ISOMETER®
isoCHA425HV

with AGH420-1/AGH421-1

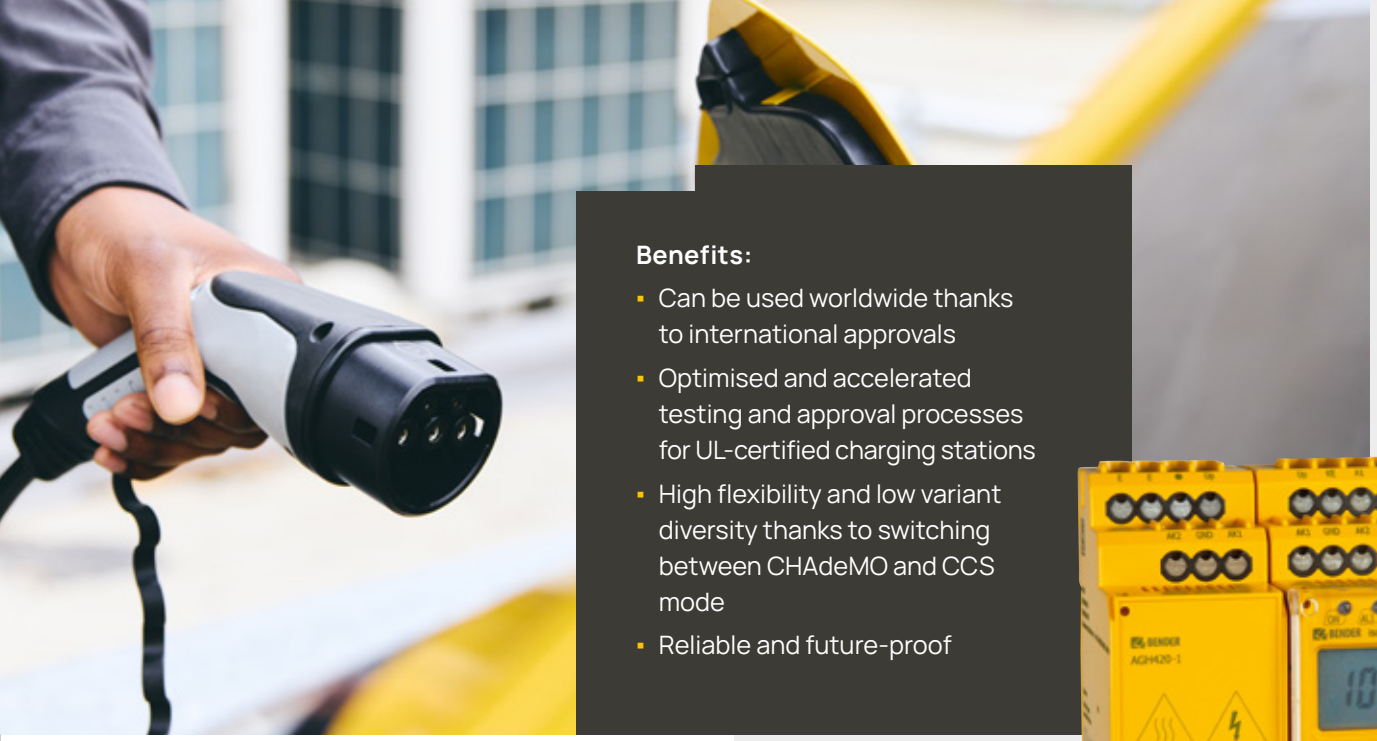
ISOMETER® isoCHA425HV with AGH420-1/AGH421-1

The ISOMETER® isoCHA425HV in combination with the AGH420-1/AGH421-1 coupling device monitors the insulation resistance for DC fast charging stations according to the CHAdeMO standard or according to the Combined Charging System (CCS) for nominal system voltage ranges between DC 0 V and 1000 V.

- Switchable between CCS (Combined Charging System) and CHAdeMO
- Nominal voltages up to DC 1000 V
- Detection of symmetrical and asymmetrical insulation faults
- Electrically isolated Modbus RTU interface
- Display of the fault location (DC-balanced)

Benefits:

- Only one device for use in all regions and applications
- Compact design for optimum utilisation of the available installation space
- High system reliability and availability of the charging station thanks to patented measuring method
- Cost-optimised installation thanks to reduced wiring effort and a wide range of communication interfaces



Benefits:

- Can be used worldwide thanks to international approvals
- Optimised and accelerated testing and approval processes for UL-certified charging stations
- High flexibility and low variant diversity thanks to switching between CHAdeMO and CCS mode
- Reliable and future-proof

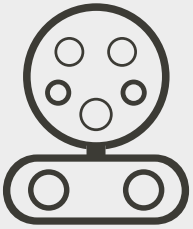
ISOMETER® isoCHA425HV
with AGH420-1

Standards

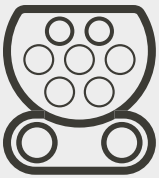
A high level of electrical safety is a priority for DC charging stations. In order to minimise the risk to the user, the ISOMETER® isoCHA425HV fulfils all the important requirements placed on the insulation monitoring device by the standards and regulations.

- IEC 61851-23:2023 ED2
- UL 2231-1 / -2
- EN 61557-8
- CCS1 (US) / CCS2 (Eur)
- CHAdeMO

CHAdeMO



CCS1



CCS2

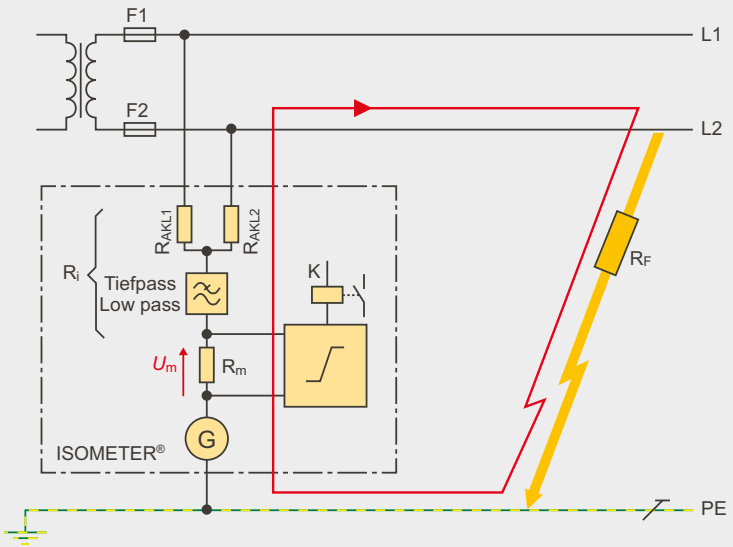
Measurement technology

Patented and reliable measuring methods ensure a high degree of safety and high availability of the DC charging station

- Detection of insulation faults up to 2 MΩ
- Maximum allowed system leakage capacitance of 20 µF – **Unique in the market**
- Active measuring method can detect symmetrical and asymmetrical insulation faults
- Voltage measurement with overvoltage and undervoltage detection
- Automatic device self-test with connection monitoring

Benefits:

- High system reliability
- High availability of the charging station
- Ideal for e-bus charging applications etc. thanks to high permissible leakage capacitance



Operating principle ISOMETER®

Form factor and connections

The demand for elegant and compact fast charging stations is on the rise. The ISOMETER® isoCHA425HV supports this trend with its compact design.

- Most compact design in the market:
  - Coupling device AGH420-1/AGH421-1: 36 mm x 93 mm (W x H)
  - ISOMETER® isoCHA425HV 36 mm x 93 mm (W x H)
- Flexible arrangement of insulation monitoring and coupling device
- Push-In wire connectors

Benefits:

- Optimum utilisation of the available installation space within the charging station
- Time savings during production thanks to fast wiring

"*With the isoCHA insulation monitor from Bender, our charging systems are safe and fulfil the current charging standards. With its high, permissible system leakage capacitances, it makes it possible to charge large electric vehicles.*"
Dr. Raoul Heyne,
ADS-TEC Energy, Senior Expert Charging

adstec Energy

Interfaces and communication

- RS-485
- Modbus RTU
- IsoData
- LC display
- Password protection against unauthorised parameter changes

Benefits:

- Quick and easy integration of the IMD in the charge controller using standard protocols
- Simple troubleshooting on site by means of the LC display

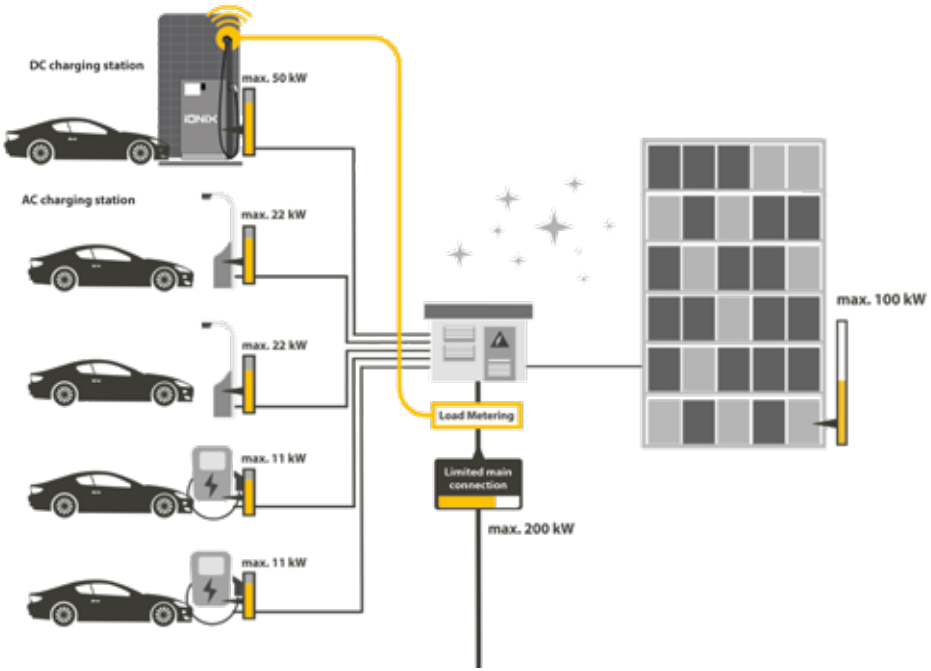
Coupling device AGH421-1

In fast charging stations with dynamic load distribution to two charging points, one IMD often has to be disconnected from the grid to avoid interference as long as the maximum power of a charging station is only made available to one vehicle.

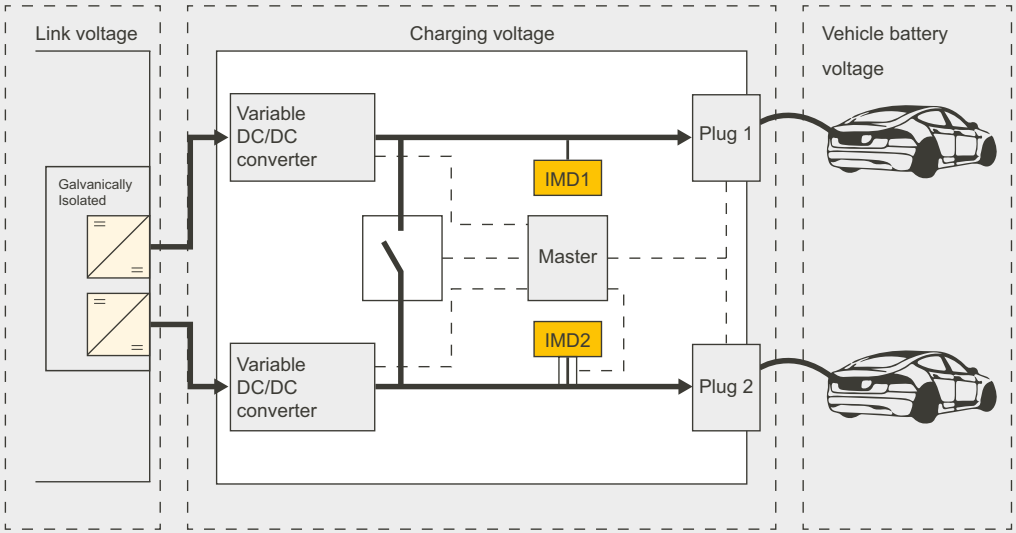
The new AGH421-1 coupling device in combination with the ISOMETER® isoCHA425HV enables disconnection from the grid without the installation of additional switching units.

Benefits:

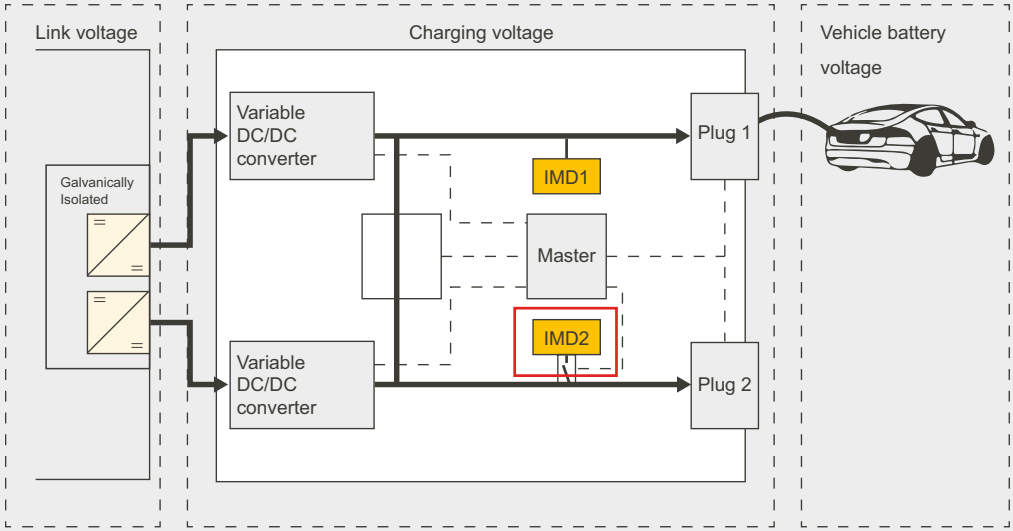
- Cost and space savings within the charging station by eliminating additional switching units
- Reduced wiring effort during the production process



Both IMDs are active



IMD 2 disconnected from the system to be monitored



The entire available power is used for charging one vehicle. IMD2 must be disconnected to avoid interference

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BENDER

Vehicle sensors – Insulation monitoring

ISOMETER® iso175
ISOMETER® IR155

Design the future of energy

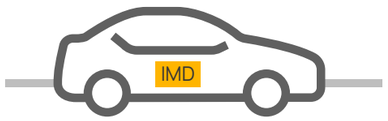
BENDER

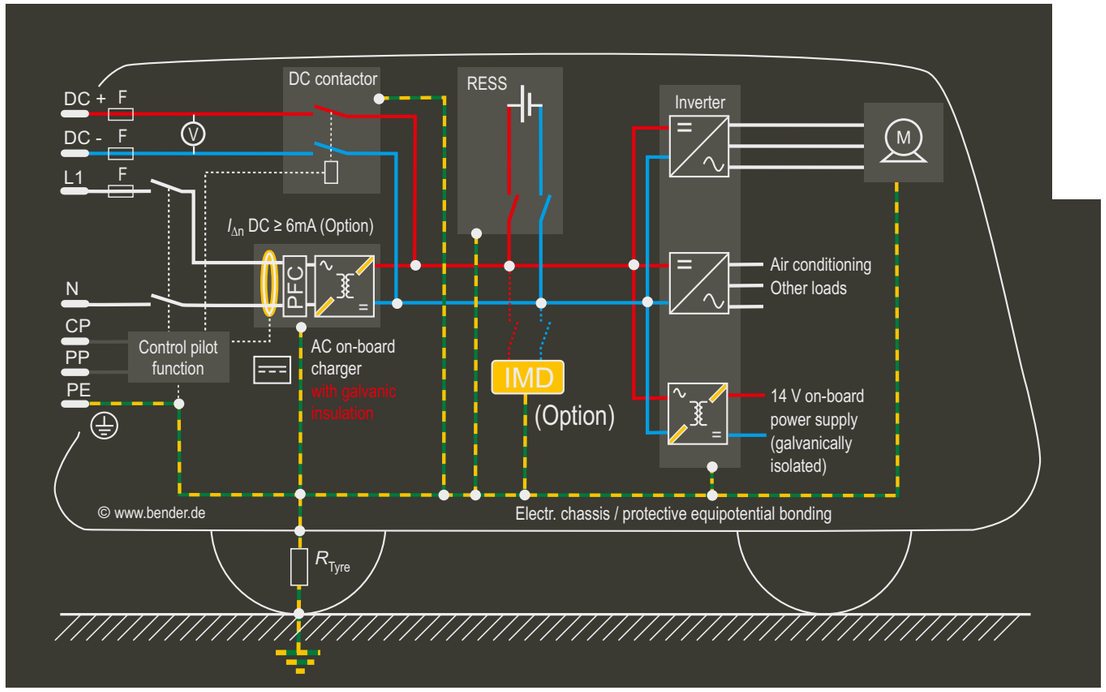
Insulation monitoring for electric and hybrid vehicles

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.

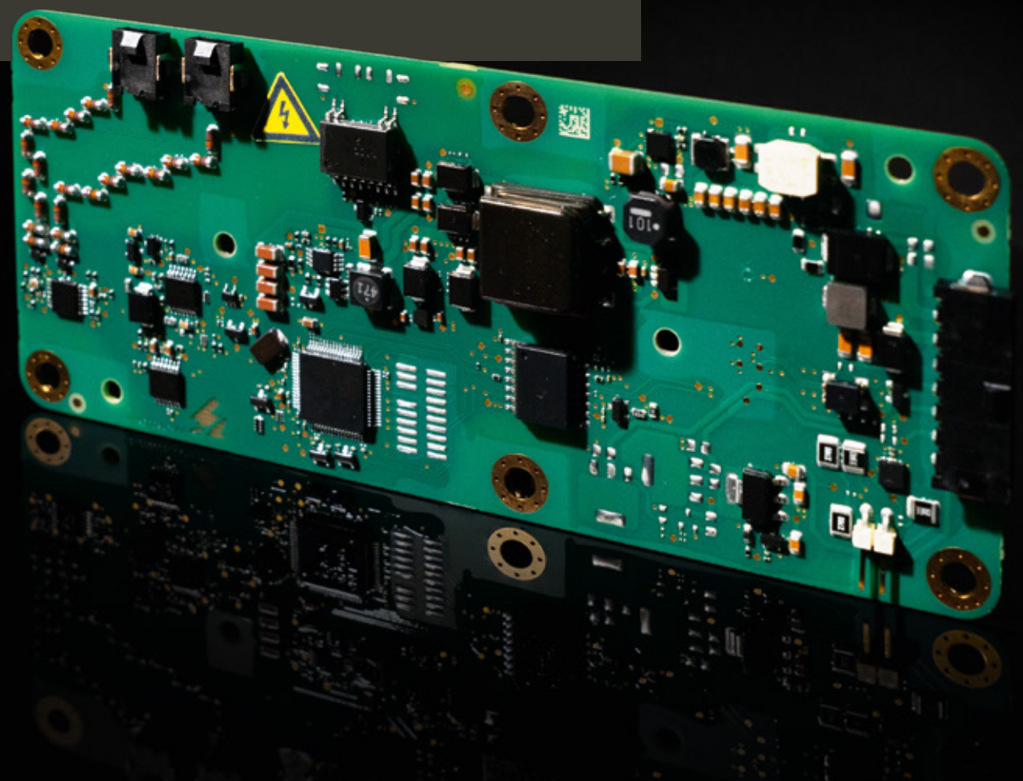
ISOMETER® iso**175**

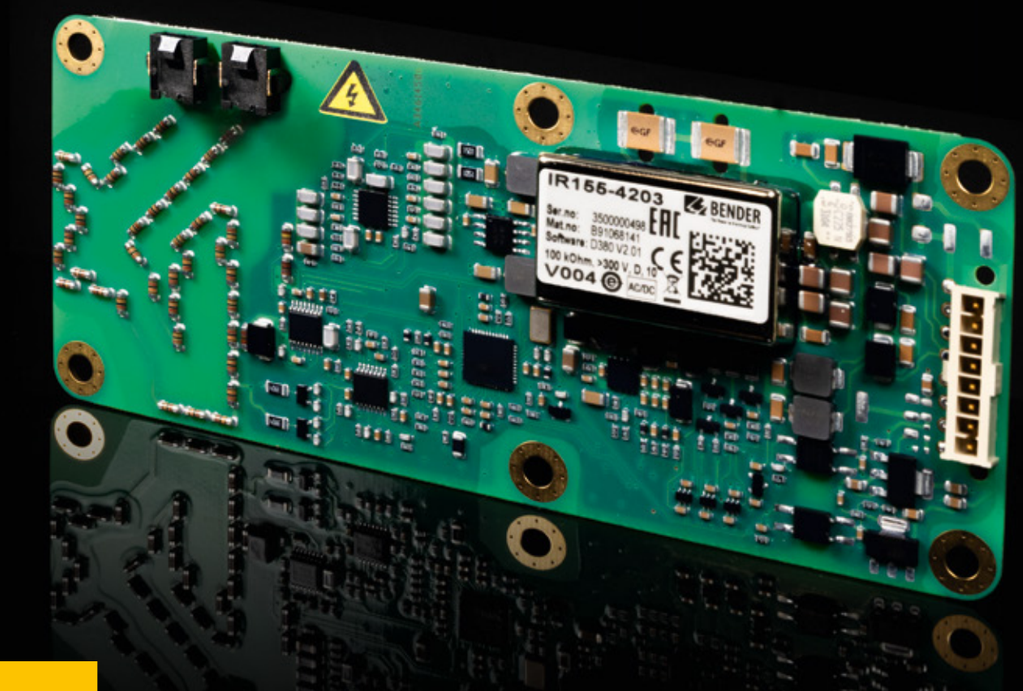
The ISOMETER® iso**175** is an insulation monitoring device for unearthed drive systems in hybrid and electric vehicles.

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® IR**155**

The ISOMETER® IR**155** 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

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

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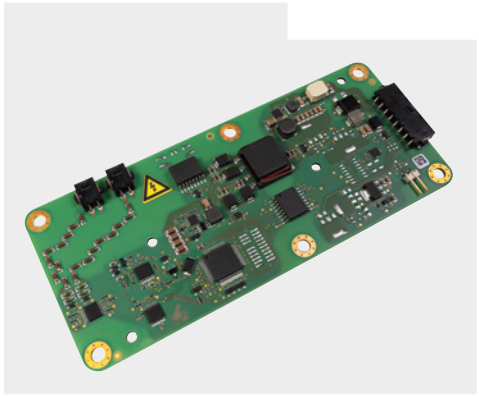
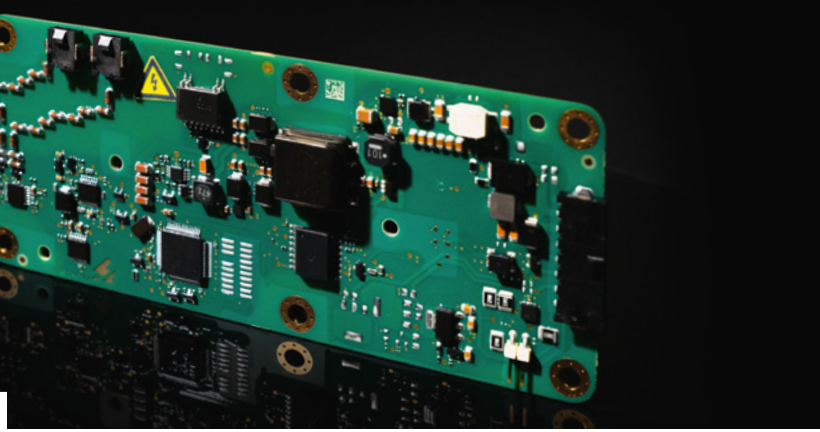
ISOMETER® iso175

Insulation monitoring for hybrid and electric vehicles

- Active measurement
- Patented technology
- Detection of symmetrical and unsymmetrical faults
- CAN interface
- Automatic adaptation to the system leakage capacitance (up to 10 µF depending on profile)
- Integrated self-diagnosis





Further product features of the iso175

- Insulation monitoring of AC and DC insulation faults for unearthed systems (IT systems) from DC 0 V...1000 V
- Integrated self-diagnosis
- Continuous measurement of the insulation resistance from 0 Ω...50 MΩ
- Detection of ground faults and HV connection loss
- Configurable undervoltage detection
- Quick start-up measurement
- Response time of ≤ 20 s for measured insulation resistance
- Galvanic separation of all signals from the HV side
- Integrated “Earthlift” for decoupling of the HV side

Bender eMobility solutions:

Standard-compliant solutions from the charging station to electric vehicle

- Vehicle sensors (insulation monitoring)
- Infrastructure sensors for AC and DC charging
- Charging technology/Charge controller

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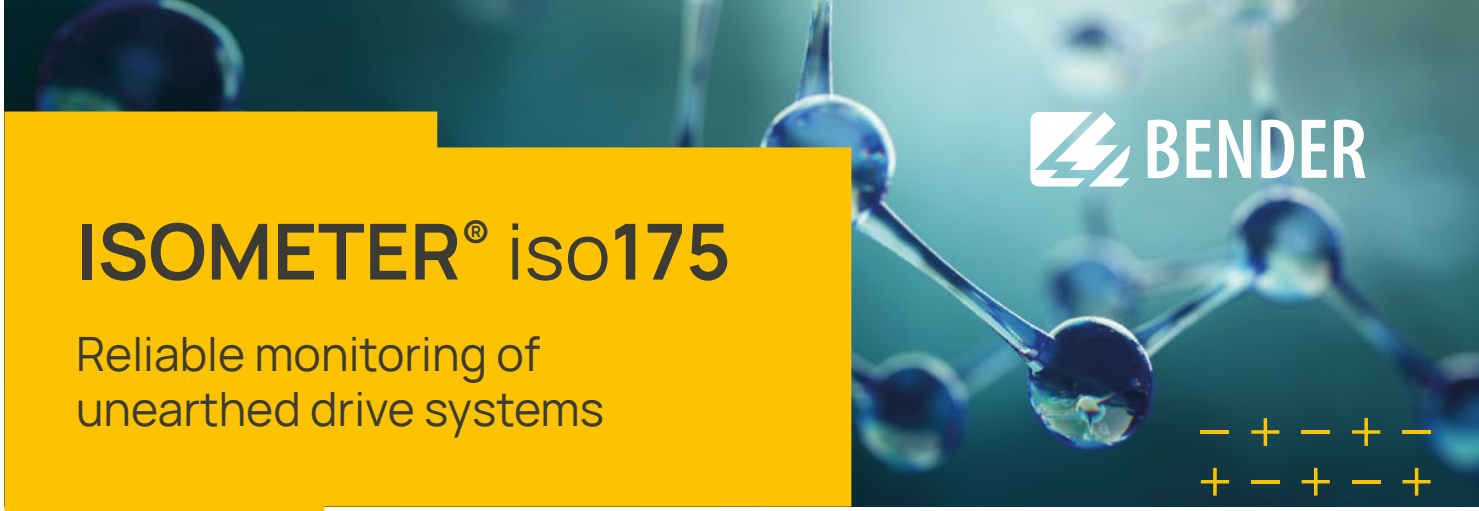
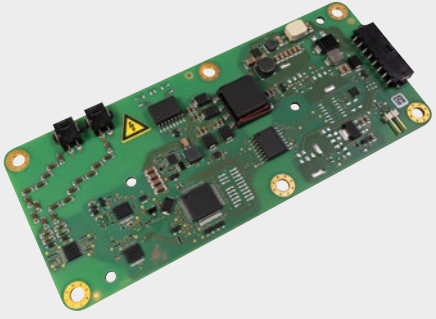


ISOMETER® iso175

Reliable monitoring of unearthed drive systems

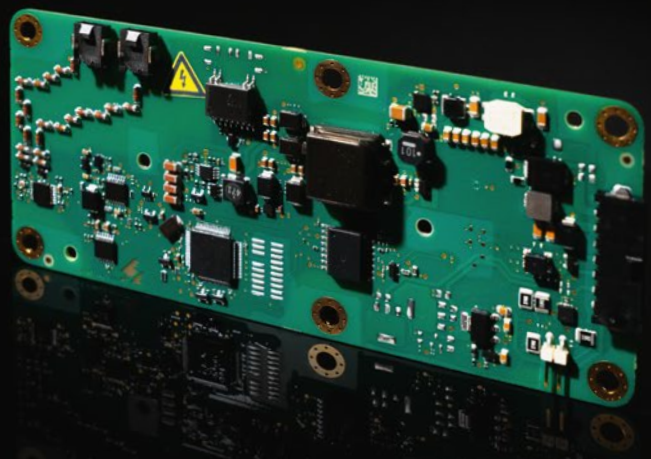
The ISOMETER® iso175 reliably monitors unearthed drive systems in hybrid, fuel cell and electric vehicles.

With patented measurement technology and simple integration via CAN interface, it ensures maximum safety and efficiency - even with voltage-free high-voltage systems and high system leakage capacitances.



Features

- Insulation measurement even when the state of the HV vehicle electrical system
- Maximum system leakage capacitance up to 10 µF
- Device disconnection via earth switch
- Numerous parameters, user adjustments and clear alarm messages available via CAN interface
- System adaptation possible through various profiles (e.g. quick start with low capacity / high capacity) capacity), disturbed
- Detection of insulation faults on the AC side from the DC link possible
- All outputs short-circuit proof
- HV connection monitoring
- Integrated self-diagnosis
- E1 Qualified



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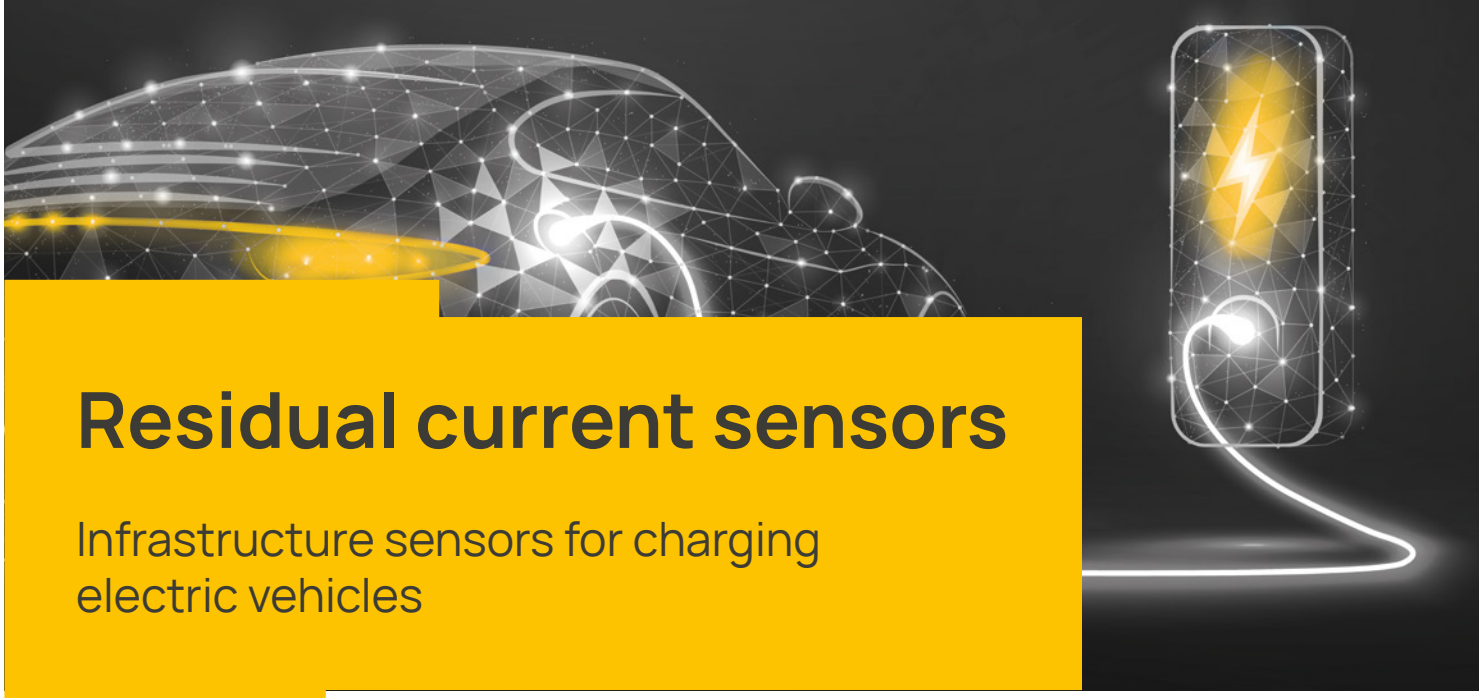


Residual current sensors

Infrastructure sensors for charging electric vehicles

A wide range of electrical safety solutions developed specifically for electric vehicle charging stations and IC-CPDs. The components are designed to be seamlessly integrated into the electronic control systems of electric vehicle safety equipment (EVSE).

BENDER

benvac®

Plug&Play, easy to use, sensing module for residual current monitoring

e. g. RCMB**121**

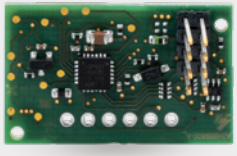
Chip-Set

Set of components for cost optimised residual current monitoring

e. g. RCMB**104** Chipset

PCB-Module

Highly flexible piggyback PCB design for residual current monitoring



e. g. RCMB**104**

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We are your eMobility partner!

- Safety while driving
- Safety while charging
- Control of the charging process

BENDER

Safety while driving

- Insulation monitoring for cars, racing cars and commercial vehicles
- Proven and active measurement method for determining the insulation resistance

Safety while charging

- Charge controllers for AC and DC charging
- Different application variants for charging
- Integrated dynamic load management
- Highly integrated circuit design:
  - Reduction of total system
  - Saves space in charging stations
- All safety components are on board

Control of the charging process

Residual fault current sensors for AC charging applications:

- IC-CPDs
- Charging stations/wallboxes
- IEC IEC 62752 and IEC 62955 compliant

Insulation monitoring devices (IMD) for DC charging stations:

- CCS/CHAdeMO compliant
- Nominal voltages up to DC 1000 V

CC613 Charge Controller Accessories

VDE certified

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Dynamic Load Management

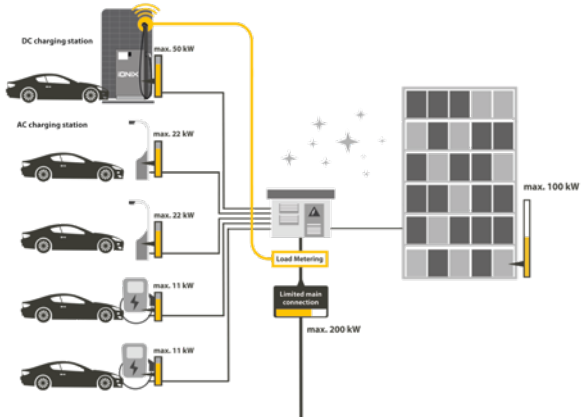
By Bender

The term load management refers to the control of electricity demand through the targeted switching on or off or regulation of electricity consumers.

Dynamic Load Management is integrated in Bender Controllers.

BENDER

Dynamic Load Management (DLM)



Features of Bender controllers with DLM:

- Dashboard with local live DLM monitoring
- Counting total available energy
- Connection to energy management systems
- Phase-individual load management
- Phase-inbalance prevention

Dynamic Load Management

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BENDER

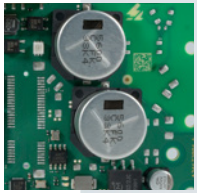
ICC1314

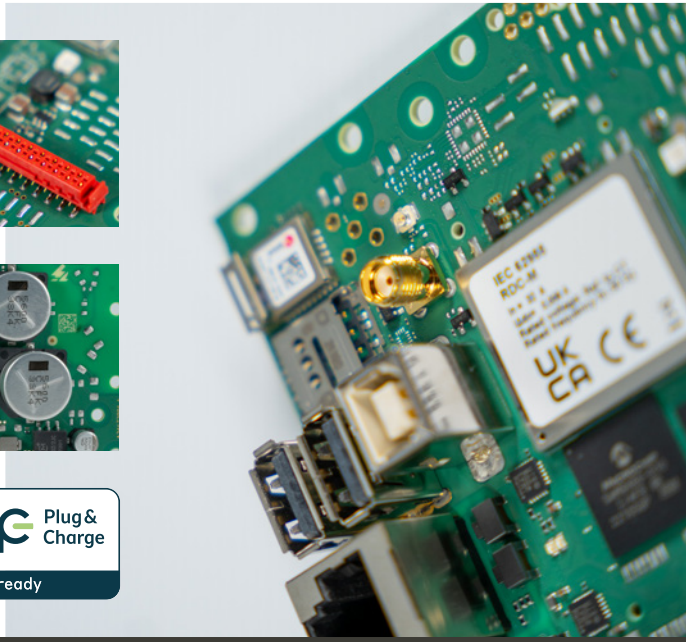
Charge controller for most compact EV-charging stations

- Single or dual charging station with Board Variant **Companion**
- Broad connectivity with LAN, WLAN and LTE
- Wide range of HMI available (including NFC, LEDs and RFID via USB connection)
- Very compact EV-charger with Bender's “Integrated Power Module” (IPM1300)
- Small PCB dimensions: 120mm x 130mm

The ICC1314 charge controller is the central element of a charging system and is designed for use with Bender IPM1xxx Power Modules.

Feature	ICC1314 Connect Plus G1	ICC1314 Companion G1
WiFi & 4G-modem	✓	—
USB (host)	2	1
Ethernet	2	—
Art. No.	B94060030	B94060031





- Web-based dashboard for easy configuration and monitoring
- App (IOS & Android)
- Rest API for enhanced integration
- Integrated Powerline Communication (PLC) according to ISO 15118, Plug & Charge certified
- Integrated solar charging and dynamic load management
- Multiple I/Os, interfaces and protocols (OCPP, Modbus, EEBus)

HUBJECT EVSE CHECK

Plug & Charge ready

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BENDER

HCC**1401**

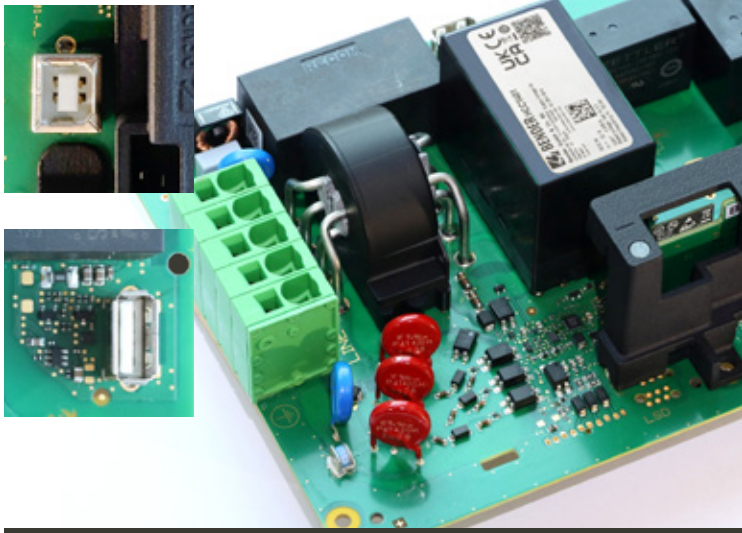
The charge controller for efficient solar charging

- For charging stations focussing on PV surplus charging scenarios
- Single-board solution with all necessary components: from 32 A power relay to integrated protection and monitoring systems
- Integrated web UI and app for the simplest operation
- Supports energy management systems and HEMS
- Enables the use of solar power and grid-friendly control
- Regular software updates for future-proof use

The HCC1401 is perfectly suited for combining a vehicle charging station with a domestic photovoltaic system. The integrated phase cut-off enables the efficient use of self-generated electricity, even when not all PV power is available. Its intuitive web interface and APP make it easy to select the different charging modes available.

Product benefits

- 22 kW (32 A) power relay for single-phase to three-phase connections
- Phase switching for efficient solar charging
- Integrated DC power supply
- Integrated solution for DC fault monitoring
- Overvoltage protection (SPD) and PE monitoring
- Comprehensive phase monitoring
- Wi-Fi, Modbus (RTU) and USB interfaces
- Monitoring of temperature, rotating field, phase and mains frequency
- Dimensions: 150 mm x 200 mm



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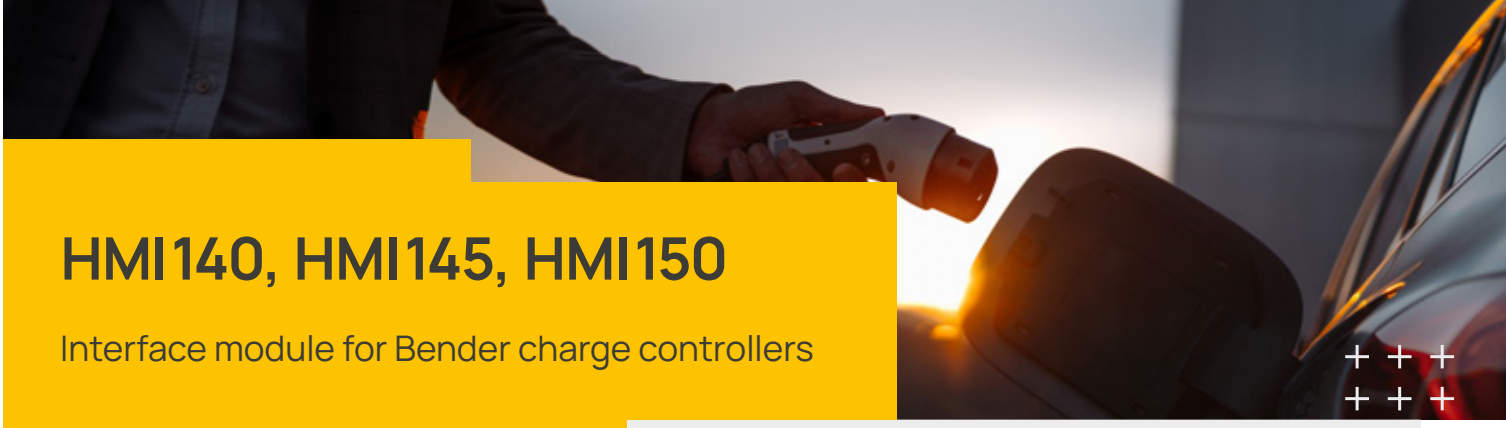

HMI140, HMI145, HMI150

Interface module for Bender charge controllers

The intelligent interface for communication between the charging station and user. The HMI module adds digital inputs and outputs, sensors and RFID / NFC communication interfaces to the charge controller. It enables the user to interact with the charging system.

Highlights*

- RFID reader to authorise the charging process
- 11 x RGB LEDs and fully controllable RGB LED outputs/drivers
- WiFi module
- Interface extensions such as USB, relay output and digital control inputs
- Compatible to all Bender Charge Controller variants with USB
- Integrated sensors for ambient light and temperature
- Dimensions: 80 mm x 100 mm; compact and flexible in use

*depending on variant

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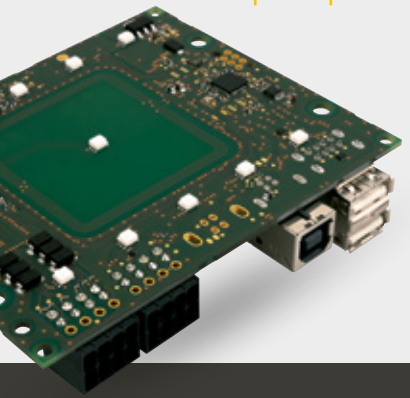
Variant overview



Feature	HMI150	HMI145	HMI140
RFID / NFC reader with improved antenna	✓	✓	✓
Programmable RGB LEDs (5+1+5)	✓	✓	✓
WiFi 3 receiver and/or accesspoint	✓	–	–
Buzzer	✓	✓	–
Light and temperature sensors	✓	–	–
USB host	2	2	–
Additional output relay	1	1	1
Additional digital input	1	1	1
Connection for external RGB LED	1	1	–
Connection via USB	✓	✓	✓
Art. No.	B94060150	B94060151	B94060152

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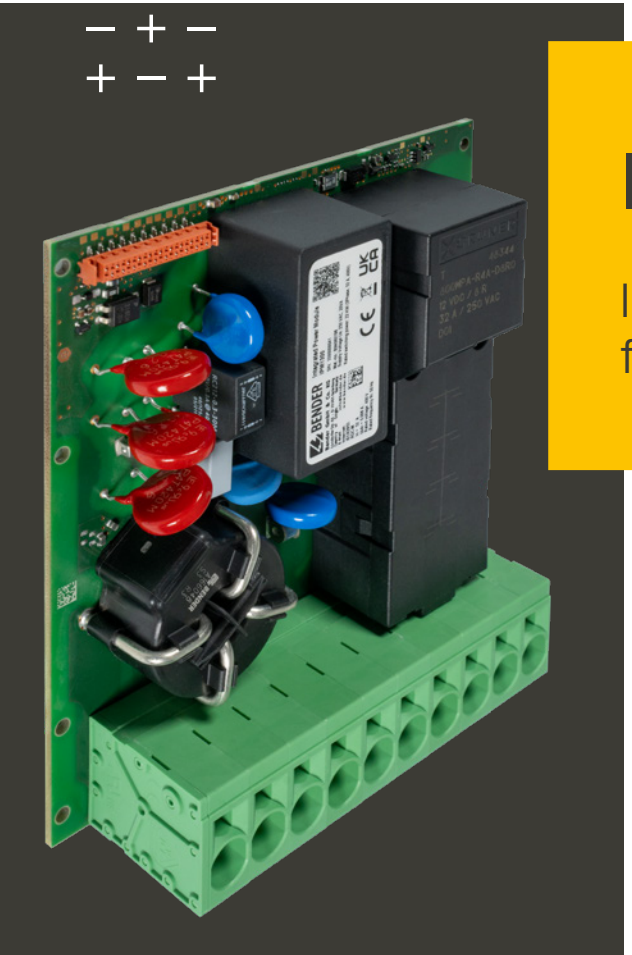
IPM1300

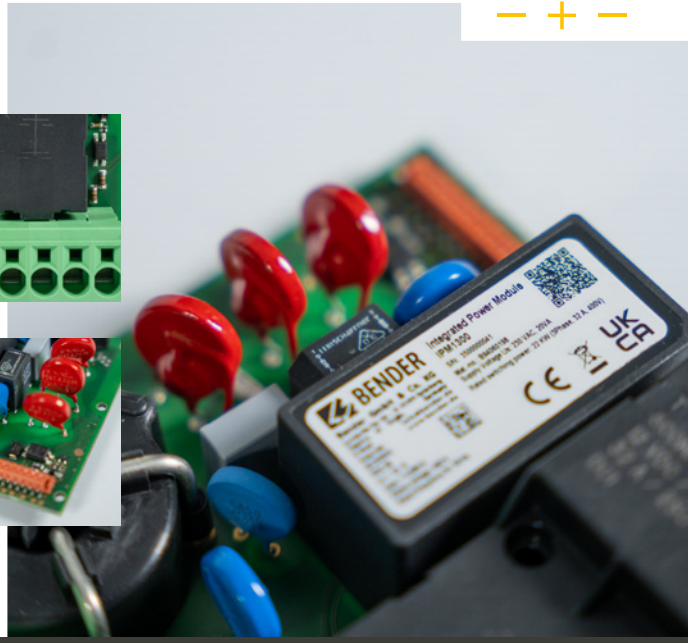
Integrated Power Module for small EV charging stations



- 22 kW (32A/400V) power contactor
- Surge Protection Device (SPD)
- Integrated DC power supply
- Integrated residual current transformer for DC fault current monitoring
- Integrated temperature sensors and PE monitoring
- Dimensions: 120 mm x 132 mm x 34 mm

The IPM1300 integrated power module is a component for the set-up of Mode 3 charging stations for electric vehicles (EV). It is intended exclusively for use with following Bender charge controllers as an optional accessory.

Type	Part No.
ICC1314- Connect Plus G1	B94060030
ICC1314- Companion G1	B94060031



Product benefits

- Integrated DC power supply
- Fault current detection
- PE connection monitoring
- 3-phase system monitoring
- Temperature sensors
- Weld check monitoring

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2253en /10.2024