LINETRAXX® RCM420

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

RCM420_D00057_05_D_XXEN/09.2024

BENDER

Device features

- AC and pulsed DC sensitive residual current monitor Type A according to DIN EN 62020
- Adjustable switching hysteresis
- R.m.s. value measurement
- Starting delay, response delay and delay on release
- Measured value display via multi-functional LC display
- Alarm indication via LEDs (AL1, AL2) and changeover contacts (K1, K2)
- N/C operation or N/O operation selectable
- Password protection against unauthorized parameter changing
- Fault memory function can be switched off
- CT connection monitoring

Intended use

The AC and pulsed DC sensitive residual current monitor RCM420 (Type A) from Bender is designed for fault and residual current monitoring in earthed power supply systems (TN/ 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.

Two separately adjustable response ranges $I_{\Delta 1}$ and $I_{\Delta 2}$ allow to distinguish between prewarning and main alarm ($I_{\Delta 1}$ = 50…100 % of the set response value $I_{\Delta 2}$).

In order to meet the requirements of the applicable standards, customised parameter settings must be made on the equipment in order to adapt it to local equipment and operating conditions. Please heed the limits of the range of application indicated in the technical data. Any use other than that described in this manual is regarded as improper.

Function

Once the supply voltage U_s is applied, the starting delay is activated. Measured values changing during this time do not influence the switching state of the alarm relays.

Residual current measurement takes place via an external measuring current transformer of the CTAC…, WR… or WS… series.

The currently measured value is shown on the LC display. In this way any changes, for example when circuits are connected to the system, can be recognized easily.

If the measured value exceeds one or both response values, the response delays $t_{on1/2}$ start running. Once the response delay $t_{on1/2}$ has elapsed, the K1/ K2 alarm relays switch and the alarm LEDs AL1/AL2 light up.

If the residual current falls below the release value (response value minus hysteresis), the delay on release t_{off} begins. Once the release delay t_{off} has elapsed, the alarm relays return to their original state and the alarm LEDs AL1/AL2 go out. If the fault memory is activated, the alarm relays remain in the alarm state and the LEDs light until the reset button is pressed or until the supply voltage is interrupted.

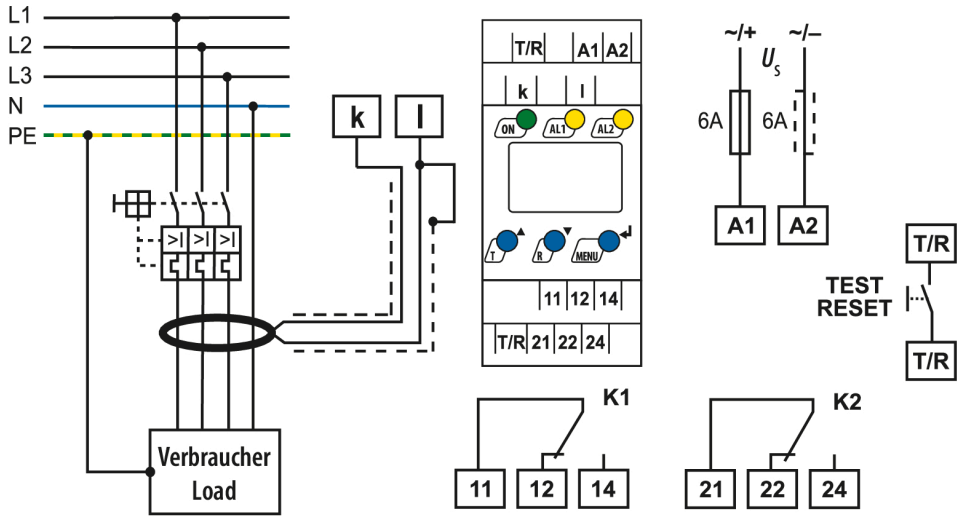
The device function can be tested using the test button. The parameterization of the device can be carried out via the LC display and the function keys integrated in the front plate and can be password-protected.

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 (Error Code E.01). After eliminating the fault, the alarm relays automatically return to their initial position, provided that the fault memory M is deactivated. With the fault memory activated, K1/ K2 return to their initial position by pressing the reset button R. A second cascaded measuring current transformer will not be monitored.

Wiring

Connect the device according the wiring diagram.



Terminal	Connections
A1, A2	Connection to supply voltage
k, l	Connection of measuring current transformers
T/R	Connection to the combined test/reset button
11, 12, 14	Alarm relay K1
21, 22, 24	Alarm relay K2

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	DC, 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	≤ 6.5 VA

Measuring circuit

External measuring current transformer type	CTAC…, WR…, WS…
Burden	68 Ω
Rated insulation voltage (measuring current transformer)	800 V
Operating characteristic acc. to IEC 62020	Typ 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 $I_{\Delta1}$ (prewarning, AL1)	50…100 % x$I_{\Delta2}$ (50 %)*
Rated residual operating current $I_{\Delta2}$ (main alarm, AL2)	AC / DC 10 mA…10 A (30 mA)*
Hysteresis	10…25 % (15 %)*

Specified time

Starting delay t	0…10 s (0.5 s)*
Response delay t_{on1} (prewarning)	0…10 s (1 s)*
Response delay t_{on2} (main alarm)	0…10 s (0 s)*
Delay on release t_{off}	0…300 s (1 s)*
Operating time t_{ae} at $I_{\Delta n}$ = 1 x $I_{\Delta1/2}$	≤ 180 ms
Operating time t_{ae} at$I_{\Delta n}$ = 5 x $I_{\Delta1/2}$	≤ 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)*

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 (on)*

Inputs/outputs

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

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
Cable	shielded, shield on one side connected to terminal l of the RCM420, not connected to earth
recommended	CAT6/CAT7 min. AWG23
alternatively	J-Y(St)Y min. 2x0.8
Connection	screw terminals

Switching elements

Number of switching elements	2 x 1 changeover contact
Operating principle	N/C operation/N/O operation (N/C operation)*
Electrical service life under rated operating conditions	10000 switching operations
Minimum contact load (relay manufacturer's reference)	10 mA/5 V DC

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

Environment/EMC

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

Classification of climatic conditions IEC 60721 (except condensation and formation of ice)

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

Option "W" data different from the standard version

Classification of climatic conditions acc. to IEC 60721 (condensation and formation of ice is possible)

Stationary use (IEC 60721-3-3)	3K23

Classification of mechanical conditions acc. to IEC 60721

Stationary use (IEC 60721-3-3)	3M12

Connection

For UL applications: Use copper wire only!	
For UL applications: Use 60/70 °C copper conductors only!	
Connection type **screw-type terminals**	
Connection properties	
rigid/flexible	0.2…4 / 0.2…2.5 mm² (AWG 24…12)
multi-conductor connection (2 conductors with the same cross section) rigid/flexible	0,2…1,5 / 0,2…1,5 mm² (AWG 24…16)
Stripping length	8…9 mm
Tightening torque	0.5…0.6 Nm
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	display oriented
Protection class, internal components (IEC 60529)	IP30
Protection class, terminals (IEC 60529)	IP20
Enclosure material	polycarbonate
Flammability class	UL94V-0
DIN rail mounting acc. to	IEC 60715
Screw mounting	2 x M4 with mounting clip
Software version	D240 V1.2x
Weight	≤ 150 g

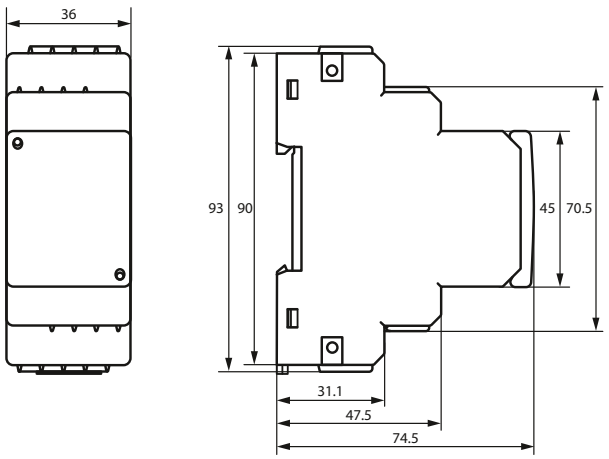
( )* = factory setting

Standards, approvals and certifications

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

UL1053 - Standard for Safety Ground-Fault Sensing and Relaying Equipment UL File number E478610 (Nur für B74014002 und B94014002 und ausschließlich in Kombination mit Marina Guard MG-1.3 und MG-T.3. Andere Anwendungen sind bei Bedarf nach Rücksprache mit dem Hersteller gesondert zu bewerten.)

Dimensions



Dimension diagram (in mm)

Ordering information

	RCM420-D-1	RCM420-D-2
Response range $I_{\Delta n}$	10 mA…10 A	
Rated frequency	42…2000 Hz	
Measuring current transformers	CTAC…, WR…, WS… series	
Supply voltage U_S*	DC 9.6…94 V / AC 42…460 Hz, 16…72 V	DC 70…300 V / AC 42…460 Hz, 70…300 V
Art. No. (B 7… = push-wire terminal)	B74014001 B94014001 B74014001W B94014001W	B74014002 B94014002

* Absolute values of the voltage range

External measuring current transformers

Type	Shape	Inner diameter	Art. No.	Manual No.
CTAC20	circular	ø 20 mm	B98110005	D00386
CTAC35		ø 35 mm	B98110007	
CTAC60		ø 60 mm	B98110017	
CTAC120		ø 120 mm	B98110019	
CTAC210		ø 210 mm	B98110020	
WR70x175S	rectangular	70 x 175 mm	B911738	D00144
WR115x305S		115 x 305 mm	B911739	
WR150x350S		150 x 350 mm	B911740	
WR200x500S		200 x 500 mm	B911763	
WR70x175SP		70 x 175 mm	B911790	
WR115x305SP		115 x 305 mm	B911791	
WR150x350SP		150 x 350 mm	B911792	
WR200x500SP		200 x 500 mm	B911793	
WS20x30	split-core	20 x 30 mm	B98080601	D00077
WS50x80		50 x 80 mm	B98080603	
WS80x120		80 x 120 mm	B98080606	

RCM420 accessories

	Art. No.
Mounting clip for screw fixing (1 piece per device)	B98060008

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