

# INVATEC<sup>®</sup>

INNOVATIVE TECHNOLOGY

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## BM-03

Batteri voltmeter og -alarm for 12 and 24 volt systems



English User Manual

**NOTE:**

Read through the manual and its safety information carefully before installation and use.

*Subject to change without notice*

## Purpose

The BM-03 is a smart battery meter which can measure and display the voltage of one or more batteries. It can also generate an alarm for under- and over-voltage and voltage differential.

## Operation

The voltage of the battery is displayed with one tenth Volt accurately.

When both connections are used, the battery 1 or 2 point will flash slowly. This is to indicate the battery voltage which is currently displayed. If the user wants the reading of the other battery voltage, it can shortly (less than 2 seconds) press the button.

## Features

- Low mounting depth
- Multiple battery monitoring
- Programmable
- Very low power consumption
- Switched alarm output
- Auto voltage Detect
- Power-save mode
- Easy Installation
- Water resistant to top
- Software is completely customizable to client needs (in numbers)

## Alarm

Once the alarm starts, the display will continuously toggle between the activated alarm ("10", "hi" and "differential") and the corresponding voltage. Also, the buzzer and output are activated. This takes one minute or until the user presses the program button for 2 seconds. Once one of those things happen, the alarm will continue in silence which means that the buzzer and output are now deactivated and the display shows- as usual - the value of the selected battery. One of the battery points, however, will blink rapidly to indicate that an alarm is activated. If there is a voltage differential alarm, both battery points will blink rapidly.

The alarm will only be fully reset when the voltage returns to a "normal" value. This means the voltage should be between 12.5V and 14.5 V. (For a 24V system, these values must be doubled)

## Power saving

If battery 1 is connected to a voltage that causes a low voltage alarm, the display will shut down 10 minutes after the alarm starts. However, the application stays working in the background and if a different voltage level is exceeded, the alarm will be activated, which will activate the display temporarily. If the program button is pressed, the display will temporarily start up again. The display starts up again - and remains on - when the battery 1 voltage will rise above 12.5V. (25.6V for the 24V version)

When the voltage remains below the charging voltage for three days (12.5V for a 12V system and 25.6V for a 24V system), there has been no alarm and the user did not press the button, then the application will further decrease it's power consumption by ceasing all activities.

## Programming

The button has three functions.

1. Changing the display voltage.
2. Resetting alarms.
3. Configuring alarm values.



The first two functions are discussed in above section, so that only the programming of the software remains.

As soon as the button is pressed for 4 seconds the display will briefly shutdown to indicate the entering of the programming menu. Then the display will show “LO” followed by the value 10.8 ( the default value - see table below). This indicates that the undervoltage alarm can be set and that it's present value is 10.8V. This value can be altered by pressing the programming button. Every time the button is pressed 0.1V will be added to the value until 12.0V is reached. By pressing again it will return to the lowest value of the table, 10.5V.

When the desired value is reached, it will be confirmed after 4 seconds by displaying the message YES.

After that the display will blank shortly, followed by “HI”. Directly after that the voltage level of the overvoltage will be displayed. This can be programmed as the undervoltage. With a 24V system with center tap (system configuration 5) there is also the option of a differential voltage alarm to activate and set.

After the overvoltage the display will blank shortly again followed by “diF”. Again you can choose the voltage value, only this time it is in millivolts (mV). If no differential voltage alarm is desired the option “—” can be chosen.

After the last programmed value is set the display will shortly blank after which the BM-03 will operate normally again.

Of course the BM-03 will remember the programmed value even if it is shorty without power.

### Configurationtable

*Note: The voltage levels are to set the value for a 12V system. When connecting to a 24V system / the values should be doubled, using the table below.*

	Undervoltage alarm		Overvoltage alarm		Differential (mV)
1	12V	24V	12V	24V	
2	10.5	21.0	14.6	29.2	*. . .
3	10.6	21.2	14.7	29.4	400
4	10.7	21.4	*14.8	*29.6	450
5	*10.8	*21.6	14.9	29.8	500
6	10.9	21.8	15.0	30.0	550
7	11.0	22.0	15.1	30.2	600
8	11.1	22.2	15.2	30.4	650
9	11.2	22.4	15.3	30.6	700
10	11.3	22.6	15.4	30.8	750
11	11.4	22.8			800
12	11.5	23.0			
13	11.6	23.2			
14	11.7	23.4			
15	11.8	23.6			
16	11.9	23.8			
17	12.0	24.0			

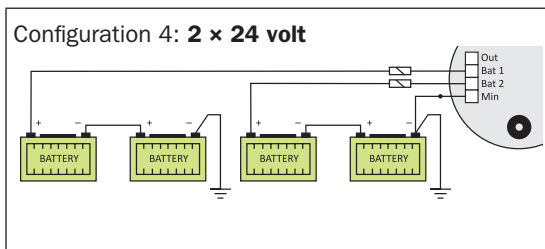
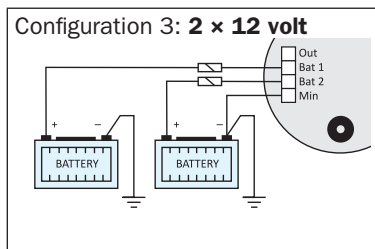
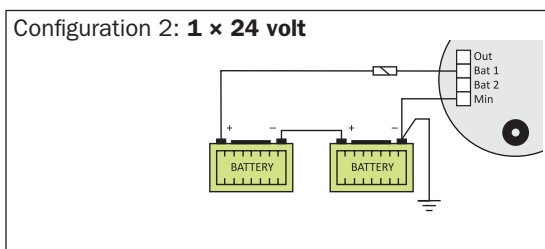
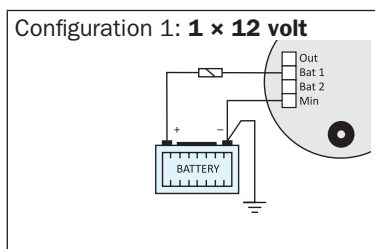
## Connecting

There are a total of 5 different battery configurations which can be connected to the BM-03. These are:

### Order of connection

First the minus (-) of the BM-03 should be connected to the minus (-) of battery (system). If you are using the alarm output this should be connected now. Next the bat2 (+) connection of the BM-03 should be connected and at last the bat1 (+) connection of the BM-03 with the battery. Once bat1 is connected to the battery, the BM-03 will start up.

Note: Always use fuses of 1A from bat1, bat2 and output. (See wiring diagrams)



## Technical specifications

Supply voltage		Autodetect 12/24V
Input voltage range		6 volt til 31 volt
Currents	Display on	+ – 20 mA
	Display off	+ – 8 mA
	Power saving mode	< 0,1 mA (after 3 dage)
Mindste kabel diameter		0,75 mm <sup>2</sup>
Weight		70 gram
Dimensions	Diameter	60 mm
	Mounting hole	55 mm
	Height	20 mm
	Mounting depth	18 mm
Materiale	Case	Aluminium anodised
	Front sticker	Polycarbonat
Alarm output		Switches to minus. Normally closed (NC)
Maximum switch current		500 mA