LINETRAXX® RCM420

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

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BENDER

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

Device features

- AC and pulsed DC sensitive residual current monitor Type A according to DIN EN 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)

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.

Approvals

UL508 – Standard for Industrial Control Equipment CSA C22.2 No. 14-13 – Industrial Control Equipment
UL File number E173157 (for all RCM420)

UL1053 – Standard for Safety Ground-Fault Sensing and Relaying Equipment
UL File number E478610
(Only for B74014002 and B94014002 and solely in combination with Marina Guard MG-1.3 and MG-T.3. If necessary, other applications are to be evaluated separately after consulting the manufacturer.)

Ordering information

Type	Supply voltage [1] *Us*	Art. No.	
		Screw-type terminal	Push-wire terminal
RCM420-D-1	AC 16…72 V, 40…460 Hz DC 9.6…94 V	B94014001	B74014001
RCM420-D-2	AC 70…300 V, 40…460 Hz DC 70…300 V	B94014002	B74014002

[1] Absolute values

Accessories

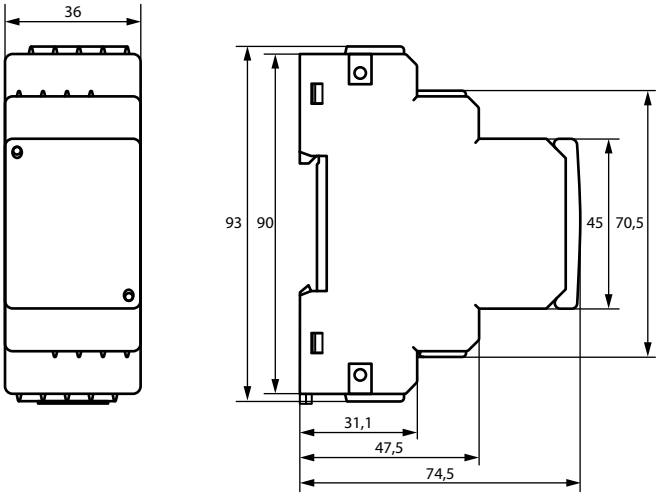
Type designation	Art. No.
Mounting clip for screw mounting (1 piece per device)	B98060008

Suitable system components

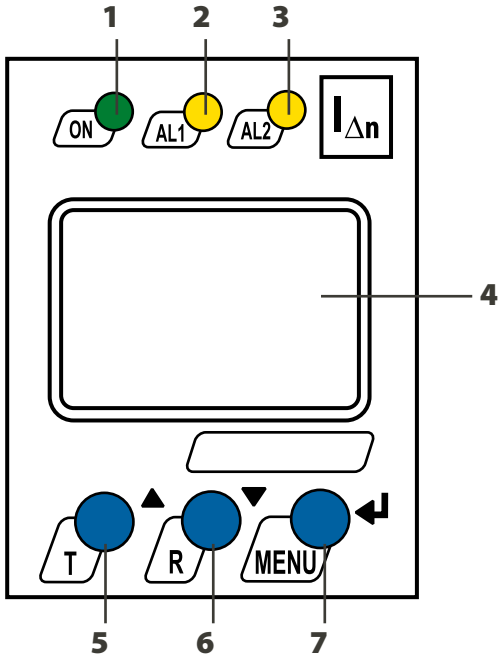
Type designation	Type of construction	Internal diameter (mm)	Type	Art. No.
Measuring current transformers	circular	ø 20	CTAC20	B98110005
		ø 35	CTAC35	B98110007
		ø 60	CTAC60	B98110017
		ø 120	CTAC120	B98110019
		ø 210	CTAC210	B98110020
	rectangular	70 x 175	WR70x175	B98080609
		115 x 305	WR115x305	B98080610
	split-core	20 x 30	WS20x30	B98080601
		50 x 80	WS50x80	B98080603
		80 x 120	WS80x120	B98080606

Other measuring current transformer types on request.

Dimension diagram XM420



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

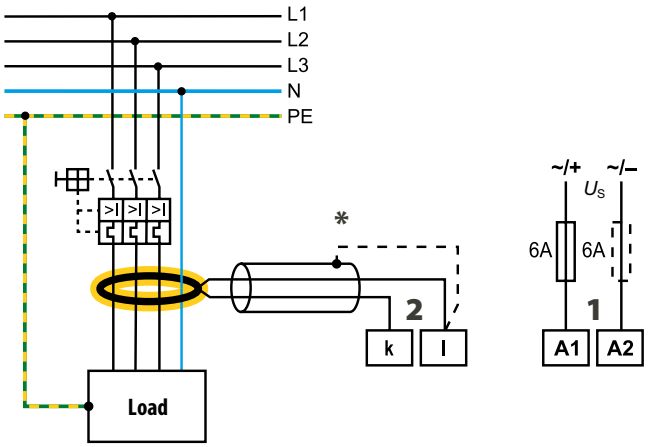
4 - Multi-functional LC display

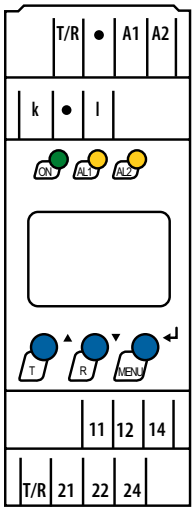
5 - Test button "T": to call up the self test.
Arrow up button: parameter change, to move up in the menu

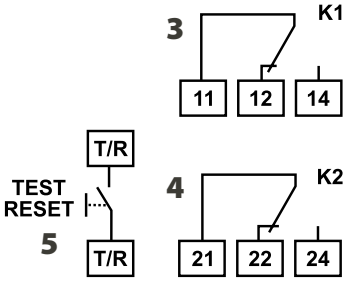
6 - Reset button "R": to delete saved alarms.
Arrow down button: parameter change, to move down in the menu

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 - **A1, A2** Supply voltage U_s see ordering information, 6 A fuse recommended

2 - **k, l** Connection of the external measuring current transformer

3 - **11, 12, 14** Alarm relay "K1": configurable for alarm $I_{\Delta n1}$/$I_{\Delta n2}$/ TEST/ERROR

4 - **21, 22, 24** Alarm relay "K2": configurable for alarm $I_{\Delta n1}$/$I_{\Delta n2}$/ TEST/ERROR

5 - **T/R** 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
Overvoltage category/pollution degree	III/3
Rated impulse voltage	2,5 kV

RCM420-D-2

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

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	CTAC…, WR…, WS…
Load	68 Ω
Rated insulation voltage (measuring current transformer)	800 V
Operating characteristic acc. to DIN EN 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 (relay manufacturer's reference)					10 mA/5 V DC

Environment/EMC

EMC	DIN EN 62020
Operating temperature	-25…+55 °C

Classification of climatic conditions acc. to IEC 60721
(related to temperature and relative humidity)

Stationary use (IEC 60721-3-3)	3K22
Transportation (IEC 60721-3-2)	2K11
Storage (IEC 60721-3-1)	1K22

Classification of mechanical conditions acc. to IEC 60721

Stationary use (IEC 60721-3-3)	3M11
Transportation (IEC 60721-3-2)	2M4
Storage (IEC 60721-3-1)	1M12

Connection

For UL application:
Use copper conductors only!
Use 60/70 °C copper conductors only!

Connection type	screw-type terminal or push-wire terminal

Screw-type terminal

Connection properties:	
rigid/flexible	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…9 mm
Tightening torque, terminal screws	0.5…0.6 Nm

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)	IP30
Degree of protection, terminals (DIN EN 60529	IP20
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

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