

LINETRAXX® RCM420

Residual current monitor for TN and TT systems
(AC and pulsed DC currents)





LINETRAXX® RCM420

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.

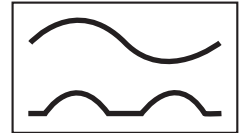
Connection monitoring

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).

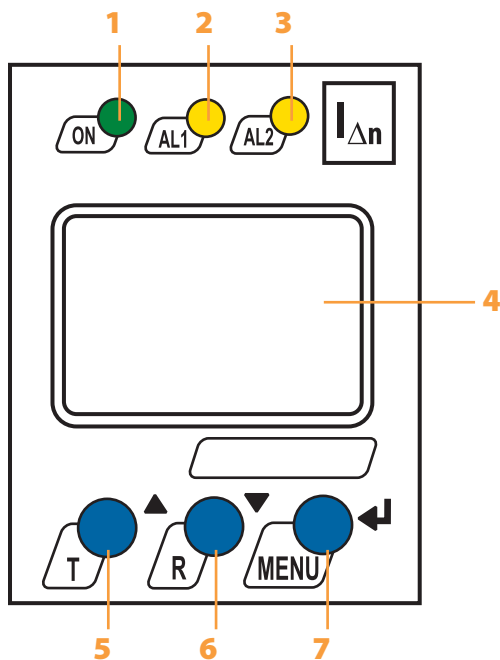
Restart function

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.

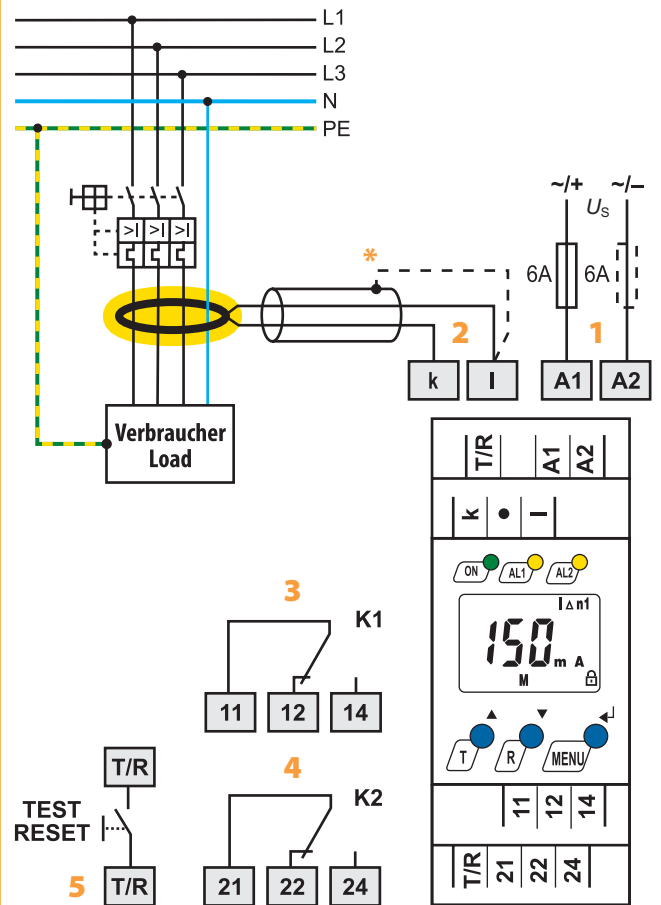


Operating and display elements



- 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

Rated insulation voltage	250 V
Rated impulse voltage/pollution degree	4 kV/3
Protective separation (reinforced insulation) between (A1, A2) - (k, l, T/R) - (11, 12, 14) - (21, 22, 24)	
Voltage tests according to IEC 61010-1	2.21 kV

Supply voltage

RCM420-D-1:

Supply voltage U_S	AC 16...72 V/DC 9.6...94 V
Frequency range U_S	42...460 Hz

RCM420-D-2:

Supply voltage U_S	AC/DC 70...300 V
Frequency range U_S	42...460 Hz
Power consumption	≤ 4 VA

Measuring circuit

External measuring current transformers type	W..., WR..., WS..., WF...
Load	68 Ω
Rated insulation voltage (measuring current transformer)	800 V
Operating characteristic acc. to IEC 62020	type A
Rated frequency	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% $\times I_{\Delta n2}$ (50%)*
Rated residual operating current $I_{\Delta n2}$ (alarm, AL2)	10 mA...10 A (30 mA)*
Hysteresis	10...25% (15%)*

Time response

Start-up 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...99 s (1 s)*
Operating time t_{ae} at $I_{\Delta n} = 1 \times I_{\Delta n1/2}$	≤ 180 ms
Operating time t_{ae} at $I_{\Delta n} = 5 \times I_{\Delta n1/2}$	≤ 30 ms
Response time t_{an}	$t_{an} = t_{ae} + t_{on1/2}$
Recovery time t_b	≤ 300 ms
Number of restart cycles	0...100 (0)*

Cable lengths for measuring current transformers

Single wire ≥ 0.75 mm ²	0...1 m
Single wire, twisted ≥ 0.75 mm ²	0...10 m
Shielded cable ≥ 0.75 mm ²	0...40 m

Shielded cable (shield on one side connected to terminal L of the RCM420, not connected to earth)	recommended: J-Y(St)Y min. 2 x 0.8
Connection	screw-type terminals

Displays, memory

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

Inputs/outputs

Cable length for external test/reset button	0...10 m
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Switching elements

Number of switching elements	2 x 1 changeover contact				
Operating principle	N/C operation or N/O operation (N/C operation)*				
Electrical endurance, 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	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 62020
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 mm ² (AWG 24...12)
flexible without ferrule	0.2...2.5 mm ² (AWG 24...12)
flexible with ferrule	0.2...1.5 mm ² (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
Degree of protection, internal components (DIN EN 60529)	IP30
Degree of protection, terminals (DIN EN 60529)	IP20
Enclosure material	polycarbonate
Screw mounting	2 x M4 with mounting clip
DIN rail mounting acc. to	IEC 60715
Flammability class	UL94 V-0
Operating manual	TGH1410
Weight	≤ 150 g

()* = factory setting

Ordering information

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

Device version with screw terminals on request.

¹⁾ Absolute values

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

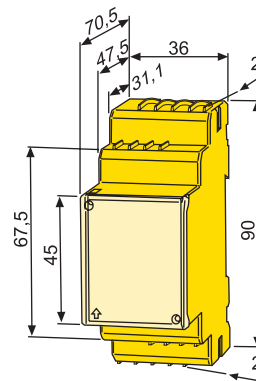
Accessories

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

Dimension diagram XM420

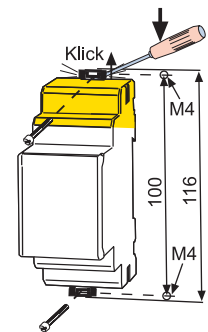
Dimensions in mm

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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