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ISOMETER® IR420-D4

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

IR420-D4_D00037_01_D_XXEN/06.2016

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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_{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.

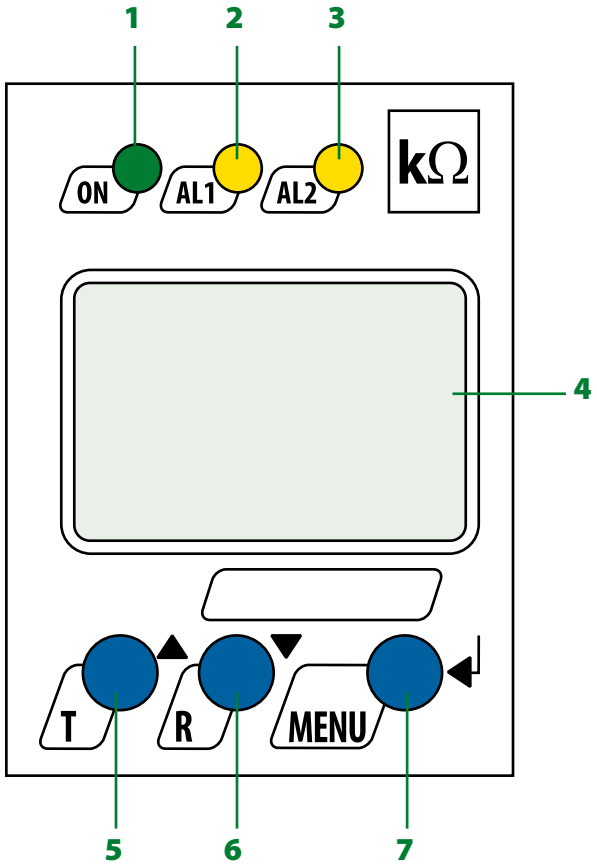
Measurement method

The 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).

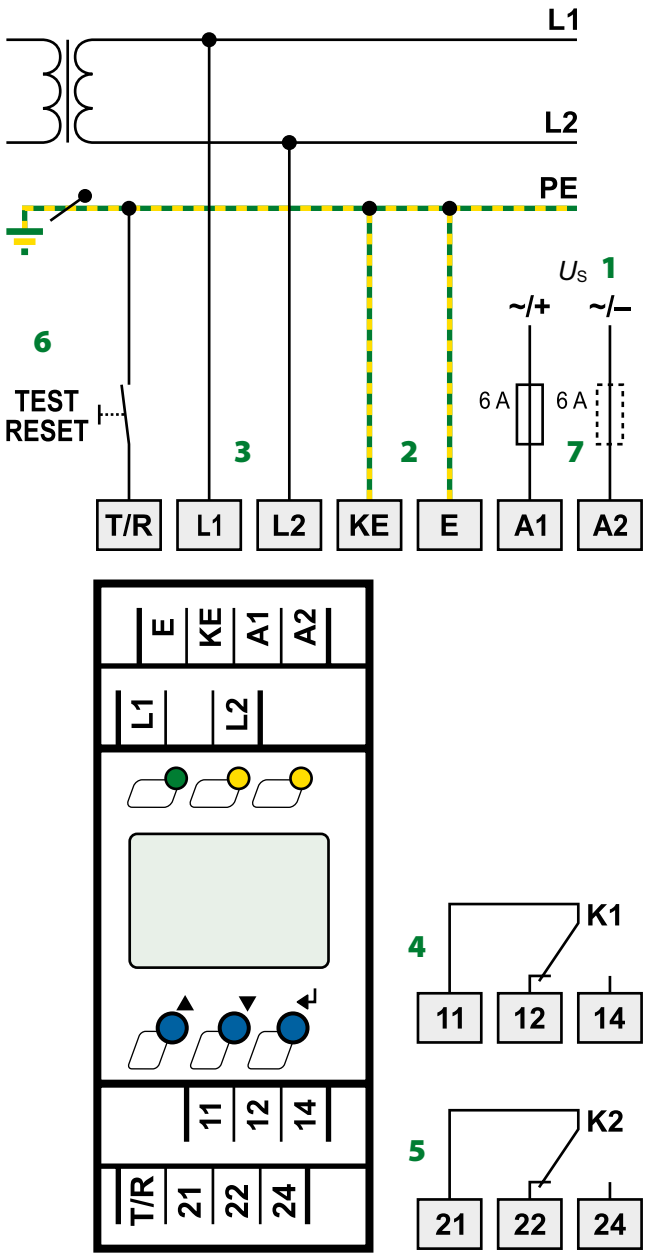
4 - LC display

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	≤ 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 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…5 kΩ/5…200 kΩ	± 0.5 kΩ/± 15 %
Hysteresis 1…5 kΩ/5…200 kΩ	+ 1 kΩ/+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 (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 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 C_e	≤ 20 µF

Displays, memory

Display	LC display, multi-functional, non-illuminated
Display range, measured value	1 kΩ…1 MΩ
Operating uncertainty 1…5 kΩ/5 kΩ…1 MΩ	± 0.5 kΩ/± 15 %
Percentage operating error	± 15 %
Password	off/0…999 (off)*
Fault memory, alarm relay	on/off*

Inputs

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					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 ≥ 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 mm² (AWG 24…14)
Flexible without ferrule	0.75…2.5 mm² (AWG 19…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 (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	≤ 150 g

( )* = factory setting

Ordering information

Supply voltage [1] U_S		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.
[1] Absolute values

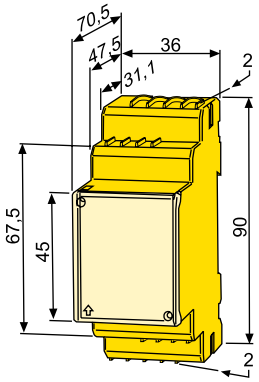
Accessories

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

Dimension diagram XM420

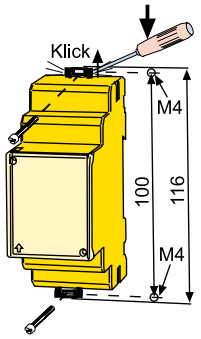
Dimensions in mm

Open the front plate cover in direction of arrow!



Screw mounting

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



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