

Vehicle sensors – Insulation monitoring

ISOMETER® iso175
ISOMETER® IR155



Design the future
of energy

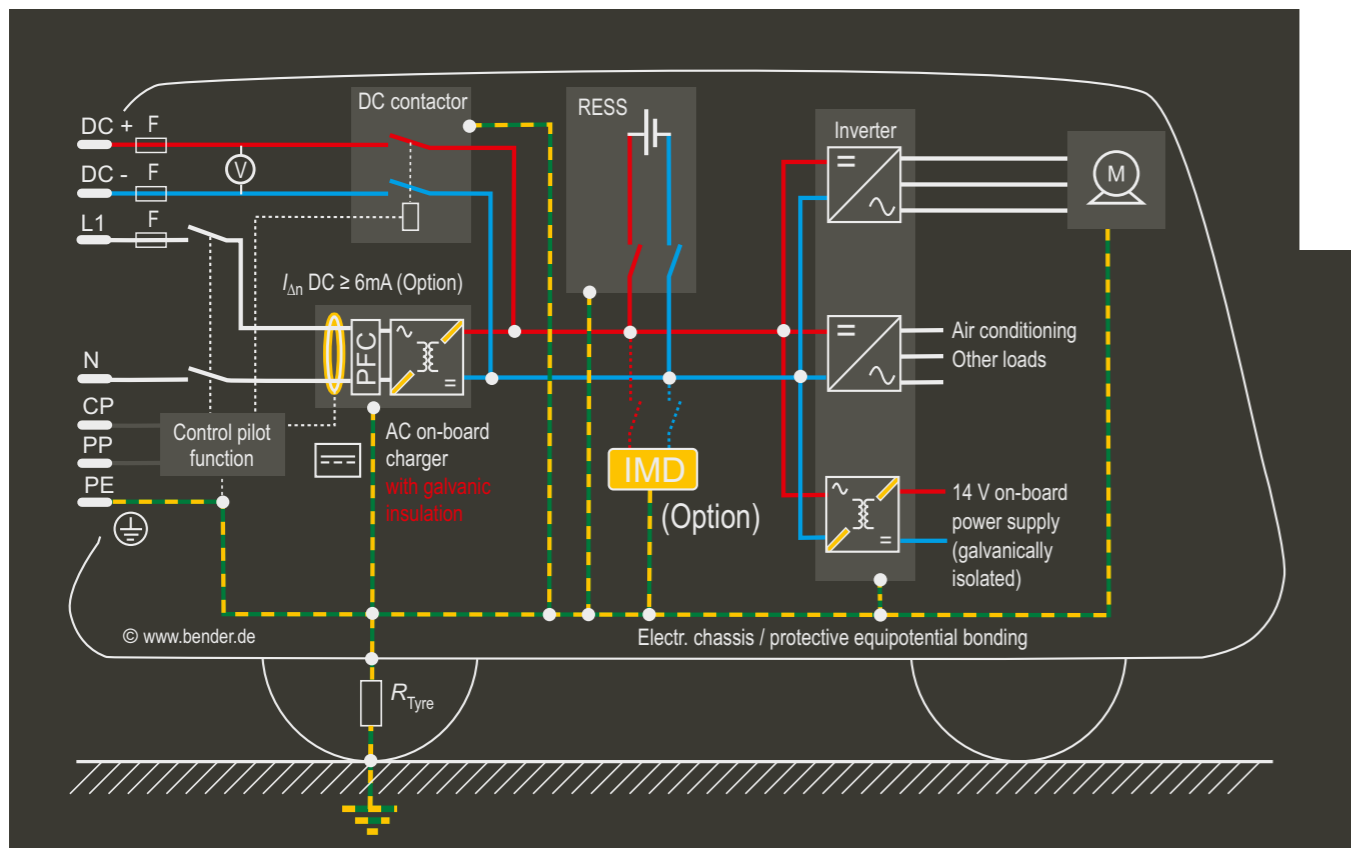


Insulation monitoring for electric and hybrid vehicles

Our innovative insulation monitoring devices protect the entire electric drive system and minimise the risk of an electric shock. The power supply system in electric vehicles must be regarded as an isolated power supply system while driving. A major challenge here is to detect insulation faults at an early stage. Causes of insulation faults during normal operation can be, for example: dirt, salt, moisture, defective plug connections, mechanical influences, etc.

The solution:
Continuous monitoring of the insulation resistance with an insulation monitoring device.

Active measurement:
The active measurement method increases electrical safety in electromobility by detecting faults not only during vehicle operation, but before the vehicle is started. Even when the battery is not connected.



Possible causes of insulation faults in vehicles

Insulation faults in DC vehicle charging applications can lead to safety hazards and system malfunction. The following examples are typical causes for insulation faults:

Overload of the used insulation by applying excessive voltage to insulation materials, mechanical stress of cables (e.g., during installation). This can lead to material failure or flashover, whereby especially arcs in DC systems can lead to a fire.

High currents or voltage spikes can stress the insulation, leading to insulation failure. Contamination with dust, moisture, or other pollutants can weaken insulation materials as well. Contaminated insulation becomes more susceptible to breakdown. Over time, insulation materials may degrade due to ageing, especially when the material is subject to rapid and frequent temperature changes or loss of insulation material flexibility.

It is also possible that insulation material is worn down by mechanical stress such as vibration, shear forces or abrasion by wrong installation or drive over at edges nearby the DC charger. Furthermore, vandalism or stealing of cables can be a root cause for risk of electric shock as well.



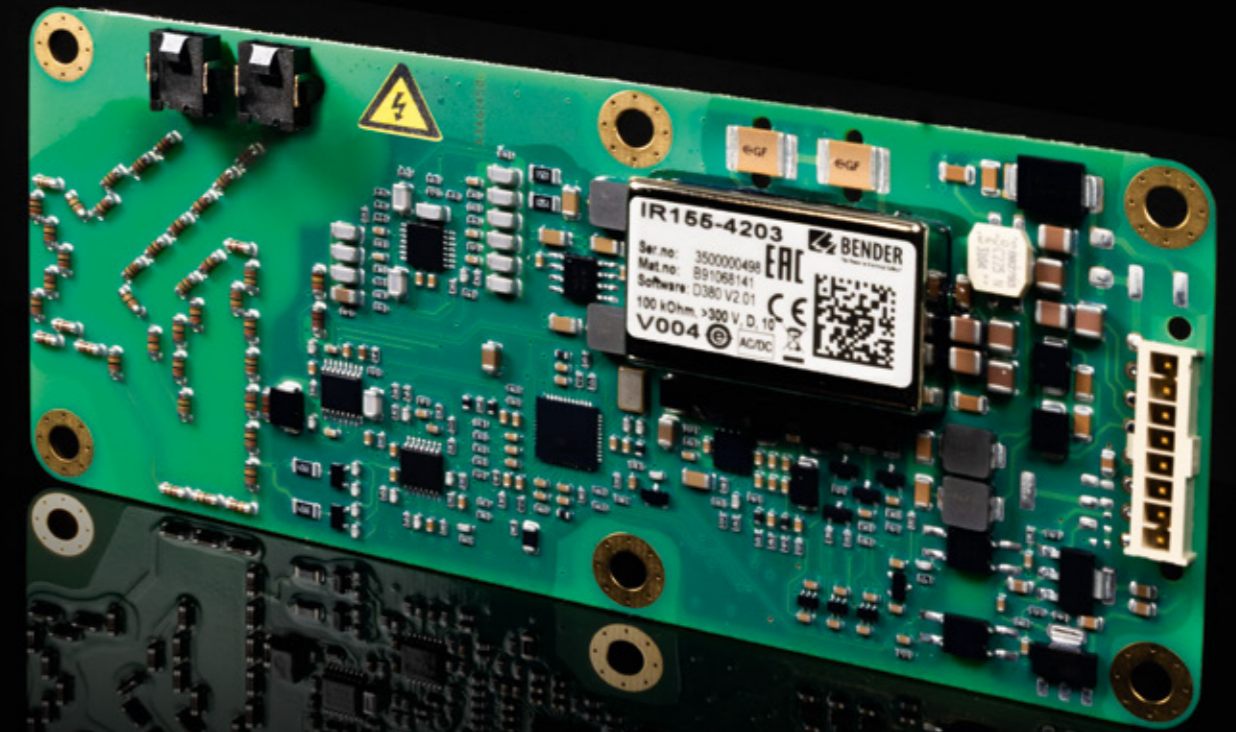
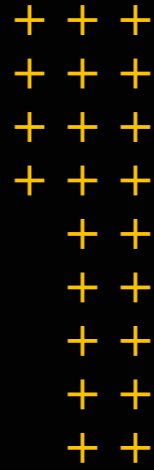
ISOMETER® iso175

The ISOMETER® iso175 is an insulation monitoring device for unearthed drive systems in hybrid and electric vehicles.

It has a patented, active measuring method for continuous monitoring of the insulation resistance in a high-voltage system. Depending on the variant, the device communicates with its system environment using different CAN protocols (standard Bender, SAE J1939).

Features:

- Insulation measurement also when the vehicle's HV electric system is not energised
- Suitable for 12 V to 24 V DC power supply
- Detection of symmetrical and asymmetrical faults
- CAN bus interface
- Automatic adaptation to the system leakage capacitance (up to 10 µF depending on profile)
- Integrated self-diagnosis (online self test)
- HV connection monitoring (offline self test)
- Continuous monitoring of the earth connection
- Undervoltage detection



ISOMETER® IR155

The ISOMETER® IR155 monitors the insulation resistance between the insulated and active HV conductors of an electrical drive system and the reference earth.

The patented measurement technology is used to monitor the condition of the insulation on the DC side as well as on the AC motor side of the electrical drive system.

Features:

- Insulation monitoring device (IMD) for unearthed DC drive systems (IT systems) in electric vehicles
- Continuous measurement of the insulation resistance 0...10 MΩ
- Insulation monitoring of AC and DC insulation faults for unearthed systems (IT systems) 0...1000 V
- Short-circuit proof outputs for fault detection and measured value
- Suitable for 12 V to 24 V power supply



Comparison of products

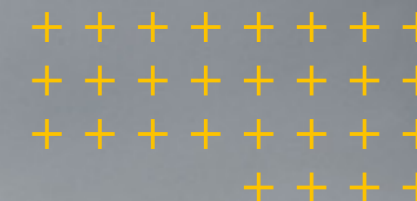


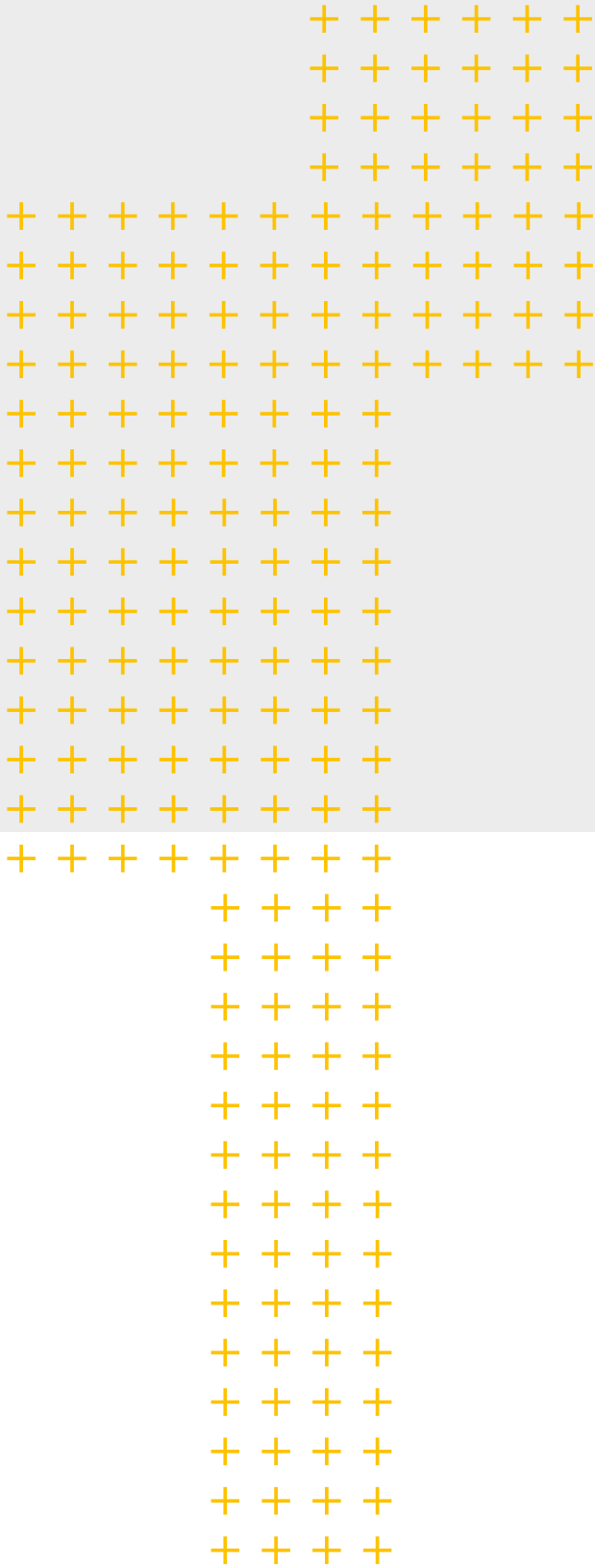
ISOMETER® iso175



**IR155-4203/
IR155-4204**

IMD features	ISOMETER® iso175	IR155-4203/ IR155-4204
System voltage range	DC 0...1000 V	DC 0...1000 V
Max. leakage capacitance C _e	5 (10) µF	1 µF
Error signal output	1 (Error)	1 (Error)
Detection of symmetrical/asymmetrical faults	✓	✓
Self diagnosis	✓	✓
Undervoltage detection	✓	✓
Decoupling of HV connection	✓	—
Interface: PWM	—	✓
Interface: CAN	✓	—
CAN protocols	SAE J1939, Bender	—
Art. No.	B91068201 - 206	B91068138(C)V4 - 143(C)
Standards	IEC 61010-1 IEC 60664-1 IEC 60068-2-6 IEC 60068-2-14 IEC 60068-2-27 IEC 60068-2-64 ISO 6469-3 ISO 16750-2 ISO 16750-3 ISO 16750-4 (UN)ECE R10 Rev.6 SAE J1939-82	IEC 61557-8 IEC 61010-1 IEC 60664-1 ISO 6469-3 ISO 23273-3 ISO 16750-1 ISO 16750-2 ISO 16750-4





Bender GmbH & Co. KG

Londorfer Straße 65
35305 Grünberg
Germany

Tel.: +49 6401 807-707
emobility@bender.de
www.bender.de/en

Photos: AdobeStock (© SappiStudio, © Superingo)
and Bender Archive.

2246de / 01.2024 / © Bender GmbH & Co. KG, Germany –
Subject to change! The specified standards take into
account the version valid at the time of printing.

