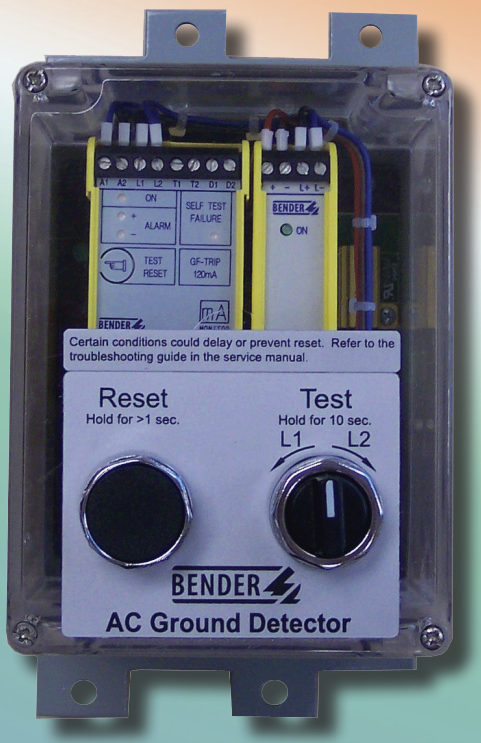
BENDER
The Power in Electrical Safety©

IR147H Series

Ground Detector for Ungrounded AC and DC Systems
For Railroad and Transit Applications



Ground Detector IR147H...

Ground Fault Detector
for Ungrounded AC and DC Systems

Ground Detector IR147H...

Device features

- Ground fault detection in ungrounded AC or DC systems
- ***AMP*** measuring principle
- Automatic adaptation to prevailing system conditions
- Plastic IP44, NEMA 1 rated enclosure
- Simple installation via 50-pin AMP plug
- External power and reset buttons
- Power and alarm LEDs
- Automatic self-test
- Connection monitoring
- Relay providing +14 VDC power to external contact
- Normally energized (failsafe) operation

Product description

The IR147H series monitors for ground faults in ungrounded AC and DC systems. These monitors are specially designed for railroad and transit applications in both form and function. For AC systems, the device is set to trip at 120 mA. For DC systems, the device is set to trip at 1.45 mA. These values result from the reciprocal value of the measured insulation resistance value multiplied by the actual voltage of a conductor with respect to ground. The result corresponds to the maximum fault current which could flow under worst case conditions.

The ground detector is encased in a plastic enclosure featuring power and reset pushbuttons on the exterior. A simple 50-pin AMP connector on the rear side allows for easy installation into the system.

Separate devices are listed depending on whether the system is AC or DC. Please see the ordering information and technical information for complete details.

Application

- AC or DC systems in railroad and transit

Function

The ground detector generates a measuring voltage which is superimposed on the system being monitored in order to determine the insulation resistance of the system conductors with respect to ground. In addition, the detector measures the system voltage to determine the maximum possible fault current. If the read fault current value exceeds the set response value, the alarm relay switches and the corresponding LED or LEDs will illuminate.

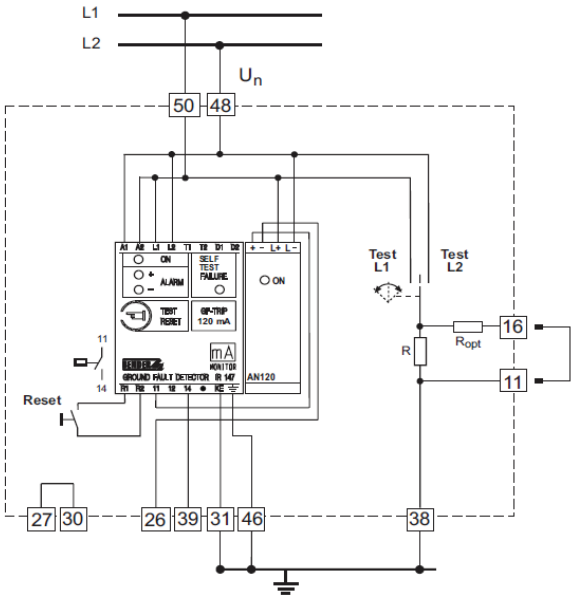
This device also allows for selective fault location. When both alarm LEDs illuminate, the device is detecting nearly symmetrical ground faults on both conductors. When only one alarm LED illuminates, the device is detecting a fault on the corresponding conductor.

A self-test of the device is periodically run automatically. When a self-test fails, the alarm relay switches and the "self test value" alarm LED will illuminate.

AMP measuring principle

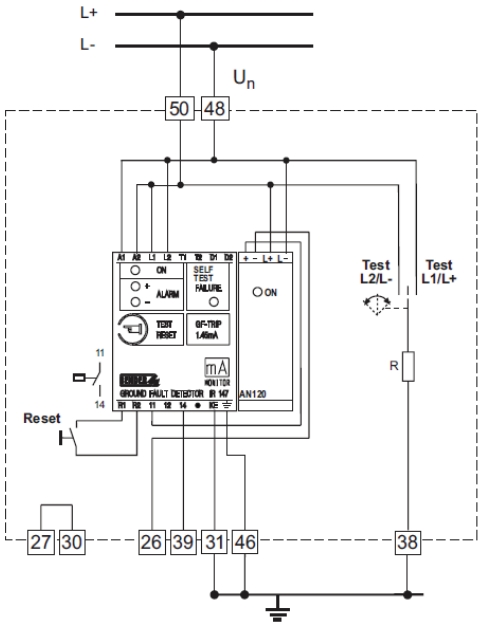
The IR147 series of devices utilizes the patented AMP measuring principle to measure the insulation resistance of the system. This measuring principle has the ability to automatically adapt itself to prevailing system conditions, such as high leakage capacitance, in order to retreive an accurate reading of ground faults on the system.

Wiring diagram: IR147H-R31FS (AC version)



50, 48 - Connections to ungrounded system being monitored
46 - Connection to equipment ground
31 - Pilot wire connection to equipment ground for use in connection monitoring
38 - Connection to equipment ground for test resistor
26, 29 - Connection to DC +14 V (normally energized operation)
27, 30 - Internal bridge
11, 16 - Optional external bridge

Wiring diagram: IR147H-R41FS (DC version)



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38 - Connection to equipment ground for test resistor
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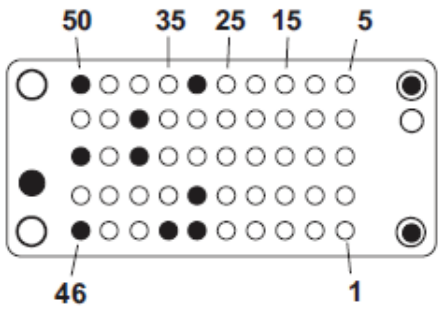
27, 30 - Internal bridge

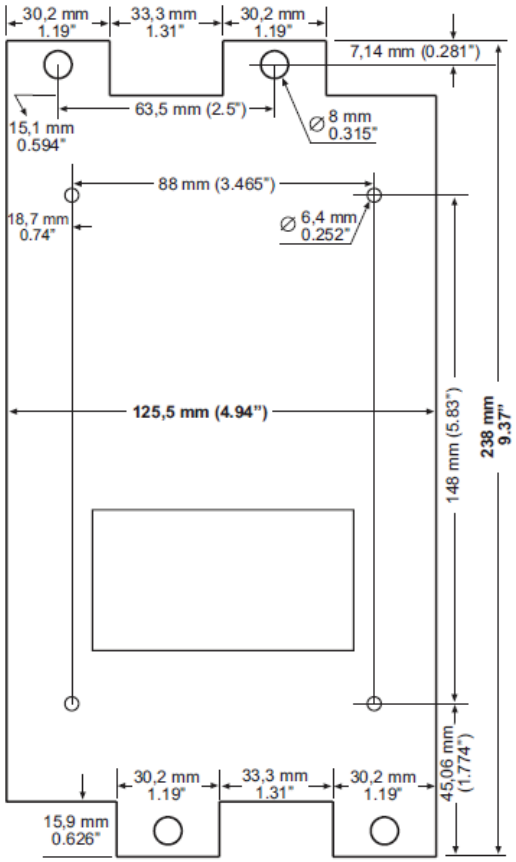
Wiring diagram: Pin connections



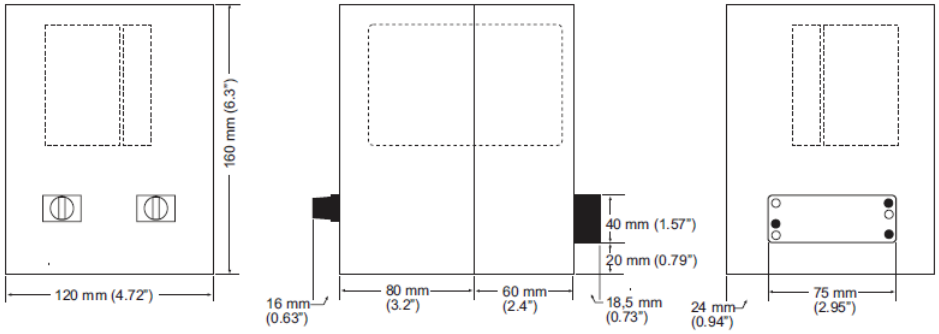
AMP Part Nr. 205058-2

- Male Guide Pin, Part Nr.: 201046-2
- Female Guide Socket, Part Nr.: 201047-2
- Male Jacksrew, Part Nr.: 201092-1
- Female Jacksrew, Part Nr.: 201089-1
- Contact, Pin Type Part Nr.: 163086-1

Dimensional Diagram: Rear view



Dimensional Diagram: Front view, right side, rear view



Ordering Information

Part Number	System Type	Nominal line voltage U_N	Supply voltage U_S	Art. No.
IR147H-31FS	AC	AC 105…125 V	AC 90…140 V	B 9101 6900
IR147H-41FS	DC	DC 26.5…30.8 V	DC 22…38 V	B 9102 4000

Technical data: IR147H-R31FS (AC device)

Insulation coordination acc. to IEC 60664-1

Rated insulation voltage	AC 200 V
Rated impulse voltage/pollution degree	2.5 kV/3

Voltage ranges

Nominal system voltage U_n	AC 105…125 V
Supple voltage U_s	AC 90…140 V
Maximum power consumption	4 VA

Response values

Response value R_{trip}	AC 120 mA
Relative percentage error	0 %…- 30 %
Response time t_{an} at C_e = 1 µF	10 s

Measuring circuit

Measuring voltage U_m (peak value)	DC 15 V
Measuring current I_m (at R_F = 0 Ω)	≤ 850 µA
Internal DC resistance R_i	≥ 18 kΩ
Impedance Z_i at 50 Hz	≥ 16 kΩ
Permissible extraneous DC voltage U_{fg}	≤ 138 V
Permissible system leakage capacitance	≤ 2 µF

Displays

Display: IR147	alarm LEDs for L1 / L2, self-test failure, power on
Display: AN120	power on LED

Testing elements

Three position, center-off, momentary switch	L1/L+, neutral, L2/L-
Testing resistor	1.07 kΩ / +- 1% / 25 W
Operational testing resistor, bridge 11 - 16	896 Ω / +- 1% / 25 W

Switching elements

Number of switching elements	1 normally open contact
Operating principle	normally energized (failsafe)
Electrical service life, number of cycles	100,000
Contact classIIB in accordance with DIN IEC 60255-0-20	
Rated contact voltage	AC 250 V/DC 300 V
Making capacity	AC/DC 5 A
Breaking capacity	2 A, AC 230 V, PF = 0.4 – 0.2 A, DC 220 V, L/R = 0.04 s
Minimum contact current at DC 14 V	30 mA

General data

EMC immunity and emission	acc. to IEC 61326
Shock resistance IEC 60068-2-27 (during operation)	5 g/30 ms
Bumping IEC 60068-2-29 (during transport)	40 g/6 ms
Vibration resistance IEC 60068-2-6 (during operation)	5 g/5…150 Hz
Vibration resistance IEC 60068-2-6 (during transport)	2 g/10…150 Hz
Ambient temperature (during operation/during storage)	- 20 °C…+ 70 °C/- 40 °C…+ 70 °C
Climatic class acc. to DIN IEC 60721-3-3	3K5
Operating mode	continuous operation
Connection	AMP connection socket (205058-2)
Protection class, internal components / plug	IP 44 (NEMA 4) / IP 20 (NEMA 1)
Type of enclosure	plastic casing 160x120x140 mm (6.2"x4.7"x5.5")
Flammability class	UL94V-0
Product standards	DIN EN 61557-8: 1998-05 EN 61557-8: 1997-03, IEC 61557-8: 1997-02
Weight	approx. 2.6 lb

Technical data: IR147H-R41FS (DC device)

Insulation coordination acc. to IEC 60664-1

Rated insulation voltage	AC 200 V
Rated impulse voltage/pollution degree	2.5 kV/3

Voltage ranges

Nominal system voltage U_n	DC 26.5…30.8 V
Supple voltage U_s	DC 22…38 V
Maximum power consumption	4 VA

Response values

Response value R_{trip}	DC 1.45 mA
Relative percentage error	0 %…- 30 %
Response time t_{an} at C_e = 1 µF	10 s

Measuring circuit

Measuring voltage U_m (peak value)	DC 15 V
Measuring current I_m (at R_F = 0 Ω)	≤ 125 µA
Internal DC resistance R_i	≥ 120 kΩ
Impedance Z_i at 50 Hz	≥ 115 kΩ
Permissible extraneous DC voltage U_{fg}	≤ 138 V
Permissible system leakage capacitance	≤ 20 µF

Displays

Display: IR147	alarm LEDs for L1 / L2, self-test failure, power on
Display: AN120	power on LED

Testing elements

Three position, center-off, momentary switch	L1/L+, neutral, L2/L-
Testing resistor	22 kΩ / +- 1% / 8 W

Switching elements

Number of switching elements	1 normally open contact
Operating principle	normally energized (failsafe)
Electrical service life, number of cycles	100,000
Contact classIIB in accordance with DIN IEC 60255-0-20	
Rated contact voltage	AC 250 V/DC 300 V
Making capacity	AC/DC 5 A
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