LINETRAXX® RCMA420

Residual current monitor
for monitoring AC and (pulsed) DC currents
$I_{\Delta n}$ = 10…500 mA in TN and TT systems

RCMA420_D00059_03_D_XXEN/07.2024

BENDER

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Device features

- AC/DC sensitive residual current monitor Type B according to IEC 62020 and IEC 60755
- Two separately adjustable response ranges (prewarning, alarm)
- 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/DC sensitive residual current monitor RCMA420 is designed for use in earthed systems (TN and TT systems) where DC and AC fault currents may occur.

These are in particular loads containing six-pulse rectifiers or one way rectifiers with smoothing, such as converters, battery chargers, construction site equipment with frequency-controlled drives. Two separately adjustable response ranges allow to distinguish between prewarning ($I_{\Delta n1}$ = 50…100 % of the set response value $I_{\Delta n2}$) and alarm ($I_{\Delta n2}$). Since the values are measured with measuring current transformers, the RCMA is nearly independent of the nominal voltage and the load current of the system being monitored.

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 CTUB101- CTBC20…60.

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.

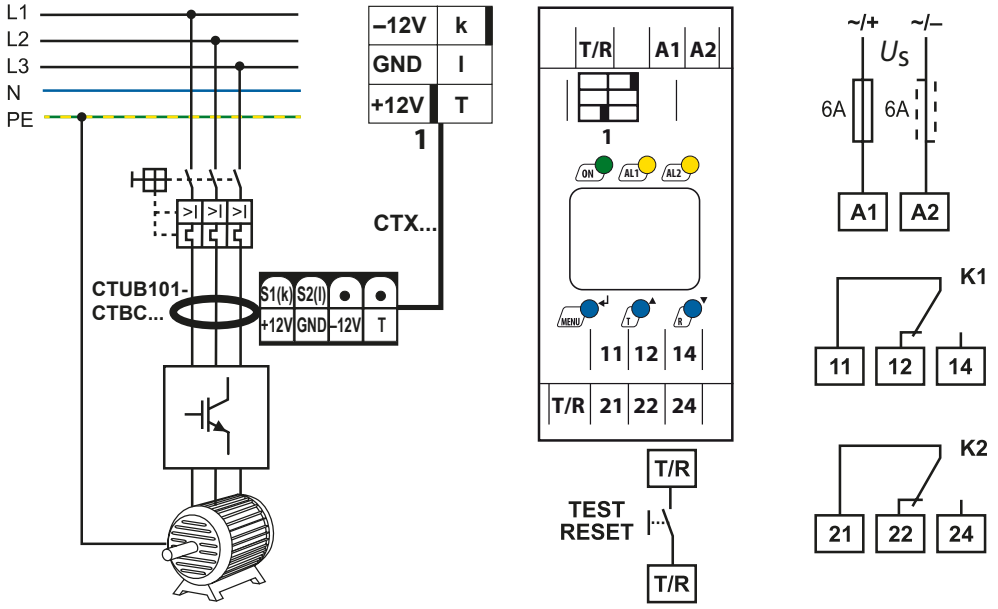
The device function can be tested using the test button. The parameterization of the device can be carried out via the LC display and the function keys integrated in the front plate and can be password-protected.

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.

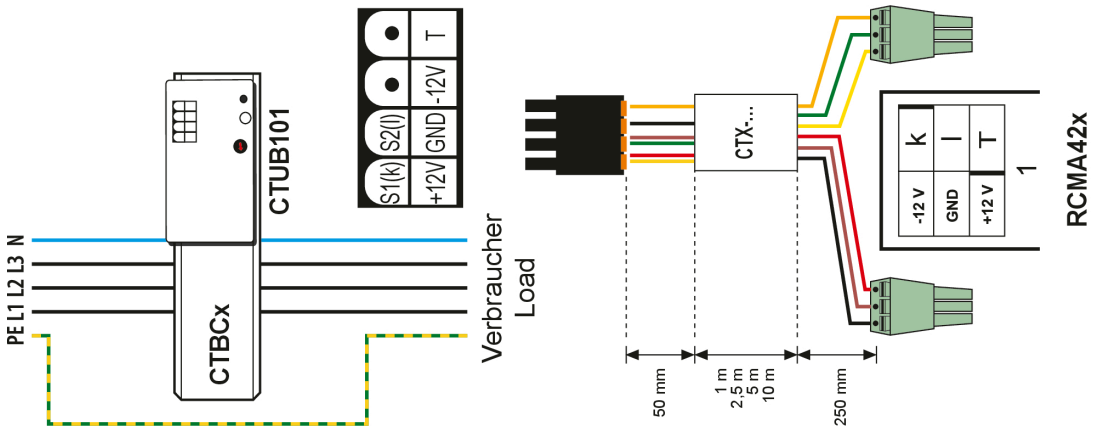
Wiring

Connect the device according the wiring diagram.
Observe the manuals of the respective measuring current transformer.



Terminal	Connections
A1, A2	Connection for supply voltage Us
1	Socket for the connecting cable CTX… to the measuring current transformer
T/R	Connection for combined test and reset button
11, 12, 14	Alarm relay K1
21, 22, 24	Alarm relay K2

Connection of measuring current transformers



Connection to the RCMA420 residual current monitor using the CTX-… connecting cable. Colour coding for CTX…: k = yellow, I = green, -12 V = black, GND = brown, +12 V = red, Test (T) = orange

Technical data

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

RCMA42x-D-1	
Rated insulation voltage	100 V
Overvoltage category/pollution degree	III/3
Rated impulse voltage	2.5 kV
RCMA42x-D-2	
Rated insulation voltage	250 V
Overvoltage category/pollution degree	III/3
Rated impulse voltage	4 kV

Supply voltage

RCMA420-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 rangeU_s	DC, 42…460 Hz
RCMA420-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	CTUB101-CTBC20…60
Rated insulation voltage (measuring current transformer)	800 V
Operating characteristic acc. to IEC 62020-1 and IEC 60755	Typ B
Frequency range	0…2000 Hz
Measuring range AC	0…1.5 A
Measuring range DC	0…600 mA
Relative uncertainty at	
f ≤ 2 Hz	0…-35 %
f > 2…< 16 Hz	-35…+100 %
f ≥ 16… ≤ 1000 Hz	0…-35 %
f > 1000…≤ 2000 Hz	±35 %
Operating uncertainty	±17.5 %

Response values

Rated residual operating current $I_{\Delta n1}$ (prewarning, AL1)	50…100 % x $I_{\Delta n2}$ (50 %)*
Rated residual operating current $I_{\Delta n2}$ (main alarm, AL2)	AC / DC 10…500 mA (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…99 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)*

Displays, memory

Display range, measured value AC	0…1.5 A
Display range, measured value DC	0…600 mA
Error of indication	±17.5 % / ± 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

Connection CTX…	1 m / 2.5 m / 5 m / 10 m
or alternatively: single wire 6 x 0.75 mm²	0…10 m

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

Connection

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

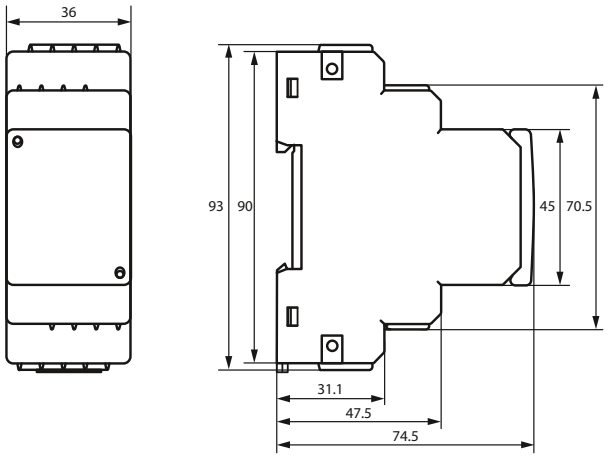
Other

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	D242 V1.2x
Weight	≤ 150 g

( )* = factory setting

Standards, approvals and certifications

Dimensions



Dimension diagram (in mm)

Ordering information

	RCMA420-D-1	RCMA420-D-2
Response range $I_{\Delta n}$	10…500 mA	
Rated frequency	0…2000 Hz	
Measuring current transformers	CTUB101-CTBC… 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)	B74043001 B94043001	B74043002 B94043002

* Absolute values of the voltage range

External measuring current transformers

Type	Inner diameter	shielded	Art. No.
CTUB101-CTBC20	ø 20 mm	—	B78120010
CTUB101-CTBC20P		X	B78120020
CTUB101-CTBC35	ø 35 mm	—	B78120012
CTUB101-CTBC35P		X	B78120022
CTUB101-CTBC60	ø 60 mm	—	B78120014
CTUB101-CTBC60P		X	B78120024

Measuring current transformer connecting cable

Type	Length (m)	Art. No.
CTX-100	1	B98110080
CTX-250	2,5	B98110081
CTX-500	5	B98110082
CTX-1000	10	B98110083

RCMA42… accessories

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

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