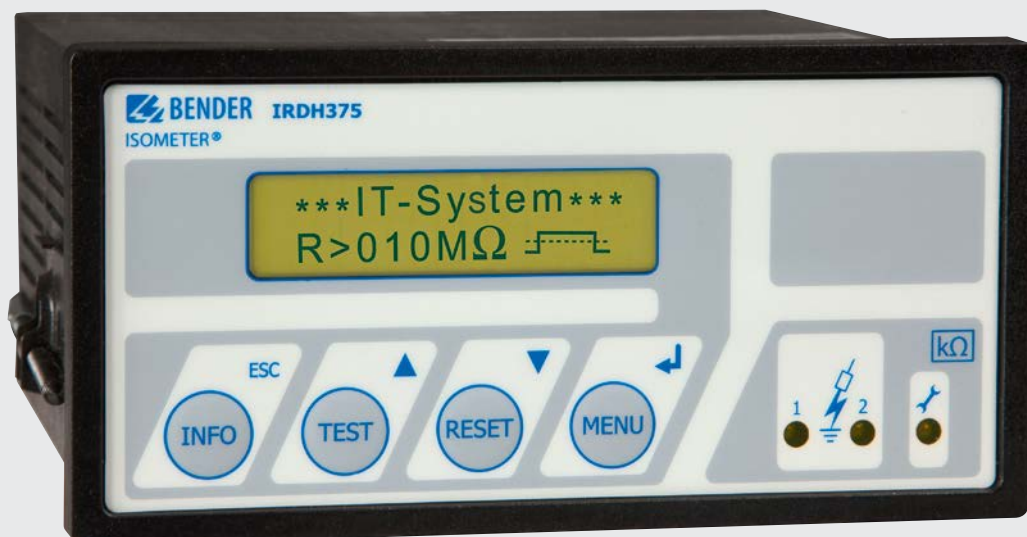


# ISOMETER® IRDH375

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



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



ISOMETER® IRDH375

## Device features

- Insulation monitoring for unearthed AC, AC/DC systems 0...793 V, DC 0...650 V
- Nominal voltage extendable via coupling device
- Two separately adjustable response values 1 kΩ...10 MΩ
- **AMP<sup>Plus</sup>** measurement method
- Automatic adaptation to the system leakage capacitance
- Info button to display device settings and the system leakage capacitance
- Continuous self monitoring, with automatic alarm message
- Automatic self test, selectable
- Connection for external kΩ indication
- Test and reset button
- Connection external test and reset button
- Two separate alarm relays with two potential-free changeover contacts
- N/O or N/C operation
- Alarm relay for system fault (N/C operation)
- Backlit LC display
- RS-485 interface
- Plug-in terminals

## Approvals



for IRDH375...-4...5

## Product description

The ISOMETER® of the IRDH375(B) 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<sup>Plus</sup>** measurement method 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 IRDH375(B) automatically adapts itself to the existing system conditions.

In combination with a coupling device, the devices can also be used for higher voltages. An external supply voltage allows de-energised systems to be monitored too.

## 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
- Installations including switch-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 recognised 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 button provides additional information, such as the existing system leakage capacitance or device settings.

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

## Device version IRDH375B

Device version IRDH375B includes the following additional functions:

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

## Use in coupled IT systems

Only one 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 only one ISOMETER® is active at any one time.

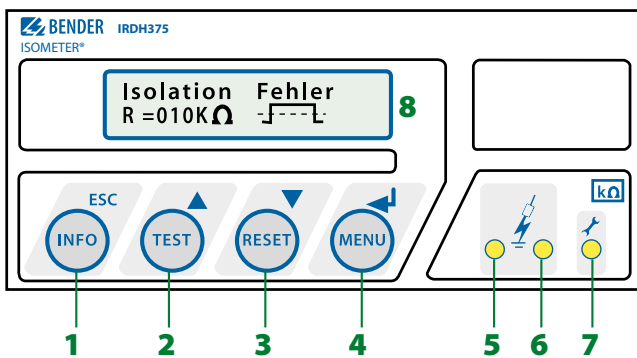
## Measurement method

**AMP<sup>Plus</sup>** The IRDH375(B) uses the patented **AMP<sup>Plus</sup>** measurement method. This measurement method allows concise monitoring of modern power supply systems, also in case of extensive, directly connected DC components and high system leakage capacitances.

## Standards

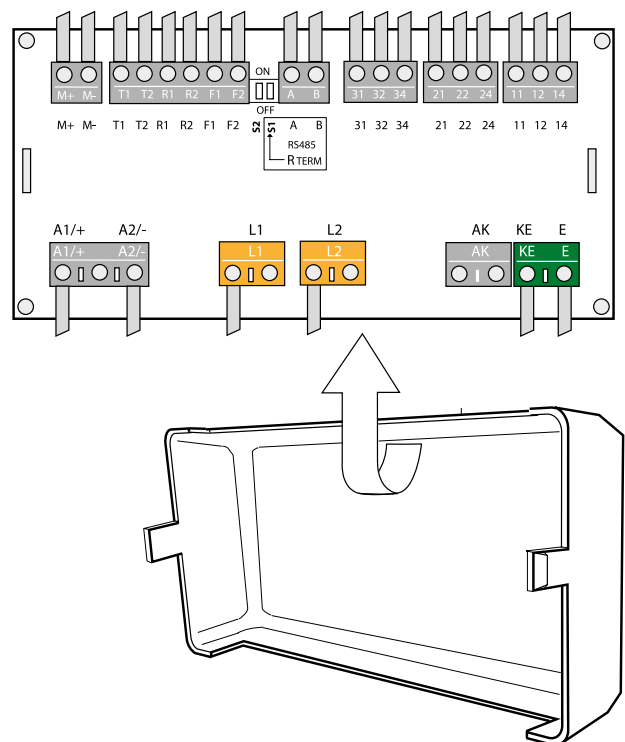
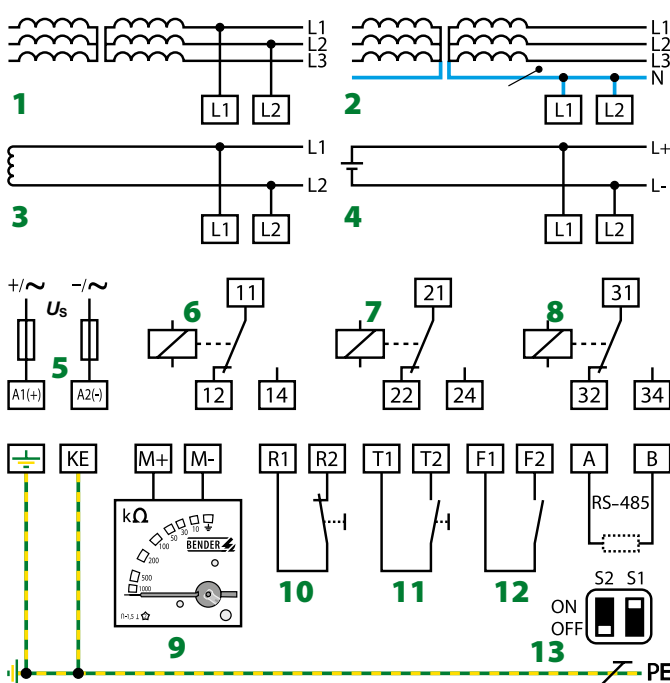
The ISOMETER® of the IRDH375 series complies with the requirements of the device standards: DIN EN 61557-8 (VDE 0413-8), EN 61557-8, IEC 61557-8, IEC 61326-2-4, DIN EN 60664-1 (VDE 0110-1), DIN EN 60664-3 (VDE 0110-3), ASTM F1669M-96 (2007), ASTM F1207M-96 (2007)

Operating elements



- 1 - INFO key: to query standard information/  
ESC key: back (menu function), confirmation parameter change
- 2 - TEST button: to call up the self test/  
Up key: parameter change, moving up in the menu
- 3 - RESET button: to delete insulation fault alarms  
Down key: parameter change, moving down in the menu
- 4 - MENU key: to activate the menu system/  
Enter key: confirmation parameter change
- 5 - Alarm LED 1 lights: insulation fault, first warning level reached
- 6 - Alarm LED 2 lights: insulation fault, second warning level reached
- 7 - Device fault LED lights: IRDH375 defective
- 8 - Two-line display for standard and menu mode

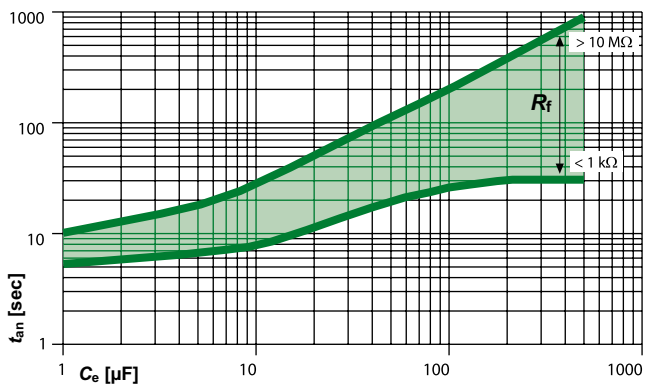
Wiring diagram



- 1 - 3AC system
- 2 - 3NAC system
- 3 - AC system
- 4 - DC system
- 5 - Supply voltage  $U_s$  (see ordering information) via 6 A fuse;  
for UL and CSA applications, it is mandatory to use 5 A fuses.
- 6 - Alarm relay  $R_{ALARM1}$
- 7 - Alarm relay  $R_{ALARM2}$
- 8 - Alarm relay system fault
- 9 - External kΩ indication 0...400 μA or current output  
0(4)...20 mA (option).

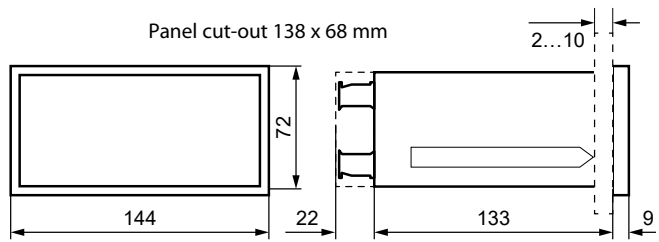
- \*10 - External reset button (N/C contact or wire jumper) when  
the terminals R1/R2 are open, the fault message will not be  
stored, provided that the memory has not been activated via  
the operating menu.
  - \*11 - External test button, if required
  - \*12 - STANDBY by means of the function input F1, F2:  
When the contact is closed, insulation measurement does  
not take place; system disconnection
  - 13 - DIP switch, S1 "ON"- RS-485 terminated (120 Ω on),  
S2 - unassigned
- \* The terminal pairs 10, 11 and 12 must be wired galvanically  
isolate and must not have a connection to PE!**

**Response times**



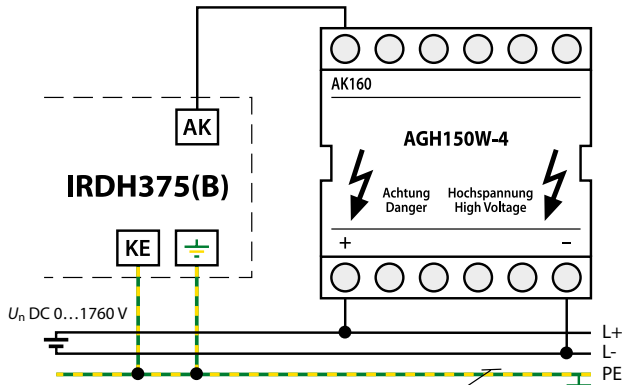
**Dimension diagram X300**

Dimensions in mm

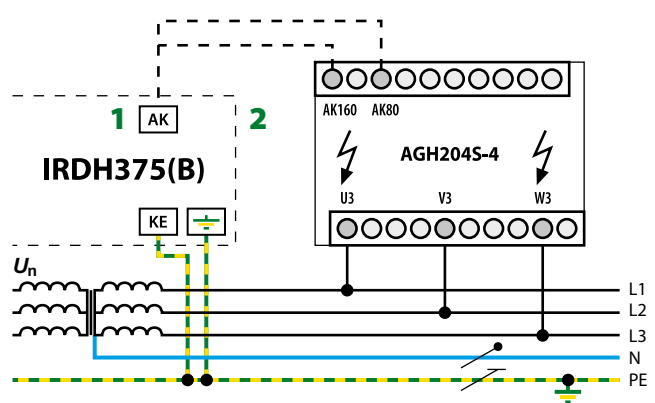


**Wiring diagrams - IRDH375 connected to different types of coupling devices**

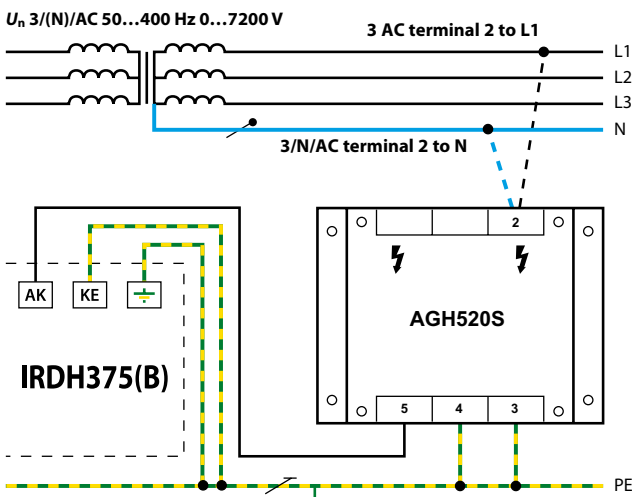
**ISOMETER® IRDH375 with coupling device AGH150W-4**



**ISOMETER® IRDH375 with coupling device AGH204S-4**



**ISOMETER® IRDH375 with coupling device AGH520S**



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

**Technical data**
**Insulation coordination acc. to IEC 60664-1**

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

**Voltage ranges**
**IRDH375...:**

Nominal system voltage $U_n$	AC, 3/(N)AC 0...793 V*
Nominal frequency $f_n$ (for $f < 50$ Hz see characteristic curve in the manual)	0,1...460 Hz
Nominal system voltage $U_n$	DC 0...650 V*

**IRDH375...-435:**

Supply voltage $U_S$ (also see nameplate)	AC 88...264 V*
Frequency range $U_S$	42...460 Hz
Supply voltage $U_S$ (also see nameplate)	DC 77...286 V*

**IRDH375...-427:**

Frequency range $U_S$	42...460 Hz
Supply voltage $U_S$ (also see nameplate)	DC 19.2...72 V*

**IRDH375...:**

Power consumption	≤ 14 VA
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**Response values**

Response value $R_{an1}$ (Alarm1)	1 kΩ...10 MΩ
Response value $R_{an2}$ (Alarm2)	1 kΩ...10 MΩ
Relative uncertainty (20 kΩ...1 MΩ) (acc. to IEC 61557-8)	± 15 %
Relative uncertainty (1...20 kΩ)	+2 kΩ/+20 %
Relative uncertainty (1...10 MΩ)	0.2 MΩ/+20 %
Response time $t_{an}$ at $R_f = 0.5 \times R_{an}$ and $C_e = 1 \mu F$	≤ 5 s
Hysteresis (1...10 kΩ)	+2 kΩ
Hysteresis (10 kΩ...10 MΩ)	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 $U_{fg}$	≤ DC 1200 V
Permissible system leakage capacitance $C_e$	≤ 500 μF
Factory setting	150 μF

**Displays**

Display, illuminated	two-line display
Characteristics (number)	2 x 16
Display range measured value	1 kΩ...10 MΩ
Operating uncertainty (20 kΩ...1 MΩ) (acc. to IEC 61557-8)	± 15 %**
Operating uncertainty (1...20 kΩ)	± 1 kΩ/± 15 %**
Operating uncertainty (1 MΩ...10 MΩ)	± 0.1 MΩ/± 15 %**

**Outputs/Inputs**

Test/reset button	internal/external
Cable length test/reset button, external	≤ 10 m
Current output for measuring instrument SKMP (scale centre point = 120 kΩ):	
Current output IRDH375 (load)	400 μA (≤ 12.5 kΩ)
Current output IRDH375B (load)	20 mA (≤ 500 Ω)
Accuracy current output (1 kΩ...1 MΩ) related to the value indicated	± 10 %, ± 1 kΩ

**Serial interface**

Interface/protocol IRDH375	RS-485/ASCII
Interface/protocol IRDH375B	RS-485/BMS
Connection	terminals A/B
Cable length	≤ 1200 m
Cable (twisted in pairs, one end of shield connected to PE)	recommended: J-Y(St)Y min. 2 x 0.8
Terminating resistor	120 Ω (0.5 W)
Device address, BMS bus	1...30 (factory setting = 3)

**Switching elements**

Switching elements	3 changeover contacts
	K1 (Alarm 1), K2 (Alarm 2), K3 (device error)
Operating principle K1, K2 (Alarm 1/Alarm 2)	N/O or N/C operation
Factory setting (Alarm 1/Alarm 2)	N/O operation
Operating principle K3 (device error)	N/C operation
Electrical endurance, number of cycles	12000
Contact class	IIB acc. to DIN IEC 60255 Part 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
Contact rating at DC 24 V	≥ 2 mA (50 mW)

**Environment/EMC**

EMC***	according to IEC 61326-2-4:2006-06 Ed. 1.0
Shock resistance IEC 60068-2-27 (device in operation)	15 g/11 ms
Bumping IEC 60068-2-29 (transport)	40 g/6 ms
Vibration resistance IEC 60068-2-6 (device in operation)	1 g/10...150 Hz
Vibration resistance IEC 60068-2-6 (transport)	2 g/10...150 Hz
Ambient temperature (during operation)	-10...+55 °C
Ambient temperature (during storage)	-40...+70 °C
Climatic class acc. to IEC 60721-3-3	3K23

**Connection**

Connection	screw-type terminals
Connection properties	
rigid/flexible	0.2...4 mm <sup>2</sup> /0.2...2.5 mm <sup>2</sup>
flexible with ferrules without/with plastic sleeve	0.25...2.5 mm <sup>2</sup>
Conductor sizes (AWG)	24...12

**Other**

Operating mode	continuous operation
Mounting	display-oriented
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	X300, free from halogen
DIN rail mounting acc. to	IEC 60715
Flammability class	UL94 V-0
Documentation number	D00124
Weight	≤ 510 g

**Option "W"**

Shock resistance IEC 60068-2-27 (device in operation)	30 g/11 ms
Bumping IEC 60068-2-29 (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	-25...+70 °C
Ambient temperature for storage	-40...+85 °C
Screw mounting	2 x M4

The data labelled with an \* are absolute values

\*\* Under EMC test conditions in accordance with IEC 61326-2-4 the specified tolerances can double

\*\*\* This device is not intended to be used in residential areas and cannot ensure adequate protection of radio reception in such environments.

## Ordering information

RS-485 interface	Coupled IT systems	Output	1 - Supply voltage $U_s$		Type	Art. No.
			AC	DC		
ASCII	not applicable	external k $\Omega$ indication 0...400 $\mu$ A	88...264 V	77...286 V	IRDH375-435	B91065000
			–	19.2...72 V	IRDH375-427	B91065002
BMS	applicable	Current output 0(4...20 mA)	88...264 V	77...286 V	IRDH375B-435	B91065004
			–	19.2...72 V	IRDH375B-427	B91065006

<sup>1)</sup> Absolute values

Device "Option-W" with increased shock and vibration resistance: Indicated by the letter "W" at the end of the order number.

## Suitable system components

Type designation	Type	Page
External k $\Omega$ measuring instruments	7204-1421	B986763
	9604-1421	B986764
	9620-1421	B986841
Coupling devices	AGH150W-4	B98018006
	AGH204S-4	B914013
	AGH520S	B913033
Transparent front plate cover IP65	144x72	B98060005



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