EN Manual

ISOMETER®IRDH275

AC/DC

IRDH275B



Insulation monitoring device for IT AC systems with galvanically connected rectifiers and converters and for IT DC systems
Software version IRDH275: D0160 V1.8
Software version IRDH275B: D159 V1.8

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3. Function

3.1 Common characteristics (IRDH275 and IRDH275B)

- ISOMETER® for IT AC systems with galvanically connected rectifiers and for IT DC systems (IT = unearthed systems)
- The operating range of the nominal voltage U_n can be extended via coupling devices.
- Automatic adaptation to the existing system leakage capacitance
- ***AMP**Plus* measuring principle (European Patent: EP 0 654 673 B1)
- Two separately adjustable ranges of the response value1 kΩ…10 MΩ (Alarm 1, Alarm 2)
- Two-line LC display
- Connection monitoring (monitoring of the measuring leads)
- Automatic device self test
- Option "W":
  This option provides: improved shock and vibration resistance for use in ships, on rolling stock and in seismic environment.

3.2 Additional characteristics IRDH275B

- Memory with real-time clock to store all alarm messages with date and time stamp.
- BMS interface (BMS protocol) for data exchange with other Bender devices (RS-485 electrically isolated).
- Internal disconnection of the ISOMETER from the IT system to be monitored (using a control signal; terminals F1/F2) , e.g. if several ISOMETERs® are interconnected.
- Current output 0(4)…20mA (galvanically separated) in relation to the measured insulation value.
- Remote setting of certain parameters via the Internet (option; COM465 additionally required)

3.3 Product description

The ISOMETER® type IRDH275 monitors the insulation resistance of IT systems. It is suitable for universal use in 3(N)AC, AC/DC and DC systems. AC systems may include extensive DC supplied loads, such as converters or thyristor-controlled DC drives. The device automatically adapts itself to the existing system leakage capacitance.

Suitable coupling devices are available to extend the nominal voltage range U_n.

The IRDH275B can be used in combination with a control and indicating device, e.g. PRC1470 version 2 or higher, on the BMS (BMS = Bender Measuring Device Interface) bus.

3.4 Function

The ISOMETER® IRDH275 is connected between the unearthed system (IT system) and the protective conductor (PE).
The response values and other function parameters are set via the function keys. The parameters are indicated on the LC display and are stored in a non-volatile memory (EEPROM) after the setting is completed.
A microprocessor-controlled pulsating AC measuring voltage is superimposed on the IT system to be monitored (AMPPlus measuring principle*).
The measuring cycle consists of positive and negative pulses of the same amplitude. The period of these pulses depends on the respective system leakage capacitances and the insulation resistances of the IT system to be monitored.
An insulation fault between the IT system and earth closes the measuring circuit. From the measured current value, the microprocessor calculates the insulation resistance which is indicated on the LC display or the external kΩ measuring instrument.
The measuring time is determined by the system leakage capacitances, the insulation resistance, and the system-related interference disturbances. System leakage capacitances do not influence the measuring accuracy.

If the reading is below the selected response values Alarm 1/Alarm 2, the associated alarm relays respond and the alarm LEDs "Alarm 1/2" light up and the measuring value is indicated on the LC display (in the event of DC insulation faults, the faulty supply line is indicated). If the terminals R1/R2 are bridged (external RESET button [NC contact] or wire bridge), the fault indication will be stored. Pressing the RESET button, resets the insulation fault message, provided that the currently displayed insulation resistance is at least 25% above the set response value when the reset is carried out. The fault memory behaviour can also be set in the "ISO SETUP" menu, by selecting the sub menu Memory: on/off.

The connections for external kΩ display supplied by the current output 0…400 µA or 0/4…20 mA (IRDH275B) at M+/M- are galvanically isolated.

*) ***AMP**Plus* measuring principle "adaptive measuring pulse", a measuring principle developed by Bender (European Patent: EP 0 654 673 B1).

Self test

A self test can be carried out manually using the TEST button or automatically. In order to guarantee high functional reliability, the ISOMETER® IRDH275 provides comprehensive self test functions. After switching the supply voltage on, all internal measuring functions, the components of the process control such as data and parameter memory as well as system and earth connections are checked using the self test functions. The progress of the self test is indicated on the display by a bar graph. Depending on the conditions in the IT system to be monitored, the self test is running for 15…20 seconds, then the message "Test ok!" appears on the LC display for approximately 2 seconds. Then the device returns to normal measuring mode and the current measuring value is displayed after the expiry of the measuring time.

9. Technical data IRDH275(B)

9.1 Data in tabular form

The values marked with * are absolute values

Insulation coordination acc. to IEC 60664-1

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

Voltage ranges

IRDH275.....:
Nominal voltage range U_n ..... 1AC/3(N)AC 0 . . . 793 V*
Nominal frequency f_n (for $f < 50$ Hz see characteristic curve on page 77) ..... 0.1 . . . 460 Hz
Nominal voltage range U_n ..... DC 0 . . . 650 V*
IRDH275. . . .-435:
Supply voltage U_s (see nameplate) ..... AC 88 . . . 264 V*
Frequency range U_s ..... 42 . . . 460 Hz
Supply voltage U_s (see nameplate) ..... DC 77 . . . 286 V*
IRDH. . . .-427:
Supply voltage U_s (see nameplate) ..... AC 19.2 . . . 55 V*
Frequency range U_s ..... 42 . . . 460 Hz
Supply voltage U_s (see nameplate) ..... DC 19.2 . . . 72 V*
IRDH275. . . .:
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
Relative uncertainty (20 kΩ . . . 1 MΩ) (acc. to IEC 61557-8:2007-01) ..... ±15 %
Relative uncertainty (1 kΩ . . . 20 kΩ) ..... +2 kΩ/+20 %
Relative uncertainty (1 MΩ . . . 10 MΩ) ..... 0.2 MΩ/+20 %
Response time t_{an} at $R_F = 0.5 \times R_{an}$ and $C_e = 1$ µF ..... ≤ 5 s
Measuring time ..... see characteristic curve
Hysteresis (1 kΩ . . . 10 kΩ) ..... +2 kΩ

Hysteresis (10 kΩ . . . 10 MΩ) ..... 25 %

Measuring circuit

Measuring voltage U_m ..... ≤ 50 V
Measuring current I_m max. (at $R_F = 0\ \Omega$) ..... ≤ 280 µA
Internal DC resistance R_i ..... ≥ 180 kΩ
Internal impedance Z_i at50 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
Characters (number of characters) ..... 2 x 16
Display range, measuring value ..... 1 kΩ . . . 10 MΩ
Operating uncertainty (20 kΩ . . . 1 MΩ) (acc. to IEC 61557-8:2007-01) ..... ±15 % **
Operating uncertainty (1 kΩ . . . 20 kΩ) ..... ±1 kΩ/±15 % **
Operating uncertainty (1 MΩ . . . 10 MΩ) ..... ±0.1 MΩ/±15 % **
** = under test conditions according to IEC 61326-2-4, the tolerances may double

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 IRDH275 (load) ..... 400 µA (≤ 12.5 kΩ)
Current output IRDH275B (load) ..... 20 mA (≤ 500 Ω)
Accuracy current output (1 kΩ . . . 1 MΩ)
in relation to the displayed measured value ..... ±10 %, ±1 kΩ

Serial interface

Interface/Protocol IRDH275 ..... RS-485/ASCII-IsoData
Interface/Protocol IRDH275B RS-485/BMS
Connection ..... terminals A/B
Cable length ..... ≤ 1,200 m
Shielded cable (shield on one side to PE) ..... two-core, ≥ 0.6 mm^2, e.g. J-Y(St)Y 2 x 0.6
Terminating resistor ..... 120 Ω (0.5 W)
Device address, BMS bus ..... 1 . . . 30 (factory setting = 3)

Switching components

Switching components	2 changeover contacts: K1 (Alarm 1), K2 (Alarm 2, device fault)
Operating principle K1, K2 (Alarm 1, Alarm 2)	N/O or N/C operation
Factory setting (Alarm 1/Alarm 2)	N/O operation
Electrical endurance	12,000 switching operations
Contact class	IIB (IEC 60255-23)
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

EMC	acc. 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 (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
Distance to adjacent devices	≥ 30 mm
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 . . . 2.5 mm^2
Conductor sizes (AWG)	24-12
Tightening torque	0.5 Nm
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	UL94 V-0

9.4 Ordering details

9.4.1 ISOMETER®

Type	Nominal voltage U_n	Supply voltage U_s	Art.-No.
IRDH275-435	3(N)AC 0…793 V DC 0…650 V	AC 88…264 V DC 77…286 V	B91065100
IRDH275W-435	„	„	B91065100W
IRDH275B-435	„	„	B91065101
IRDH275BW-435	„	„	B91065101W
IRDH275-427	3(N)AC 0…793 V DC 0…650 V	AC 19.2…55 V 42…460 Hz DC 19.2…72 V	B91065104
IRDH275W-427	„	„	B91065104W
IRDH275B-427	„	„	B91065105
IRDH275BW-427	„	„	B91065105W
IRDH275-425	„	10.2…36 V	B91065108
IRDH275B-425	„	„	B91065109

Series …B…

The 275B series provides a BMS interface, a memory with real-time clock and other features. An overview about these features is shown in the menu structure on page 43 and in the product and function description on page 19.