

EV Power Batmon

BMU-12S v1.4

Introduction

The Batmon 12S Battery Management System (BMS) is designed to monitor and balance cells in a Lithium Ion battery. It is useful for batteries of 4-48 cells in series. Configuration is possible for any Lithium battery chemistry.

The system is comprised of three parts:

- 1) CBM-12S cell modules connected to up to 12 cells in series (a stack).
- 2) Battery Monitoring Unit (BMU) connects to and monitors up to four CBM12S stacks.
- 3) Configurator display serial connection to the BMU to display information and adjust BMU parameters.

These work together to create a single BMS system that can balance and signal over/under-voltage events with the battery. It does not measure current or do any state of charge estimation.

Features of BMU-12S

- **4-12 cells monitored per CBM-12s, up to 4 stacks (48 cells)**
- 2 wire isoSPI twisted pair communications between BMU and cell stacks
- Switched outputs to signal OK/Error states
- CANbus output to control charger OR output cell and battery data



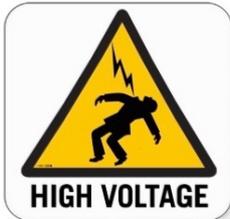
Read these instructions before commencing installation.

Specifications

BMU-12S	
Supply Voltage	8-30VDC
Current Consumption	40mA @ 24VDC (50mA with Configurator 204)
Cell Stacks (4-12 cells/stack) monitored	1-4 stacks
Weight (g)	30
Dimensions	75 x 55 x 30(h)mm

Disclaimer

This is a guide only. Potentially lethal voltages and currents are involved when working with batteries. It is the responsibility of the installer to have the appropriate qualifications and skills for working with high voltages. No liability whatsoever will be assumed by EV Power for injury, accidents or damage resulting from the use of these instructions or any EV Power supplied components.



High Voltages and currents may be present in battery packs.



Connect the orange connector onto the CBM-12S only when the terminal connections have been checked and the voltages are in ascending order from one cell terminal to the next.

Connecting up the BMU to the CBM-12S modules

One BMU can communicate with up to 4 daisy chained CBM-12S modules via the IsoSPI interface using a **twisted pair** cable.

IP (BMU) → ILP (CBM12S)

IM (BMU) → ILM (CBM12S)

Shield is optional but may be required in high EMI environments.

You will know if it is connected correctly because when powered up the BMU with 12-24V, all the red LEDs on all the stack modules will switch on for a second.

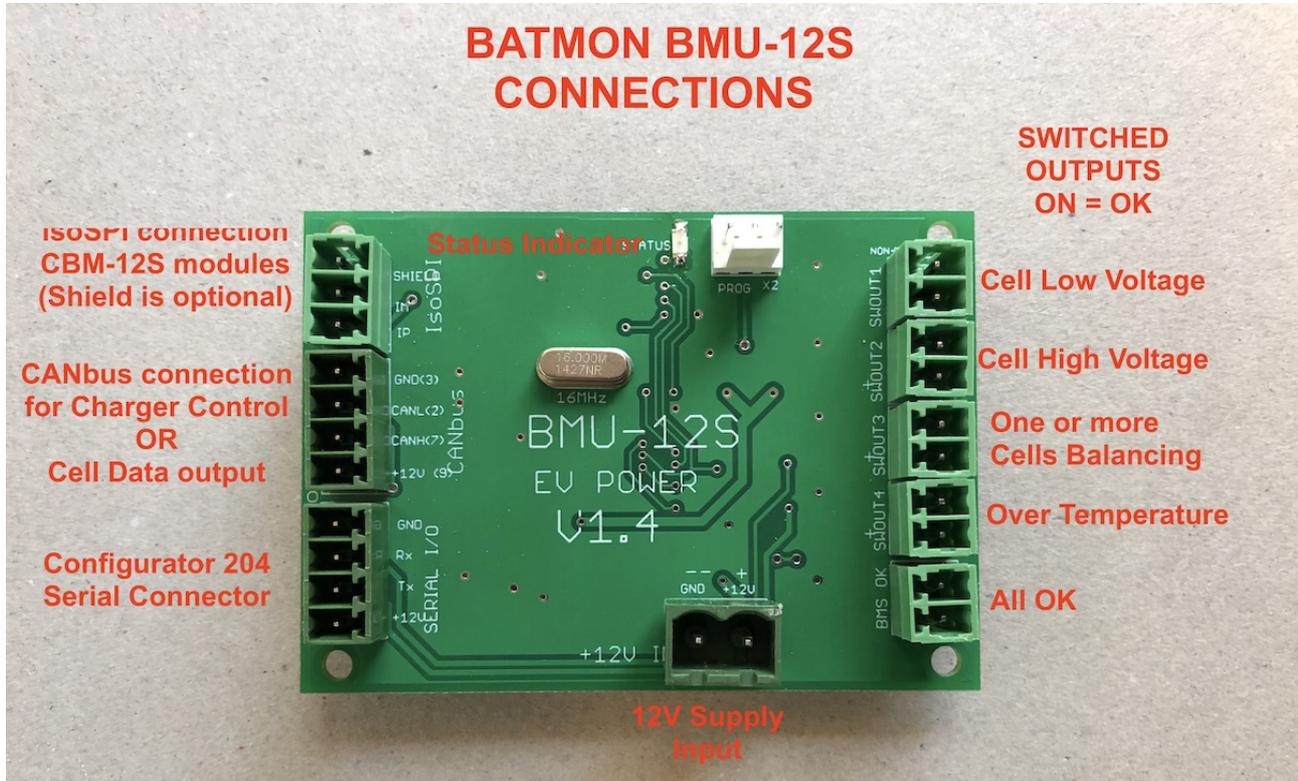
They are bright.

If it still does not work try :

- 1) disconnecting the second CBM-12S board.
- 2) reversing the polarity on the ISOSPI link from BMU to stack 1. Maybe it is backwards.

BMU Layout

The BMU requires an external 12V supply.

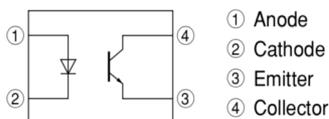


The Configurator plugs directly into the BMU and will scroll through stack voltages in the display once the BMU is powered up.

Unpowered Switched Outputs:

- Switched output 1 - Low Cell Voltage, ON = OK, OFF = one or more cells below low voltage threshold. **NON-POLARISED (SSR)**. Can be used to control a load device that has remote enable.
- Switched output 2 - High Cell Voltage, ON = OK, OFF = one or more cells above high voltage threshold. **POLARISED**. High cell output which can be used to control a charger that has remote enable.
- Switched output 3 - Balance threshold reached, ON = One or more cells above balance threshold. OFF = all cells below balance voltage. **POLARISED**. Can be used to switch a charger into low current mode for cell balancing.
- Switched output 4 - Temperature out of range, ON = in range, OFF = one or more stacks outside safe range. **POLARISED**
- BMS OK – ON = all ok, OFF = high cell, low cell or Temperature out of range. **NON-POLARISED (SSR)**.

Polarized Switches: PC-357



CANbus Output

NOTE: There are **two CANbus modes**, one or other can be selected, they cannot be active together:

- 1) Cell information is output on the CANbus at the selected Baud Rate
- 2) Charger control for an EV Power A-Series CANbus enabled charger (48-100VDC, 0-20A).

To select **Charger Control mode** set the **Baudrate to 2 (250MBPS)** and the **COBID = 0**.



A 120 Ohm termination resistor may be required between CANH and CANL.

The following is a snippet of the MODE 1 CANbus output for Cell Information Mode.

Three Message types.

Bus speed can be set using the Configurator.

First COBID can also be set by the Configurator, eg 0x350 2nd and 3rd message types will have an incremented COBID.

```
'      SET UP BUFFER 0 WITH VOLTAGE, TEMP AND ERROR VARIABLE
'      COB-ID = 0x350
'      length = 4 bytes
'      BYTE 0 = battery total voltage, U16, MSB. Scale Factor 10
'      BYTE 1 = battery total voltage, U16, LSB.
'      BYTE 2 = MAX temperature U8
'      BYTE 3 = ERROR variable

'      SET UP BUFFER 0 WITH STACK INFO
'      COB-ID = 0x351
'      length = 6 bytes
'      BYTE 0 = number of stacks (1 - 10)
'      BYTE 1 = (MSB) number of cells in stack1 (4 bits) : (LSB) number of cells in stack2 (4 bits), 0 = no
'                cells in stack, 4-12 = valid number of cells
'      BYTE 2 = (MSB) number of cells in stack3 (4 bits) : (LSB) number of cells in stack4 (4 bits), 0 = no
'                cells in stack, 4-12 = valid number of cells
'      unused BYTE 3 = (MSB) number of cells in stack5 (4 bits) : (LSB) number of cells in stack6 (4 bits),
'                0 = no cells in stack, 4-12 = valid number of cells
'      unused BYTE 4 = (MSB) number of cells in stack7 (4 bits) : (LSB) number of cells in stack8 (4 bits),
'                0 = no cells in stack, 4-12 = valid number of cells
'      unused BYTE 5 = (MSB) number of cells in stack9 (4 bits) : (LSB) number of cells in stack10 (4
'                bits), 0 = no cells in stack, 4-12 = valid number of cells

'      SET UP BUFFER 0 WITH STACK TEMPERATURES AND CELL VOLTAGES
'      COB-ID = 0x352
'      length = 8 bytes
'      BYTE 0 = stack number 4 bits (0x1-0xA) : starting cell number 4 bits (0x1-0xC)
'      BYTE 1 = temperature, U8, 0-99
'      BYTE 2 = cell 1 voltage MSB, U16
'      BYTE 3 = cell 1 voltage LSB
'      BYTE 4 = cell 2 voltage MSB, U16
'      BYTE 5 = cell 2 voltage LSB
'      BYTE 6 = cell 3 voltage MSB, U16
'      BYTE 7 = cell 3 voltage LSB
```

Draft Suggestions for future versions