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IRDH575 Series

Digital Ground Fault Monitor / Ground Detector
Controller for Ground Fault Location System
Ungrounded (Floating) AC/DC Systems

Technical Bulletin

NAE1012060 / 03.2011

IRDH575

Ground fault detector for ungrounded AC/DC systems
Controller for ground fault location system

A-ISOMETER® IRDH575

Features

- Universal application in 3(N)AC, AC/DC and DC ungrounded 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, operating normally energized or normally de-energized
- Backlit LCD display
- RS-485 interface
- Data memory, system disconnection and 0/4…20mA current output
- Extendable to ground fault location system for 1080 circuits
- Adjustable test current for ground fault location

Approvals

RoHS

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

Description

The IRDH575 monitors for ground faults in ungrounded AC (20 - 760 V, single- and three-phase) and DC (20 - 575 V) by measuring the system's insulation resistance. Systems with extensive power conversion devices, such as rectifiers and variable frequency drives, are supported by the IRDH575. The IRDH575 is able to detect ground faults in ungrounded systems before leakage current may even be present.

When combined with EDS4… ground fault location devices and the appropriate current transformers, the IRDH575 becomes a controller for a ground fault location system.

Function: Ground fault detection

When the insulation resistance from system to ground falls below the set response value, the alarm relays switch and the alarm LEDs activate. Two separately adjustable alarm contacts can be set to a prewarning and main warning alarm. The measured value is indicated on the LCD display or on an externally connected meter. If the device is set to non-latching mode, the alarms will clear when the ground fault clears. If the device is set to latching mode, the alarms will not reset until the device is reset manually or the supply voltage is lost. An external and internal test/reset can be activated remotely or on the device. A comprehensive INFO menu key displays additional information such as the current leakage capacitance and device settings.

The IRDH575 continuously monitors the equipment ground connection and line connections to ensure proper operation. The device's easy-to-use onboard menu manages all settings via the detailed LCD screen.

Function: Ground fault location

When a ground fault is detected, the EDS ground fault location system is activated (this feature can be set to require a manual start as well). Each channel of the EDS location device is connected to a particular branch circuit. The IRDH575 begins transmitting a pulsed signal. This signal will travel through the channel of the EDS with the ground fault back to the IRDH575. If the pulse travels back to the IRDH575, the channel with the ground fault will display on both the IRDH575 and the EDS device.

In addition, an optional EDS30... portable ground fault location system can be used to follow the pulse travelling to the source of the ground fault.

Additional functions

99 timestamped alarm messages may be stored in the non-volatile memory of the IRDH575. The device also includes standby contacts when several A-ISOMETER® detectors are operating in coupled ungrounded systems.

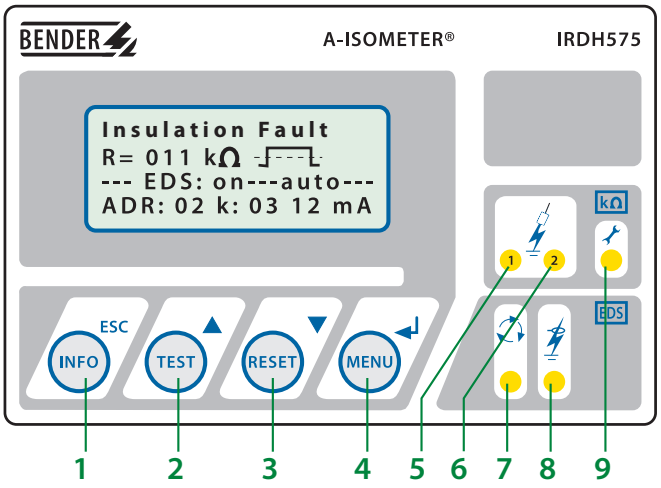
Two-way data communication is carried out between devices via an RS-485 interface. This interface can be connected to a BENDER protocol converter to exchange data across other protocols, such as Ethernet, MODBUS, or PROFIBUS.

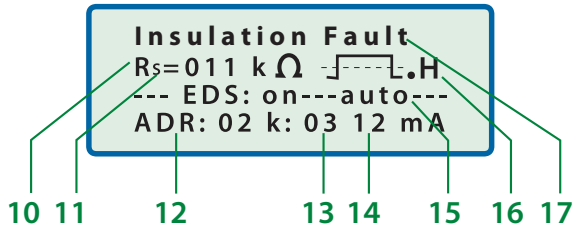
A 0/4 - 20 mA output can be connected to an external meter or higher-level control system, such as a PLC.

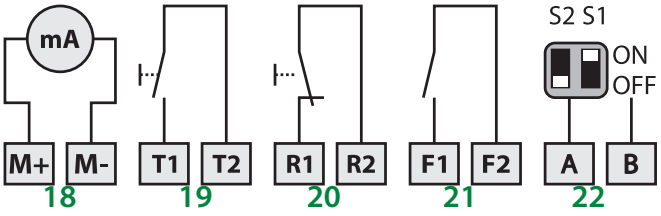
System design

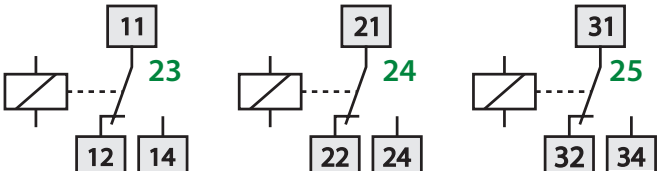
Each isolated system requires one IRDH575 for ground fault detection and location control. Up to 90 EDS46... devices can be interconnected to the IRDH575. Each EDS device can monitor up to 12 separate channels. An optional EDS30.... portable ground fault location system can be used in conjunction with the IRDH575/EDS46... system.

Front display and wiring diagram









1 - INFO key: Displays pertinent system information
ESC key: Goes back a step inside device's menu

2 - TEST button: Activates self-test
Arrow up key: Scrolls down inside device's menu

3 - RESET button: Resets device
Arrow down key: Scrolls down inside device's menu

4 - MENU key: Activates device's internal menu
Enter key: Confirm change inside device's menu

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

6 - Alarm LED 2 lights: Insulation fault, alarm level reached

7 - EDS LED lights: Indicates ground fault location is active

8 - EDS alarm LED lights: Indicates EDS ground fault location device is in alarm

9 - LED lights: Indicates system fault alarm

10 - Real-time measurement of insulation resistance in kΩ

11 - Additional information - "s" displayed when device has begin a new measurement

12 - Active when EDS4… is connected and in alarm; indicates address of EDS4… in alarm

13 - Active when EDS4… is connected and in alarm; indicates channel of EDS4… in alarm

14 - Active when EDS4… is connected and in alarm; indicates strength of test signal detected by the channel in alarm (measured in mA or µA)

15 - Active when EDS4… is connected. Displays mode of operation for ground fault location system. AUTO indicates location system is activated automatically when IRDH575 goes into alarm. System may also be set manually on or off.

16 - Polarity of the test current pulse. Point = valid BMS traffic, H = A new entry has been made in the history.

17 - Text indicating state of device

18 - Analog output: 0…20 mA or 4…20 mA (selectable)

19 - External test button (N/D contact)

20 - External reset button (N/E contact or wire jumper). When the terminals are open, the device will reset automatically.

21 - STANDBY contacts. When the contacts are closed, the device is forced into standby mode and will not send out a measurement signal.

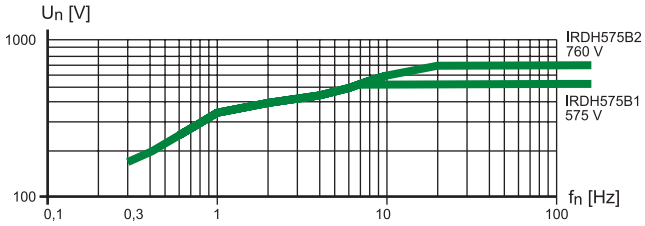
22 - RS-485 termination (120 Ω) with micro switch S1 and connection BMS bus; S1 = ON = BMS bus terminated, S2 = unassigned

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

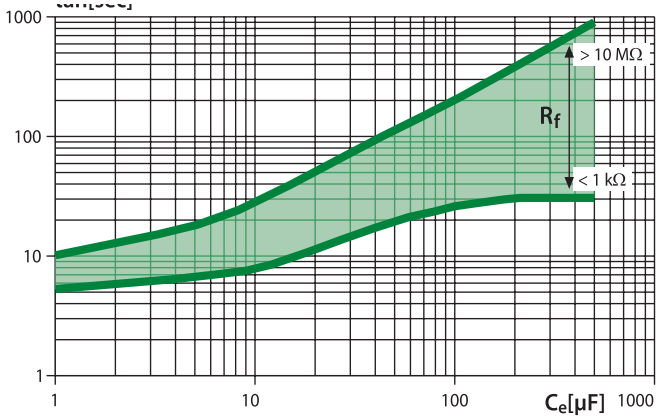
24 - Alarm relay: Alarm 2 (A-ISOMETER®)

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

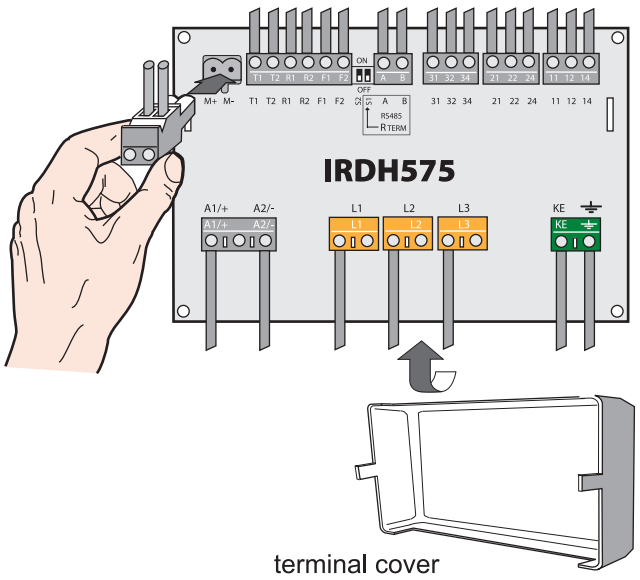
Characteristic curve: Max. AC voltage between system and ground for frequencies < 50 Hz



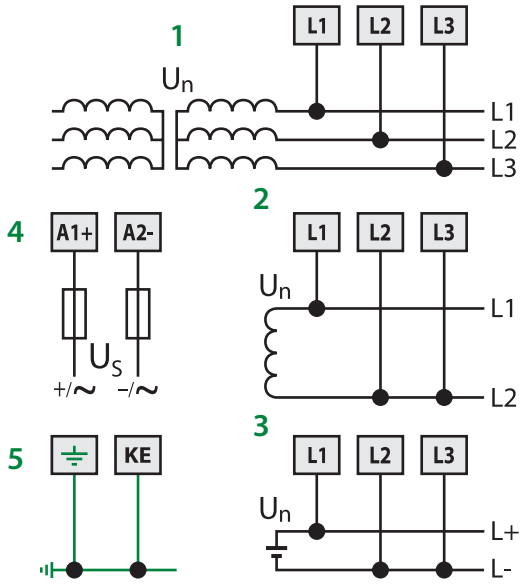
Characteristic curve: Response times



Wiring diagram – back of the device



Wiring diagram – system connection



1 - System connection for three-phase AC

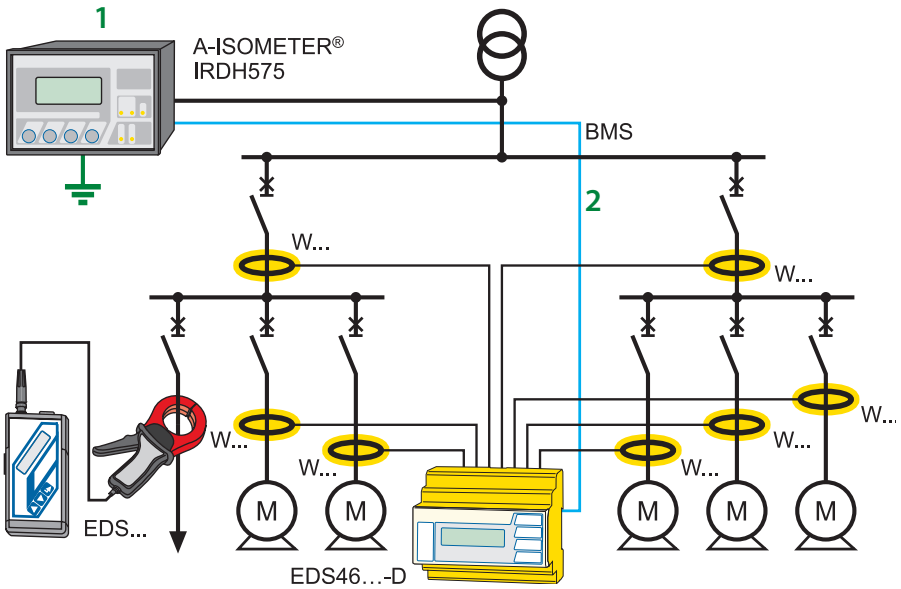
2 - System connection for single-phase AC

3 - System connection for DC

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

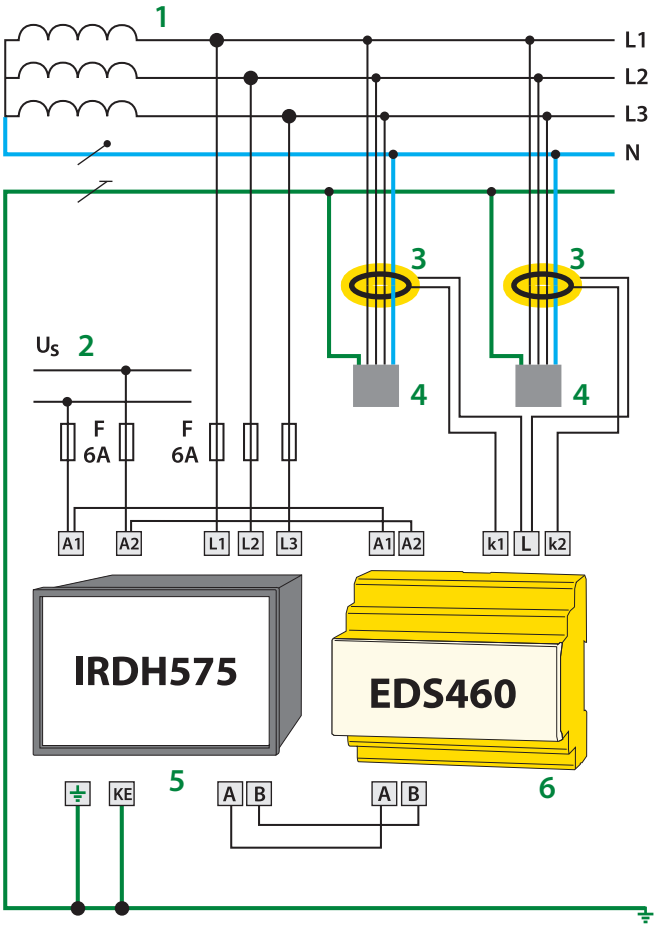
5 - Equipment ground connection

System structure – Example



1 - A-ISOMETER® IRDH575
2 - RS-485/BMS protocol
3 - EDS460/EDS461
4 - EDS3090/EDS3091

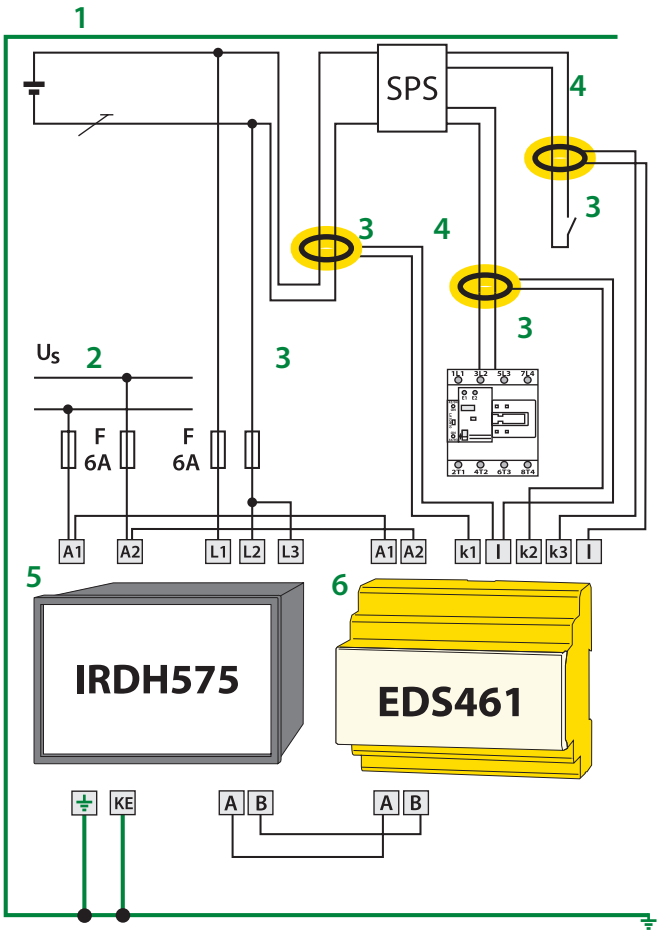
Example: IRDH575 with EDS460 (main circuits)



EDS460 system with IRDH575, EDS460 and measuring current transformers W… in a three-phase AC system

1 - 3AC/3NAC/AC 20…575 V
2 - U_S see ordering information, 6 A fuse recommended.
3 - Current transformers, W series
4 - Loads
5 - A-ISOMETER® IRDH575
6 - Ground fault location device EDS460

Example: IRDH575 with EDS461 (control circuits)



1 - DC 20 V…308 V
2 - U_S see ordering information, 6 A fuse recommended.
3 - Current transformers, W…/8000 series
4 - Load PLC
5 - A-ISOMETER® IRDH575
6 - Ground fault location device EDS461

Design of an EDS461 system

The above example shows an EDS461 device being fed by a PLC in a DC system. Using an EDS461 device is recommended for PLC inputs due to the sensitivity required.

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 f_n (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 f_n (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 fault location (EDS)

Test current IP DC	≤ 1; 2,5; 10; 25; 50 mA
Test pulse/break	2 s / 4 s

Displays

LCD 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 SPDT contacts: K1 (Alarm 1), K2 (Alarm2), K3 (device error, additionally selectable EDS alarm)
Operating principle K1, K2	Normally energized or de-energized operation
Factory setting (Alarm 1/Alarm 2)	Normally de-energized operation
Operating principle K3	Normally energized 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 mm /0.2…2.5 mm
Degree of protection, internal components/terminals (DIN EN 60529)	IP 30/IP 20, NEMA 1
Degree of protection in case of door mounting	IP 40, NEMA 1
Flammability class	UL94V-1
Product standards	DIN EN 61557-8: 1998-05 EN 61557-8: 1997-03, IEC 61557-8: 1997-02 ASTM F1669M-96, DIN EN 61557-9): 2000-08 EN 61557-9: 1999-11, IEC 61557-9: 1999-09
Operating manual	TGH1364
Weight	≤ 900 g

* absolute values

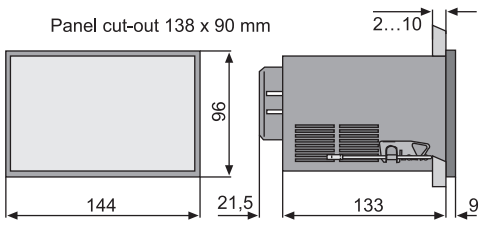
Ordering information

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

Dimensions: X500

Dimensions in mm



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