Product description

The A-ISOMETER® IRDH275 monitors for ground faults in ungrounded AC 0 - 793 V and DC 0 - 650 V systems by measuring the system’s insulation resistance. The IRDH275 is able to detect ground faults in ungrounded systems before leakage current may even be present.

The AMPPlus measuring principle meets the requirements of modern power supplies which often include rectifiers, variable frequency drives, and pure DC components by automatically adapting itself to prevailing system conditions.

An optional voltage coupler extends the nominal voltage range up to 7200 V. An external power supply allows offline/standby systems to be monitored. For a panel-mounted version of this device, refer to the IRDH375(B) series.

Application

Function

When the insulation resistance from system to ground falls below the set response value, the alarm relays switch and the alarm LEDs activate. Two separately adjustable alarm 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 setting
- Connection for external metering
- Internal and external test/reset
- Two separate alarms with two voltage-free SPDT contacts
- Normally energized or normally deenergized operation
- Backlit LCD display
- RS-485 interface

"B" Version

The IRDH275B includes the following additional features:

- 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
- Disconnect relays for the operation of several A-ISOMETER®s in interconnected ungrounded systems
- Current output 0(4)…20 mA (electrically isolated)

Use in interconnected ungrounded systems

Only one BENDER insulation monitor may be active when several ungrounded systems are coupled together. The disconnect relays and control inputs F1/F2 integrated into the IRDH275 guarantee no interference with other BENDER devices when system coupling is activated.

Measuring principle

AMPPlus The IRDH275(B) series uses the patented AMPPlus measuring principle. This measuring principle allows for the concise monitoring of modern power supply systems, pure DC systems, and systems where AC/DC rectification and power conversion may occur.

Device features

- Insulation monitoring for ungrounded systems: single- or three-phase AC 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 setting
- Connection for external metering
- Internal and external test/reset
- Two separate alarms with two voltage-free SPDT contacts
- Normally energized or normally deenergized operation
- Backlit LCD display
- RS-485 interface

Approvals

- UL Listed
- CSA Certified
- IEC
- EN 61557
- PTC
- AE2S

Application

- AC systems, single- and three-phase
- Pure DC and mixed AC/DC systems
- UPS systems and battery systems
- Systems with variable frequency drives
- Systems with power conversion components, such as rectifiers and inverters
- Large industrial systems
- Ungrounded systems including high leakage capacitances
- Coupled ungrounded systems

Approvals

A-ISOMETER® IRDH275

A-ISOMETER® IRDH275

Ground Fault Monitor / Ground Fault Relay for Ungrounded AC, DC, and AC/DC Systems

1.5

62 Main catalogue part 1 – 08.2008 / Insulation monitoring
Operating elements: IRDH275

1 - INFO key: displays pertinent system information
   ESC key: Goes back a step inside device's menu
2 - TEST button: Activates self-test
   Arrow up key: Scrolls up inside device's menu
3 - LCD display
4 - RESET button: Resets device
   Arrow down key: Scrolls down inside device's menu
5 - MENU key: Activates device's internal menu
   Enter key: Confirm change inside device's menu
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: Displays corresponding ground fault

Response times

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

Wiring diagram

1 - External supply voltage used to power device
2,3 - Wiring diagram for a three-phase system. Only two connections to the system are necessary to monitor all three phases.
4 - Wiring diagram for a single-phase system
5 - Wiring diagram for a DC system
6 - Equipment ground connections
7 - External test button (normally open contact)
8 - External reset button (normally closed contact). When the terminals are open, the fault message will not be stored.
9 - Standby contact. When the contact is closed, no insulation measurements take place.
10 - IRDH275: Analog output, electrically isolated: $0 \ldots 400 \, \mu A$
     IRDH275B: Analog output, electrically isolated: $0 \ldots 20 \, mA$ or $4 \ldots 20 \, mA$
11 - RS-485 interface:
     IRDH275: One-way ASCII stream detailing status
     IRDH275B: Two-way communication with other BENDER devices
12 - Alarm relay 1, normally energized or deenergized contact
13 - Alarm relay 2/System Fault Relay, normally energized or deenergized contact
Wiring diagrams – IRDH275 connected to various voltage couplers

A-ISOMETER® IRDH275 with coupling device AGH150W-4

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

A-ISOMETER® IRDH275 with coupling device AGH204S-4

A-ISOMETER® IRDH275 with coupling device AGH520S

Ordering information (standard and "B" option)

<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 19.2...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 19.2...72 V</td>
<td>B 9106 5105</td>
</tr>
</tbody>
</table>

* Absolute values

Accessories

External panel mounted meter (0 - 400 \( \mu \)A output)

<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 panel mounted meter (0(4) - 20 mA output)

<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>

Dimension diagram XM112

Dimensions in mm
## 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
- **Nominal system voltage** Un AC, 3(N)AC 0…793 V, DC 0…650 V
- **Rated frequency fn DC**: 0.2…460 Hz
- **Supply voltage US AC**: 88…264 V, DC 77…286 V
- **Frequency range US**: 20…460 Hz
- **Power consumption**: ≤ 14 VA

### Response values

- **Response value R1 (Alarm 1)**: 1 k\(\Omega\)…10 M\(\Omega\)
- **Response value R2 (Alarm 2)**: 1 k\(\Omega\)…10 M\(\Omega\)
- **Absolute error (1 k\(\Omega\)…10 k\(\Omega\))**: + 2 k\(\Omega\)
- **Relative percentage error (10 k\(\Omega\)…10 M\(\Omega\))**: 0 %…+ 20 %
- **Response time tR**: \(0.5 \times R_{\text{nom}}\) and \(C_{\text{r}} = 1 \mu\text{F}\) < 5 s
- **Hysteresis** (1 k\(\Omega\)…10 k\(\Omega\))/(10 k\(\Omega\)…10 M\(\Omega\)) + 2 k\(\Omega\)/25 %

### Measuring circuit

- **Measuring voltage Um (peak value)**: ± 50 V
- **Measuring current Im (at RF = 0 Ω)**: ≤ 278 µA
- **Internal DC resistance \(R_{\text{d}}\)**: ≥ 180 k\(\Omega\)
- **Impedance \(Z_{\text{i}}\) at 50 Hz**: ≥ 180 k\(\Omega\)
- **Permissible extraneous DC voltage Ufg**: ≤ 1200 V
- **Permissible system leakage capacitance**: ≤ 500 µF
- **Factory setting**: 150 µF

### Displays

- **Display (illuminated)**: two-line display
- **Display range, measuring value**: 1 k\(\Omega\)…10 M\(\Omega\)
- **Absolute error (1 k\(\Omega\)…10 k\(\Omega\))**: ± 1 k\(\Omega\)
- **Relative percentage error (10 k\(\Omega\)…10 M\(\Omega\))**: ± 10 %

### Outputs

- **Test/reset button**: internal/external
- **Current output measuring instrument**: 120 k\(\Omega\)
- **Load**: ≤ 400 µA (12.5 k\(\Omega\))
- **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 ground)

1-Y(ST)IY 2 x 0.6

### Terminating resistor

120 Ω (0.5 W)

### Switching elements

- **Number of switching elements**: 2 SPDT contacts
- **Operating principle**: normally energized/denergized operation
- **Factory setting**: normally deenergized operation
- **Electrical service life, number of cycles**: 12000
- **Contact class IL in accordance with DIN IEC 60255-0-20**: 12
- **Rated contact voltage**: AC 250 V/DC 300 V
- **Making capacity**: AC/DC 5 A
- **Breaking capacity**: 2 A, AC 230 V, PF = 0.4 – 0.2 A
- **Ambient temperature**: ≤ 500 µF
- **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 k\(\Omega\)…10 M\(\Omega\)
- **Absolute error (1 k\(\Omega\)…10 k\(\Omega\))**: ± 1 k\(\Omega\)
- **Relative percentage error (10 k\(\Omega\)…10 M\(\Omega\))**: ± 10 %

### Outputs

- **Test/reset button**: internal/external
- **Current output measuring instrument**: 120 k\(\Omega\)
- **Load**: ≤ 400 µA (12.5 k\(\Omega\))
- **Load B version**: ≤ 20 mA (500 Ω)

### Option “W”

#### 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 60608-2-6 (during operation)

- **1 g/10…150 Hz**

#### Vibration resistance IEC 60608-2-6 (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

- **3KS**

#### Operating mode

- **continuous operation**

#### Mounting

- **display oriented**

#### Connection

- **screw-type terminals**

#### Connection properties rigid/flexible

- **AWG 24…12 / 24…14**

#### Degree of protection, internal components / terminal (DIN EN 60529)

- **IP30 / IP20, NEMA 1**

#### DIN rail mounting acc. to DIN EN 60715/IEC 60715

- **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. 1.1 lb**

### Ordering information: IRDH275 (For all models, including special options)

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**Code 1: Optional features**

<table>
<thead>
<tr>
<th>Modifier</th>
<th>Additional features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing</td>
<td>Standard device</td>
</tr>
<tr>
<td>“B”</td>
<td>Real-time clock with history memory, 0(4) - 20 mA output</td>
</tr>
<tr>
<td>“W”</td>
<td>Additional vibration protection, greater temperature range</td>
</tr>
<tr>
<td>“BW”</td>
<td>Both features of the “B” and “W” above</td>
</tr>
</tbody>
</table>

**Code 2: Auxiliary supply voltage**

<table>
<thead>
<tr>
<th>Modifier</th>
<th>Supply voltage US (absolute values)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“435”</td>
<td>DC 77…286 V / AC 42…460 Hz 88…264 V</td>
</tr>
<tr>
<td>“425”</td>
<td>DC 10.2…36 V</td>
</tr>
<tr>
<td>“427”</td>
<td>DC 19.2…72 V</td>
</tr>
</tbody>
</table>