



comemso

Flex Case 3HU for NTC, R-ISO, FSU

Technical Datasheet

Flex Case 3HU

for NTC-, R-ISO- and FSU-Cassette

Modular
Design

Flexible
Configuration

Full
Integration

Description

The Flex Case 3HU for NTC-, R-ISO-, FSU-Cassette offers an outstanding flexible and space-saving solution for testing the battery management systems (BMS).

Given the increasing complexity and diversity of BMS designs, flexibility is the key to efficient testing. This innovative design integrates multiple test functions into a single device:

- NTC / PTC – temperature sensor simulation
- R-ISO – resistance insulation simulation
- FSU – failure simulation unit

Using Flex Cases enables quick scaling adjustments and customisation so that your test setup meets the specific requirements of your BMS.

It has five configurable slots that can be filled with different cassettes depending on the specific test requirements, be it for NTCs, insulation resistance (R-ISO) or enhanced fault simulation (measuring leads to BMS).

Flexible Configuration

Customisable to specific BMS design requirements, to ensure adaptability for different applications.

Specification	
Communication	CAN-Bus 500 kBd / 1 MBd
Slots per Flex Case	5
Temperature range	+5 °C to +35 °C
Power supply	100-240V, 50-60Hz

Modular Design

The five slots can be filled with cassettes as follows:

- Slots 1-4 can be filled with the FSU master, NTC/PTC 4-channel or the R-ISO
- Slot 5 is for the use of FSU master or R-ISO cassette

Space-Saving Construction

Compact housing to reduce the required space.

Smooth Communication

CAN bus communication and the open interface ensure integration into existing systems, Ethernet is available on demand.



Summary

The comemso Flex Case 3HU is an indispensable tool for developers who test battery management systems (BMS) under real fault conditions. With its flexible and modular design, it ensures that users can configure the test system according to their specific needs. Whether simulating temperature sensor behaviour, insulation faults or enhanced fault simulation (measuring leads to BMS).

NTC / PTC

Temperature Sensor Simulation

Description

The NTC/PTC cassette was developed to simulate the temperature-dependent resistance, a critical factor in BMS tests with regard to thermal runaway.

The 4-channel cassette supports a wide range of temperature sensors, including NTC, PT100 and PT1000 and can work with self-defined tables of resistance and temperature dependencies. This makes it possible to simulate the thermal behaviour of a battery. The device can simulate a resistance range from 0 Ω to 4 M Ω , with the possibility of additionally performing fault conditions such as short circuits and cable breaks. This cassette is ideal for use in the development of electric vehicles, in building automation and in other areas where temperature-dependent resistance takes an important role.

Four cassettes can be installed in the Flex Case to simulate up to 16 channels.

Simulation of various sensors

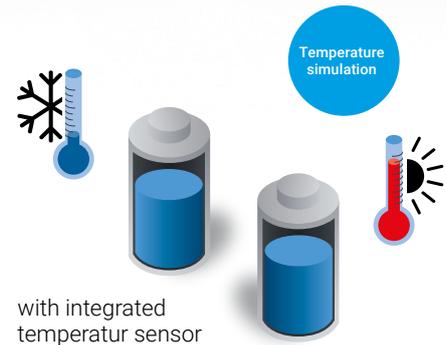
Simulate NTC/PTC temperature sensors and other resistance-based sensors.

Fault Simulation

Simulate cable breaks and short circuits to test the reaction of the BMS to faults.

High Precision

Offers high-precision resistance changes for an accurate simulation of thermal behaviour.



with integrated temperature sensor

Specification

Communication	CAN-Bus 500 kBd / 1 MBd
Channels per board	4
Value range	0 Ω to 4 M Ω
Accuracy	+/- 1%, 25 ppm/ $^{\circ}$ C
Resolution	1 Ω
Loadability	1 W, 125 mW for resistance > 130 k Ω
Reaction time	< 3 ms
Voltage range	0 to 1 kV
Power In	12 V, max. 1 A
Electrical isolation	1.5 kV
Temperature range	+5 $^{\circ}$ C to +35 $^{\circ}$ C
Fault Simulation	open wire, short circuit simulation ¹

¹ only NTC/PTC 4 Channel Cassette + F)

R-ISO

Resistance Insulation Simulation

Description

The R-ISO cassette simulates the resistance insulation between the battery and its housing. This is crucial for testing the BMS's ability to detect and respond to insulation faults, such as leaks or direct connections between the battery and the housing. The device simulates a wide range of insulation resistances, from 20 k Ω to 65 M Ω , and can apply these conditions at voltages up to 1.5 kV. The R-ISO device is the basic element for testing insulation monitoring devices (IMD) within the BMS to ensure that all insulation breakdowns are accurately detected.

Wide resistance range

Simulates insulation resistance value between 20 k Ω und 65 M Ω .

High Precision

High precision with an accuracy of $\pm 1\%$, which guarantees reliable test results.

Integrated Safety

Integrated safety functions for each channel.

High voltage capability

Simulates insulation conditions at voltages up to 1.5kV and measures interference-free voltage potentials up to 1000V.



Specification

Communication	CAN-Bus 500kBd / 1 MBd
Channels per board	2
Value range	20 k Ω to 65 M Ω (across 1000V range)
Accuracy	+/- 1%, 100 ppm/ $^{\circ}$ C (for resistance range 40 k Ω to 16 M Ω)
Resolution	1 k Ω
Voltage measurement	Up to 1000 V ($\pm 10\%$ accuracy)
Electrical isolation	1.5 kV
Temperature range	+5 $^{\circ}$ C to +35 $^{\circ}$ C
Self protection	Each channel has integrated self-protection mechanisms
Bar graph display	1.5 kV
Temperature range	Provides real-time status on the front panel
Safety	Does not influence electrical isolation of test system

FSU

Failure simulation unit

Description

The failure simulation unit is used to simulate faults between the battery and the battery management system (BMS). This unit is ideal for testing the BMS under fault conditions and enables the simulation of measuring cable breaks that can occur between the BMS and the battery cells.

The FSU is based on the master and slave principle and can be used for testing a single cell up to 144 cells, whereby the failure mode of each cell can be configured individually.

This FSU consists of two components:

- The central control unit for the simulation can be designed for up to 144 cells and can be used several times for a higher number of cells.
- FSU Slave extends the configuration to enable the simulation of faults across multiple cells.

The system supports cascading and enables the simulation of faults in up to 12 cells per slave and up to 12 slaves for each master. The master can be designed for up to 144 cells and can be used multiple times for a higher number of cells.

Individual Fault Simulation

Simulation of measuring cable breaks per cell for accurate tests

Cascading features

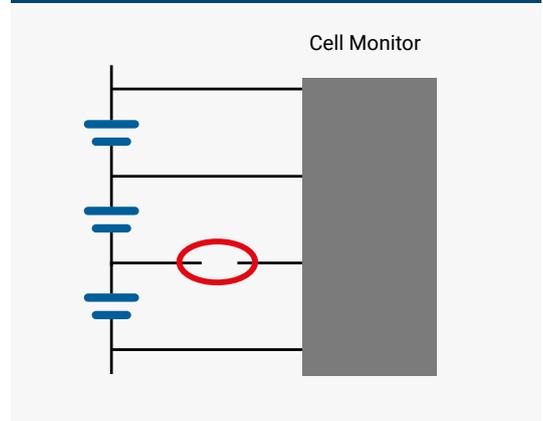
Support for up to 12 slaves per master for larger configurations

Precise voltage emulation

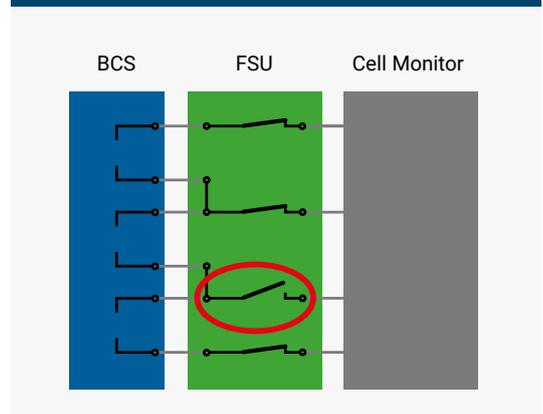
Does not affect the accuracy of the cell voltage simulation, when integrated with the comemso battery cell simulator.



Draft



Realisation



Specification	
Communication	CAN-Bus 500 kBd / 1 MBd
Temperature range	+5 °C to +35 °C
Cascading	Up to 12 emulated cells per slave, 12 slaves per master via Ethernet cable
Accuracy	+/- 1%, 25 ppm/°C
Fault Simulation	Simulate cable breakage between measurement cable with independent settings per line

Design and realisation of a measuring cable break simulation

15 years of excellence

comemso

Understanding and visualize charging processes

For 15 years, comemso has developed analysis systems for the optimization of charging processes. Today, we are more committed than ever to enriching the electromobility market with innovations in the future. In order to find the best possible solution, we are always performing our own tests in the field. The insights gained from this process empower directly the development of new solutions and products.





” comemso itself set up a high level standard to develop testing and analyzing systems for years to perform optimized solutions for their customers.

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