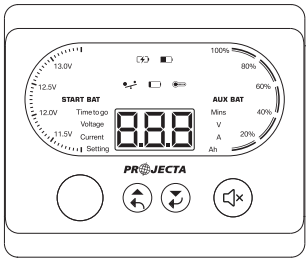
BM500-BT is compatible with RS485 and CAN. It allows the user to connect with an external device by either RS485 or CAN protocol. The COMM port is defined as below:

Table 4: Pin definition of COMM port

PIN port	Status color	Description
Pin1	Orange / white	Reserved
Pin2	Orange	Reserved
Pin3	Green / white	485A
Pin4	Blue	CANH
Pin5	Blue / white	CANL
Pin6	Green	485B
Pin7	Brown / white	Reserved
Pin8	Brown	Reserved



COMM



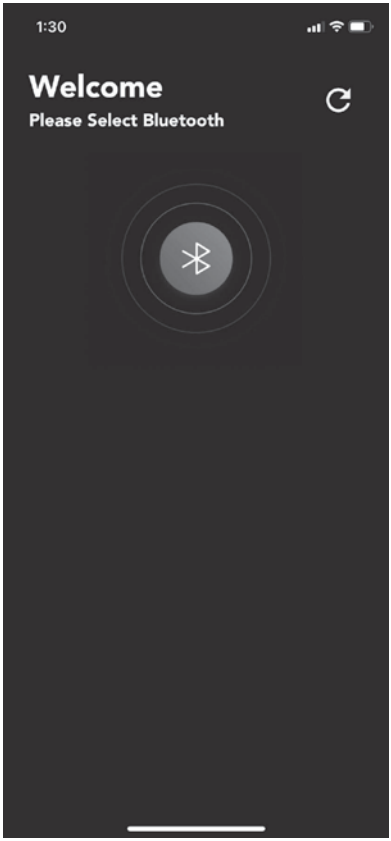
BM500-BT – BLUETOOTH™ BATTERY MONITOR

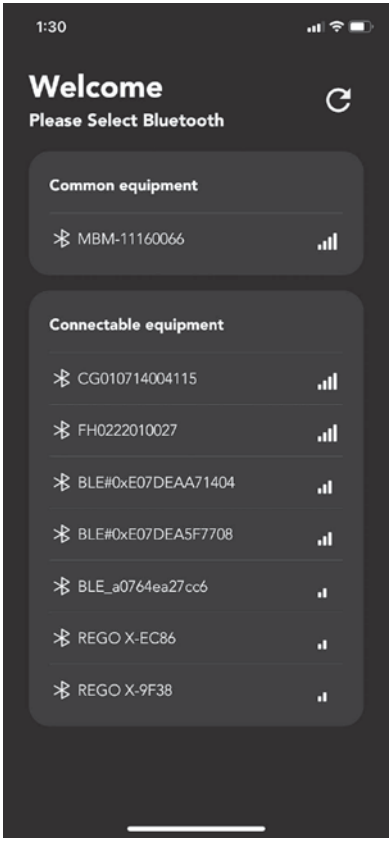
Table 5: Display and buttons of BM500-BT – Bluetooth™ Battery Monitor

Display Icon	Item	Description
	Charge	Connected battery is being charged
	Discharge	Connected battery is being discharged
	Overcurrent	Auxiliary battery alarm for high charge or discharge current
	SoC.Low alarm	Low State of Charge for auxiliary battery
	Temperature warning	Low temperature or high temperature alarm for auxiliary battery
START BAT	Starter battery voltage	Starter battery voltage indicator
AUX BAT	AUX.BAT SoC	Auxiliary battery state of charge (SoC) (%)
	Scroll up or Return button	Scroll up to last item, to exit configuration hold button for 2 seconds
8.8.8	Value Information	Display value based on what parameter is being observed
	Scroll down or Confirm button	Scroll down to next item. Or, to confirm selection and configuration, hold button for 2 seconds
	Mute button	Mute or unmute an alarm set

BM500 - BT
APP QUICK GUIDE

1. CONNECTING TO A SMART DEVICE (BLUETOOTH)



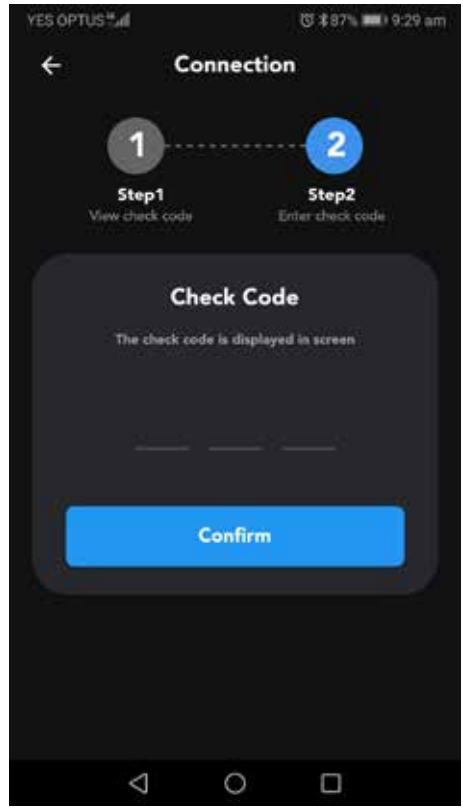


1. Go to your smart device's App Store (iPhone/iPad) or Play Store (Android) and search for "Projecta BM500 app". Download this app to your smart device.
   (See list of compatible devices on page 23)

2. Ensure Bluetooth and Location are enabled on your smart device and that permission is granted for the app to use Bluetooth and discover new connections.

3. Open the app and it will begin searching for compatible devices. Select the device beginning with "MBM".

1. CONNECTING TO A SMART DEVICE (BLUETOOTH)



4. A verification code will pop up on the display module. Click Next Step.

5. Enter the 3-digit code into the mobile APP and press confirm.

6. Once you have established a paired connection with your smart device, the app will take you to the home screen.

2. USING THE PROJECTA BM500-BT APP

From the home screen, the BM500-BT app allows the user to remotely monitor key aspects of their battery from the convenience of their phone or tablet, as well as remotely set alerts for various conditions to optimise the life of the battery.

The following information is displayed in the app's home screen.

Alerts

Settings

Battery status: Standby/Charging/Discharging

Battery SOC & Time to Go/Empty

Battery Type

Battery Voltage

Battery Current

Battery Temperature (if temperature sensor is used)

Battery Capacity

Note: Starter battery must be enabled. See page 14

See page 13 for further instructions on how to use the BM500-BT APP.

BM500-BT – BLUETOOTH™ BATTERY MONITOR OPERATION

The BM500-BT – Bluetooth™ Battery Monitor can show a wide range of important battery parameters. The monitor will cycle through the following items; Time to go, Voltage, Current for the auxiliary battery. Users can alternatively press the scroll up/down button to cycle through the screen. The screen will automatically turn off after 150 seconds and will turn on again if any button is pressed.

NOTE: It is essential to configure BM500-BT to ensure the display and the app provide accurate information.

- Set the battery type and capacity as per the battery connected to the BM500-BT (can be set either in monitor or app)
- Before connecting the auxiliary battery to the BM500-BT ensure it is charged to 100%; as the BM500-BT will calibrate the state of charge upon auxiliary battery connection.

Table 6: Display Values

Display Value		Description
Time to go	Mins	Time left under the present load, before the auxiliary battery is empty. Or time left under the charge current, before the auxiliary battery is full charged Note: 999 is the highest value
Voltage	V	Voltage of the auxiliary battery
Current	A	Current flowing in or out of the auxiliary battery
Blank	Percentage	Percentage value of the auxiliary battery state of charge

CONFIGURING BM500-BT VIA MONITOR

Press the Scroll down button (Confirm button) for 2 seconds, to enter into setting page. This menu can be accessed using the following sequence:

F01

There are four items in setting page to be selected:
(1) F01 (2) F02 (3) C01 (4) C02

The user can press the Scroll up (Return button) or Scroll down (Confirm button) button to cycle through the above four selections. By pressing the Scroll up button (Return button) for 2 seconds, it will quit from the settings page and return to the main operation page.

F01 – BATTERY TYPE SETTING

The user can choose the chemistry type of their battery by setting this menu. It can be accessed by using the following sequence:

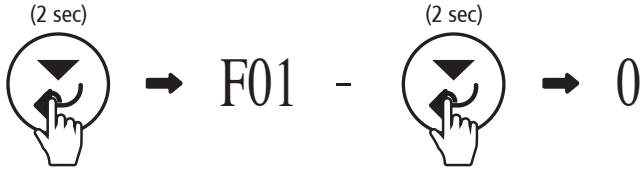


Table 7: Battery type in F01

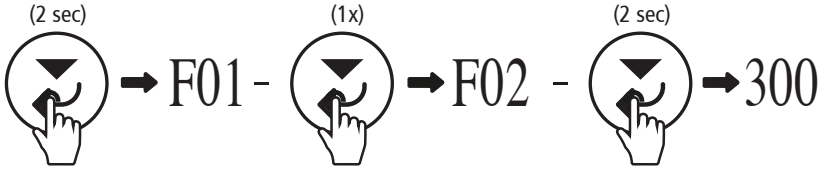
Number	Battery type
0	AGM
1	GEL
2	WET
3	LITHIUM

Press the Scroll down button (Confirm button) for 2 seconds to confirm the selection.

Note: LFP is the default setting

F02 - BATTERY CAPACITY SETTING

The user can choose their auxiliary battery's capacity by setting this menu. It can be accessed using the following sequence:

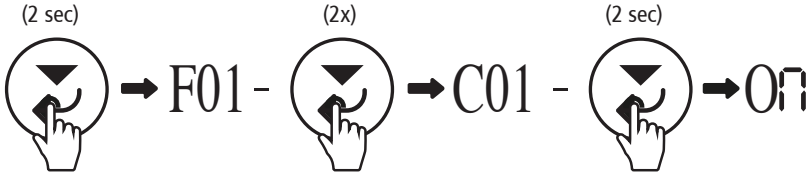


Press the Scroll down button (Confirm button) to move the cursor in hundreds, tens and single digits; press the Scroll up button (Return button) to change the number from 0-9; Press the Scroll down button (Confirm button) for 2 seconds to confirm the selection.

Note: 200Ah is default setting

C01 - RESET BATTERY

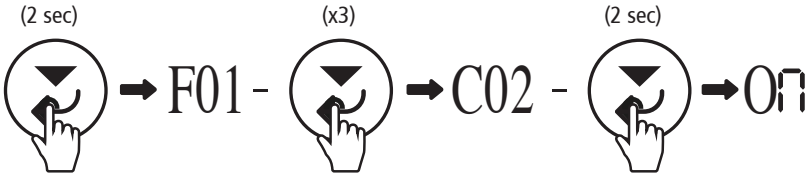
This can be applied after installing a new battery of the same specifications as the previous one. This menu can be accessed using the following sequence:



Select On and Press the Scroll down button (Confirm button) for 2 seconds to confirm the selection.

C02 - BUZZER ALARM SETTING

The user can turn ON/OFF the buzzer alarm by setting this menu. This menu can be accessed by using the following sequence:



The user can select ON or OFF in this setting:

- ON: Enable alarm
- OFF: Disable alarm

Press the Scroll down button (Confirm button) for 2 seconds to confirm the selection. Alternatively the user can press the mute button on the display

Note: ON is the default setting

WARNING CODES

BM500-BT will display warnings as they occur. Please refer to the chart below for a each warning and description.

Table 8: Warning code list

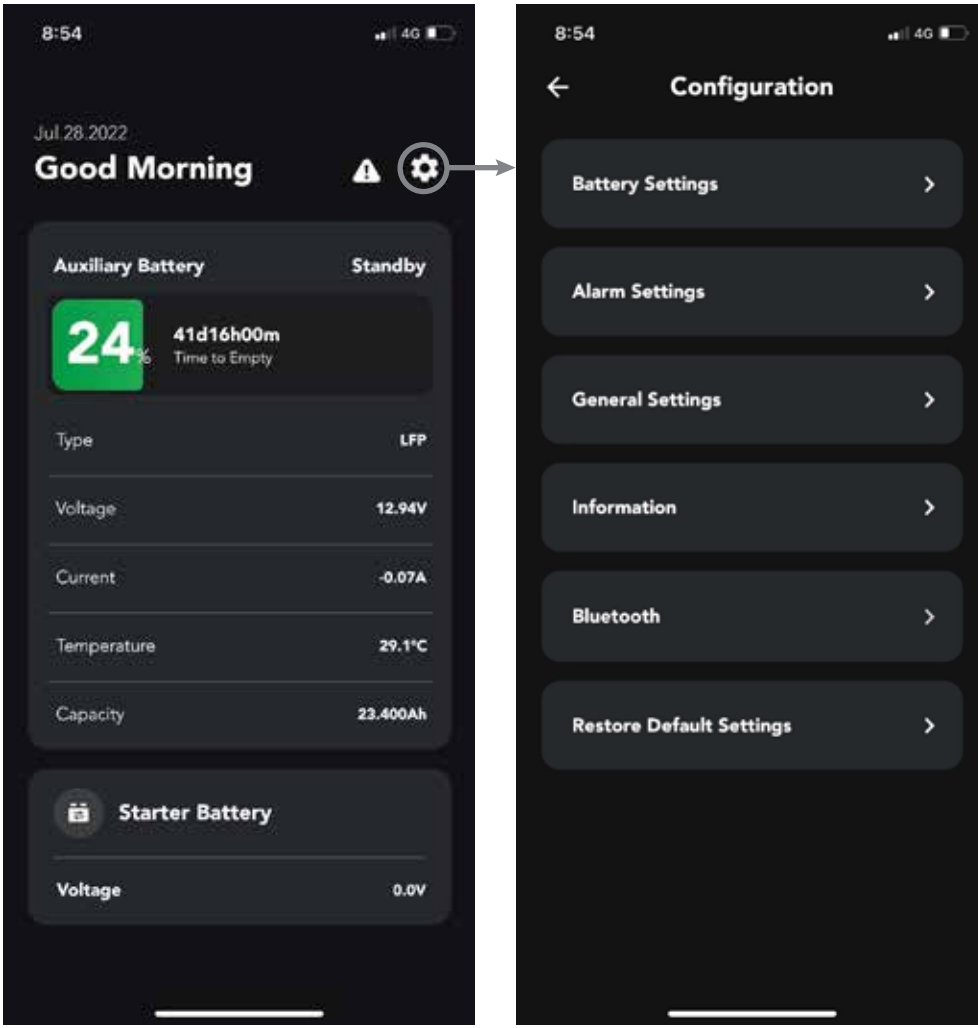
Item	Warning code	Warning type	Description
BM500-BT warning code	E01	V.LOW(+B1)	Low battery voltage for auxiliary battery
	E02	V.HIGH (+B1)	High battery voltage for auxiliary battery
	E03	SoC.LOW (+B1)	Low state of charge for auxiliary battery
	E04	TIME.LOW (+B1)	Low time remaining for auxiliary battery
	E05	I.CHARGE (+B1)	High charge current for auxiliary battery
	E06	I.DISCH (+B1)	High discharge current for auxiliary battery
	E07	T.LOW (+B1)	Low battery temperature for auxiliary battery
	E08	T.HIGH (+B1)	High battery temperature for auxiliary battery
	E10	V.LOW (+V2)	Low battery voltage for starter battery
	E11	V.HIGH (+V2)	High battery voltage for starter battery
	E12	V.LOW (+V3)	Low battery voltage for 2nd starter battery
	E13	V.HIGH (+V3)	High battery voltage for 2nd starter battery

3. USING THE PROJECTA BM500 APP (CONTINUED)

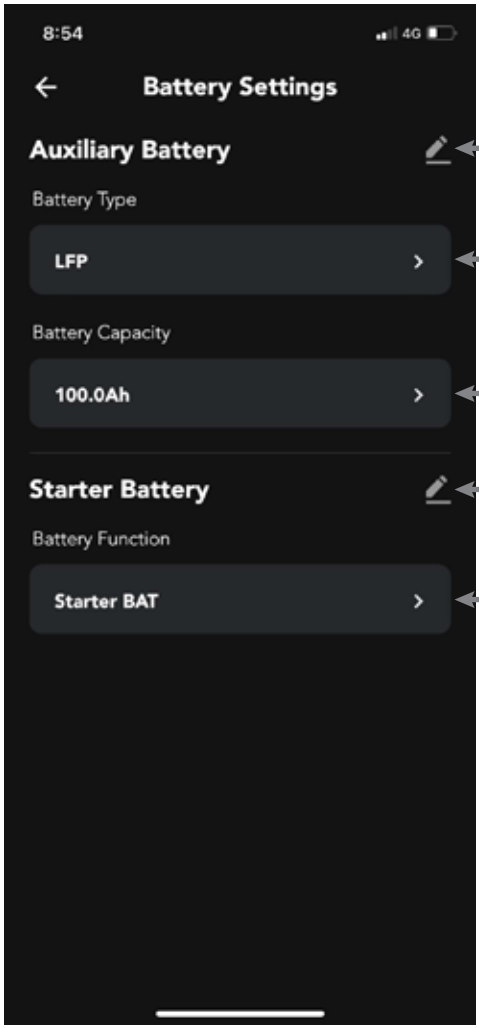
The user can adjust the settings by clicking on the COG icon on the top right of the menu

Note: Upon first set up, it is recommended to adjust the following two settings:

Battery Settings -> Battery Capacity (see 3.1)
Alarm Settings -> Over current-discharging (see 3.2.6)



3.1 BATTERY SETTINGS



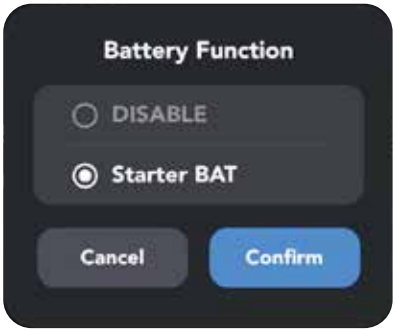
Edit the battery name

Change the battery Type:
AGM/Lithium/WET/GEL

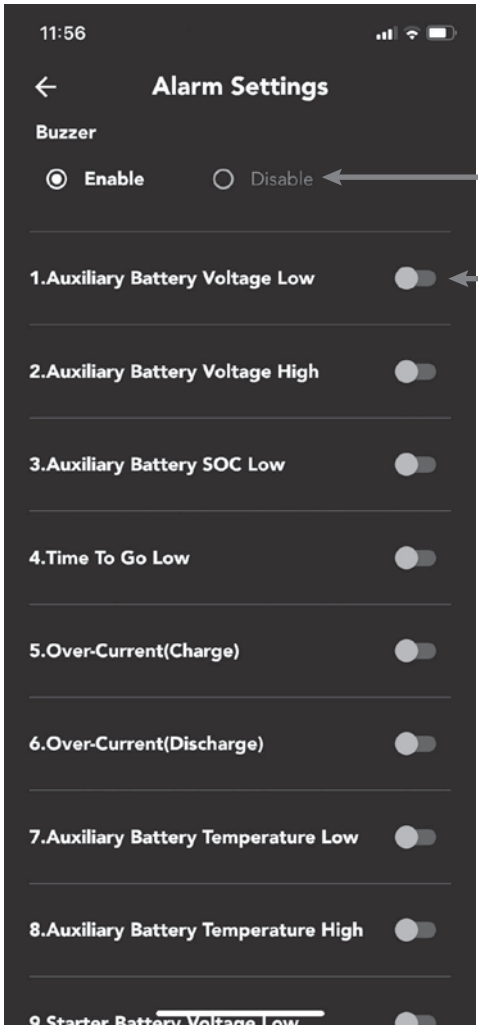
Change the battery capacity:
10~10000Ah

Edit the Battery Name

Enable/Disable Starter battery feature:
If disabled, starter battery information will not be shown on the main page



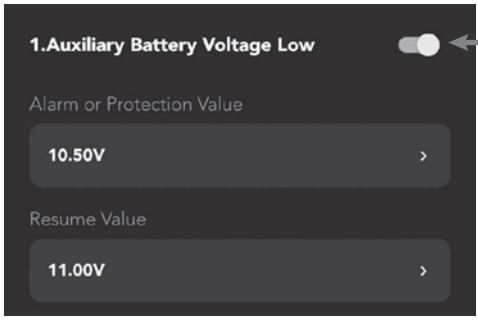
3.2 ALARM SETTINGS



Enable/Disable the buzzer on the display (MBM) monitor.

Enable/Disable the setting item: If disabled, the user will not receive an alert for that alarm.

3.2.1 AUXILIARY BATTERY VOLTAGE LOW

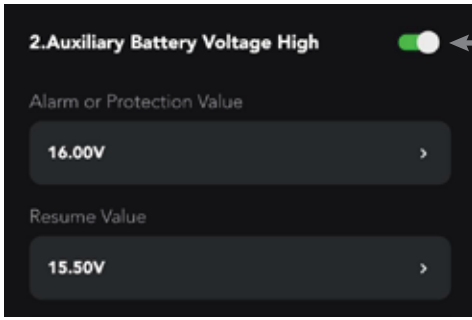


An alert will be sent when the battery voltage is below the alarm value set by the user.

Voltage setting range： 7~95 V

The alert will stop once the battery voltage reaches the resume value set by the user.

3.2.2 AUXILIARY BATTERY VOLTAGE HIGH

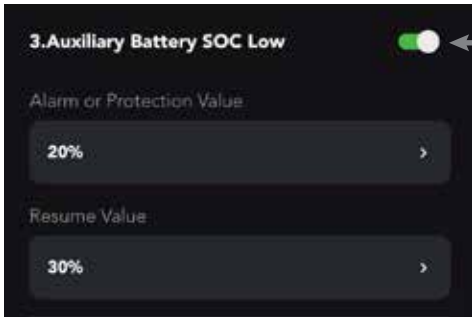


An alert will be sent when the battery voltage is higher than the alarm value set by the user

Voltage setting range： 7~95 V

The alert will stop once the battery voltage reaches the resume value set by the user

3.2.3 AUXILIARY BATTERY SOC LOW



An alert will be sent when the battery SOC is below the alarm value set by the user

SOC setting range： 0~99%

The alert will stop once the battery SOC reaches the resume value set by the user

3.2.4 TIME TO GO LOW

An alert will be sent when the remaining time is below the alarm value set by the user

Time setting range：23H59min59sec

The alert will stop once the time to go low value reaches the resume value

3.2.5 OVER CURRENT-CHARGING

An alert will be sent when the charging current is higher than alarm value set by the user

Current setting range：1~600A

The alert will stop once the over current charging value reaches the resume value set by the user

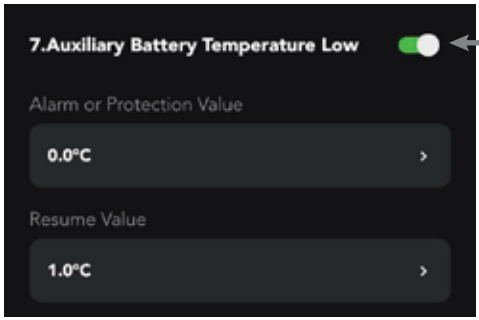
3.2.6 OVER CURRENT-DISCHARGING

An alert will be sent when the discharge current is below the alarm value set by the user

Current setting range：- 1~ 600A

The alert will stop once the over-current discharge reaches the resume value set by the user

3.2.7 AUXILIARY BATTERY TEMPERATURE LOW

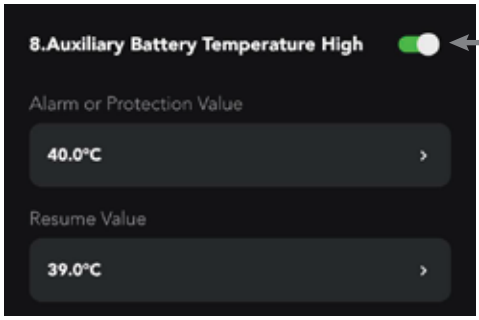


An alert will be sent when the battery temperature is below the alarm value set by the user

Temperature setting range：-20 ~ 50C

The alert will stop once the temperature reaches the resume value set by the user

3.2.8 AUXILIARY BATTERY TEMPERATURE HIGH



An alert will be sent when the battery temperature is higher than the alarm value set by the user

Temperature setting range：-20 ~ 50C

The alert will stop once the temperature reaches the resume value set by the user

3.2.9: STARTER BATTERY VOLTAGE LOW

An alert will be sent when the battery voltage is below the alarm value set by the user

Voltage setting range： 7~95 V

The alert will stop once the battery voltage reaches the resume value set by the user

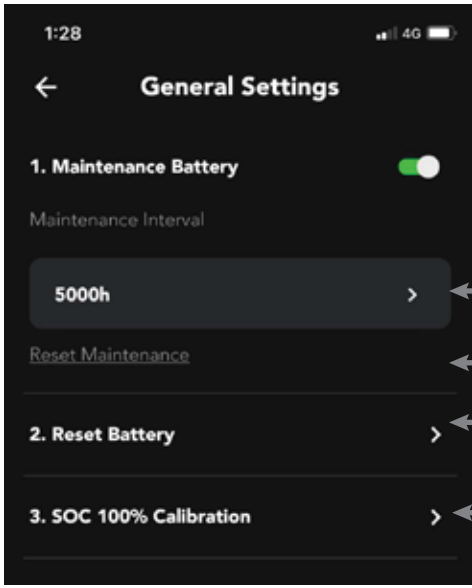
3.2.10: STARTER BATTERY VOLTAGE HIGH

An alert will be sent when the battery voltage is higher than the alarm value set by the user

Voltage setting range： 7~95 V

The alert will stop once the battery voltage reaches the resume value set by the user.

3.3: GENERAL SETTINGS



1. Reminder interval setting:
interval range: 100~10000 h

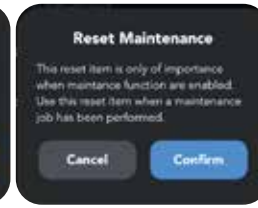
2. Reset maintenance will reset the time interval.

3. Reset battery is used when replacing the battery. The SOC will reset with the current state of the battery.

4. This will set SOC to 100% directly. It can be used when battery is fully charged but SOC is not 100%

1.

2.



3.

4.

3.4: INFORMATION
3.4.1 DEVICE INFORMATION

PMSHUNT Software version number
Any Software updates will show here when available

BM500-BT(MBM) Software version number
Any Software updates will show here when available

BM500-BT(MBM) serial number

APP software version

3.4.2 RUNNING INFORMATION

System runtime

Maintenance reminder countdown time:
When the time reaches 0, the system will remind the user that battery maintenance is needed

Time since last change

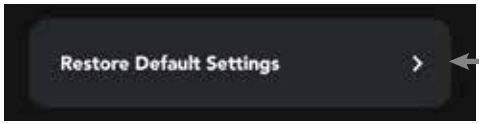
Time since last calibration

3.4.3 BLUETOOTH

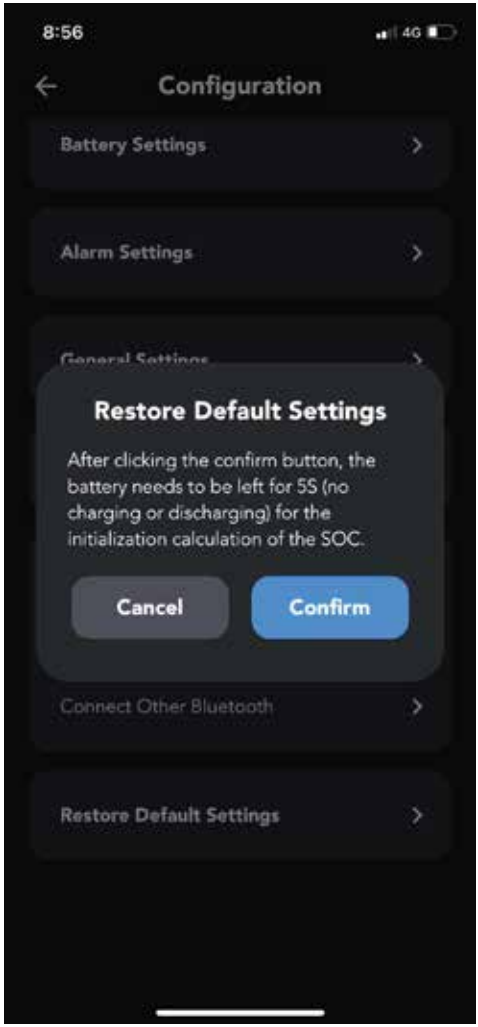
Bluetooth Name

Disconnects the current bluetooth connection

3.4.4 RESET DEFAULT SETTING



Restores all battery information to their default values



TROUBLESHOOTING GUIDELINE

Table 9: Troubleshooting guideline

Issue	Suggested Action
The BM500-BT doesn't operate (The Status LED does not flash)	• Check the 'B-' and battery side connections • Check battery voltage. Battery might be flat. The B1+ voltage must be above 7V DC for the shunt to system to detect the battery • Try restarting the monitor by removing and reconnecting the supply wire to the 'B+'
The monitor doesn't operate (no display)	• Check the connection between the shunt and the monitor
Current readout gives wrong polarity (current should be positive when charging and negative when discharging the battery)	• Shunt installed in reverse. Make sure that the 'B-' is connected to the battery negative terminal and the 'S-' bolt to the battery loads
Display returns '---' in Time to go readout and the state of charge (SoC) bar is flashing.	• Make sure that the battery is not charging or discharging when you restart the BM500-BT device
"State of Charge" and/or "Time to go" not accurate	• Check if all current is flowing through the 'B-' of the shunt (the negative terminal of the battery should only contain the wire going to the 'B-' side of the shunt) • Shunt installed in reverse. Make sure that the 'B-' terminal is connected to the battery negative terminal and the 'S-' terminal to the battery loads • Check if all battery properties (F01 and F02) are correctly set • Check if the battery monitor is synced with battery. Perform full charge cycle
The monitor resets all the time	• Check the wiring for corrosion and / or loose contacts • Connected battery might be flat or defective
The monitor does not automatically synchronize	• The battery is not reaching its fully charged state. Check if the charge algorithm matches the requirements of the connected battery. Do not interrupt the charge process before it is finished.

SPECIFICATION

Table 10: Specification of BM500-BT

Specification	Specification Value
Communication	RS485, CAN
Nominal battery voltage	7~95V
Nominal current	±500A
Auxiliary battery voltage (+B1)	7~95V
Starter battery voltage (+V2,+V3)	1~95V, max support 2 batteries
Battery capacity	10~10000Ah
Battery type	AGM / GEL / WET / LFP
Temperature sensor	1
Working temperature	-20~50°C
Storage temperature	-30~70°C
Voltage accuracy	±0.3%
Current accuracy	±0.4%
Continuous current	500A
Dimension	BM500-BT Shunt: 105mm*105mm*63mm Bluetooth Battery Monitor: 110x78 mm (front) / 99x67mm (bottom) / 32mm (total depth) / 23.5mm (installation depth)
IP	IP20
Standards	CE certified (Safety: EN60335-1:2012, EN62233:2008 EMC:EN61000-6-3:2012, EN50498 Automotive EMC)

LIST OF COMPATIBLE SMART DEVICES

IOS Compatibility
iPhone

Requires iOS 9.0 or later

- iPhone 5S
- iPhone 6
- iPhone 6S
- iPhone 6S Plus
- iPhone SE (1st generation)
- iPhone 7
- iPhone 7 Plus
- iPhone 8
- iPhone 8 Plus
- iPhone X
- iPhone XS
- iPhone XS Max
- iPhone XR
- iPhone 11
- iPhone 11 Pro
- iPhone 11 Pro Max
- iPhone SE (2nd generation)
- iPhone 12 mini
- iPhone 12
- iPhone 12 Pro
- iPhone 12 Pro Max
- iPhone 13 Pro
- iPhone 13 Pro Max
- iPhone 13 mini
- iPhone 12
- iPhone SE (3rd generation)

iPod touch

Requires iOS 9.0 or later

- iPod touch (6th generation)
- iPod touch (7th generation)

Android 4.4 or later

WARRANTY STATEMENT

APPLICABLE ONLY TO PRODUCT SOLD IN AUSTRALIA

Brown & Watson International Pty Ltd of 1500 Ferntree Gully Road, Knoxfield, Vic., telephone (03) 9730 6000, fax (03) 9730 6050, warrants that all products described in its current catalogue will under normal use and service be free of failures in material and workmanship for a period of one (1) year (unless this period has been extended as indicated elsewhere) from the date of the original purchase by the consumer as marked on the invoice. This warranty does not cover ordinary wear and tear, abuse, alteration of products or damage caused by the consumer.

To make a warranty claim the consumer must deliver the product at their cost to the original place of purchase or to any other place which may be nominated by either BWI or the retailer from where the product was bought in order that a warranty assessment may be performed. The consumer must also deliver the original invoice evidencing the date and place of purchase together with an explanation in writing as to the nature of the claim.

In the event that the claim is determined to be for a minor failure of the product then BWI reserves the right to repair or replace it at its discretion. In the event that a major failure is determined the consumer will be entitled to a replacement or a refund as well as compensation for any other reasonably foreseeable loss or damage.

This warranty is in addition to any other rights or remedies that the consumer may have under State or Federal legislation.

IMPORTANT NOTE

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

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