

ISOMETER® IR427

with alarm indicator and test combination MK7

Insulation monitoring device with integrated load and temperature monitoring for medical IT systems in accordance with IEC 60364-7-710, IEC 61557-8 and DIN VDE 0100-710



ISOMETER® IR427 with alarm indicator and test combination MK7

Insulation monitoring device with integrated load and temperature monitoring for medical IT systems in accordance with IEC 60364-7-710 and DIN VDE 0100-710



ISOMETER® IR427



Alarm indicator and test combination MK7

Device features

ISOMETER® IR427

- Insulation monitoring for medical IT systems
- Load and temperature monitoring for IT system transformers
- Adjustable response value for insulation monitoring
- Adjustable load current response value
- Integrated voltage monitoring for four alarm and test combinations MK7
- Temperature monitoring with PTC thermistor or bimetal switch
- Connection monitoring earth
- LEDs: Power On, Alarm 1, Alarm 2
- Internal/external test button
- Configurable alarm relay: N/O or N/C operation selectable
- Self monitoring with automatic alarm
- Compact two-module enclosure (36 mm)
- Four-wire interface for four alarm indicator and test combinations MK7

Remote alarm indicator and test combination MK7

- Easy-to-clean front foil surface
- Label field
- Panel frame alpine white
- Alarm LEDs: Power On, insulation fault overload, overtemperature
- Test button, mute button
- Standard flush-mounting enclosure 66 mm

Product description

The ISOMETER® of the IR427 series is designed to monitor the insulation resistance of AC circuits (medical IT systems). At the same time, the load current and temperature of the IT system transformer can be monitored.

Application

Medical IT systems in accordance with IEC 60364-7-710, IEC 61557-8 and DIN VDE 0100-710.

Function

The insulation monitoring device monitors the insulation resistance, the load current and the temperature of the IT system transformer. In addition, the connections to earth, the measuring current transformer and the temperature sensor connections are monitored. The currently measured value is indicated on the LC display. By pressing the "▲" or "▼" keys, other measured values can be displayed.

Alarms are indicated on the LC display via LEDs and an additional identification.

Parameters are assigned to the device via LCD or the function keys on the front of the device.

Insulation monitoring

The AMP measuring principle, also detects DC faults. When the value of the insulation resistance falls below the set response value, the alarm relay K1 switches and the alarm LED "AL1" lights. When the insulation resistance exceeds the release value (response value plus hysteresis), the alarm relay returns to its initial position and the alarm LED "AL1" goes out.

Load current and temperature monitoring

The load current is monitored via the measuring current transformer STW2; the temperature is monitored via a temperature (Bimetal) switch or a PTC Thermistor according to DIN 44081. When the response value is exceeded, the alarm LED "AL2" lights. The required temperature sensors are already incorporated in BENDER transformers.

Alarm relays

The alarm relay switches on the occurrence of an alarm or in case of voltage failure (N/C operation). The operating principle can be changed.

Alarm messages LEDs

| | IR427 | | | MK7 | | | |
|-----------------------------------|----------|----------|----------|----------|------------|----------|-----------|
| | "ON" | "AL1" | "AL2" | ON | Ins. fault | Overload | Overtemp. |
| Operation | ■ | – | – | ■ | – | – | – |
| System fault ¹⁾ | flashing | flashing | flashing | flashing | flashing | flashing | flashing |
| Insulation fault | ■ | ■ | – | ■ | ■ | – | – |
| Overcurrent | ■ | – | ■ | ■ | – | ■ | – |
| Overtemperature | ■ | – | ■ | ■ | – | – | ■ |
| No communication betw. IR 427+MK7 | – | – | – | flashing | – | – | – |

¹⁾ Detailed alarm information on LCD

Test function/connection monitoring

The device carries out a self test when supply voltage is fed and later at hourly intervals. During the self test, the internal device functions, the connections to earth (E/KE) and the current transformer connections are monitored for interruption and short-circuit. In the event of a fault, the alarm relay K1 switches and the LEDs ON/AL1/AL2 flash. The respective error code appears on the LC display. After eliminating the fault, the alarm relay automatically switches to its initial position. By pressing the test button, on the IR427 or on the MK7, the device functions and also the relay function will be tested.

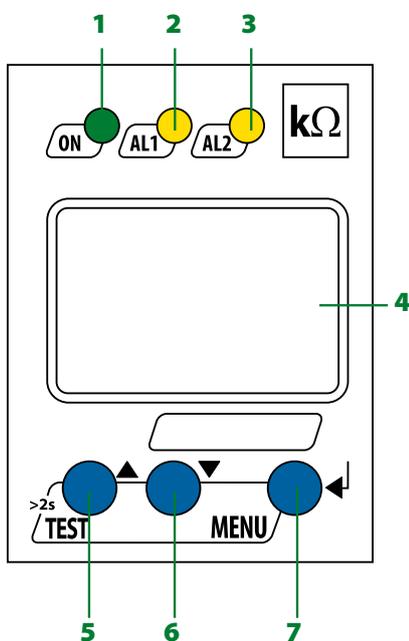
Standards

The ISOMETER® of the IR427 series complies with the requirements of the device standards: IEC 60364-7-710, IEC 61557-8 and DIN VDE 0100-710.

Approvals



Operating elements

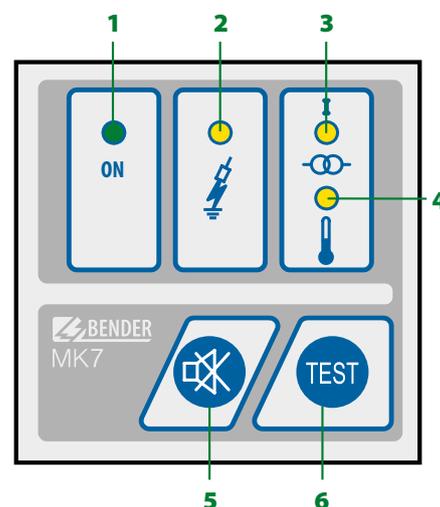


IR427

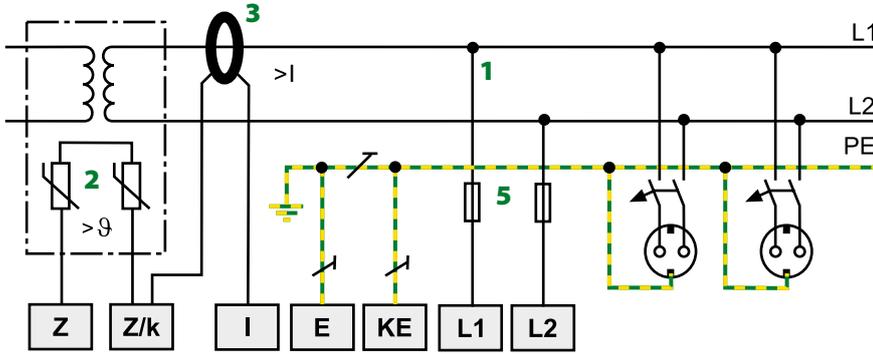
- 1 - Power ON LED
- 2,3 - Alarm LEDs "AL1", "AL2"
- 4 - LC display
- 5 - TEST button (> 2s): Call up the self test
Arrow up key: parameter change to move up in the menu
- 6 - Arrow down key: parameter change to move down in the menu
- 7 - MENU key (> 2s): To call up the menu system
Enter key: To confirm parameter change

MK7

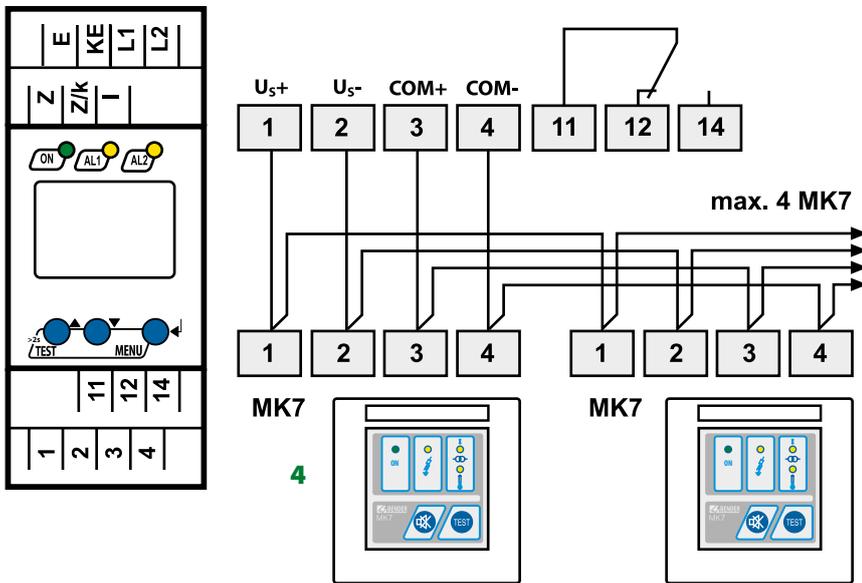
- 1 - Power On LED "ON"
- 2 - Insulation fault LED
- 3 - Overload LED
- 4 - Overtemperature LED
- 5 - Mute button
- 6 - Test button "TEST"



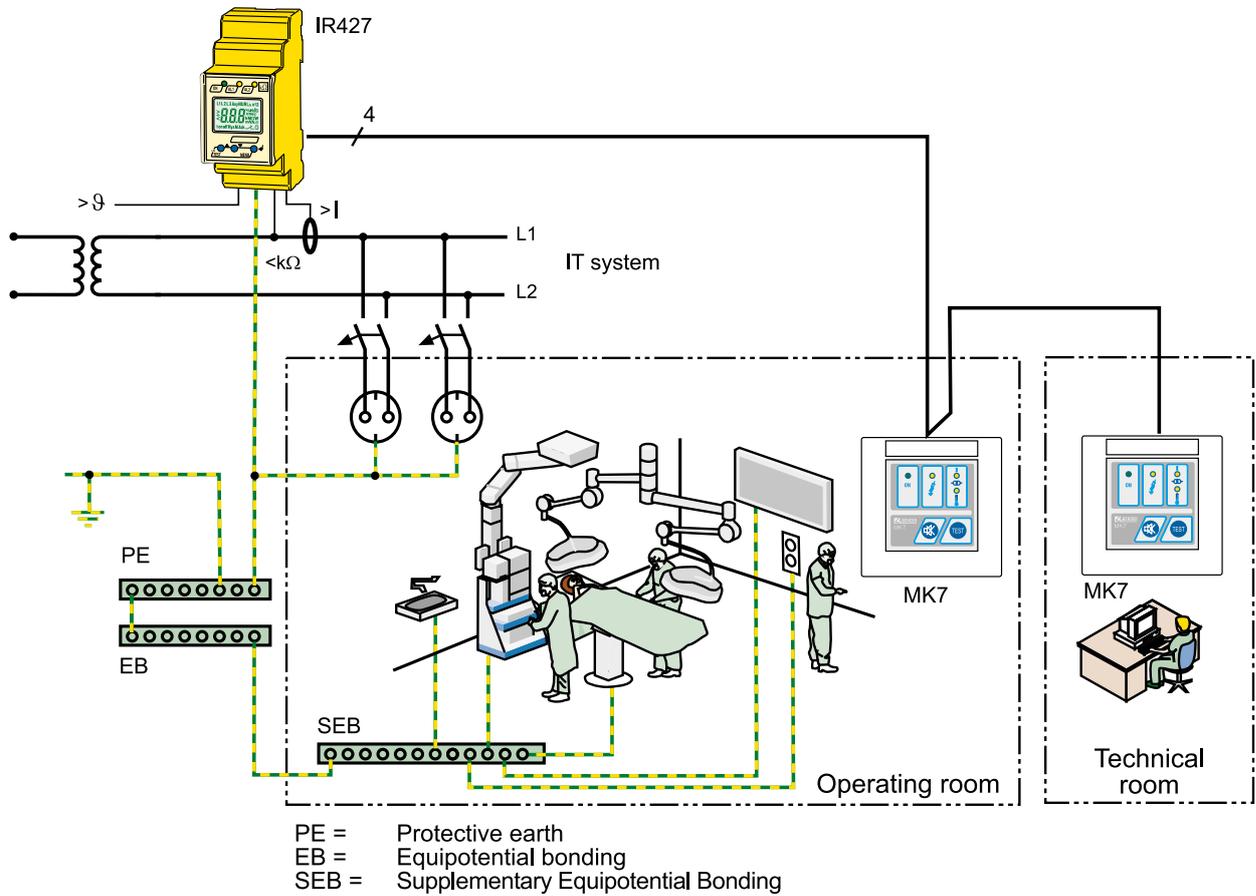
Wiring diagram



- 1 - Connection to the IT system being monitored = supply voltage U_s via fuse
- 2 - Temperature sensor
- 3 - Measuring current transformer for load current monitoring
- 4 - Connection alarm indicator and test combination MK7 (max. 4 pieces)
- 5 - Line protection by a fuse in accordance with IEC 60364-4-43 (6 A fuse recommended). In case of supply (L1/L2) from an IT system, both lines have to be protected by a fuse.



Application example



Ordering information

| Supply voltage U_s | | Nominal system voltage U_n ¹⁾ | Type | Art. No. | |
|-------------------------|-----------|--|---|----------------------|---------------------|
| AC | DC | AC | | screw-type terminals | push-wire terminals |
| 70...264 V, 42...460 Hz | – | 70...264 V, 42...460 Hz | IR427-2 | B92075300 | B72075300 |
| – | 18...28 V | – | MK7 Remote alarm indicator and test combination | B95100201 | – |

¹⁾ Absolute values

Accessories

| Type designation | Art. No. |
|---|-----------|
| Mounting clip for screw mounting (1 piece per device) | B98060008 |
| MK-cavity-wall-box-60mm | B95100203 |

Suitable system components

| Type designation | Type | Art. No. |
|--------------------------------|--------|----------|
| Measuring current transformers | STW2 | B942709 |
| Temperature sensor (PTC) | ES0107 | B924186 |
| Mounting frame | XM420 | B990994 |

Technical data ISOMETER® IR427

Insulation coordination acc. to IEC 60664-1/IEC 60664-3

| | |
|--|---------|
| Rated insulation voltage | 250 V |
| Rated impulse voltage/pollution degree | 4 kV/3 |
| Protective separation (reinforced insulation) between (L1, L2, E, KE, 1, 2, 3, 4 Z, Z/k, I) -(11, 12, 14) | |
| Voltage test acc. to IEC 61010-1 | 2.21 kV |

Supply voltage

| | |
|----------------------|-------------|
| Supply voltage U_S | $= U_n$ |
| Power consumption | ≤ 4 VA |

IT system being monitored

| | |
|------------------------------|---------------|
| Nominal system voltage U_n | AC 70...264 V |
| Nominal frequency f_n | 47...63 Hz |

Insulation monitoring

| | |
|---|---------------------------------------|
| Response value R_{an} | 50...500 k Ω (50 k Ω)* |
| Relative uncertainty | ± 10 % |
| Hysteresis | 25 % |
| Response time t_{an} at $R_F = 0.5 \times R_{an}$ and $C_e = 0.5$ μ F | ≤ 5 s |
| Permissible system leakage capacitance C_e | ≤ 5 μ F |

Measuring circuit

| | |
|--|-----------------------|
| Measuring voltage U_m | ± 12 V |
| Measuring current I_m (at $R_F = 0$ Ω) | ≤ 50 μ A |
| Internal DC resistance R_i | ≥ 240 k Ω |
| Impedance Z_i at 50 Hz | ≥ 200 k Ω |
| Permissible extraneous DC voltage U_{f0} | \leq DC 300 V |

Load current monitoring

| | |
|--|--|
| Response value, adjustable | 5...50 A (7 A)* |
| Relative uncertainty | ± 5 % |
| Hysteresis | 4 % |
| Setting values load current measurement: | |
| Transformer | 3150 VA 4000 VA 5000 VA 6300 VA 8000 VA 10000 VA |
| $I_{alarm} 1\sim$ | 14 A 18 A 22 A 28 A 35 A 45 A |
| Response time overload, (50 % to 120 %) | < 5 s |
| Response time for measuring current transformer monitoring | at restart, test or every 1 h |

Temperature monitoring:

| | |
|--|------------------|
| Response value (fixed value) | 4 k Ω |
| Release value (fixed value) | 1.6 k Ω |
| PTC resistors acc. to DIN 44081 | max. 6 in series |
| Response time overtemperature | < 2 s |
| Response time connection fault PTC resistors | < 2 s |

Displays, memory

| | |
|--|----------------------------------|
| LC display | multifunctional, not illuminated |
| Measured value insulation resistance | 10 k Ω ...1 M Ω |
| Operating uncertainty | ± 10 %, ± 2 k Ω |
| Measured value load current (as % of the set response value) | 10 %...199 % |
| Operating uncertainty | ± 5 %, ± 0.2 A |
| Password | on, off/0...999 (off, 0)* |

Interface for MK7

| | |
|---|----------------------------------|
| Cable length, twisted in pairs, shielded | 200 m |
| Cable (twisted in pairs, one end of shield connected to PE) | recommended: J-Y(St)Y min. 2x0.8 |

Power supply (terminals 1 and 2):

| | |
|------------------------|---------|
| U_{off} | DC 24 V |
| I_{max} (max. 4 MK7) | 80 mA |

Communication (terminal 3 and 4):

| | |
|----------------------|------------------------------------|
| Interface/protocol | RS-485/proprietary, no BMS |
| Terminating resistor | 120 (0.25 W), internal, switchable |

Cable lengths for the connection of the measuring current transformer STW2 and the temperature sensor

| | |
|---|----------------------------------|
| single wire > 0.5 mm ² | ≤ 1 m |
| single wire, twisted > 0.5 mm ² | ≤ 10 m |
| twisted in pairs, twisted > 0.5 mm ² | ≤ 40 m |
| Cable (shield on one side connected to PE) | recommended: J-Y(St)Y min. 2x0.6 |

Switching elements

| | | | | | |
|--|---|-------|-------|-------|-------|
| Number | 1 changeover contact | | | | |
| Operating principle | N/C operation or N/O operation (N/C operation)* | | | | |
| Electrical endurance, number of cycles | 10000 | | | | |
| Contact data acc. to IEC 60947-5-1 | | | | | |
| Utilisation category | AC-13 | AC-14 | DC-12 | DC-12 | DC-12 |
| Rated operational voltage | 230 V | 230 V | 24 V | 110 V | 220 V |
| Rated operational current | 5 A | 3 A | 1 A | 0.2 A | 0.1 A |
| Minimum contact rating | 1 mA at AC/DC 10 V | | | | |

Environment/EMC

| | |
|--|--|
| EMC | IEC 61326-2-4 |
| Operating temperature | -25...+55 °C |
| Classification of climatic conditions acc. to IEC 60721: | |
| Stationary use (IEC 60721-3-3) | 3K5 (except condensation and formation of ice) |
| Transport (IEC 69721-3-2) | 2K3 (except condensation and formation of ice) |
| Long-term storage (IEC 60721-3-1) | 1K4 (except condensation and formation of ice) |
| Classification of mechanical conditions acc. to IEC 60721: | |
| Stationary use (IEC 60721-3-3) | 3M4 |
| Transport (IEC 60721-3-2) | 2M2 |
| Storage (IEC 60721-3-1) | 1M3 |

Connection

| | |
|---|--|
| Connection type | screw-type terminals |
| Connection properties: | |
| rigid/flexible/AWG | 0.2...4/0.2...2.5 mm ² /AWG 24...12 |
| Two conductors with the same cross section: | |
| rigid/flexible | 0.2...1.5/0.2...1.5 mm ² |
| Stripping length | 8 mm |
| Tightening torque, terminal screws | 0.5...0.6 Nm |

| | |
|--------------------------|--|
| Connection type | push-wire terminals |
| Connection properties: | |
| rigid/flexible | 0.2...2.5 mm ² (AWG 24...14) |
| Flexible without ferrule | 0.75...2.5 mm ² (AWG 19...14) |
| Flexible with ferrule | 0.2...1.5 mm ² (AWG 24...16) |
| Stripping length | 10 mm |
| Opening force | 50 N |
| Test opening, diameter | 2.1 mm |

Other

| | |
|--|----------------------|
| Operating mode | continuous operation |
| Position of normal use | any |
| Degree of protection, internal components (DIN EN 60529) | IP30 |
| Degree of protection, terminals (DIN EN 60529) | IP20 |
| Enclosure material | polycarbonate |
| Flammability class | UL94V-0 |
| Screw mounting | 2 x M4 |
| DIN rail mounting acc. to | IEC 60715 |
| Documentation number | D00118 |
| Weight | ≤ 150 g |

() * = Factory setting

Technical data ISOMETER® MK7

Insulation coordination acc. to IEC 60664-1/IEC 60664-3

| | |
|--|---------|
| Rated insulation voltage | 50 V |
| Rated impulse voltage/pollution degree | 500 V/3 |

Supply voltage

| | |
|----------------------|--------------|
| Supply voltage U_s | DC 18...28 V |
| Power consumption | 0.5 VA |

Environment/EMC

| | |
|--|--|
| EMC | IEC 61326 |
| Operating temperature | -10...+55 °C |
| Classification of climatic conditions acc. to IEC 60721: | |
| Stationary use (IEC 60721-3-3) | 3K5 (except condensation and formation of ice) |
| Transport (IEC 60721-3-2) | 2K3 (except condensation and formation of ice) |
| Long-term storage (IEC 60721-3-1) | 1K4 (except condensation and formation of ice) |
| Classification of mechanical conditions acc. to IEC 60721: | |
| Stationary use (IEC 60721-3-3) | 3M4 |
| Transport (IEC 60721-3-2) | 2M2 |
| Storage (IEC 60721-3-1) | 1M3 |

Connection

| | |
|-----------------------|---|
| Connection | screw-type terminals |
| Connection properties | |
| rigid/flexible | 0.2...2.5 mm ² (AWG 24...14) |
| Flexible with ferrule | 0.2...1.5 mm ² (AWG 24...16) |
| Stripping length | 8 mm |

Other

| | |
|--|----------------------|
| Operating mode | continuous operation |
| Position of normal use | any |
| Degree of protection, internal components (IEC 60529) | IP30 |
| Degree of protection, terminals (IEC 60529) | IP20 |
| Front plate colour | alpine white |
| Flush-mounting enclosure, diameter (included in the scope of delivery) | 66 mm |
| Weight (including mounting frame) | ≤ 80 g |

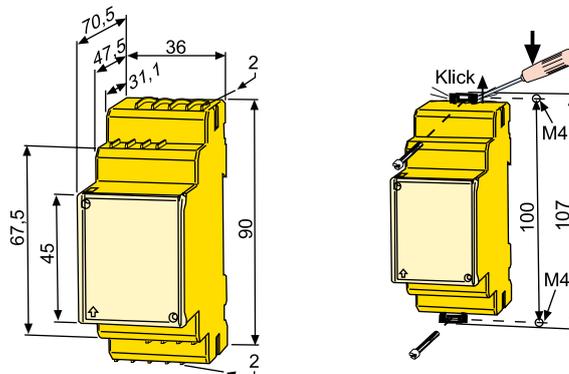
Dimension diagram IR427

Dimensions are given in mm

Open the front plate cover in direction of arrow!

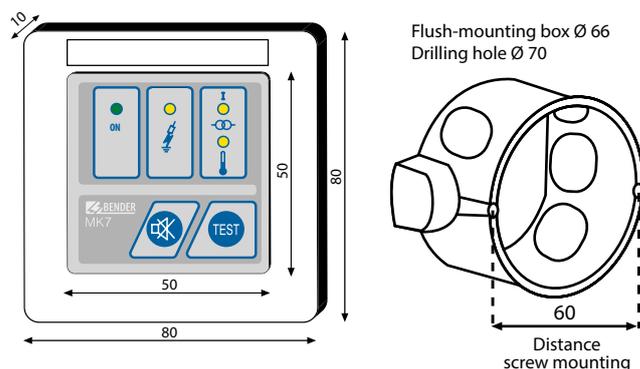
Screw fixing

Note: Pull out the mounting clip for screw mounting.



Dimension diagram MK7 and flush-mounting enclosure

Dimensions are given in mm





Bender GmbH & Co. KG

P.O. Box 1161 • 35301 Gruenberg • Germany
Londorfer Strasse 65 • 35305 Gruenberg • Germany
Tel.: +49 6401 807-0 • Fax: +49 6401 807-259
E-Mail: info@bender.de • www.bender.de



BENDER Group