Battery Monitoring Module (BMM)
Operator / Installer Manual

WARNINGS

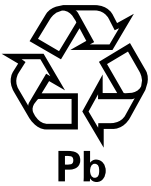
Keep open flames away from batteries on charge.

Risk of battery explosion.

Be aware of battery fumes and electrolyte.

Do not dispose of batteries in the garbage.

Electrical hazard exists inside the charger, do not remove the side cover.



Always recycle lead acid batteries.

Battery electrolyte is highly corrosive.

Wear eye protection when working near batteries.

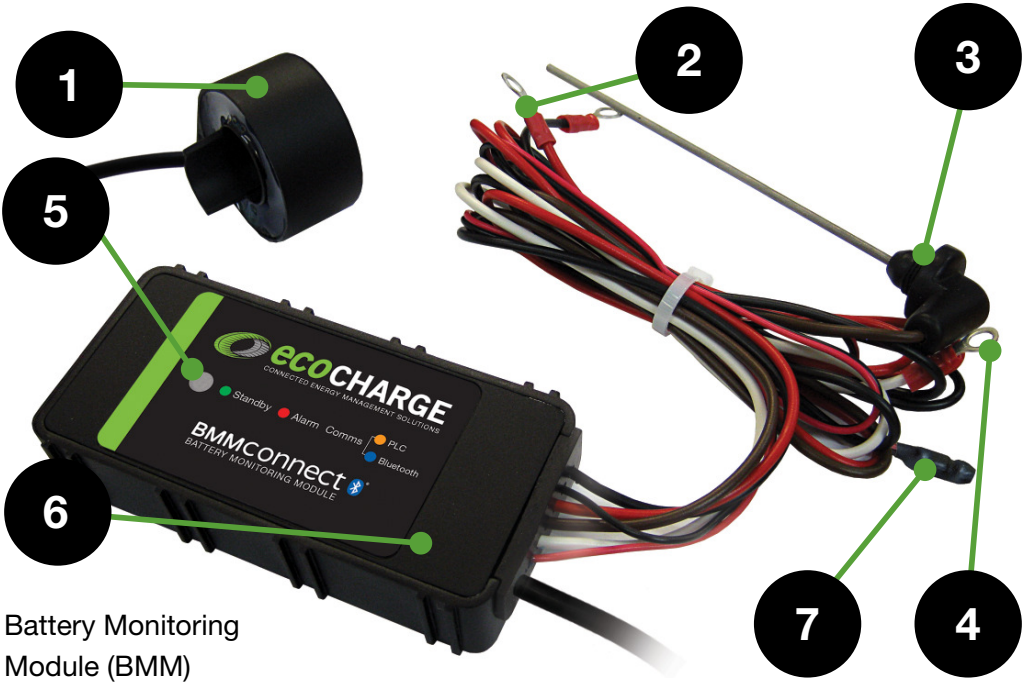
Contents

BMM Serial Number	
BMM Part Number	
Date Supplied	
Battery Model	
Purchaser	
Purchase Invoice Number	
Fleet Number	

Overview

This guide covers the installation of a BMM and configuration of a BMM and associated XHF Series Charger. For instructions on the advanced functionality of the BMM data logging and analysis features available in the Charger Interface Software Manual, contact your EcoCharge dealer.

1. Communications Toroid
2. DC Supply Terminals
3. Electrolyte Sensor
4. Midpoint Voltage Sensor
5. Tri-color LED
6. Module Housing
7. Temperature Sensor



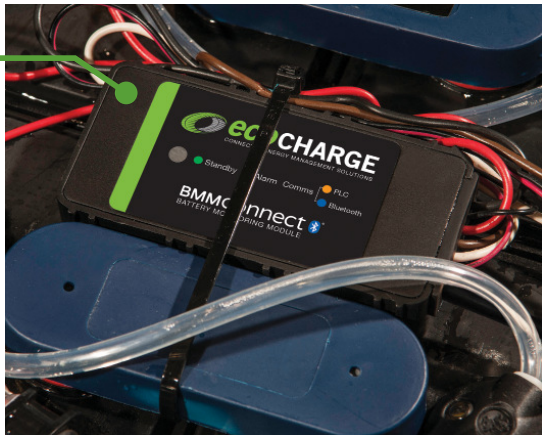
Battery Monitoring Module (BMM)

Installation

NOTE: Before attempting installation, please read through the complete installation instructions. The battery to be fitted should be disconnected from any load prior to installation.

Unit Location

The BMM module is designed to sit directly on top of the battery surface. For optimum *Bluetooth*® range, locate the module near any openings in the battery enclosure. Cable ties are supplied to secure the unit to the battery straps as shown.



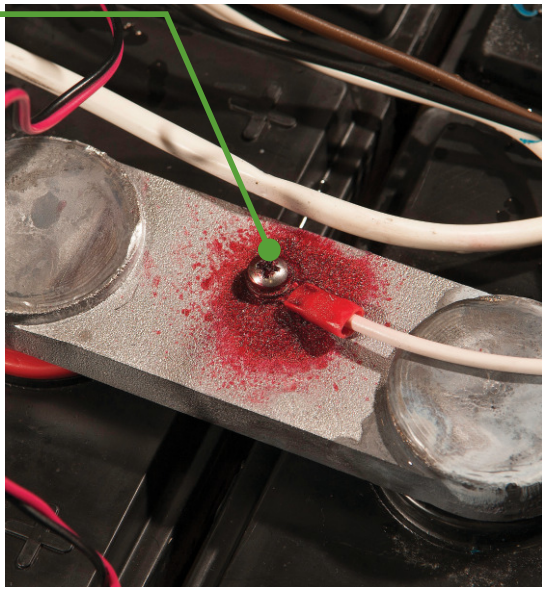
Communications and Current Sensing Toroid

The Communications Toroid requires the negative lead to be removed from the battery and placed through the toroid and re-secured to the negative battery terminal. Alignment of the toroid should be made so that the cable exits the toroid away from the battery terminal. Keep at least 8in (20cm) clearance between the toroid and the positive battery lead. A half-sleeve on the toroid housing is provided to secure the toroid to the battery cable by cable tie.

Installation - continued

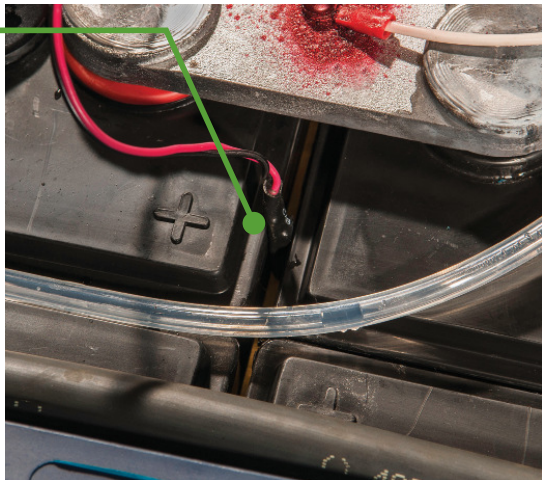
DC Supply & Voltage Midpoint Sensor

The DC Supply wires are terminated with ring terminals for easy fastening to the battery with the supplied screws. The positive (RED) and negative (BLACK) wires should be fastened to the top of their respective battery terminal posts. The Midpoint Voltage (WHITE) wire should be fastened to strapping or a terminal as close as possible to the voltage midpoint of the battery. It is recommended to coat wire terminations with corrosion inhibitor before installation.



Temperature Sensor

The ideal location for the BMM temperature sensor is between the cells at the center of the battery. Depending on the battery type and construction, this may not be practical. The alternative location is cable tied to the underside of a segment of lead strapping. An additional temperature sensor is built-in to the BMM module.



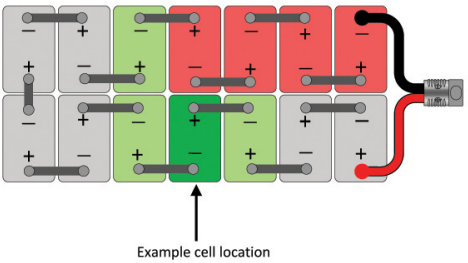
Electrolyte Sensor

Installation of the electrolyte sensor requires care and consideration of the cell's internal construction. If not required, the electrolyte sensor should be removed from the BMM by cutting the brown sensor wire at the entry point to the BMM module.

1

Identify cell for installation

The probe should be installed in a cell near the center of the battery, no closer than 5 cells to the negative battery post.

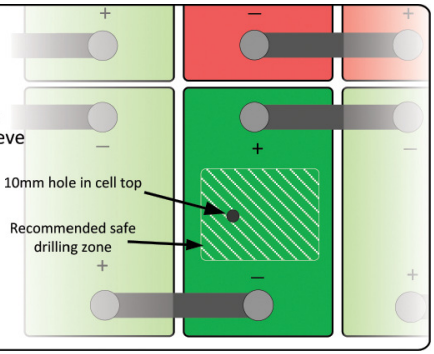


2

Drill probe hole

The probe requires a 0.39 inch (10mm) hole diameter to achieve a secure friction fit.

Unless 0.39in knockouts are fitted, a hole must be drilled in the cell to accommodate the probe.

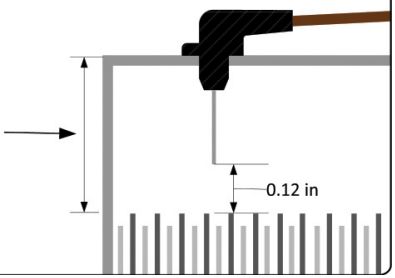


3

Determine probe length

Use wire cutters to trim the probe to length so that the end of the probe is 0.12in (3mm) above the cell separator when fitted.

It is recommended to first gauge the distance from cell top down to plate separator using a non-conductive measuring tool.



Configuration

BMM Configuration

Before use, both the BMM and the charger require configuration to enable the Automatic Profile Configuration (APC) feature.

The following instructions cover:

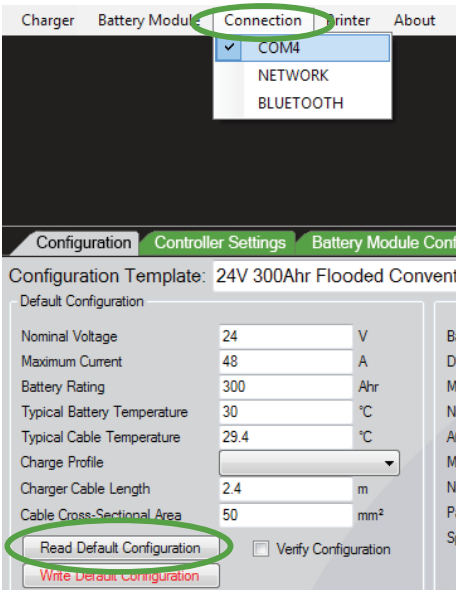
1. Connecting to the charger
2. Configuring the BMM with the correct battery rating details. (see page 9).
3. Configuring the charger to enable APC functionality (see page 10). This step applies to all chargers intended to be used with the BMM.

Required for configuration:

- The BMM installed on the battery.
- A XHF Series Charger
- Standard-A to Mini-B USB cable.
- PC or laptop running Windows Vista or later with Charger Interface software v7.4 or later.
- Password for BMM configuration access.

1. Setup Communication via Charger Interface

- Connect the BMM-equipped battery to any XHF Series charger, connect the charger to the PC via USB and open the Charger Interface software.
- From the **Connection** menu, ensure the appropriate COM port is selected for the USB interface.
- Verify communications with the charger by selecting **Read Default**

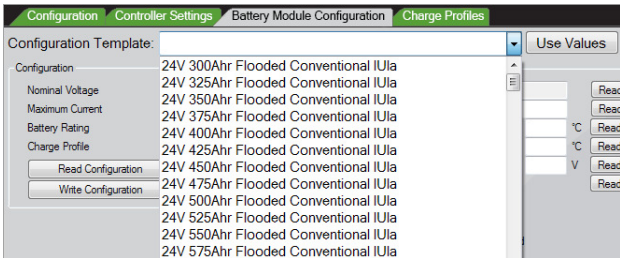


Configuration.

- If successful, the Voltage and Current details will populate the data fields.

2. Program BMM with Configuration Parameters

- Enable the **Battery Module Configuration** tab from the **Battery Module** menu.
- From the **Battery Module Configuration** tab, choose the appropriate battery type from the template drop-down list. Click **Use Values** to populate the parameter fields with the template's parameters.
- To load the configuration parameters into the BMM module, click **Write Configuration**.
- The BMM configuration can be confirmed by clicking **Read Configuration**, and checking that the correct values are returned to the parameter fields.



3. Create a BMM Identifier

The BMM should be given a unique name which allows quick identification of the battery when reading charge logs.

- Enter a unique name in the **Identification** field
- Click **Write** to program the BMM with the new name.
  - A useful name may include any combination of the site location, truck ID, or battery ID numbers.

Configuration - continued

Charger Configuration

Configuration of your XHF Series charger for Automatic Profile Configuration (APC) can be achieved by configuration via the Charger Interface Software.

- Connect your PC to the charger via USB and ensure the charger has AC supply.
- Check that the Charger Interface is communicating with the charger by following the Setup steps on page 8.
- From the **Charger** menu, enable the **Configuration** tab, and ensure the tab is visible.
- From the **Configuration Template** drop-down list, choose the option "**APC Enabled**".
- Ensure the adjacent drop-down lists are appropriate for charger type and AC supply.
- Click the **Use Values** button to populate the parameter fields below.
- Click **Write Default Configuration** to program the charger with the selected parameters.
- Chargers intended for high rate charging should have the additional parameter **"Use Fast Charge Profile"** checked, under the Controller Settings tab.

To confirm successful configuration, the charger front display will read "**APC Enabled**".

Operation / LED Function Indicator

Operation of the BMM module is automated once installed and configured.

- Connect the BMM-equipped battery to an APC-enabled XHF Series charger.
  - The charger must display "**APC Enabled**" for BMM auto-configuration operation.
- Disconnect and reconnect the battery from the charger.
  - The charger will read the configuration from the BMM module and the charge cycle will commence.

Refer to your XHF Series charger documentation for information specific to your charger's operation.

LED Function Indicator

The BMM module indicates various states of operation via a 4 color LED on the top surface of the module.

Green LED: Standby	
Flashes once every 2 seconds to indicate ready to-charge standby status.	
Red LED: Alarm	
Every 2 seconds: Water level low	**Every 8 seconds:** State of charge low
Every 4 seconds: Temperature high, low or sensor failed	**Every 10 seconds:** State of health low
Every 6 seconds: Voltage imbalance	**Every 12 seconds:** Other error has occurred
Yellow LED: PLC Comms	
Double flash every 2 seconds when communicating with the connected charger via the battery cable.	
Blue LED: *Bluetooth*® Comms	
Flashes when a *Bluetooth*® device is connected to the BMM.	

See the Troubleshooting section for descriptions of and resolutions to BMM alarms.

Voltage Imbalance Monitoring

Battery Equalization

The BMM incorporates a Midpoint Voltage Sensor to allow monitoring of cell imbalance.

- Voltage measured via the Midpoint Voltage Sensor on the battery is monitored to ensure it remains within 0.5V of half the battery voltage.
- If the voltage moves outside this range a non-urgent Voltage Imbalance alarm is triggered. The BMM then schedules an equalization charge to commence following the current charge if connected, or following the next completed charge.
- Should the midpoint voltage imbalance persist, further equalizations will be scheduled. Repeated Voltage Imbalance alarms that will not clear should be investigated as this indicates a potential battery problem.

Enabling Voltage Imbalance Monitoring

To enable voltage imbalance monitoring, ensure the BMM equipped battery and charger are connected to a PC with Charger Interface software and select the **Voltage Imbalance Monitoring** option under the **Battery Module Configuration** tab.

Water Level Monitoring

If installed, the electrolyte sensor allows the BMM to monitor the battery electrolyte level. Should a low water level be detected, with Water Level Monitoring enabled the BMM can perform the following operations:

- Display a Low Water alarm on the connected XHF series charger display (configured for BMM operation)
- Initiate a top-up of the battery following a charge, provided both the XHF series charger and the battery are fitted with an auto-watering system.

Enabling Water Level Monitoring

To enable water level monitoring , ensure the BMM equipped battery and charger are connected to a PC with Charger Interface software and select the **Water Level Monitoring** option under the **Battery Module Configuration** tab.

Troubleshooting

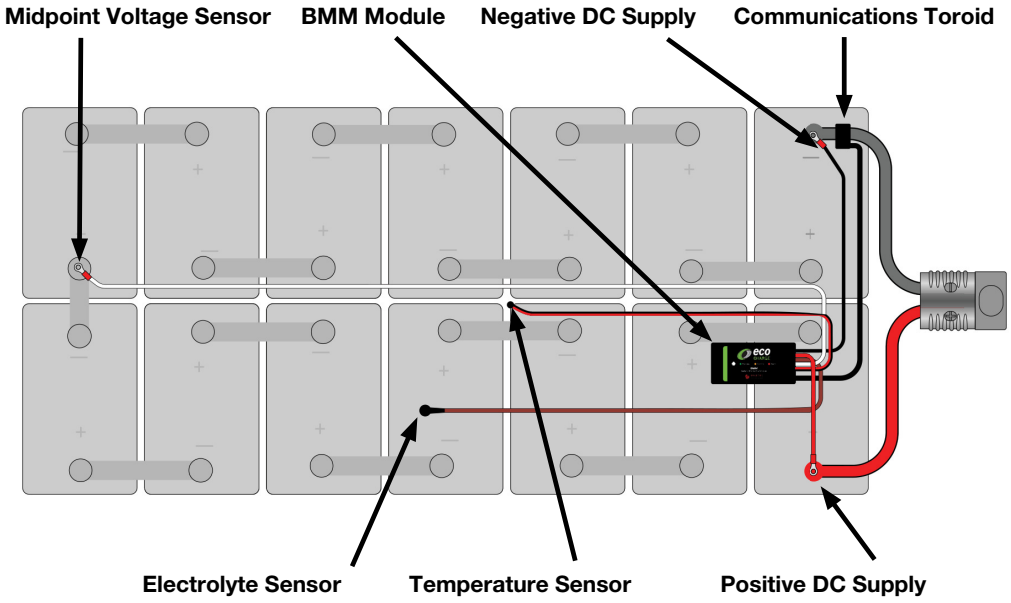
Problem	Possible Cause	Remedy
Water Level Alarm	Electrolyte Sensor indicating low cell electrolyte	Check all cells for electrolyte level, top up as required. Check installation of electrolyte sensor probe is as described in the Installation section of this document. If not required, the electrolyte sensor probe may have been removed from the BMM module during installation.
Temperature Alarm	Temperature sensors indicating temperatures outside the range specified in BMM configuration.	Check installation of remote temperature sensor is as described in the Installation section.
Voltage Imbalance Alarm	Sensor at the voltage midpoint on the battery indicating 0.5V outside the half-battery-voltage.	The BMM automatically schedules an equalize charge on this alarm occurrence. Regular occurrence indicates poor battery condition or incorrect installation. Check installation is as described in the Installation section.
Charger Indicates Config Error	Communications toroid may be installed incorrectly.	Ensure installation is as described in the Installation section.
No Charger Comms/ No LED Activity	DC supply terminals loose or corroded.	Ensure terminals are routinely checked for secure fit and clean, corrosion free condition. Always follow battery maintenance guidelines.
No *Bluetooth*® Connectivity	BMM is too far from device or enclosed a conductive housing.	Ensure the BMM is located near openings in the battery enclosure. Establish unobstructed line-of-sight path between BMM and reading device, and move as close as possible to the BMM.

Maintenance

Once installed on the battery, the BMM module requires no maintenance other than to ensure the module and its various peripherals are secure and clear of excess battery acid.

Routine checks on the condition of DC Supply and Midpoint Voltage terminals should be made and any accumulated corrosion removed according to the battery maintenance documentation.

Typical BMM Installation



Service & Warranty

Service

Contact your local EcoCharge Dealer for service or repair.

Warranty

Enatel Motive Power warrants the product is free from defects in material and workmanship and agrees to remedy any defect (or at its option replace the product) for a period of one year from the date of purchase. This warranty covers parts only.

This warranty will not apply to any product that is improperly installed, misused, abused, used in ways the product was not designed, altered or repaired in any way which may affect the performance or reliability of operation, sustained damage by power surges or electrical storms, or sustained shipping damage, or repaired by any unauthorized repair center. Please contact your local EcoCharge dealer for repair.

Enatel Motive Power makes no other warranties, express or implied, including any warranty of fitness for a particular purpose. In no event shall Enatel Motive Power be responsible for indirect or consequential damages or lost profits even if Enatel Motive Power has been advised of the possibility of such damages. Enatel Motive Power's sole obligation shall be the repair or replacement of a nonconforming product.

Specifications

Dimensions (in):	4.33L x 2.12W x 11.0H
Toroid Internal Diameter (in):	0.74
Weight (oz):	11.6

Environmental Specifications

Ambient Temp. Range:	-5ºF to 122ºF
	(max. output power is derated above 122ºF)
Storage Temp.:	-68ºF to 158ºF
Humidity:	5-95% RH (non-condensing)
Bluetooth® Specifications:	Class 1 *Bluetooth*® 2.0
	Contains FCCID: T9JRN41-3

Notes

Contact Your Local Dealer:

Manufactured by:

Enatel Motive Power Ltd
66 Treffers Road, Christchurch 8042, New Zealand.
Ph +64-3-366 4550 Fax +64-3-366 0884
info@enatel-mp.com
www.enatel-mp.com

Battery Monitoring Module (BMM) Operator/Installer
Drawing: 150205A