ECO-WORTHY

Version: 0.1

BATTERY MONITOR

Disclaimer & Warning:

1. Thank you for choosing our products! Before using this product, please read this manual carefully.It includes important information and advice on installation, use, troubleshooting, etc., and please keep this manual in a safe place.
2. The warranty does not cover failure of the product due to accidental damage, unauthorised repair, improper storage and use.

·Call: 1-866 939 8222(US) +44 20 7570 0328(UK) +49 693 1090 113(DE)
·Email: customer.service@eco-worthy.com

CONTENTS

I. Product overview

This product is a special coulometer for batteries, which can be applied to 9 -80V lithium batteries and lead-acid batteries. It can view the current, voltage, SOC, SOH, actual capacity, cycle times and other information of the battery in real time through mobile phone APP, and supports setting various parameters, which can meet a variety of battery application scenarios, such as home off-grid system, low-speed electric vehicles and so on.

II. Product features

2.1 Product features

(1)Using high-precision Hall sensor for data acquisition, its current and voltage detection error is less than ±1%.

(2)With current and SOH correction function to make the data more accurate.

(3)With battery health monitoring function, it can automatically detect the current actual capacity and cycle times of the battery.

(4)Support to set many kinds of alarm functions.

(5)With Bluetooth communication function, it can meet the wireless information transmission.

(6)Support connecting mobile phone APP or display terminal [the display terminal is a display of our company that can receive the monitoring data of this product], which can view the detailed battery data in real time.

(7)Compact size, lugs on both sides reserved for fixing screw holes, easy to install in any home or caravan environment.

2.2 Basic technical parameters

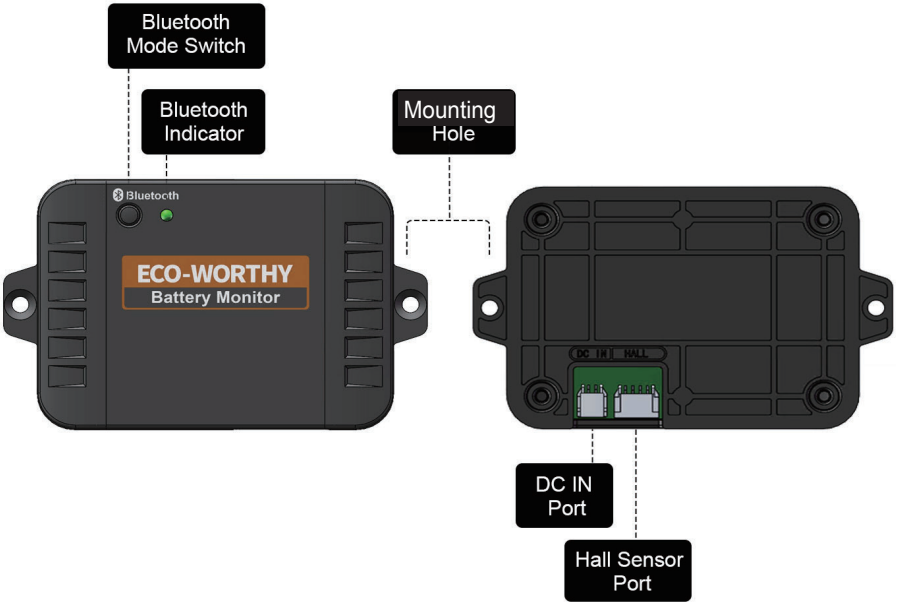
Model	ECO-BMM-1	
Battery monitor		
Product size (L*W*H)	113 x 70 x 22（mm）	
Operating voltage	9 - 80 （V）	
Current detection range	0 - 300 （A）	
Operating power consumption	0.3（W）	
Accuracy	Voltage error	< ± 1%
	Current error	< ± 1%
Operating temperature range	-20 - 60 （℃）	
Weight	80 （g）	

III. Usage method

3.1 Packing list

NO.	Name	Quantity	Unit	Remarks
1	Battery monitoring module	1	piece	
2	Hall sensor	1	piece	
3	Power supply connection cable (5m)	1	piece	2-core cable
4	Hall sensor connection cable （5m)	1	piece	4-core cable
5	Plastic expansion tube	2	piece	M 6 * 30（mm）
6	Phillips self-tapping screw	2	piece	M 4 * 30（mm）
7	Instruction manual	1	piece	

3.2 Product description

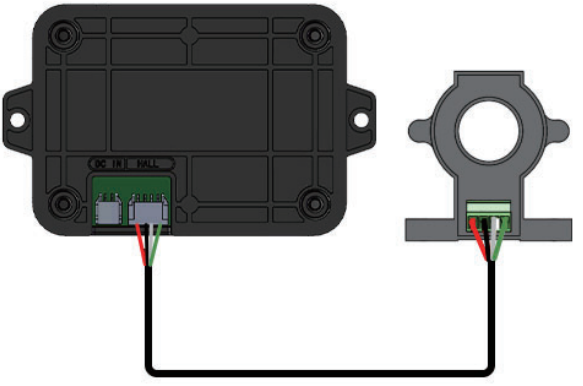


Battery Monitor Product Function Description Table

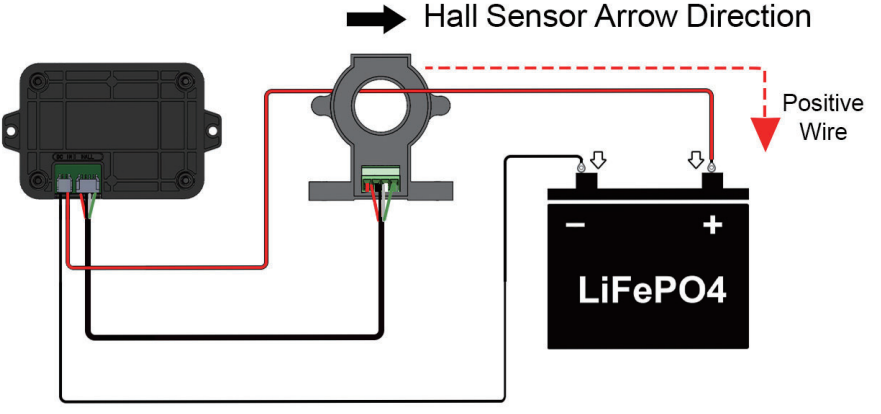
No.	Name	Function	Description
1	Bluetooth Mode Switch	Switch APP connection or display terminal connection	
2	Bluetooth Indicator	Showing the current Bluetooth mode and its connection status	Blue light blinking - No connection on APP connection mode Blue light always on - Successfully connected on APP connection mode
3	Mounting Hole	For mounting and fixing the product	
4	DC IN Port	For power supply of the battery Monitor	
5	Hall Sensor Port	For connecting Hall sensor	

3.3 Assembly steps

1. Hall Sensor and Battery Monitor Connection
Connect the Hall Sensor to the Hall Sensor Port of our product via the connection cable.

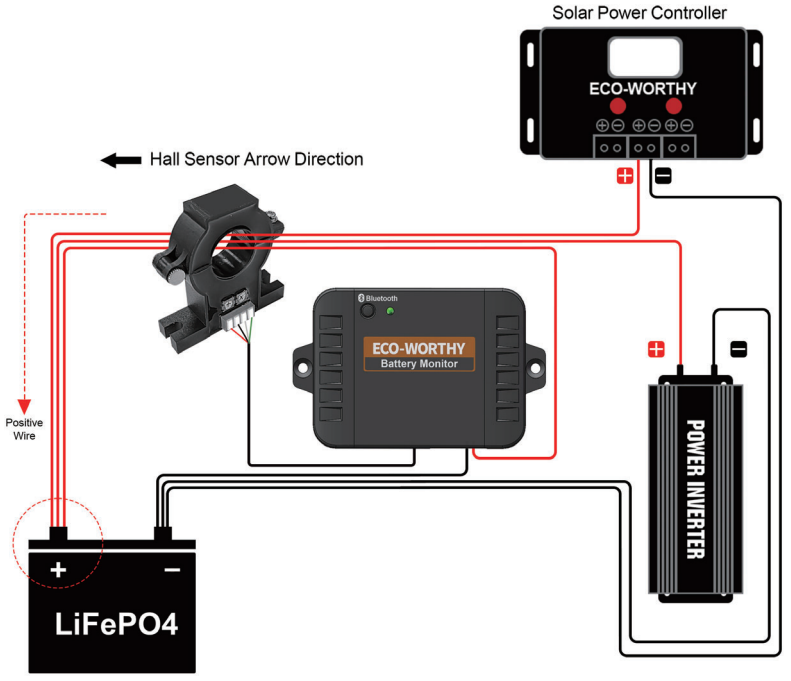


2. Access the Monitor to the power cord
Pass the positive wire of the power supply cable through the Hall sensor, and the Hall sensor arrow direction along the positive wire points to the positive terminal of the battery. Connect the OT terminal of the power cable to the positive and negative terminals of the battery respectively (Note: Please do not reverse), and plug the other end of the power cable into the DC IN Port of the product. If the wiring correct, the Bluetooth indicator of the product will light up.



3. Pass the positive input and output wires of the battery through the Hall sensor

Pass all positive battery input and output wires through the Hall sensor, making sure that all positive wires along the direction of the Hall sensor arrow point to the positive battery terminal.



4. Mounting and fixing the Battery Monitor

① Determine where the product is to be mounted first and mark the exact location of the screws.

② After punching holes at the marked screw locations, clean the sand particles inside.

Note: The depth of the hole should be greater than the length of the plastic expansion pipe so that the expansion pipe can be fully inserted into the wall.

③ Insert the M 6 * 30 plastic expansion pipe into the hole first, and then hammer it into the wall until it is level with the wall surface.

Note: When you use the hammer, don't hit the plastic expansion pipe too hard resulting in damaging it.

④ From the front, use M 4 * 30 phillips self-tapping screws to go through the mounting hole of the product, and then use a screwdriver to screw them into the plastic expansion pipes.

3.4 Usage Instructions

3.4.1 Steps for use

1. Install the mobile phone software
You can search and install eco-worthy in Apple App Store and Google App Store, or directly scan the QR code below to download the APP.With it, you do not need to log in to the account to use the Bluetooth connection function.And this product does not support the use of WiFi connection.

2. Select the corresponding Bluetooth connection mode
Make sure the Bluetooth of this product is in APP connection mode, at this time the Bluetooth indicator of this product is blue. If the indicator is not blue, you need to the Bluetooth Mode Switch of this product for 2s to switch the mode.

3.Connection and Pairing
Before pairing, make sure the Bluetooth of your mobile phone is on, and put your mobile phone in a position within 3mins from the product without any obstruction.

Click the + sign in the upper right corner of the device page of the mobile phone APP to add a device, and select the corresponding product number(ECO-WORTHY BW04_xxxx) in the device list.

After this product is successfully connected to APP, the APP device page will prompt successful connection and the Bluetooth indicator on the product will change from blue blinking state to blue constant light state. Click the corresponding battery icon on the APP device page to view the monitored data of the product.

After successfully connecting to the APP, if the product disconnected, the mobile phone will automatically search for the product in the vicinity within 10 seconds to try to re-establish the connection. If re-establishing the connection fails, the APP page will indicate that the product is offline and jump back to the device page. When the mobile phone is near the product again, Bluetooth will connect automatically if you click the corresponding battery icon on the APP device page.

If you want to delete the information of this product on APP, you can long press the corresponding battery icon on APP device page, and then select delete.
For detailed operation, you can scan the QR code below to get the APP operation manual.

3.4.2 APP Page Introduction

1. Home Page
This page displays an overview of important data for monitoring the battery (including: SOC, total battery power, etc.).

2.Control Page
This page is used to control the Settings Clear Current, SOH Restored to 100%,Clear Cumulated Cycles and Restart.

2.1 Clear Current : When using the Battery Monitor, enture the battery is in an idle state,neither charging nor discharging. If the current value is not 0 at this time, you can manually set the current value to zero.
We recommend perfrming this operation each time the Battery Monitor is powered up ,regardless of the displayed current value being 0 or not.

2.2 SOH Restored to 100%: When users replace the battery with a new one,they need to reset the SOH record of the old battery.

2.3 Clear Cumulated Cycles : When replacing a battery with a new one, you can reset the cycle count of the old battery to zero.

2.4 Restart: After triggering some warnings, the product cannot automatically close the warning until the problem is solved. You need to click this option to reboot the device to close the warning.

3. Data Page
This page displays the complete data information of the monitored battery, which is divided into Real Time Data and Self-defined Parameter sections.

Real Time Data
3.1 Total Voltage: Battery voltage value.

3.2 Total Current: Under the premise of correct Hall connection direction, when the battery input current is greater than the output current, the battery state is charging and the current value is positive. On the contrary, the battery state is discharging and the current value is negative.

3.3 Total Power: Under the premise of correct Hall connection direction, when the battery input current is greater than the output current, the battery state is charging and the power value is positive. On the contrary, the battery state is discharging and the power value is negative.

3.4 SOC: SOC means the State of Charge. It represents the battery level in percentage, and the value is obtained according to the operation relationship of the Real Time Capacit.

3.5 SOH: SOH means the percentage of the battery health state.It reflects the battery health life condition. Its initial default is 100%, and SOH < 70%, it is recommended to replace the battery.

3.6 Battery Status: It shows that the battery is currently in discharging, charging or standby status.

3.7 Remaining Discharge Time: The system predicts the remaining battery life time,and when the remaining battery life time exceeds 99Hour59Minutes, 99Hour59Minutes will be displayed. When there is no load output, -- Hour-- Minutes will be displayed.

3.8 Actual Capacity: After the product is connected to the battery for a full charge voltage and discharge to empty voltage, the actual usable capacity of the battery will be displayed, which is automatically calculated by the system.

3.9 Real Time Capacity: The actual remaining capacity of the battery is automatically calculated by the system.

3.10 Accumulated Cycle : It displaying the battery cycle times according to 100%
DOD (depth of discharge).

Self-defined Parameter

Click the edit button on the right side of the line, then the font colour of the customizable parameter will change from grey to yellow. Click the yellow parameter font to enter the editing state, click OK after changing the value, and the APP page will prompt the successful setting, that is to say, the custom parameter setting is completed.

3.11 Rated Capacity: This item is the nameplate parameter marked by the battery manufacture and is mandatory. If omitted, it will affect the accuracy of the SOH value of the battery.

3.12 Battery Cell strings: Setting the numbers of connecting lithium battery cells in series, which is only applicable to lithium iron phosphate batteries. If the user's battery is not a lithium iron phosphate battery or we are not clear about the numbers of connecting lithium battery cells in series, be sure not to set this parameter, and keep it as 0 (default value is 0), otherwise it will cause the SOC calculation error.

3.13 Maximum Voltage: This parameter is the full-charge voltage of the battery. When the battery voltage reaches this value, the SOC will be automatically corrected to 100%, and the actual capacity of the battery will be calculated. We need to make sure that the battery can reach the voltage value when it is fully charged, and it is recommended to set this value to the charger's charging voltage.

3.14 Minimum Voltage: This parameter is the empty battery voltage. When the battery voltage reaches this value, the SOC will be automatically corrected to 0%, and the actual capacity of the battery will be calculated. You need to make sure that the battery can reach this voltage value when the battery is depleted.

3.15 High Voltage Alarm Value: the threshold value is set from 0 - 80.0V and should be greater than the Low Voltage Alarm Value. When the battery voltage reaches this value for more than 6s, there will be a High Voltage Warning in the "Warning Page" .Until the battery voltage is lower than this value for more than 6s the High Voltage Warning will be turned off.

3.16 Low-voltage warning value: the threshold value is set from 0 to high-voltage threshold. When the battery voltage is lower than this setting value for more than 5s, there will be a prompt of low-voltage warning in "Fault Page". Until the battery voltage is greater than this setting value for more than 5s, the low-voltage warning will be closed.

The following chart shows the recommended alarm values for different system voltages of lithium batteries:

Battery system voltage(V)	High voltage(w)	Low voltage(v)
12	15	10
24	30	20
36	45	30
48	60	40
60	75	50

3.17 Low SOC Alarm Value: the threshold value is set from 0 - 100%. When SOC is lower than this setting value for more than 6s, there will be a Low SOC Warning in the "Warning Page". Until the SOC is greater than this setting value for more than 6s, then the Low SOC Warning will be turned off.

3.18 Overcurrent Alarm Value:the threshold value is set from 0 - 300.0A. When the current reaches this setting value for more than 6s, there will be a prompt of Overcurrent Warning in "Warning Page". Until the battery current is lower than this setting value for more than 6s, the Overcurrent Warning will be turned off.

4. Warning Page

Monitoring of warnings/faults details	Long Time Without Calibrating The Actual Capacity
	Low SOC Warning
	Low Voltage Warning
	High Voltage Warning
	Overcurrent Warning

4.1 Long Time Without Calibrating The Actual Capacity: The battery cannot trigger the SOH auto calibration function if the battery has not experienced a discharge and full charge for a long time. The warning can be turned off automatically when the trigger condition is no longer met.

4.2 Low SOC Warning, High Voltage Warning, Low Voltage Warning, and Overcurrent Warning are described in detail in the corresponding threshold settings in 3. 'Data Page' of this section, and will not be repeated.

3.4.3 Precautions for use

1. Ensure that the working temperature of this product is -20 - 65℃ and keep it in a dry environment.

2.Be careful not to exceed the voltage and current range of the product when using, or it may damage the product.

3.The DC IN Port of this product can only be connected to the battery. It is strictly prohibited to connect the AC power supply to the DC IN Port, otherwise the product will be destroyed.

4. Make sure that the input power supply is correctly connected to the positive and negative poles and the Hall sensor is correctly orientated, otherwise the product will not work and may even be damaged.

5. Be careful not to lose all items in the packing list - accessories, manuals, etc.

6. If there is any abnormality during the use of the product, please contact our after-sales service personnel immediately.

7. This product is not waterproof, the please keep it away from rainwater for installation and use.

8. When the product monitors an input voltage greater than 80V, it will immediately and automatically cut off the power supple to the monitored device.

IV. Anomaly analysis and troubleshooting program

Overview of the issue	Abnormal Phenomenon	Reason	Remedy
Product cannot switch on properly	Product Bluetooth indicator does not light up	The product is not properly connected or the connection harness is damaged	Check or replace the connecting harness to ensure that the product is wired correctly
		Input voltage is not within the operating range of this product	Check if the input voltage is within the operating range of the product
Unable to view the monitoring content of the product via mobile app	Unable to connect to the product using the mobile app	Current Bluetooth signal instability	Bring the mobile phone or display terminal close to the product
		Currently the Bluetooth indicator of this product is green or Bluetooth is connected to the display terminal mode	Long press the Bluetooth Mode Switch of this product for 2s for mode switching
	Prolonged inability to access app device page or appear white screen	APP loading failure	Close the app from the background and enter again
	After clicking the corresponding product icon on the APP device page, a connection failure appears		
Abnormal display current value	In the case that the battery input and output currents are 0, the APP shows that the current is not 0	It is normal for sensors to be subject to very small errors.	Go to set 3.4.2 APP Page 2. "Control page" > 2.1 "Clear Current "and zero setting at no load
		If the current value is set to zero while the battery is loaded (charging or discharging), the displayed value will deviate.	Repeat 2.1 "Clear Current" once can eliminate the deviation when the battery is unloaded.

Overview of the issue	Abnormal Phenomenon	Reason	Remedy
Abnormal display current value	The ± sign of the displayed current value or power value is opposite to the desired ± sign.		Check that the Hall sensors are connected in the correct direction
	No SOC data available	There are no values in the SOC display area.	You need to set 3.4.2 Introduction to the APP Page 3. "Data Page" > "3.11 "Rated Capacity", 3.13 "Maximum Voltage" and 3.14 "Minimum Voltage" parameters, and then charge the battery to Maximum Voltage and discharge the battery to Minimum Voltage respectively after powering up the Battery Monitor, and complete the above operations to display the correct SOC value.

V. After-sales contact information

Official website address: www.eco-sources.cn
After-sales service email: customer.service@eco-worthy.com

VI. Appendix

ECO-WORTHY

customer.service@
eco-worthy.com

Tel(DE): +49 693-1090-113
Tel(US): 1-866-939-8222
Tel(UK): +44 20 7570 0328

www.eco-worthy.com

FCC WARNING

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception,

which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum 20cm distance between the radiator and your body: Use only the supplied antenna.