

ISOMETER® isoHV425 with AGH422

Insulation monitoring device for unearthed AC, AC/DC and DC systems up to 3(N)AC, AC 1000 V



Image similar



Device features

- Monitoring of the insulation resistance R_f for unearthed AC/DC systems
- Measuring the system voltage U_n (True-RMS) with undervoltage/ overvoltage detection
- Measuring the DC residual voltages U_{L1e} (L1/+ to PE) and U_{L2e} (L2/- to PE)
- Selectable start-up delay, response delay and delay on release
- Alarm output via LEDs ("AL1", "AL2"), display, and alarm relays ("K1", "K2")
- Automatic device self test with connection monitoring
- Selectable n/c or n/o relay operation
- Measured value indication via multi-functional LC display
- Activatable fault memory
- Automatic adjustment to the system leakage capacitance C_e up to 150 μF
- Two separately adjustable response value ranges 10...500 k Ω (prewarning, alarm)
- Password protection against unauthorised changing of parameters
- **isoHV425-D4-4:** 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)
- **isoHV425-D4M-4:** Analogue output (galvanically separated)

Intended use

The ISOMETER® monitors the insulation resistance R_f of unearthed AC, AC/DC and DC systems (IT systems) with nominal system voltages of 3(N)AC, AC/DC 0...1000 V or DC 0...1000 V.

The maximum permissible system leakage capacitance is 150 μF .

DC components existing in AC systems do not influence the operating characteristics when a minimum load current of DC 100 mA flows. A separate supply voltage U_s allows de-energised systems to be monitored as well.

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** To ensure that the ISOMETER® functions correctly, an internal resistance of ≤ 1 k Ω must exist between L1/+ and L2/- via the source (e.g. PSU) or the load.
- i** If the ISOMETER® is installed inside a control cabinet, the insulation fault message must be audible and/or visible to attract attention.

Functional description

The ISOMETER® measures the insulation resistance R_f and the system leakage capacitance C_e between the system to be monitored (L1/+, L2/-) and earth (PE). The RMS value of the system voltage U_n between L1/+ and L2/-, as well as the DC residual voltages U_{L1e} (between L1/+ and earth) and U_{L2e} (between L2/- and earth) are also measured.

The determined fault can be assigned to an alarm relay via the menu. If the values R_f or U_n exceed the response values activated in the "AL" menu, this will be indicated by the LEDs and relays "K1" and "K2" according to the alarm assignment set in the "out" menu. In addition, the operation of the relay can be set and the fault memory "M" can be activated.

If the values R_f oder U_n do not exceed 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 stop lighting. If the fault memory is activated, the alarm relays remain in the alarm condition and the LEDs light until the reset button "R" is pressed or the supply voltage U_s 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 (COM465IP) or the Modbus RTU.

Connection
Wiring diagram legend:

Terminal	Connections
A1, A2	Connection to the supply voltage U_s via fuse: If supplied from an IT system, both lines have to be protected by a fuse.*
E, E, KE	Connect each terminal separately to PE: Use the same wire cross section as for "A1", "A2".
L1/+, L2/-	Connection to IT system to be monitored
Up, AK1, GND, AK2	Connect the terminals of the AGH to the corresponding terminals of the ISOMETER®.
T/R	Connection for 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 selectable terminating resistance
M-, M+	Analogue output

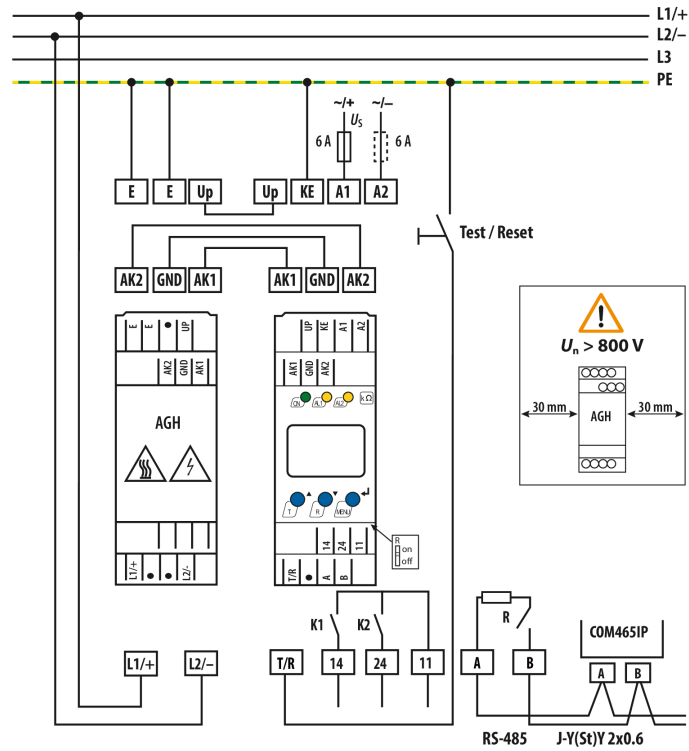
i * For UL and CSA applications:

Feed the supply voltage U_s via 5 A back-up fuses.

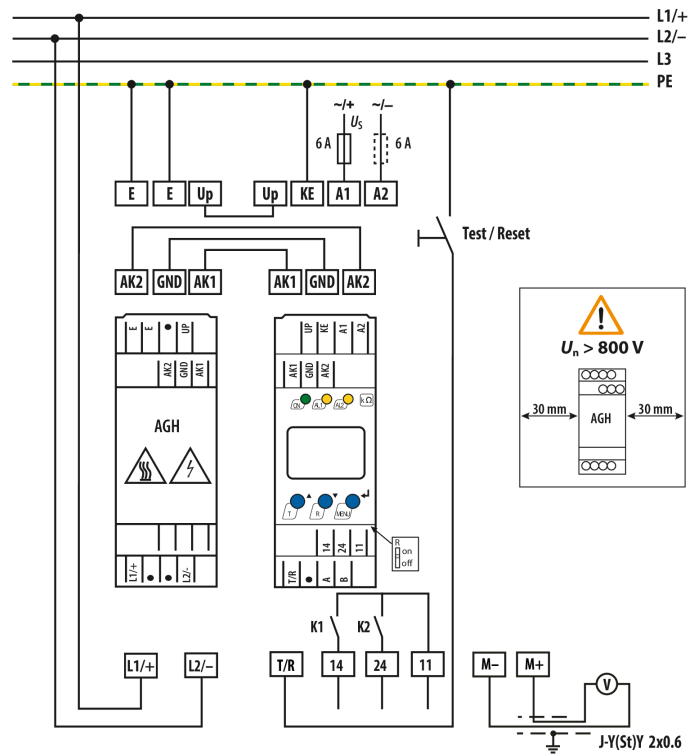
i For UL applications:

Only use 60/75 °C copper lines.

Wiring diagram for isoHV425(W)-D4-4



Wiring diagram for isoHV425(W)-D4M-4



Wiring diagram with analogue interface

Technical data isoHV425

(*) = factory setting

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

Supply circuit (IC2)	A1, A2
Output circuit (IC3)	11, 14, 24
Control circuit (IC4)	Up, KE, T/R, A, B, AK1, GND, AK2; M+, M-
Rated voltage	240 V
Overvoltage category	III

Rated impulse voltage

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

Rated insulated voltage

IC2/(IC3-4)	250 V
IC3/IC4	250 V
Polulation degree	3

Protective separation (reinforced insulation) between

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

IT system being monitored

Nominal system voltage U_n with AGH422	AC 0...1000 V / DC 0...1000 V
Tolerance of U_n	AC +10 %, DC +10 %
Nominal system voltage range U_n with AGH422 (UL 508)	AC/DC 0...600 V
Frequency range of U_n	DC, 15...460 Hz

Measuring circuit

Permissible system leakage capacitance C_e	≤ 150 μ F
Permissible extraneous DC voltage U_{fg}	≤ 1600 V

Response values

Response value R_{an1}	11...500 k Ω (50 k Ω)*
Response value R_{an2}	10...490 k Ω (25 k Ω)*
Relative uncertainty R_{an}	± 15 %, at least ± 3 k Ω
Hysteresis R_{an}	25 %, at least 1 k Ω
Undervoltage detection	30...1090 V (off)*
Overvoltage detection	31...1100 V (off)*
Relative uncertainty U	± 5 %, at least ± 5 V
Relative uncertainty depending on the frequency ≥ 200 Hz	-0,075 %/Hz
Hysteresis U	5 %, at least 5 V

Time response

Response time t_{an} at $R_F = 0.5 \times R_{an}$ and $C_e = 1$ μ F acc. to IEC 61557-8	≤ 20 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 k Ω ... 4 M Ω
Operating uncertainty at $R_F \leq 1$ M Ω	± 15 %, at least ± 3 k Ω
Display range measured value system voltage (U_n)	30...1150 V _{RMS}
Operating uncertainty	± 5 %, at least ± 5 V
Display range measured value system leakage capacitance at $R_F > 20$ k Ω	0...200 μ F
Operating uncertainty	± 15 %, at least ± 2 μ F
Password	off / 0...999 (0, off)*
Fault memory alarm messages	on/(off)*

Interface (isoHV425-D4-4 only)

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 x 0.6
Terminating resistor	120 Ω (0,25 W), internal, can be connected
Device address, BMS bus, Modbus RTU	3...90 (3)*

Analogue output (isoHV425-D4M-4 only)

Operating mode	mid-scale U (R = 120 kΩ)*
Functions	(insulation value R _p)*
Max. no load voltage (open terminals)	DC 12 V
Max. short-circuit current	25 mA, short-circuit-proof
Voltage output	DC 0...10 V, load ≥ 20 kΩ*
Current output	DC 0/4...20 mA, load ≤ 130 Ω
Current output	DC 4...400 μA, load ≤ 3 kΩ
Tolerance	±10 %, +2 % of the full scale value

Switching elements

Switching elements	2 x 1 n.o. contacts, common terminal 11
Operating principle	n/c or n/o (n/c)*
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
Minimum contact rating	1 mA at AC/DC ≥ 10 V

Environment/EMC

EMC	IEC 61326-2-4; DIN EN 50121-3-2
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Ambient temperatures

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

Classification of climatic conditions acc. to IEC 60721 (related to temperature and relative humidity)

Stationary use (IEC 60721-3-3)	3K22
• W variant	3K24
Transport (IEC 60721-3-2)	2K11
Long-term storage (IEC 60721-3-1)	1K22

Classification of mechanical conditions acc. to IEC 60721

Stationary use (IEC 60721-3-3)	3M11
• W variant	3M12
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, 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 fixing	2 x M4 with mounting clip
Weight	≤ 150 g

Technical data AGH422
Insulation coordination acc. to IEC 60664-1/-3
Definitions

Measuring circuit (IC1)	L1/+, L2/-
Control circuit (IC2)	AK1, GND, AK2, Up, E
Rated voltage	1000 V
Overtoltage category	III

Rated impulse voltage

IC1/IC2	8 kV
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Rated insulated voltage

IC1/IC2	1000 V
Polution degree	3

Protective separation (reinforced insulation) between

IC1/IC2	Overtoltage category III, 1000 V
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Monitored IT system

Nominal system voltage range U_n	AC/DC 0...1000 V
Tolerance of U_n	AC/DC +10 %

Measuring circuit

Measuring voltage U_m	± 45 V
Measuring current I_m at R_f	≤ 120 μ A
Internal resistance DC R_i	≥ 390 k Ω

Environment/EMC

EMC	IEC 61326-2-4; DIN EN 50121-3-2
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Ambient temperatures

Operation $U_n < 700$ V	-40...+70 °C
Operation $U_n > 700$ V	-40...+55 °C
Transport	-40...+85 °C
Storage	-40...+70 °C

Classification of climatic conditions acc. to IEC 60721 (related to temperature and rel.humidity)

Stationary use (IEC 60721-3-3)	3K22
• W variant	3K24
Transport (IEC 60721-3-2)	2K11
Long-term storage (IEC 60721-3-1)	1K22

Classification of mechanical conditions acc. to IEC 60721

Stationary use (IEC 60721-3-3)	3M11
• W variant	3M12
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
Distance to adjacent devices from $U_n > 800$ V	≥ 30 mm
Degree of protection internal 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 x M4 with mounting clip
Weight	≤ 150 g

Connection (for ISOMETER® and AGH)

Screw-type terminals

Nominal current	≤ 10 A
Tightening torque	0.5...0.6 Nm (5...7 lb-in)
Conductor sizes	AWG 24...12
Stripping length	8 mm
Rigid/flexible	0.2...2.5 mm ²
Flexible with ferrules with/without plastic sleeve	0.25...2.5 mm ²
Multi-conductor rigid	0.2...1.5 mm ²
Multi-conductor flexible	0.2...1.5 mm ²
Multi-conductor flexible with ferrules without plastic sleeve	0.25...1.5 mm ²
Multi-conductor flexible with TWIN ferrules with plastic sleeve	0.25...1.5 mm ²

Push-wire terminals

Nominal current	≤ 10 A
Conductor sizes	AWG 24...14
Stripping length	10 mm
Rigid	0.2...2.5 mm ²
Flexible without ferrules	0.75...2.5 mm ²
Flexible with ferrules with/without plastic sleeve	0.25...2.5 mm ²
Multi-conductor flexible with TWIN ferrules with plastic sleeve	0.5...1.5 mm ²
Opening force	50 N
Test opening	∅ 2.1 mm

Single cables for terminals Up, AK1, GND, AK2

Requirement for connecting cables between ISOMETER® and AGH

Cable lengths	≤ 0.5 m
Connection properties	≥ 0.75 mm ²

Standards and certifications

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

- DIN EN 61557-8 (VDE 0413-8): 2015-12/Cor1: 2016-12
- DIN EN 50155: 2018-05
- EN 45545-2:2016
- IEC 61557-8: 2014/COR1: 2016
- EN61373 cat I class B



i Application in rail vehicles / DIN EN 45545-2:2016

If the distance to neighbouring components that do not comply with the requirement of DIN EN 45545-2 table 2 is <20 mm horizontally or <200 mm vertically, these components shall be considered grouped.

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

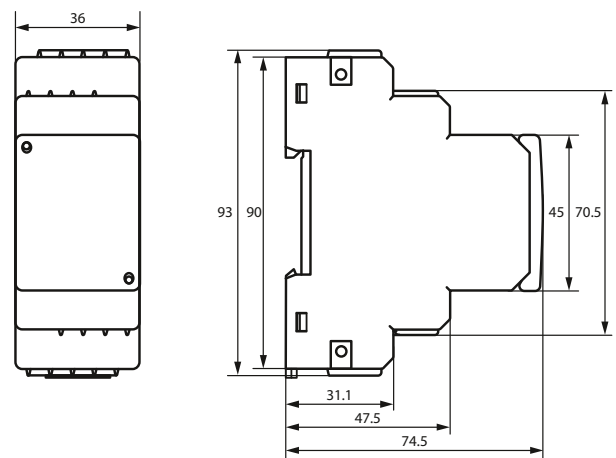
Type	Supply voltage U_s	Version	Article number	
			Push-wire terminals	Screw-type terminals
isoHV425-D4-4 mit AGH422	AC 100...240 V; 47...63 Hz DC 24...240 V	Serial interface	B71036501	B91036501S
isoHV425W-D4-4 mit AGH422W ¹⁾			B71036501W	B91036501W
isoHV425-D4M-4 mit AGH422	AC 100...240 V; 47...63 Hz DC 24...240 V	Analogue output	B71036503	–
isoHV425W-D4M-4 mit AGH422W ¹⁾			B71036503W	B91036503W

¹⁾ Option W: Increased shock and vibration resistance 3K23; 3M12; -40...+70 °C

Accessories

Description	Article number
Mounting clip for screw mounting	B98060008

Dimensions



Dimension diagram (in mm)



Bender GmbH & Co. KG

Londorfer Straße 65
35305 Grünberg
Germany

Tel.: +49 6401 807-0
info@bender.de
www.bender.de



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Subject to change!
The specified standards take into account the
edition valid until 08.2024 unless otherwise
indicated.