LINETRAXX® GM420

Loop monitoring relay to monitor loop resistances
or PE conductor connections

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Device features

- Loop monitoring of the PE conductor in AC systems
- Measuring circuit providing a high resistance against extraneous voltages and indication of extraneous voltages
- Adjustable start-up delay, response delay and delay on release
- Adjustable switching hysteresis
- Digital measured value display via multi-functional LC display
- Preset function (automatic setting of basic parameters)
- LEDs: Power On, Alarm 1, Alarm 2
- Measured value memory for operating value
- Continuous self monitoring
- Internal test/reset button
- Two separate alarm relays with one changeover contact each
- N/C or N/O operation and fault memory behaviour selectable
- Password protection for device setting
- Sealable transparent cover
- Two-module enclosure (36 mm)
- Push-wire terminal (two terminals per connection)
- RoHS compliant

Approvals

Product description

The GM420 series loop monitor is designed to monitor the resistance of PE conductor connections in AC systems and in de-energised systems. The extraneous voltage U_f between the terminals E and KE must not exceed AC 12 V. The ohmic resistance of the conductor loop and the AC extraneous voltage U_f, if existing, will be indicated on the display. The currently measured value is continuously indicated on the LC display. If the measured resistance value increases above the set response value, the alarm will be activated and stored. Adjustable time delays allow installation-specific requirements to be considered.

Typical applications

- Loop monitoring of motors
- Loop monitoring of PE conductor connections for wire interruptions in electrical installations
- Monitoring of earthing systems

Function

Once the supply voltage is applied, the start-up delay begins. Values of the resistance and extraneous voltage changing during this time do not influence the switching state of the alarm relays. The device provides two individually adjustable measuring channels (loop resistance/extraneous voltage U_f). When the measuring value exceeds the response value > R (Alarm 1) or > U_f (Alarm 2), the time of the response delay $t_{on1/2}$ begins. Once the response delay has elapsed, the alarm relays switch and the alarm LEDs light up. If the measuring quantity falls below the release value (response value plus hysteresis) after the alarm relays have switched, the selected release time "t_{off}" begins. When "t_{off}" has elapsed, the alarm relays switch back to their initial position. If the fault memory is enabled, the alarm relays will remain in alarm position until the reset button is pressed.

Preset function

After connecting the relay to the power supply for the first time, the response value for the loop resistance (Alarm 1) is automatically set only once to the following value:

Response value loop resistance (> R) = (R_{mess} + 0.5 Ω) x 1.5

If the measured resistance value is > 66 Ω, the response value will automatically be set to 100 Ω. After restoring the factory settings, the preset function is automatically active again.

$$\Omega$$
LOOP
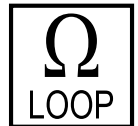
Operating elements
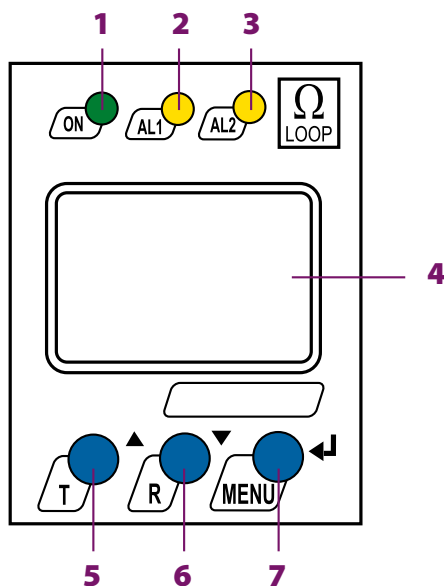
1 - Power On LED "ON" (green); lights when supply voltage is applied and flashes in the event of system fault alarm

2 - Alarm LED "AL1" (yellow), lights when the set response value > R, OL, > U_f, ERROR, TEST is exceeded and flashes in the event of system fault alarm

3 - Alarm LED "AL2" (yellow), lights when the value falls below the set response value > R, OL, > U_f, ERROR, TEST and flashes in the event of system fault alarm

4 - Multi-functional LC display

5 - Test button "T":
Arrow up button: To change the measured value display, move upwards in the menu or to change parameters.
To call up the self test: press the button > 1.5 s

6 - Reset button "R":
Arrow down button: to change the measured value indication, move downwards in the menu or to change parameters
To delete stored alarms: press the button "T" > 1.5 s

7 - "MENU" button:
Enter button: to confirm the measured value indication or to confirm changed parameters
To call up the menu system, press the button "T" > 1.5 s
Press the ESC button > 1.5 s to abort an action or to return to the previous menu level

When the menu item LEd is activated, the alarm LED "AL1" indicates that K1 is in the alarm state. When "AL2" lights up, K2 is in the alarm position.

Wiring diagram
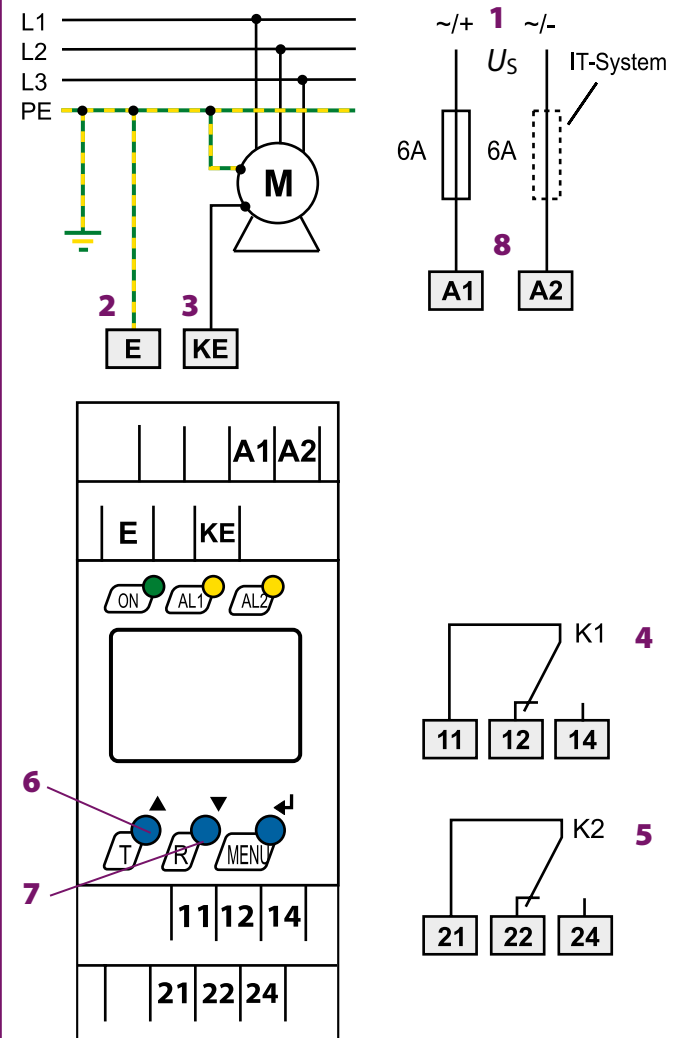
1 - Supply voltage U_S (see ordering details) via fuse

2 - Connection of E to the PE conductor

3 - Connection of KE to the loads or the monitoring conductor

4 - Alarm relay "K1": Alarm 1 configurable for > R, OL, > U_f, ERROR, TEST

5 - Alarm relay "K2": Alarm 2 configurable for > R, OL, > U_f, ERROR, TEST

6 - Test button "T"

7 - Reset button "R"

8 - Line protection by a fuse in accordance with DIN VDE 0100-430/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	400 V
Rated impulse voltage/pollution degree	4 kV/3
Protective separation (reinforced insulation) between:	
	(A1, A2) - (E, KE) - (11-12-14) - (21-22-24)
Voltage test acc. to IEC 61010-1:	
(E, KE) - [(A1-A2), (11-12-14)]	3.32 kV
(E, KE) - (21-22-24)	2.21 kV
(A1- A2) - (11-12-14) - (21-22-24)	2.21 kV

Supply voltage

Supply voltage U_S	see ordering information
Frequency range U_S	see ordering information
Power consumption	≤ 4 VA

Measuring circuit

Loop resistance R_m:

Measuring range R_m	0…100 Ω
Measuring current I_m	DC 20 mA
Measuring voltage U_m	≤ DC 24 V

Extraneous voltage U_f:

Measuring range U_f	AC 0…50 V
Rated frequency f_n	42…460 Hz
Disconnection of the measuring loop at U_f	≥ 12 V
Reconnection of the measuring loop	≤ 10 V
Permissible extraneous voltage U_f	≤ 440 V
Permissible extraneous DC voltage, without influence on the measurement	DC 0 V

Response values

Loop resistance > R (Alarm 1)	0.1…100 Ω
Resolution of setting R = 0…10 Ω	0.1 Ω
Resolution of setting R = 10…100 Ω	1 Ω

Preset function:

Loop resistance (> R) =	$((R_m + 0.5\ \Omega) \times 1.5)$*
Relative uncertainty 0…1 Ω	±20 %, ±1 digit
Relative uncertainty 1…100 Ω	±5 %, ±1 digit
Hysteresis > R	1…40 % (25 %)*
Extraneous voltage > U (Alarm 2)	1…50 V (25 V)*
Resolution of setting U_f 1…50 V	0.5 V
Relative uncertainty Uf (> U) in the range of 50/60 Hz	±2 %, ±1 digit
Relative uncertainty U_f (> U) in the range of 42…460 Hz	±10 %, ±1 digit
Hysteresis > U	1…40 % (5 %)*

Time response

Start-up delay t	0…99 s (0 s)*
Response delay $t_{on1/2}$	0…99 s (0 s)*
Delay on release t_{off}	0…99 s (0.5 s)*

Operating time

In the case of loop interruption (R > 50 kΩ) t_{ae}	≤ 40 ms
In the case of closed loop (> R) t_{ae}	≤ 500 ms
in case of extraneous voltage (> U) and overload (OL) t_{ae}	≤ 100 ms
Response time t_{an}	$t_{an} = t_{ae} + t_{on1/2}$
Recovery time t_b	≤ 300 ms
Recovery time t_b after safety shutdown	≤ 1 s

Displays, memory

Display	LC display, multifunctional, not illuminated
Display range, measuring value R_m	0…100 Ω
Display range, measuring value U_f	AC 0…50 V
Operating uncertainty, loop resistance 0…1 Ω	±20 %, ±1 digit
Operating uncertainty loop resistance 1…100 Ω	±5 %, ±1 digit
Operating uncertainty voltage in the range of 50/60 Hz	±2 %, ±1 digit
Operating uncertainty voltage in the range of 42…460 Hz	±10 %, ±1 digits
History memory (HiS) for the first alarm value	data record measured values
Password	off/0…999 (off)*
Fault memory (M) alarm relay	on/off (on)*

Switching elements

Number	2 x 1 changeover contacts (K1, K2)
Operating principle	N/C operation or N/O operation
	K1: Err, > R, OL, > U, tES (device error, loop resistance, measuring current disconnection: N/O operation n.o.)*
	K2: Err, > R, OL, > U, tES (overvoltage: N/O operation n.o.)*
Electrical endurance, number of cycles	10000
Contact data acc. to IEC 60947-5-1	

Utilisation category	AC13	AC14	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
Operating temperature	-25…+55 ℃
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)
Climatic class acc. to 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 terminals
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 (IEC 60529)	IP30
Degree of protection, terminals (IEC 60529)	IP30
Enclosure material	polycarbonate
Screw mounting	2 x M4 with mounting clip
DIN rail mounting acc. to	IEC 60715
Flammability class	UL94 V-0
Software version	D268 V1.0x
Weight	≤ 150 g

( )* = factory setting

Ordering information

Supply voltage [1] U_S		Type	Art. No.
AC	**DC**		
16…72 V, 15…460 Hz	9.6…94 V	**GM420-D-1**	**B 7308 2001**
70…300 V, 15…460 Hz	70…300 V	**GM420-D-2**	**B 7308 2002**

Device version with screw terminals on request.
[1] Absolut values

Accessories

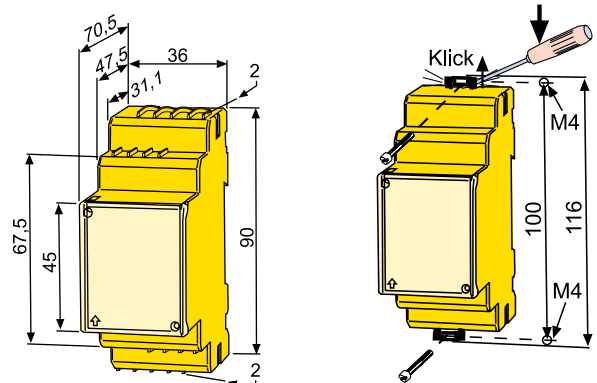| Type designation	Art. No.
Mounting clip for screw mounting (1 piece per device)	**B 9806 0008**

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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