# A-ISOMETER® IRDH575

**Insulation monitoring device for unearthed AC, DC and AC/DC systems (IT systems) with integrated test generator and controller 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 key 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 LC display 4 x 16 characters
- RS-485 interface
- Data memory, system disconnection and 0/4…20mA current output
- Extendable to an insulation fault location system for 1080 circuits
- Adjustable test current for insulation fault location
- Appropriate for EDS4… insulation fault evaluators

## Approvals

**RoHS**

c UL us LISTED · Lloyd's Register TYPE APPROVED · GL · PG AE25

## 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, the insulation fault evaluators of the EDS4… series and the appropriate measuring current transformers can be combined to an insulation fault location system.

## 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 recognized 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 insulation fault evaluators of the EDS4… series 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 test current the amplitude of which is dependent on the existing system voltage and the insulation fault. When low-resistance insulation faults occur, the test current is limited by the IRDH575. This limit value can be set via an appropriate menu. The test 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 current pulse is then detected by the measuring current transformers located in the insulation fault path, and is evaluated by the EDS4... insulation fault evaluators. When the test 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® are operated in (coupled) IT systems. An integrated RS-485 interface (BMS protocol) allows information exchange with other BENDER devices.

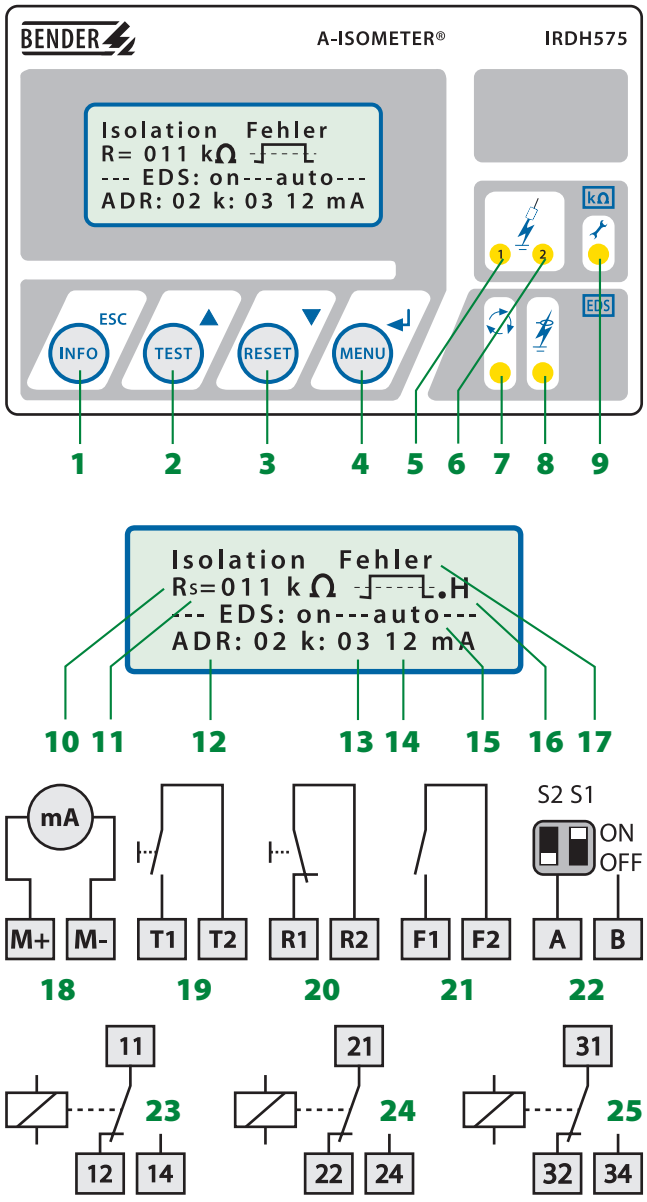
Via the 0/4-20mA interface details about the insulation resistance can be transferred to higher-level control systems.

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

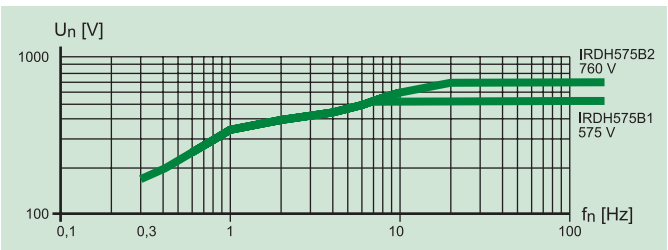
Basically, an EDS system consists of an IRDH575 and one or several EDS4... insulation fault evaluators with the associated measuring current transformers. Information exchange between the EDS4… and the IRDH575 takes place via a time and cost-saving RS-485 interface. Such a system may include up to 90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

## Wiring diagram – Operating elements

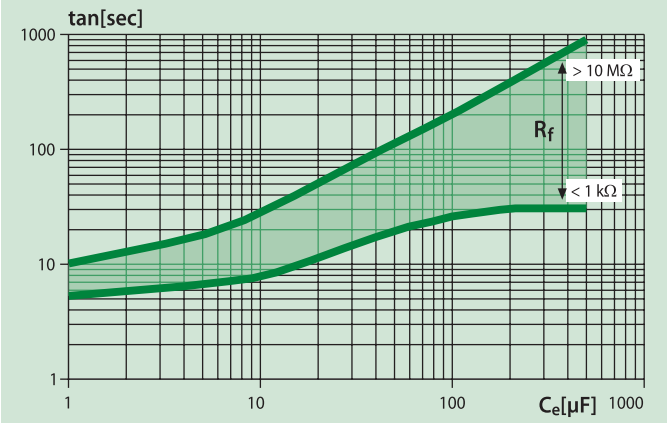



1 - INFO key: to query standard information
ESC key: back to the menu function
2 - TEST button: to call up the self test.
Arrow up key: Parameter change, scroll.
3 - RESET button: to delete alarm and fault messages
Arrow down key: Parameter change, scroll.
4 - MENU key: to call up the Menu
Enter key: to confirm parameter change.
5 - Alarm LED 1 lights: Insulation fault, first warning level Alarm 1 reached
6 - Alarm LED 2 lights: Insulation fault, second warning level Alarm 2 reached
7 - EDS LED lights: Insulation fault location has been started.
8 - EDS alarm LED lights: Insulation fault has been detected.
9 - LED lights: a system fault exists
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 - Test 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: after testing all the channels once, the EDS will be deactivated.
16 - Polarity of the test current pulse. 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 (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.
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)

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




## Characteristic curve response times

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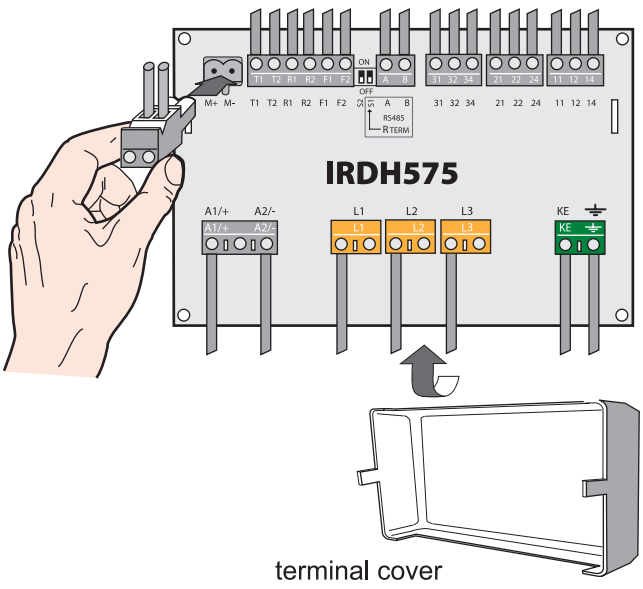
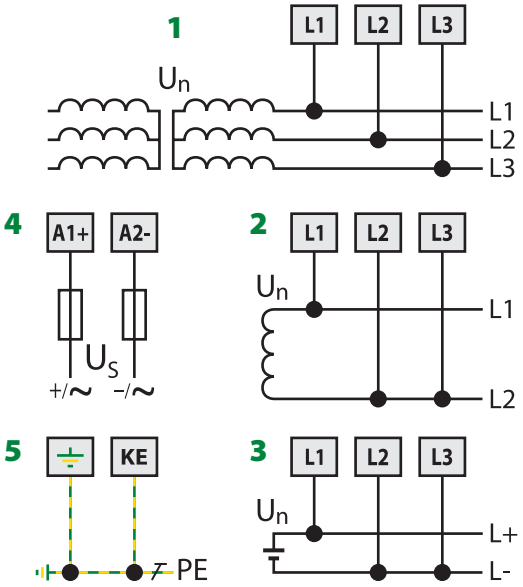
## Wiring diagram – back of the device

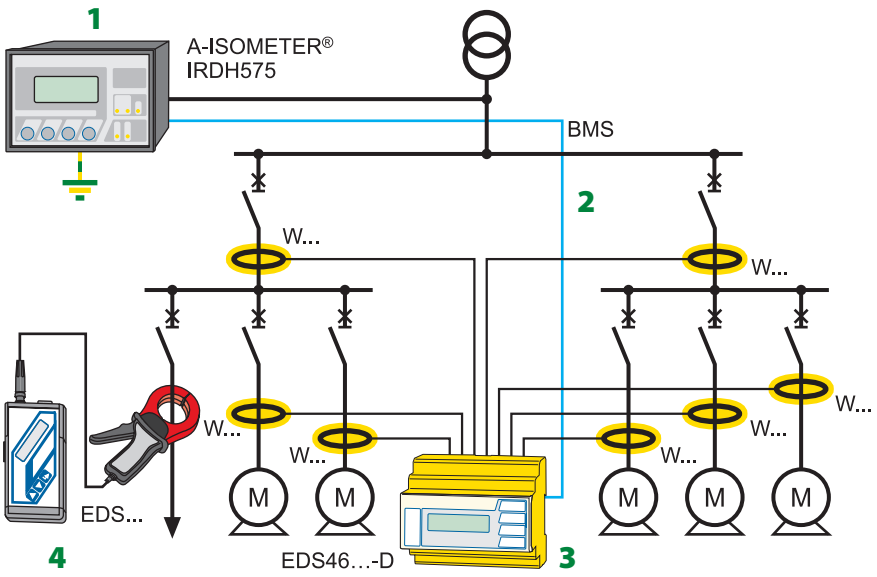



## Wiring diagram – system connection




1 - System connection 3AC
2 - System connection AC
3 - System 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

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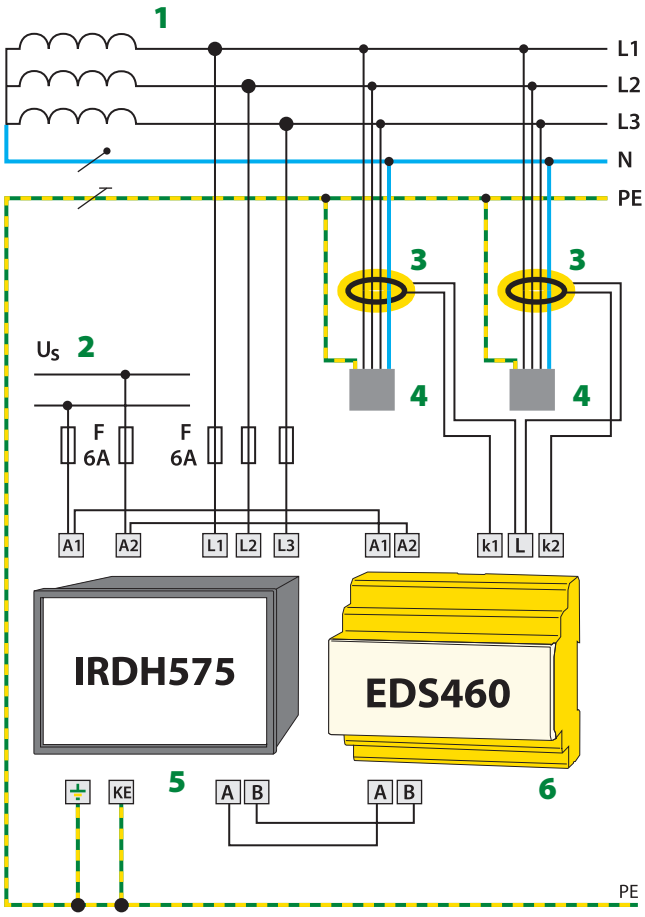
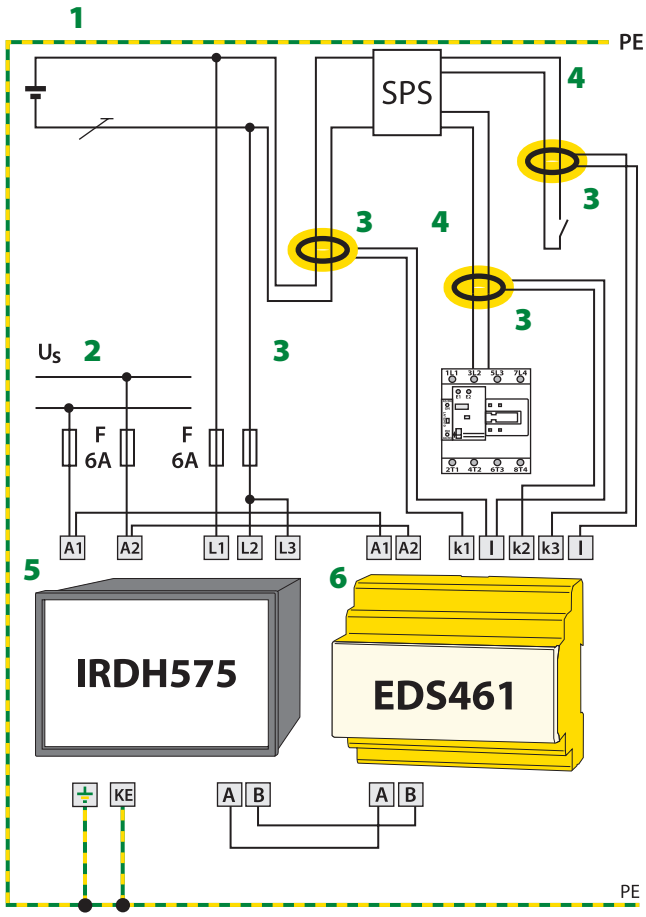
## Typical circuit EDS460 system with IRDH575




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

1 - 3AC/3NAC/AC 20…575 V
2 - $U_S$ see ordering information, 6 A fuse recommended. Note: Supply voltage $U_S$ in the IT system requires two fuses.
3 - Measuring current transformers W…
4 - Subcircuits to the loads
5 - A-ISOMETER® IRDH575
6 - Insulation fault evaluator EDS460

## Typical circuit EDS461 system with IRDH575




1 - DC 20 V…308 V
2 - $U_S$ see ordering information, 6 A fuse recommended. Note: Supply voltage $U_S$ in the IT system requires two fuses.
3 - Measuring current transformers W…/8000
4 - Subcircuits PLC: Inputs and outputs
5 - A-ISOMETER® IRDH575
6 - Insulation fault evaluator EDS461

### Design of an EDS461 system

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 test 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 A-ISOMETER® IRDH575

### Insulation coordination acc. to IEC 60664-1

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

### Voltage ranges

**System being monitored IRDH575B1-435**

| | |
|---|---|
| Nominal system voltage $U_n$ | AC, 3(N)AC 20…575 V* |
| Rated frequency fn ( f < 50 Hz see characteristic curve) | 50…460 Hz |
| Nominal system voltage $U_n$ | DC 20…575 V* |

**System being monitored IRDH575B2-435**

| | |
|---|---|
| Minimal system voltage $U_n$ | AC, 3(N)AC 340…760 V* |
| Rated frequency fn ( f < 50 Hz see characteristic curve) | 50…460 Hz |
| Nominal system voltage $U_n$ | DC 340…575 V* |

### Supply voltage

| | |
|---|---|
| Supply voltage $U_S$ (also refer to nameplate) | AC 40…460 Hz 88 …264 V*/ DC 77…286 V* |
| 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 percentage error (10 kΩ…10 MΩ) | 0%…+ 20%/(1 kΩ …10 kΩ) + 2 kΩ |
| Response time $t_{an}$ at $R_F$ = 0.5 x $R_{an}$ and $C_e$ = 1 µF | see characteristic curve |
| Measuring time | see characteristic curves |
| Hysteresis | 25%, + 2 kΩ |

### Measuring circuit

| | |
|---|---|
| Measuring voltage $U_m$** | ≤ 40 V |
| Measuring current $I_m$ (at $R_F$ = 0 Ω) | ≤ 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/Variant B2 ≤ DC 1060 V |
| Permissible system leakage capacitance $C_e$ | ≤ 150 (500) µF |

### Measuring circuit for insulation fault location (EDS)

| | |
|---|---|
| Test current $I_P$ DC | ≤ 1; 2,5; 10; 25; 50 mA |
| Test pulse/break | 2 s / 4 s |

### Displays

| | |
|---|---|
| LC display | backlit |
| Characters (number of characters, height) | 4 x 16 characters/5 mm |
| Display range, measuring value | 1 kΩ…10 MΩ |
| Relative percentage error | (10 kΩ…10 MΩ) ± 10%/(1 kΩ…10 kΩ) ± 1 kΩ |

### Outputs

| | |
|---|---|
| Test/reset button | external/internal |
| Current output (load) | 0/4…20 mA ≤ (500 Ω) |

### Interfaces

| | |
|---|---|
| Interface/protocol | 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

| | |
|---|---|
| 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 service life, number of cycles | 12000 |
| Contact class | IIB (DIN 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 |
| 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/during storage) | - 10 °C…+ 55 °C/- 40 °C…+ 70 °C |
| Climatic class acc. to DIN IEC 60721-3-3 | 3K5 |
| Operating mode | continuous operation |
| Mounting | display oriented |
| Connection | plug-in screw terminals |
| Connection properties rigid/flexible | 0.2…4 mm²/0.2…2.5 mm² |
| Degree of protection, internal components/terminals (DIN EN 60529) | IP 30/IP 20 |
| Degree of protection in case of door mounting | IP 40 |
| Flammability class | UL94V-1 |
| Product standards | DIN EN 61557-8: 1998-05<br>EN 61557-8: 1997-03, IEC 61557-8: 1997-02<br>ASTM F1669M-96, DIN EN 61557-9): 2000-08<br>EN 61557-9: 1999-11, IEC 61557-9: 1999-09 |
| Operating manual | TGH1364 |
| Weight | ≤ 900 g |

* absolute values

## 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 9106 5500 |
| IRDH575B1-4227** | 3(N)AC/DC 20…150 V* | DC 19,2…72 V* | 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

## Dimension diagram X500

Dimensions are given in mm