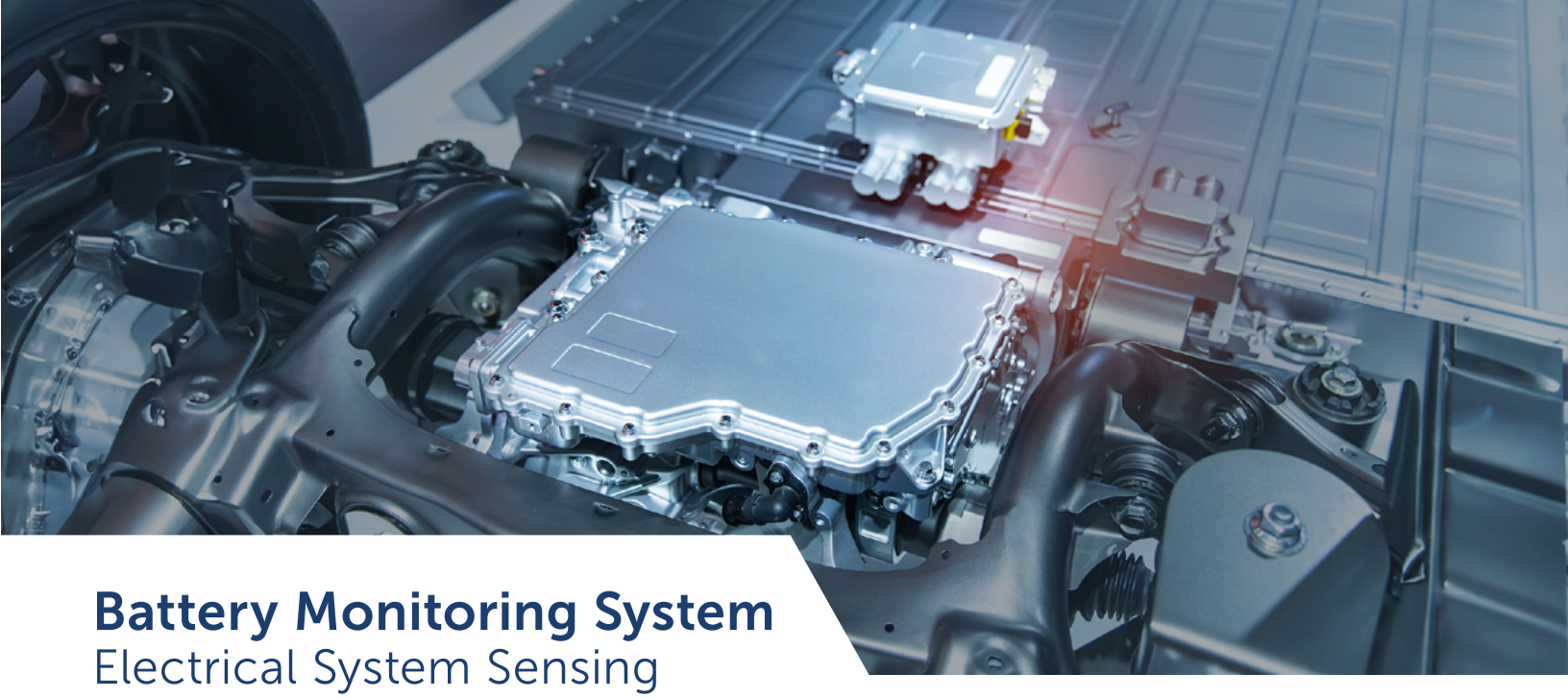


Battery Monitoring System
Electrical System Sensing

Battery Monitoring/Management Systems (BMS) are any electronic system that monitors the physical variables of a battery, such as current, voltage and temperature and prevents the battery from operating outside its safe operation parameters. Monitored variables are used to check the battery state, to calculate secondary data, report that data, control its environment, or for authentication

Redundant Multi-sensor System

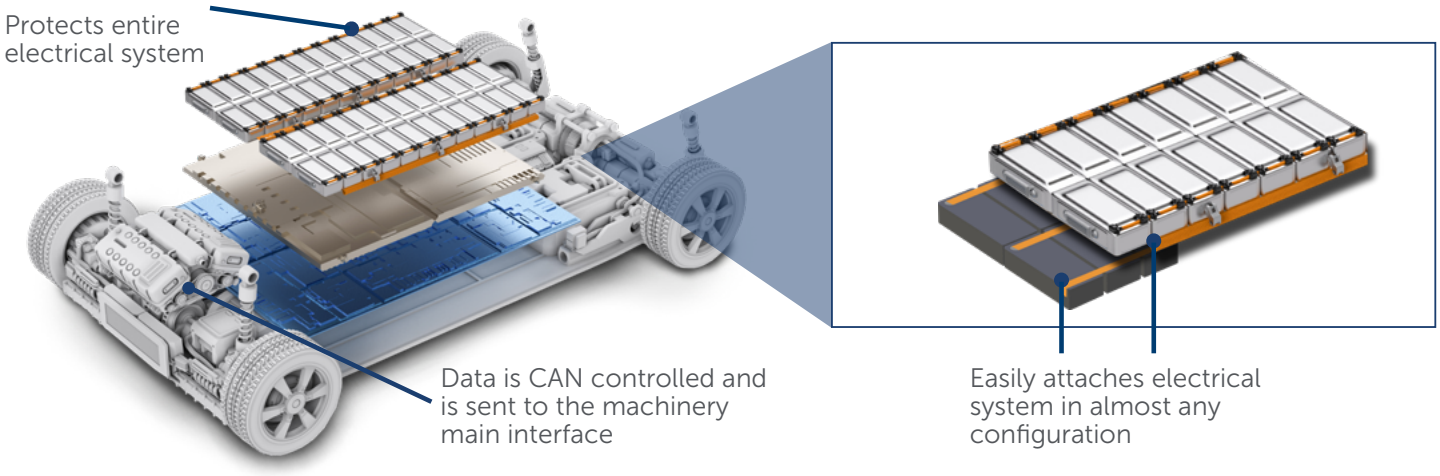
The system consists of two heterogeneous current sensors and two shunt resistor-based current sensors, creating a fail-safe current sensing mechanism. Additionally, the standard module includes a battery voltage sensor and a temperature sensor. Together, these components—high-accuracy shunt measurements, a galvanically isolated Hall current sensor, and the voltage and temperature sensors—monitor internal system parameters to detect potential malfunctions and ensure reliable operation.

Programmable and Customizable

All four sensor signals are read by analog-to-digital converters (ADCs), processed by a programmable STM32 microcontroller, and provided at the output via the CAN interface. This design is highly modifiable and can easily integrate changes upon request.

Special Features

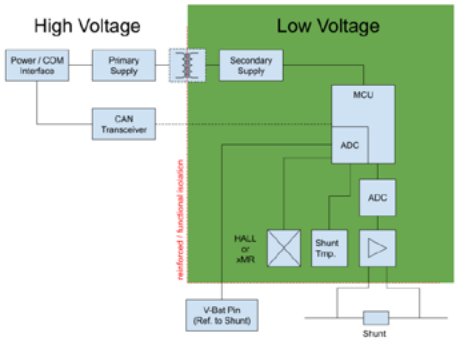
A particular feature of the product is its independent power supply and galvanically insulated design. Therefore the device operates directly with 12V DC and can be attached on both high-side and low-side of the high voltage (HV) battery system.



Technical Specifications Table:

Parameter	Value
Current Range	±2000A
Voltage Range	±5 to ±800 V
Accuracy	±0.1%
Operation Temperature Range	−40 to +80 °C
Supply Voltage	17 to 6 V
Redundant Measurement Hall	12 Bits
Redundant Measurement Shunt	18 Bits

Technical Layout:



Secondary Calculated Data:

Monitored variables are used to calculate secondary data

- **Voltage Monitor:** Monitor voltages of individual cells, minimum and maximum cell voltage, or voltage of periodic taps
- **Temperature:** Detect average temperature, coolant, intake temperature, coolant output temperature, or temperatures of individual cells

  Current Monitor: Current in or out of the battery
- **State-of-Health (SOH):** Measurement of the remaining capacity of the battery as a percent of the original capacity

  State-of-Safety (SOS): Overall indication of safe operation based on programmed parameters
- **State-of-Charge (SOC):** Indicate the charge level of the battery
- **State-of-Power (SOP):** Detect amount of power available for a defined time interval given the current power usage, temperature, and other conditions
- **Coolant Flow:** Monitor air or fluid-cooled batteries.

Years Of Automotive Experience

CTS Corporation began expanding into the automotive market in the early 1970's, when the U.S. government first issued requirements for controlling automotive emissions.

Today, we are a leading provider of sensing solutions, smart actuators, and pedals. As a former leader in providing soft ferromagnetic cores, shields, and shunts, we have grown into providing full current sensing solutions for high power and industrial applications.

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