

# RCMB20/RCMB35-500 Series

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



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# RCMB20-500 / RCMB35-500 Series

#### **Integratable Ground Fault Monitoring Modules**

BENDER



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



# 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

ordering mornation							
Туре	Supply voltage U <sub>S</sub>	Inside diameter	Ordering No.				
RCMB20-500-01	DC 20.428.8 V*	ø 0.78" (20 mm)	B 9404 2101				
RCMB35-500-01	DC 20.428.8 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 <sup>2</sup> 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*<sub>A</sub> 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	nt electronics
Voltage tests according to IEC 61010-1	6.88 kV

# Supply voltage

Supply voltage U <sub>S</sub>	DC 24 V
Operating range of Us	20.428.8 V
Ripple Us	≤1%
Power consumption	≤ 2.5 VA

# Measuring circuit

Measuring current transformers RCMB20 / RCMB35, inside diameter	r 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	0500 Hz
Measuring range I <sub>An</sub> AC/DC	AC/DC 0500 mA
Nominal current at 3 N AC (RCMB20 / RCMB35)	$\leq$ 32 A / 80 A
Relative uncertainty for DC	±4%*
Relative uncertainty for 1030 Hz	+3 %15 % *
Relative uncertainty for 30400 Hz	±3%*
Relative uncertainty for 400500 Hz	± 10% *
Resolution measuring circuit	2 mA
Test winding	yes

# Time response

Response delay t <sub>on</sub>	0 s
Delay on release toff (if outside the measurement rar	ıge) ≤ 1 s
Operating time $t_{ae}$ at $I_{\Delta}$	≤ 180 ms
Response time t <sub>an</sub>	$= t_{ae} + t_{on}$
Recovery time tb	≤ 1 s
Displays	
LED constantly illuminated in green = operation ind	icator
flashes	red = fault (output current > 20 mA)
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# Outputs

Current output, proportional to the residu	ial current	DC 4	.20 mA
Current output, resolution	$I_{\Delta n} = 31.25 \text{ x}$ (analogue output c	urrent –	- 4 mA)
Load		$\leq$	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 a	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 con	ductor: (assuming no additional insula	ation)
RCMB20	$\leq$ 4 x AWG 10 (6 mm <sup>2)</sup> / 3 x AWG	8 (10 mm <sup>2)</sup> / 2 x AWG 6 (16 mm <sup>2</sup>
RCMB35	$\leq$ 4 x AWG 2 (35 mm <sup>2)</sup> / 3 x AWG 1	(50 mm <sup>2)</sup> / 2 x AWG 2/0 (70 mm <sup>2</sup>
Connector X	K1:	
Connection ty	pe	pluggable push-wire terminals
		2 x four-pole
Connection pr	operties:	
rigid		0.22.5 mm <sup>2</sup> (AWG 2414)
Flexible witho	out ferrules	0.22.5 mm <sup>2</sup> (AWG 2414)
Flexible with t	ferrules	0.21.5 mm <sup>2</sup> (AWG 2416)
Stripping leng	ıth	10 mm
Opening force	1	50 N
General data	a	
Operating mo	de	continuous operation
Position		any position
Degree of pro	tection, internal components (DIN EN 6052	9) IP40
Degree of prot	tection, terminals (DIN EN 60529)	IP20
Enclosure mat	terial	polycarbonate
Flammability	class	UL94 V-0
Screw mounti	ng	M5 with mounting brackets
DIN rail moun	ting acc. to	IEC 60715
Software vers	ion	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
		а	black	GND (U <sub>S</sub> )
		b	-	-
		C	white	DC 420 mA
		d	blue	GND (DC 420 mA)
		е	red	+24 V ( <i>U</i> <sub>S</sub> )
		f	-	-
		g	-	-
		h	_	-

# **Dimensions: Main enclosure**

Dimensions in inches (mm)



# Dimensions: Screw mounting (2 brackets, diagonal)

Dimensions in inches (mm)



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

Dimensions: Screw mounting						
Туре	A	В	C	D		
RCMB20	1.85"	1.14"	2.48"	0.8"		
	(47)	(29)	(63)	(20.35)		
RCMB35	1.85"	1.91"	2.48"	0.51"		
	(47)	(48.5)	(63)	(12.85)		



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