

ISOMETER® isoLR275 with coupling device AGH-LR

Insulation monitoring device for unearthed IT AC, AC/DC and DC systems for electrical installations with a low level of resistance



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Device features

isoLR275

- ISOMETER® for IT AC systems with galvanically connected rectifiers or converters and for IT DC systems (IT = unearthed systems)
- Particularly suitable to monitor installations with a low level of insulation
- Use the isoLR275 only combination with the coupling device AGH-LR
- Automatic adaptation to the existing system leakage capacitance
- **AMP^{Plus}** measurement method (European patent: EP 0 654 673 B1)
- Choice of measurement methods to meet different requirements
- Two separately adjustable response ranges of 0.2...100 kΩ (Alarm 1, Alarm 2)
- Two-line LC display
- Automatic device self test
- History memory with real-time clock to store alarm messages with date and time stamp
- BMS interface (Bender Measuring Device Interface) for communication with other Bender devices (RS-485 electrically isolated)
- Internal disconnection of the ISOMETER® from the IT system to be monitored (via control signal; terminals F1/F2) (e.g. if several ISOMETERs® are interconnected)
- Current output 0(4)...20mA (electrically isolated) analogously to the measured insulation value

AGH-LR

- Appropriate coupling device for ISOMETER® isoLR275
- Nominal voltage range AC 0...793 V and DC 0...1100 V
- DIN rail mounting

Product description

The isoLR275 ISOMETER® in conjunction with the AGH-LR coupling device monitors the insulation resistance of IT systems. It is suitable for universal use in 3(N) AC, AC/DC and DC systems. AC systems may include extensive DC-supplied loads, such as converters or thyristor-controlled DC drives. The adaptation to the existing system leakage capacitances takes place automatically.

Only use the AGH-LR coupling device supplied with the device for adaptation of the nominal voltage range.

isoLR275 can share the BMS bus with other bus devices.

Application

- AC, DC or AC/DC main circuits
- IT systems with directly connected inverters
- IT systems with high system capacitances of up to 500 µF
- IT systems with high but slow voltage fluctuations
- Installations including switch-mode power supplies
- Coupled IT systems

Function

The isoLR275 ISOMETER® is connected between the unearthed system (IT system) and the protective conductor (PE) using the AGH-LR coupling device.

The response values and other function parameters are set via the function buttons. The parameters are indicated on the LC display and are stored in a non-volatile memory (EEPROM).

A microprocessor-controlled pulsating AC measuring voltage is superimposed on the IT system to be monitored (**AMP^{Plus}**-measurement method).

The measuring pulse consists of positive and negative cycles of the same amplitude. The period depends on the respective system leakage capacitances and the insulation resistance of the system to be monitored. The devices isoLR275 and AGH-LR are ideally adapted to each other. The corresponding combination device required in each case can be identified via the serial number on the device label. For repair work, both devices should be sent in in order to guarantee measuring accuracy. Otherwise, the measuring accuracy might be reduced!

An insulation fault between system and earth closes the measuring circuit. The evaluation circuit calculates the insulation resistance which is indicated on the LC display or the external kΩ measuring instrument after the measuring time has expired.

The measuring time is dependent on the selected measurement method, the system leakage capacitance, the insulation resistance and the system-related disturbances. System leakage capacitances do not influence the measuring accuracy.

If the reading is below the selected response values Alarm 1/Alarm 2, the associated alarm relays respond, the LEDs "Alarm 1/2" light up and the measuring value is indicated on the LC display (in the event of DC insulation faults, the faulty supply line is indicated). If the terminals R1/R2 are bridged (external reset button [N/C contact] or wire jumper), the fault message will be stored.

Pressing the reset button, resets the fault message, provided that the insulation resistance is at least 25 % and at least 1 kΩ above the actual response value. The fault memory behaviour can also be set in the "ISO SETUP" menu, by selecting the submenu Memory: on/off.

Measurement method

AMP^{Plus} The isoLR uses the patented **AMP^{Plus}** measurement method. This measuring method allows concise monitoring of modern power supply systems, also in case of extensive, directly connected DC components and high system leakage capacitances.

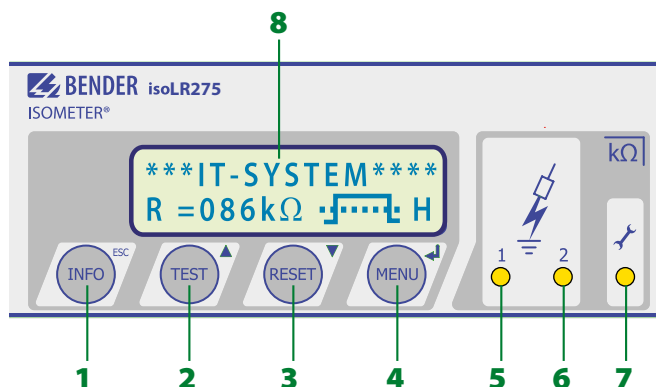
Standards

The ISOMETER® of the isoLR275 series complies with the requirements of the device standards: DIN EN 61557-8 (VDE 0413-8), IEC 61557-8, IEC 61326-2-4 Ed. 1.0, DIN EN 60664-1 (VDE 0110-1), DIN EN 60664-3 (VDE 0110-3)

Approvals

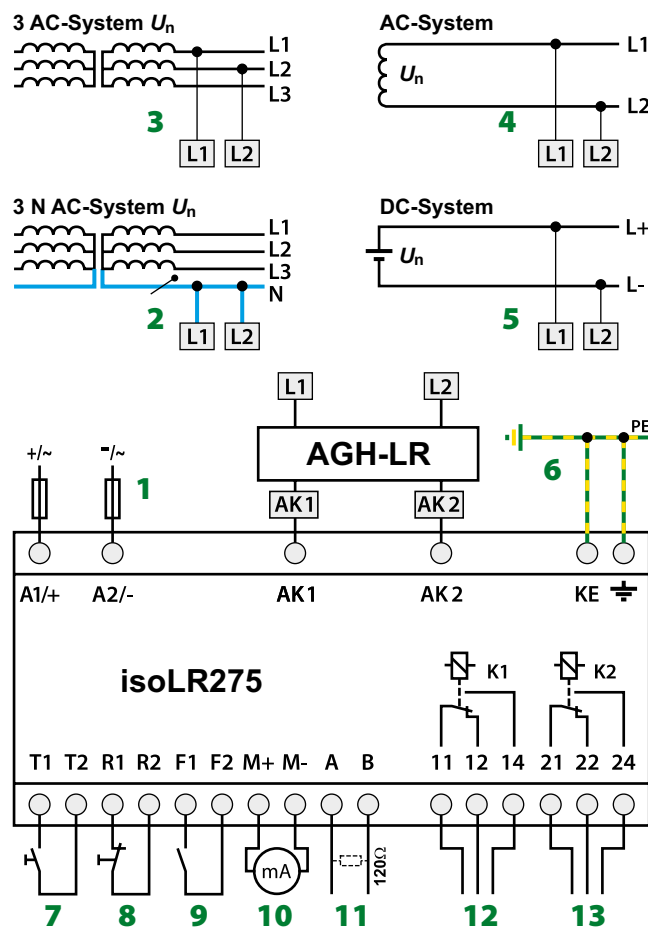


Control elements isoLR275



- 1 - "INFO" button: to query standard information/
"ESC" button: back (menu function), to confirm parameter change
- 2 - "TEST" button: to call up the self test/arrow up button:
parameter change, to move up in the menu
- 3 - "RESET" button: to delete stored insulation fault alarms
Arrow down button: parameter change, to move down in the menu
- 4 - "MENU" button: to call up the menu system.
Enter button: to confirm parameter changes
- 5 - Alarm LED "1" lights: insulation fault, first warning level reached
- 6 - Alarm LED "2" lights: insulation fault, second warning level reached
- 7 - Device error LED lights: isoLR275 faulty
- 8 - Two-line display for standard and menu mode

Wiring diagram



- 1 - Supply voltage U_S (see nameplate) via 6 A fuse;
For UL and CSA applications, it is mandatory to use 5 A fuses.
- 2, 3 - Connection to the 3 AC system to be monitored: Connect the terminals L1, L2 to neutral conductor N or terminals L1, L2 to conductor L1, L2.
- 4 - Connection to the AC system to be monitored: connect terminals L1, L2 to conductor L1, L2.
- 5 - Connection to the DC system to be monitored: Connect terminal L1 to conductor L+, terminal L2 to conductor L-
- 6 - Separate connection of and KE to PE
- *7 - External test button (N/O contact)
- *8 - External reset button (N/C contact or wire jumper), when the terminals are open, the fault message will not be stored
- *9 - STANDBY by means of the function input F1, F2: when the contact is closed, the insulation resistance is not measured. Disconnection from the IT system
- 10 - Current output, electrically isolated: 0...20 mA or 4...20 mA
- 11 - Serial interface RS-485 (termination with a 120 Ω resistor)
- 12 - Alarm relay 1; available changeover contacts
- 13 - Alarm relay 2 (device error relay); available changeover contacts

*** The wiring of the terminal pairs 7, 8 and 9 must be carried out galvanically isolated from each other and must not have a connection to PE!**

Technical data ISOMETER® isoLR275

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

Rated insulation voltage for isoLR275-3	AC 250 V
Rated impulse voltage/pollution degree	6 kV/III
Protective separation (reinforced insulation) between (A1/+, A2/-) - (11, 12, 14, 21, 22, 24) - (AK1, AK2, KE, PE, T1, T2, R1, R2, F1, F2, M+, M-, A, B)	
Voltage test acc. to IEC 61010-1	3.536 kV
Rated insulation voltage	AC 250 V
Rated impulse voltage/pollution degree	4 kV/3
Basic insulation between:	(11, 12, 14) - (21, 22, 24)
Voltage test acc. to IEC 61010-1	2.21 kV

Voltage ranges

Nominal system voltage U_n	via AGH-LR
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isoLR275-335:

Supply voltage U_S (also see nameplate)	AC 88...264 V**
Frequency range U_S	42...460 Hz
Power consumption	≤ 16 VA
Supply voltage U_S (also see nameplate)	DC 77...286 V**
Power consumption	≤ 8 W

isoLR275-327:

Supply voltage U_S (also see nameplate)	AC 19.2...55 V**
Frequency range U_S	42...460 Hz
Supply voltage U_S (also see nameplate)	DC 19.2...72 V**
Power consumption	≤ 8 W

Response values

Response value R_{an1}	0.2...100 kΩ
Factory setting R_{an1} (Alarm1)	4 kΩ
Response value R_{an2}	0.2...100 kΩ
Factory setting R_{an2} (Alarm2)	1 kΩ
Relative uncertainty (7...100 kΩ) (acc. to IEC 61557-8)	± 15 %
Relative uncertainty (0.2...7 kΩ)	± 1 kΩ
Response time t_{an}	see table TGH1468 from page 39 onwards
Hysteresis	25 %, + 1 kΩ

Measuring circuit

Measuring voltage U_m (peak value)	± 50 V
Measuring current I_m (at $R_F = 0 \Omega$)	≤ 1.5 mA
Internal DC resistance R_i	≥ 35 kΩ
Impedance Z_i at 50 Hz	≥ 35 kΩ
Permissible extraneous DC voltage U_{fg}	≤ DC 1100 V
Permissible system leakage capacitance C_e	≤ 500 μF (150 μF)*

Displays

Display, illuminated	two-line display
Characters (number/height)	2 x 16/4/mm
Display range measured value	0.2 kΩ...1 MΩ
Operating uncertainty	±15%, ±1 kΩ

Outputs/Inputs

Test/reset button	internal/external
Cable length test/reset button, external	≤ 10 m
Current output (load)	0/4...20 mA (≤ 500 Ω)
Accuracy current output, related to the value indicated (1...100 kΩ)	±15 %, ±1 kΩ

Serial interface

Interface/protocol	RS-485/BMS
Connection	terminals A/B
Cable length	≤ 1200 m
Shielded cable (shield to PE on one end)	2-core, ≥ 0.6 mm ² , e.g. J-Y(St)Y min. 2 x 0.6
Terminating resistor	120 Ω (0.5 W)
Device address, BMS bus	1...30 (3)*

Switching elements

Switching elements	2 changeover contacts: K1 (Alarm 1), K2 (Alarm 2, device error)
Operating mode K1, K2 (Alarm 1/Alarm 2)	N/C operation/N/O operation (N/O operation)*

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

Utilisation category	AC 13	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	3 A	1 A	0.2 A	0.1 A
Minimum contact rating	1 mA at AC/DC ≥ 10 V				

Environment/EMC

EMC	
not suitable for household and small companies	IEC 61326-2-4 Ed. 1.0
Operating temperature	-25...+65 °C

Classification of climatic conditions acc. to IEC 60721:

Stationary use (IEC 60721-3-3)	3K5 (with condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (with condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K4 (with condensation and formation of ice)

Classification of mechanical conditions acc. to IEC 60721:

Stationary use (IEC 60721-3-3)	
for screw mounting with accessories B990056	3M7
for DIN rail mounting	3M4
Transport (IEC 60721-3-2)	2M2
Long term storage (IEC 60721-3-1)	1M3

Connection

Connection	screw-type terminals
Connection properties	
rigid/flexible	0.2...4 mm ² /0.2...2.5 mm ²
flexible with ferrules without/with plastic sleeve	0.25...2.5 mm ²
Tightening torque	0.5 Nm
Conductor sizes (AWG)	24...12
Cable length between isoLR275 and AGH-LR	≤ 0.5 m

Other

Operating mode	continuous operation
Mounting	display-oriented
Distance to adjacent devices	≥ 30 mm
Degree of protection, terminals (DIN EN 60529)	IP30
Degree of protection, terminals (DIN EN 60529)	IP20
Type of enclosure	X112, free from halogen
Screw mounting with mounting clip	2 x M4
DIN rail mounting acc. to	IEC 60715
Flammability class	UL94 V-0
Documentation number	D00127
Weight	≤ 510 g

(*) = factory setting

Data labelled with ** are absolute values

Technical data coupling device AGH-LR

Insulation coordination acc. to IEC 60664-1

Rated insulation voltage	AC 800 V
Rated impulse voltage/pollution degree	8 kV/3

Voltage ranges

Nominal system voltage U_n	AC, 3(N)AC 0...793 V, DC 0...1100 V
Nominal frequency f_n	DC, 10...460 Hz
Max. AC voltage $U_{\sim}$ in the frequency range $f_n = 0.1...10$ Hz	$U_{\sim \max} = 110 \text{ V/Hz} * f_n$

Environment/EMC

EMC	IEC 61326-2-4 Ed. 1.0
Operating temperature	-25...+65 °C

Classification of climatic conditions acc. to IEC 60721:

Stationary use (IEC 60721-3-3)	3K5 (with condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (with condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K4 (with condensation and formation of ice)

Classification of mechanical conditions acc. to IEC 60721:

Stationary use (IEC 60721-3-3)	3M7
Transport (IEC 60721-3-2)	2M2
Storage (IEC 60721-3-1)	1M3

Connection

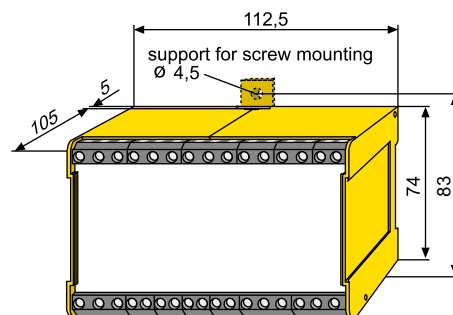
Connection	screw-type terminals
Connection properties	
rigid/flexible	0.2...4 mm ² /0.2...2.5 mm ²
flexible with ferrules without/with plastic sleeve	0.25...2.5 mm ²
Tightening torque	0.5 Nm
Conductor sizes (AWG)	24...12
Cable length between isoLR275 and AGH-LR	≤ 0.5 m

Other

Operating mode	continuous operation
Mounting	cooling slots must be ventilated vertically!
Distance to adjacent devices	≥ 30 mm
Degree of protection, internal components (DIN EN 60529)	IP30
Degree of protection, terminals (DIN EN 60529)	IP20
Type of enclosure	X200
Screw mounting	2 x M4
DIN rail mounting acc. to	IEC 60715
Flammability class	UL94 V-0
Weight	≤ 230 g

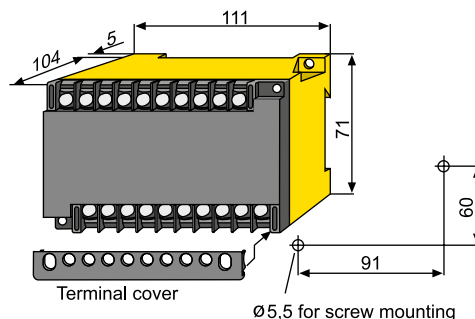
Dimension diagram XM112 – ISOMETER® isoLR275

Dimensions in mm



Dimension diagram X200 – coupling device AGH-LR

Dimensions in mm



Ordering information

Supply voltage U_s		Set comprising		Art. No.
AC	DC	Type	Art. No.	
19.2...55 V	19.2...72 V	isoLR275-327	B91065700W	B91065702W
		AGH-LR-3	B98039022W	
88...264 V	77...286 V	isoLR275-335	B91065701W	B91065703W
		AGH-LR-3	B98039022W	

Devices are available as a set.

Accessories

Type designation	Art. No.
Screw mounting	B990056

Suitable system components

Type designation	Type	Art. No.
External kΩ measuring instruments	9620-1421	B986841



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