

A-ISOMETER® IRDH275

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



A-ISOMETER® IRDH275

Device features

- Insulation monitoring for unearthed systems AC, AC/DC 0...793 V, DC 0...650 V
- Nominal voltage extendable via coupling device
- Two separately adjustable response values 1 kΩ...10 MΩ
- **AMP^{plus}** measuring principle
- Automatic adaptation to the system leakage capacitance
- Info key to display device settings and the system leakage capacitance
- Self monitoring with automatic alarm message
- Automatic self test, selectable
- Connection for external kΩ indication
- test and reset button
- Connection external test/reset button
- Two separate alarm relays with two voltage-free changeover contacts
- N/O or N/C operation
- Backlit LC display
- RS-485 interface

Approvals



Product description

The A-ISOMETER® of the IRDH275 series is designed to monitor the insulation resistance of unearthed main circuits (IT systems) AC, AC/DC 0...793 V resp. DC 0...650 V. The **AMP^{plus}** measuring principle meets the particular requirements of modern power supplies which often include rectifiers, converters, thyristor-controlled DC drives and directly connected DC components. In these systems often high leakage capacitances against earth occur due to interference suppression measures. The IRDH275 automatically adapts itself to the existing system conditions.

In combination with a coupling device, the Isometers can also be used for higher voltages. An external supply voltage allows de-energized systems to be monitored too. For door mounting into distribution panels, refer to type IRDH375(B).

Application

- AC, DC or AC/DC main circuits
- AC/DC main circuits with directly connected DC components, such as rectifiers, converters, and thyristor-controlled DC drives
- UPS systems, battery systems
- Heaters with phase control
- Systems including switched-mode power supplies
- IT systems including high leakage capacitances
- Coupled IT systems

Function

When the insulation resistance between the system conductors and earth falls below the set response value, the alarm relays switch and the alarm LEDs light up. Two separately adjustable alarm relays allow to distinguish between prewarning and alarm. The measured value is indicated on the LC display or an externally connectable measuring instrument. In this way any changes, for example when circuits are connected to the system, can be recognized easily. The fault message can be stored. The fault memory can be reset by pressing the reset button. By pressing the test button, the function of the device as well as the connections to system and earth can be tested. Pressing the INFO key provides additional information, such as the existing system leakage capacitance or device settings.

The function of the device and the system and earth connections are continuously monitored. When a fault occurs, the system fault relay switches and the alarm LED "system fault" lights up. The parameterization of the device can be carried out via the LC display or the function keys integrated in the front plate.

Device version IRDH275B

Device version IRDH275B includes the following additional functions:

- History memory with real-time clock to store all alarm messages with date and time stamp.
- Galvanically isolated RS-485 interface (BMS protocol) for data exchange with other BENDER devices
- Isometer disconnecting relays for the operation of several A-ISOMETER®s in interconnected IT systems
- Current output 0(4)...20 mA (electrically isolated)

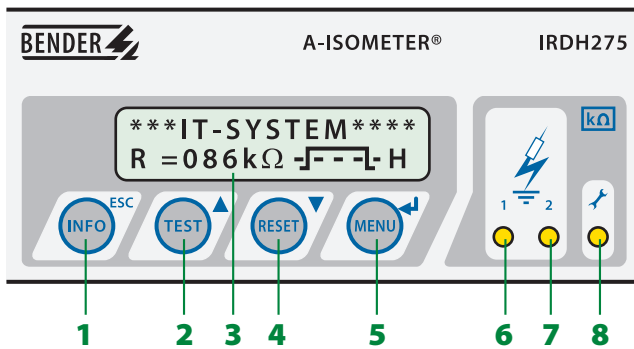
Use in coupled IT systems

Only one A-ISOMETER® may be active when several IT systems are coupled. Isometer disconnecting relays and the control inputs F1/F2 integrated in version IRDH275B guarantee that this requirement will always be met and make them suitable for coupled systems too.

Measuring principle

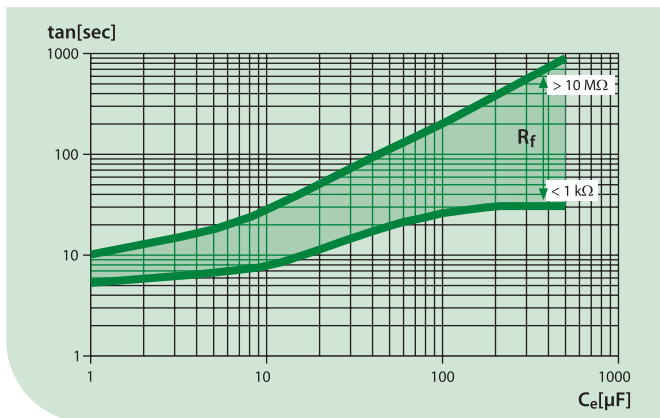
AMP^{plus} The IRDH275(B) series uses the patented **AMP^{plus}** measuring principle (refer to chapter Annex – "Technical aspects..."). This measuring principle allows concise monitoring of modern power supply systems, also in case of extensive, directly connected DC components and high system leakage capacitances.

Operating elements IRDH275



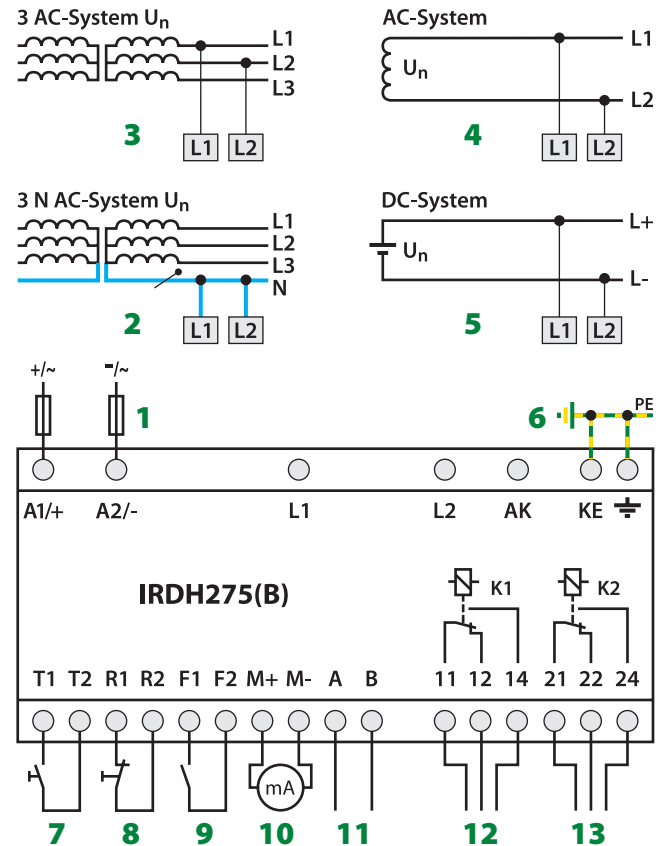
- 1 - INFO key: to query standard information
ESC key: back to the menu function
- 2 - TEST button: to call up the self test.
Arrow up key: Parameter change, scroll.
- 3 - LC display
- 4 - RESET button: to delete alarm and fault messages
Arrow down key: Parameter change, scroll.
- 5 - MENU key: to activate the MENU system
Enter key: To confirm parameter change.
- 6 - Alarm LED 1 lights: insulation fault, 1st warning level reached
- 7 - Alarm LED 2 lights: insulation fault, 2nd warning level reached
- 8 - LED lights: a system fault exists

Response times



A-ISOMETER® response times in relation to the system leakage capacitances: $C_e = 1 \dots 500 \mu F$, $U_n = 0 \dots 793 V/50 Hz$

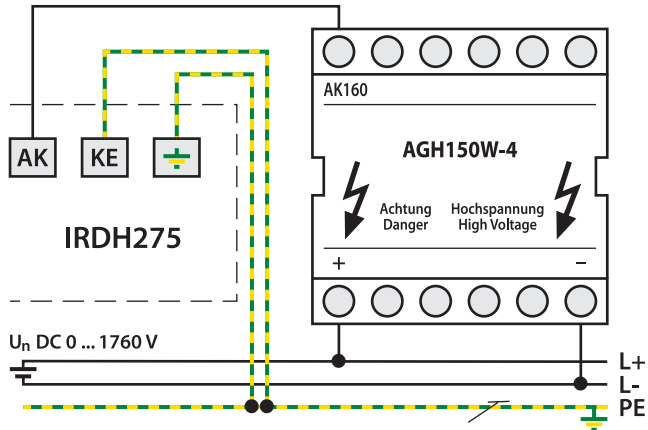
Wiring diagram



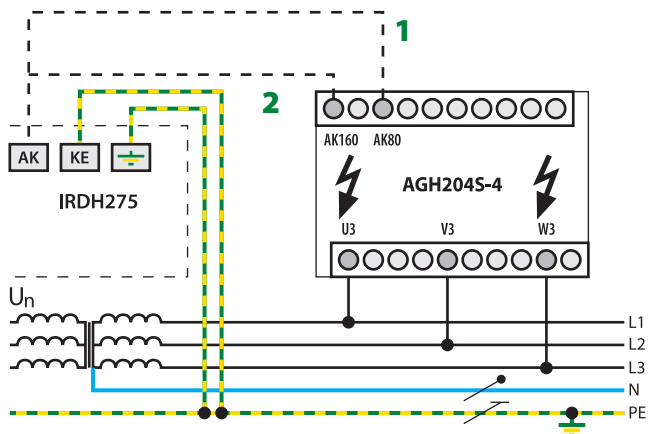
- 1 - Supply voltage U_s (see ordering information) via fuse
- 2,3 - Connection to the 3AC system being monitored:
Connect the terminals L1, L2 to neutral conductor N or terminals L1, L2 to conductor L1, L2
- 4 - Connection to the AC system being monitored:
Connect terminals L1, L2 to conductor L1, L2.
- 5 - Connection to the DC systems being monitored:
Connect terminal L1 to conductor L+ and terminal L2 to conductor L-.
- 6 - Separate connection of the equipotential bonding conductor to PE and KE.
- 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, no insulation measurement takes place. (Isometer disconnection B version only/no disconnection when operated via coupling device)
- 10 - IRDH275: Current output, electrically isolated: $0 \dots 400 \mu A$
IRDH275B: Current output, electrically isolated: $0 \dots 20 mA$ or $4 \dots 20 mA$
- 11 - RS-485 interface
- 12 - Alarm relay: Alarm 1
- 13 - Alarm relay: Alarm 2/system

Wiring diagrams – IRDH275 connected to different types of coupling devices

A-ISOMETER® IRDH275 with coupling device AGH150W-4

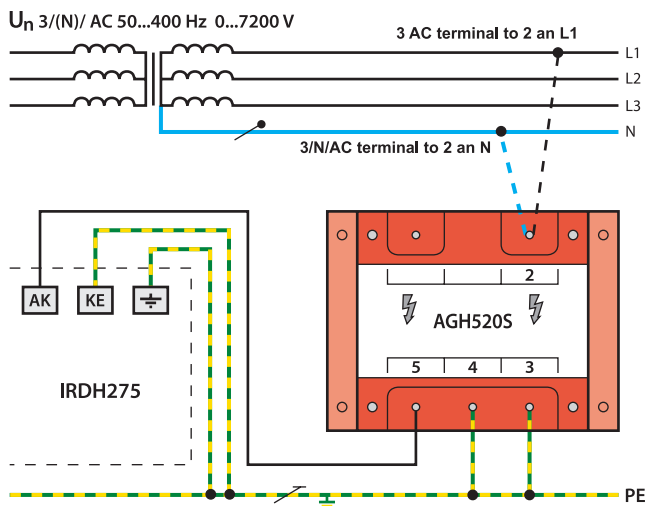


A-ISOMETER® IRDH275 with coupling device AGH204S-4



- 1 - without rectifier $U_n = 3AC\ 0...1650\ V$ (DC max. 1000 V)
 2 - with rectifier $U_n = 3AC\ 0...1300\ V$ (peak voltage downstream of the rectifier or intermediate voltage max. 1840 V)

A-ISOMETER® IRDH275 with coupling device AGH520S



Ordering information A-ISOMETER® IRDH275

Type	Nominal voltage U_n	Supply-voltage U_s	Art. No.
IRDH275-435	AC 0...793 V/ DC 0...650 V*	AC 88...264/ DC 77...286 V*	B 9106 5100
IRDH275B-435	AC 0...793 V/ DC 0...650 V*	AC 88...264/ DC 77...286 V*	B 9106 5101
IRDH275-427	AC 0...793 V/ DC 0...650 V*	DC 19.2...72 V	B 9106 5104
IRDH275B-427	AC 0...793 V/ DC 0...650 V*	DC 19.2...72 V	B 9106 5105

* Absolute values

Accessories

External k Ω measuring instrument 400 μA

Type	Art. No.
7204-1421	B 986 763
9604-1421	B 986 764

External k Ω measuring instrument 20 mA

Type	Art. No.
9620-1421	B 986 841

Coupling devices

Type	Nominal system voltage U_n	Art. No.
AGH150W-4	DC 0...1760 V	B 9801 8006
AGH204S-4	AC 0...1650 (1300) V	B 914 013
AGH520S	AC 0...7200 V	B 913 033

Technical data A-ISOMETER® IRDH275

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...650 V
Rated frequency f_N	DC, 0.2...460 Hz
Supply voltage U_S	AC 88...264 V, DC 77...286 V
Frequency range U_S	20...460 Hz
Power consumption	≤ 14 VA

Response values

Response value R_{an1} (Alarm 1)	1 kΩ...10 MΩ
Response value R_{an2} (Alarm 2)	1 kΩ...10 MΩ
Absolute error (1 kΩ...10 kΩ)	+ 2 kΩ
Relative percentage error (10 kΩ...10 MΩ)	0%...+ 20%
Response time t_{an} at $R_F = 0.5 \times R_{an}$ and $C_e = 1 \mu F$	< 5 s
Measuring time	see characteristic curves (TGH page 69)
Hysteresis (1 kΩ...10 kΩ)/(10 kΩ...10 MΩ)	+ 2 kΩ/25%

Measuring circuit

Measuring voltage U_m (peak value)	± 50 V
Measuring current I_m (at $R_F = 0 \Omega$)	≤ 278 μA
Internal DC resistance R_i	≥ 180 kΩ
Impedance Z_i at 50 Hz	≥ 180 kΩ
Permissible extraneous DC voltage U_{fg}	≤ 1200 V
Permissible system leakage capacitance	≤ 500 μF
Factory setting	150 μF

Displays

Display (illuminated)	two-line display
Characters (number of characters, height)	2 x 16 characters/4 mm
Display range, measuring value	1 kΩ...10 MΩ
Absolute error (1 kΩ...10 kΩ)	± 1 kΩ
Relative percentage error (10 kΩ...10 MΩ)	± 10%

Outputs

Test/reset button	internal/external
Current output measuring instrument	120 kΩ
Load	≤ 400 μA (12.5 kΩ)
Load B version	≤ 20 mA (500 Ω)

Serial interfaces

IRDH275	RS-485/ASCII
IRDH275B	RS-485/BMS
Max. cable length	1200 m
Recommended cable (shielded, shield on one side connected to PE)	J-Y(ST)Y 2 x 0.6
Terminating resistor	120 Ω (0.5 W)

Switching elements

Number of switching elements	2 x 1 changeover contact
Operating principle	N/O or N/C operation
Factory setting	N/O operation
Electrical service life, number of cycles	12000
Contact class	IIB in accordance with DIN IEC 60255-0-20
Rated contact voltage	AC 250 V/DC 300 V
Making capacity	AC/DC 5 A
Breaking capacity	2 A, AC 230 V, $\cos \phi = 0.4 - 0.2$ A, DC 220 V, $L/R = 0.04$ s
Minimum contact current at DC 24 V	2 mA (50 mW)

General data

Shock resistance IEC 60068-2-27 (during operation)	15 g/11 ms
Bumping IEC 60068-2-29 (during transport)	40 g/6 ms
Vibration resistance IEC 60068-2-6 (during operation)	1 g/10...150 Hz
Vibration resistance IEC 60068-2-6 (during transport)	2 g/10...150 Hz
Ambient temperature (during operation/during storage)	- 10 °C...+ 55 °C/- 40 °C...+ 70 °C
Climatic class acc. to DIN IEC 60721-3-3	3K5
Operating mode	continuous operation
Mounting	display oriented
Connection	screw-type terminals
Connection properties rigid/flexible	0.2...4 mm ² /0.2...2.5 mm ²
Degree of protection, internal components /terminal (DIN EN 60529)	IP30 / IP20
DIN rail mounting acc. to	DIN EN 60715/IEC 60715
Screw mounting, mounting plate	2 x M4
Flammability class	UL94V-0
Product standards	DIN EN 61557-8: 1998-05 EN 61557-8: 1997-03, IEC 61557-8: 1997-02 ASTM F1669M-96, ASTM F1207M-96
Operating manual	TGH1361
Weight	approx. 510 g

Option „W“

Shock resistance IEC 60068-2-27 (during operation)	30 g/11 ms
Bumping IEC 60068-2-29 (during transport)	40 g/6 ms
Vibration resistance IEC 60068-2-6	1.6 mm/10...25 Hz, 4 g/25...150 Hz
Ambient temperature (during operation)	- 40 °C...+ 70 °C
Ambient temperature (during transport)	- 40 °C...+ 85 °C

Dimension diagram XM112 Dimensions in mm

