Ground fault monitor
RCMA471LY

Device features

- External measuring current transformer
- Two separately adjustable response values
  - Alarm $I_{Δn1}$: 300 / 100 mA...3 A (0...60 Hz),
  - Prewarning $I_{Δn2}$: 50 % / 100 % of $I_{Δn1}$
- Adjustable response delay 0...10 s
  (prewarning 0 / 1 s)
- Two separate voltage-free SPDT contacts
- Selectably operates normally energized or normally de-energized
- Latching operation
- Combined TEST and RESET button
- Connection external TEST and RESET button
- LED bar graph indicator $I_{Δn}$ 0...100 %
- Connection for optional external measuring instrument $I_{Δn}$ 0...100 %
- CT connection monitoring
- Sealable transparent cover
- Separate supply voltage
- Type B acc. to IEC 60755

Approvals

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 nuisance tripping.

A wide, steplessly adjustable range allows for flexibility in a variety of systems. In addition to the standard setpoint setting, a prewarning setting for 50% or 100% of the main alarm is available. These two alarms control two voltage-free SPDT contacts, allowing 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 of 120 mm (4.7”) and 210 mm (8.2”). For systems with smaller wire gauges, please refer to the RCMA470LY.

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
- Systems with larger wire gauges

Function

Measurements of the system’s ground fault current are taken via external current transformers. 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 of the 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 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 active and the contacts will change over without delay.
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 phases (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 main alarm or the CT connection alarm is active.

6. Alarm relay: Switches over when the prewarning alarm or the CT alarm is active.

**Do not route ground through with the power conductors!**
Technical data: Ground fault monitor RCMA471LY

**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 to 1.1 times $U_S$
- 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 $I_{\Delta n 2}$ (prewarning): 50% of $I_{\Delta n 1}$
- Response delay $t_v$: 0...1 s
- Rated residual operating current $I_{\Delta n 1}$ (alarm): W120B: 100 mA...3 A, W210B: 300 mA...3 A
- Response delay $t_v$, adjustable: 0...10 s
- Rated frequency: 0...60 Hz
- Relative percentage error: 0...-25%
- Hysteresis: approx. 25% of the response value
- Response time $t$ at $I_{\Delta n 1} = 5 x I_{\Delta n 1}/2$: $t_v = 0$ s
  - ≤ 70 ms
- Response time $t$ at $I_{\Delta n 1} = I_{\Delta n 1}/2$: $t_v = 0$ 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: ≤ 10 m
- Current source for external measuring instrument: 0...100 %
- Load: DC 0...400 µA
  - ≤ 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 60608-2-27 (during operation): 15 g / 11 ms
- Bumping IEC 60608-2-29 (during transport): 40 g / 6 ms
- Vibration resistance IEC 60608-2-6 (during operation): 1 g / 10...150 Hz
- Vibration resistance IEC 60608-2-6 (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: 3KS
- Operating mode: continuous operation
- Mounting: any position
- Connection: screw terminals
- Connection properties:
  - rigid / flexible: 0.2...4 / 0.2...2.5 mm²
  - Flexible with ferrules without / with plastic collar: 0.25...2.5 mm²
- 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: BP404002
- Weight: ≤ 350 g

**Ordering information**

<table>
<thead>
<tr>
<th>Type</th>
<th>Response range $I_{\Delta n}$</th>
<th>Rated frequency</th>
<th>Time delay</th>
<th>Measuring current transformers</th>
<th>Indication</th>
<th>Fault memory</th>
<th>Supply voltage $U_S$</th>
<th>Art. No.</th>
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<td>300 / 100 mA...3 A</td>
<td>0...60 Hz</td>
<td>0...10 s</td>
<td>W120B, W210B</td>
<td>internal / external</td>
<td>×</td>
<td>AC 230 V</td>
<td>B 9404 2005 2)</td>
</tr>
<tr>
<td>RCMA471LY-13</td>
<td>300 / 100 mA...3 A</td>
<td>0...60 Hz</td>
<td>0...10 s</td>
<td>W120B, W210B</td>
<td>internal / external</td>
<td>×</td>
<td>AC 90...132 V*</td>
<td>B 9404 2006 2)</td>
</tr>
<tr>
<td>RCMA471LY-21</td>
<td>300 / 100 mA...3 A</td>
<td>0...60 Hz</td>
<td>0...10 s</td>
<td>W120B, W210B</td>
<td>internal / external</td>
<td>×</td>
<td>DC 9.6...84 V*</td>
<td>B 9404 2010 1)</td>
</tr>
<tr>
<td>RCMA471LY-23</td>
<td>300 / 100 mA...3 A</td>
<td>0...60 Hz</td>
<td>0...10 s</td>
<td>W120B, W210B</td>
<td>internal / external</td>
<td>×</td>
<td>DC 77...286 V*</td>
<td>B 9404 2011 1)</td>
</tr>
</tbody>
</table>

Other supply voltages on request

1) For industrial application only
2) For industrial and household applications

* Absolute values of the operating range
## Conditions of operation according to IEC 62020, IEC 60755 amendment 2, Type B

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<th>Wave form</th>
<th>Tripping current</th>
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<td>![Alternating current waveform]</td>
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<td>Pulsed DC residual currents (positive and negative half waves)</td>
<td>![Pulsed DC residual current waveform]</td>
<td>0.5...1.4 x I(\Delta n)</td>
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<tr>
<td>Phase-controlled half-wave currents</td>
<td>![Phase-controlled half-wave currents waveform]</td>
<td>0.5...1.4 x I(\Delta n)</td>
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<tr>
<td>Current delay angle 90° el – 135° el</td>
<td>![Phase-controlled half-wave currents waveform]</td>
<td>0.5...1.4 x I(\Delta n)</td>
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<tr>
<td>Half-wave current superimposed by a smooth direct current of 6 mA</td>
<td>![Half-wave current superimposed by a smooth direct current waveform]</td>
<td>0.5...1.4 x I(\Delta n)</td>
</tr>
<tr>
<td>Smooth DC residual current</td>
<td>![Smooth DC residual current waveform]</td>
<td>0.5...2 x I(\Delta n)</td>
</tr>
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</table>

## Dimension diagram X470

Dimensions in mm