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your partner for complex embedded solutions

NEW

BATTERY CELL SIMULATOR COMPACT

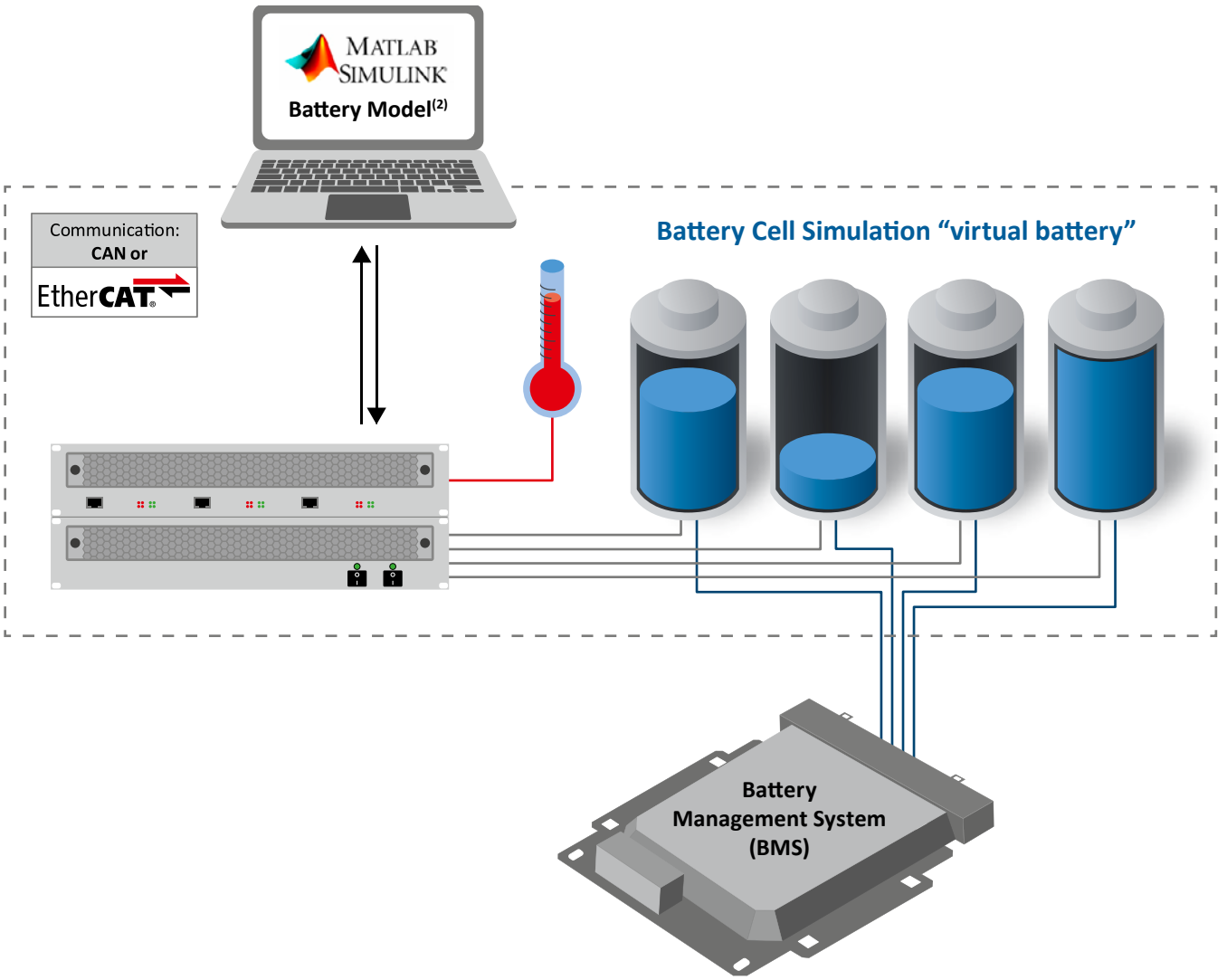
Based on Generation 7

FUNDED BY
electric mobility south-west
Federal Ministry of Education and Research
INVENTED IN GERMANY

www.comemso.com

The new compact design of the Battery Cell Simulator.

The comemso BCS allows you to test your Battery Management System on cell-level with high-precision and more dynamic as ever before. The electrical emulation of such virtual battery cells puts you into the position to achieve safe, reproducable and full automated testing of your BMS. The Battery Cell Simulator is the core of a BMS test system. The last pages of this product information give you an overview of the BMS testing product family and availible variants of the battery cell emulation hardware.



(1) When using more than 60 battery cells.
(2) Not offered by comemso.

INNOVATION BW 2013
Innovation Award Baden-Württemberg
Dr.-Rudolf-Eberle-Preis
Award Winner 2013

- Cell supply range 0.01 ... 8 V up to 5 A
  - ► Accuracy +/- 500 µV
  - ► Active and passive balancing
- Current measurement up to +/- 4.9 A
- Coulomb measurement (Charge / Discharge)
- Integrated failure simulation
- Communication CAN or EtherCAT 100 MBit/s
- Up to 144 cells per rack, 200 cells in total
- Scalable system, different versions available
- High reliability: 3 years warranty

All features of the normal Battery Cell Simulator.

Flexible voltage source and current load adjustment.

High-precision function tests of the BMS are possible with the comemso BCS. Each cell has an electronic load, which can be used for active and passive balancing. This constant current sink can generate currents up to 4.5 A (depending on selected features). The comemso BCS comes with all accuracies directly at the BMS test object, even with 3 m cable length.

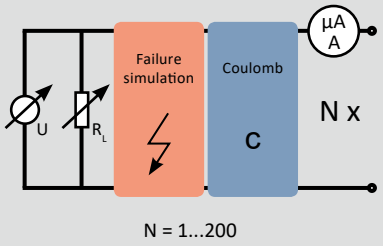
Fault simulation and current measurement.

Each cell provides a fault simulation for generating short circuits, cable breakage and change in polarity (reverse polarity). Each cell output also includes a high-precision current measurement system. This market innovation enables the BCS to detect balancing currents as well as leakage currents per cell, e.g. at a turned-off BMS.

This way, deep discharges of whole battery modules can be analysed quickly. With the integrated Coulomb measurement, per cell balancing procedures are verified. The comemso BCS combines a high-precision emulation of battery cells with high-resolution measurement technology and extended validation possibilities. Communication takes place via CAN or via EtherCAT, for high-performance measurements and highly dynamic control even at > 120 cells.

Virtual Battery Cell

With integrated fault simulation including Coulomb and leakage current measurement.

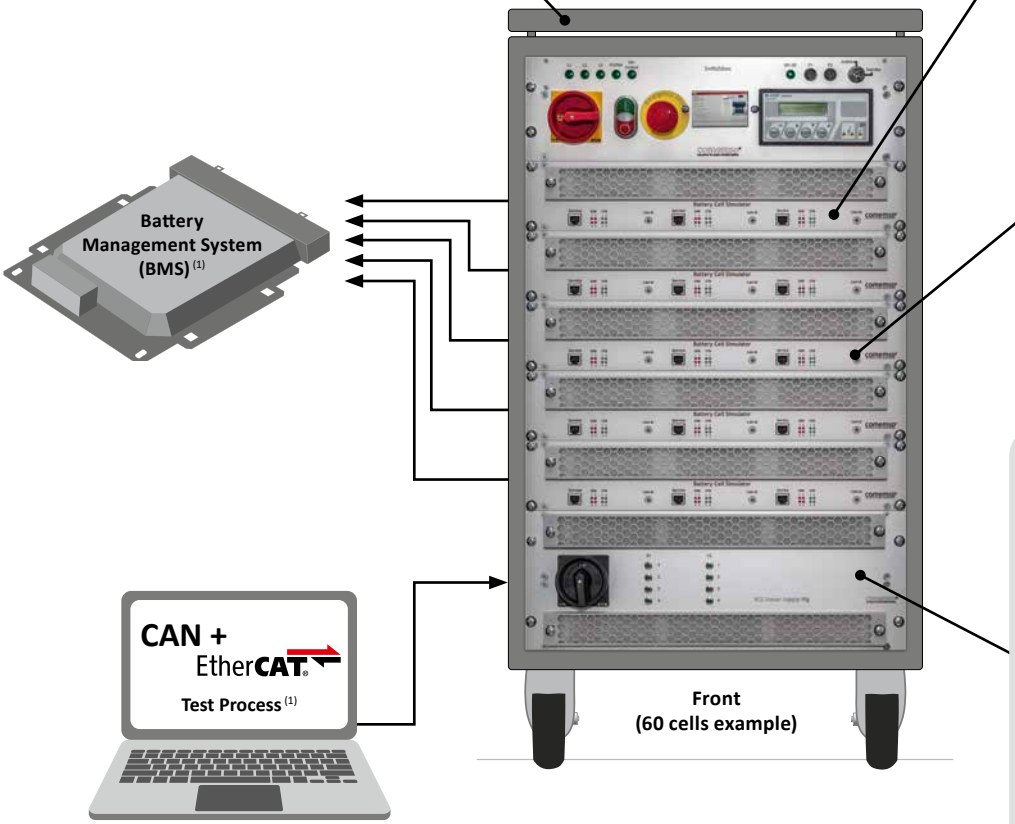


Completely individual

A large mix of modules with scalable variants and different functions.

BCS compact slide-in module

Simulation of 12 cells per module.



Compact Power Supply

Large version
- 4 height units (HU)
- at max. 5 A source up to 12 BCS modules

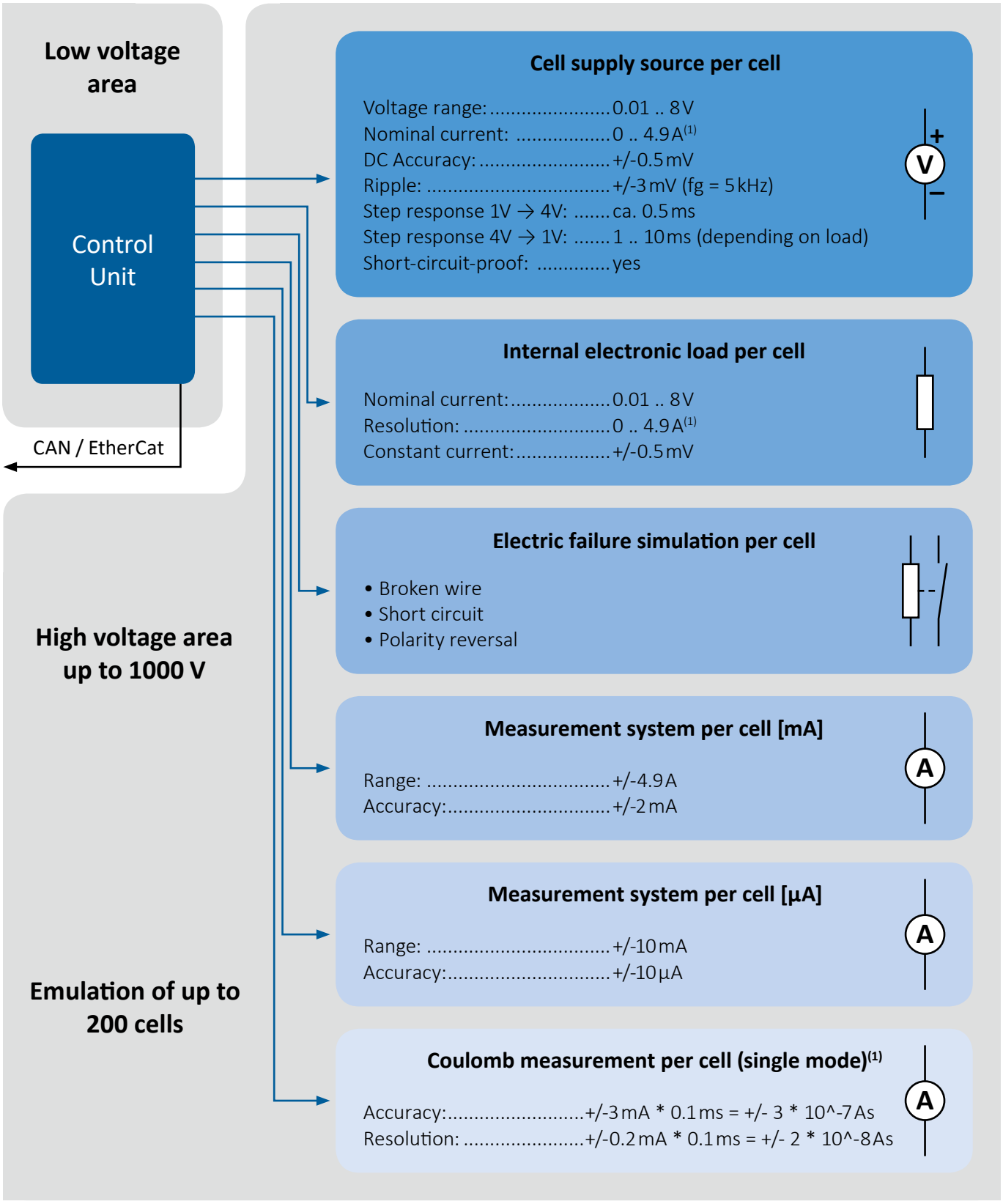
Small version
- 2 height units (HU)
- at max. 3 A source up to 5 BCS modules

(1) Not included with BCS products.

Technical data

Communication:	CAN bus/EtherCAT	Isolation cell/communication:	2 kV
Temperature range:	Lab conditions	Isolation cell/cell:	60 V
Connector:	115 V/230 V or CEE 3 x 16 A	Amount of cells:	12 to 200
Integrated emergency shutdown management		Simulation of up to 144 cells per rack	

Technical data overview.

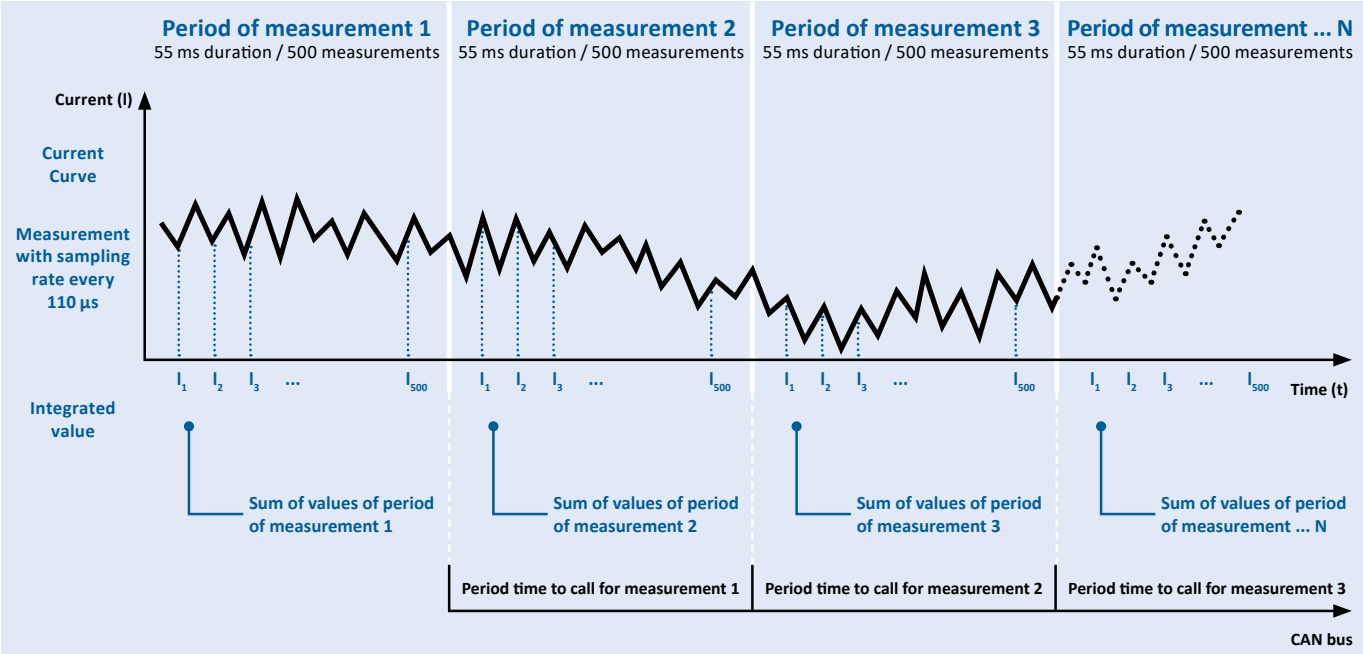


(1) At 5 V cell voltage.

Details of the Coulomb current measurement.

When you have a current measurement with a high frequency, but you have a lower sampling rate by your host PC to call for those measurements, you will lose important information e.g. for verifying your balancing algorithm.
To minimise this, the “Extended“ version of the BCS cards has an internal integration of current values, which are measured every 110 µs. 500 measurement values are added in sum (=55 ms). This sum is converted into the physical value using calibration data and can then be read-out via CAN bus (the Flag „Coulomb Measurement (NewValue)“ in the CAN message is set to TRUE and back to FALSE after CAN transmission).

Description of the Coulomb current measurement principle (Charging/discharging measurement).

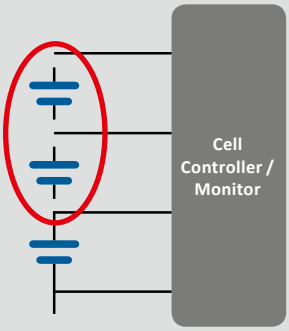
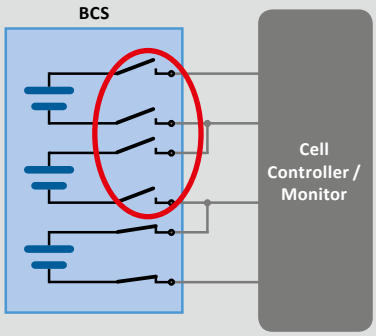
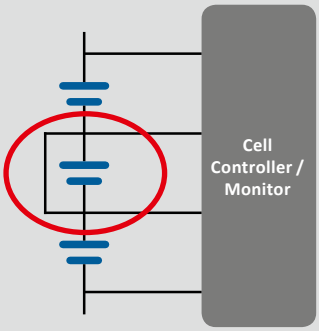
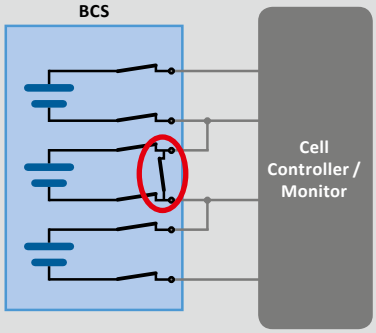
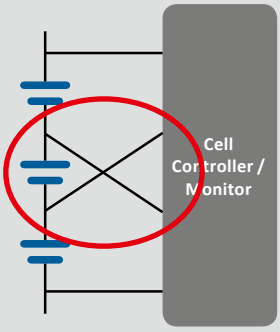
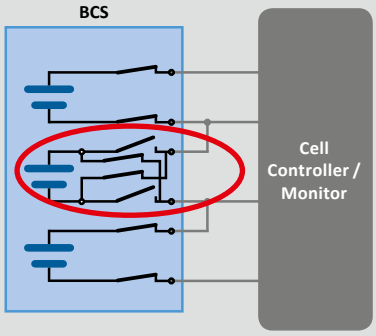


Technical data[1]

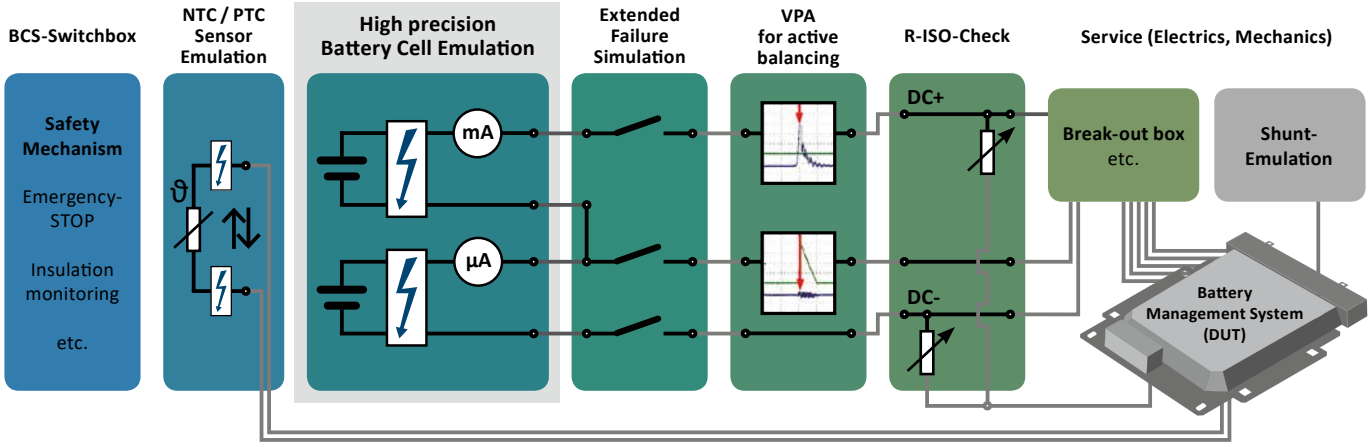
Sampling time:	110 µs
CAN resolution:	1/10000 mC
Measurement range:	+/-3 A
Averaging:	No averaging (integration is sufficient)
Hardware filter: (Baseboard rev. 7.2.6):	100 R, 47 nF = 29 µs

[1] Of the Coulomb current measurement firmware 07.00.19

Integrated failure simulation for each cell.

No.	Test case failure simulation	Sketch	Realisation
1	Connection of different cells to the BMS. **Cause:** Such as a sequenced connecting of the cells to the BMS by the ECU connector.		
2	Short circuit of one cell. **Cause:** Defect of cell or failure on cell controller.		
3	Polarity change of a cell. **Cause:** Mistake in cabling.		

BMS test bench extendable by further failure insulation, measurements and emulation.



Overview of "Battery Cell Simulator Compact"-variants:

Product variant	Light	Basic	Basic + F	Basic + F + µA	Basic + F + HiLoad	Full
Height	2 HU	2 HU	2 HU	2 HU	2 HU	2 HU
Cells per module	12	12	12	12	12	12
Max. number of cells	200	200	200	200	200	200
Source [1]	1.0 A	4.9 A	4.9 A	4.9 A	4.9 A	4.9 A
Sink [1]	1.0 A	2.0 A	2.0 A	2.0 A	4.5 A	4.5 A
Fault simulation			●	●	●	●
Current measurement µA				●		●
Current measurement +/- 5A	●	●	●	●	●	●
Fast current measurement (Coulomb)		●	●	●	●	●
CAN-Baud rate 500kBd	●	●	●	●	●	●
CAN-Baud rate 1MBd	●	●	●	●	●	●

[1] Sink and source: values can be reached separately – not in combination. Example: If sink has 2.0A setting, then the source is only max. 2.9A (4.9A – 2.0A)

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