

# ISOMETER® iso415R

Insulation monitoring device  
for unearthed 3(N)AC, AC and DC systems (IT systems)



Image similar



### Device features

- Monitoring of the insulation resistance for unearthed 3(N)AC, AC and DC systems with galvanically connected rectifiers
- Automatic adaptation to the system leakage capacitance up to 25  $\mu\text{F}$
- Response time  $\leq 10$  s at  $C_e = 1$   $\mu\text{F}$  and  $R_f = R_{an} / 2$
- Automatic and manual device self test with connection monitoring
- Two separately adjustable response value ranges (5...1000 k $\Omega$ )<sup>1</sup>
- Alarm output via LEDs (AL1, AL2) and alarm relay
- Selectable n/c or n/o relay operation<sup>1</sup>
- Selectable start-up delay, response delay and delay on release<sup>1</sup>
- Fault memory activatable<sup>1</sup>
- RS-485 interface with Modbus RTU protocol
- NFC interface

<sup>1</sup> via Bender Connect app or Modbus RTU

### Intended use

The iso415R is used in unearthed systems to monitor the insulation fault  $R_f$  and to locate the  $R_f$  fault (positive or negative conductor) in DC systems. In addition to the limit value comparison, functions for connection monitoring, detection internal faults and the exceeding of the maximum permissible leakage capacitance  $C_e$  are available.

The DC components existing in AC/DC systems can have an influence on the response behaviour if an insulation fault occurs downstream of rectifiers with an electrolytic capacitor.

The separate supply voltage of the iso415R-1 also enables monitoring of a de-energised system.

Any other use than that described in this manual is regarded as improper.

Do not make any unauthorised changes to the device. Only use spare parts and optional accessories sold or recommended by the manufacturer.

Intended use also includes

- the observation of all information in the manual and
- compliance with test intervals.

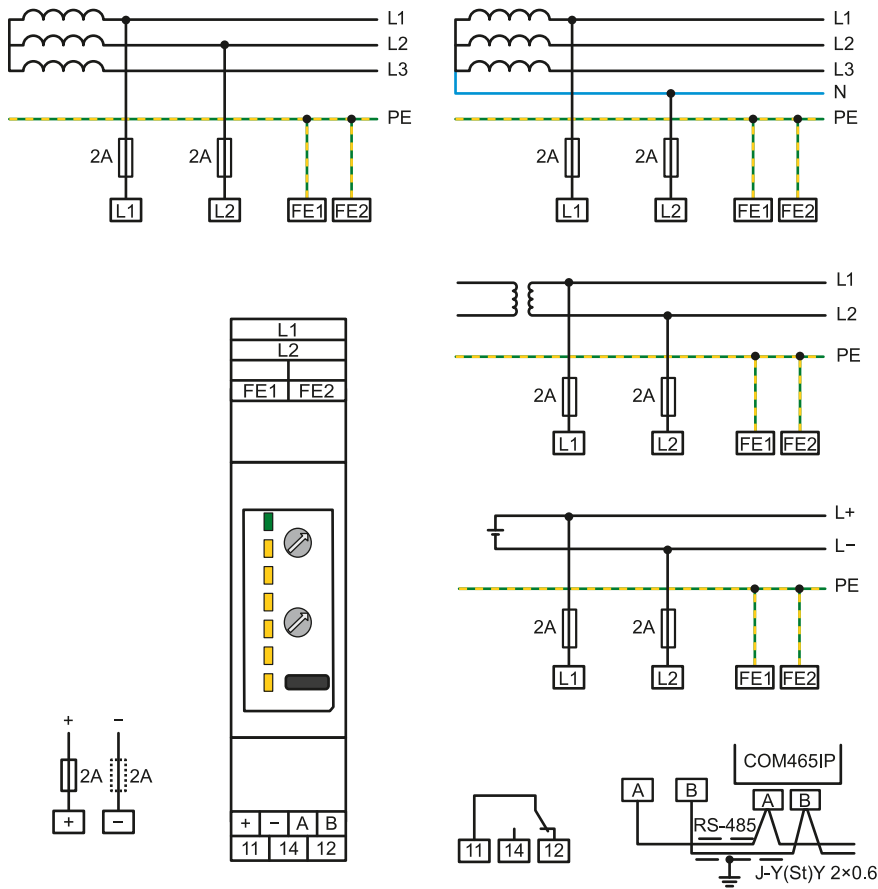
To comply with the applicable standards, the device must be configured for the local system and operating conditions. Observe the operating limits specified in the technical data.

### Functions

The iso415R is an insulation monitoring device in accordance with IEC 61557-8 for IT systems.

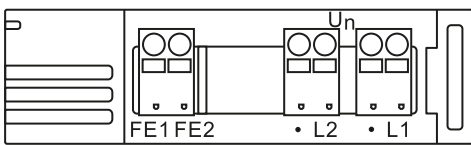
The measured value  $R_f$  as well as all messages and alarms are displayed via LEDs and can be read out via Modbus RTU and NFC. The messages and alarms are also output via the relay **K1**, depending on the message assignments that can be set via the interfaces.

Wiring diagram



Connections overview

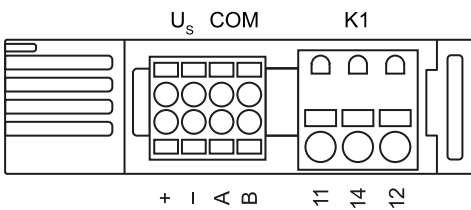
Connections top



Terminal	Connection
FE1, FE2	Functional Earth
L1, L2	Monitored system
•	Not in use

iso415R-1 top

Connections bottom



Terminal	Connection
+, -	Supply voltage DC 12...48 V
A, B	RS-485 interface
11, 14, 12	Relaiy

iso415R-1 bottom

## Technical data

### iso415R-1: Insulation coordination acc. to IEC 61010-1 and IEC 61010-2-30

#### Definitions

Measuring circuit (IC1)	L1/+, L2/-
Supply circuit (IC2)	+, -
Output circuit (IC3)	11, 14, 12
Control circuit (IC4)	FE1, FE2
Control circuit (IC5)	A, B

Pollution degree	2
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#### Definition of circuits according to IEC 61010-1, section 6.7.1.5

IC1	Measuring circuit, CAT III, 600 V
IC2	60 V (Secondary circuit, derived from primary circuit < AC 300 V, OVC II) <sup>1</sup>
IC3	Mains circuit, OVC III, 300 V
IC4 / IC5	≤30 V, not dangerously active

#### Protective separation (reinforced insulation) between the circuits

IC1 / (IC2-IC5)	protective impedance
IC3 / (IC2, IC4-IC5)	

#### Voltage tests (routine test) according to IEC 61010-1

IC1 / IC4	AC 510 V
IC3 / (IC1, IC2, IC4, IC5)	AC 2.2 kV
IC2 / (IC1, IC4, IC5)	AC 350 V
IC4 / IC5	AC 200 V

<sup>1</sup> Operation with SELV or PELV also possible

### Supply voltage

#### iso415R-1: (+/-)

Supply voltage $U_s$	DC 12...48 V
Tolerance of $U_s$	-20...+25 %
Power consumption	≤ 1.1 W
Inrush current (< 5 ms)	< 10 A

### Monitored IT system

#### iso415R-1

Nominal system voltage $U_n$	3(N)AC, AC, DC 0...400 V
Tolerance of $U_n$	+15 %
Frequency range of $U_n$	42...460 Hz

### Measuring circuit

Measuring voltage $U_m$	±16 V
Measuring current $I_m$ at $R_F, Z_F = 0 \Omega$	≤ 90 $\mu$ A
Internal resistance $R_i, Z_i$	
iso415R-1	≥ 178 k $\Omega$
Permissible system leakage capacitance $C_e$	≤ 25 $\mu$ F
Permissible extraneous DC voltage $U_{ig}$	
iso415R-1	≤ 650 V

### Response values

Response value $R_{an1}$	10...1000 k $\Omega$ (40 k $\Omega$ )*
Response value $R_{an2}$	5...700 k $\Omega$ (10 k $\Omega$ )*
Relative uncertainty $R_{an}$	±15 %, ±3 k $\Omega$
Hysteresis $R_{an}$	25 %, minimum 1 k $\Omega$

### Time response

Relative uncertainty $t_{an}$ at $R_F = 0.5 \times R_{an}$ and $C_e = 1 \mu$ F acc. to IEC 61557-8	≤ 10 s
Start-up delay $t^1$	0...1800 s (0 s)*
Response delay $t_{on}^1$	0...1800 s (0 s)*
Delay on release $t_{off}^1$	0...1800 s (0 s)*
Recovery time	< 5 s

<sup>1</sup> Can be parameterised via Bender Connect app and Modbus

### Displays, memory

Display	Status LED incl. LED bargraph (7 LEDs)
Display range insulation resistance ( $R_F$ )	1...1000 k $\Omega$
Measuring range insulation resistance ( $R_F$ ) <sup>1</sup>	1...10000 k $\Omega$
Operating uncertainty	± 15 % ± 3 k $\Omega$
Fault memory alarm messages <sup>2</sup>	on/off (off)*

<sup>1</sup> Step size: 1 k $\Omega$

<sup>2</sup> Can be parameterised via Bender Connect app and Modbus

### RS-485 interface

Protocol	Modbus RTU
Baud rate <sup>1</sup>	max. 115.2 kbit/s (19.2 kbit/s)* max. 9.6 kbit/s for 1200 m cable length
Parity <sup>1</sup>	even, no, odd (even)*
Stop bits <sup>1</sup>	1 / 2 / auto (auto)*
Device address, Modbus RTU <sup>2</sup>	1...247 (100 + SN)*
Cable length	≤ 1200 m
Cable type	CAT6/CAT7 recommended; min. J-Y(St)Y 2 × 0.6 twisted pair; shield connected to PE on one side
Termination resistor (external)	120 $\Omega$ (0.25 W)

<sup>1</sup> Can be parameterised via Bender Connect app and Modbus

<sup>2</sup> Factory setting: 100 + last two digits of serial number

### Switching elements

Switching elements	1 changeover contact
Operating principle <sup>1</sup>	n/c / n/o (n/c)*
Electrical endurance	10,000 cycles

<sup>1</sup> Can be parameterised via Bender Connect app and Modbus

### Contact data acc. to IEC 60947-5-1

Utilisation category	AC-12 / AC-14 / DC-12 / DC-12 / DC-12
Rated op. voltage	250 V / 250 V / 24 V / 110 V / 220 V
Rated op. current	5 A / 2 A / 1 A / 0.2 A / 0.1 A
Minimum contact rating <sup>1</sup>	10 mA at AC/DC ≥ 10 V

<sup>1</sup> refers to relays that have not been operated with high contact currents

**Connection**

**iso415R-1**

Connection type	Push-in plug connector
Nominal current	≤ 5 A
Stripping length	8...9 mm

Connection properties for grid dimension 3.5 mm	
rigid	0.2...1.5 mm <sup>2</sup> (AWG 24...16)
flexible	0.2...1.5 mm <sup>2</sup> (AWG 24...16)
with ferrule with plastic sleeve	0.25...0.5 mm <sup>2</sup>
with ferrule without plastic sleeve	0.25...1.5 mm <sup>2</sup>

Connection properties for grid dimension 5.08 mm (relay switching contacts)	
rigid	0.2...1.5 mm <sup>2</sup> (AWG 24...16)
flexible	0.2...1.5 mm <sup>2</sup> (AWG 24...16)
with ferrule with plastic sleeve	0.25...1.5 mm <sup>2</sup>
with ferrule without plastic sleeve	0.25...1.5 mm <sup>2</sup>

**Environment/EMC**

EMC	IEC 61326-2-4
Operating altitude	≤ 2000 AMSL

**Ambient temperatures**

Operation	-25...+55 °C
Transport	-40...+85 °C
Storage	-40...+70 °C

**Climatic conditions acc. to IEC 60721** (related to temperature and relative humidity)

Stationary use (IEC 60721-3-3)	3K22
Transport (IEC 60721-3-2)	2K11
Long-term storage (IEC 60721-3-1)	1K22

**Mechanical conditions acc. to IEC 60721**

Stationary use (IEC 60721-3-3)	3M11
Transport (IEC 60721-3-2)	2M4
Long-term storage (IEC 60721-3-1)	1M12

**Other**

Operating mode	continuous operation
Mounting	cooling slots must be ventilated vertically
Degree of protection, internal components (DIN EN 60529)	IP20
Degree of protection, terminals (DIN EN 60529)	IP20
Enclosure material	polycarbonate
DIN rail mounting acc. to	IEC 60715
Flammability class	UL 94 V-0
Weight	≤ 100 g

(\*) Factory setting

**Standards and certificates**

**Standards**

The iso415R has been developed in accordance with the following standards:

- IEC 61557-8

**Licences**

For a list of the open-source software used see our [Website](#).

**Declaration of conformity**

Bender GmbH & Co. KG hereby declares that the device covered by the Radio Equipment Directive complies with Directive 2014/53/EU.

The complete EU and UK declarations of conformity are available in the download area:

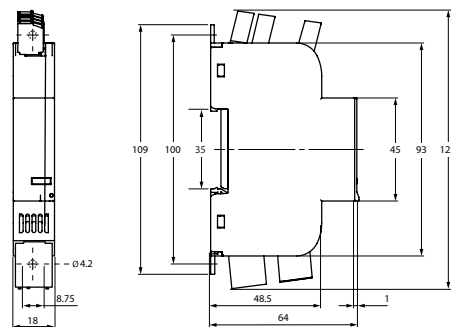
<https://www.bender.de/en/service-support/download-area/>

**Marks**



**Dimension Diagram**

**Pluggable push-in terminals**



*Dimensions in mm*

## Ordering information

Type	Supply voltage $U_s$	Nominal system voltage $U_n$	Art. No.
iso415R-1	DC 12...48 V	3(N)AC, AC, DC 0...400 V	B81604000

## Accessories

Description	Art. No.
SMARTDETECT ISO41xR connector kit for push-in terminals	B80609102
SMARTDETECT 41x Sealable transparent cover   49 × 18 × 3 (mm)	B80609199



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Subject to change!  
The specified standards take into account the  
edition valid until 05.2026 unless otherwise  
indicated.