

## Product overview

# ISOMETER<sup>®</sup>

Insulation monitoring devices  
for industrial applications

# ISOSCAN<sup>®</sup>

EDS insulation fault  
location systems

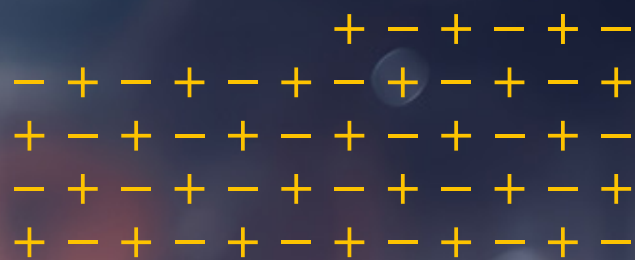


Design the future  
of energy



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# Unearthed power supply systems



Reporting critical operating states to avoid unwanted events, such as interruptions to operation, costly damage to property or even physical injuries.

## **Safe power supply**

To ensure electrical safety for man and machine in an efficient way on a long-term basis, Bender offers insulation monitoring devices for all key industries. In particular, these devices are used anywhere where a safe power supply is an essential requirement to prevent installation failure, eliminate the risk of serious or fatal injuries and avoid damage to property.

## **Top-level productivity and maximum safety for man and machine**

With Bender insulation monitoring devices for unearthed power supplies (IT systems) you are already using state-of-the-art technology in terms of reliability, measurement methods and design. Along with precise measurement equipment, the ISOMETER®s provide many functions for early detection and quality assurance with user-friendly and intuitive operation, reliable evaluation and diverse communication possibilities.



### **Fast localisation of insulation faults**

Bender insulation fault location systems enable fast localisation and elimination of insulation faults even during operation. Disconnection of the installation is not required. Portable Bender solutions facilitate the use in large installations with sub-distributions.

For more than 75 years, Bender has been a name for advanced technology using the latest "Made in Germany" measurement equipment and outstanding technical expertise. Trust the technology from the inventor of the ISOMETER®!

### **Industry-specific solutions for**

- Photovoltaic systems
- Installations with a low-resistance insulation level
- Deenergised loads
- Railway – Infrastructure & rolling stock
- Mobile generators



# IT systems

## Information ahead of time

### Modern power supplies require maximum availability, safety and predictive information

Given the wide variety of production processes, continuous competitive pressure, the impact of soaring costs and operational availability around the clock, the maximum possible level of electrical safety for power supplies is required. Even with careful planning, execution and maintenance, electrical installations may nevertheless be impaired by factors such as humidity, ageing, dirt, mechanical damage, to mention but a few. Undetected insulation faults can be disastrous and costly, especially when factors such as production failure, repairs, device replacement or even unplanned service work are counted.

### The aim: reduce costs – increase availability

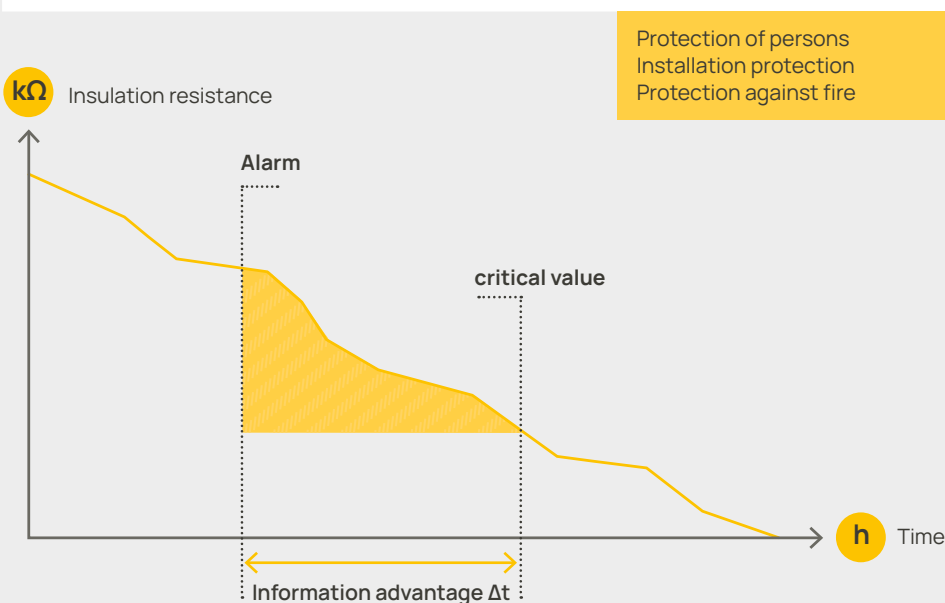
The aim of every plant operator should be to detect malfunctions at an early stage and eliminate the causes economically in order to achieve optimal installation and operational reliability and ultimately reduce costs significantly. To achieve this objective, a possible solution is the use of unearthed power supplies (IT systems) with insulation monitoring.



In IT systems, none of the active conductors is directly connected to earth. Therefore, on the occurrence of an insulation fault, only a small leakage current, essentially caused by system leakage capacitances, can flow.

The upstream fuse does not trip, hence continuous power supply and operation is ensured. Prompt information about possible hazards is given by the ISOMETER®, which continuously monitors the insulation resistance between the system and earth.

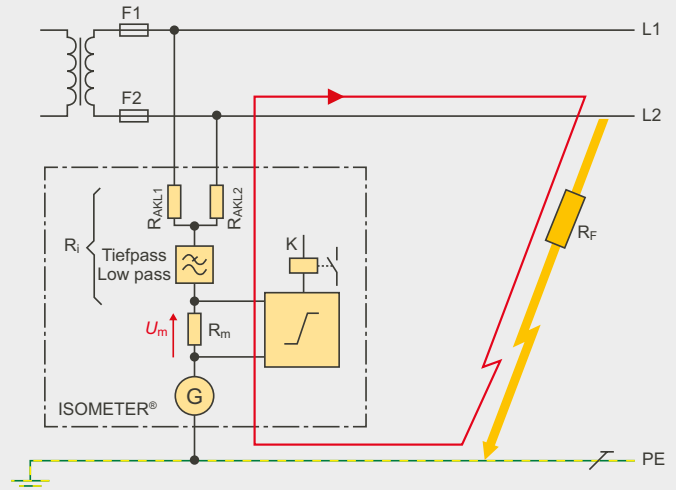
Information advantage through the ISOMETER®



## ISOMETER®: a wide variety of solutions for all types of IT systems

For the whole range of electrical power supplies, Bender provides appropriate solutions for most applications. Taking all types of system structures and loads into account, ISOMETER®s using Bender's patented measuring principles guarantee reliable evaluation of the insulation resistance for:

- Nominal system voltages AC, DC or AC/DC up to 15.5 kV
- System types 1ph, 3ph, deenergised loads
- System leakage capacitances up to 4000  $\mu\text{F}$
- Response values in various device variants from 10  $\Omega$  to 3 G $\Omega$



Operating principle ISOMETER®

### IT systems – information ahead of time

ISOMETER®s in IT systems are an effective means of damage prevention, they enable increased productivity and optimised maintenance, which in turn lead to considerable reduction in costs. Bender's wide range of products allows the implementation of individual safety solutions and safeguards your investment.



#### Optimised maintenance

- Early detection and reporting of insulation degradation
- Automatic localisation of faulty current paths
- Optimised use of time and personnel resources
- Centralised information about the installation status
- Remote diagnosis via Internet/Ethernet



#### Increased fire protection

- Early detection of gradually developing insulation faults
- Minimising fault arcs as a common cause of fire
- Separating areas prone to explosions and fire from the rest of the system via isolating transformers and monitoring these areas separately



#### Improved economic efficiency

- Avoiding expensive and unplanned installation shutdowns
- Reducing time and staff expenses for maintenance
- Detecting weak points in installations
- Support of investment decisions



#### Increased operational reliability

- No interruption to operation at the first fault
- No control malfunction in the event of insulation faults
- Electrical installations are kept at a high level of availability
- Monitoring electrical installations and loads even when not in operation



#### Enhanced accident prevention

- Low touch currents in small and medium-sized installations
- No malfunction in control systems of installations and machines due to an earth fault



#### Higher earthing resistances

- Higher earthing resistances permissible, for example, for mobile power supplies

# ISOMETER® insulation monitoring devices

## Maximum operational reliability in main circuits

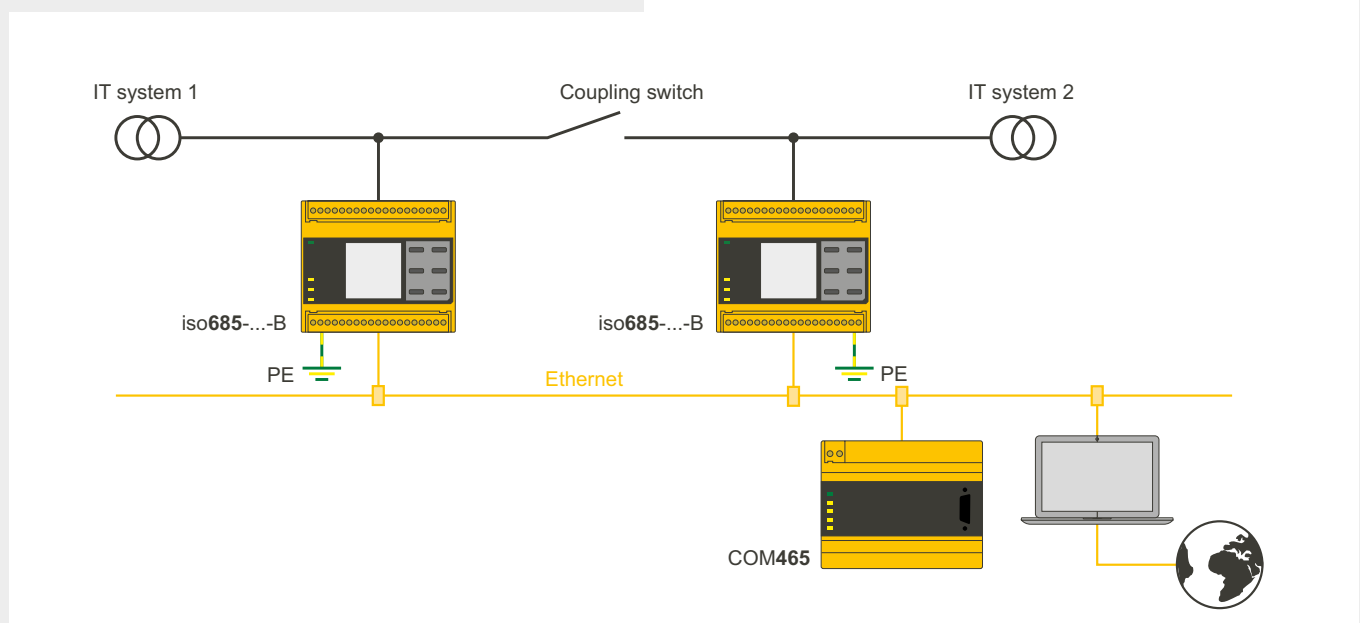
|  |                                   | ISOMETER®<br>iso685-...                 | ISOMETER®<br>iso685-...-B               | ISOMETER®<br>iso685-...-P               | ISOMETER®<br>isoNAV685-D                                             | ISOMETER®<br>isoNAV685-D-B              | ISOMETER®<br>isoHR685W-...-B                    |
|-----------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|----------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------|
| Application                                                                       |                                   |                                         |                                         |                                         | Quick response to combined resistance and offset voltage measurement | Deenergised loads/ frequency converters | High-resistance insulation measurement          |
| Circuits                                                                          | Control circuits                  | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
|                                                                                   | Auxiliary circuits                | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
|                                                                                   | Main circuits                     | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
| Voltage system                                                                    | 3(N)AC                            | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
|                                                                                   | AC                                | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
|                                                                                   | AC/DC                             | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
|                                                                                   | DC                                | ✓                                       | ✓                                       | ✓                                       | —                                                                    | ✓                                       | ✓                                               |
| Nominal system voltage $U_n$                                                      |                                   | AC/3(N)AC<br>0...690 V<br>DC 0...1000 V | AC/3(N)AC<br>0...690 V<br>DC 0...1000 V | AC/3(N)AC<br>0...690 V<br>DC 0...1000 V | AC/3(N)AC<br>0...690 V (60 Hz)                                       | AC 0...690 V<br>DC 0...1000 V           | AC 0...1000 V<br>3AC 0...690 V<br>DC 0...1300 V |
| Tolerance of $U_n$                                                                |                                   | +15 %                                   | +15 %                                   | +15 %                                   | +15 %                                                                | —                                       | +15 %                                           |
| System leakage capacitance $C_e$                                                  |                                   | ≤ 1000 µF                               | ≤ 1000 µF                               | ≤ 1000 µF                               | ≤ 1000 µF                                                            | ≤ 1000 µF                               | ≤ 1000 µF                                       |
| Response value $R_{an}$                                                           |                                   | 1 kΩ...10 MΩ                            | 1 kΩ...10 MΩ                            | 1 kΩ...10 MΩ                            | 1 kΩ...10 MΩ                                                         | 1 kΩ...10 MΩ                            | 1 kΩ...3 GΩ                                     |
| Coupled systems                                                                   |                                   | —                                       | ✓                                       | ✓                                       | —                                                                    | —                                       | ✓                                               |
| Locating current injector for insulation fault location                           |                                   | —                                       | —                                       | ✓                                       | —                                                                    | —                                       | —                                               |
| Mounting                                                                          | DIN rail                          | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
|                                                                                   | Screw mounting                    | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
|                                                                                   | Panel mounting/<br>wall fastening | ✓                                       | ✓                                       | ✓                                       | —                                                                    | —                                       | ✓                                               |
| Interface                                                                         | Web server                        | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
|                                                                                   | Modbus                            | TCP/RTU                                 | TCP/RTU                                 | TCP/RTU                                 | TCP                                                                  | TCP                                     | TCP                                             |
|                                                                                   | BCOM                              | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
|                                                                                   | BS                                | ✓                                       | ✓                                       | ✓                                       | ✓                                                                    | ✓                                       | ✓                                               |
|                                                                                   | isoData                           | ✓                                       | ✓                                       | ✓                                       | —                                                                    | —                                       | ✓                                               |

## Ordering information

| Type                                   | Supply voltage $U_s$                          | Nominal system voltage $U_n$                       | Panel mounting | Option "W" <sup>1)</sup> | Art. No.   |
|----------------------------------------|-----------------------------------------------|----------------------------------------------------|----------------|--------------------------|------------|
| iso685-D                               | AC 24...240 V<br>50...400 Hz<br>DC 24...240 V | AC/3(N)AC 0...690 V<br>1...460 Hz<br>DC 0...1000 V | —              | —                        | B91067010  |
| iso685W-D <sup>1)</sup>                |                                               |                                                    | —              | -40...+70 °C, 3K23, 3M12 | B91067010W |
| iso685-S + FP200                       |                                               |                                                    | ✓              | —                        | B91067210  |
| iso685W-S + FP200W <sup>1)</sup>       |                                               |                                                    | ✓              | -40...+70 °C, 3K23, 3M12 | B91067210W |
| iso685-D-B                             |                                               |                                                    | —              | —                        | B91067020  |
| iso685W-D-B <sup>1)</sup>              |                                               |                                                    | —              | -40...+70 °C, 3K23, 3M12 | B91067020W |
| iso685-S-B + FP200                     |                                               |                                                    | ✓              | —                        | B91067220  |
| iso685W-S-B + FP200W <sup>1)</sup>     |                                               |                                                    | ✓              | -40...+70 °C, 3K23, 3M12 | B91067220W |
| iso685-D-P                             |                                               |                                                    | —              | —                        | B91067030  |
| iso685W-D-P <sup>1)</sup>              |                                               |                                                    | —              | -40...+70 °C, 3K23, 3M12 | B91067030W |
| iso685-S-P + FP200                     |                                               |                                                    | ✓              | —                        | B91067230  |
| iso685W-S-P + FP200W <sup>1)</sup>     |                                               |                                                    | ✓              | -40...+70 °C, 3K23, 3M12 | B91067230W |
| isoNAV685-D                            |                                               | AC/3(N)AC 0...690 V (60 Hz)                        | —              | —                        | B91067014  |
| isoNAV685-D-B                          |                                               | AC 0...690 V<br>DC 0...1000 V                      | —              | —                        | B91067024  |
| isoHR685W-D-I-B <sup>1)</sup>          |                                               | AC 0...1000 V<br>3AC 0...690 V<br>DC 0...1300 V    | —              | -40...+70 °C, 3K23, 3M12 | B91067025W |
| isoHR685W-S-I-B + FP200W <sup>1)</sup> |                                               |                                                    | ✓              | -40...+70 °C, 3K23, 3M12 | B91067225W |

<sup>1)</sup> Increased shock and vibration resistance 3K23 and 3M12

## Application example for coupled systems



# ISOMETER® insulation monitoring devices

Maximum operational reliability in control and auxiliary circuits

|                                  |                             |  <br><b>ISOMETER®<br/>iso415R</b> | <br><b>ISOMETER®<br/>IR420-D4</b> | <b>ISOMETER®<br/>IR425</b> |
|----------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------|
| Circuits                         | Control circuits            | ✓                                                                                                                                                                                                   | ✓                                                                                                                    | ✓                          |
|                                  | Main circuits               | —                                                                                                                                                                                                   | —                                                                                                                    | —                          |
| Voltage system                   | 3(N)AC                      | ✓                                                                                                                                                                                                   | —                                                                                                                    | —                          |
|                                  | AC                          | ✓                                                                                                                                                                                                   | ✓                                                                                                                    | ✓                          |
|                                  | AC/DC                       | ✓                                                                                                                                                                                                   | —                                                                                                                    | ✓                          |
|                                  | DC                          | ✓                                                                                                                                                                                                   | —                                                                                                                    | ✓                          |
| Nominal system voltage $U_n$     |                             | 3(N)AC/AC 0...415 V<br>DC 0...400 V                                                                                                                                                                 | AC 0...300 V                                                                                                         | AC/DC 0...300 V            |
| Tolerance of $U_n$               |                             | AC +15%<br>DC +25%                                                                                                                                                                                  | —                                                                                                                    | —                          |
| Frequency range $f_n$            |                             | DC 42...460 Hz                                                                                                                                                                                      | AC 42...460 Hz                                                                                                       | AC/DC 15...460 Hz          |
| System leakage capacitance $C_e$ |                             | $\leq 25 \mu\text{F}$                                                                                                                                                                               | $\leq 20 \mu\text{F}$                                                                                                | $\leq 20 \mu\text{F}$      |
| Response value                   | Response value $R_{an}$     | 5 k $\Omega$ ...1 M $\Omega$                                                                                                                                                                        | 1...200 k $\Omega$                                                                                                   | 1...200 k $\Omega$         |
|                                  | Alarm contacts              | 1 changeover contact                                                                                                                                                                                | 2 changeover contacts                                                                                                | 2 changeover contacts      |
|                                  | Operating principle         | N/O or N/C operation                                                                                                                                                                                | N/O or N/C operation                                                                                                 | N/O or N/C operation       |
|                                  | Response time $t_{an}^{1)}$ | $\leq 6 \text{ s}$                                                                                                                                                                                  | $\leq 1 \text{ s}$                                                                                                   | $\leq 2 \text{ s}$         |
|                                  | Start-up delay $t$          | 0...1800 s                                                                                                                                                                                          | 0...10 s                                                                                                             | 0...10 s                   |
|                                  | Response delay $t_{on}$     | 0...1800 s                                                                                                                                                                                          | 0...99 s                                                                                                             | 0...99 s                   |
| Display                          | LC display                  | —                                                                                                                                                                                                   | ✓                                                                                                                    | ✓                          |
|                                  | Power On LED                | ✓                                                                                                                                                                                                   | ✓                                                                                                                    | ✓                          |
|                                  | Alarm LEDs                  | ✓                                                                                                                                                                                                   | ✓                                                                                                                    | ✓                          |
| Mounting                         | DIN rail                    | ✓                                                                                                                                                                                                   | ✓                                                                                                                    | ✓                          |
|                                  | Screw mounting              | ✓                                                                                                                                                                                                   | ✓                                                                                                                    | ✓                          |

<sup>1)</sup> at  $R_f = 0.5 \times R_{an}$  and  $C_e = 1 \mu\text{F}$

## Ordering information

| Type       | Nominal voltage $U_n$                                  | Supply voltage $U_s^{2)}$              | Art. No.            |                    |
|------------|--------------------------------------------------------|----------------------------------------|---------------------|--------------------|
|            |                                                        |                                        | Screw-type terminal | Push-wire terminal |
| iso415R-24 | 3(N)AC/AC 0...415 V/DC 0...400 V                       | DC 24 V (unearthed)                    | —                   | B71602000          |
| iso415R-2  | (3)AC 100...240 V/3(N)AC 100...415 V<br>DC 100...240 V | AC/DC 100 ... 240 V                    | —                   | B71603000          |
| IR420-D4-1 | AC 0...300 V/42...460 Hz                               | AC 16...72 V/42...460 Hz/DC 9.6...94 V | B91016409           | B71016409          |
| IR420-D4-2 |                                                        | AC/DC 70...300 V/DC 42...460 Hz        | B91016405           | B71016405          |
| IR425-D4-1 | AC/DC 0...300 V/15...460 Hz                            | AC 16...72 V/5...460 Hz/DC 9.6...94 V  | B91036403           | B71036403          |
| IR425-D4-2 |                                                        | AC/DC 70...300 V/DC 15...460 Hz        | B91036402           | B71036402          |

<sup>2)</sup> Absolute values



In localised areas, such as machine control systems or safety lighting, where space is limited, control and auxiliary circuits provide additional functions, e.g. command output, interlocking, signalling and measuring. Operational reliability is the main focus of these circuits. Control circuits are restricted in terms of space, e.g. machine controls or safety lighting.

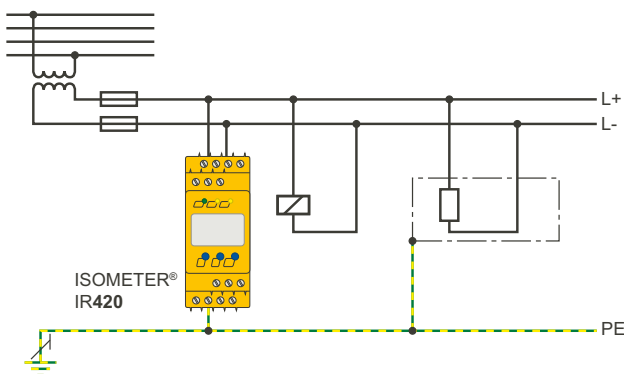
### Bender Connect App

The Bender Connect App is a straightforward solution that allows you to conveniently parameterise our latest devices.

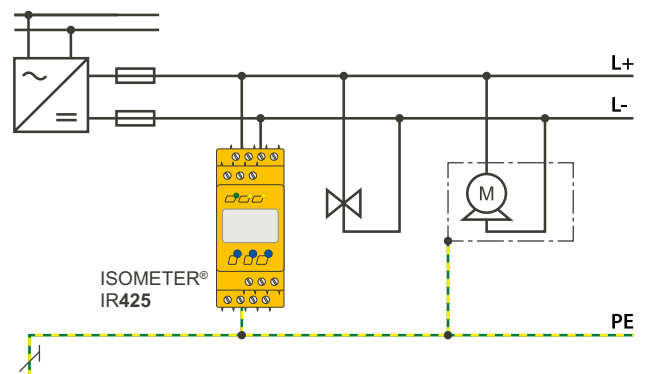
- Reading in energised state
- Parameter setting in deenergised state
- Device documentation (PDF documentation of the set parameters)
- Backup of the devices



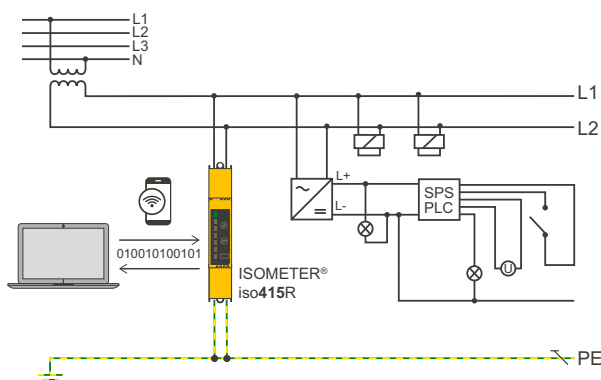
### Application examples



AC control circuit with IR420



DC control circuit with IR425



AC/DC control circuit with iso415R-2

# ISOMETER® insulation monitoring devices

## For main circuits with particular requirements

|                                                                                   |                  |                                |                                |                               |
|-----------------------------------------------------------------------------------|------------------|--------------------------------|--------------------------------|-------------------------------|
|  |                  | ISOMETER®<br>iso1685DP         | ISOMETER®<br>isoHV1685D        | ISOMETER®<br>isoLR1685DP      |
| Circuits                                                                          | Control circuits | —                              | —                              | —                             |
|                                                                                   | Main circuits    | ✓                              | ✓                              | ✓                             |
| Voltage system                                                                    | 3(N)AC           | —                              | —                              | —                             |
|                                                                                   | AC               | ✓                              | ✓                              | ✓                             |
|                                                                                   | AC/DC            | ✓                              | ✓                              | ✓                             |
|                                                                                   | DC               | ✓                              | ✓                              | ✓                             |
| Nominal system voltage $U_n$                                                      |                  | AC 0...1000 V<br>DC 0...1500 V | AC 0...2000 V<br>DC 0...3000 V | AC 0...690 V<br>DC 0...690 V  |
| Tolerance of $U_n$                                                                |                  | AC +10 %<br>DC +5%             | AC +10 %<br>DC +5%             | AC +10 %<br>DC +5%            |
| System leakage capacitance $C_e$                                                  |                  | $\leq 2000 \mu\text{F}$        | $\leq 2000 \mu\text{F}$        | $\leq 2000 \mu\text{F}$       |
| Response value $R_{an}$                                                           |                  | 200 $\Omega$ ...1 M $\Omega$   | 200 $\Omega$ ...1 M $\Omega$   | 20 $\Omega$ ...100 k $\Omega$ |
| Coupled systems                                                                   |                  | ✓                              | ✓                              | ✓                             |
| Mounting                                                                          | DIN rail         | —                              | —                              | —                             |
|                                                                                   | Screw mounting   | ✓                              | ✓                              | ✓                             |
| Interface                                                                         | Modbus           | RTU                            | RTU                            | RTU                           |
|                                                                                   | BMS              | ✓                              | ✓                              | ✓                             |
|                                                                                   | isoData          | —                              | —                              | —                             |

### Ordering information

| Type            | Supply voltage $U_s$ <sup>1)</sup> | Response value range          | Nominal voltage $U_n$          | Art. No.  |
|-----------------|------------------------------------|-------------------------------|--------------------------------|-----------|
| iso1685DP-425   | DC 18...30 V                       | 200 $\Omega$ ...1 M $\Omega$  | AC 0...1000 V<br>DC 0...1500 V | B91065802 |
| isoHV1685D-425  |                                    |                               | AC 0...2000 V<br>DC 0...3000 V | B91065805 |
| isoLR1685DP-325 |                                    | 20 $\Omega$ ...100 k $\Omega$ | AC 0...690 V<br>DC 0...690 V   | B91065803 |

<sup>1)</sup> Absolute values

Main circuits provide the power supply for electrical installations, machines or buildings. These circuits include equipment for generating, converting, distributing, switching and consuming electrical energy. A distinction should be made between the following loads: pure AC loads (e.g. motors), AC/DC loads containing electronic components (e.g. converters) and pure DC loads (e.g. battery systems).

#### **Insulation monitoring devices for inductive heating**

Due to the water cooling and the design of the inductor, experience has shown that the insulation resistance of the systems is rather low during inductive heating and often lies in the range of a few  $10\ \Omega$  to a few  $k\Omega$ . To monitor the insulation as recommended in VDE0100-410 or IEC 60364-4-41, appropriate insulation monitoring devices are required for these applications. We offer insulation monitoring devices that can measure very low resistance levels, such as the isoLR1685DP.



# Special applications

## Detect malfunctions in large-scale photovoltaic systems in time

| Area of use                      |                  | Photovoltaics                                                                     |                                                                                   |                                                                                     |                                                                                     |
|----------------------------------|------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                  |                  |  |  |  |  |
|                                  |                  | ISOMETER®<br>isoPV                                                                | ISOMETER®<br>isoPV425                                                             | ISOMETER®<br>isoPV1685RTU                                                           | ISOMETER®<br>isoPV1685DP                                                            |
| Circuits                         | Control circuits | —                                                                                 | —                                                                                 | —                                                                                   | —                                                                                   |
|                                  | Main circuits    | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| Voltage system                   | 3(N)AC           | ✓                                                                                 | —                                                                                 | ✓                                                                                   | ✓                                                                                   |
|                                  | AC               | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
|                                  | AC/DC            | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
|                                  | DC               | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| Nominal system voltage $U_n$     |                  | via AGH-PV<br>3(N)AC 0...690 V<br>DC 0...1000 V                                   | AC 0...690 V<br>DC 0...1000 V                                                     | AC 0...1000 V<br>DC 0...1500 V                                                      | AC 0...1000 V<br>DC 0...1500 V                                                      |
| Tolerance of $U_n$               |                  | AC +15%<br>DC +10%                                                                | AC +15%<br>DC +10%                                                                | AC +10%<br>DC +6%                                                                   | AC +10%<br>DC +5%                                                                   |
| System leakage capacitance $C_e$ |                  | ≤ 2000 μF                                                                         | ≤ 500 μF                                                                          | ≤ 2000 μF                                                                           | ≤ 4000 μF                                                                           |
| Response value $R_{an}$          |                  | 200 Ω...100 kΩ                                                                    | 1 kΩ...990 kΩ                                                                     | 200 Ω...990 kΩ                                                                      | 200 Ω...200 kΩ                                                                      |
| Mounting                         | DIN rail         | ✓                                                                                 | ✓                                                                                 | —                                                                                   | —                                                                                   |
|                                  | Screw mounting   | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| Interface                        | Modbus           | —                                                                                 | RTU                                                                               | RTU                                                                                 | RTU                                                                                 |
|                                  | BMS              | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
|                                  | isoData          | —                                                                                 | ✓                                                                                 | —                                                                                   | —                                                                                   |

### Ordering information

| Type                                                                                 | Nominal system voltage $U_n$   | Supply voltage $U_s$ <sup>1)</sup>      | Art. No.                |
|--------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------|-------------------------|
| isoPV-327 + AGH-PV<br>consisting of: isoPV-327 (B9106 5130W),<br>AGH-PV (B98039020W) | AC 0...690 V/DC 0...1000 V     | DC 19.2...72 V                          | B91065132W              |
| isoPV-335 + AGH-PV<br>consisting of: isoPV-335 (B91065131W),<br>AGH-PV (B98039020W)  | AC 0...690 V/DC 0...1000 V     | AC 88...264 V/DC 77...286 V             | B91065133W              |
| isoPV425-D4-2 with AGH420                                                            | AC 0...690 V/DC 0...1000 V     | AC 100...240 V/47...63 Hz/DC 24...240 V | B71036303 <sup>2)</sup> |
| isoPV1685RTU-425                                                                     | AC 0...1000 V<br>DC 0...1500 V | DC 18...30 V                            | B91065603               |
| isoPV1685DP                                                                          |                                |                                         | B91065808               |

<sup>1)</sup> Absolute values

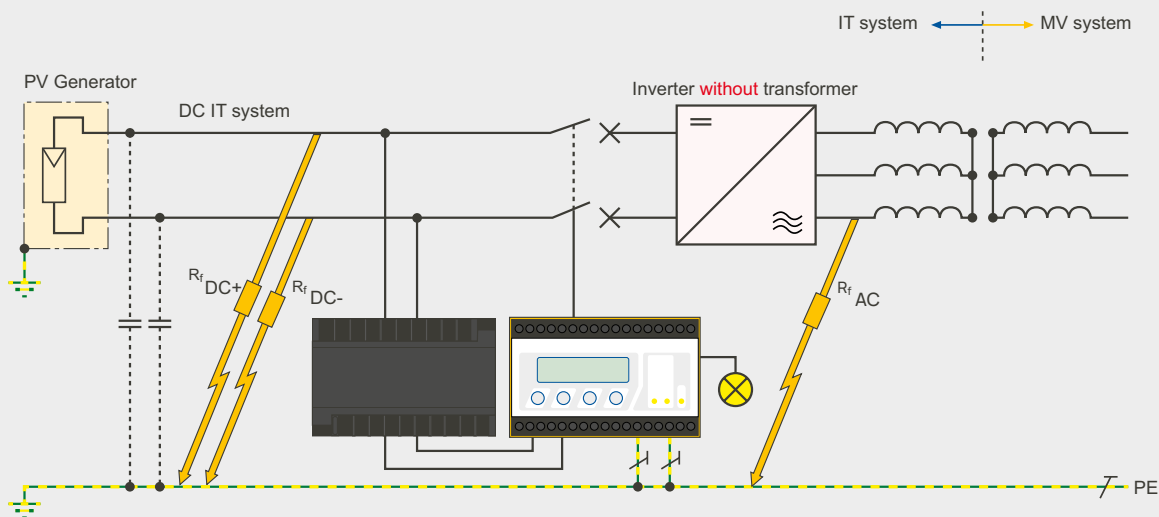
<sup>2)</sup> Device version with screw-type terminals on request

The modern insulation monitoring devices of the ISOMETER® series from Bender can be used to measure and visualise insulation resistance over time. This metrological monitoring gives operators of large-scale photovoltaic systems a head start in terms of information before a critical state occurs. ISOMETER®s as adaptive measuring systems for insulation monitoring thus offer a safe, standard-compliant and simple solution for monitoring insulation deterioration throughout the entire service life of PV systems.

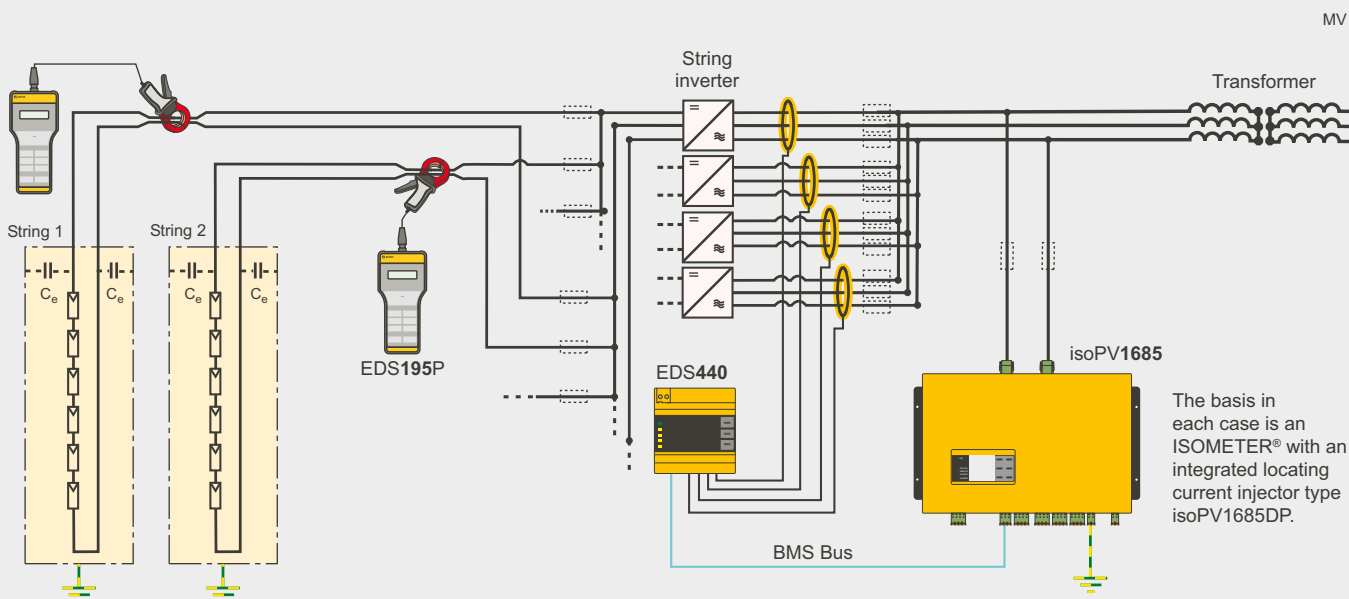
## Standard-compliant solutions for renewables

- Photovoltaic systems
- Wind power stations
- Hydroelectric power plants
- Pumped-storage power plants
- Hydrogen electrolyzers
- Battery energy storage systems (BESS)
- and many more

## Application examples



Unearthed PV generator (IT system) with ISOMETER® isoPV and coupling device AGH-PV



## Principle of a photovoltaic system with insulation monitoring and manual/automatic insulation fault location

# Special applications

| Area of use                                        | Insulated elevating work platforms                                                | AC, DC or AC/DC medium voltage systems                                            | Installations with a low-resistance insulation level                                | Deenergised loads                                                                   |
|----------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                    |  |  |  |  |
|                                                    | <b>ISOMETER® isoHR1685DW</b>                                                      | <b>ISOMETER® IRDH275BM-7</b>                                                      | <b>ISOMETER® isoLR275</b>                                                           | <b>ISOMETER® IR420-D6</b>                                                           |
| <b>Main circuits</b>                               | ✓                                                                                 | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| <b>Voltage system</b>                              | 3(N)AC                                                                            | —                                                                                 | ✓                                                                                   | ✓                                                                                   |
|                                                    | AC                                                                                | —                                                                                 | ✓                                                                                   | ✓                                                                                   |
|                                                    | AC/DC                                                                             | ✓                                                                                 | ✓                                                                                   | —                                                                                   |
|                                                    | DC                                                                                | ✓                                                                                 | ✓                                                                                   | —                                                                                   |
| <b>Nominal system voltage <math>U_n</math></b>     | AC 0...1000 V<br>DC 0...1500 V                                                    | AC/3(N)AC/DC 0...15.5 kV (absolute)                                               | via AGH-LR<br>3(N)AC 0...690 V<br>DC 0...1000 V                                     | AC 0...400 V                                                                        |
| <b>Tolerance of <math>U_n</math></b>               | AC +10 %<br>DC +5 %                                                               | —                                                                                 | AC +15 %<br>DC +10 %                                                                | —                                                                                   |
| <b>System leakage capacitance <math>C_e</math></b> | ≤ 1 µF                                                                            | ≤ 5 µF                                                                            | ≤ 500 µF                                                                            | ≤ 10 µF                                                                             |
| <b>Response value <math>R_{an}</math></b>          | 100 kΩ...100 MΩ                                                                   | 100 kΩ...10 MΩ                                                                    | 200 Ω...100 kΩ                                                                      | 100 kΩ...10 MΩ                                                                      |
| <b>Coupled systems</b>                             | ✓                                                                                 | —                                                                                 | —                                                                                   | —                                                                                   |
| <b>Mounting</b>                                    | DIN rail                                                                          | —                                                                                 | ✓                                                                                   | ✓                                                                                   |
|                                                    | Screw mounting                                                                    | ✓                                                                                 | ✓                                                                                   | ✓                                                                                   |
| <b>Interface</b>                                   | Modbus                                                                            | —                                                                                 | —                                                                                   | —                                                                                   |
|                                                    | BMS                                                                               | ✓                                                                                 | ✓                                                                                   | —                                                                                   |
|                                                    | isoData                                                                           | —                                                                                 | —                                                                                   | —                                                                                   |

## Ordering information

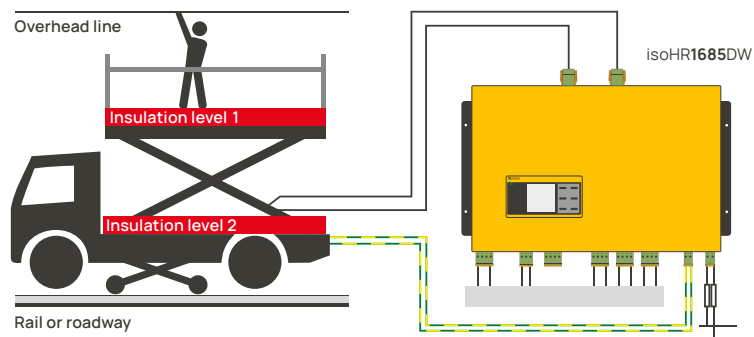
| Type                                                                                    | Nominal system voltage $U_n$              | Supply voltage $U_s$ <sup>1)</sup>      | Art. No.                |
|-----------------------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------|-------------------------|
| isoHR1685DW-925                                                                         | AC 0...1000 V/DC 0...1500 V               | DC 18...30 V                            | B91065806W              |
| IRDH275BM-7                                                                             | —                                         | AC 19.2...72 V                          | B91065120               |
| isoLR275-327 + AGH-LR-3 consisting of: isoLR275-327 (B91065700W), AGH-LR-3 (B98039022W) | AC 0...793 V/DC 0...1100 V                | DC 19.2...72 V                          | B91065702W              |
| isoLR275-335 + AGH-LR-3 consisting of: isoLR275-335 (B91065701W), AGH-LR-3 (B98039022W) |                                           | AC 88...264 V/DC 77...286 V             | B91065703W              |
| IR420-D6-1                                                                              | —                                         | AC 16...72 V/42...460 Hz/DC 9.6...94 V  | B71016415 <sup>2)</sup> |
| IR420-D6-2                                                                              |                                           | AC 70...300 V/42...460 Hz/DC 70...300 V | B71016407 <sup>2)</sup> |
| IR420-D64-2                                                                             |                                           |                                         | B71016408 <sup>2)</sup> |
| isoUG425-D4-4                                                                           | AC 24...240 V/47...63 Hz<br>DC 24...240 V | AC 12...120 V                           | B71036320               |
| isoES425-D4-4                                                                           |                                           | AC/DC 0...400 V/15...460 Hz             | B71037020               |

<sup>1)</sup> Absolute values

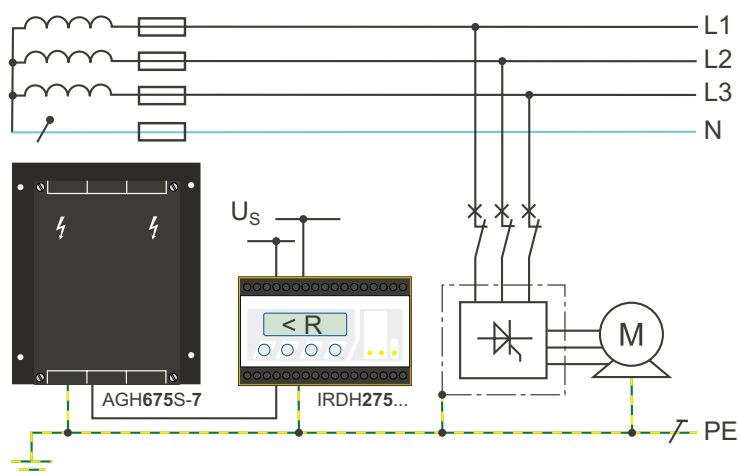
<sup>2)</sup> Device version with screw-type terminals on request

|  | Unearthed DC systems                                                              | Energy storage<br>VDE-AR-E 2510-2                                                 |
|--|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|  |  |  |
|  | <b>ISOMETER®<br/>isoUG425</b>                                                     | <b>ISOMETER®<br/>isoES425</b>                                                     |
|  | ✓                                                                                 | ✓                                                                                 |
|  | —                                                                                 | ✓                                                                                 |
|  | —                                                                                 | ✓                                                                                 |
|  | —                                                                                 | ✓                                                                                 |
|  | ✓                                                                                 | ✓                                                                                 |
|  | DC 12...120 V                                                                     | 3 (N)AC/AC 0...400 V<br>DC 0...400 V                                              |
|  | +20 %                                                                             | +25 %                                                                             |
|  | ≤ 50 µF                                                                           | ≤ 100 µF                                                                          |
|  | 2 kΩ...100 kΩ                                                                     | 2 kΩ...990 kΩ                                                                     |
|  | —                                                                                 | —                                                                                 |
|  | ✓                                                                                 | ✓                                                                                 |
|  | ✓                                                                                 | ✓                                                                                 |
|  | RTU                                                                               | —                                                                                 |
|  | ✓                                                                                 | ✓                                                                                 |
|  | ✓                                                                                 | ✓                                                                                 |

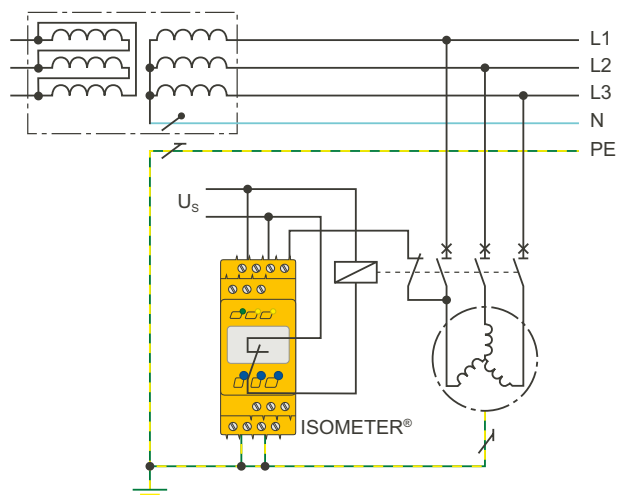
## Application example



Continuous monitoring of the insulation levels of overhead catenary maintenance vehicles with isoHR1685DW



Monitoring of medium-voltage drives with IRDH275... and coupling device AGH675S-7



Monitoring of deenergised loads with IR420-D6 (offline)

# Special applications

| Area of use                      | Mobile generators                                                                                               | Mobile generators                                                                                                 | Generators acc. to standard<br>DIN VDE 0100-551                                                                       |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
|                                  | <br><b>ISOMETER®<br/>IR423</b> | <br><b>ISOMETER®<br/>IR123P</b> | <br><b>ISOMETER®<br/>isoGEN423</b> |
| Main circuits                    | ✓                                                                                                               | ✓                                                                                                                 | ✓                                                                                                                     |
| Voltage system                   | 3(N)AC                                                                                                          | —                                                                                                                 | ✓                                                                                                                     |
|                                  | AC                                                                                                              | ✓                                                                                                                 | ✓                                                                                                                     |
|                                  | AC/DC                                                                                                           | —                                                                                                                 | ✓                                                                                                                     |
|                                  | DC                                                                                                              | —                                                                                                                 | ✓                                                                                                                     |
| Nominal system voltage $U_n$     | AC 0...300 V                                                                                                    | AC 100...300 V                                                                                                    | 3(N)AC/AC 0...400 V<br>DC 0...400 V                                                                                   |
| Tolerance of $U_n$               | + 20 %                                                                                                          | + 20 %                                                                                                            | +25 %                                                                                                                 |
| System leakage capacitance $C_e$ | $\leq 5 \mu\text{F}$                                                                                            | $\leq 1 \mu\text{F}$                                                                                              | $\leq 5 \mu\text{F}$                                                                                                  |
| Response value $R_{an}$          | 1 k $\Omega$ ...200 k $\Omega$                                                                                  | 46 k $\Omega$ /23 k $\Omega$                                                                                      | 5 k $\Omega$ ...200 k $\Omega$                                                                                        |
| System isolation function        | —                                                                                                               | —                                                                                                                 | ✓                                                                                                                     |
| Mounting                         | DIN rail                                                                                                        | —                                                                                                                 | ✓                                                                                                                     |
|                                  | Screw mounting                                                                                                  | ✓                                                                                                                 | ✓                                                                                                                     |
| Interface                        | Modbus                                                                                                          | —                                                                                                                 | RTU                                                                                                                   |
|                                  | BMS                                                                                                             | —                                                                                                                 | ✓                                                                                                                     |
|                                  | isoData                                                                                                         | —                                                                                                                 | ✓                                                                                                                     |

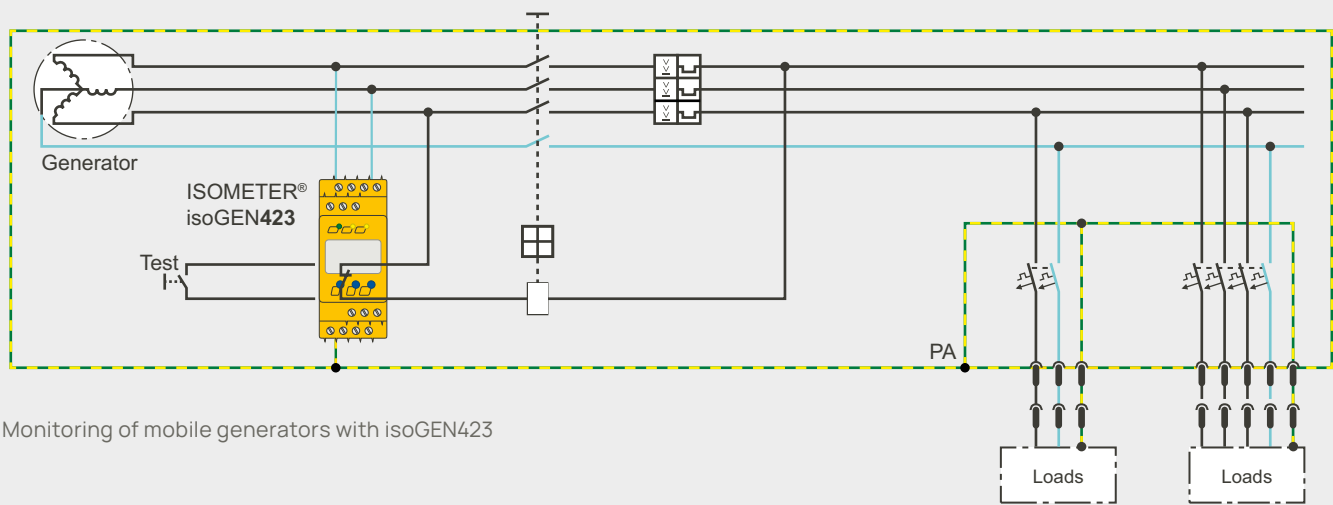
## Ordering information

| Type           | Nominal system voltage $U_n$     | Supply voltage $U_s$ <sup>1)</sup>      | Art. No.                 |
|----------------|----------------------------------|-----------------------------------------|--------------------------|
| IR423-D4-1     | AC 0...300 V                     | AC 16...72 V/30...460 Hz/ DC 9.6...94 V | B71016304 <sup>2)</sup>  |
| IR423-D4-2     |                                  | AC/DC 70...300 V/30...460 Hz            | B71016305 <sup>2)</sup>  |
| IR423-D4W-1    |                                  | AC 16...72 V/30...460 Hz/ DC 9.6...94 V | B71016304W <sup>2)</sup> |
| IR423-D4W-2    |                                  | AC/DC 70...300 V/30...460 Hz            | B71016305W <sup>2)</sup> |
| IR123P-4-2     | AC 100...300 V/22...460 Hz       | $U_s = U_n$                             | B91016308                |
| isoGEN423-D4-4 | 3(N)AC/AC 0...400 V/DC 0...400 V | AC 100...240 V/ DC 24...240 V           | B71036325                |

<sup>1)</sup> Absolute values

<sup>2)</sup> Device version with screw-type terminals on request

Application example



Monitoring of mobile generators with isoGEN423



# Special applications

## Electrical safety in railway technology

| Area of use                      |                    | Railway, rolling stock                                                            |                                                                                    |                                                                                     |
|----------------------------------|--------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                  |                    |  |  |  |
|                                  |                    | <b>ISOMETER®<br/>isoRW425</b>                                                     | <b>ISOMETER®<br/>isoRW685W-D</b>                                                   | <b>ISOMETER®<br/>isoRW685W-D-B</b>                                                  |
| Circuits                         | Control circuits   | —                                                                                 | ✓                                                                                  | ✓                                                                                   |
|                                  | Auxiliary circuits | —                                                                                 | ✓                                                                                  | ✓                                                                                   |
|                                  | Main circuits      | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |
| Voltage system                   | 3(N)AC             | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |
|                                  | AC                 | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |
|                                  | AC/DC              | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |
|                                  | DC                 | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |
| Nominal system voltage $U_n$     |                    | 3(N)AC/AC/DC 0...440 V                                                            | 3(N)AC/AC 0...690 V<br>DC 0...1000 V                                               | 3(N)AC/AC 0...690 V<br>DC 0...1000 V                                                |
| Tolerance of $U_n$               |                    | +15 %                                                                             | +15 %                                                                              | +15 %                                                                               |
| System leakage capacitance $C_e$ |                    | ≤ 300 µF                                                                          | ≤ 1000 µF                                                                          | ≤ 1000 µF                                                                           |
| Response value $R_{an}$          |                    | 1 kΩ...990 kΩ                                                                     | 1 kΩ...10 MΩ                                                                       | 1 kΩ...10 MΩ                                                                        |
| System isolation function        |                    | —                                                                                 | —                                                                                  | ✓                                                                                   |
| Mounting                         | DIN rail           | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |
|                                  | Screw mounting     | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |
| Interface                        | Web server         | —                                                                                 | ✓                                                                                  | ✓                                                                                   |
|                                  | Modbus             | RTU                                                                               | TCP/RTU                                                                            | TCP/RTU                                                                             |
|                                  | BCOM               | —                                                                                 | ✓                                                                                  | ✓                                                                                   |
|                                  | BS                 | —                                                                                 | ✓                                                                                  | ✓                                                                                   |
|                                  | BMS                | ✓                                                                                 | —                                                                                  | —                                                                                   |
|                                  | isoData            | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |

### Ordering information

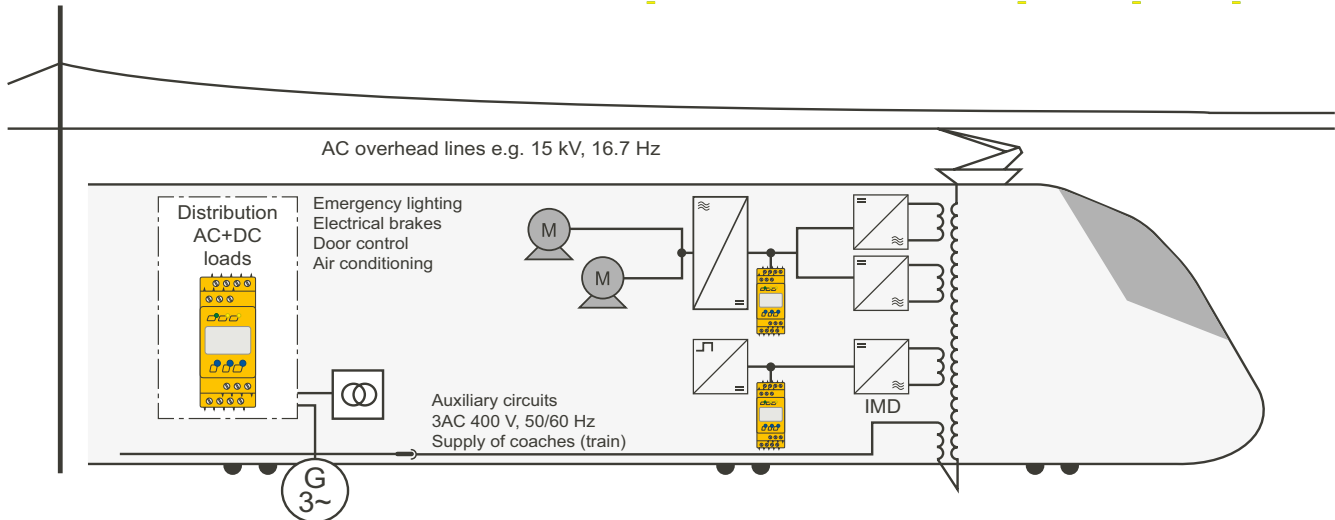
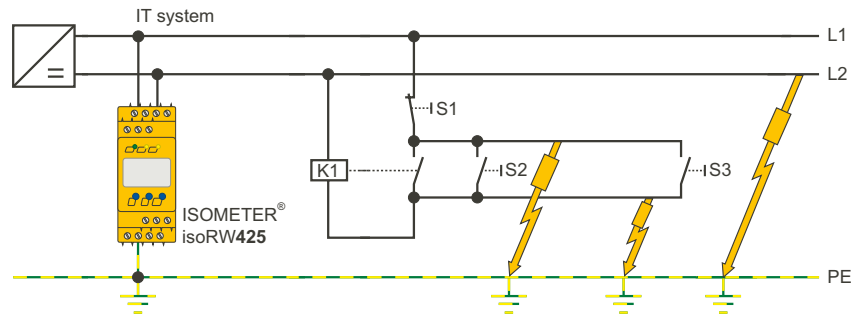
| Type                           | Supply voltage $U_s$ <sup>1)</sup>      | Nominal system voltage $U_n$            | System leakage capacitance $C_e$ | Art. No.                 |
|--------------------------------|-----------------------------------------|-----------------------------------------|----------------------------------|--------------------------|
| isoRW425-D4W-4                 | AC 100...240 V/DC 24...240 V            | 3(N)AC/AC/DC 0...440 V                  | ≤ 300 µF                         | B71037000W <sup>2)</sup> |
| isoRW685W-D                    | AC 24...240 V/50...400 Hz/DC 24...240 V | AC 0...690 V/1...460 Hz/DC 0...1000 V   | ≤ 1000 µF                        | B91067012W               |
| isoRW685W-D-B                  | AC 24...240 V/50...400 Hz/DC 24...240 V | AC 0...690 V/0.1...460 Hz/DC 0...1000 V | ≤ 1000 µF                        | B91067022W               |
| isoHV425W-D4-4<br>with AGH422W | AC 100...240 V/47...63 Hz/DC 24...240 V | 3(N)AC/AC 0...1000 V                    | ≤ 150 µF                         | B71036501W               |

<sup>1)</sup> Absolute values

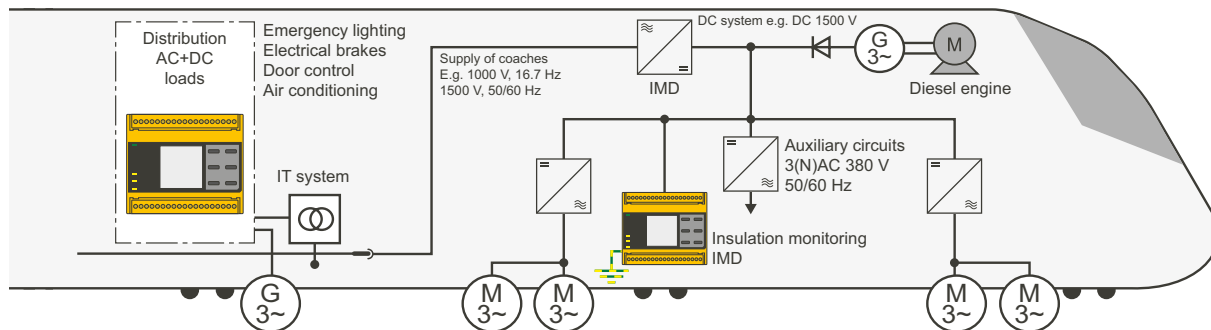
<sup>2)</sup> Device version with screw-type terminals on request

## Application examples

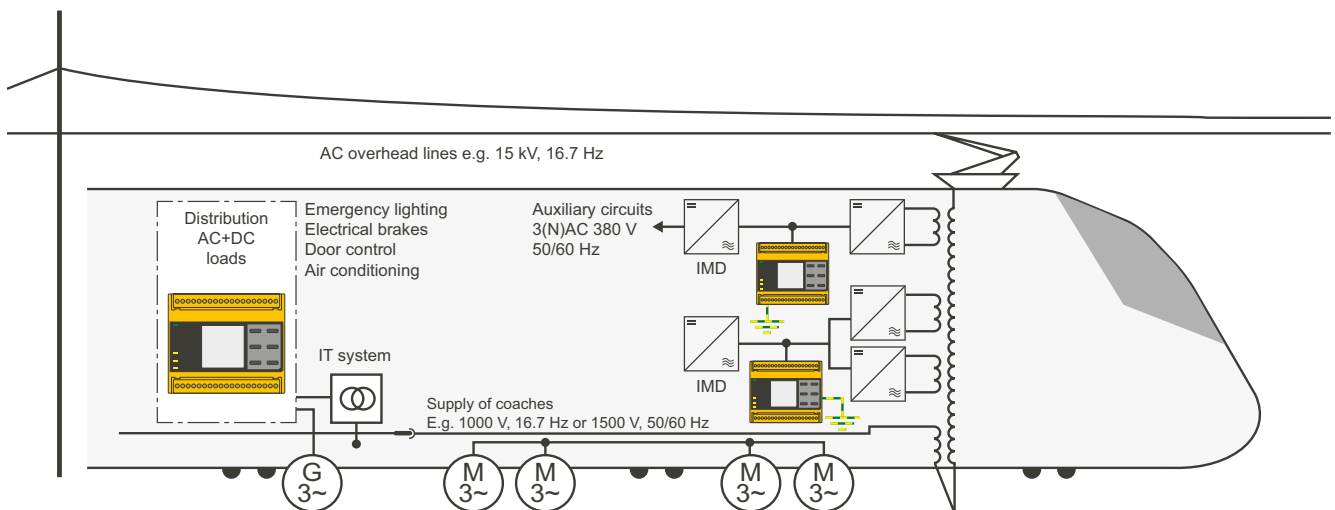
Monitoring of the complete IT system  
 $\leq 400$  V with isoRW425



Universal use of the isoRW425 for IT systems  $\leq 400$  V



Universal use of the isoRW685 for IT systems  $> 400$  V



Universal use of the isoRW685 for IT systems  $> 400$  V

# Accessories

## Coupling devices

|                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                              |  |  |  |  |  |  |
|                              | AGH150W-4                                                                         | AGH204S-4                                                                         | AGH520S                                                                           | AGH676S-4                                                                          | AGH675S-7                                                                           | AGH675S-7MV                                                                         |
| Application                  | Nominal voltage extension for ISOMETER®s                                          |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| Nominal system voltage $U_n$ | AC 0...1150 V<br>DC 0...1760 V                                                    | AC 0...1300 V<br>AC 0...1650 V                                                    | AC/3(N)AC<br>0...7200 V                                                           | AC/3(N)AC<br>0...12000 V                                                           | AC/3(N)AC/DC<br>0...7200 V                                                          | AC/3(N)AC/DC<br>0...15500 V                                                         |
| For device family            | IRDH275BM-7                                                                       | —                                                                                 | —                                                                                 | —                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              | IR420-D64                                                                         | —                                                                                 | —                                                                                 | ✓                                                                                  | —                                                                                   | —                                                                                   |
|                              | iso685-D                                                                          | ✓                                                                                 | ✓                                                                                 | ✓                                                                                  | —                                                                                   | —                                                                                   |
|                              | iso685-S                                                                          | ✓                                                                                 | ✓                                                                                 | ✓                                                                                  | —                                                                                   | —                                                                                   |

### Ordering information

| Type              | Nominal system voltage $U_s$        | Art. No.  |
|-------------------|-------------------------------------|-----------|
| AGH150W-4         | AC 0...1150 V/DC 0...1760 V         | B98018006 |
| AGH204S-4         | AC 0...1650 V/0...1300 V            | B914013   |
| AGH520S           | 3(N)AC 0...7200 V                   | B913033   |
| AGH675S-7-500     | AC/3(N)AC/DC 0...7200 V/0...460 Hz  | B913060   |
| AGH675S-7-2000    |                                     | B913061   |
| AGH675S-7MV15-500 | AC/3(N)AC/DC 0...15500 V/0...460 Hz | B913058   |
| AGH676S-4         | AC/3(N)AC 0...12000 V/50...460 Hz   | B913055   |



# Accessories

## Measuring instruments

|                                                                                   |                 |             |                 |             |
|-----------------------------------------------------------------------------------|-----------------|-------------|-----------------|-------------|
|  | <b>7204</b>     | <b>7220</b> | <b>9604</b>     | <b>9620</b> |
| Input current                                                                     | 0...400 $\mu$ A | 0...20 mA   | 0...400 $\mu$ A | 0...20 mA   |
| Dimensions (mm)                                                                   | 72 x 72         | 72 x 72     | 96 x 96         | 96 x 96     |
| For device family iso685...                                                       | ✓               | ✓           | ✓               | ✓           |

### Ordering information

| Type       | Input current   | Dimensions | Midscale       | Art. No. |
|------------|-----------------|------------|----------------|----------|
| 7204-1421  | 0...400 $\mu$ A | 72 x 72 mm | 120 k $\Omega$ | B986763  |
| 7204S-1421 |                 |            |                | B986804  |
| 9604-1421  |                 | 96 x 96 mm | 120 k $\Omega$ | B986764  |
| 9604S-1421 |                 |            |                | B986784  |
| 9620-1421  | 0...20 mA       | 96 x 96 mm | 120 k $\Omega$ | B986841  |
| 9620S-1421 |                 |            |                | B986842  |
| 9604-1621  | 0...400 $\mu$ A | 96 x 96 mm | 1.2 M $\Omega$ | B986782  |
| 7220-1421  | 0...20 mA       | 72 x 72 mm | 120 k $\Omega$ | B986844  |
| 7220S-1421 |                 |            |                | B986848  |

# Accessories

## Gateway

|                            |                                 |  |                                                       |                              |  |
|----------------------------|---------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------|
|                            |                                 | COMTRAXX®<br>COM465IP                                                             | COMTRAXX®<br>COM465DP                                 | COMTRAXX®<br>COM465ID        | COMTRAXX®<br>CP9...-I                                                               |
| <b>Application</b>         |                                 | Condition monitor, gateway                                                        | Condition Monitor, PROFIBUS gateway                   | Condition Monitor, gateway   | Condition Monitor, gateway                                                          |
| <b>Functions</b>           | Protocol input                  | BMS, BCOM, Modbus RTU/TCP                                                         | BMS, BCOM, Modbus RTU/TCP                             | isoData, Modbus TCP          | BMS (internal), BCOM, Modbus RTU/TCP                                                |
|                            | Protocol output                 | Ethernet, Modbus RTU/TCP, SNMP, PROFINET                                          | Ethernet, Modbus RTU/TCP, SNMP, PROFINET, PROFIBUS DP | Ethernet, Modbus TCP, OPC-UA | Ethernet, Modbus RTU/TCP, SNMP, PROFINET                                            |
|                            | Display                         | LED                                                                               | LED                                                   | LED                          | 7" or 15.6" display                                                                 |
|                            | Alarm messages                  | ✓ <sup>1, 2)</sup>                                                                | ✓ <sup>1, 2)</sup>                                    | ✓ <sup>1, 2)</sup>           | ✓ <sup>1, 2, 3)</sup>                                                               |
|                            | Measured values                 | ✓ <sup>1, 2)</sup>                                                                | ✓ <sup>1, 2)</sup>                                    | ✓ <sup>1, 2)</sup>           | ✓ <sup>1, 2, 3)</sup>                                                               |
|                            | Device parameter setting        | ✓ <sup>1)</sup>                                                                   | ✓ <sup>1)</sup>                                       | ✓ <sup>1)</sup>              | ✓ <sup>1, 3)</sup>                                                                  |
|                            | Alarm list                      | ✓ <sup>1)</sup>                                                                   | ✓ <sup>1)</sup>                                       | ✓ <sup>1)</sup>              | ✓ <sup>1, 3)</sup>                                                                  |
|                            | History memory                  | ✓ <sup>1)</sup>                                                                   | ✓ <sup>1)</sup>                                       | ✓ <sup>1)</sup>              | ✓ <sup>1, 3)</sup>                                                                  |
|                            | Diagrams                        | ✓ <sup>1)</sup>                                                                   | ✓ <sup>1)</sup>                                       | ✓ <sup>1)</sup>              | ✓ <sup>1, 3)</sup>                                                                  |
|                            | Visualisation                   | ✓ <sup>1)</sup>                                                                   | ✓ <sup>1)</sup>                                       | ✓ <sup>1)</sup>              | ✓ <sup>1, 3)</sup>                                                                  |
|                            | E-mail notification             | ✓ <sup>1, 4)</sup>                                                                | ✓ <sup>1, 4)</sup>                                    | ✓ <sup>1, 4)</sup>           | ✓ <sup>1, 4)</sup>                                                                  |
|                            | Device tests                    | ✓ <sup>1, 2)</sup>                                                                | ✓ <sup>1, 2)</sup>                                    | ✓ <sup>1, 2)</sup>           | ✓ <sup>1, 2, 3)</sup>                                                               |
|                            | PEM... and energy meter support | ✓ <sup>1)</sup>                                                                   | ✓ <sup>1)</sup>                                       | ✓ <sup>1)</sup>              | ✓ <sup>1)</sup>                                                                     |
|                            | SNMP                            | ✓ <sup>1)</sup>                                                                   | ✓ <sup>1)</sup>                                       | ✓ <sup>1)</sup>              | ✓ <sup>1)</sup>                                                                     |
|                            | Data logger                     | ✓ <sup>1)</sup>                                                                   | ✓ <sup>1)</sup>                                       | ✓ <sup>1)</sup>              | ✓ <sup>1)</sup>                                                                     |
| <b>Connection</b>          | BMS                             | Screw-type terminal                                                               | Screw-type terminal                                   | —                            | Screw-type terminal                                                                 |
|                            | Modbus RTU                      | Screw-type terminal                                                               | Screw-type terminal                                   | —                            | Screw-type terminal                                                                 |
|                            | isoData                         | —                                                                                 | —                                                     | Screw-type terminal          | —                                                                                   |
|                            | Output                          | RJ45                                                                              | RJ45, Sub-D 9-pole                                    | RJ45                         | RJ45                                                                                |
| <b>System requirements</b> | Supply voltage U <sub>s</sub>   | AC/DC 24...240 V                                                                  | AC/DC 24...240 V                                      | AC/DC 24...240 V             | DC 24 V                                                                             |
|                            | Browser                         | Edge, Chrome, Firefox etc.                                                        | Edge, Chrome, Firefox etc.                            | Edge, Chrome, Firefox etc.   | Edge, Chrome, Firefox etc.                                                          |

<sup>1)</sup> Available functions on the web server – accessible via a PC with a browser

<sup>2)</sup> Available via the protocol

<sup>3)</sup> On the device-internal LC display

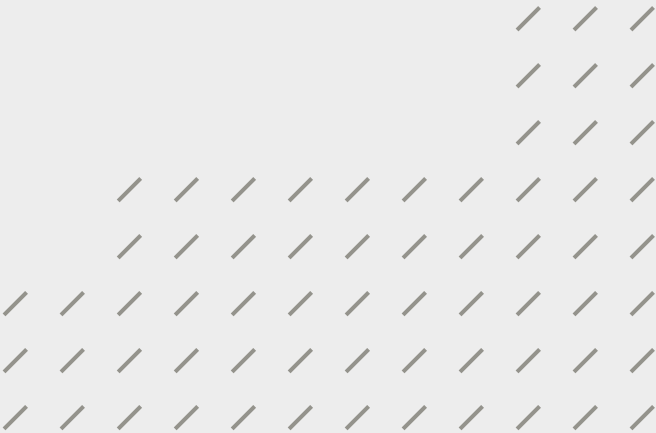
<sup>4)</sup> TLS/SSL support

Ordering information

| Type            | Supply voltage/frequency range U <sub>s</sub> | Power consumption | Art. No.  |
|-----------------|-----------------------------------------------|-------------------|-----------|
| COM465IP-230V   | AC/DC 24...240 V/50...60 Hz                   | ≤ 6.5 VA/ ≤ 4W    | B95061065 |
| COM465DP-230V   | AC/DC 24...240 V/50...60 Hz                   | ≤ 6.5 VA/ ≤ 4W    | B95061060 |
| COM465ID-230 V  | AC/DC 24...240 V/50...60 Hz                   | ≤ 6.5 VA/ ≤ 4 W   | B95061070 |
| CP907-I         | DC 24                                         | ≤ 15 W            | B95061031 |
| CP915-I (white) | AC 100...240 V                                | ≤ 30 W            | B95061033 |
| CP915-I (grey)  |                                               |                   | B95061034 |

Function modules for COM465IP and COM465DP

| Function module (software licence) | Application                                                                                                                    | Art. No.  |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------|
| Function module A                  | Individual text messages for all devices/channels, device failure monitoring, e-mail in case of an alarm, device documentation | B75061011 |
| Function module B                  | Data is provided via Modbus TCP and Modbus RTU, SNMP server with trap function                                                 | B75061012 |
| Function module C                  | Parameter setting of all integrated devices, device backups                                                                    | B75061013 |
| Function module D                  | Visualisation application                                                                                                      | B75061014 |
| Function module E                  | Virtual devices                                                                                                                | B75061015 |
| Function module F                  | Integration of third-party devices                                                                                             | B75061016 |



# EDS insulation fault location systems

## ISOMETER® with locating current injector

|                                                         |                                |  |  |                              |
|---------------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------|
|                                                         |                                | ISOMETER®<br>iso685-...-P                                                         | ISOMETER®<br>iso1685DP                                                              | ISOMETER®<br>isoLR1685DP     |
| Circuits                                                | Control circuits               | ✓                                                                                 | —                                                                                   | —                            |
|                                                         | Auxiliary circuits             | ✓                                                                                 | —                                                                                   | —                            |
|                                                         | Main circuits                  | ✓                                                                                 | ✓                                                                                   | ✓                            |
| Voltage system                                          | 3(N)AC                         | ✓                                                                                 | —                                                                                   | —                            |
|                                                         | AC                             | ✓                                                                                 | ✓                                                                                   | ✓                            |
|                                                         | AC/DC                          | ✓                                                                                 | ✓                                                                                   | ✓                            |
|                                                         | DC                             | ✓                                                                                 | ✓                                                                                   | ✓                            |
| Nominal system voltage $U_n$                            |                                | AC/3(N)AC 0...690 V<br>DC 0...1000 V                                              | AC 0...1000 V<br>DC 0...1500 V                                                      | AC 0...690 V<br>DC 0...690 V |
| Tolerance of $U_n$                                      |                                | +15 %                                                                             | AC +10 %<br>DC +5%                                                                  | AC +10 %<br>DC +5%           |
| System leakage capacitance $C_e$                        |                                | ≤ 1000 µF                                                                         | ≤ 2000 µF                                                                           | ≤ 2000 µF                    |
| Response value $R_{an}$                                 |                                | 1 kΩ...10 MΩ                                                                      | 200 Ω...1 MΩ                                                                        | 20 Ω...100 kΩ                |
| Coupled systems                                         |                                | ✓                                                                                 | ✓                                                                                   | ✓                            |
| Locating current injector for insulation fault location |                                | ✓                                                                                 | ✓                                                                                   | ✓                            |
| Mounting                                                | DIN rail                       | ✓                                                                                 | —                                                                                   | —                            |
|                                                         | Screw mounting                 | ✓                                                                                 | ✓                                                                                   | ✓                            |
|                                                         | Panel mounting/ wall fastening | ✓                                                                                 | —                                                                                   | —                            |
| Interface                                               | Web server                     | ✓                                                                                 | —                                                                                   | —                            |
|                                                         | Modbus                         | TCP                                                                               | RTU                                                                                 | RTU                          |
|                                                         | BCOM                           | ✓                                                                                 | —                                                                                   | —                            |
|                                                         | BS                             | ✓                                                                                 | —                                                                                   | —                            |
|                                                         | BMS                            | —                                                                                 | ✓                                                                                   | ✓                            |

### Ordering information

| Type                             | Supply voltage $U_s$                              | Nominal system voltage $U_n$         | Art. No.  |
|----------------------------------|---------------------------------------------------|--------------------------------------|-----------|
| iso685-D-P <sup>1)</sup>         | AC 100...240 V/47...460 Hz<br>DC 24 V/100...240 V | AC/3(N)AC 0...690 V<br>DC 0...1000 V | B91067030 |
| iso685-S-P + FP200 <sup>1)</sup> |                                                   |                                      | B91067230 |
| iso1685DP-425                    | DC 18...30 V                                      | AC 0...1000 V/DC 0...1500 V          | B91065802 |
| isoLR1685DP-325                  |                                                   | AC 0...690 V/DC 0...690 V            | B91065803 |

<sup>1)</sup> Device variant "option W" with increased shock and vibration resistance: specify order number with "W" at the end

# EDS insulation fault location systems

## Fast localisation of insulation faults

Fast localisation and elimination of insulation faults is required by DIN VDE 0100-410 (VDE 0100-410). The iso685-...-P resp. isoxx1685DP in combination with the EDS system is a modular system that solves this problem. The application areas for EDS systems are very diverse.

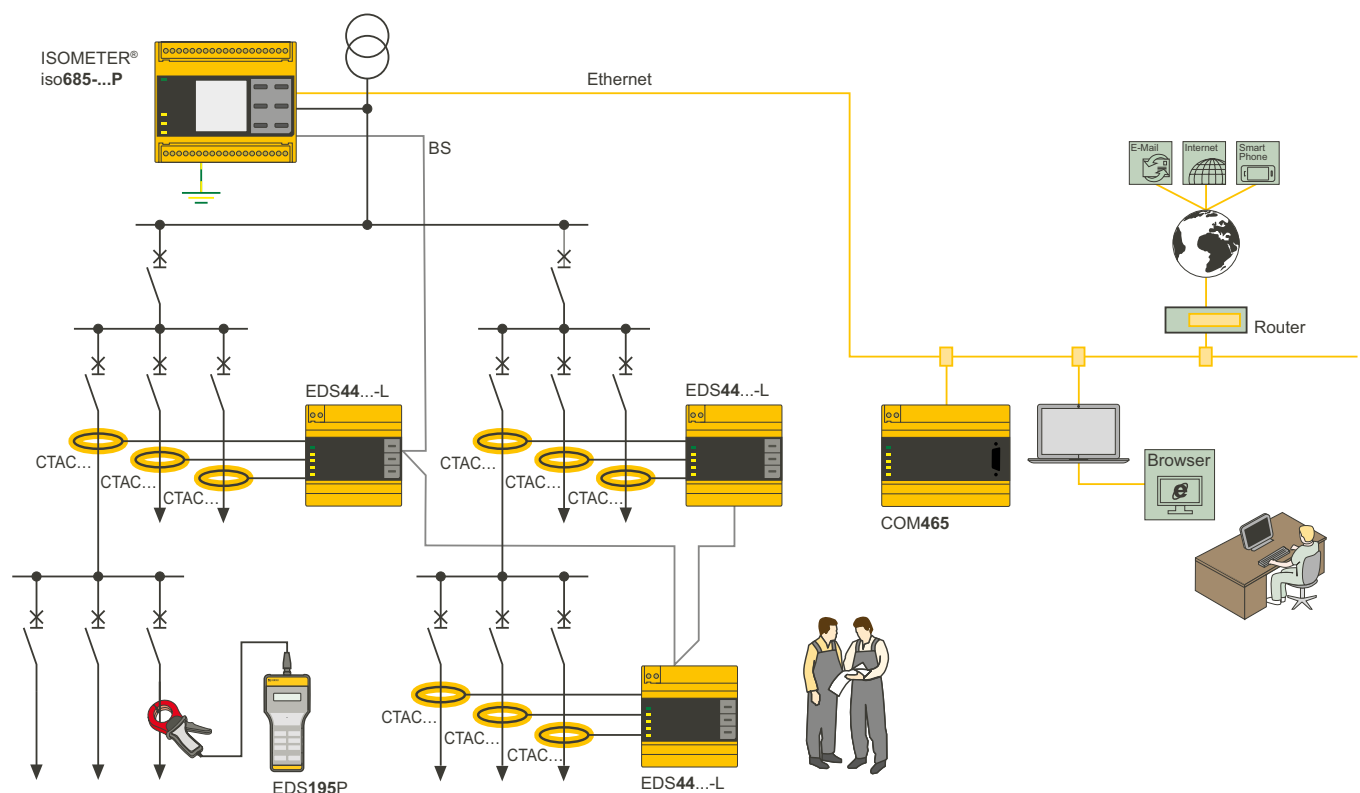
They are operated/used for **main and control circuits** e.g. in:

- Power plants
- Shipbuilding
- Traffic engineering
- Industrial plants
- Paper industry
- Oil and natural gas industry
- Mining, open-cast mining
- Rolling mills
- Mechanical engineering
- and many other areas

## Advantages of EDS insulation fault location systems

- Disconnection of the electrical installation is not required, insulation fault location takes place during operation
- Fast localisation of faulty circuits
- Information about the location of the fault is centrally displayed
- Combination with portable insulation fault location systems EDS3090/3090PG and EDS3091/3091PG
- Reduced maintenance and repair costs

## Application example



# EDS insulation fault location systems

## ISOSCAN® with locating current injector

|  |                  | ISOSCAN®<br>EDS440-S | ISOSCAN®<br>EDS440-L | ISOSCAN®<br>EDS441-S | ISOSCAN®<br>EDS441-L | ISOSCAN®<br>EDS441-LAB                                                                               | ISOSCAN®<br>EDS440-LAF                            |
|-----------------------------------------------------------------------------------|------------------|----------------------|----------------------|----------------------|----------------------|------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| <b>Application</b>                                                                |                  | —                    | —                    | —                    | —                    | High-resistance insulation faults for high system leakage capacitance and low locating current value | Use with flexible CTAF strap current transformers |
| <b>Circuits</b>                                                                   | Control circuits | —                    | —                    | ✓                    | ✓                    | ✓                                                                                                    | —                                                 |
|                                                                                   | Main circuits    | ✓                    | ✓                    | —                    | —                    | —                                                                                                    | ✓                                                 |
| <b>Voltage system</b>                                                             | 3(N)AC           | ✓                    | ✓                    | —                    | —                    | —                                                                                                    | —                                                 |
|                                                                                   | AC               | ✓                    | ✓                    | ✓                    | ✓                    | ✓                                                                                                    | ✓                                                 |
|                                                                                   | AC/DC            | ✓                    | ✓                    | ✓                    | ✓                    | ✓                                                                                                    | ✓                                                 |
|                                                                                   | DC               | ✓                    | ✓                    | ✓                    | ✓                    | ✓                                                                                                    | ✓                                                 |
| <b>Display</b>                                                                    | Power On LED     | ✓                    | ✓                    | ✓                    | ✓                    | ✓                                                                                                    | ✓                                                 |
|                                                                                   | Alarm LEDs       | —                    | ✓                    | —                    | ✓                    | ✓                                                                                                    | ✓                                                 |
| <b>Mounting</b>                                                                   | DIN rail         | ✓                    | ✓                    | ✓                    | ✓                    | ✓                                                                                                    | ✓                                                 |
|                                                                                   | Screw mounting   | ✓                    | ✓                    | ✓                    | ✓                    | ✓                                                                                                    | ✓                                                 |
| <b>Interface</b>                                                                  |                  | BB                   | BS                   | BB                   | BS                   | BS                                                                                                   | BS                                                |

### Ordering information

| Type       | Supply voltage U <sub>s</sub> | Response value | LED display | Art. No.  |
|------------|-------------------------------|----------------|-------------|-----------|
| EDS440-S-1 | AC/DC 24...240 V              | 2...10 mA      | —           | B91080201 |
| EDS440-L-4 |                               |                | ✓           | B91080202 |
| EDS440-LAF |                               |                | ✓           | B91080209 |
| EDS441-S   |                               | 0.2...1 mA     | —           | B91080204 |
| EDS441-L-4 |                               |                | ✓           | B91080205 |
| EDS441-LAB |                               |                | ✓           | B91080207 |

# EDS insulation fault location systems

## ISOSCAN® with integrated current transformer

|                                                                                   |                  |                    |                    |
|-----------------------------------------------------------------------------------|------------------|--------------------|--------------------|
|  |                  | ISOSCAN®<br>EDS150 | ISOSCAN®<br>EDS151 |
| <b>Application</b>                                                                |                  | stationary         | stationary         |
| <b>Circuits</b>                                                                   | Control circuits | —                  | ✓                  |
|                                                                                   | Main circuits    | ✓                  | —                  |
| <b>Voltage system</b>                                                             | 3(N)AC           | —                  | —                  |
|                                                                                   | AC               | ✓                  | ✓                  |
|                                                                                   | AC/DC            | ✓                  | ✓                  |
|                                                                                   | DC               | ✓                  | ✓                  |
| <b>Mounting</b>                                                                   | DIN rail         | —                  | —                  |
|                                                                                   | Screw mounting   | ✓                  | ✓                  |

### Ordering information

| Type   | Circuits         | Measuring range | Response value |              | Supply voltage $U_s$ <sup>1)</sup>         | Art. No.  |
|--------|------------------|-----------------|----------------|--------------|--------------------------------------------|-----------|
|        |                  |                 | EDS function   | RCM function |                                            |           |
| EDS151 | Control circuits | 0.5...2.5 mA    | 0.5 mA         | 1 A          | AC 17...24 V<br>50...60 Hz<br>DC 14...28 V | B91080101 |
| EDS150 | Main circuits    | 5...25 mA       | 5 mA           | 10 A         |                                            | B91080103 |

<sup>1)</sup> Absolute values

# EDS insulation fault location systems

## Portable equipment

| Locating current injector                                                         |                  |                                    |                                  |                                |
|-----------------------------------------------------------------------------------|------------------|------------------------------------|----------------------------------|--------------------------------|
|  |                  | PGH185                             | PGH186                           | PGH183                         |
| Circuits                                                                          | Control circuits | —                                  | —                                | ✓                              |
|                                                                                   | Main circuits    | ✓                                  | ✓                                | —                              |
| Application                                                                       |                  | energised                          | offline                          | energised                      |
| Nominal system voltage $U_n$                                                      |                  | 3AC/AC 20...575 V<br>DC 20...504 V | 3AC/AC 0...575 V<br>DC 0...504 V | AC 20...265 V<br>DC 20...308 V |
| $U_s$ AC 230 V                                                                    |                  | (PGH185)                           | (PGH186)                         | (PGH183)                       |
| $U_s$ AC 90...132 V                                                               |                  | (PGH185-13)                        | (PGH186-13)                      | (PGH183-13)                    |
| Locating current $I_L$ max.                                                       |                  | 10/25 mA                           | 10/25 mA                         | 1/2.5 mA                       |

| Insulation fault locator                                                            |  |                                |
|-------------------------------------------------------------------------------------|--|--------------------------------|
|  |  | EDS195PM                       |
| LC display                                                                          |  | 3 x 16 characters              |
| Evaluating current $I_{\Delta L}$                                                   |  | 0.2...50 mA                    |
| Response value                                                                      |  | 0.2 ... 1/2...10 mA selectable |

| Strap current transformers                                                          |         |          |
|-------------------------------------------------------------------------------------|---------|----------|
|  | CTAF500 | CTAF1000 |
|                                                                                     | ✓       | —        |
| Strap 500 mm                                                                        | ✓       | —        |
| Strap 1000 mm                                                                       | —       | ✓        |

| Complete systems                                                                    |                  |         |
|-------------------------------------------------------------------------------------|------------------|---------|
|  | EDS3090          | EDS3091 |
|                                                                                     | —                | ✓       |
| Circuits                                                                            | Control circuits | —       |
|                                                                                     | Main circuits    | ✓       |

| Measuring clamps                                                                     |         |         |
|--------------------------------------------------------------------------------------|---------|---------|
|  | PSA3020 | PSA3320 |
|                                                                                      | ✓       | ✓       |
| 20 mm                                                                                | ✓       | ✓       |
| 52 mm                                                                                | —       | —       |
| 115 mm                                                                               | —       | —       |

|  | PSA3052 | PSA3352 |
|--------------------------------------------------------------------------------------|---------|---------|
|                                                                                      | —       | —       |
| 20 mm                                                                                | —       | —       |
| 52 mm                                                                                | ✓       | ✓       |
| 115 mm                                                                               | —       | —       |

|  | PSA3165 (optional) |  |
|--------------------------------------------------------------------------------------|--------------------|--|
|                                                                                      | —                  |  |
| 20 mm                                                                                | —                  |  |
| 52 mm                                                                                | —                  |  |
| 115 mm                                                                               | ✓                  |  |



## EDS309... components

| Device type  | Aluminium case with carrying strap<br>Operating manual |   | EDS195PM with accessories |                            |                                              |                                                      |                                        | PGH18... with accessories for |                                 |                              |                                     |                         |                                |                                                                                   | Measuring clamps       |                        |                                   |                   |
|--------------|--------------------------------------------------------|---|---------------------------|----------------------------|----------------------------------------------|------------------------------------------------------|----------------------------------------|-------------------------------|---------------------------------|------------------------------|-------------------------------------|-------------------------|--------------------------------|-----------------------------------------------------------------------------------|------------------------|------------------------|-----------------------------------|-------------------|
|              |                                                        |   | Insulation fault locator  | Terminal connector to 4 mm | Adapter BNC/4mm plug for current transformer | Adapter BNC-PS2 for WF current transformer, optional | Plug-in power supply unit for EDS195PM | Locating current injector     | Power supply cable for PGH18... | Safety measuring lead, black | Safety measuring lead, green/yellow | Safety claw grip, black | Safety claw grip, green/yellow | Coupling device, optional (for EDS3096PV only; included in the scope of delivery) | Measuring clamps 20 mm | Measuring clamps 52 mm | Measuring clamps 115 mm, optional | EDS set, optional |
| EDS3090      | 1                                                      | 1 | EDS195PM                  | 1                          | 1                                            | 1                                                    | 1                                      | —                             | —                               | —                            | —                                   | —                       | —                              | —                                                                                 | PSA3020                | PSA3052                | PSA3165                           | 1                 |
| EDS3090PG    | 1                                                      | 1 | EDS195PM                  | 1                          | 1                                            | 1                                                    | 1                                      | PGH185                        | 1                               | 3                            | 1                                   | 3                       | 1                              | AGE185                                                                            | PSA3020                | PSA3052                | PSA3165                           | 1                 |
| EDS3090PG-13 | 1                                                      | 1 | EDS195PM                  | 1                          | 1                                            | 1                                                    | 1                                      | PGH185-13                     | 1                               | 3                            | 1                                   | 3                       | 1                              | AGE185                                                                            | PSA3020                | PSA3052                | PSA3165                           | 1                 |
| EDS3091      | 1                                                      | 1 | EDS195PM                  | 1                          | 1                                            | 1                                                    | 1                                      | —                             | —                               | —                            | —                                   | —                       | —                              | —                                                                                 | PSA3320                | PSA3352                | —                                 | 1                 |
| EDS3091PG    | 1                                                      | 1 | EDS195PM                  | 1                          | 1                                            | 1                                                    | 1                                      | PGH183                        | 1                               | 3                            | 1                                   | 3                       | 1                              | —                                                                                 | PSA3320                | PSA3352                | —                                 | 1                 |
| EDS3091PG-13 | 1                                                      | 1 | EDS195PM                  | 1                          | 1                                            | 1                                                    | 1                                      | PGH183-13                     | 1                               | 3                            | 1                                   | 3                       | 1                              | —                                                                                 | PSA3320                | PSA3352                | —                                 | 1                 |
| EDS3092PG    | 1                                                      | 1 | EDS195PM                  | 1                          | 1                                            | 1                                                    | 1                                      | PGH183<br>PGH185              | 2                               | 6                            | 2                                   | 6                       | 2                              | —                                                                                 | PSA3320<br>PSA3020     | PSA3352<br>PSA3052     | —                                 | 1                 |
| EDS3096PG    | 1                                                      | 1 | EDS195PM                  | 1                          | 1                                            | 1                                                    | 1                                      | PGH186                        | 1                               | 3                            | 1                                   | 3                       | 1                              | AGE185                                                                            | PSA3020                | PSA3052                | PSA3165                           | 1                 |
| EDS3096PG-13 | 1                                                      | 1 | EDS195PM                  | 1                          | 1                                            | 1                                                    | 1                                      | PGH186-13                     | 1                               | 3                            | 1                                   | 3                       | 1                              | AGE185                                                                            | PSA3020                | PSA3052                | PSA3165                           | 1                 |
| EDS3096PV    | 1                                                      | 1 | EDS195PM                  | —                          | —                                            | —                                                    | 1                                      | PGH186                        | 1                               | 3                            | 1                                   | 3                       | 1                              | AGE185                                                                            | —                      | 2x PSA3052             | —                                 | —                 |

## Ordering information

| Type         | Main circuits |             | Control circuits |             | Nominal voltage $U_n$                   | Supply voltage $U_s$     | Art. No.  |
|--------------|---------------|-------------|------------------|-------------|-----------------------------------------|--------------------------|-----------|
|              | with EDS      | without EDS | with EDS         | without EDS |                                         |                          |           |
| EDS3090      | EDS440        | —           | —                | —           | AC 20...575 V/42...460 Hz/DC 20...504 V | —                        | B91082026 |
| EDS3090PG    | —             | ✓           | —                | —           | AC 20...575 V/42...460 Hz/DC 20...504 V | AC 230 V/50...60 Hz      | B91082021 |
| EDS3090PG-13 |               |             |                  |             | AC 20...575 V/42...460 Hz/DC 20...504 V | AC 90...132 V/50...60 Hz | B91082022 |
| EDS3096PG    |               |             |                  |             | AC 0...575 V/42...460 Hz/DC 0...504 V   | AC 230 V/50...60 Hz      | B91082025 |
| EDS3096PG-13 |               |             |                  |             |                                         | AC 90...132 V/50...60 Hz | B91082029 |
| EDS3091      | —             | —           | EDS441           | —           | AC 20...265 V/42...460 Hz/DC 20...308 V | —                        | B91082027 |
| EDS3091PG    | —             | —           | —                | ✓           | AC 20...265 V/42...460 Hz/DC 20...308 V | AC 230 V/50...60 Hz      | B91082023 |
| EDS3091PG-13 |               |             |                  |             |                                         | AC 90...132 V/50...60 Hz | B91082024 |
| EDS3092PG    | —             | ✓           | —                | ✓           | AC 20...265 V/42...460 Hz/DC 20...308 V | AC 230 V/50...60 Hz      | B91082030 |
|              | —             | ✓           | —                | ✓           | AC 20...575 V/42...460 Hz/DC 20...504 V | AC 230 V/50...60 Hz      |           |
| EDS3096PV    | —             | ✓           | —                | —           | AC 20...575 V/42...460 Hz/DC 20...504 V | —                        | B91082031 |

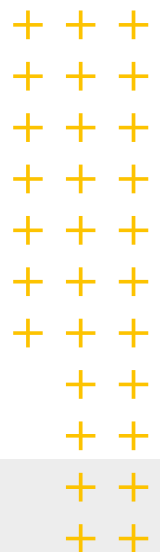
# Communication solutions

## Modern communication

Since increasing demands are placed on communication capability, data transparency and flexibility, the use of modern field bus and network technologies has become a must in the field of automation of electrical installations. For instance, operating, alarm and fault messages via the web or a network substantially contribute to increasing the transparency of power supply systems. At the same time, they allow fast responses to critical operating states. In addition, important messages can be transferred via text message or e-mail to the mobile phones or laptops of service personnel. Early information about the location and cause of a fault allows time and cost-efficient deployment of service personnel and helps avoid a possible installation failure or damage to expensive devices.

## Electrical Safety Management

Under the heading "Electrical Safety Management" Bender offers comprehensive solutions for the electrical safety of power supply systems in all areas. Carefully matched products and systems with innovative measuring instruments, communication solutions for the visualisation of data from Bender monitoring systems as well as the easy connection to field bus and SCADA systems (Supervisory Control and Data Acquisition systems) provide the highest level of safety, economic efficiency and transparency. The range of products is completed by comprehensive services, which are provided for the entire service life of the products.



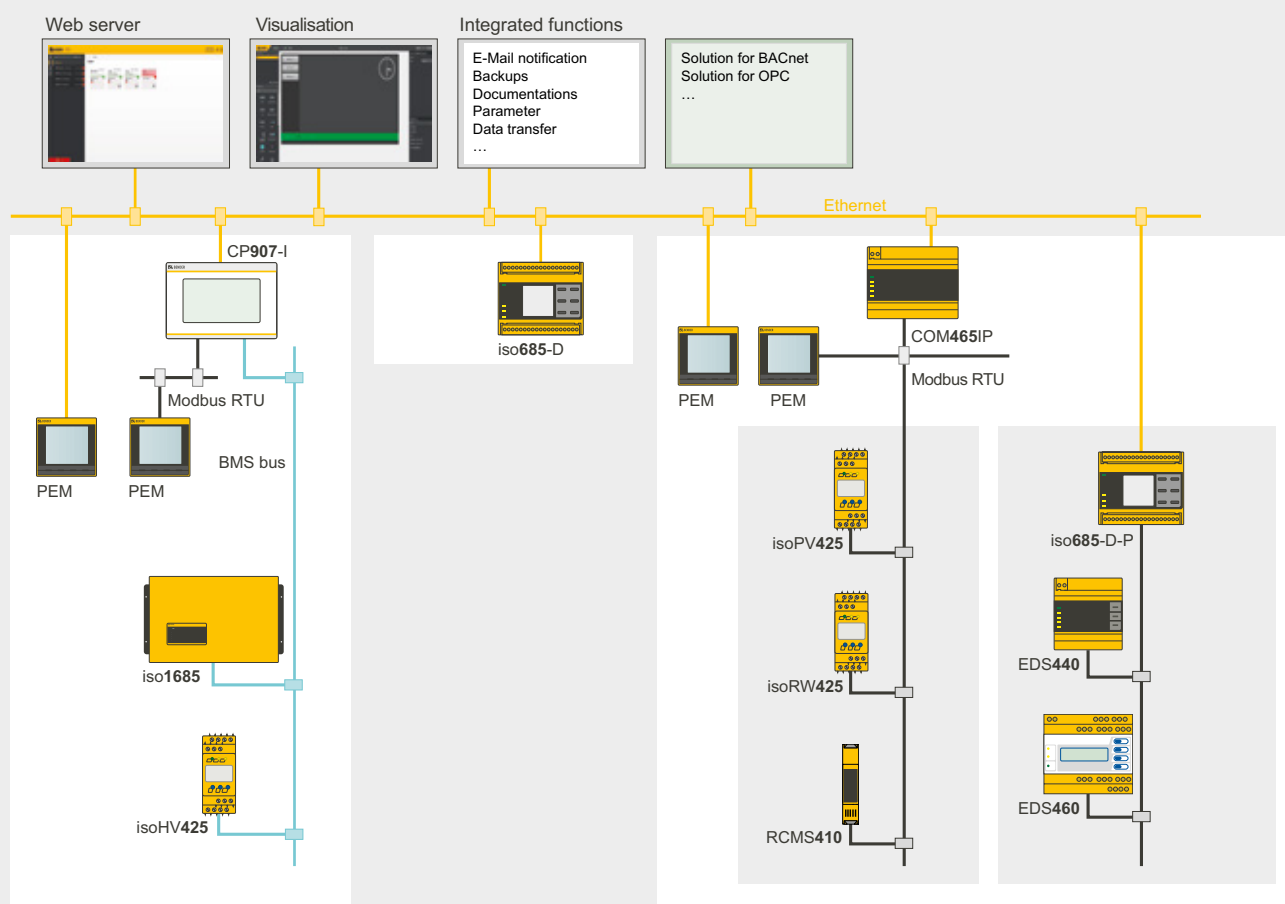
### COM465IP

Condition monitor with an integrated gateway for the connection of Bender devices to Ethernet TCP/IP networks

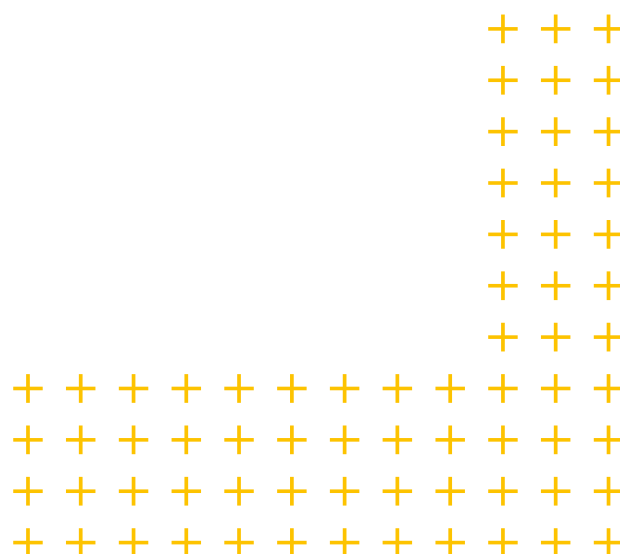


### CP9...-I

Condition monitor with an integrated gateway and touch screen for the connection of Bender devices to Ethernet TCP/IP networks



Electrical Safety Management: Comprehensive solutions for electrical safety in all areas with various Bender devices



## Retrofits

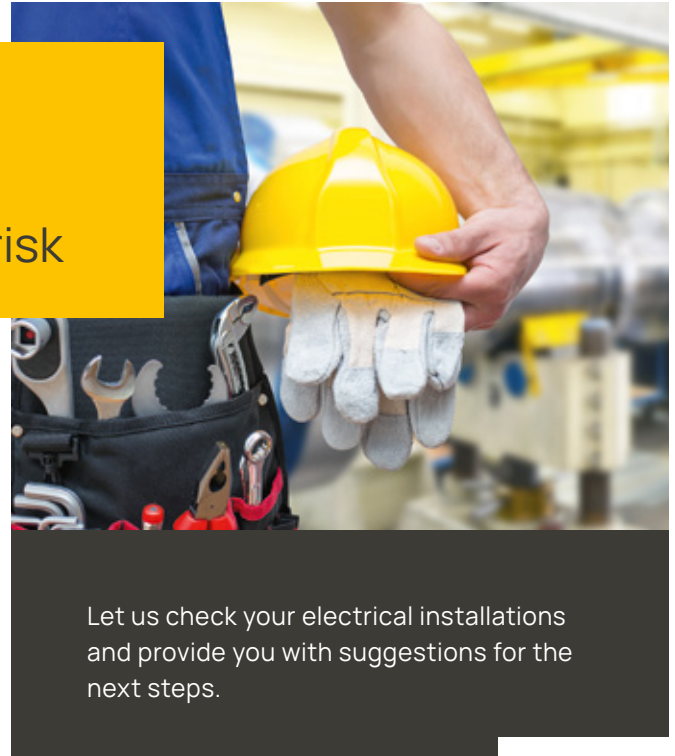
Untested devices and installations pose a safety risk

### Is your installation still state-of-the-art?

Even the most modern electrotechnical installations are not immune to the effects of time. Whether it is decreasing operational reliability, changing legal conditions or rising energy costs: Adapting to the current state of the art is indispensable. Typically, products for monitoring energy quality and fault search are retrofitted.

### Risk assessment according to Directive 2009/104/EC and its implementations in national law: Does your currently installed monitoring system detect symmetrical and asymmetrical insulation faults?

Symmetrical and asymmetrical insulation faults pose a high risk potential. With Bender insulation monitors, your installations are continuously monitored, insulation faults are detected and reported. Bender insulation monitors comply with IEC 61557-8.



Let us check your electrical installations and provide you with suggestions for the next steps.

### Bender provides flexible solutions for retrofitting projects

Modern monitoring methods can also be integrated in old installations even during ongoing operation. Retrofitting is made possible by devices such as split-core current transformers, as the power supplies do not have to be switched off and cable systems do not have to be disconnected for the retrofit.

### Successor devices from Bender can easily replace old devices.

#### Your advantages

- Well prepared for the standards of tomorrow
- Compliance with legal requirements
- Increased availability
- Update to the latest safety standard
- Cut costs and reduce energy consumption
- Ensure spare parts supply in the long term

### Systematic and efficient modernisation at low cost!



## Support during all stages remote, by phone, on site

**From planning to modernisation** – Our extensive know-how is at your disposal during all project phases.

**Furthermore, with our first-class service we guarantee maximum safety for your electrical installations.**

We offer services ranging from support over telephone to repairs and on-site service – with modern measuring devices and competent employees.

### Be on the safe side:

- High availability of your installation thanks to fast reaction to fault messages
- Increased return on your capital expenditure (CAPEX) via optimised maintenance processes
- Targeted reduction of the operating expenditure (OPEX) due to reduced downtimes and shorter service visits
- Support for your predictive installation monitoring and regular tests of your installation/power quality/monitoring devices

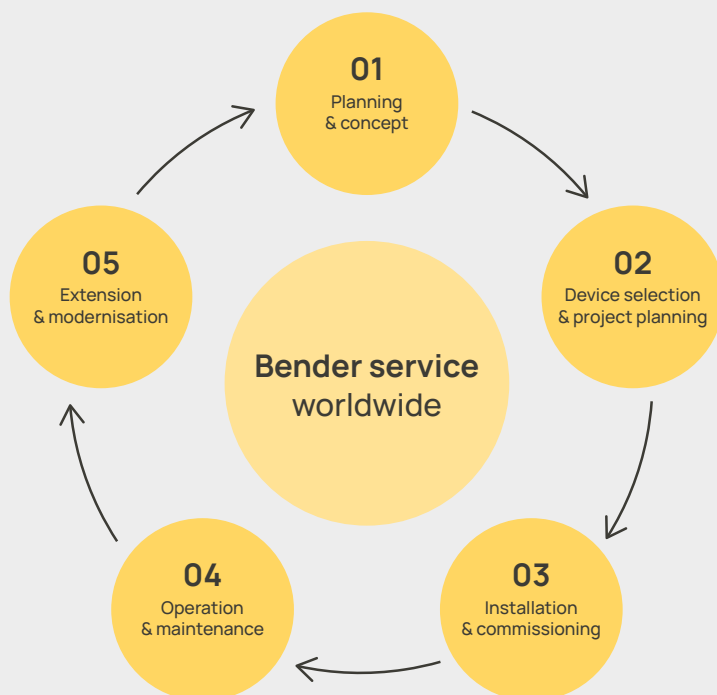
- Automatic checks, analysis, correction, new settings/updates
- Competent assistance with parameter changes and updates

### Bender Remote Assist

Bender Remote Assist offers you support via remote access, high-quality service and advice for your challenging task of ensuring consistent high safety in your installations.

For, in many cases service visits, fault clearance but also analysis and controls can be carried out remotely – without the expenses of time and money that an on-site visit of a technician implies.

This fast, efficient help and advice by our expert network allows the highest possible availability of your installation.



Competent service for maximum safety and high availability of your installation

### Fault location – made easy

With portable insulation fault location systems, existing insulation faults can be located quickly. They are the best alternative if no stationary insulation fault location systems are available.

# POWERSCOUT®

## Maximum transparency with minimum expenditure

Moisture, deterioration, dirt, mechanical damage or faults due to the impact of current, voltage and temperature cause malfunctions in every electrical installation. The web-based software solution POWERSCOUT® helps you detect malfunctions at an early stage and eliminate the causes in an economically reasonable way. This guarantees a high safety level for the installation as well as high operational reliability, and it reduces costs.

### **Analysis – as individual as your installation – as simple as possible**

Predictive maintenance prevents downtimes, reduces costs and personnel expenditure. POWERSCOUT® informs you about the condition of your electrical installation at all times, since the informative visualisations with flexible dashboards can be retrieved via any display device, be it a smartphone, a laptop or a PC. On request, POWERSCOUT® sends you these graphically processed reports at specified intervals.

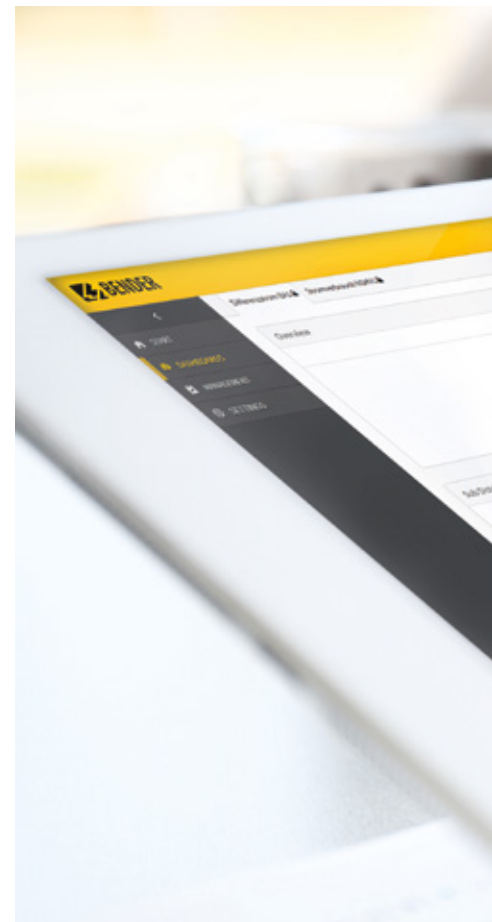
### **Continuous monitoring instead of random tests**

Manual data acquisition is time consuming, error-prone and only provides random results. With POWERSCOUT® you have the complete data of your installation at your disposal at any time since all measured values are automatically and continuously saved. Your data is stored reliably and remains available for years.

### **Basis for periodic verification as per IEC 60364-6**

The automated POWERSCOUT® report on residual currents forms the basis for measuring without switch-off by means of periodic verification as per IEC 60364-6. In order to maintain the correct status for electrical installations and stationary electrical equipment, periodic verification must be carried out.

This can be ensured, for example, when the installation is monitored continuously by qualified personnel. In this case, it is a smart move to rely on continuous monitoring with multi-channel residual current monitoring systems (RCMS) and an evaluation adapted to the installation (COMTRAXX® series). The automatic POWERSCOUT® reports based on this monitoring enable the qualified person in charge to adjust the times when the insulation test shall be performed as part of the periodic verification.



POWERSCOUT®: The web-based software solution for analysis, predictive maintenance, and reporting.

### Analysis

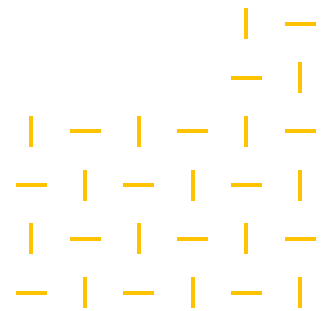
- Continuously recording insulation values
- Recognising correlations and optimising processes
- Cross-plant evaluation options
- Access from any location
- Support for investment decisions

### Report

- Historical comparisons
- Reliable storage of measured values
- Event and alarm statistics

### Predictive maintenance

- Higher availability
- Continuous monitoring
- Early detection of gradually developing insulation faults
- Early detection and reporting of short-time insulation degradation
- Lower costs incurred due to unexpected malfunctions and shutdowns





# Bender. Making your world safe.

Our world is networked on a global scale; it is digital, mobile and highly automated. And no matter whether in hospitals, in industry, inside or outside buildings, in power stations, in trains, underwater or underground: it never stands still and it is more dependent than ever on a reliable and, above all, safe electrical power supply.

And exactly that is our mission: We make electricity safe. With our technologies, we ensure that electricity is permanently available and guarantee faultless protection against the hazards of electricity. We protect buildings, installations and devices, and therefore your investments and plans. But what we primarily protect are the lives of the people behind the electrical installations.



Mechanical and plant engineering



Oil, gas



Renewable energy



Healthcare



Public power supply network



Mobile power generation



Ships and ports



Railway



eMobility



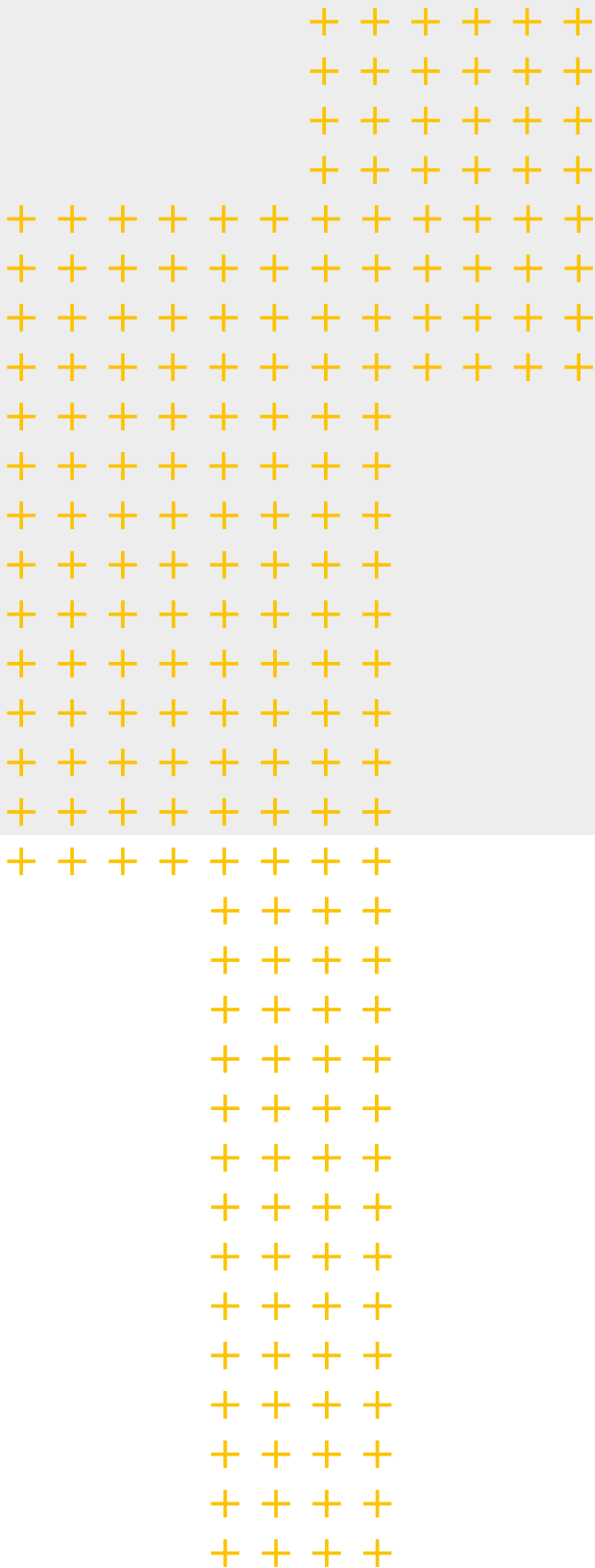
Data centres



Mining



Battery energy storage systems (BESS)



Bender GmbH & Co. KG



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