A-ISOMETER® IRDH575

Insulation monitoring device for unearthed AC, DC and AC/DC systems (IT systems) with control and display function for EDS insulation fault location systems

A-ISOMETER® IRDH575

Device features

- Universal application in 3(N)AC, AC/DC and DC IT systems 20…575 V/340…760 V
- Response range 1 kΩ…10 MΩ
- Info button for the indication of various parameters and the system leakage capacitance
- Comprehensive self-monitoring function including system fault alarm relay
- Internal/external test and reset button
- Two separate alarm relays, N/C or N/O operation selectable
- Backlit plain text display 4 x 16 characters
- RS-485 interface
- Data memory, system disconnection and 04…20mA current output
- Can be extended to an insulation fault location system for 1080 circuits
- Adjustable locating current for insulation fault location
- Appropriate for EDS4… insulation fault locators
- AMP measurement method

Standards, approvals and certifications

RoHS

Product description

The A-ISOMETER® of the IRDH575 series monitors the insulation resistance of unearthed power supplies (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 IRDH575 in combination with EDS4… series insulation fault locators and the appropriate measuring current transformers is designed to set up the respective equipment for insulation fault location.

Function insulation monitoring

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 (N/C or N/O operation) allow a distinction to be made 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 internal or external 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 key provides additional information, such as the existing system leakage capacitance or device settings.

Function insulation fault location

Insulation fault location is carried out with EDS4… series insulation fault locators and the respective measuring current transformers. When the IRDH575 detects an insulation fault, the insulation fault location process is started automatically or manually. The IRDH575 generates a locating current the amplitude of which is dependent on the existing system voltage and the insulation fault. When low-resistance insulation faults occur, the locating current is limited by the IRDH575. This limit value can be set via an appropriate menu. The locating current pulse flows from the IRDH575 via the live parts, taking the shortest path to the location of the insulation fault. From there, it flows via the insulation fault and the PE back to the IRDH575. This locating current pulse is then detected by the measuring current transformers located in the insulation fault path, and is evaluated by the EDS… insulation fault locators. When the locating current in the measuring current transformer exceeds the response value, the associated alarm LED at the EDS47… lights up indicating the faulty subcircuit. This information is also indicated on the LC display of the IRDH575. By assigning the measuring current transformers to the respective circuit, the point of fault can easily be detected.

Additional functions

99 alarm messages with date and time can be stored in the data memory of the IRDH575. The device also includes Isometer disconnecting relays when several A-ISOMETER®s are operated in (coupled) IT systems. An integrated RS-485 interface (BMS protocol) allows information exchange with other Bender devices.

Via the 0 / 4-20mA interface details about the insulation resistance can be transferred to higher-level control systems.

The function of the IRDH575 is continuously monitored. When a system fault occurs, the associated alarm LED lights up and the respective alarm relay switches.

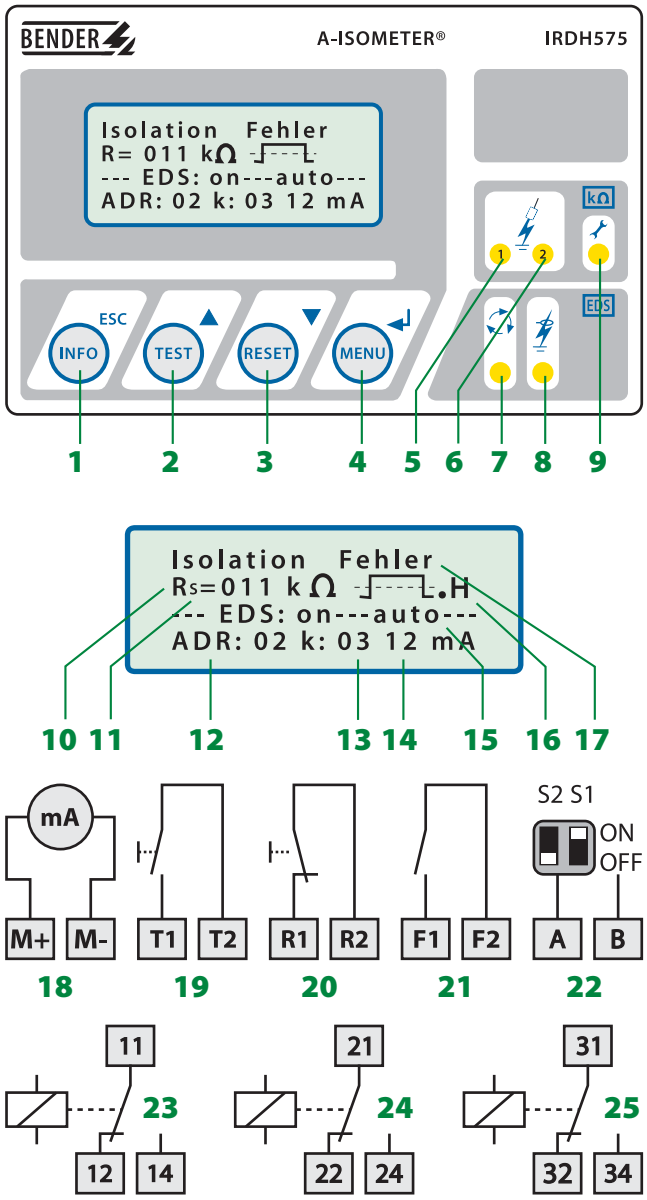
System design

Basically, an EDS system consists of an IRDH575 and one or several EDS4… insulation fault locators with the associated measuring current transformers. Information exchange between the EDS4… and the IRDH575 takes place via a time and cost-saving RS-485 interface. Such a system may include up to 90 EDS4… so that a total of 1080 circuits can be monitored.

Standards

The A-ISOMETER® was designed in accordance with the following standards:
IEC 61557-8, IEC 61326-2-4, IEC 60664-1, IEC 60664-3, IEC 61557-9,
ASTM F1669M-96 (2007), ASTM F1207M-96 (2007).

Wiring diagram – Operating elements



1- "INFO" button: to query standard information
ESC button: back to the menu function

2 - "TEST" button: to call up the self test
Arrow up button: parameter change, scroll

3 - "RESET" button: to delete alarm and fault messages
Arrow down button: parameter change, scroll

4 - "MENU" button: to activate the menu system
Enter button: to confirm parameter change

5 - Alarm LED "1" lights: Insulation fault,
first warning level Alarm 1 reached

6 - Alarm LED "2" lights: Insulation fault,
first warning level Alarm 2 reached

7 - EDS LED lights: Insulation fault location process started

8 - EDS alarm LED lights: Insulation fault detected

9 - LED lights up: system fault

10 - Indication of the insulation resistance in kΩ

11 - Additional information about the insulation resistance: + = Fault at L+, - = Fault at L-, s = A new measuring process has been started.

12 - Bus address of the active EDS46…
(indication when a fault has been detected)

13 - Channel monitored by EDS4…
(indication when a fault has been detected)

14 - Locating current in mA or µA
(indication when a fault has been detected)

15 - EDS is running in the AUTO mode. Further modes are: on, off, pos: address and channel of the EDS can be predefined (in Master mode only). 1 cycle: when the channels are tested once, the EDS will be deactivated.

16 - Polarity of the locating current. Point = valid BMS traffic, H = a new entry is made in the history memory.

17 - Messages in plain text

18 - Current output 0…20 mA or 4…20 mA

**19 - External test button "T1/T2" (N/O contact)

**20 - External reset button (N/C contact or wire jumper), when the terminals are open, the fault message will not be stored, provided that the memory has not been activated via the operating menu.

**21 - STANDBY, contact closed = no measurement; no alarm; system disconnection

22 - RS-485 termination (120 Ω) with micro switch S1 and connection BMS bus; S1 = ON = BMS bus terminated, S2 = unassigned

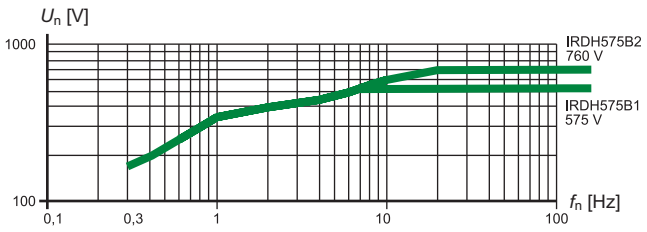
23 - Alarm relay: Alarm 1 (A-ISOMETER®)

24 - Alarm relay: Alarm 2 (A-ISOMETER®)

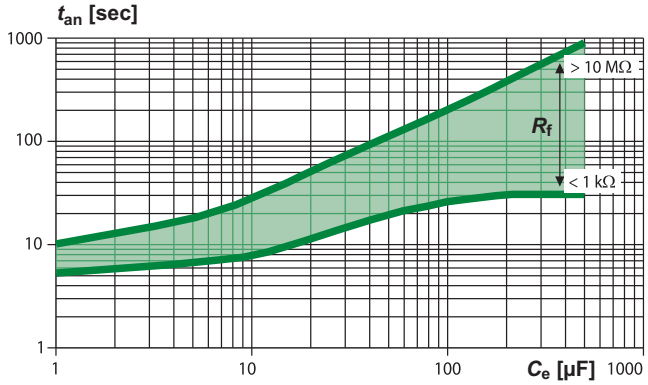
25 - Alarm relay: System fault and EDS alarm (Adr.:1)

* The terminal pairs 19, 20 and 21 must be wired galvanically isolate and must not have a connection to PE!

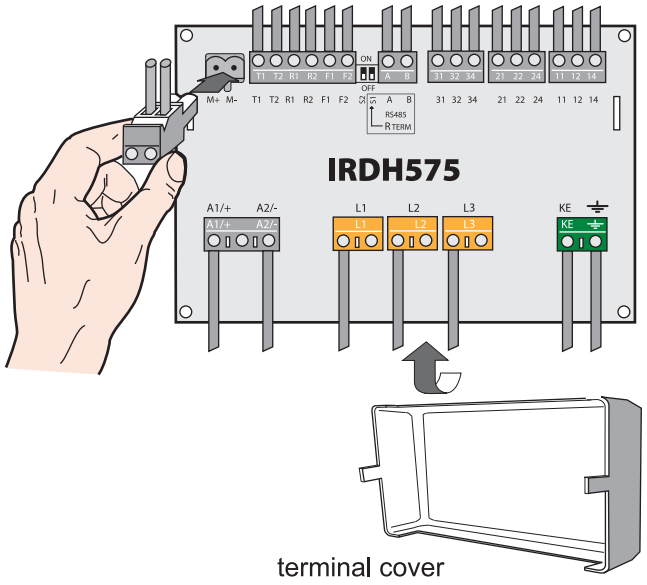
Characteristic curve – Max. AC voltage between system and earth in the frequency range < 50 Hz



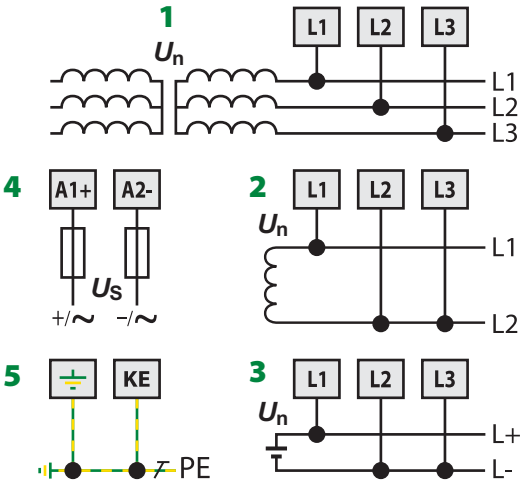
Characteristic curve response times



Wiring diagram – rear view

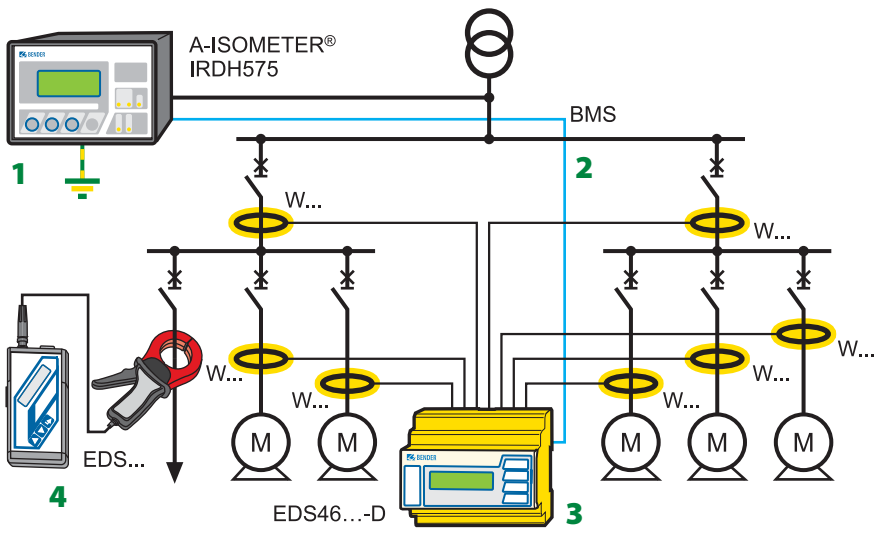


Wiring diagram – system connection



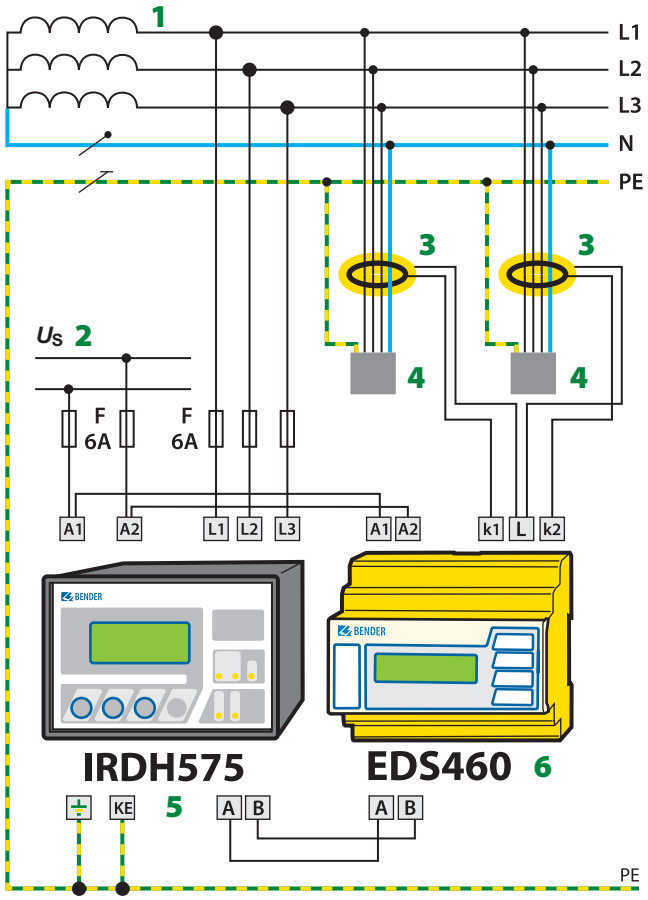
1 - Mains connection 3AC
2 - Mains connection AC
3 - Mains connection DC
4 - U_S see ordering information, 6 A fuse recommended
Note: Supply voltage U_S in the IT system requires two fuses
5 - PE connection

System structure – Example



1 - A-ISOMETER® IRDH575
2 - RS-485/BMS protocol
3 - EDS460 / EDS461
4 - EDS3060 / EDS3360

Typical circuit EDS460 insulation fault location system with IRDH575



EDS460 system with IRDH575, EDS460 and measuring current transformers W… in a 3AC system

1 - 3AC / 3NAC / DC 20…575 V resp. 3AC / 3NAC / DC 340…760 V

2 - U_S see ordering information, 6 A fuse recommended
Note: Supply voltage US in the IT system requires two fuses.

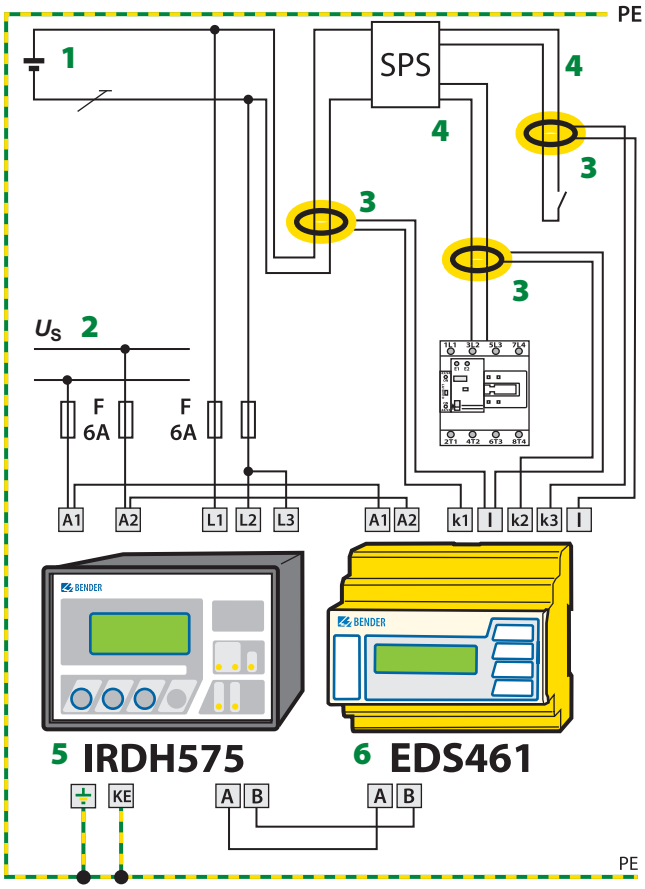
3 - Measuring current transformers W…

4 - Outgoing circuits to the loads

5 - A-ISOMETER® IRDH575

6 - Insulation fault locator EDS460

Typical circuit EDS461 insulation fault location system with IRDH575



1 - AC 20…265V / DC 20 V…308 V

2 - U_S see ordering information, 6 A fuse recommended
Note: Supply voltage US in the IT system requires two fuses.

3 - Measuring current transformer W…/8000

4 - Outgoing circuits PLC: inputs and outputs

5 - A-ISOMETER® IRDH575

6 - Insulation fault locator EDS461

Design of an insulation fault location system with EDS461

The example above shows an EDS461 system for the supply of a programmable logic controller (PLC) in a DC system. Due to the fact that the inputs of PLC systems are very sensitive, the use of an EDS461 is recommended. The locating current current of the IRDH575 is to be set to max. 2.5 mA or as necessary to 1 mA, in order to avoid influences on the PLC system.

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

IRDH575B1-4235:	
Nominal system voltage U_n	AC, 3(N)AC 20…150 V*
Nominal frequency f_n	50…460 Hz
Nominal system voltage U_n	DC 20…150 V*
IRDH575B1-435:	
Nominal system voltage U_n	AC, 3(N)AC 20…575 V*
Nominal frequency f_n	50…460 Hz
Nominal system voltage U_n	DC 20…575 V*
IRDH575B2-435:	
Nominal system voltage U_n	AC, 3(N)AC 340…760 V*
Nominal frequency f_n	50…460 Hz
Nominal system voltage U_n	DC 340…575 V*
IRDH575B1-435:	
Supply voltage U_S (also see nameplate)	88…264 V*
Frequency range U_S	42…460 Hz
Supply voltage U_S (also see nameplate)	DC 77…286 V*
IRDH575B1-427:	
Supply voltage U_S (also see nameplate)	DC 19.2…72 V*
Power consumption	≤ 14 VA

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 kΩ…20 kΩ)	+2 kΩ / +20
Realtive uncertainty (1 MΩ…10 MΩ)	0.2 MΩ / +20 %
Measuring time	see characteristic curves
Hysteresis (1 kΩ…10 kΩ)	+2 kΩ
Hysteresis (10 kΩ…10 MΩ)	25 %

Measuring circuit

Measuring voltage U_m	≤ 40 V
Measuring voltage U_m (IRDH575B1-4227)	≤ 10 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} (variant B1)	≤ DC 810 V
Permissible extraneous DC voltage U_{fg} (variant B2)	≤ DC 1060 V
System leakage capacitance C_e	500 µF
Factory setting C_e	150 µF

Measuring circuit for insulation fault location (EDS)

Locating current I_p DC	1/2.5/10/25/50 mA
Test cycle/idle time	2 s / 4 s

Displays

Display, illuminated	four-line display
Characters (number of characters)	4 x 16
Display range measured value	1 kΩ….10 MΩ
Operating uncertainty (20 kΩ…1 MΩ) (IEC 61557-8)	±15 %**
Operating uncertainty (1 kΩ…20 kΩ)	±1 kΩ / ± 15 %**
Operating uncertainty (1 MΩ…10 MΩ)	±0.1 MΩ / 15 %**

Outputs/Inputs

Test / reset button	internal/external
Current output for measuring instrument SKMP (scale centre point = 120 k):	
Current output IRDH575 (max. load)	0/4…20 mA (≤ 500 Ω)
Accuracy current output (1 kΩ…1 MΩ)	±10 %, ± 1 kΩ
Serial interface	
Interface / protocol	RS-485 / BMS
Max. cable length	≤ 1200 m
Recommended cable (shielded, shield connected to PE at one end)	J-Y(St) Y 2x0.6
Terminating resistor	120 Ω (0.5 W)

Switching elements

Switching components	3 changeover contacts: K1 (Alarm 1), K2 (Alarm2), K3 (device error, additionally selectable EDS alarm)
Operating principle K1, K2	N/O or N/C operation
Factory setting (Alarm 1/Alarm 2)	N/O operation
Operating principle K3	N/C operation
Electrical endurance, number of cycles	12000
Contact class	IIB
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)

General data

EMC	acc. to IEC 61326-2-4
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 (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 IEC 60721-3-3	3K5
Operating mode	continuous operation
Mounting	display-oriented
Distance to adjacent devices	≥ 30 mm
Connection	screw-type terminals
Connection, rigid/flexible	0.2…4 mm² / 0.2…2.5 mm²
Connection, flexible with ferrule, without/with plastic sleeve	0.25…2.5 mm²
Conductor sizes (AWG)	24…12
Degree of protection, internal components (IEC 60529)	IP30
Degree of protection, terminals (IEC 60529)	IP20
Degree of protection, in case of door mounting (IEC 60529)	IP40
Degree of protection, for door mounting with panel sealing (IEC 60529)	IP42
Degree of protection, for mounting the transparent front plate cover (IEC 60529)	IP65
Type of enclosure: suitable for panel mounting	free from halogen
Flammability class	UL94 V-0
Software version	D185 V1.6
Operating manual	TGH1364
Weight	≤ 900 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 °C…+ 70 °C
Ambient temperature, during operation > 55 °C not for continuous operation in the insulation fault location mode with 50 mA	
Ambient temperature for storage	- 40 °C…+ 85 °C

The data labelled with an * are absolute values

** = under test conditions according to IEC 61326-2-4, the tolerances may double

Ordering information			
Type	**Nominal system voltage U_n**	**Supply voltage U_S**	**Art. No.**
IRDH575B1-427	AC/DC 20…575 V	DC 19.2…72 V	B 9106 5502
IRDH575B1-435	3(N)AC / DC 20…575 V*	AC 88…264 V/ DC 77…286 V*	B 913 054
IRDH575B1-4227**	3(N)AC / DC 20…150 V*	DC 19.2…72V*	B 9106 5505
IRDH575B1-4235	AC/DC 20…150 V	AC 88…264 V / DC 77…286 V	B 9106 5504
IRDH575B2-435	3(N)AC 340…760 V DC 340…575 V*	AC 88…264 V/ DC 77…286 V*	B 9106 5503

* absolute values

** measuring voltage U_m 10 V, version -4227

Accessories		
Protection against dust and moisture		
Type	**Dimensions**	**Art. No.**
Panel sealing, degree of protection IP42	144 x 96 mm	B 9806 0006
Transparent cover, degree of protection IP65	144 x 96 mm	B 9806 0007

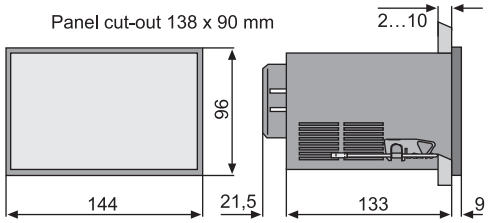
Adaptor for rail mounting	
Type	**Art. No.**
Adaptor for rail mounting	B 9806 0010

The adaptor allows fast mounting of the IRDH575 on a DIN rail according to IEC 60715.

Measuring instruments			
Type	**Measuring range**	**Dimensions**	**Art. No.**
9620-1421	0…20 mA	96 x 96 mm	B 986 841
9620S-1421	0…20 mA	96 x 96 mm	B 986 842

Dimension diagram X500

Dimensions in mm



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