ISOMETER® IR425

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

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Device features

- Insulation monitoring for AC/DC control circuits 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)
- Push-wire terminal (two terminals per connection)

Approvals

Product description

The ISOMETER®s of the IR425 series monitor the insulation resistance of unearthed AC/DC control circuits (IT systems) 0…300 V. DC components existing in AC/DC systems do not influence the operating characteristics. An external supply voltage allows de-energised systems to be monitored too.

Application

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

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. Insulation faults are distinguished according to AC and DC faults (indication ±). In the event of insulation faults on the plus or minus conductor, the corresponding +/- symbol is activated on the display. 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 to 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” signals 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.

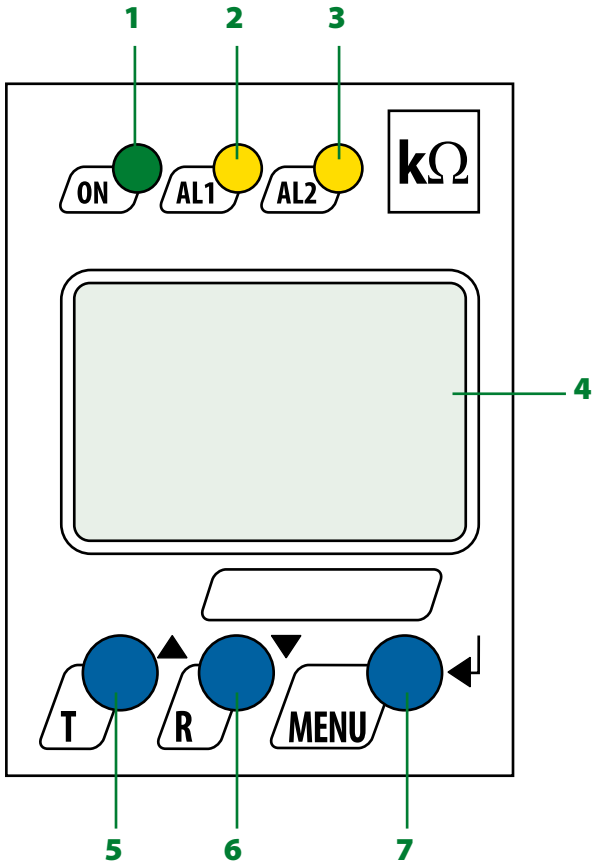
Measurement method

The ISOMETER® IR425 uses the AMP measuring principle.

Standards

The ISOMETER® of the IR425 complies with the requirements of the device standards: DIN EN 61557-8 (VDE 0413-8), IEC 61557-8, ASTM F 1669M-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.

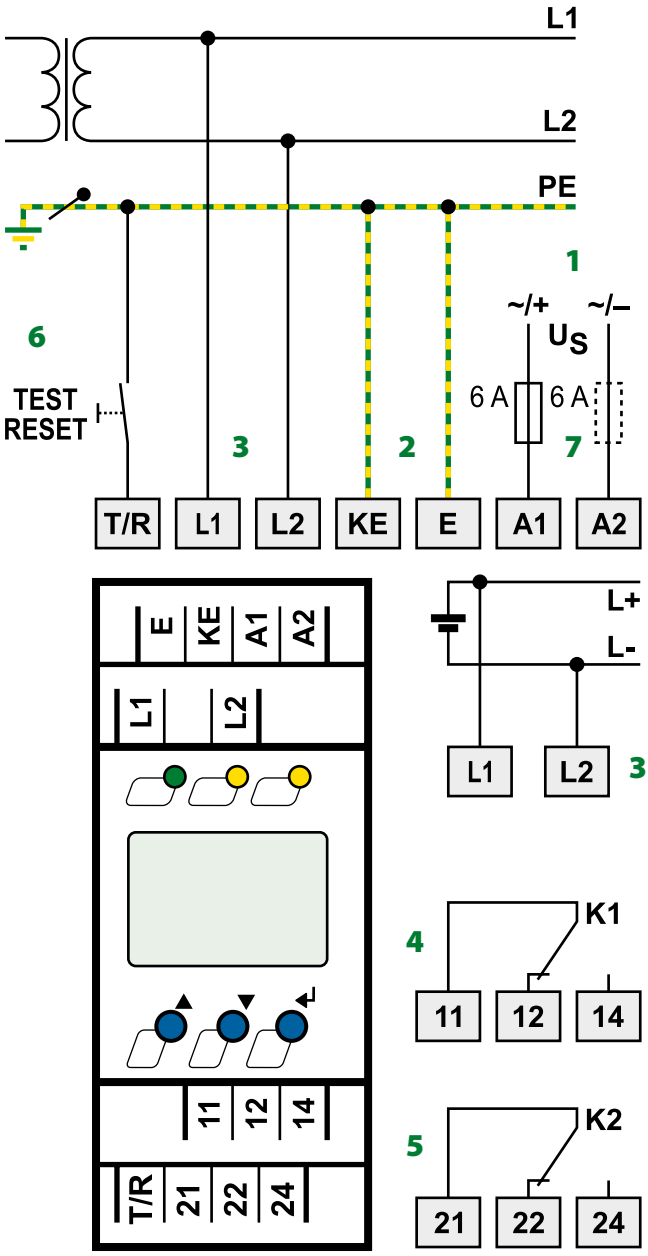
4 - LC display

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 to the IT 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. IEC 61010-1	2.2 kV

Supply voltage

IR425-D4-1, IR425-D4W-1:

Supply voltage U_s	AC 16…72 V/DC 9.6…94 V
Frequency range U_s	15…460 Hz/DC

IR425-D4-2, IR425-D4W-2:

Supply voltage U_s	AC/DC 70…300 V
Frequency range U_s	15…460 Hz, DC
Power consumption	≤ 4 VA

IT System being monitored

Nominal system voltage U_n	AC/DC 0… 300 V
Nominal frequency f_n	15…460 Hz

Response values

Response value R_{an1} (ALARM 1)	1…200 kΩ
Response value R_{an1} (ALARM 2)	1…200 kΩ

Preset function:

U_n ≤ 72 V: R_{an1} (ALARM 1)/R_{an2} (ALARM 2)	20 kΩ/10 kΩ
U_n > 72 V: R_{an1} (ALARM 1)/R_{an2} (ALARM 2)	46 kΩ/23 kΩ
Operating error (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	≤ 2 s
Starting delay t	0…10 s
Response delay t_{on}	0…99 s

Measuring circuit

Measuring voltage U_m	±12 V
Measuring current I_m (R_F = 0 Ω)	≤ 200 µA
Internal d.c. resistance R_i	≥ 62 kΩ
Internal impedance Z_i (50 Hz)	≥ 60 kΩ
Admissible extraneous d.c. voltage U_{fg}	≤ DC 300 V
System leakage capacitance C_e	≤ 20 µF

Displays, memory

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

Inputs

Cable length external test/reset button	≤ 10 m

Switching elements

Number of	2 (changeover contacts K1, K2)
Operating principle	(N/O operation)(N/C operation)
Electrical endurance	10000 switching operations

Contact data according IEC 60947-5-1

Rated operational voltage AC		230 V	230 V
Utilization category AC		AC 13	AC 14
Rated operational current AC		5 A	3 A
Rated operational voltage DC	220 V	110 V	24 V
Utilization category DC	DC 12	DC 12	DC 12
Rated operational current DC	0.1 A	0.2 A	1 A
Minimum current	1 mA at AC/DC ≥ 10 V		

Environment/EMC

EMC	acc. to IEC 61326
Operating temperature	-25 °C…+55 °C

Climatic categories acc. to IEC 60721:

Stationary use (IEC 60721-3-3) (except condensation and formation of ice)	3K5
Transport (IEC 60721-3-2) (except condensation and formation of ice)	2K3
Storage (IEC 60721-3-1) (except condensation and formation of ice)	1K4

Classification of mechanical conditions acc. to IEC 60721:

Stationary use (IEC 60721-3-3)	3M4
for W variant	3M7
Transport (IEC 60721-3-2)	2M2
Storage (IEC 60721-3-1)	1M3

Connection

Connection	**screw terminals**
Nominal current	≤10 A
Connection properties:	
rigid/flexible/AWG	0.2…4/0.2…2.5 mm² /AWG 24…12
Two conductors with the same cross section:	
rigid/flexible	0.2…1.5/0.2…1.5 mm²
Stripping length	8 mm
Tightening torque, terminal screws	0.5…0.6 Nm

Connection	**push-wire terminals**
Nominal current	≤10 A
Connection properties:	
rigid	0.2…2.5 mm² (AWG 24…14)
flexible without ferrules	0.75…2.5 mm² (AWG 19…14)
flexible with ferrules	0.2…1.5 mm² (AWG 24…16)
Stripping length	10 mm
Opening force	50 N
Test opening, diameter	2.1 mm

Other details

Operating mode	continuous
Position	any position
Degree of protection internal components (EN 60529)	IP30
Degree of protection terminals (EN 60529)	IP20
Enclosure material	polycarbonat
Flammability class	UL94 V-0
DIN rail mounting acc. to	IEC 60715
Screw fixing	2 x M4 with mounting clip
Weight	approx. 150 g

Ordering information

Supply voltage [1] U_S		Type	Art. No.	
AC	DC		screw terminals	push-wire terminals
16…72 V, 15…460 Hz	9.6…94 V	IR425-D4-1	B91036403	B71036403
		IR425-D4W-1	B91036403W	B71036403W
70…300 V, 15…460 Hz	70…300 V	IR425-D4-2	B91036402	B71036402
		IR425-D4W-2	B91036402W	B71036402W

[1] Absolute values

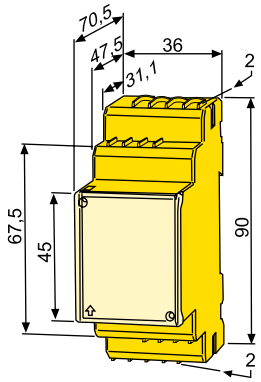
Accessories

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

Dimension diagram XM420

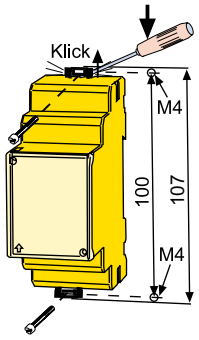
Dimensions in mm

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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The Power in Electrical Safety©

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