



Instruction Manual

Battery Capacity Meter

BCM-5P series

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1. Introduction

The BCM-5P series are small, but accurate and intelligent battery capacity meters. They have been designed to work with lithium as well as conventional lead acid batteries and have built in temperature compensation.

There is also a battery protection output, which can be used to turn off a controller if the voltage falls too low.

They have been designed to fit the same mounting holes as the BCM-524 & 536.

2. Battery Types

Battery chemistry is evolving, and some of the latest types have discharge voltage curves that are very different to the familiar lead-acid ones. Lithium phosphate for example has a very flat discharge curve that varies significantly with temperature.

We have designed the BCM-5Ps to automatically measure the ambient temperature at switch-on and to select the curve that is most appropriate.

Different versions of software have been developed for different battery chemistries, please see our website for the latest versions available.

3. Operation

At switch on, the BCM will perform a self-test by cycling all the LEDs on and off, after which the LEDs will light to show the amount of battery capacity left according to the following tables.

3.1 Lead acid

At switch on, the BCM will perform a self-test by cycling all the LEDs on and off, after which the LEDs will light to show the amount of battery capacity left according to the following table [off-load voltages].

Lead acid	% Capacity	24V [BCM-5P1]	12V [BCM-5P3]
Green	80% +	25.2	12.6
Green	60%	24.8	12.4
Yellow	40%	24.5	12.3
Red	20%	23.8	11.9
Red	0% +	23	11.5

The temperature sensor is not used for lead acid batteries as the voltage is not particularly temperature sensitive.

3.2 Lithium phosphate

At switch on, the BCM will first cycle all the LEDs on and off, it will then measure the temperature and show which range it is in by flashing 1 to 4 LEDs 3 times. The LEDs will then light to show the amount of battery capacity left according to the following table [off-load voltages].

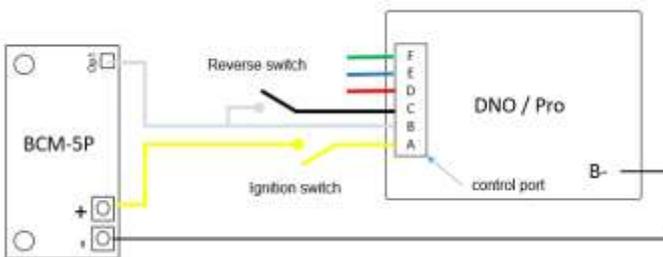
24V BCM-5P2 LiFePo4	% capacity	-10°C 1 led flash	0°C 2 leds flash	20°C 3 leds flash	50°C 4 leds flash
Green	80% +	24.2	25.4	25.8	26.2
Green	60%	24	25.2	25.6	26
Yellow	40%	23.8	24.8	25.4	25.8
Red	20%	23.6	22.8	24.6	25.4
Red	0% +	20	20	20	20

Notes:

- The capacities in the tables have been derived from datasheets, there are differences between manufacturers, and also between individual batteries.
- The battery voltage will reduce under load and increase during regenerative braking.
- The BCM is accurate to +/- 0.1V.
- Each version of BCM software is specific to one battery chemistry and one voltage range [see website for details].
- The BCM-5P4 is for 12V LiFePo4 batteries and the voltages are half those in the table in 3.2.

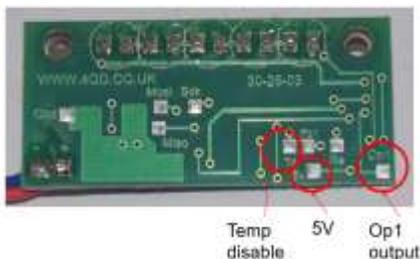
4. Battery Discharge Protection

On the rear of the circuit board there is a small pad marked “Op1”. This pad will be at B+ when the battery voltage is above the minimum required to turn on the bottom red LED. When the battery voltage falls below this level the pad will go to 0V. The pad can be used to drive the ignition line of our DNO and Pro series controllers by using the circuit below. Circuits for other controllers will be in our knowledgebase.



5. Temperature Disable

On the rear of the circuit board there is a small pad marked “Td”, if this is connected to the “5v” pad, the BCM will ignore the temperature sensor and use a nominal 20°C battery curve.



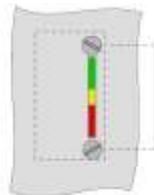
6. Dimensions

Length = 41mm, width = 19mm, height = 11mm.

7. Mounting

The BCM requires a 2.2 mm wide slot, 25.6mm long, with two x 3.5 mm fixing holes at 33mm hole spacing.

The mounting pillars have an M3 thread.



8. Water Resistance

The BCMs are not water resistant, and when mounting you should make sure water cannot run down the leads onto the circuit board.

9. Connections

The BCMs are supplied with wires attached. The positive and negative wire colours for each model are shown in the table below. The BCM should be connected directly across the battery supply, usually via the ignition switch.

	+ Positive	- Negative
12V	White	Green
24V	Red	Blue

10. Service

The BCMs are very reliable but they are a low cost item and unfortunately we cannot offer an economical repair service. If the item is not under warranty it is advisable to replace it.

Warranty

All our products have a warranty against defective manufacturing for 12 months from the date of shipment. The warranty doesn't cover damage caused by incorrect installation.