A-ISOMETER® IR420

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

A-ISOMETER® IR420

Device features

- Insulation monitoring for IT control circuits AC 0…300 V
- Two separately adjustable response values
- Preset function (automatic assignment 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)

Standards, approvals and certifications

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

Product description

The A-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 IEC 60204-1: "Safety of machinery – Electrical equipment of machines, Part 1: General requirements"
- 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_{on}" starts. Once the response delay "t_{on}" 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 A-ISOMETER® IR420 uses the measurement method "superimposed DC voltage".

Standards

The IR420 series complies with the requirements of the device standards: IEC 61557-8, ASTM F1207M-96 (2007).

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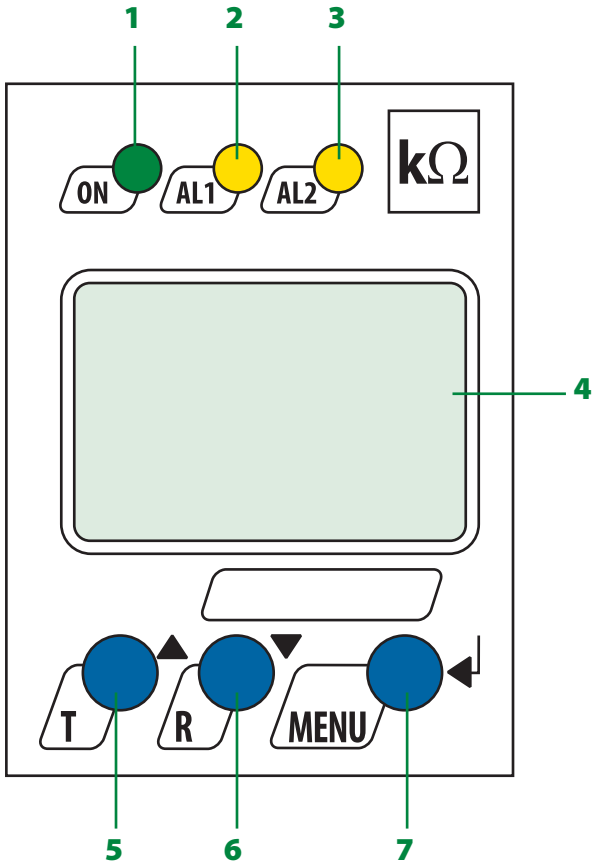
Operating elements



1 - LED Power "ON", flashes in case of interruption of the connecting leads earth/ 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 earth/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 earth/KE or L1/L2).

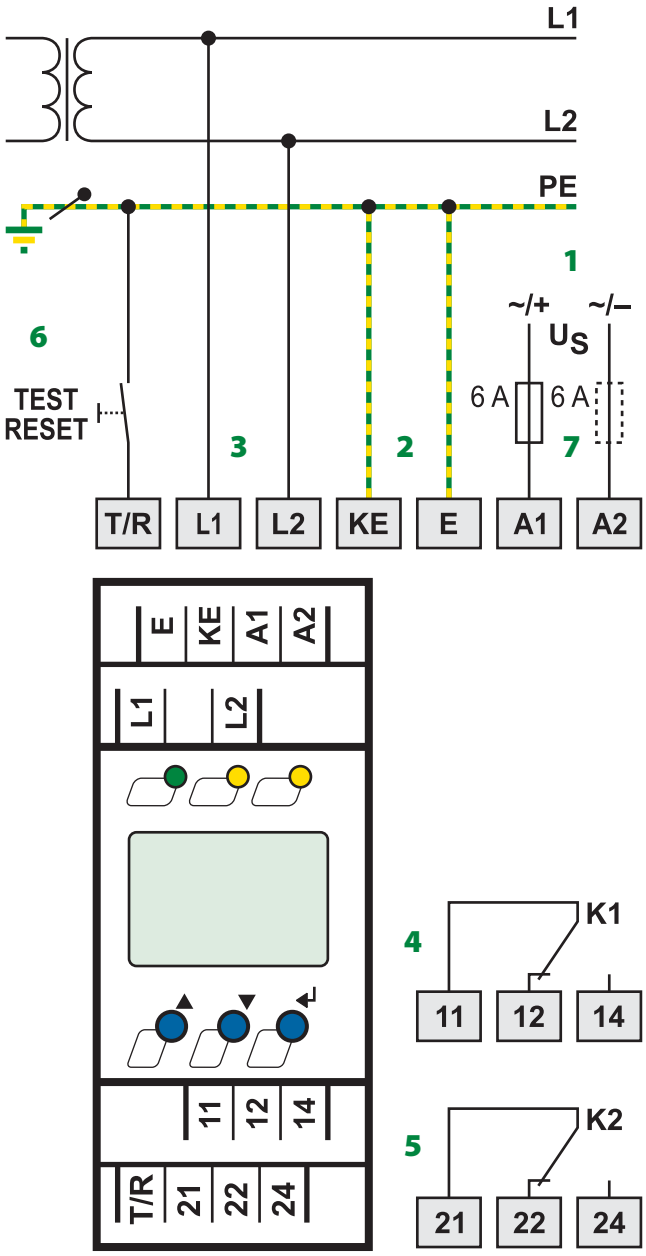
4 - LC display

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
Abwärts-Taste: Parameter change, to move down in the menu.

7 - "MENU" button: to call up the menu system.
Enter button: to confirm parameter change

Wiring diagram



1 - Supply voltage U_S (see ordering information) via fuse

2 - Separate connection of E and KE to PE

3 - Connection to 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.

1.1

Technical data

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

Rated insulation voltage	250 V
Rated impulse voltage/pollution degree	2.5 kV / III
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	≤ 3 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 kΩ
Response value R_{an2} (Alarm 2)	1…200 kΩ
PreSet mode	U_n ≤ 72 V R_{an1} (Alarm 1) = 20 kΩ / R_{an2} (Alarm 2) = 10 kΩ
	U_n > 72 V R_{an1} (Alarm 1) = 46 kΩ / R_{an2} (Alarm 2) = 23 kΩ
Relative uncertainty 1 kΩ…5 kΩ / 5 kΩ…200 kΩ	± 0.5 kΩ / ± 15 %
Hysteresis	25 %

Time response

Response time t_{an} at R_F = 0.5 x R_{an} and C_e = 1 µF	≤ 1 s
Start-up delay 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 Ω)	≤ 200 µA
Internal DC resistance R_i	≥ 62 kΩ
Impedance Z_i at 50 Hz	≥ 60 kΩ
Permissible extraneous DC voltage U_{fg}	≤ DC 300 V
Permissible system leakage capacitance	≤ 20 µF

Displays, memory

Display range, measuring value	1 kΩ…1 MΩ
Operating uncertainty 1 kΩ…5 kΩ / 5 kΩ…1 MΩ	± 0.5 kΩ / ± 15 %
Password	off / 0…999 (off)*
Fault memory, alarm relay	on/off*

Outputs

Cable length test and reset button	≤ 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					10.000
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 ≥ 10 V

Environment/EMC

EMC	IEC 61326
Operating temperature	- 25 °C…+ 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 mm² / AWG 24-14
Flexible without ferrule	0.2…2.5 mm² / AWG 24-14
Flexible with ferrule	0.2…1.5 mm² / 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 (IEC 60529)	IP 30
Degree of protection, terminals (IEC 60529)	IP 20
Enclosure material	polycarbonate
DIN rail mounting acc. to	IEC 60715
Screw mounting	2 x M4 with mounting clip
Operating manual	TBP101012
Weight	≤ 150 g

( )* = factory setting

Ordering information

Type	Nominal system voltage* U_n	Supply voltage* U_S	Response value R_{an}	System leakage capacitance C_e	Art. No.
IR420-D4-1	AC 42…460 Hz 0…300 V	DC 9.6…94 V / AC 42…460 Hz 16…72 V	1…200 kΩ	< 20 µF	B 7101 6409
IR420-D4-2	AC 42…460 Hz 0…300 V	DC 70…300 V / AC 42…460 Hz 70…300 V	1…200 kΩ	< 20 µF	B 7101 6405

Device version with screw terminals on request.
* Absolute values

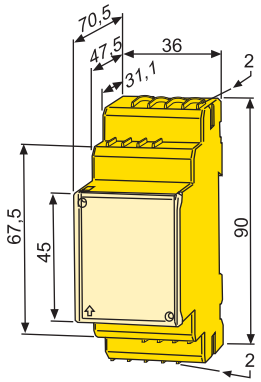
Accessories

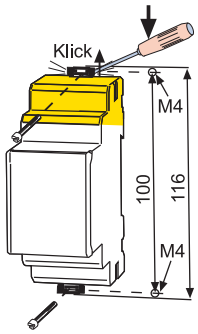
Type	Art. No.
Mounting clip for screw mounting (1 piece per device)	B 9806 0008

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).