

# ISOMETER® IR420-D4

Insulation monitoring device for  
unearthed AC control circuits (IT systems)



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ISOMETER® IR420

## Device features

- Insulation monitoring for IT control circuits AC 0...300 V
- Two separately adjustable response values
- Preset function (automatic setting of basic parameters)
- Connection monitoring system/earth
- LEDs: Power On, Alarm 1, Alarm 2
- Internal/external test/reset button
- Two separate alarm relays (one changeover contact each)
- N/O or N/C operation, selectable
- Fault memory behaviour, selectable
- Self monitoring with automatic alarm
- Multi-functional LC display
- Adjustable response delay
- Two-module enclosure (36 mm)
- RoHS compliant
- Push-wire terminal (two terminals per connection)

## Approvals



## Product description

The ISOMETER® IR420 monitors the insulation resistance of unearthed AC control circuits (IT systems) 0...300 V. If the systems to be monitored include DC components, such as switched-mode power supplies or solenoid valves, the display and operating characteristics may be affected.

The display and response values apply to pure AC systems.

An external supply voltage allows de-energised systems to be monitored too.

## Application

- AC control circuits in the industrial sector, mechanical engineering, power plants, elevators, automation systems etc.
- AC control and auxiliary circuits in accordance with DIN EN 60204-1 "Electrical equipment of machines", IEC 60204-1, EN 60204-1
- AC auxiliary circuits in accordance with DIN VDE 0100-725
- Smaller AC IT systems such as lighting systems, mobile generators

## Function

The currently measured insulation resistance is indicated on the LC display. In this way any changes, for example when circuits are connected to the system, can be recognised easily. When the value falls below the preset response values, the response delay "t<sub>on</sub>" starts. Once the response delay "t<sub>on</sub>" has elapsed, the alarm relays "K1/K2" switch and the alarm LEDs "AL1/AL2" light up. Two separately adjustable response values/alarm relays allow a distinction to be made between prewarning and alarm. If the insulation resistance exceeds the release value (response value plus hysteresis), the alarm relays return to their initial position. If the fault memory is enabled, the alarm relays remain in the alarm state until the reset button is pressed or until the supply voltage is switched off. The device function can be tested using the test button. The parameterisation of the device can be carried out via the LC display or the function keys integrated in the front plate.

## Connection monitoring

The connections to the system (L1/L2) and earth (E/KE) are either automatically checked every 24 h, or by pressing the test button or when supply voltage has been connected. In case of interruption of a connecting lead, the alarm relay K2 switch, the LEDs ON/AL1/AL2 flash and the following message appears on the display:

"E.02" indicating a fault in the connecting leads to the system,

"E.01" signals a fault in the connecting leads to PE.

After eliminating the fault, the alarm relays return to their initial position either automatically or by pressing the reset button.

## Preset function

After connecting the device for the first time, the nominal system voltage is measured and the response values are set automatically.

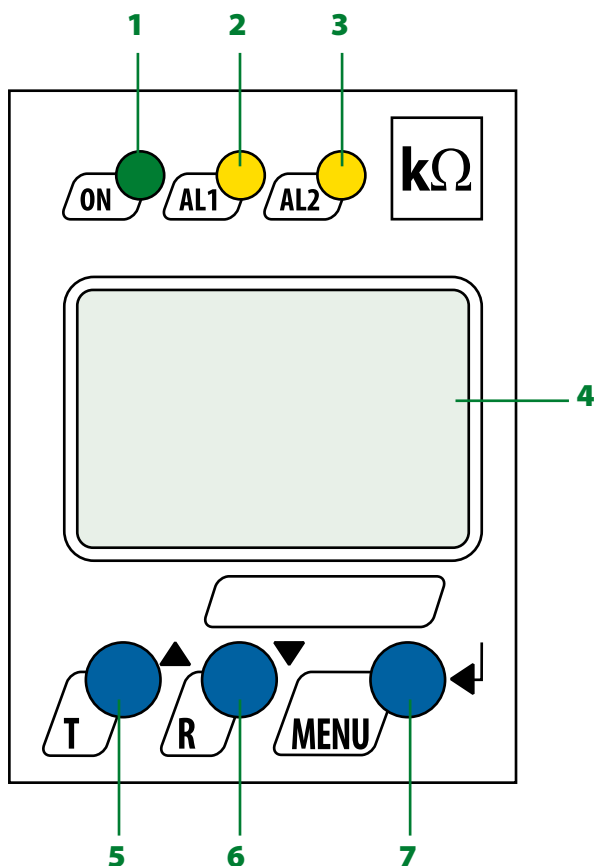
## Measurement method

The ISOMETER® IR420 uses the measurement method "superimposed DC voltage".

## Standards

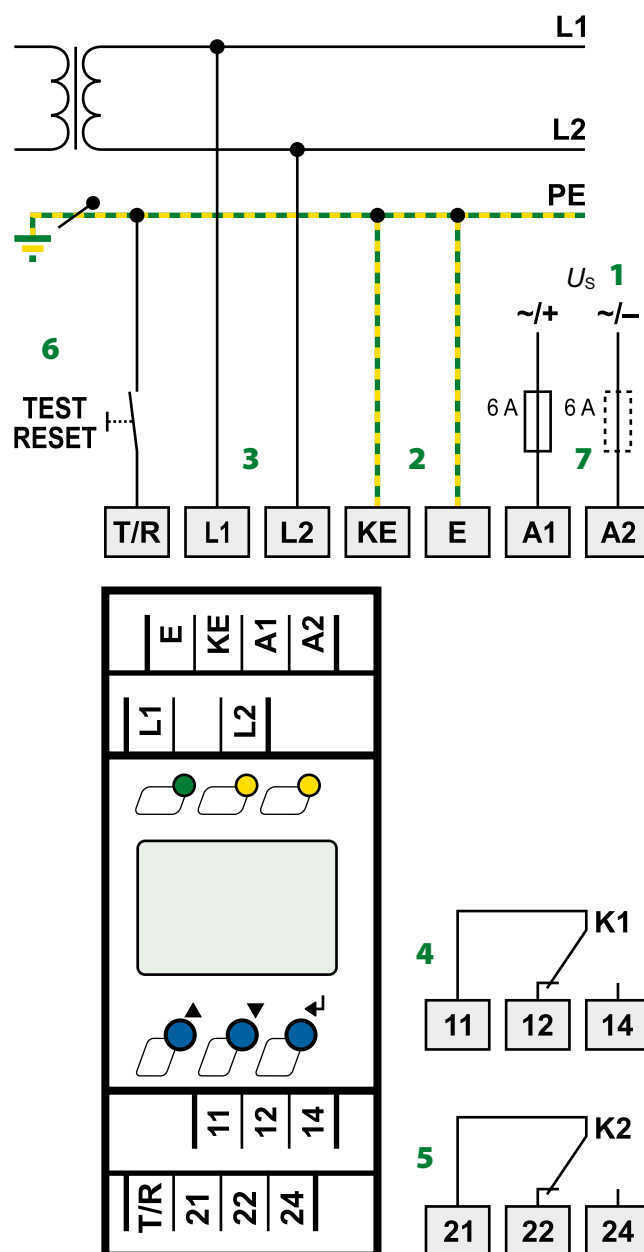
The ISOMETER® of the IR420 series complies with the requirements of the device standards: DIN EN 61557-8 (VDE 0413-8), EN 61557-8, IEC 61557-8, ASTM F 1207M-96 (2007).

## Operating elements



- 1 - LED power "ON", (flashes in case of interruption of the connecting leads E/KE or L1/L2).
- 2 - Alarm LED "AL1", lights when the value falls below the set response value Alarm 1 and flashes in case of interruption of the connecting leads E/KE or L1/L2).
- 3 - Alarm LED "AL2", lights when the value falls below the set response value Alarm 2 and flashes in case of interruption of the connecting leads E/KE or L1/L2).
- 4 - LC display
- 5 - Test button "T": to call up the self test.  
Arrow up button: parameter change, to move up in the menu
- 6 - Reset button "R": to delete stored insulation fault alarms  
Arrow down button: parameter change, to move down in the menu
- 7 - Menu button "MENU": to call up the menu system.  
Enter button: Confirms parameter changes

## Wiring diagram



- 1 - Supply voltage  $U_s$  (see ordering details) via fuse
- 2 - Separate connection of E, KE to PE
- 3 - Connection of the AC system to be monitored:  
AC: connect terminals L1, L2 to conductor L1, L2.
- 4 - Alarm relay "K1": Alarm 1
- 5 - Alarm relay "K2": Alarm 2
- 6 - Combined test and reset button "T/R":  
short-time pressing (< 1.5 s) = RESET, long-time pressing (> 1.5 s) = TEST
- 7 - Line protection by a fuse in accordance with IEC 60364-4-43 (6 A fuse recommended). In case of supply (A1/A2) from an IT system, both lines have to be protected by a fuse.

## Technical data

### 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         |         |
| (A1, A2) - (L1, L2, E, KE, T/R) - (11, 12, 14) - (21, 22, 24) |         |
| Voltage test acc. to IEC 61010-1                              | 2.21 kV |

### Supply voltage

|                      |                          |
|----------------------|--------------------------|
| Supply voltage $U_S$ | see ordering information |
| Power consumption    | $\leq 4$ VA              |

### IT system being monitored

|                              |              |
|------------------------------|--------------|
| Nominal system voltage $U_n$ | AC 0...300 V |
| Nominal frequency $f_n$      | 42...460 Hz  |

### Response values

|                                                           |                                                                                                                                                                                     |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Response value $R_{an1}$ (Alarm 1)                        | 1...200 k $\Omega$                                                                                                                                                                  |
| Response value $R_{an2}$ (Alarm 2)                        | 1...200 k $\Omega$                                                                                                                                                                  |
| PreSet mode                                               | $U_n \leq 72$ V $R_{an1}$ (Alarm 1) = 20 k $\Omega$ / $R_{an2}$ (Alarm 2) = 10 k $\Omega$<br>$U_n > 72$ V $R_{an1}$ (Alarm 1) = 46 k $\Omega$ / $R_{an2}$ (Alarm 2) = 23 k $\Omega$ |
| Relative uncertainty 1...5 k $\Omega$ /5...200 k $\Omega$ | $\pm 0.5$ k $\Omega$ / $\pm 15$ %                                                                                                                                                   |
| Hysteresis 1...5 k $\Omega$ /5...200 k $\Omega$           | + 1 k $\Omega$ /+25 %                                                                                                                                                               |

### Time response

|                                                                           |                 |
|---------------------------------------------------------------------------|-----------------|
| Response time $t_{an}$ at $R_F = 0.5 \times R_{an}$ and $C_e = 1$ $\mu$ F | $\leq 1$ s      |
| Start-up delay (start time) $t$                                           | 0...10 s (0 s)* |
| Response delay $t_{on}$                                                   | 0...99 s (0 s)* |

### Measuring circuit

|                                                  |                      |
|--------------------------------------------------|----------------------|
| Measuring voltage $U_m$                          | 12 V                 |
| Measuring current $I_m$ (at $R_F = 0$ $\Omega$ ) | $\leq 200$ $\mu$ A   |
| Internal DC resistance $R_i$                     | $\geq 62$ k $\Omega$ |
| Impedance $Z_i$ at 50 Hz                         | $\geq 60$ k $\Omega$ |
| Permissible extraneous DC voltage $U_{fg}$       | $\leq$ DC 300 V      |
| Permissible system leakage capacitance $C_e$     | $\leq 20$ $\mu$ F    |

### Displays, memory

|                                                                      |                                               |
|----------------------------------------------------------------------|-----------------------------------------------|
| Display                                                              | LC display, multi-functional, non-illuminated |
| Display range, measured value                                        | 1 k $\Omega$ ...1 M $\Omega$                  |
| Operating uncertainty 1...5 k $\Omega$ /5 k $\Omega$ ...1 M $\Omega$ | $\pm 0.5$ k $\Omega$ / $\pm 15$ %             |
| Percentage operating error                                           | $\pm 15$ %                                    |
| Password                                                             | off/0...999 (off)*                            |
| Fault memory, alarm relay                                            | on/off*                                       |

### Inputs

|                                    |             |
|------------------------------------|-------------|
| Cable length test and reset button | $\leq 10$ m |
|------------------------------------|-------------|

### Switching elements

|                                           |                                   |       |       |       |       |
|-------------------------------------------|-----------------------------------|-------|-------|-------|-------|
| Number of switching elements              | 2 x 1 changeover contact          |       |       |       |       |
| Operating principle                       | NC/N/O operation (N/O operation)* |       |       |       |       |
| Electrical service life, 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 | 220 V | 110 V | 24 V  |
| Rated operational current                 | 5 A                               | 3 A   | 0.1 A | 0.2 A | 1 A   |
| Minimum contact rating                    | 1 mA at AC/DC $\geq 10$ V         |       |       |       |       |

### Environment/EMC

|                                                   |                                                |
|---------------------------------------------------|------------------------------------------------|
| EMC                                               | IEC 61326-2-4                                  |
| Operating temperature                             | -25...+55 °C                                   |
| Climatic class 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-time storage (IEC 60721-3-1)                 | 1K4 (except condensation and formation of ice) |
| Classification of mechanical conditions IEC 60721 |                                                |
| Stationary use (IEC 60721-3-3)                    | 3M4                                            |
| Transport (IEC 60721-3-2)                         | 2M2                                            |
| Long-time storage (IEC 60721-3-1)                 | 1M3                                            |

### Connection

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

### Other

|                                                          |                           |
|----------------------------------------------------------|---------------------------|
| Operating mode                                           | continuous operation      |
| Mounting                                                 | any position              |
| Degree of protection, internal components (DIN EN 60529) | IP30                      |
| Degree of protection, terminals (DIN EN 60529)           | IP20                      |
| Enclosure material                                       | polycarbonate             |
| Flammability class                                       | UL94 V-0                  |
| DIN rail mounting acc. to                                | IEC 60715                 |
| Screw mounting                                           | 2 x M4 with mounting clip |
| Documentation number                                     | D00037                    |
| Weight                                                   | $\leq 150$ g              |

( ) \* = factory setting

### Ordering information

| Supply voltage <sup>1)</sup> U <sub>S</sub> |            | Type       | Art. No.    |
|---------------------------------------------|------------|------------|-------------|
| AC                                          | DC         |            |             |
| 16...72 V, 42...460 Hz                      | 9.6...94 V | IR420-D4-1 | B 7101 6409 |
| 70...300 V, 42...460 Hz                     | 70...300 V | IR420-D4-2 | B 7101 6405 |

Device version with screw terminals on request.

<sup>1)</sup> Absolute values

### Accessories

| Type designation                                         | Art. No.    |
|----------------------------------------------------------|-------------|
| Mounting clip for screw mounting<br>(1 piece per device) | B 9806 0008 |

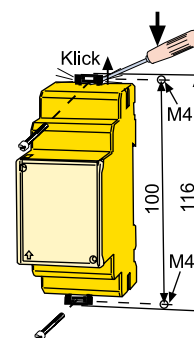
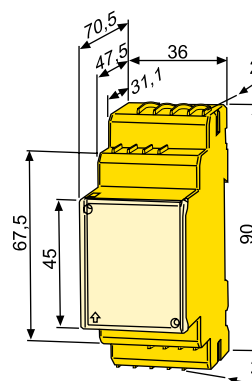
### Dimension diagram XM420

Dimensions in mm

Open the front plate cover in direction of arrow!

### Screw mounting

Note: The upper mounting clip must be ordered separately (see ordering information).





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**BENDER Group**

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