



BMS configuration

BMS ZE6000i-PCBT.xxxx / ver. 2

Programmable battery management system for Lithium Ion battery cells, for up to 32 round or prismatic cells, 10 to 400Ah

NOTE:

This is a guide to using the BMS configuration & monitoring tools. Configuration may only be carried out using the webpage based tools. Monitoring may be carried out using the configuration webpage or through the BMS serial port either with a directly wired connection or using the optional bluetooth wireless connection.

Webpage access to the configuration tools has various permissions layers; of which some are password protected to prevent unauthorised changes to the BMS configuration.

The BMS monitoring output provides real time data on the battery stack operating conditions together with the installed configuration settings.

The information provided by the BMS depends on the connected type & so may vary in some details from those shown in this guide.

Access layers are as follows:

Guest: *anyone has access & may view the connected BMS's stack conditions & configuration settings*

Installer: *access is password controlled & allows the system installer to change some of the configuration settings*

Engineer: *access is password controlled & allows the engineer to change all configurable settings*



Hardware & software requirements

The BMS includes a serial port which is used for configuration & monitoring. Data is continuously broadcast from this port & may be viewed with most serial port capture software, such as for example, "RealTerm".

RS232 style serial ports are rarely found on modern PC's, so a USB serial to USB conversion connection lead can be used to perform the same function. The BMS is designed to be fully compatible with the following USB to serial lead:

Manufacturer: FTDI
Manufacturer's part code: TTL-232R-AJ or TTL-232R-5V-AJ
Summary specification: 5V TTL, asynchronous, idle high

FTDI products are widely used for USB to serial conversion & are readily available from many different suppliers,



This cable requires drivers to be installed; follow the manufacturer's instructions on how to do this. It is the Virtual Com Port (VCP) drivers that are required. At the time of producing this guide, the drivers were downloadable from the following manufacturer's webpage:

<http://www.ftdichip.com/Drivers/VCP.htm>

If the web page is to be used, a third party ActiveX control needs to be installed on the connected PC. This control allows the web browser to connect to the serial (or USB) port. The control is available as a demo-version, which is free to use, although it includes "nag" function that repeatedly asks if you wish to purchase. The software only costs a few euros, so it is advisable to purchase a copy if any serious use is intended. The ActiveX software is called "Strokereader" and at the time of producing this guide was downloadable from the following manufacturer's webpage:

<https://strokescribe.com/en/serial-port-download.html>

ActiveX controls function with Microsoft Internet Explorer which must be installed & used with the webpage.

Webpage - hardware connection

Do not power up the PC with the BMS connected to the serial port. This is because the BMS is continually broadcasting data; the PC can misinterpret this data as it powers up, with an unpredictable outcome. If the PC is powered with the BMS connected, it may be necessary to restart the PC & possibly reconfigure the BMS.

If the optional bluetooth connection is used, then this problem does not arise.

The proper sequence is:

Either:

- If the PC is already powered up & running, plug the USB to serial lead into the PC first & then plug the lead into the BMS socket.

Or:

- If the PC is not yet powered up, the USB to serial lead may be plugged into the PC, but not into the BMS.
- Power up the PC & wait until it has completed its start up processes.
- Then plug the USB to serial lead into the BMS.



BMS monitoring - using serial port capture software

First pair your monitoring device with the BMS bluetooth by “searching for nearby devices”. The BMS identity begins “BMS” followed by the BMS type & configuration reference. The bluetooth default passcode is all zeros ie 0000, although this may have been changed on your system. If 0000 is rejected, ask your system installer for the new passcode.

Once paired & connected, you can monitor the bluetooth transmissions using either the “bluetooth monitor” webpage, or third party serial port capture software. Data can be received on Windows PC's, Android devices & other equipment that can receive the bluetooth data stream.

These are the settings that are used by the BMS for bluetooth:

Baud: 38400
Parity : none
Databits : 8
Stop bits : 1
Encoding : ASCII

The data is broadcast in plain English, but some control codes are also transmitted which may be displayed as text or symbols - these can be ignored. Any data transmitted to the BMS by bluetooth is ignored, so there is no danger of accidentally reconfiguring the BMS

BMS monitoring - using the interactive web page

To connect to the BMS configuration & monitoring tools, go to the home page & select either Guest, Installer or Engineer & enter your user & password details - this will take you to the appropriate web page. You must use Microsoft Internet Explorer for this, along with the ActiveX control as stated in hardware & software requirements above.

You can view the webpage with other browsers, but it will be passive & not interactive with the BMS.

Once on the webpage, you will need to find out which COM port has been allocated by your PC. There are some tools towards the bottom of the page that will help with this; click “List COM ports” to see which ports are available. Once you have this list, you can enter them in turn into the box just above “Find port name” . The “Find port name” will return the name for the entered port number. You are looking for something along the lines of “USB serial port (COMxx)”. Once you have identified the most likely candidate, make a note of the COM port number. You will need to enter this number into the settings form on the webpage in order to establish communication with the BMS.

The default setting is COM port 6. If you know how, it is a good idea to use Windows control panel to re-allocate the USB lead's COM port to port 6. Windows remembers the setting and will allocate the same port next time the lead is used.

If port 6 is not allocated, look for the “COM port number” box in the settings table & enter the allocated port number.

This completes the basic settings.

To connect to the BMS, click the “Confirm” button below the settings table. The other values in the settings table do not matter at this stage; “Confirm” merely opens the connection to the BMS. After a few seconds, data should appear in the communications windows as shown below:



Messages from BMS:
BMS 6159 V6641
Average stack temperature is +25degC
Stack voltage: 13.46 volts
Charger voltage: 0.00 volts
Load voltage: 13.40 volts
Stack current: 0.5 amps
Battery state of charge: 102%
Last measured battery capacity: 39Ahr
cell no 1, bank no 1 = 3370 millivolts
cell no 2, bank no 1 = 3370 millivolts
cell no 3, bank no 1 = 3350 millivolts
cell no 4, bank no 1 = 3375 millivolts

BMS settings
SETTINGS:
Charge over-temperature: +45degC
Discharge over-temperature: +55degC
Charge under-temperature: +0degC
Discharge under-temperature: -20degC
Fan start temperature: +32degC
Fan stop temperature: +30degC
Cell undervoltage threshold: 2.550 volts
Cell overvoltage threshold: 3.600 volts
Cell balancer on threshold: 3.500 volts
Current shunt rating: 50mV at 500 amps
Peak charging current limit: 100 amps
Mean charging current limit: 100 amps
Peak discharge current limit: 200 amps
Mean discharge current limit: 100 amps
Rated battery capacity: 40Ahr

The data is updated every few seconds; the message details will depend on the type of BMS used. Do not click the “Send to BMS” button, if present, unless you want to change the BMS configuration settings to those in the settings table. Changing the settings is described in the following section.

BMS configuration - using the interactive web page

If you are logged in as either “Engineer” or “Installer”, you are able to use change some of the BMS configuration parameters using the interactive web page. Follow the instructions in the section immediately above to connect to the BMS. Once connected to the BMS, select a cell type from the drop-down list, which will then update the table with the settings for the selected cell type:

Manufacturer: CALB

Your selected manufacturer are in the boxes below; you can change the default values if required:

Balancer on voltage:	3.5 volts	Cell overvoltage threshold:	3.6 volts	Charge high temperature:	45 °C		
allowed range	2.0 to 4.0 volts	allowed range	2.0 to 4.0 volts	allowed range	1°C to 70°C		
Discharge low temperature:	-20 °C	Fan start temperature:	35 °C	Fan stop temperature:	30 °C		
allowed range	-30°C to +5°C	allowed range	20°C to 50°C	allowed range	20°C to 50°C		
SOC for charger on:	90 %	Current for SOC sync:	18 amps	Charger volts per cell:	3.55 volts	Rated battery capacity:	100 A-hr

You can edit these values to suit particular requirements. Never set any parameter outside of the cell manufacturer's limits; the limit values are those loaded into the settings table from the drop-down list. Refer to the applications information document for guidance on parameter selection. There are also individual help links alongside some of the settings table entry boxes.

Once you are happy with the selection values, click the “Confirm” button below the table. This builds the data string that will be sent to the BMS. You can still go back & edit the settings after clicking the “Confirm” button. Once all is finalised, click the “Confirm” button to rebuild the data string, then click the “Send to BMS” button. This will send the setup data string to the BMS.



Once the BMS has updated the settings as requested for itself & any connected expander units, the new values will appear in the “BMS settings” window. Check that these match the requested values.

For BMS systems incorporating a real time clock, click the “Send to BMS” button immediately after the final “Confirm” button to rebuild. This is because the BMS real time clock is reset to the connected computer's own time & date, but the values are those read when the “Confirm” button is clicked, & not the “Send to BMS” button, so any delay results in the clock being slow.

BMS datalogger - using the interactive web page

If you are logged in as either “Engineer” or “Installer”, you are able to download the contents of the datalogger using the interactive web page. Once logged in, a link offers the option of downloading the datalogger contents.

Downloading & processing the datalogger information is covered by a separate manual.

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