

A-ISOMETER® IRDH275



Insulation monitoring device for grounded AC, AC/DC and DC power supplies (Floating Systems)



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IRDH275

Characteristics of the device

- insulation monitoring for AC, AC/DC Floating systems 0... 793 V AC and DC Floating systems 0...650V.
- nominal voltage expandable by using of an appropriate coupling unit
- two separately adjustable response values 1 kΩ ... 10 MΩ
- AMP^{PLUS} measuring principle
- automatic adaptation to system leakage capacitances
- info button for displaying the device settings and system leakage capacitance
- self check with automatic signalling
- automatic self test, selectable
- connection for external clear text display
- test and reset button
- connection for external test and reset button
- two separate alarm relays with two floating changeover contacts
- N/O or N/C operation, selectable
- illuminated clear text display
- RS485 interface
- transparent dust cover for ingress protection

Product description

The IRDH275-series A-ISOMETER® monitors the insulation resistance of grounded AC, AC/DC 0 ... 793 V and DC 0 ... 650 V power circuits (Floating systems). Due to the AMP^{PLUS}-measuring principle the devices are particularly suitable for modern power supply systems frequently containing converters, power converters, thyristor controls and directly connected DC components. Due to interference suppression methods (EMC), high leakage capacitances often exist in these systems. The IRDH275 adapts itself automatically to the respective system conditions and optimizes the measuring time. The voltage range can be expanded with coupling devices. A separate supply voltage enables monitoring of the system in the de-energized state. For installation in distribution box doors, see type IRDH375(B).

Applications

- AC,DC or AC/DC main circuits
- AC/DC main circuits with directly connected DC components such as converters, power converters, and thyristor-controlled DC drives
- UPS (uninterruptible power supply) systems, battery systems
- heaters with phase controllers
- systems with switched-mode power supplies
- Floating systems with high leakage capacitances
- coupled Floating systems

Functions

If the insulation resistance between the conductors and ground falls below the set response values, the alarm relays are switched and the alarm LEDs light up. Through the use of separately adjustable alarm relays it is possible to make a distinction between a „Prewarning“ and a „main warning“. The measured value is shown on the LC display or on an externally connected measuring instrument. This makes it easy to detect changes, such as when load circuits are cut in. The fault message can be stored. To clear the fault memory, press the RESET button. The TEST button can be used to verify the functions of the unit, including the connections to the mains and to ground. By pressing the INFO button, important information, such as the system leakage capacitance and device settings, will be displayed. The functions of the unit and connections to the mains and to ground are monitored continuously. If a fault occurs, the system fault relay is switched and the „System error“ alarm LED lights up. The device parameters are set by using the control buttons on the front of the unit and the LC display.

IRDH275B version

The IRDH275B version includes the following additional functions:

- memory to store all alarm messages with date and time stamp
- electrically isolated RS485 interface (BMS protocol) for exchange of data with other Bender components
- Isometer disconnecting relay for the operation of multiple A-ISOMETERs® in coupled Floating systems
- current output 0(4) ... 20 mA (electrically isolated)

Use in coupled Floating systems

Due to the Isometer disconnecting relay included in the IRDH275B version and the F1/F2 control inputs, this unit can also be used in coupled Floating systems. It is thus ensured that only one A-ISOMETER® is actively measuring at any given time.

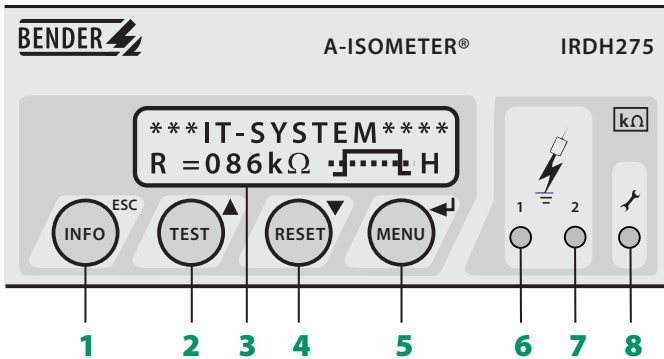
Measuring principle

AMPPlus The IRDH275(B) series uses the patented AMPPlus measuring principle. This ensures exact monitoring of modern power supply systems, even with extensive, directly connected DC components and high system leakage capacitances.

Standards

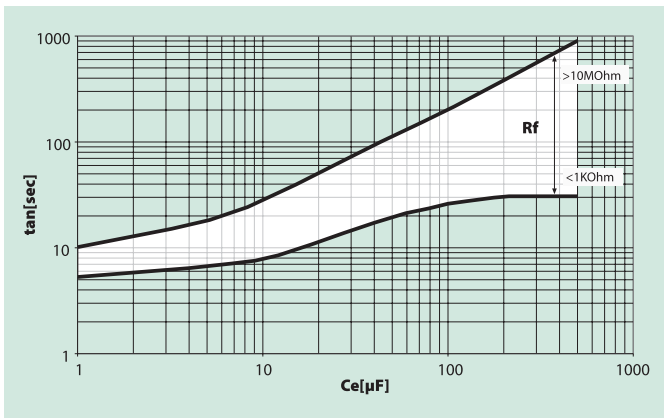
The IRDH275(B) series conforms to the following equipment standards: DIN EN 61557-8 (VDE 0413 part 8): 1998-05, EN 61557-8: 1997-03, IEC 61557-8: 1997-02, ASTM F1669M 1996-00

Front panel of the IRDH275



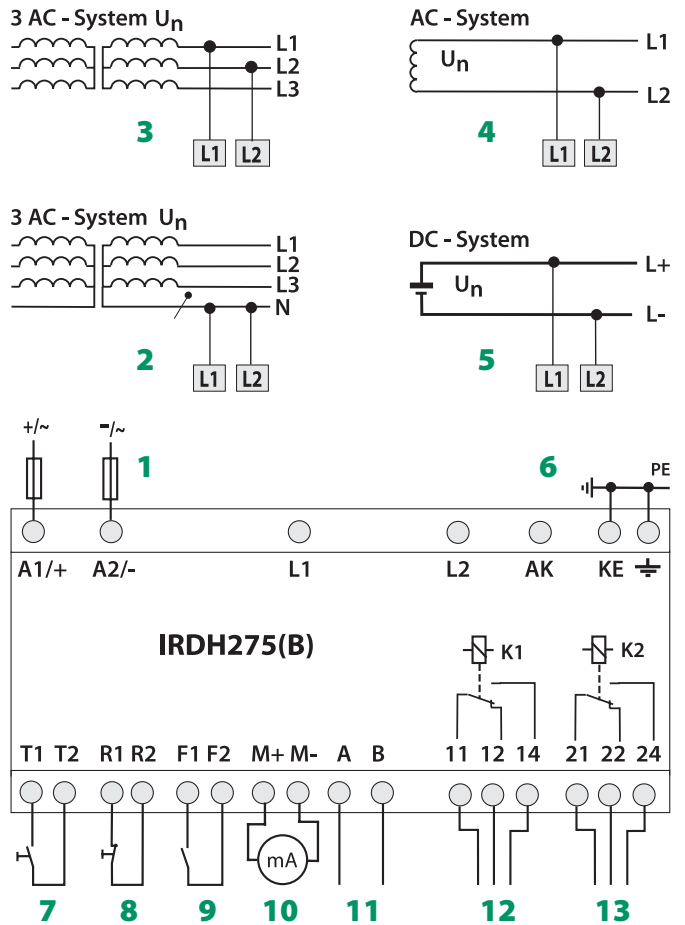
- 1 - INFO button: for calling up standard information/ESC button: back to the menu function
- 2 - TEST button: Call up self test/Up arrow button: changing parameters, scrolling
- 3 - display
- 4 - RESET button: deleting installation and fault messages (A-Iso-meter® only) Down arrow button: changing parameters, scrolling
- 5 - Menu button: calling up the system menu/Return button: confirming changed parameters
- 6 - Alarm LED1 lights up: Insulation fault, 1st warning level reached
- 7 - Alarm LED2 lights up: Insulation fault, 2nd warning level reached
- 8 - LED lights up: System fault is present

Characteristic of the IRDH275



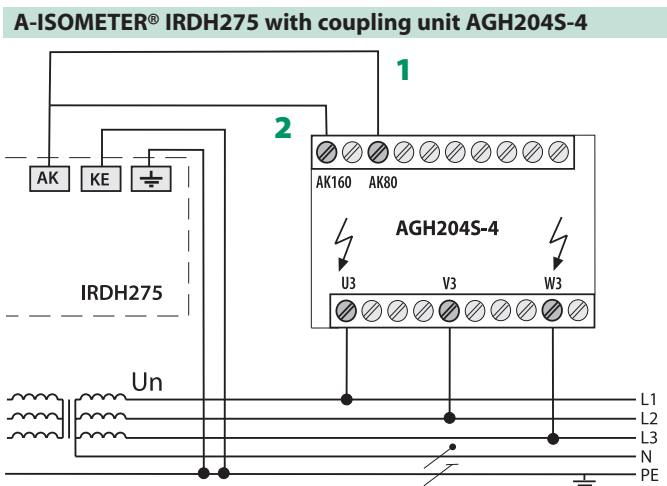
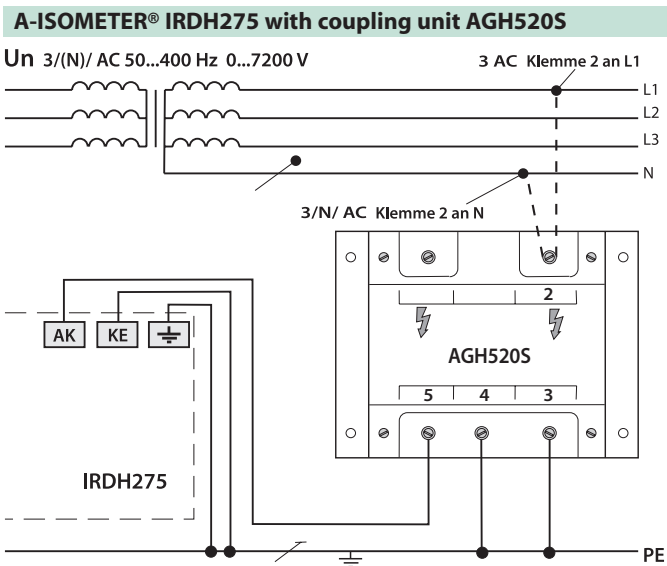
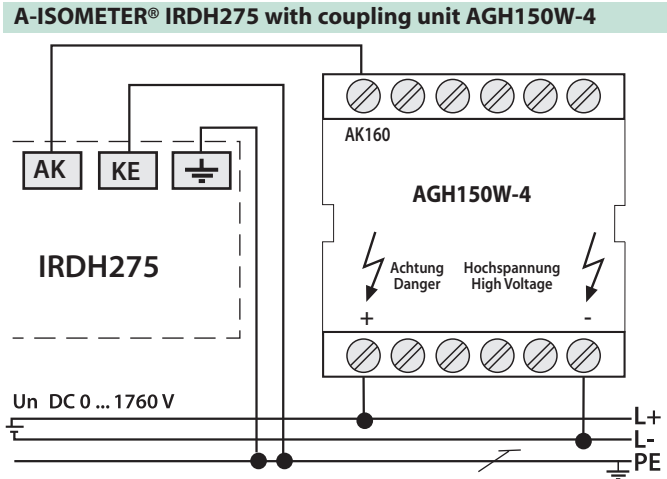
A-ISOMETER® response times as a function of leakage capacitance: $C_e = 1 \dots 500 \mu\text{F}$, $U_n = 0 \dots 793 \text{ V} / 50 \text{ Hz}$

Wiring diagram



- 1 - U_s supply voltage (see nameplate) via fuse
- 2 - Connection of the 3AC system to be monitored: terminals
- 3 - Connect L1, L2 with neutral conductor N or terminals L1, L2 with conductors L1, L2
- 4 - Connection of the AC system to be monitored: connect terminals L1, L2 with conductors L1, L2
- 5 - Connection of the DC system to be monitored: connect terminal L1 with conductor L+, terminal L2 with conductor L-
- 6 - Connect equipotential bonding to and KE separately
- 7 - External test button (make contact)
- 8 - External reset button (break contact or wire jumper); if terminals are open, no fault message will be saved
- 9 - STANDBY via function input F1/F2; when F1/F2 contact is closed, no insulation fault measurement; isolation from mains
- 10 - IRDH275: current output, electrically isolated: $0 \dots 400 \mu\text{A}$, IRDH275B: current output, electrically isolated: $0 \dots 20 \text{ mA}$ or $4 \dots 20 \text{ mA}$
- 11 - Serial interface RS485
- 12 - Alarm relay: Alarm 1
- 13 - Alarm relay: Alarm 2 or system fault

**Wiring diagrams -
IRDH275 with various coupling units**



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

Ordering details for A-ISOMETER® IRDH275 and accessory equipment

Ordering details for A-ISOMETER® IRDH275

Type	Operating range U_N	Supply voltage U_S	Art. no
IRDH275-435	AC 0 ... 793 V/DC 0 ... 650 V	AC 88 ... 264/DC 77 ... 286V	B 9106 5100
IRDH275B-435	AC 0 ... 793 V/DC 0 ... 650 V	AC 88 ... 264/DC 77 ... 286V	B 9106 5101

Accessories

External clear text measuring instruments, 400 μ A

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

External clear text measuring instruments, 20 mA

Type	Art. no.
9620-1421	B 986 841

Coupling units

Type	Nominal voltage U_N	Art. no.
AGH150W	DC 0 ... 1760 V	B 9801 8006
AGH204S-4	AC 0 ... 1300 V/DC 0 ... 150 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 voltage	AC 800 V
Rated impulse voltage/pollution degree	8 kV / 3

Voltage ranges

Nominal voltage range U_n	1 AC / 3 AC 0 ... 793 V, DC 0 ... 650 V
Nominal frequency f_n	0,1 ... 400 Hz
Supply voltage U_s	AC 88 ... 264 V, DC 77 ... 286 V
Frequency range U_s	20 ... 400 Hz
Max. power consumption	14 VA

Response values

Response value R_{an1} (Alarm 1)	1 k Ω ... 10 M Ω
Response value R_{an2} (Alarm 2)	1 k Ω ... 10 M Ω
Absolute error (1 k Ω ... 10 k Ω)	+ 2 k Ω
Relative percentage error (10 k Ω ... 10 M Ω)	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 curve (TGH page 69)
Hysteresis (1 k Ω ... 10 k Ω)/(10 k Ω ... 10 M Ω)	+2 k Ω / 25 %

Measuring circuit

Measuring voltage U_m (peak value)	± 50 V
Measuring current I_m max. (at $R_f = 0 \Omega$)	$\leq 278 \mu A$
Internal DC resistance R_i	≥ 180 k Ω
Internal impedance Z_i , at 50 Hz	≥ 180 k Ω
Max. permissible extraneous DC voltage U_{fg}	DC 1200 V
Max. permissible system leakage capacitance C_e	max. 500 μF
Factory setting	150 μF

Displays

Display, illuminated	double-line display
Characters (number of characters)	2x 16
Display range, measuring value	1 k Ω ... 10 M Ω
Relative percentage error (1 k Ω ... 10 k Ω)	± 1 k Ω
Relative percentage error (1 k Ω ... 10 k Ω)	± 20 %

Outputs

TEST / RESET button	internal/external
Current output for measuring instrument SKMP (scale centre point = 120 Ω)	
Current output IRDH275/IRDH275B (max. load)	400 μA (12.5 k Ω)/20 mA (500 Ω)
Accuracy current output (1 k Ω ... 1 M Ω)	± 10 %, ± 1 k Ω

Serial interface

IRDH275	RS485 / ASCII
IRDH275B	RS485 / BMS
Max. cable length	1200 m
Recommended cable (screened, screen one site connected to PE)	J(Y)STY 2x 0,6
Terminating resistor	120 Ω (0,5 W)

Switching components

Switching components	2 changeover contacts
Operating principle	N/O or N/C operation
Factory setting (Alarm 1/Alarm 2)	N/O operation
Electrical endurance	12 000 switching operations
Contact class	IIB acc. to DIN IEC 60255 part 0-20
Rated contact voltage	AC 250 V / DC 300 V
Making capacity	UC 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 (device in operation)	15 g / 11 ms
Bumping IEC 60068-2-29 (during 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 (during transport)	2 g / 10 ... 150 Hz
Ambient temperature (during operation)	-10 °C ... +55 °C
Storage temperature range	-40 °C ... +70 °C
Climatic class acc. to IEC 60721-3-3	3K5
Operating mode	continuous operation
Mounting	as indicated on the display
Connection	screw terminals
Connection, rigid, flexible	0.2 ... 4 mm ² / 0.2 ... 2.5 mm ²
Connection, flexible with connector sleeve, without/with plastic sleeve	0.25 mm ² ... 2.5 mm ²
Conductor sizes (AWG)	24-12
Protection class, internal components (DIN EN 60529)	IP30
Protection class, terminals (DIN EN 60529)	IP20
Type of enclosure	X112, free from halogen
DIN rail mounting	IEC 60715
Flammability class	UL94V-0
Weight approx.	ca. 150 g

Option „W“

Shock resistance IEC 60068-2-27 (Device in 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)	-25 °C ... +70 °C
Storage temperature range	-40 °C ... +85 °C
Screw mounting	2x M4

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