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LINETRAXX® RCM420

Residual current monitor for AC current monitoring in TN and TT systems

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**Residual current monitor
for AC current monitoring in TN and TT systems**

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Device features

- AC and pulsed DC sensitive residual current monitor Type A according to IEC 62020
- r.m.s. value measurement (AC)
- Two separately adjustable response values
- Frequency range 42…2000 Hz
- Start-up delay, response delay and delay on release
- Restart function
- Digital measured value display via LC display
- Measured value memory for operating value
- CT connection monitoring
- 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 and fault memory behaviour selectable
- Password protection for device setting
- Device self monitoring
- Sealable transparent cover
- Two-module enclosure (36 mm)
- RoHS compliant
- Push-wire terminal (two terminals per connection)

Approvals

Product description

The AC and pulsed DC sensitive residual current monitor RCM420-D (Type A) from Bender is designed for fault and residual current monitoring in earthed power supply systems (TN and TT systems) where an alarm is to be activated in the event of a fault, but disconnection must be prevented. In addition, the device can be used to monitor single conductors, such as PE conductors, N-PE connections and PE-PAS connections.

The prewarning stage (50…100 % of the set response value $I_{\Delta n2}$) allow to distinguish between prewarning and alarm. Since the values are measured with measuring current transformers, the device is nearly independent of the load current and the nominal voltage of the system.

Applications

- Residual current monitoring in earthed 2, 3 or 4-conductor systems
- Current monitoring of, in the normal case, de-energised single conductors
- Socket-outlet circuits for devices which are operated unattended for a long time and which may not fail
- Alarm systems, safety devices
- Air conditioning systems, EDP systems
- Cooling equipment with valuable frozen goods
- Canteen kitchens
- Monitoring of earthed power supplies for stray currents
- Impact on N conductors
- Trace heating systems

Function

Once the supply voltage U_S has been applied, the start-up delay "t" starts. Measured values exceeded during this time do not influence the switching state of the alarm relays.

Residual current monitoring takes place via an external measuring current transformer. The actual measured value is indicated on the LCD. In this way any changes, for example when circuits are connected to the system, can be recognised easily.

If the measured value exceeds one or both response values, the response delays $t_{on1/2}$ begin. Once "$t_{on1/2}$" have elapsed, the selected alarm relays switch). If the release value is not reached before the response delay "t_{on}" has elapsed, the alarm LEDs "AL1/AL2" do not light up and the alarm relays do not switch. The set release time "t_{off}" begins when the measured value again falls below the release value (response value minus hysteresis) after the switching of the alarm relays. When "t_{off}" has elapsed, the alarm relays switch back 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 interrupted. The device function can be tested using the test button. Parameters are assigned to the device via the LCD and the control buttons on the front panel; this function can be password-protected.

Connection monitoring

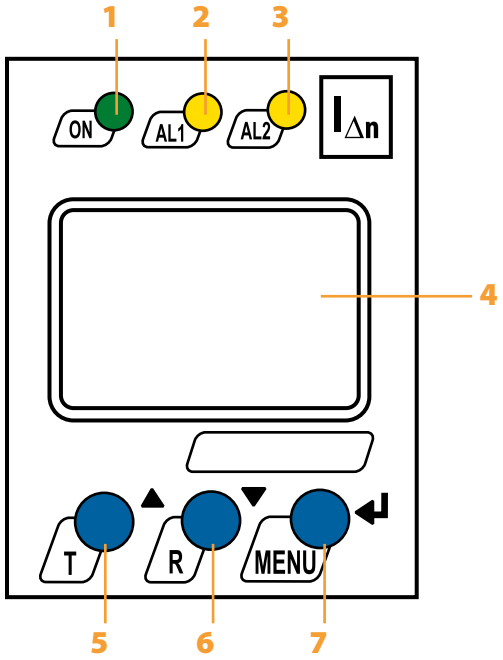
The CT connections are continuously monitored. In the event of a fault, the alarm relays K1/K2 switch without delay, the alarm LEDs AL1/AL2/ON flash. After eliminating the fault, the alarm relays return to their initial position either automatically or by pressing the reset button (fault memory behaviour).

Restart function

If an alarm is pending after resetting the alarm relay and restarting the system being monitored, this reset process is repeated until the preset number of restart cycles is completed.

As soon as the preset number of restart cycles is completed, the fault memory is set to ON.

Operating and display elements



1 - Power On LED “ON” (green); lights when supply voltage is applied and flashes in the event of system fault alarm respectively in the event of CT malfunction.

2 - Alarm LED “AL1” (yellow), prewarning; lights when the set response value $I_{\Delta n1}$ is exceeded or flashes in the event of system fault alarm respectively in the event of CT malfunction

3 - Alarm LED “AL2” (yellow), alarm; lights when the set response value $I_{\Delta n2}$ is exceeded or flashes in the event of system fault alarm respectively in the event of CT malfunction

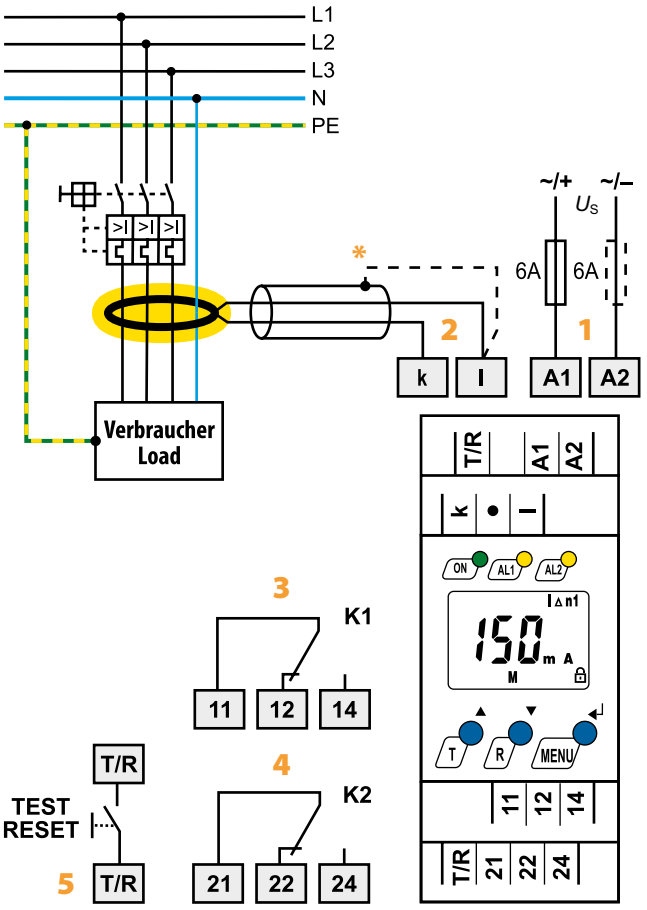
4 - Multi-functional LC display

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 saved alarms.
Arrow down button: parameter change, to move down in the menu

7 - “MENU” button: to call up the menu system.
Enter button: to confirm parameter change.
“ESC” button: press the button “T” >1.5 s

Wiring diagram



1 - Supply voltage U_S see ordering information,
6 A fuse recommended

2 - Connection of the external measuring current transformer

3 - Alarm relay “K1”: configurable for alarm $I_{\Delta n1}$/$I_{\Delta n2}$/TEST/ERROR

4 - Alarm relay “K2”: configurable for alarm $I_{\Delta n1}$/$I_{\Delta n2}$/TEST/ERROR

5 - Combined test and reset button “T/R”
short-time pressing (< 1.5 s) = RESET
long-time pressing (> 1.5 s) = TEST

* - when a shielded cable is used

Do not route the PE conductor through the measuring current transformer!

Technical data

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

RCM420-D-1

Rated insulation voltage	100 V
Rated impulse voltage/pollution degree	2,5 kV/3
Overvoltage category	III

RCM420-D-2

Rated insulation voltage	250 V
Rated impulse voltage/pollution degree	4 kV/3
Overvoltage category	III

Supply voltage

RCM420-D-1

Supply voltage range U_S	AC 24…60 V/DC 24…78 V
Operating range U_S	AC 16…72 V/DC 9.6…94 V
Frequency range U_S	DC, 42…460 Hz

RCM420-D-2

Supply voltage range U_S	AC/DC 100…250 V
Operating range U_S	AC/DC 70…300 V
Frequency range U_S	42…460 Hz

Protective separation (reinforced insulation) between
(A1, A2) - (k/l, T/R) - (11, 12, 14) - (21, 22, 24)

Voltage test according to IEC 61010-1	2.21 kV
Power consumption	≤ 4 VA

Measuring circuit

External measuring current transformer type	W…, WR…, WS…
Load	68 Ω
Rated insulation voltage (measuring current transformer)	800 V
Operating characteristic acc. to IEC 62020	type A
Frequency range	42…2000 Hz
Measuring range	3 mA…16 A
Relative uncertainty	0…-20 %
Operating uncertainty	0…30 %

Response values

Rated residual operating current $I_{\Delta n1}$ (prewarning, AL1)	50…100 % x $I_{\Delta n2}$, (50 %)*
Rated residual operating current $I_{\Delta n2}$ (Alarm, AL2)	10 mA…10 A (30 mA)*
Hysteresis	10…25 % (15%)*

Specified time

Starting delay t	0…10 s (0.5 s)*
Response delay t_{on2} (Alarm)	0…10 s (0 s)*
Response delay t_{on1} (prewarning)	0…10 s (1 s)*
Delay on release t_{off}	0…300 s (1 s)*
Operating time t_{ae} at $I_{\Delta n} = 1$ x $I_{\Delta n1/2}$	≤ 180 ms
Operating time t_{ae} at $I_{\Delta n} = 5$ x $I_{\Delta n1/2}$	≤ 30 ms
Response time t_{an}	$t_{an} = t_{ae} + t_{on1/2}$
Recovery time t_b	≤ 300 ms
Number of reload cycles	0…100 (0)*

Cable lengths for measuring current transformers

Single wire ≥ 0.75 mm²	0…1 m
Single wire, twisted ≥ 0.75 mm²	0…10 m
Shielded cable ≥ 0.75 mm²	0…40 m
Recommended cable (shielded, shield on one side connected to terminal l of the RCM420, not connected to earth)	J-Y(St)Y min. 2x0.8
Connection	screw terminals

Displays, memory

Display range, measured value	3 mA…16 A
Error of indication	± 15 %/± 2 digit
Measured-value memory for alarm value	data record measured values
Password	off/0…999 (OFF)*
Fault memory alarm relay	on/off (off)*

Inputs/outputs

Cable length for external test/reset button	0…10 m

Switching elements

Number of switching elements	2 x 1 changeover contact
Operating principle	N/C operation/ N/O operation (N/O operation)*
Electrical service life under rated operating conditions	10000 switching operations

Contact data acc. to IEC 60947-5-1:

Utilization category	AC-13	AC-14	DC-12	DC-12	DC-12
Rated operational voltage	230 V	230 V	24 V	110 V	220 V
Rated operational voltage UL	200 V	200 V	24 V	110 V	200 V
Rated operational current	5 A	3 A	1 A	0.2 A	0.1 A
Minimum contact load	1 mA at AC/DC ≥ 10 V				

Environment/EMC

EMC	IEC 62020
Operating temperature	-25…+55 °C
Classification of climatic conditions IEC 60721	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transportation (IEC 60721-3-2)	2K3 (except condensation and formation of ice)
Storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3M4
Transportation (IEC 60721-3-2)	2M2
Storage (IEC 60721-3-1)	1M3

Connection

For UL application

use 60/70°C copper conductors only

Connection type	push-wire terminals
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

Operating mode	continuous operation
Position of normal use	any
Protection class, internal components (DIN EN 60529)	IP 30
Degree of protection, terminals (DIN EN 60529	IP 20
Enclosure material	polycarbonate
Flammability class	UL94V-0
DIN rail mounting acc. to	IEC 60715
Screw mounting	2 x M4 with mounting clip
Documentation number	D00057
Weight	≤ 150 g

( )* = factory setting

Ordering information

Supply voltage [1] U_S		Type	Art. No.
AC	DC		
16…72 V, 40…460 Hz	9.6…94 V	RCM420-D-1	B 7401 4001
70…300 V, 40…460 Hz	70…300 V	RCM420-D-2	B 7401 4002

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

Suitable system components

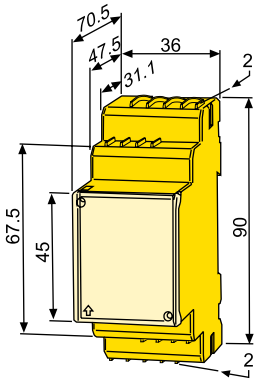
Type designation	Type of construction	Internal diameter (mm)	Type	Art. No.
Measuring current transformers	circular	ø 20	W20	B 9808 0003
		ø 35	W35	B 9808 0010
		ø 60	W60	B 9808 0018
		ø 120	W120	B 9808 0028
		ø 210	W210	B 9808 0034
	rectangular	70 x 175	WR70x175	B 9808 0609
		115 x 305	WR115x305	B 9808 0610
	split-core	20 x 30	WS20x30	B 9808 0601
		50 x 80	WS50x80	B 9808 0603
		80 x 120	WS80x120	B 9808 0606

Other measuring current transformer types on request

Dimension diagram XM420

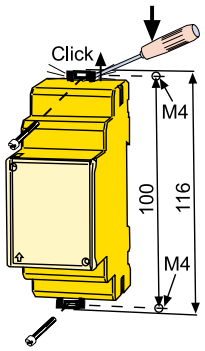
Dimensions in mm

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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