A-ISOMETER® IRDH275

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

**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 AMPplus 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**

**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**

AMPPlus The IRDH275(B) series uses the patented AMPPlus 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.

**Apparatus 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.
- AMPplus 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**

- 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.

- UL, VDE, TÜV, CE.
- American AESSEAL.
- Canadian CAN/CSA-C22.2 No. 144,
- CAN/CSA-C22.2 No. 144,
- CAN/CSA-C22.2 No. 144,
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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

**Wiring diagram**

1. Supply voltage \( U_S \) (see ordering information) via fuse
2. Connection to the 3AC system being monitored:
   - Connect the terminals L1, L2 to neutral conductor N or terminals L1, L2 to conductor L1, L2
3. Connection to the AC system being monitored:
   - Connect terminals L1, L2 to conductor L1, L2.
4. Connection to the DC systems being monitored:
   - Connect terminal L1 to conductor L+ and terminal L2 to conductor L-.
5. Separate connection of the equipotential bonding conductor to PE and KE.
6. External test button (N/O contact)
7. External reset button (N/C contact or wire jumper). When the terminals are open, the fault message will not be stored.
8. **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)
9. IRDH275: Current output, electrically isolated: \(0...400 \mu A\)
   - IRDH275B: Current output, electrically isolated:
     - \(0...20 mA\) or \(4...20 mA\)
10. **RS-485 interface**
11. **Alarm relay**: Alarm 1
12. **Alarm relay**: Alarm 2/system

**Response times**

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

**A-ISOMETER® IRDH275 with coupling device AGH520S**

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### Ordering information A-ISOMETER® IRDH275

<table>
<thead>
<tr>
<th>Type</th>
<th>Nominal voltage $U_n$</th>
<th>Supply voltage $U_S$</th>
<th>Art. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRDH275-435</td>
<td>AC 0…793 V/ DC 0…650 V*</td>
<td>AC 88…264/ DC 77…286 V*</td>
<td>B 9106 5100</td>
</tr>
<tr>
<td>IRDH275B-435</td>
<td>AC 0…793 V/ DC 0…650 V*</td>
<td>AC 88…264/ DC 77…286 V*</td>
<td>B 9106 5101</td>
</tr>
<tr>
<td>IRDH275-427</td>
<td>AC 0…793 V/ DC 0…650 V*</td>
<td>DC 19…72 V</td>
<td>B 9106 5104</td>
</tr>
<tr>
<td>IRDH275B-427</td>
<td>AC 0…793 V/ DC 0…650 V*</td>
<td>DC 19…72 V</td>
<td>B 9106 5105</td>
</tr>
</tbody>
</table>

* Absolute values

### Accessories

**External kΩ measuring instrument 400 μA**

<table>
<thead>
<tr>
<th>Type</th>
<th>Art. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7204-1421</td>
<td>B 986 763</td>
</tr>
<tr>
<td>9604-1421</td>
<td>B 986 764</td>
</tr>
</tbody>
</table>

**External kΩ measuring instrument 20 mA**

<table>
<thead>
<tr>
<th>Type</th>
<th>Art. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>9620-1421</td>
<td>B 986 841</td>
</tr>
</tbody>
</table>

### Coupling devices

<table>
<thead>
<tr>
<th>Type</th>
<th>Nominal system voltage $U_n$</th>
<th>Art. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGH150W-4</td>
<td>DC 0…1760 V</td>
<td>B 9801 8006</td>
</tr>
<tr>
<td>AGH204S-4</td>
<td>AC 0…1650 (1300) V</td>
<td>B 914 013</td>
</tr>
<tr>
<td>AGH520S</td>
<td>AC 0…7200 V</td>
<td>B 913 033</td>
</tr>
</tbody>
</table>
**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** $f_U$: 20 ... 460 Hz
- **Power consumption**: ≤ 14 VA

### Response values
- **Response value** $R_{res}$ (Alarm 1): 1 kΩ ... 10 MΩ
- **Response value** $R_{res}$ (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** $t_{res}$ at $R_t = 0.5 x R_{res}$ and $C_t = 1 \mu F$: < 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 $R_t = 0$ Ω): ≤ 278 μA
- **Internal DC resistance** $R_i$: ≥ 180 kΩ
- **Impedance** $Z_i$ at 50 Hz: ≥ 180 kΩ
- **Permissible extraneous DC voltage** $U_{ex}$: ≤ 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**: AC 230 V, cos φ = 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): 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
- **Screw mounting, mounting plate**: 2 x M4
- **Flammability class**: UL94V-0
- **Product standards**: DIN 60721-3-3
- **Degree of protection, internal components /terminal (DIN EN 60529)**: IP30 / IP20
- **DIN rail mounting acc. to DIN EN 60715/IEC 60715**: DIN EN 60664-1
- **Weight**: approx. 510 g
- **Display range, measuring value**: 1 kΩ ... 10 MΩ
  - **Absolute error** (1 kΩ ... 10 kΩ): ± 1 kΩ
  - **Relative percentage error** (10 kΩ ... 10 MΩ): ± 10%

### 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 transportation): -40 °C ... + 70 °C
- **Ambient temperature** (during transport): -40 °C ... + 85 °C

### Measuring circuit
- **Measuring voltage** $U_m$ (peak value): ± 50 V
- **Measuring current** $I_m$ (at $R_t = 0$ Ω): ≤ 278 μA
- **Internal DC resistance** $R_i$: ≥ 180 kΩ
- **Impedance** $Z_i$ at 50 Hz: ≥ 180 kΩ
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- **Test/reset button**: internal/external
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### Dimension diagram XM112
- Dimensions in mm

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**A-ISOMETER® IRDH275**

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