DC

ISOMETER® isoUG425

Insulation monitoring device for earth fault detection
in unearthed DC systems up to 120 V

Image similar

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BENDER

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Insulation monitoring device for earth fault detection in unearthed DC systems up to 120 V

Device features

- Monitoring of the asymmetrical insulation resistance R_F for unearthed DC systems
- Measuring the system voltage U_n (True-RMS and DC) with undervoltage/ overvoltage detection
- Measuring the DC residual voltages U_{L+e} (L+ to PE) and U_{L-e} (L– to PE)
- Selectable start-up delay, response delay and delay on release
- Alarm output via LEDs (“AL1”, “AL2”), display, and alarm relays (“K1”, “K2”)
- Selectable n/c or n/o relay operation
- Measured value indication via multi-functional LC display
- Activatable fault memory
- Configurable adaptation to the system leakage capacitance C_e up to 50 µF
- Two separately adjustable response value ranges 1…100 kΩ (prewarning, alarm)
- Password protection against unauthorised changing of parameters
- RS-485 (galvanically isolated) including the following protocols:
  - BMS (Bender measuring device interface) for the data exchange with other Bender devices
  - Modbus RTU
  - IsoData (for continuous data output)

Intended use

The ISOMETER® isoUG425 is an insulation monitoring device for earth fault detection. It monitors the asymmetrical insulation resistance R_F of unearthed DC systems (IT systems) with system voltages of DC 12…120 V.

The maximum permissible system leakage capacitance is 50 µF.

In order to meet the requirements of the applicable standards, customised parameter settings must be made on the equipment in order to adapt it to local equipment and operating conditions. Please heed the limits of the range of application indicated in the technical data.

Any other use or a use that goes beyond this constitutes improper use.

i The isoUG425 is not an insulation monitoring device as described in IEC 61557-8 / EN 61557-8. The offset voltage measured in the event of an insulation fault on a system conductor is metrologically evaluated. Using a passive measurement method, the isoUG425 records insulation faults that cause an asymmetry to PE in the IT system. Symmetrical insulation faults (i.e. equally large insulation faults on the positive and negative power conductors to earth) are not detected or recorded.

i If the ISOMETER® is installed inside a control cabinet, the insulation fault message must be audible and/or visible to attract attention.

Function description

The ISOMETER® measures, from a minimum system voltage, the asymmetrical insulation resistance R_F between the system to be monitored (L+, L–) and earth (PE). The RMS value and the DC value of the system voltage U_n between L+ and L– as well as the residual voltages U_{L+e} (between L+ and earth) and U_{L-e} (between L– and earth) are also measured.

It is possible to assign the detected fault or the faulty conductor to an alarm relay via the menu. If the values R_F or U_n violate the response values activated in the “AL” menu, this will be indicated by the LEDs and relays “K1” and “K2” according to the signalling assignment set in the “out” menu. In addition, the operation of the relay can be set and the fault memory “M”, activated.

If the values R_F or U_n do not violate their release value (response value plus hysteresis) for the period t_{off} without interruption, the alarm relays will switch back to their initial position and the alarm LEDs “AL1”/“AL2” go out. If the fault memory is activated, the alarm relays remain in alarm condition and the LEDs light until the reset button “R” is pressed or the supply voltage is interrupted.

The device function can be tested using the test button “T”.

Parameters are assigned to the device via the LCD and the control buttons on the front panel; this function can be password-protected. Parameterisation is also possible via the BMS bus, for example by using the BMS Ethernet gateway (COM460IP) or the Modbus RTU.

Connection

For UL applications:

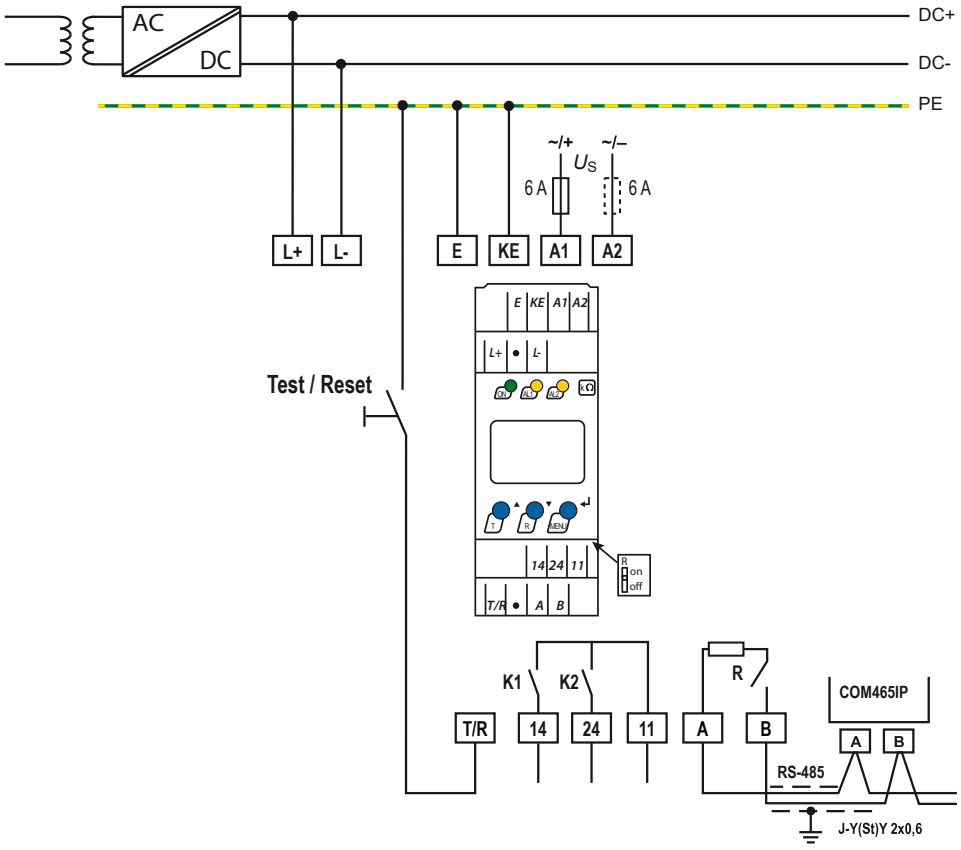
Only use 60/75 °C copper lines.

For UL and CSA applications: Connect the supply voltage via 5 A fuses.

The supply voltage U_s applied to A1/A2 can be provided by the system voltage (DC+/DC–) when the DC system voltage is ≥ 24 V. Otherwise a separate power supply is needed.

For details about the conductor cross sections required for wiring, refer to chapter Technical data.

Wiring diagram



Terminal	Connections
A1, A2	Connection to the supply voltage U_s via fuse (line protection): If supplied from an IT system, protect both lines by a fuse.
E, KE	Separate connection to PE: Use same wire cross section as for “A1”, “A2”.
L+, L–	Connection to the DC system to be monitored Indication in display: “L1” for L+; “L2” for L-
T/R	Connection for the external combined test and reset button
11, 14	Connection to alarm relay “K1”
11, 24	Connection to alarm relay “K2”
A, B	RS-485 communication interface with connectable terminating resistor Example: Connection of a BMS Ethernet gateway COM465IP

Technical data isoUG425

( )* = factory setting

Insulation coordination acc. to IEC 60664-1/-3

Definitions

Measuring circuit (IC1)	L+, L–
Supply circuit (IC2)	A1, A2
Output circuit (IC3)	11, 14, 24
Control circuit (IC4)	E, KE, T/R, A, B
Rated voltage	400 V
Overvoltage category	III

Rated impulse voltage

IC1/(IC2-4)	6 kV
IC2/(IC3-4)	4 kV
IC3/(IC4)	4 kV

Rated insulation voltage

IC1/(IC2-4)	400 V
IC2/(IC3-4)	250 V
IC3/(IC4)	250 V
Pollution degree	3

Protective separation (reinforced insulation) between

IC1/(IC2-4)	Overvoltage category III, 600 V
IC2/(IC3–4)	Overvoltage category III, 300 V
IC3/(IC4)	Overvoltage category III, 300 V

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

IC2/(IC3-4)	AC 2.2 kV
IC3/(IC4)	AC 2.2 kV

Supply voltage

Supply voltage U_s	AC 100…240 V DC 24…240 V
Tolerance of U_s	–30…+15 %
Frequency range of U_s	47…63 Hz
Power consumption	≤ 3 W, ≤ 9 VA

Monitored IT system

Nominal system voltage U_n	DC 12…120 V
Tolerance of U_n	+20 %

Measuring circuit

Internal resistance R_i	≥ 115 kΩ
Permissible system leakage capacitance C_e	≤ 50 µF

Response values

Response value R_{an1}	1…100 kΩ (50 kΩ)*
Response value R_{an2}	1…95 kΩ (25 kΩ)*
Relative uncertainty R_{an}	±15 %, at least ±2 kΩ
Hysteresis R_{an}	25 %, at least 1 kΩ
Undervoltage detection U_{DC}	8…143 V (off)*
Overvoltage detection U_{DC}	8.1…144 V (off)*
Relative uncertainty U_{DC}	±5 %, at least ±0.5 V
Hysteresis U_{DC}	5 %, at least 1 V

Time response

Response time t_{an} of $R_F = 0.5 \times R_{an}$ and C_e = 1 µF acc. to IEC 61557-8	≤ 1 s
Start-up delay t	0…10 s (0 s)*
Response delay t_{on}	0…99 s (0 s)*
Delay on release t_{off}	0…99 s (0 s)*

Displays, memory

Display	LC display, multi-functional, not illuminated
Display range measured value insulation resistance (R_F)	1 kΩ … 1 MΩ
Operating uncertainty R_F	±15 %, at least ±2 kΩ
Display range measured value system voltage (U_n)	0…150 V (R_F =∞ : 300 V_p; R_F = 0 kΩ : 150 V_p)
Operating uncertainty U_{DC}	±5 %, at least ±0.5 V
Operating uncertainty U_{RMS}	±5 %, at least ±1.5 V
Password	off / 0…999 (off, 0)*
Fault memory alarm messages	on / (off)*

Interface

Interface; protocol	RS-485; BMS, Modbus RTU, isoData
Baud rate	BMS (9.6 kBit/s), Modbus RTU (selectable), isoData (115.2 kBit/s)
Cable length (9.6 kBit/s)	≤ 1200 m
Cable: twisted pairs, shield connected to PE on one side	min. J-Y(St)Y 2 × 0.6
Terminating resistor	120 Ω (0.25 W), internal, can be connected
Device address, BMS bus, Modbus RTU	3…90 (3)*

Switching elements

Switching elements	2 × 1 n/o contacts, common terminal 11
Operating principle	n/c, n/o (n/o)*
Electrical endurance	10,000 cycles

Contact data acc. to IEC 60947-5-1

Utilisation category	AC-12 / AC-14 / DC-12 / DC-12 / DC-12
Rated operational voltage	230 V / 230 V / 24 V / 110 V / 220 V
Rated operational current	5 A / 2 A / 1 A / 0.2 A / 0.1 A
Necessary minimum contact load (relay manufacturer's reference)	10 mA / DC 5 V

Environment/EMC

EMC	IEC 61326-2-4

Ambient temperatures

Operation	–40…+70 °C
Transport	–40…+85 °C
Storage	–40…+70 °C

Climatic class acc. to IEC 60721

Stationary use (IEC 60721-3-3)	3K22
Transport (IEC 60721-3-2)	2K11
Long-time storage (IEC 60721-3-1)	1K21

Classification of mechanical conditions acc. to IEC 60721

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

Other

Operating mode	continuous operation
Mounting	cooling slots must be ventilated vertically
Degree of protection, built-in components (DIN EN 60529)	IP30
Degree of protection, terminals (DIN EN 60529)	IP20
Enclosure material	polycarbonate
DIN rail mounting acc. to	IEC 60715
Screw mounting	2 × M4 with mounting clip
Weight	≤ 150 g

Connection

Push-wire terminals

Nominal current	≤ 10 A
Conductor sizes	AWG 24…14
Stripping length	10 mm
Rigid	0.2…2.5 mm²
Flexible without ferrules	0.75…2.5 mm²
Flexible with ferrules with/without plastic sleeve	0.25…2.5 mm²
Multi-conductor flexible with TWIN ferrules with plastic sleeve	0.5…1.5 mm²
Opening force	50 N
Test opening	Ø 2.1 mm

Standards and certifications

The ISOMETER® was developed in compliance with the following standards:

- DIN EN 50155: 2018-05

The isoUG425 is no insulation monitoring device for the purposes of IEC 61557-8/EN 61557-8. It detects insulation faults that cause an unbalance towards PE in the IT system. Symmetrical insulation faults cannot be detected.

EU Declaration of Conformity

The EU Declaration of Conformity is available at the following Internet address:

https://www.bender.de/fileadmin/content/Products/CE/CEKO_isoXX425.pdf

UKCA Declaration of Conformity

Die UKCA-Konformitätserklärung ist unter folgendem Link verfügbar:

https://www.bender.de/fileadmin/content/Products/UKCA/UKCA_isoXX425.pdf

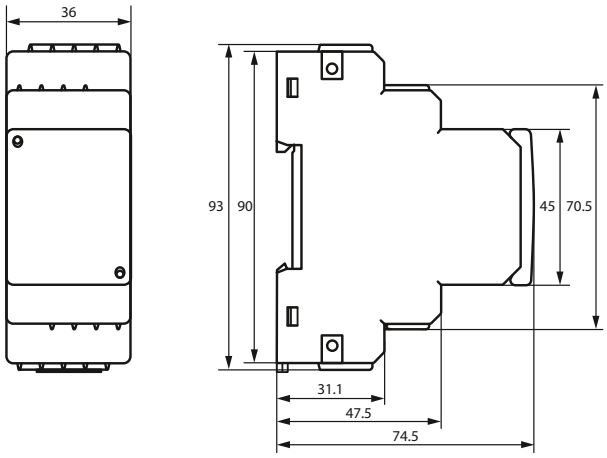
Ordering data

Type	Nominal system voltage U_n	Article number	
		Push-wire terminals	Screw-type terminals
isoUG425-D4-4	AC 100…240 V, 47…63 Hz DC 24…240 V	B71036320	–

Accessories

Description	Article number
Mounting clip for screw mounting	B98060008
XM420 mounting frame	B990994

Dimensions



Dimension diagram (in mm)

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