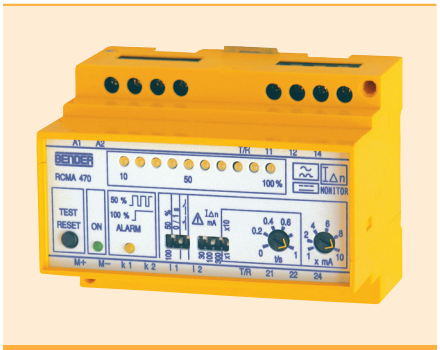
Ground fault monitor RCMA470LY

Ground Fault Monitor / Ground Fault Relay for Grounded AC, DC, and AC/DC Systems



RCMA470LY

Device features

- External measuring current transformer
- Two separately adjustable response values, Alarm $I_{\Delta n1}$: 30 mA…3 A (0…150 Hz) Prewarning $I_{\Delta n2}$: 50 % / 100 % of $I_{\Delta n1}$
- Adjustable response delay 0…10 s (prewarning 0 / 1 s)
- Two separate voltage-free SPDT contacts
- Selectably operates normally energizsed or normally de-energized
- Latching operation
- TEST / RESET button, internal / external
- LED bar graph indicator $I_{\Delta n}$ 0…100 %
- Connection for optional external measuring instrument $I_{\Delta n}$ 0…100 %
- CT connection monitoring
- Sealable transparent cover
- Separate supply voltage
- Type B acc. to IEC 60755

Approvals

c UL us LISTED AE25

Product description

The RCMA470LY monitors for ground faults in grounded and high-resistance grounded AC (both single- and three-phase), DC, and mixed AC/DC systems. The RCMA470LY is specially designed to provide advanced warning of developing ground faults without the problems associated with high sensitivity nuissance tripping.

A wide, steplessly adjustable setpoint range allows for flexibility in a variety of systems. In addition to the standard setpoint setting, a prewarning alarm of either 50% or 100% is available. These two alarms control two SPDT contacts which allow for information transmission (such as to a PLC) or power interruption (such as through a contactor or shunt trip breaker).
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. This device uses current transformers up to 60 mm (2.3") in diameter. For systems requiring larger current transformers, please refer to the RCMA471LY.

Application

- Ground fault detection in single- or three-phase AC systems
- Ground fault detection in pure DC or mixed AC/DC systems
- Variable frequency drives (VFDs)
- Uninterruptible power supplies (UPS)
- Construction site equipment
- Battery backup systems
- Laboratory equipment
- Photovoltaic systems

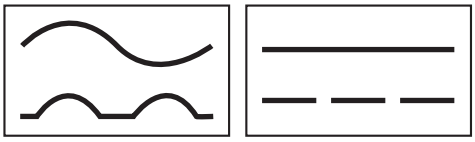
Function

Measurements of the system's ground fault current are taken via an external current transformer. All phases (including the neutral if one exists) are placed through the current transformer. The currently measured value (measured as a percentage of the setpoint) is indicated on the LED bar graph.

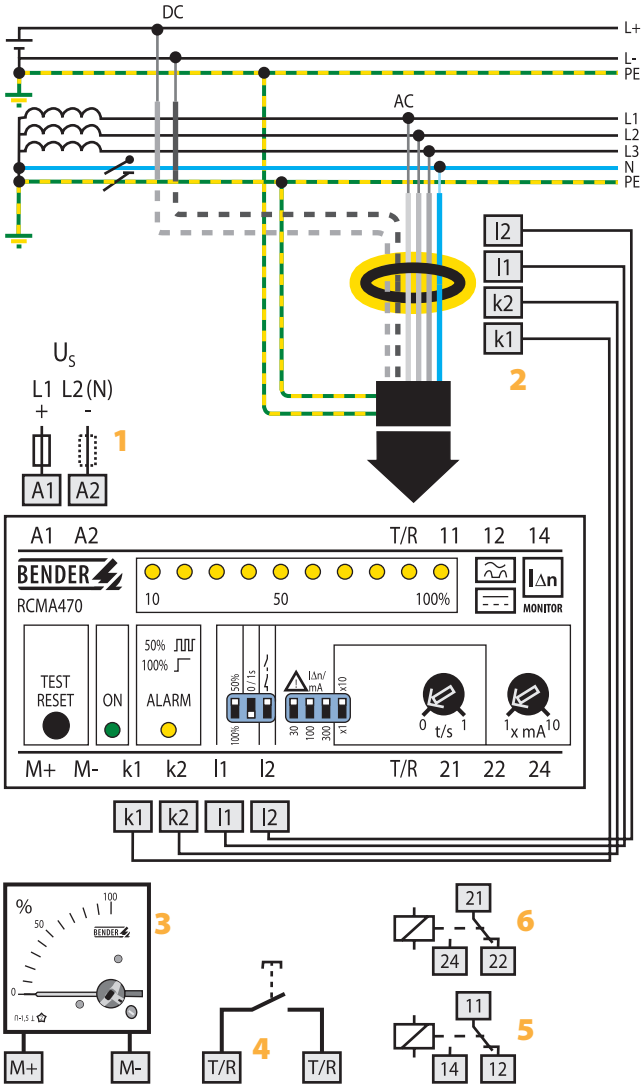
If the measured value exceeds one or both response values, the respective contacts switch over and the alarm LEDs activate after the time delay has expired. After the ground fault clears, the alarms will not clear until the device is reset manually or the supply voltage is lost.

The TEST function allows for an internal operation testing of the device. Settings are modified via the device's DIP switches and potentiometers.

The connections between the device and the external current transformer are continuously monitored. If the device detects a connection error, the CT connection monitoring alarm will activate, and the contacts will change over without delay.



Wiring diagram – system connection, external connections



1 - Supply voltage U_S (see ordering information), a 6 A fuse recommended for internal protection.

2 - Connection to external current transformer. For AC, all pha ses (including a neutral if one exists) are placed through. For DC, both legs are placed through.

3 - Optional external measuring instrument

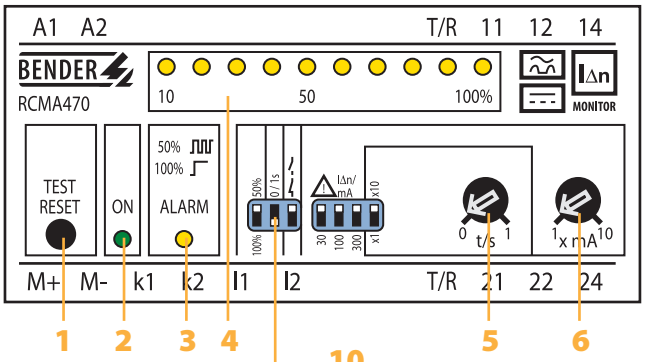
4 - External TEST and RESET button connection

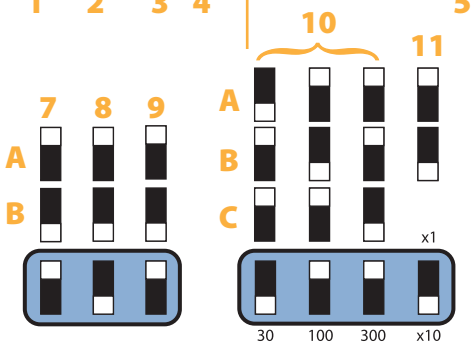
5 - Alarm relay: Switches over when the alarm value is exceeded or when the CT connection alarm is active.

6 - Alarm relay: Switches over when the prewarning value is exceeded or the CT connection alarm is active.

Do not route the ground conductor through the measuring current transformer when also routing through the power conductors!

Device setup





1 - Combined TEST and RESET button: short depress (< 1 s) = RESET, hold (> 2 s) = TEST.

2 - Power On LED: Illuminates when power is received to the device. Flashes when the CT connection alarm is active.

3 - Alarm LED: Illuminates when the response value has been exceeded. Flashes when the prewarning alarm is exceeded.

4 - LED bar graph indicator: Displays the measured value as a percentage of the preset response value.

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

6 - Potentiometer for setting the response value (x 1…10 mA).

DIP switch settings (white = switch position)

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

8 - Prewarning response delay
- A - Delay 1 s
- B - Delay 0 s

9 - Alarm relay
- A - Normally de-energized operation
- B - Normally energized operation

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

} x 1…10

11 - Response delay
- A - Setting value t / s x 10
- B - Setting value t / s x 1

4.2

4.2

Technical data residual current monitor RCMA470LY

Insulation coordination acc. to IEC 60664-1

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

Voltage ranges

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

Measuring circuit / response values

External measuring current transformer	W…B series
Operating characteristic 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	0…- 25 %
Hysteresis	approx. 25 % of the response value
Response time t_{an} at $I_{\Delta n1} = 1$ x $I_{\Delta n1\,/\,2}$ ($t_v = 0$ s)	< 70 ms
Response time t_{an} at $I_{\Delta n1} = 5$ x $I_{\Delta n1\,/\,2}$ ($t_v = 0$ s)	< 40 ms

Displays

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

Inputs / outputs

TEST and RESET button	internal / external
Cable length external TEST and RESET button	≤ 32.8 ft (10 m)
Current source for external measuring instrument 0…100 %	DC 0…400 µA
Load	≤ 12.5 kΩ

Cable lengths for measuring current transformers

Single wire ≥ AWG 20 (0.75 mm²)	0…32.8 ft (0…10 m)

Switching elements

Number of switching elements	2 SPDT contacts
Operating principle, adjustable	normally energized or de-energized
Electrical endurance, number of cycles	12000
Rated contact voltage	AC 250 V / DC 300 V
Limited making capacity	AC / DC 5 A
Breaking capacity	2 A, AC 230 V, PF = 0,4 0.2 A, DC 220 V, L / R = 0.04 s
Fault memory behavior	Latching operation

General data

EMC immunity	acc. to EN 61543
EMC emission	acc. to EN 61000-6-4
Shock resistance IEC 60068-2-27 (during operation)	15 g / 11 ms
Bumping IEC 60068-2-29 (during transport)	40 g / 6 ms
Vibration resistance IEC 60068-2-6 (during operation)	1 g / 10…150 Hz
Vibration resistance IEC 60068-2-6 (during transport)	2 g / 10…150 Hz
Ambient temperature, during operation	- 25 °C…+ 70 °C
Ambient temperature, when stored	- 40 °C…+ 75 °C
Climatic category IEC 60721-3-3	3K5
Operating mode	continuous operation
Mounting	any position
Connection	screw terminals
Connection properties	
rigid / flexible	AWG 24…12 / 24…14
flexible with ferrules without / with plastic collar	AWG 24…14
Conductor sizes (AWG)	24…12
Protection class, internal components (IEC 60529)	IP30, NEMA 1
Protection class, terminals (IEC 60529)	IP20, NEMA 1
Type of enclosure	X470
Enclosure material	polycarbonate
Screw mounting	2 x M4
DIN rail mounting acc. to	IEC 60715
Flammability class	UL94V-0
Standards	IEC 62020
Instruction leaflet	BP404001
Weight	≤ 350 g

Ordering information

Type	Response range $I_{\Delta n}$	Rated frequency	Time delay	Measuring current transformers	Fault memory	Indication	Supply voltage U_S	Art. No.
RCMA470LY	30 mA…3 A	0…150 Hz	0…10 s	W35B, W60B	internal / external	×	AC 230 V	B 9404 2001[2]
RCMA470LY-13	30 mA…3 A	0…150 Hz	0…10 s	W35B, W60B	internal / external	×	AC 90…132 V*	B 9404 2003[2]
RCMA470LY-21	30 mA…3 A	0…150 Hz	0…10 s	W35B, W60B	internal / external	×	DC 9.6…84V*	B 9404 2008[1]
RCMA470LY-23	30 mA…3 A	0…150 Hz	0…10 s	W35B, W60B	internal / external	×	DC 77…286V*	B 9404 2009[1]

Other supply voltages on request

[1] For industrial application only

* Absolute values of the operating range

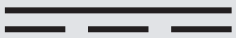
[2] For industrial and household applications.

Accessories

External measuring current transformers		
Type	**Inside diameter (mm)**	**Art. No.**
W35B	ø 35	B 9808 0013
W60B	ø 60	B 9808 0021

External measuring instrument			
Type	**Display range**	**Size (mm)**	**Art. No.**
9604-4241	0…100 %	96 x 96	B 986 807

Measuring converter			
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 $I_{\Delta n}$
Pulsed DC residual 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 X470

Dimensions in mm