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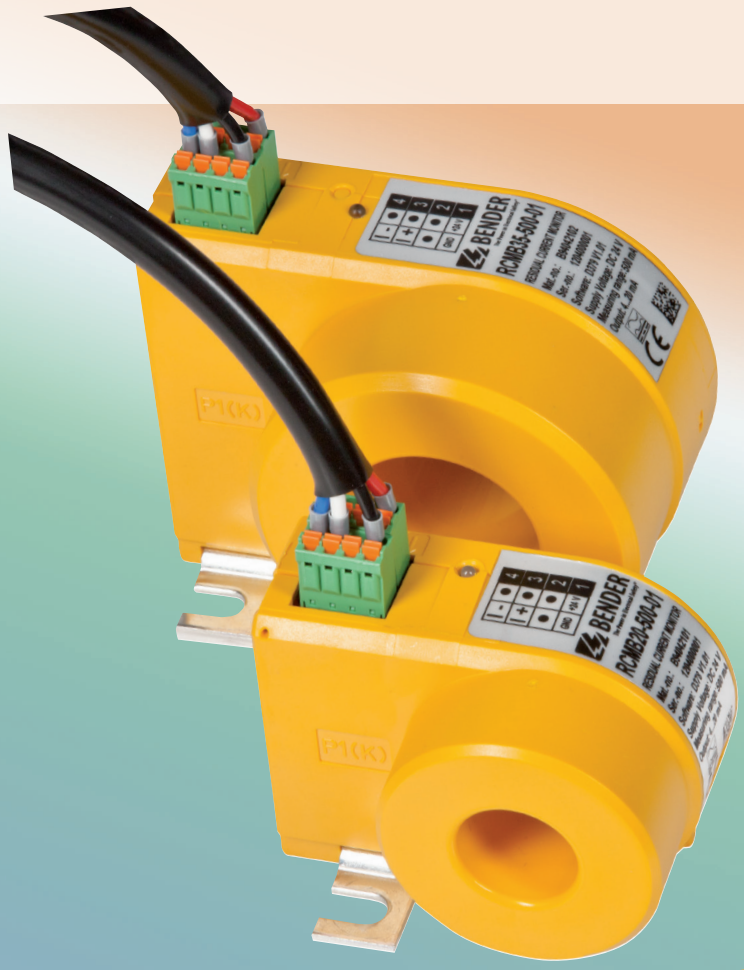
RCMB20/RCMB35-500 Series

Integratable Ground Fault Monitoring Modules
For Integration Into Frequency Converters and Combiner Boxes

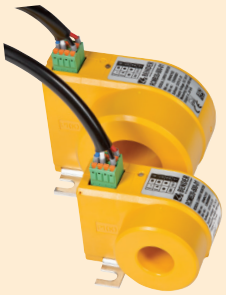


Technical Bulletin

NAE1042510 / 10.2012

RCMB20-500 / RCMB35-500 Series

Integratable Ground Fault Monitoring Modules



RCMB20-500-01 / RCMB35-500-01

Features

- Integratable device for AC/DC fault current monitoring
- RMS value measurement (AC + DC)
- 0 - 500 Hz frequency range
- Measuring electronics integrated into current transformer
- 0.78" (20 mm) and 1.38" (35 mm) openings for system conductors
- 500 mA measuring range
- 24 VDC supply voltage
- 4 - 20 mA analog output
- CT connection monitoring utilizing cyclical test current
- Multicolor LED for device status

Approvals

c UL us LISTED

Description

RCMB20-500 and RCMB35-500 series ground fault monitoring modules are designed for fault current monitoring in AC/DC systems. All monitoring electronics are built into the measuring current transformer. The small form-factor devices are designed for integration into equipment and panels on the line side, such as frequency converters, inverters, and combiner boxes. Push-wire terminal connectors and insulated wire ensure simple installation and integration.

RCMB20-500 models feature a 0.78" (20 mm) opening, and RCMB35-500 models feature a 1.38" (35 mm) opening. Both models have a 4 - 20 mA output, proportional to the RMS value of the measured ground fault current (up to 500 mA).

Applications

- Integration into frequency converters / inverters / VFDs
- Integration into combiner boxes in PV systems

Function

Once the supply voltage is applied, the multicolor LED will display green during normal operation (flashing red indicates a device fault) and will carry out an internal self-test.

The device measures both AC and DC currents. The RMS value is calculated by summing the DC components included in the ground fault current and AC components below 500 Hz. A 4-20 mA analog output proportional to this RMS value is provided at the module output. This value is updated at the latest every 20 ms.

Every two seconds, the device cyclically tests the connections to the current transformer, as well as the proper functioning of the AC and DC measurement. In addition, the supply voltage is monitored continuously. If a fault occurs, the LED will flash red and the analog output will go to 20 mA.

Ordering Information

Type	Supply voltage U_S	Inside diameter	Ordering No.
RCMB20-500-01	DC 20.4…28.8 V*	ø 0.78" (20 mm)	B 9404 2101
RCMB35-500-01	DC 20.4…28.8 V*	ø 1.38" (35 mm)	B 9808 2102

* Voltage range absolute values

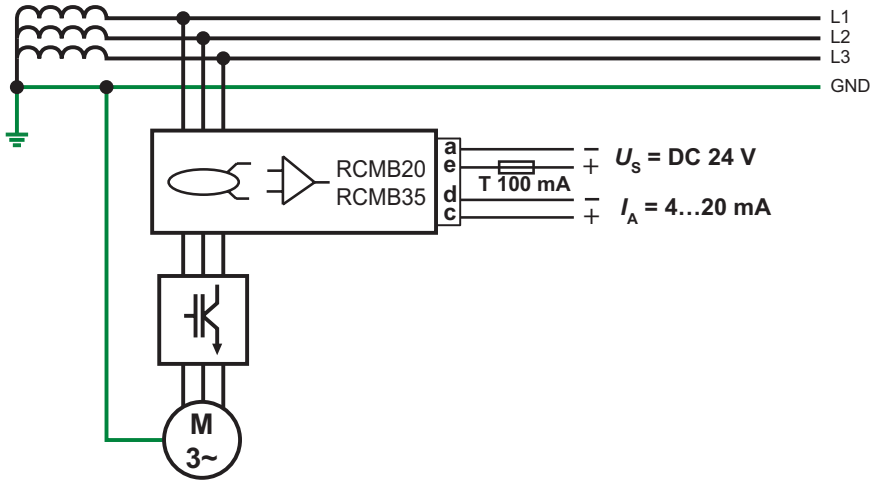
Scope of Delivery

The connecting kit included with each device includes the following components:

Standard Accessory	Dimension/Length	Qty.
RCMB20-500-01:		
Single conductor with integrally moulded ferrule (black, white, red, blue)	45 cm	4
PVC insulating tube	45 cm	1
RCMB35-500-01:		
Single conductor with integrally moulded ferrule (black, white, red, blue)	80 cm	4
PVC insulating tube	80 cm	1
RCMB20-500-01, RCMB35-500-01:		
Push-wire plug, 4-pole, coded	–	2
Assembly bracket for current transformer	–	1
Ferrule (mm^2 x mm)	0.5 x 6	4
wire strap (mm x mm)	100 x 2,5	2
Lens head screw	M6 x 12	2
Spring washer	M6	2

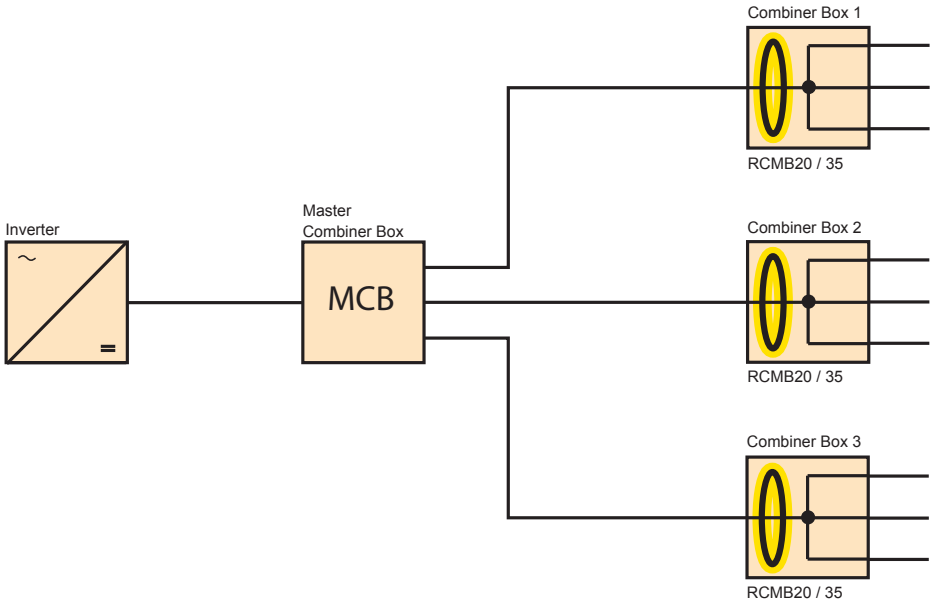
Sample wiring diagram - frequency converter

Connect the ground fault monitoring module according to the wiring diagram. The output current in proportion to the residual current I_A must be made available to the frequency converter.



Sample overview - combiner box integration

Below is an overview diagram for integrating RCMB20/RCMB35 modules into individual combiner boxes in PV systems.



Technical data

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

Rated insulation voltage	AC 800 V
Rated impulse voltage/pollution degree	12 kV / 2
Overvoltage category	CAT III
Protective separation (reinforced insulation) between	primary conductor and the measurement electronics
Voltage tests according to IEC 61010-1	6.88 kV

Supply voltage

Supply voltage U_S	DC 24 V
Operating range of U_S	20.4…28.8 V
Ripple U_S	≤ 1 %
Power consumption	≤ 2.5 VA

Measuring circuit

Measuring current transformers RCMB20 / RCMB35, inside diameter	20 mm / 35 mm
Rated insulation voltage (measuring current transformer)	800 V
Operating characteristics according to IEC 62020 and IEC/TR 60755	AC/DC sensitive, Type B
Rated frequency	0…500 Hz
Measuring range $I_{\Delta n}$ AC/DC	AC/DC 0…500 mA
Nominal current at 3 N AC (RCMB20 / RCMB35)	≤ 32 A / 80 A
Relative uncertainty for DC	± 4 % *
Relative uncertainty for 10…30 Hz	+3 %…-15 % *
Relative uncertainty for 30…400 Hz	± 3 % *
Relative uncertainty for 400….500 Hz	± 10% *
Resolution measuring circuit	2 mA
Test winding	yes

Time response

Response delay t_{on}	0 s
Delay on release t_{off} (if outside the measurement range)	≤ 1 s
Operating time t_{ae} at I_{Δ}	≤ 180 ms
Response time t_{an}	= t_{ae} + t_{on}
Recovery time t_b	≤ 1 s
Displays	
LED constantly illuminated in green = operation indicator	
	flashes red = fault (output current > 20 mA)

Outputs

Current output, proportional to the residual current	DC 4…20 mA
Current output, resolution	$I_{\Delta n}$ = 31.25 x (analogue output current – 4 mA)
Load	≤ 300 Ω

Environment / EMC

EMC	IEC 60947-2
Operating temperature	-25…70 °C
Climatic class acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (except condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)
Classification of mechanical conditions acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M3
Storage (IEC 60721-3-1)	1M3
Chemical stresses acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3C4

Connection

Primary conductor: (assuming no additional insulation)

RCMB20	≤ 4 x AWG 10 (6 mm²) / 3 x AWG 8 (10 mm²) / 2 x AWG 6 (16 mm²
RCMB35	≤ 4 x AWG 2 (35 mm²) / 3 x AWG 1 (50 mm²) / 2 x AWG 2/0 (70 mm²

Connector XK1:

Connection type	pluggable push-wire terminals
	2 x four-pole
Connection properties:	
rigid	0.2…2.5 mm² (AWG 24…14)
Flexible without ferrules	0.2…2.5 mm² (AWG 24…14)
Flexible with ferrules	0.2…1.5 mm² (AWG 24…16)
Stripping length	10 mm
Opening force	50 N

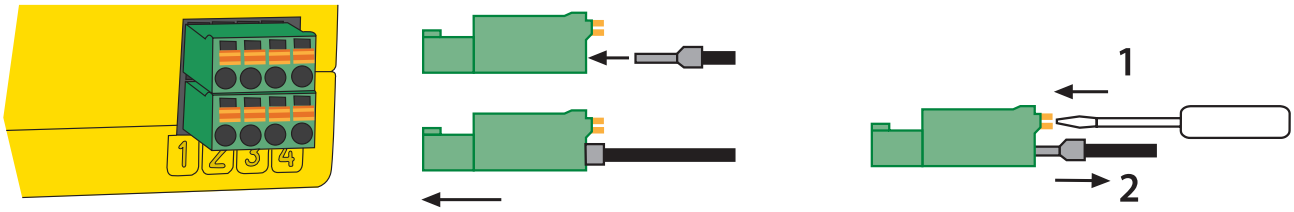
General data

Operating mode	continuous operation
Position	any position
Degree of protection, internal components (DIN EN 60529)	IP40
Degree of protection, terminals (DIN EN 60529)	IP20
Enclosure material	polycarbonate
Flammability class	UL94 V-0
Screw mounting	M5 with mounting brackets
DIN rail mounting acc. to	IEC 60715
Software version	D378V1.0 (RCMB20-500-01)
	D379 V1.0 (RCMB35-500-01)
Weight	200 g (RCMB20)
	250 g (RCMB35)

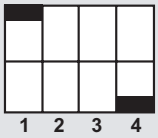
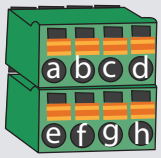
* of upper range value

Connection

Position of the terminals, connecting and disconnecting of the conductors

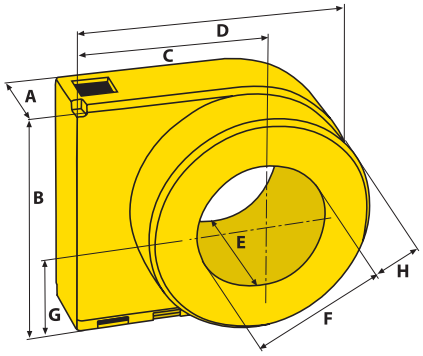


Plug-in terminal wiring

Socket coding	Pluggable push-wire terminal	Terminal	Coulor	RCMB20 / RCMB35
	 XK1	a	black	GND (U_S)
		b	–	–
		c	white	DC 4…20 mA
		d	blue	GND (DC 4…20 mA)
		e	red	+24 V (U_S)
		f	–	–
		g	–	–
		h	–	–

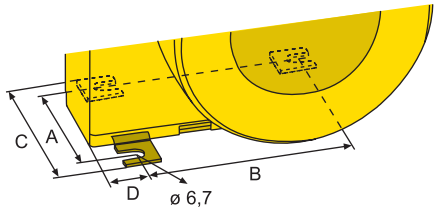
Dimensions: Main enclosure

Dimensions in inches (mm)



Dimensions: Screw mounting (2 brackets, diagonal)

Dimensions in inches (mm)



Dimensions: Main enclosure								
Type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
RCMB20	1.18″ (30)	2.22″ (56.3)	1.97″ (50)	3″ (76.4)	1.91″ (48.5)	ø 0.79″ (ø 20)	1.17″ (29.8)	0.65″ (16.4)
RCMB35	1.18″ (30)	3.12″ (79.2)	2.44″ (62)	3.92″ (99.5)	2.17″ (55)	ø 1.38″ (ø 35)	1.64″ (41.7)	0.79″ (20)

Dimensions: Screw mounting				
Type	**A**	**B**	**C**	**D**
RCMB20	1.85″ (47)	1.14″ (29)	2.48″ (63)	0.8″ (20.35)
RCMB35	1.85″ (47)	1.91″ (48.5)	2.48″ (63)	0.51″ (12.85)

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