

IRDH375 Series

Digital Ground Fault Monitor / Ground Detector
Ungrounded (Floating) AC/DC Systems



A-ISOMETER® IRDH375

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



A-ISOMETER® IRDH375

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
- **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 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
- Plug-in terminals

Approvals



Product description

The A-ISOMETER® IRDH375 monitors for ground faults in ungrounded AC 0 - 793 V and DC 0 - 650 V systems by measuring the system's insulation resistance. The IRDH375 is able to detect ground faults in ungrounded systems before leakage current may even be present.

The **AMP^{plus}** 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 DIN rail mounted version, refer to the IRDH275(B) series.

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

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-contacts can be set to a prewarning and main warning alarm. The measured value is indicated on the LCD display or an externally connectable measuring instrument. A fault storage setting allows the device to reset automatically or require a manual reset. An external and internal test/reset can be activated remotely or on the device. A comprehensive INFO menu displays additional information such as the current leakage capacitance.

The IRDH375 continuously monitors the equipment ground connection to ensure proper operation. The device's easy-to-use onboard menu manages all settings via the detailed LCD screen.

"B" Version

The IRDH375B 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)

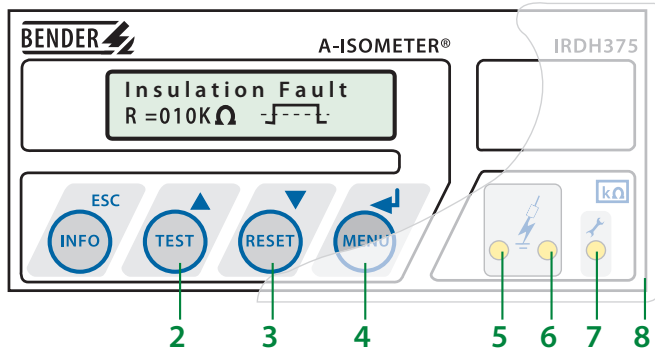
Use in interconnected ungrounded systems

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

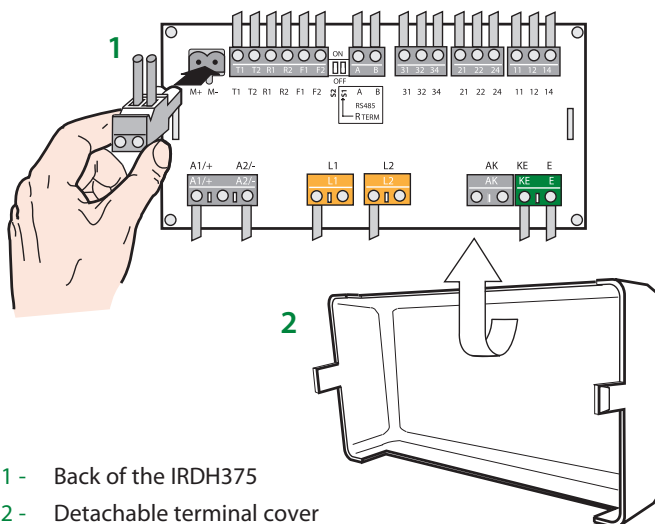
AMP^{plus} The IRDH375(B) series uses the patented **AMP^{plus}** measuring principle. This measuring principle allows for the concise monitoring of modern power supply systems, pure DC systems, and systems where AC/DC rectification and power conversion may occur.

Operating elements



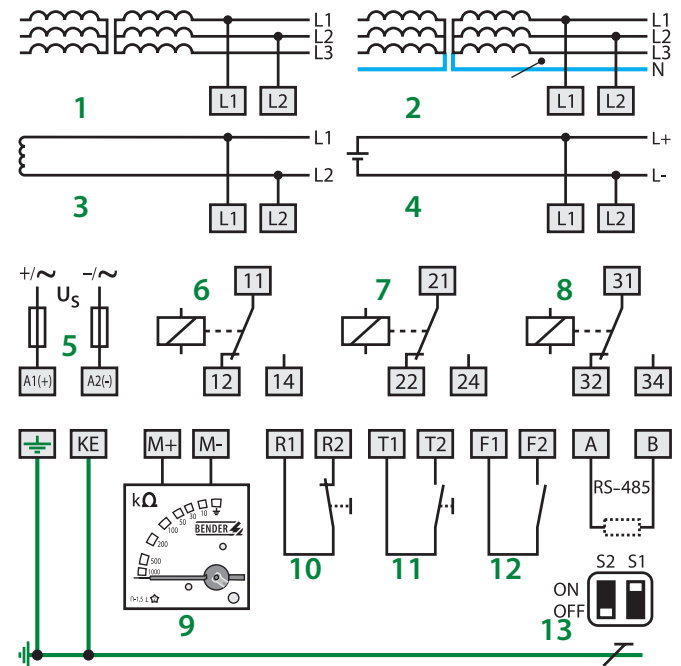
- 1 - INFO key: Displays pertinent system information
ESC key: Goes back a step inside device's menu
- 2 - TEST button: Activates self-test
Arrow up key: Scrolls up inside device's menu
- 3 - RESET button: Resets device
Arrow down key: Scrolls down inside device's menu
- 4 - MENU key: Activates device's internal menu
Enter key: Confirm change inside device's menu
- 5 - Alarm LED 1 lights: Insulation fault, warning level reached
- 6 - Alarm LED 2 lights: Insulation fault, alarm level reached
- 7 - Alarm LED lights: In case of connection fault or device error
- 8 - Transparent front plate cover (accessory)

Wiring diagram – back of the device



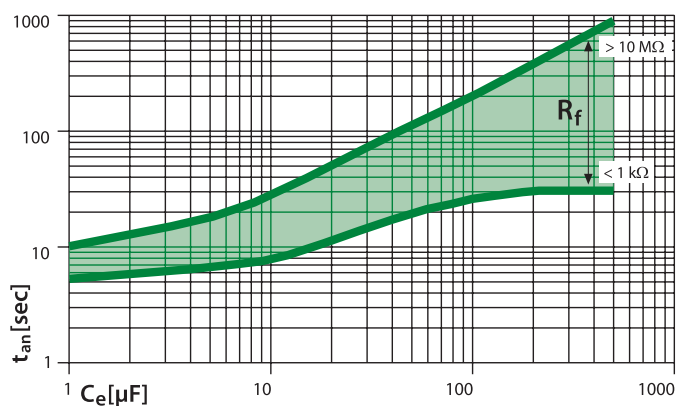
- 1 - Back of the IRDH375
- 2 - Detachable terminal cover

Wiring diagram



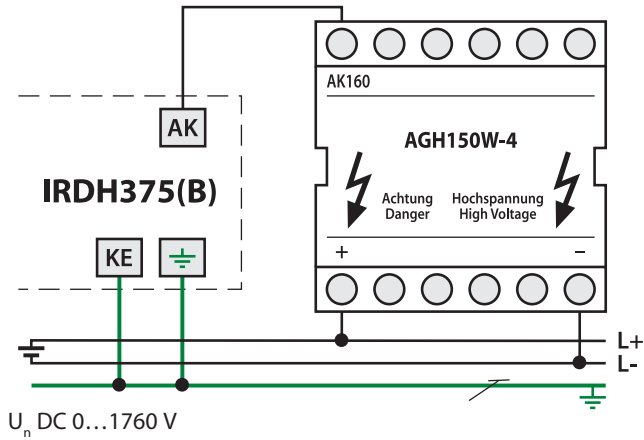
- 1,2 - Wiring, 3-phase AC.
Only two connections are necessary.
- 3 - Wiring, single-phase AC
- 4 - Wiring, DC system
- 5 - External supply voltage connection
- 6 - Alarm relay 1
- 7 - Alarm relay 2
- 8 - Alarm relay: System Fault
- 9 - Analog outputs
IRDH375: 0...400 μ A
IRDH375B: 0(4)...20 mA
- 10 - External reset contact (N/C), forces automatic reset if contact is not jumped.
- 11 - External test contact (N/O)
- 12 - Standby contact. When the contact is closed, no measurements take place.
- 13 - RS-485 connection
DIP switch S1: Termination resistor for RS-485 connection

Response times

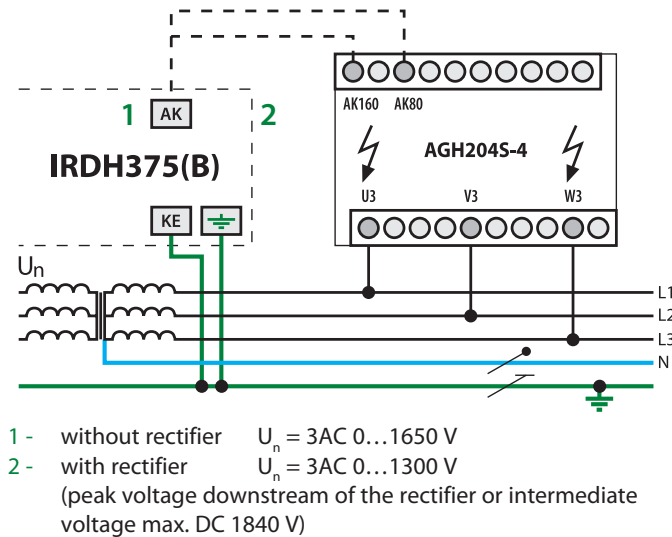


Wiring diagrams – IRDH375 connected to different types of coupling devices

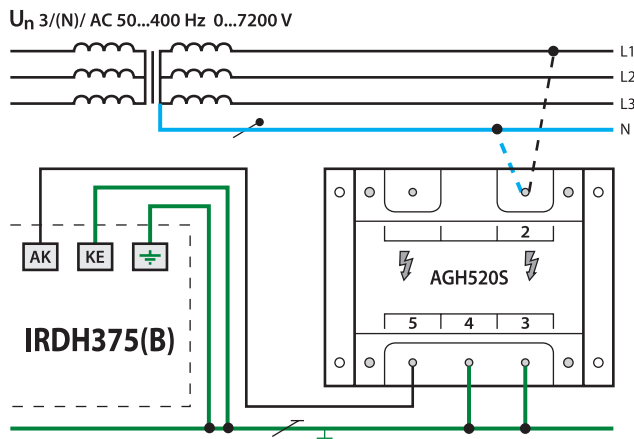
A-ISOMETER® IRDH375 with coupling device AGH150W-4



A-ISOMETER® IRDH375 with coupling device AGH204S-4



A-ISOMETER® IRDH375 with coupling device AGH520S



Ordering information (standard and "B" option)

Type	Nominal voltage U_n	Supply-voltage U_s	Art. No.
IRDH375-435	AC 0...793 V/ DC 0...650 V*	AC 88...264 V/ DC 77...286 V*	B 9106 5000
IRDH375-427	AC 0...793 V/ DC 0...650 V*	DC 19.2...72 V*	B 9106 5002
IRDH375B-435	AC 0...793 V/ DC 0...650 V*	AC 88...264 V/ DC 77...286 V*	B 9106 5004
IRDH375B-427	AC 0...793 V/ DC 0...650 V*	DC 19.2...72 V*	B 9106 5006

* absolute values

Accessories

External panel-mounted meter (0 - 400 μ A output)

Type	SKMP *2)	Art. No.
7204-1421	120 k Ω	B 986 763
9604-1421	120 k Ω	B 986 764

*2) SKMP = scale centre point

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

Type	Art. No.
9620-1421	B 986 841

Transparent front plate cover IP65

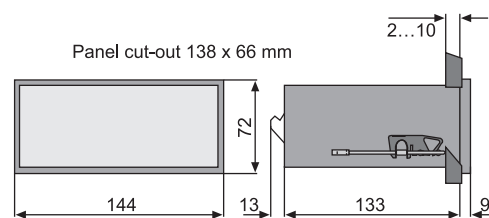
Type	Art. No.
144 x 72	B 9806 0005

Coupling devices

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

Dimensions: X300

Dimensions are given in mm



Technical data A-ISOMETER® IRDH375

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	see ordering information
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%
Measuring time	see characteristic curves
Hysteresis (1 kΩ...10 kΩ)/(10 kΩ...10 MΩ)	+2 kΩ/25%

Measuring circuit

Measuring voltage U_m	≤ 40 V
Measuring current I_m (at $R_f = 0 \Omega$)	≤ 220 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 set system leakage capacitance C_e	150 μF

Displays

Display (illuminated)	two-line display
Characters (number of characters, height)	2 x 16 characters/5 mm
Display range, measuring value	1 kΩ...10 MΩ
Absolute error 1 kΩ...10 kΩ	± 1 kΩ
Percentage operating error 10 kΩ...10 MΩ	± 10%

Outputs

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

Serial interfaces

IRDH375	RS-485/ASCII
IRDH375B	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	3 x 1 changeover contact
Operating principle	N/O operation / 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)	-10 °C...+55 °C
Ambient temperature (during storage)	-40 °C...+70 °C
Climatic class acc. to DIN IEC 60721-3-3	3K5
Operating mode	continuous operation
Mounting	any position
Connection	plug-in terminals
Connection properties rigid/flexible	0.2...4 mm²/0.2...2.5 mm²
Degree of protection, internal components (DIN EN 60529)	IP 30
Degree of protection, terminals (DIN EN 60529)	IP 20
Flammability class	UL94V-1
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	TGH1352
Weight approx.	650 g

Ordering information: IRDH375 (For all models, including special options)

IRDH375

B

W

- 435

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Code 2: Auxiliary supply voltage

Modifier	Supply voltage U_s (absolute values)
"435"	DC 77...286 V / AC 42...460 Hz 88...264 V
"425"	DC 10.2...36 V
"427"	DC 19.2...72 V

Code 1: Optional features

Modifier	Additional features
Nothing	Standard device
"B"	Real-time clock with history memory, 0(4) - 20 mA output
"W"	Additional vibration protection, greater temperature range
"BW"	Both features of the "B" and "W" above



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