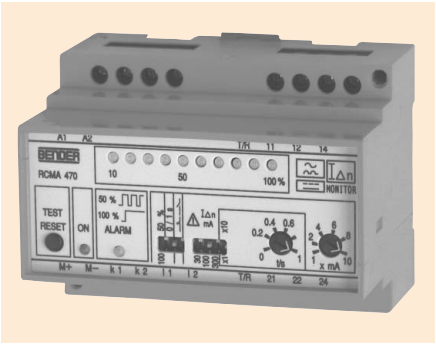
Residual current monitor RCMA470LY

AC/DC sensitive residual current monitor for TN and TT systems (AC, DC, pulsating DC currents)



RCMA470LY

Device features

- External measuring current transformer
- Two response values:
  Alarm $I_{\Delta n1}$: 30 mA…3 A (0…150 Hz)
  Prewarning $I_{\Delta n2}$: 50 % of $I_{\Delta n1}$
- Time delay, adjustable 0…10 s (prewarning 0 / 1 s)
- Two separate alarm relays with one voltage free changeover contact each
- N/O / N/C operation, selectable
- Fault memory behaviour
- Combined test and reset button
- Connection for external test and reset button
- LED bar graph indicator $I_{\Delta n}$ 0…100 %
- Connection external measuring instrument $I_{\Delta n}$ 0…100 %
- CT connection monitoring
- Transparent dust cover for ingress protection
- Separate supply voltage
- Type B according to IEC 60755 A2

Approvals

c UL us LISTED

Product description

The AC/DC sensitive residual current monitor RCMA470LY is designed for monitoring earthed systems (TN and TT systems), where smooth DC fault currents or residual currents continuously greater than zero may occur. These are in particular loads including six-pulse rectifiers or one way rectifiers with smoothing, such as converters, battery chargers, uninterruptible power supply systems (UPS), construction site equipment with frequency-controlled drives.

The prewarning stage (50 % of the set reponse value $I_{\Delta n1}$) allows to distinguish between prewarning and alarm. The measuring values are detected via measuring current transformers, therefore the device is nearly independent of the load current and nominal voltage of the system. The device is also suitable for busbar systems.

Application

- AC/DC sensitive residual current monitoring in earthed two, three or four conductor systems (TN and TT systems)
- AC/DC sensitive current monitoring of single conductors de-energized under normal conditions (e. g. N and PE conductors)
- Variable-speed drives
- Uninterruptible power supply systems (UPS)
- Construction site equipment
- Wood working machines
- Battery systems
- Computer tomographs
- Laboratory equipment
- Photovoltaics systems
- Furniture industry

Function

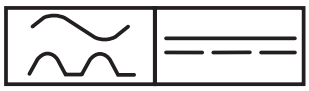
The residual current is measured using an external measuring current transformer. When the current respectively the residual current exceeds the set response value, the respective alarm LED lights up and the associated alarm relay switches after the expiry of the set response delay.

The alarm messages are stored. The alarm messages can be reset by pressing the reset button. The function of the device can be tested using the test button.

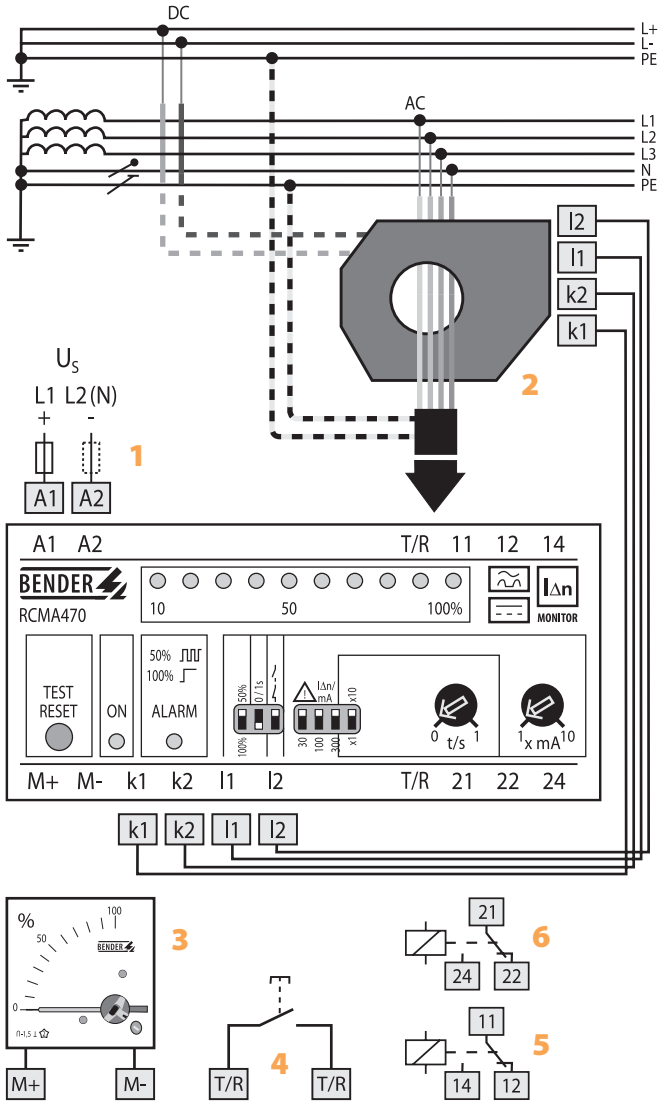
The currently measured value in per cent related to the set response value is indicated on the LED bar graph indicator. The CT circuit is continuously monitored. In case of wire breakage, the alarm relay switches and the Power On LED flashes.

Standards and regulations

The residual current monitor RCMA470LY complies with the requirements of DIN EN 62020 (VDE 0663): 1999-07, IEC 62020: 2003-11.



Wiring diagram – system connection, external connections



1 - Supply voltage U_S see ordering details, a 6 A fuse is recommended

2 - External measuring current transformer W…A-…

3 - External measuring instrument

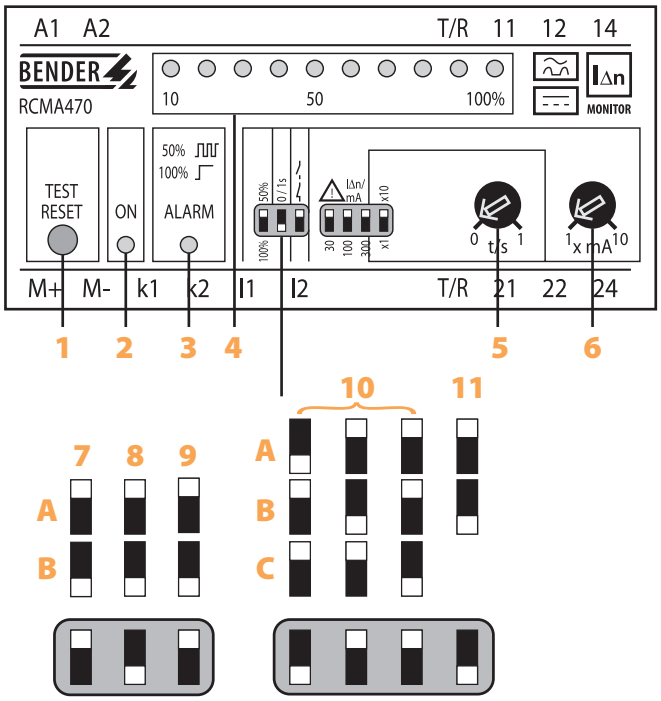
4 - External test and reset button

5 - Alarm relay: switches when the fault current exceeds the response value of $I_{\Delta n1}$ (alarm stage) and in case of CT interruption

6 - Alarm relay: switches when the fault current exceeds 50 % or 100 % of $I_{\Delta n1}$

Note ! Do not lead the PE conductor through the measuring current transformer !

Wiring diagram – frontplate



1 - Combined test and reset button: short-time pressing (< 1 s) = RESET; long-time pressing (> 2 s) = TEST

2 - Power ON LED: lights indicating that the device is in operation and flashes in case of interruption of the CT connection, defective CT or when the measuring range is exceeded.

3 - Alarm LED: lights when the fault current exceeds the set response value and flashes when 50 % of the set response value are reached.

4 - LED bar graph indicator, indicates the measured value in % related to the set response value

5 - Potentiometer for setting the response delay (0…1 s)

6 - Potentiometer for setting the response value $I_{\Delta n}$/mA x 1…10

Setting of the DIP switches (white = switch position)

7 - Contact 21-22-24 (prewarning)
- A - at 50 % of $I_{\Delta n1}$
- B - at 100 % of $I_{\Delta n1}$

8 - Time delay prewarning
- A - delay 1 s
- B - delay 0 s

9 - Operating principle alarm relay
- A - N / O operation
- B - N / C operation

10 - Response range
- A - 30 mA
- B - 100 mA
- C - 300 mA

} x 1 … 10

11 - Response delay
- A - setting $^t/_S$ x 10
- B - setting $^t/_S$ x 1

Technical data residual current monitor RCMA470LY

Insulation coordination acc. to IEC 60664-1:

Rated voltage	AC 250 V
Rated impulse voltage / pollution degree	4 kV / 3

Voltage ranges

Supply voltage U_S	see ordering details
Operating range of U_S (AC)	0.85…1.1 x U_S
Frequency range of U_S	DC / 50…60 Hz
Power consumption	≤ 3.5 VA

Measuring circuit

Type of external measuring current transformer	W.-A….
Operating characteristics acc. to IEC 60755	type B
Rated residual operating current $I_{\Delta n2}$ (prewarning)	50 % / 100 % of $I_{\Delta n1}$
Response delay t_v	0 / 1 s
Rated residual operating current $I_{\Delta n1}$ (alarm)	30 mA…3 A
Response delay t_v, adjustable	0…10 s
Rated frequency	0…150 Hz
Relative percentage error	see table "conditions of operation"
Hysteresis	approx. 25 % of the response value
Response time t_{an} at $I_{\Delta n1} = 5 \times I_{\Delta n1/2}$ ($t_v = 0$ s)	< 40 ms
Response time t_{an} at $I_{\Delta n1} = 1 \times I_{\Delta n1/2}$ ($t_v = 0$ s)	< 70 ms

Displays and LEDs

LED bar graph indicator	0…100 %
LEDs	Power On, prewarning, alarm

Inputs / outputs

Test / reset button	internal, external
Cable length test / reset button	≤ 10 m
Current output measuring instrument 0…100 %	DC 0…400 µA
Load	≤ 12.5 kΩ
Connection to CT:	
single wire 4 x 0.75 mm²	0…10 m

Switching elements

Switching elements	2 changeover contacts for "prewarning" and "alarm" stage
Operating principle	N/C / N/O operation
Electrical endurance, number of cycles	12000
Rated contact voltage	AC 250 V / DC 300 V
Limited making capacity	AC / DC 5 A
Limited breaking capacity	2 A, AC 230 V, cos phi = 0.4
	0.2 A, DC 220 V, L / R = 0.04 s
Fault memory behaviour	automatic fault storage

General data

EMC immunity	acc. to EN 61543
EMC emission	acc. to EN 61000-6-4
Shock resistance IEC 60068-2-27 (device in operation)	15 g / 11 ms
Bumping IEC 60068-2-29 (during transport)	40 g / 6 ms
Vibration resistance IEC 60068-2-6 (device in operation)	1 g / 10…150 Hz
Vibration resistance IEC 60068-2-6 (device out of operation)	2 g / 10 … 150 Hz
Ambient temperature (during operation)	- 25 °C…+ 70 °C
Storage temperature range	- 40 °C…+ 75 °C
Climatic category DIN IEC 60721-3-3	3K5
Operating mode	continuous operation
Position	any position
Connection	screw terminals
Cross sectional area of connecting cable	
Rigid, flexible	0.2…4 mm² / 0.2…2.5 mm²
Flexible with ferrules without / with plastic collar	0.25…2.5 mm²
Conductor sizes (AWG)	24-12
Degree of protection DIN EN 60529	
Internal components	IP 30
Terminals	IP 20
Type of enclosure	X470
Enclosure, material	polycarbonate
Screw fixing	2 x M4
DIN rail mounting acc. to	DIN EN 60715 / IEC 60715
Installation into standard distribution panels acc. to	DIN 43871
Flammability class	UL94V-0
Instruction leaflet	404001
Weight	approx. 350 g

Ordering details

Type	Response range $I_{\Delta n}$	Rated frequency	Time delay	Measuring current transformer	Indication	Fault storage behaviour	Supply voltage U_S	Art. No.
RCMA470LY	30 mA…3 A	0…150 Hz	0…10 s	W1-A35S, W2-A70S	internal / external	automatic fault storage	AC 230 V	B 9404 2001[2)]
RCMA470LY-13	30 mA…3 A	0…150 Hz	0…10 s	W1-A35S, W2-A70S	internal / external	automatic fault storage	AC 90…132 V*	B 9404 2003[2)]
RCMA470LY-21	30 mA…3 A	0…150 Hz	0…10 s	W1-A35S, W2-A70S	internal / external	automatic fault storage	DC 9.6…84 V*	B 9404 2008[1)]
RCMA470LY-23	30 mA…3 A	0…150 Hz	0…10 s	W1-A35S, W2-A70S	internal / external	automatic fault storage	DC 77…286 V*	B 9404 2009[1)]

Other supply voltages on request

* absolute values of the operating range

[1)] for industrial applications only

[2)] for household and industrial applications

Accessories

External measuring current transformers

Type	Internal diameter (mm)	Art. No.
W1-A35S	ø 35	B 911 744
W2-A70S	ø 70	B 911 746

External measuring instrument

Type	Indication	Size (mm)	Art. No.
9604-4241	0…100 %	96 x 96	B 986 807

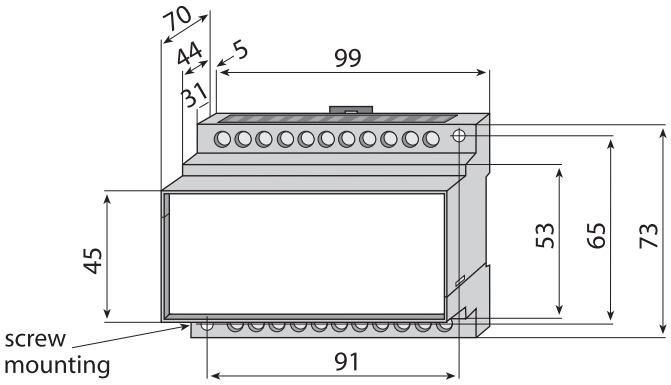
Measuring transducer

Type	Input	Output	Art. No.
RK170	0…400 µA	0…10 V / 0/4…20 mA	B 9804 1500

Conditions of operation according to IEC 62020, IEC 60755 amendment 2, type B

Type of current	Wave form	Tripping current
Alternating currents (50 Hz)		0.5…1 x $I_{\Delta n}$
Residual pulsating direct currents (positive and negative half waves) half-wave current		0.5…1.4 x $I_{\Delta n}$
Phase-controlled half-wave currents Current delay angle 90° el / 135° el		0.5…1.4 x $I_{\Delta n}$
Half-wave current superimposed by a smooth direct current of 6 mA		0.5…1.4 x $I_{\Delta n}$
Smooth DC residual current		0.5…2 x $I_{\Delta n}$

Dimension diagram, enclosure X470



Dimensions in mm