ERROR DIAGNOSTIC PROCESS

TEST PROCEDURE FOR **BMV BATTERY MONITOR**

1. SCOPE

Victron Energy BMV battery monitors of the BMV 6xx*, 6xxs* and 7xx series.

* Please note that the BMV 6xx and 6xxs series have been discontinued more than 5 years ago and their warranty period is expired. The Victron connect and Bluetooth parts of this test procedure does not apply either to them.

2. INTRODUCTION

The aim of this test procedure is to ascertain if a product is faulty, and if the product is faulty, to provide test results to the Master Instruments Returns Department so that a warranty decision can be made.

Before an RGA is submitted, it first needs to be ascertained if a product is actually faulty, and if the fault is warrantable. Common system issues, like broken fuses, loose cabling, aged or faulty battereis and so forth will need to be ruled out. In addition to this it needs to be ascertained, if the product is indeed faulty and what the cause of the fault could be. This test procedure will provide Master Instruments with a detailed fault report needed for warranty analysis and quality improvement.

The complete test procedure needs to be completed before submitting an RGA unless the outcome of one of the test specifies otherwise. When submitting an RGA, the test results of this test procedure will need to be submitted. There is a separate document called the “Test Result Form”. The results from these test need to be filled out on the Test Result Form.

This test procedure will need to be performed by a knowledgeable electrical or electronic technician or engineer, who has a working knowledge of all applicable electric and battery safety regulations.

3. EQUIPMENT NEEDED FOR THIS TEST

- Digital Multimeter.
- A spare BMV 712 or 702 set (head unit, shunt board, UTP cable, power cable).
- Adjustable DC power supply or battery.
- DC load. This can be a DC lamp, or an inverter connected to an AC load.
- RJ12 cable tester.
- VictronConnect on PC and/or on smartphone
- VE.Direct to USB-VE.Direct interface or VE.Direct Bluetooth Smart Dongle

4. THE BMV

A BMV battery monitor package 702 or 712 contains multiple parts, being:

- Head unit
- Shunt with a shunt board
- 2 red power cables with a fuse holder and fuse
- RJ12 UTP cable
- Square front plate

Any of these can be faulty. This test procedure requires you to have a spare BMV set to use its parts to fault find by method of elimination. Also, when executing an RGA, we often will replace the head unit or the shunt board, rather than replacing the complete BMV package.

5. TEST PROCEDURE

A. VISUAL CHECK OF SHUNTBOARD AND HEAD UNIT

Visually inspect the head unit and shunt board:

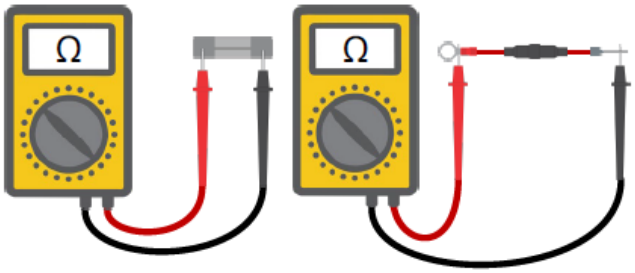
- ☐ Is there water damage or corrosion on the shunt board or inside the head unit?
- ☐ Is shunt board or head unit very dirty, is there soot, dust or dirt present?
- ☐ Does the shunt board or head unit have mechanical damage?
- ☐ Does the shunt board or head unit have damage to its connectors?
- ☐ Are the screws that affix the shunt board to the shunt correctly fastened?
- ☐ Does the shunt board or head unit have burn marks, or smell burned?

Note: Mechanical damage, dirt, dust water or loose connections are not covered by warranty, do not submit an RGA for these.

B. RED CABLE(S)

Check the red cable(s) and the fuse(s):

- ☐ Remove the fuse from the red power cable(s) and test it for continuity using a digital multimeter. If the fuse is broken replace the fuse.
- ☐ Test the cable(s) for continuity. If there is a continuity issue with the cable(s) fix or replace the cable(s).If yes, remove the fuse and test its continuity.



Notes:

A blown fuse due to a system issue does not fall under warranty. However, a blown fuse can indicate that there is a problem with the shunt board or the head unit. In this case find the reason for it by continue testing.

Damage to the cable, the terminals and the fuse holder does not fall under warranty unless it is a production fault.

Do not submit an RGA for a non-warranty but replace the fuse or repair the cable.

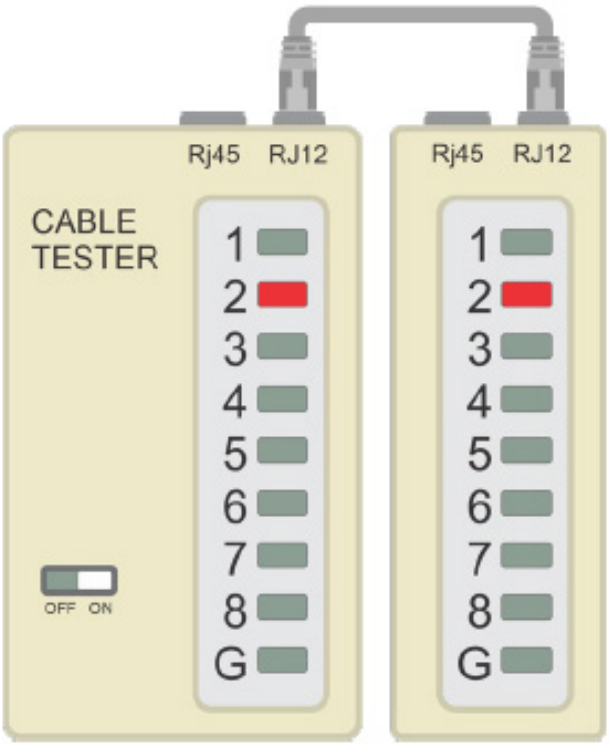
C. RJ12 CABLE

Check the RJ12 cable:

- ☐ Is it a twisted pair cable? If not, replace the cable.
- ☐ Is it a manufactured cable? If not, replace the cable.
- ☐ Is there damage to the connectors or pins? If so, replace the cable.
- ☐ Connect the cable to a data cable tester. Are all 6 leads testing ok? If not replace the cable

Note: Damage to the cable or the terminals does not fall under warranty unless it is a production fault.

RJ12 cable info: The RJ12 cable is a “straight” cable. Pin 1 on one side connects to pin 1 on the other side. All 6 wires in the cable are used by the BMV. If one (or more) signals do not arrive at the BMV head unit, the head unit might not be powered or certain current or voltage information will be missing.



The cable carries the following signals:

- Pin 1: B1+
- Pin 2: B2+
- Pin 3: Shunt +
- Pin 4: Shunt -
- Pin 5: Ground –
- Pin 6: Power Supply +

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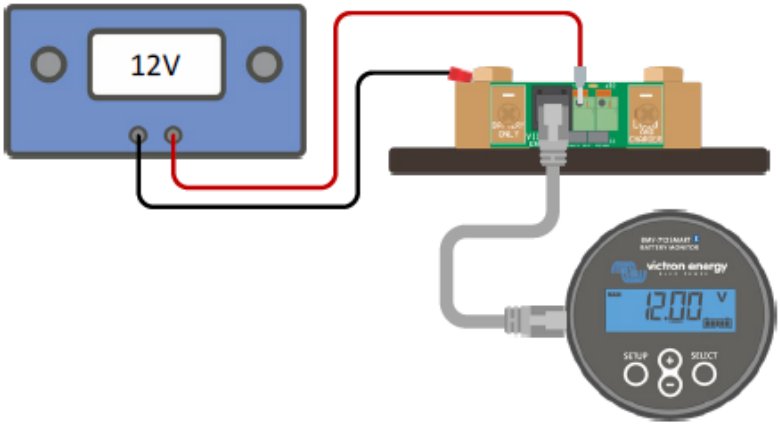
D. POWER UP

Test setup:

- Set a power supply at 12V and set the current limit to 200 mA. In case a battery is used make sure the positive cable contains a fuse.
- Connect the negative to the “battery” side of the shunt.
- Connect the positive to the B1 connector on the shunt.
- Connect the BMV head unit via a RJ12 cable to the shunt
- Turn the power supply or battery on.



Power up check:

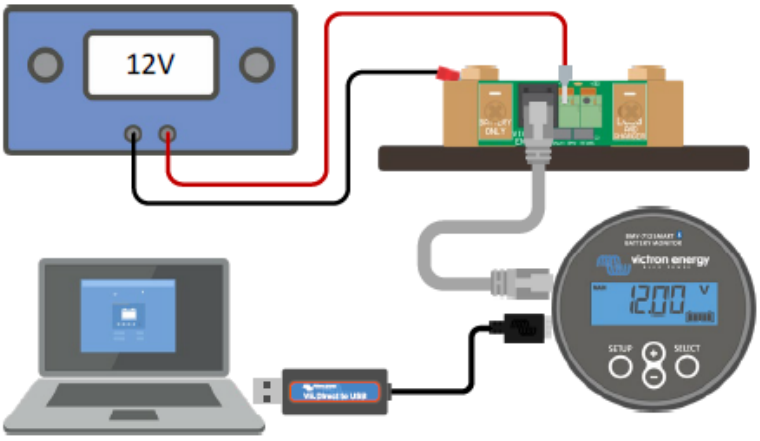
- ☐ Is there a short-circuit? If yes determine, by process of elimination, if the short circuit is caused by the head unit or by the shunt board. If so, lodge a warranty claim for the head unit or the shunt board.
- ☐ Does the BMV head unit power up? If no, determine, by process of elimination, if the problem is caused by the head unit or the shunt board. If so, lodge a warranty claim for the head unit or the shunt board.

Note on short-circuit: A short circuit can be tested with a fuse or with a current limited power supply. When there is a short-circuit the fuse will blow. In case of a power supply a short-circuit will cause the power supply to reach its current limit and the power supply voltage will drop.

E. ERRORS

Error message check:

- ☐ Does the head unit display an error message? If so, try to resolve the error. If unresolvable, lodge an RGA for the head unit.

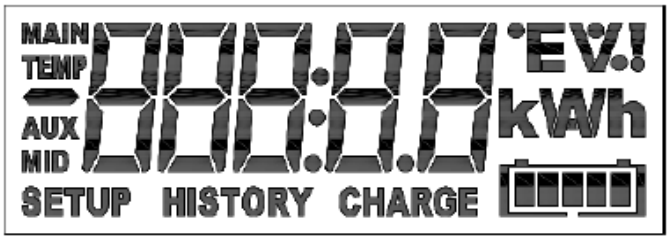


Note on error message “BL 1.02”: This means that a firmware update has been interrupted. To resolve this error, update the firmware using Victron Connect. Should the update fail, lodge an RGA.

F. DISPLAY

Display check:

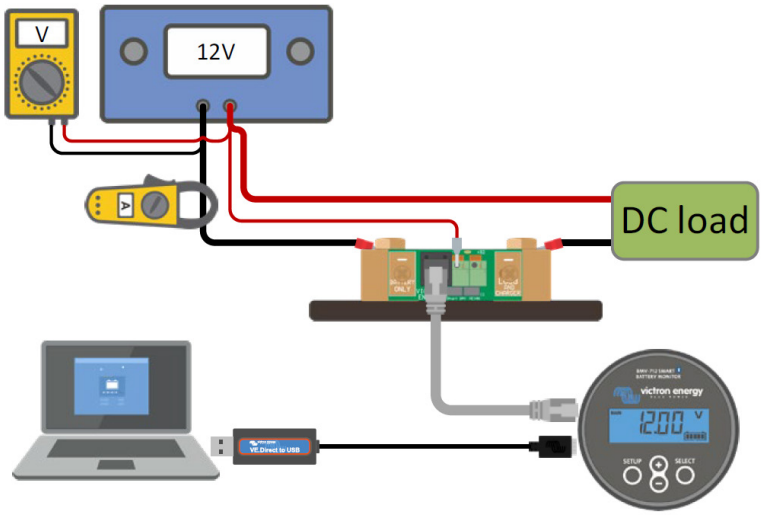
- ☐ Are any of the display segments missing? If so, lodge an RGA for head unit and describe what is missing.
- ☐ Is the backlight operational? If not, check the backlight setting in the setup menu to make sure it is enabled. If this did not resolve the issue lodge an RGA for the head unit.
- ☐ Is there anything else wrong with the display? If so describe and lodge RGA for head unit.



G. CURRENT AND VOLTAGE READINGS

Test setup:

Connect a switchable dc load between the positive of the power supply and the battery load side of the shunt.



Current and voltage check:

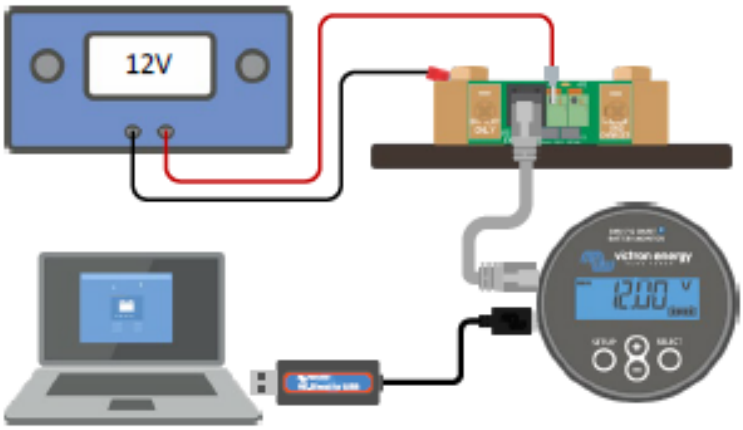
- ☐ With the load switched off is the current displayed by the BMV between - 0.01A and 0.01A? If not, do a zero-current calibration. See Victron Connect battery menu. Is the current now between - 0.01A and 0.01A? If not lodge an RGA for the head unit.
- ☐ Compare the BMV voltage reading with the actual voltage. Do they differ more than 1%? If so, lodge an RGA for the head unit.
- ☐ Turn the DC load on. Compare the BMV current reading with the actual current reading. Do they differ more than 1%? If so, lodge an RGA for the head unit.

Note on measurement accuracy: In this test the BMV readings are compared versus the actual values. Please be aware that these measurements are not 100% accurate. The multimeter has a certain amount of inaccuracy, and the readout has a has a certain readout resolution. The BMV also has this inaccuracy and readout resolution. For this test a difference of 1% between the BMV display and your multimeter is allowed. So, if you measure 12.00V and the BMV displays anything between 12.12V and 11.88V it is deemed a pass.

H. COMMUNICATION AND SETTINGS

Communication and settings check:

- ☐ Check if the VE.Direct port is functional. Do this by connecting a GX device or Victron connect via VE.Direct to USB-VE.Direct interface or VE.Direct Bluetooth Smart Dongle.
- ☐ Check if Bluetooth works (see note on Bluetooth).
- ☐ Attempt a firmware update and see if this resolves the issue.
- ☐ Set settings to default and see if this resolves the issue. If not resolved describe the issue in the remarks section and lodge an RGA.



Note on Bluetooth: It is possible that Bluetooth has been switched off in Victron Connect. This can be checked and rectified with VictronConnect and using a VE.Direct to USB-VE.Direct interface or VE.Direct Bluetooth Smart Dongle. If, after this, there still is a Bluetooth communication issue, follow the trouble shooting section in the VictronConnect manual. Please note that the Bluetooth interface in the BMV hardly ever fails. Try not to submit an RGA for Bluetooth issues.

I. FEATURES AND ACCESSORIES

Note: These accessories or features might not all be present in all BMV models. This test is optional. Only do this test, or part thereof, if you suspect that there could be an issue with a particular feature or accessory.

Features and accessories check:

- ☐ Check the relay.
- ☐ Check the buzzer.
- ☐ Check the B2 input (BMV xx2 only). The B2 input is needed for start battery, midpoint measurement or temperature sensor.
- ☐ Check the BMV temperature sensor.

6. RGA TEST RESULT FORM

Fill in the Test Result Form and submit this together with the RGA.