Emerge BMS 2K – Batterie Management System

Battery Management System with advanced connectivity

- ☐ Applications
  - ☐ 10S – 14S Lithium Battery Packs
  - ☐ 50A cont. / 65A peak (in closed compartments)
  - ☐ Certified in different Projects according to CE, UN
  - ☐ NEW: Certified according to UL (with redundant cell-voltage check and chemical fuse)
- ☐ Interfaces / Connectivity
  - ☐ CAN: Automotive CAN-Bus
  - ☐ USB: Enable-Tool Interface
  - ☐ On/off input
  - ☐ Configurable LED-Display
  - ☐ Kill-switch input
  - ☐ 12V-Output (1.7A, separate from 48V Ouput)
- ☐ Features
  - ☐ NEW: Grid-capability: To connect up to 50 battery-packs in parallel (e.g. for storage applications)
  - ☐ Precise state of charge (SOC) and state of health (SOH) calculation
  - ☐ Pre-Charge function
  - ☐ Current and voltage limits via CAN-bus
- ☐ Safety Features
  - ☐ Temperature monitoring for cells, power-stage and controller
  - ☐ Redundant overcurrent protection
  - ☐ On-board fuses

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Main electrical parameters		
Number of Cells (Serial / Parallel)	-	10 .. 14S / 30P
Max. Pack Voltage	V	60
Continuous Charge / Discharge Current (No heatsink / in closed compartment)	A	50
Peak Charge / Discharge Current (No heatsink / in closed compartment)	A	65 (8 minutes starting at 20°C)
Standby Current (Deepsleep)	µA	78
Idle Current (Active State)	mA	20
Powerstage topology	-	Combined Charge-/ Discharge terminal with back to back highside FET[1]
Switching the BMS output (combined charge / discharge terminal) on and off		
To activate the combined charge / discharge terminal the BMS there are several configurable ways to use the BMS		
Long press on enable button	Mode 0	BMS output can be toggled with a push button long press. Any error event during discharge disables the output until the push button is pressed again
Key-mode (permanent connection from enable-signal to GND)	Mode 2	Use a key-switch or any other device that connectes the enable-signal with GND, to activate the BMS output
Connect a charger		BMS detects the charger and starts charging automatically
To enter the deepsleep		Press the push button for more then 3 seconds (super long press)
CAN-Bus remote control		Selectable Modes: - Charge (48V active) - Discharge (48V active) - Standby / 12V active - Deepsleep

[1] Interrupts charge and discharge current completely. Absolutly no current going in or out of the battery pack

LED indications on a LED-bar with 5 LEDs		
Push button short press		SOC is displayed for a few seconds
During charging		LED stairs up to the current SOC, then holds SOC indication for a few seconds.
On Error event		LEDs flashing to indicate error
On entering deepsleep		LED stairs down to zero (goodbye)
Mechanical Parameters		
Size	mm	152 x 63
Height	mm	12.5
Weight	Gramm	72

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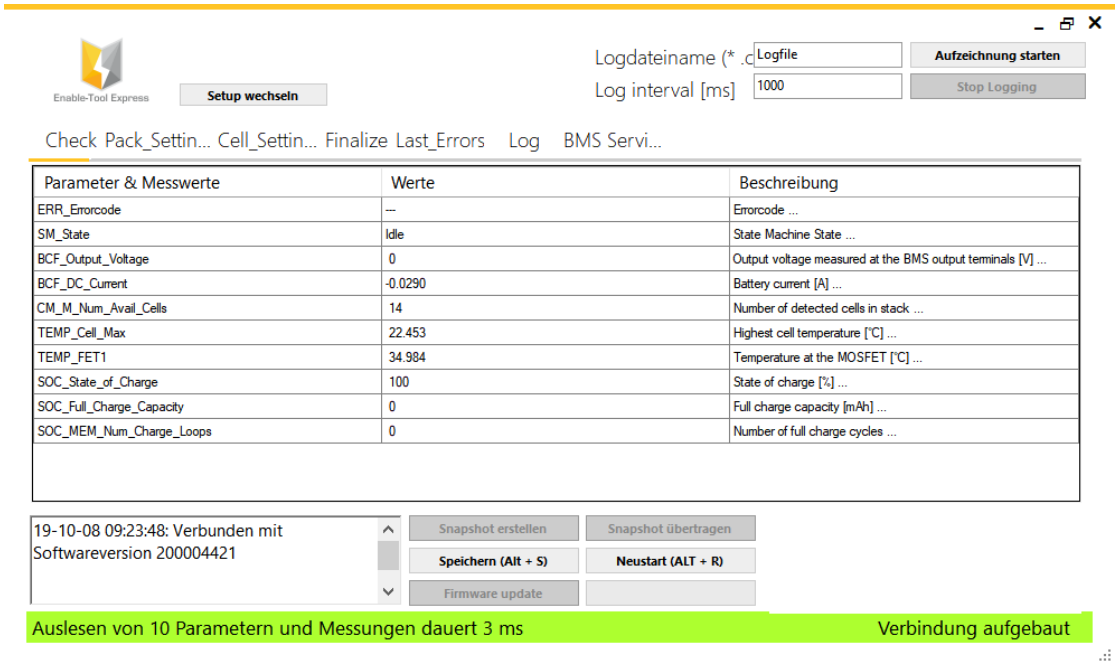
USB-Interface[2]



Intended Use-case	The enable-tool USB-interface is made to support the different stages of a product development a) Development: Allowing the motor-controller to be analyzed, measured and calibrated in real-time. b) Production: with reduced complexity, just allowing to write the production dataset and calibrate the system c) Aftersales: The look and feel of Enable-Tool can be customized and reduced to a "minimum level of complexity" to allow a quick and easy support. d) Dealer and Retailers: Setup your dealers and retailers to service your vehicles. ☐ Enable-Tool provides functions that you would expect from professional automotive measurement and calibration tools, like encryption of datasets to share with the production and dealships, or encrypted and signed flash-datasets and encrypted-hex-files.
Supported OS	Windows 7 / Windows 8

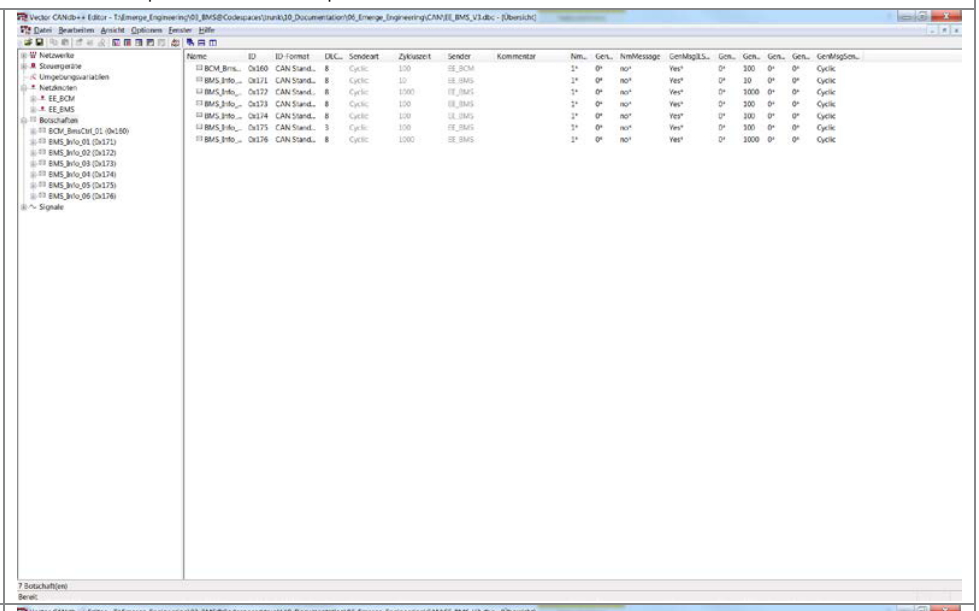
[2] Parameter list depends on predefined user-packages and use-case

CAN-Bus Interface

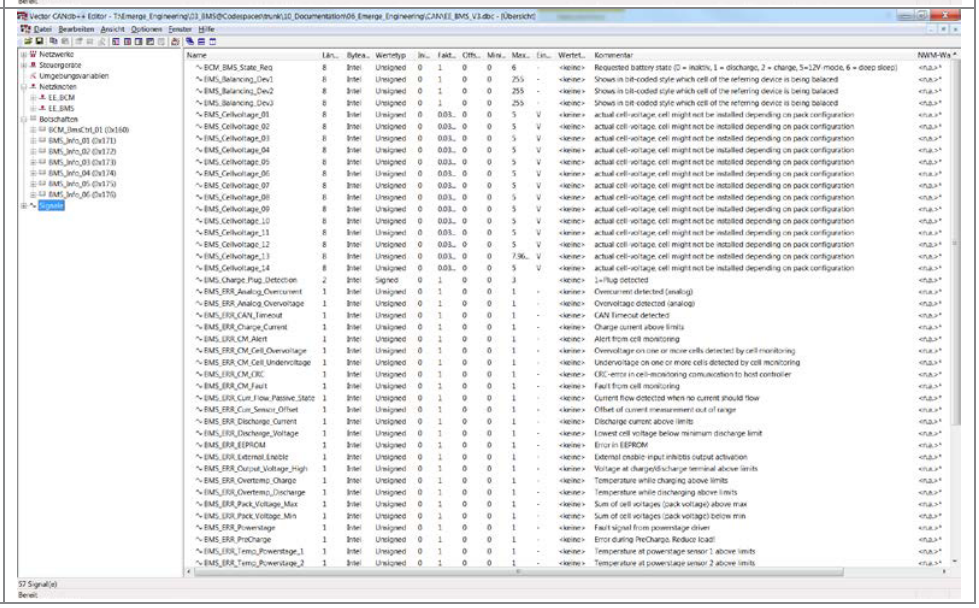
The CAN-bus interface is compliant with any standard automotive CAN-bus. The baudrate can be configured to from low-speed (125kbit/s) to high-speed (1000kbit/s). Messages are transmitted periodically (no remote request necessary).

This is an overview on the standard CAN-protocoll which is implemented by default.
You can get a CAN matrix in Vector Informatik's standard file-formar (*.dbc) on request.
Custom protocolls can be implemented on request.

Messages



Signals



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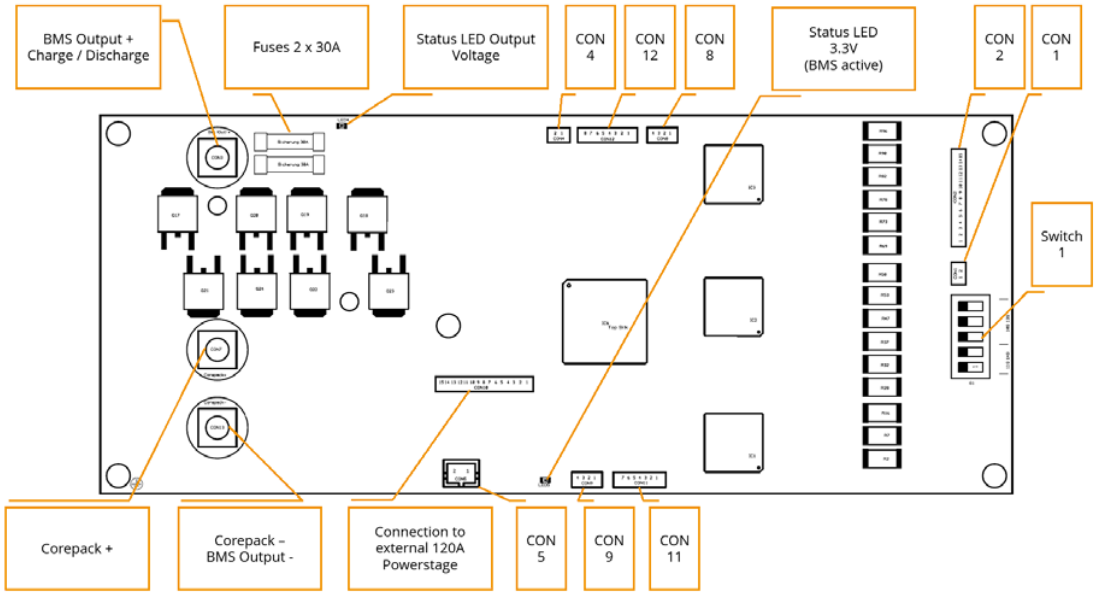
Installation / Connection



Connector	Pin	Function	Additional Info
CON 4 (BM02B-SRSS-TB)	1 2	ENA EXT GND	The BMS will inhibit the battery-voltage output if this pin is not connected to GND. The 12V supply is not affected by this pin. If not used, bridge pins
CON 5 (B2B-PH-SM4-TB)	1 2	GND 12V / 1.7A	Supply output. Not protected by a fuse. Short circuit forces BMS into deepsleep.
CON 8 (BM04B-SRSS-TB)	1 2 3 4	Cell Temp 2 Cell Temp 2 Cell Temp 1 Cell Temp 1	NTC 10 kOhm (103AT)
CON 9 (BM04B-SRSS-TB)	1 2 3 4	Push Button GND Charge Detect GND	Push Button and Charge Detect detect connection to ground. The input is edge triggered, so the BMS can change to deepsleep eben while this pin is actively connected to GND

Connector	Pin	Function	Additional Info
CON 11 (BM07B-SRSS-TB)	1 2 3 4 5 6 7	LED1+ LED2+ LED3+ LED4+ LED5+ Push Button GND	
CON 12 (BM08B-SRSS-TB)	1 2 3 4 5 6 7 8	USB ID USB DP USB DM USB 5V USB GND CAN High GND CAN LOW	

Cell Connection Terminals 10S Configuration[3]			
Connector	**Pin / Color**	**Function**	**Additional Info**
CON 2 (BM15B-SRSS-TB)	15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	Cell 1- / GND Cell 1+ Cell 2+ Cell 3+ Cell 4+ Cell 5+ Cell 6+ Cell 7+ Cell 8+ Cell 9+ Cell 10+ - - - -	Setup for 10S (10 serial cells). Set switch 1 before connection CON 2 and CON 1! 
CON 2 (BM02B-SRSS-TB)	2 1	- Cell 10+	Additional connection from TOP-cell to Pin1 to power the BMS

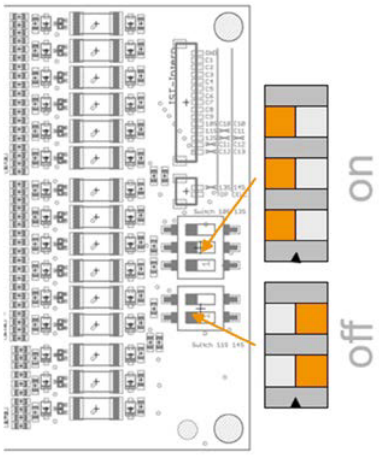
[3] Connect CON 2 first, then connect CON 1

Cell Connection Terminals 11S Configuration[4]			
Connector	**Pin / Color**	**Function**	**Additional Info**
CON 2 (BM15B-SRSS-TB)	15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	Cell 1- / GND Cell 1+ Cell 2+ Cell 3+ Cell 4+ Cell 5+ Cell 6+ Cell 7+ Cell 8+ Cell 9+ Cell 10+ Cell 11+ - - -	Setup for 11S (11 serial cells). Set switch 1 before connection CON 2 and CON 1! 
CON 2 (BM02B-SRSS-TB)	2 1	- Cell 11+	Additional connection from TOP-cell to Pin1 to power the BMS

[4] Connect CON 2 first, then connect CON 1

Cell Connection Terminals 12S Configuration[5]			
Connector	**Pin / Color**	**Function**	**Additional Info**
CON 2 (BM15B-SRSS-TB)	15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	Cell 1- / GND Cell 1+ Cell 2+ Cell 3+ Cell 4+ Cell 5+ Cell 6+ Cell 7+ Cell 8+ Cell 9+ Cell 10+ Cell 11+ Cell 12+ - -	Setup for 12S (12 serial cells). Set switch 1 before connection CON 2 and CON 1! 
CON 2 (BM02B-SRSS-TB)	2 1	- Cell 12+	Additional connection from TOP-cell to Pin1 to power the BMS

[5] Connect CON 2 first, then connect CON 1

Cell Connection Terminals 13S Configuration[6]			
Connector	**Pin / Color**	**Function**	**Additional Info**
CON 2 (BM15B-SRSS-TB)	15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	Cell 1- / GND Cell 1+ Cell 2+ Cell 3+ Cell 4+ Cell 5+ Cell 6+ Cell 7+ Cell 8+ Cell 9+ Cell 10+ - - Cell 11+ Cell 12+	Setup for 13S (13 serial cells). Set switch 1 before connection CON 2 and CON 1! 
CON 2 (BM02B-SRSS-TB)	2 1	Cell 13+ Cell 13+	Additional connection from TOP-cell to Pin1 to power the BMS

[6] Connect CON 2 first, then connect CON 1

Cell Connection Terminals 14S Configuration[7]			
Connector	**Pin / Color**	**Function**	**Additional Info**
CON 2 (BM15B-SRSS-TB)	15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	Cell 1- / GND Cell 1+ Cell 2+ Cell 3+ Cell 4+ Cell 5+ Cell 6+ Cell 7+ Cell 8+ Cell 9+ Cell 10+ Cell 11+ - Cell 12+ Cell 13+	Setup for 14S (14 serial cells). Set switch 1 before connection CON 2 and CON 1! 
CON 2 (BM02B-SRSS-TB)	2 1	Cell 14+ Cell 14+	Additional connection from TOP-cell to Pin1 to power the BMS

[7] Connect CON 2 first, then connect CON 1

Revision / History		
Version	**Date**	**Change**
V1.6	20170327	Updated features
V1.5	20150316	Images
V1.4	20150316	Enable-tool description
V1.3	20140601	Mechanical data
V1.2	20140301	Electrial data
V1.1	20130601	Initial document