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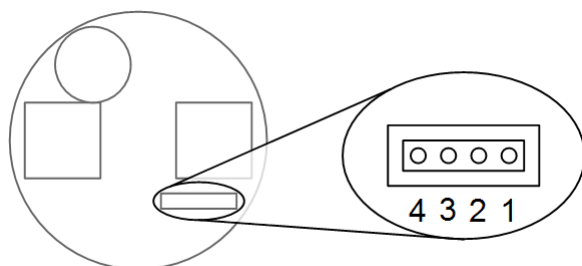
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## Introduction

The BMV-600S, BMV-602S and BMV-600HS feature a serial communications interface which allows simple access to detailed information on the status of the battery. The serial communications interface makes the BMV ideal for applications where remote monitoring is desirable. This document describes how to receive and interpret this information.

## Physical interface

The serial port is accessed via the 4-pin header located on the rear of the BMV as shown below.



Pin	Function
1	3.3V
2	BMV-TX
3	BMV-RX
4	GND

**Note:** The header does not provide any strain relief. In order to prevent damage to the header, and/or loss of connection, it is important to ensure that external strain relief is provided by adequately securing the serial cable.

The signals on the BMV serial link are non-isolated 3.3V logic levels. An isolated TTL to RS232 cable can be purchased from Victron Energy ("BMV Data Link", part number ASS030071000).

When using the Victron BMV Data Link, the RS232 port of the monitoring device must implement the following connections (standard on PC serial ports):

Pin	Function
2	RXD
3	TXD
4	DTR
5	GND
7	RTS

For more information on these signals, refer to the RS232 standard.

## Serial port configuration

Baud rate: 19200  
Data bits: 8  
Parity: None  
Stop bits: 1  
Flow control: None

## Message format

The BMV transmits blocks of statistics in 1 second intervals. Each statistic uses the following format:

<Newline><Label><Tab><Value>

The identifiers are defined as follows:

Identifier	Meaning
<Newline>	A carriage return followed by a line feed (0x0D, 0x0A).
<Label>	An arbitrary length label that identifies the statistic. Where applicable, this will be the same as the label that is used on the LCD.
<Tab>	A horizontal tab (0x09).
<Value>	The ASCII formatted value of this statistic. The number of characters transmitted depends on the magnitude and sign of the value.

## Data integrity

The statistics items are grouped in blocks with a checksum appended. The last statistic in a block will always have the label "Checksum". The value of this statistic is a single byte, and will not necessarily be a printable ASCII character. The modulo 256 sum of all bytes in a block will equal 0 if there were no transmission errors. Multiple blocks are sent containing different statics.

## Units

The values sent over the serial communications interface do not necessarily use the same units as the values on the LCD. The units used by the serial interface are as follows:

Label	Units
V	mV
VS	mV
I	mA
CE	mAh*
SOC	%*
TTG	Minutes*†
H1	mAh
H2	mAh
H3	mAh
H4	
H5	
H6	mAh
H7	mV
H8	mV
H9	Seconds
H10	
H11	
H12	
H13	
H14	
H15	mV
H16	mV

\* When the BMV is not synchronised, these statistics have no meaning, so "---" will be displayed instead of a value.

† When the battery is not discharging the time to go is infinite. This is represented as -1.

## Other statistics

In addition to the battery statistics that are present in the monitoring and historical menus of the BMV, additional values are send.

### Alarm

This shows the buzzer alarm state of the BMV. During normal operation, this will be "OFF". When a buzzer alarm occurs the value will change to "ON".

**Note:** This refers to the value of the alarm condition, and not the buzzer itself. This means that once a condition has occurred, the value will be "ON" until all alarm conditions have cleared; regardless of whether or not a button has been pressed to silence the buzzer.

### Relay

This shows the relay alarm state of the BMV-602. During normal operation, this will be "OFF". When a relay alarm occurs the value will change to "ON".

**Note for both Alarm and Relay:** BMV's with firmware v2.09 or lower used to send "On" and "Off" instead of "ON" and "OFF". It is therefore recommended to use a case-insensitive string comparison in your implementation, for example `stricmp()`.

### Since firmware version 2.08

The fields listed below are available since version 2.08 and above.

### BMV

This field contains a textual description of the BMV model, for example 602S.

### FW

The firmware version of the BMV. The version is reported as a whole number, e.g. 208 for firmware version 2.08.

### AR

Alarm reason; this field describes the cause of the alarm. Since multiple alarm conditions can be present at the same time the values of the separate alarm conditions are added. The value total is send in decimal notation.

Low Voltage	1
High Voltage	2
Low SOC	4
Low Starter Voltage	8
High Starter Voltage	16

E.g. a value of 5 would indicate the presence of a low SOC alarm and a low Voltage.

## Document history

Version	Date	Changes
1	24 April 2008	Document created.
1.1	05 May 2008	Added historical information for the starter battery. Added alarm and relay state information.
1.2	16 May 2008	Added the part number for the serial to TTL cable.
2.0	16 June 2008	Added a checksum field to the protocol, and removed the ETX framing character.
2.1	05 May 2009	Added details on which RS232 connections must be implemented by the monitoring application.
2.2	24 June 2009	Updated to reflect the change in product naming.
2.3	01 December 2009	Added BMV-600S and field BMV, FW and AR
2.4	12 April 2011	Renamed the protocol and document to BMV Text Protocol
2.5	16 October 2012	Added details on On/Off vs ON/OFF for Relay and Alarm state