Insulation monitoring in Megawatt Charging Systems

Voltage in balance. Safety in the system.

Design the future of energy

BENDER

Safety and reliability in Megawatt Charging Systems

Megawatt Charging Systems (MCS) enable ultra fast charging of heavy-duty electric commercial vehicles, such as long-haul e-trucks, as well as electrified construction and specialty vehicles. To achieve this, very high charging power (up to 3.75 MW) is delivered through increased system voltages and high charging currents.

The resulting requirements for safety, insulation monitoring, and system design present new challenges for the development and certification of charging infrastructure.

Reliable operation in Megawatt Charging Systems

The isoMCS1685 enables insulation monitoring in Megawatt Charging Systems with voltages of up to 1500 V and large systems capacitances of up to 55 µF. This forms the basis for reliable operation in MCS applications.

Reducing certification risk from the start

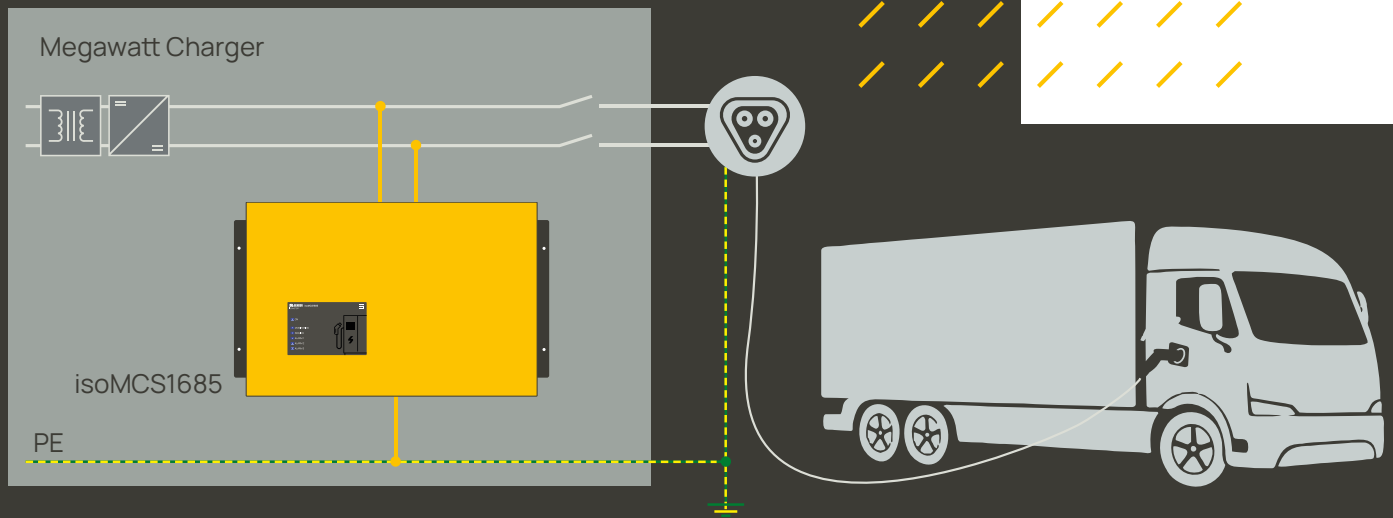
Compliance with safety-related requirements is a key prerequisite for the certification of megawatt chargers. The isoMCS1685 supports the standard-compliant design of the entire system in accordance with IEC 61851-23-3, thereby reducing development risks early on, avoiding additional hardware, and minimising project delays.

Accelerating MCS development

Megawatt Charging Systems are currently in an early phase of market adoption, with rollout expected in the near future. The isoMCS1685 is available early in the development phase and enables a rapid start to the development and validation of megawatt chargers. This helps accelerate time-to-market for MCS charging solutions.

Proven technology

Stable insulation monitoring is essential for preventing unplanned shutdowns and ensuring high charger availability. The isoMCS1685 is based on a proven IMD hardware platform that has already been used successfully for many years in demanding high-voltage applications.



Integrated voltage balancing

The isoMCS1685 integrates active voltage balancing directly into the IMD, enabling safe and standards-compliant operation of Megawatt Charging Systems. Based on patented technology, the integrated balancing function supports compliance with the requirements of IEC 61851-23-3.

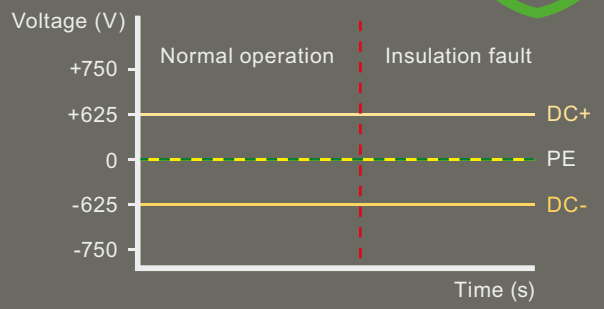
Always in balance

Voltage balancing keeps the conductor-to-earth voltages in the DC system in balance even under asymmetric insulation conditions. This prevents unacceptable voltage shifts within the charging system and therefore limits touch currents to the levels required by IEC 61851-23-3.

Safe, cost-effective, and compliant

As a result, safe and standards-compliant operation of the charging system is ensured while helping to avoid project delays during system validation and certification. By integrating voltage balancing directly into the IMD, no additional balancing hardware is required, reducing system complexity, development effort, and overall system costs.

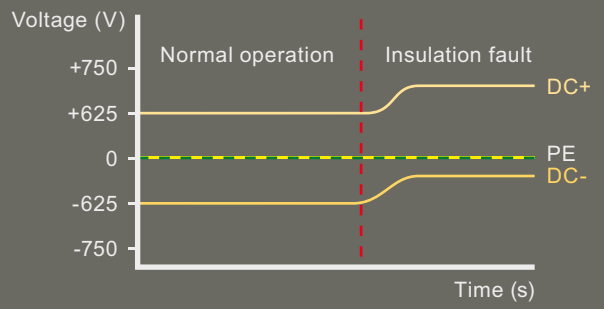
With voltage balancing



Balanced voltage curves

- Voltages stay symmetrical to earth
- No increase in touch currents following an insulation fault

Without voltage balancing



Asymmetrical voltage curves

- Insulation faults shift the voltages to earth
- Increased touch currents and risk to people

Validated performance

The isoMCS1685 has been extensively validated under realistic operating conditions in collaboration with industry partners.

„The isoMCS IMD supports an easy integration into our charging test systems. It realizes upcoming features, becoming relevant for MCS with increased voltage, while showing a reliable and stable operation during our charge validation tests."

Michael Kalusche
Product Owner at Vector Informatik GmbH

VECTOR

„Bender's integrated insulation monitoring and voltage balancing enable AIP to operate our Megawatt Charging Systems safely and in full compliance with applicable standards, even at the highest charging capacities. Together, we are creating the foundation for a reliable and future-proof MCS infrastructure, benefiting both AIP as a developer of innovative charging solutions and our customers through maximum operational safety and high system availability."

Andreas Rogg
Product Manager at AIP

AIP

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