RCMB300-series

AC/DC sensitive residual current monitoring modules
with an integrated measuring current transformer

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Table of contents

1 General information

1.1 How to use the manual

ADVICE

This manual is intended for qualified personnel working in electrical engineering and electronics! Part of the device documentation in addition to this manual is the enclosed supplement "Safety instructions for Bender products".

ADVICE

Read the operating manual before mounting, connecting and commissioning the device. Keep the manual within easy reach for future reference.

1.2 Indication of important instructions and information

DANGER

Indicates a high risk of danger that will result in death or serious injury if not avoided.

WARNING

Indicates a medium risk of danger that can lead to death or serious injury if not avoided.

CAUTION

Indicates a low-level risk that can result in minor or moderate injury or damage to property if not avoided.

ADVICE

Indicates important facts that do not result in immediate injuries. They can lead to malfunctions if the device is handled incorrectly.

i   *Information can help to optimise the use of the product.*

1.3 Signs and symbols

	Disposal		Protect from moisture		Protect from dust
	Temperature range		Recycling		RoHS directives
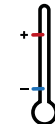
1.4 Service and Support

Information and contact details about customer service, repair service or field service for Bender devices are available on the following website: Fast assistance | Bender GmbH & Co. KG.

1.5   Training courses and seminars

Regular face-to-face or online seminars for customers and other interested parties:

www.bender.de > know-how > seminars.

1.6   Delivery conditions

The conditions of sale and delivery set out by Bender GmbH & Co. KG apply. These can be obtained in printed or electronic format.

The following applies to software products:

"Software clause in respect of the licensing of standard software as part of deliveries, modifications and changes to general delivery conditions for products and services in the electrical industry"

1.7   Inspection, transport and storage

Check the shipping and device packaging for transport damage and scope of delivery. In the event of complaints, the company must be notified immediately, see "www.bender.de > service & support.".

The following must be observed when storing the devices:
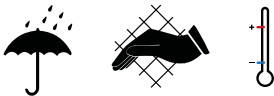
1.8   Warranty and liability

Warranty and liability claims for personal injury and property damage are excluded in the case of:

- Improper use of the device.
- Incorrect mounting, commissioning, operation and maintenance of the device.
- Failure to observe the instructions in this operating manual regarding transport, commissioning, operation and maintenance of the device.
- Unauthorised changes to the device made by parties other than the manufacturer.
- Non-observance of technical data.
- Repairs carried out incorrectly.
- The use of accessories or spare parts that are not provided, approved or recommended by the manufacturer.
- Catastrophes caused by external influences and force majeure.
- Mounting and installation with device combinations not approved or recommended by the manufacturer.

This operating manual and the enclosed safety instructions must be observed by all persons working with the device. Furthermore, the rules and regulations that apply for accident prevention at the place of use must be observed.

1.9   Disposal of Bender devices

Abide by the national regulations and laws governing the disposal of this device.

For more information on the disposal of Bender devices, refer to

www.bender.de > service & support.

1.10   Safety

If the device is used outside the Federal Republic of Germany, the applicable local standards and regulations must be complied with. In Europe, the European standard EN 50110 applies.

⚠️   **DANGER**   *Risk of fatal injury due to electric shock!*
       Touching live parts of the system carries the risk of:

• Risk of electrocution due to electric shock
• Damage to the electrical installation
• Destruction of the device

Before installing the device and before working on its connections, make sure that the installation has been de-energised. The rules for working on electrical systems must be observed.

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2 Product description

2.1 Intended use

The residual current monitoring modules of the RCMB30… are intended for measuring AC and DC fault currents in earthed systems (TN and TT systems).
The modules are able to measure residual currents up to I_Δ = 20 A in a frequency range of DC…100 kHz.

Any other use than that described in this document is regarded as improper.

2.2 Area of application

The residual current monitoring modules of the RCMB300 series are intended for measuring AC and DC fault currents in earthed systems (TN and TT systems). The modules are able to measure residual currents up to I_Δ = 20 A in a frequency range of DC…100 kHz.

Two separately adjustable response values allow a distinction to be made between prewarning and main alarm. When the response value $I_{\Delta n1}$ (prewarning) is reached, the output relay K1 switches. When the response value $I_{\Delta n2}$ (main alarm) is reached, the output relay K2 also switches.

The modules feature an RS-485 interface with Modbus RTU which can be used to transfer measured values and alarm values. Setting parameters is also possible via this interface.

The residual current monitoring modules each consist of the RCMB301 evaluation electronics and a CTBC20(P)…210(P) series measuring current transformer.

To obtain a complete module, hence both the electronics and a measuring current transformer are required. If ordered separately, these two components must then be plugged together and calibrated during commissioning.

The CTBC…**P** series measuring current transformers feature an integrated magnetic shield and are suitable for applications with high load currents or inrush currents.

2.3 Device features

- Continuous residual current monitoring in compliance with DGUV Vorschrift 3 (German Social Accident Insurance Regulation 3)
- Easy DIN rail or screw mounting
- RS-485 interface with Modbus RTU (reading out measured values/setting parameters)
- Integrated switching outputs with two changeover contacts K1 and K2 (galvanically isolated)
- Frequency range DC…100 kHz
- Combined test and reset button
- Multicolour LED indicating operation, exceeded response value, disturbances and status messages
- AC/DC sensitive type B measured value acquisition acc. to IEC 60755
- AC/DC sensitive type B+ measured value acquisition acc. to VDE 0664-400
- Separate evaluation of the AC and DC components as well as the r.m.s. value of the residual current possible
- Exchangeable electronic enclosure without mechanical separation of the primary conductors
- Extension/retrofitting or modification of functionalities in case of changed monitoring requirements
- Insensitive to load currents due to full magnetic shield (CTBC…**P** only)
- Connection monitoring of the measuring current transformer with cyclical test current

- Use of the RCMB301 for all CTBC… measuring current transformer sizes
- Supply voltage DC 24 V

2.4   Variants

Electronic modules
- **RCMB301**
  Type B modular residual current module acc. to IEC 60755

Measuring current transformers (P = shielded)
- **CTBC20(P)**
  Measuring current transformer, internal diameter 20 mm
- **CTBC35(P)**
  Measuring current transformer, internal diameter 35 mm
- **CTBC60(P)**
  Measuring current transformer, internal diameter 60 mm
- **CTBC120(P)**
  Measuring current transformer, internal diameter 120 mm
- **CTBC210(P)**
  Measuring current transformer, internal diameter 210 mm

2.5   Functions
2.5.1   Functional description

Residual current $I_{\Delta n}$

The residual current monitoring module measures both AC and DC currents. Tripping takes place based on the determined r.m.s. value. When the response value set for $I_{\Delta n2}$ (alarm) is exceeded by a residual current, the output relay K2 switches an undervoltage release (recommended) or a shunt release (N/O operation) within the required tripping time and the LED lights up red. The individual components of the residual current (AC component, DC component) and the r.m.s. value can be evaluated separately with the RCMB module. In addition, it is possible to set the main alarm and prewarning for the individual components and assign them to the two relays. The response values for the different components should be within the same measuring range.

Measuring range	Response values	Maximum value
Measuring range 1	30…126 mA	450 mA
Measuring range 2	127…495 mA	1750 mA
Measuring range 3	496 mA…3 A	14 A

If the fault memory behaviour of relay K1 or K2 is activated, the device must be reset by pressing the "T" button. The RCMB module automatically checks the measuring current transformer and the function of the residual current measurement cyclically.

Offset calibration

When the device has been installed, an offset calibration must first be carried out (see "Offset calibration", page 19). After successful offset calibration, the multicolour LED lights up green and the device is ready for operation.

Test

Press the "T" button or the external test button for 5…10 s to start the manual self test of the device.

Reset

Press the "T" button or the external test button for 1.5...5 s to reset the device.

RS-485 interface

The RS-485 interface enables both reading out the measured values and setting the parameters of the device via Modbus RTU. Furthermore, a test or a reset can be triggered via the bus.

2.5.2 Delay times t_b, t, t_{on}, and t_{off}

The times t_b, t, t_{on} and t_{off} described below delay the output of alarms via LEDs, relays and Modbus RTU.

Recovery time t_b

The recovery time is the time the device needs to be ready for measurement after connecting the supply voltage U_S.

Start-up delay t

After connecting the supply voltage U_S, the measuring function is delayed by the set time t (0 s…60 min) plus the recovery time t_b.

Response delay t_{on}

If a residual operating current is exceeded, the residual current monitor requires the response time t_{an} to output the alarm. A set response delay t_{on} (50 ms…60 min) is added to the device-specific operating time t_{ae} and delays signalling:

Response time $t_{an} = t_{ae} + t_{on}$

If the fault does not persist during the response delay, the alarm is not signalled.

Delay on release t_{off}

If the alarm no longer exists and the fault memory is disabled, the alarm LEDs go out and the alarm relays switch back to their initial position. By means of the delay on release (0 s…60 min) , the alarm state is maintained for the selected period.

3   Mounting

Only skilled persons are permitted to carry out the work necessary to install, put into service and run a device or system.

DANGER   ***Risk of fatal injury due to electric shock!***
Touching live parts of the system carries the risk of:

- Risk of electrocution due to electric shock
- Damage to the electrical installation
- Destruction of the device

Before installing the device and before working on its connections, make sure that the installation has been de-energised. The rules for working on electrical systems must be observed.

Refer to the rated and supply voltage values as specified in the technical data!

3.1   Composition of an RCMB module

Any combination of electronic modules (RCMB30…) and measuring current transformers (CTBC…) is possible to enable individual adaptation to every installation situation.

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3.2   Dimension diagrams
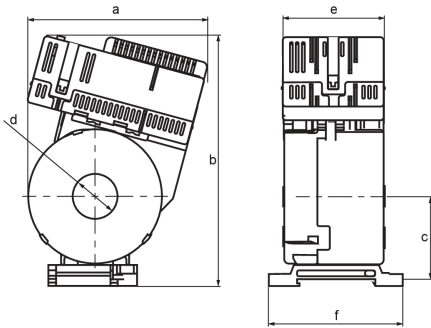
CTBC20(P) / CTBC35(P)
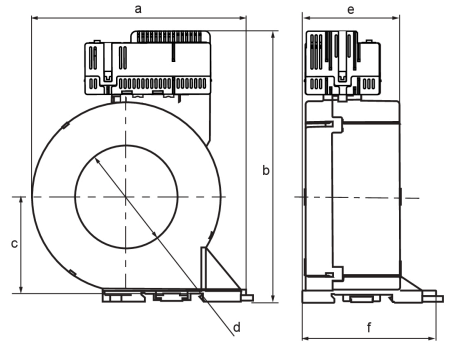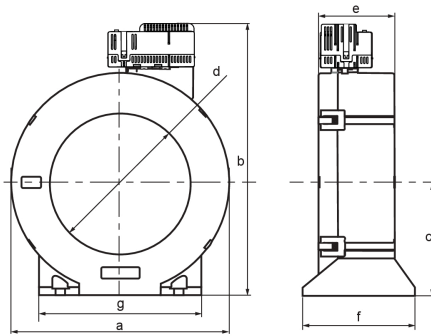
CTBC60(P)
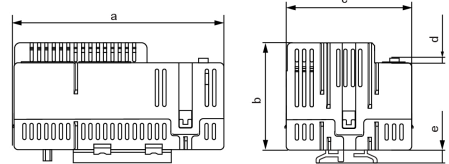
CTBC120(P) / CTBC210(P)

RCMB301

Type	a	b	c	d	e	f	g
RCMB301-CTBC20(P)	81	112	37	ø 20	46	60	
RCMB301-CTBC35(P)	97	130	47	ø 35	49	61	
RCMB301-CTBC60(P)	126	158	57	ø 60	56	78	
RCMB301-CTBC120(P)	188	232	96	ø 120	65	96	139
RCMB301-CTBC210(P)	302	346	153	ø 210	67	113	277
RCMB301	74	37	44	2	4.6		

all dimensions in mm, tolerance ±0.5 mm

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3.3   Mountings
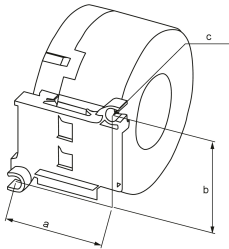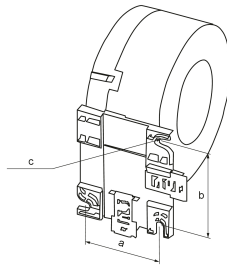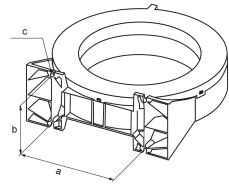
CTBC20(P) / CTBC35(P)   CTBC60(P)   CTBC120(P) / CTBC210(P)

Type	a	b	c
CTBC20(P)	31.4	49	2 x ø 5.5
CTBC35(P)	49.8	49	2 x ø 5.5
CTBC60(P)	56	66	2 x ø 6.5
CTBC120(P)	103	81	4 x ø 6.5
CTBC210(P)	180	98	4 x ø 6.5

all dimensions in mm, tolerance ±0.5 mm

3.4   Assembly

Slide the electronic module onto the plug contacts of the measuring current transformer.
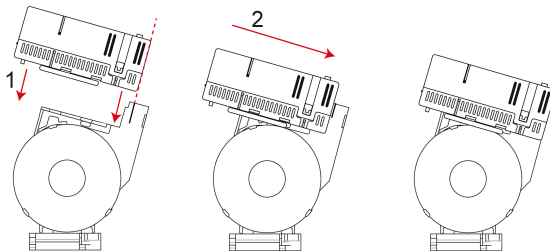
i   *Avoid repeated plugging and unplugging of the electronics (10 plugging cycles).*

4 Connecting the device

⚠️ **DANGER** *Risk of fatal injury due to electric shock!*
Touching live parts of the system carries the risk of:

- Risk of electrocution due to electric shock
- Damage to the electrical installation
- Destruction of the device

Before installing the device and before working on its connections, make sure that the installation has been de-energised. The rules for working on electrical systems must be observed.

**Refer to the rated and supply voltage values** as specified in the technical data!

ℹ️ **For UL applications**:
Use 60/75 °C copper wires only!

4.1 Device view

1	–	Not used	
2	–		
3	A	RS-485 interface	
4	B		
5	X1	Terminals for cable bridge for connection of the integrated terminating resistor of the RS-485 interface	
6	X2		
7	GND	Connection external test/reset	
8	T/R		
9	GND	Supply voltage U_S	
10	24 V		
11	11, 12, 14	Relay K1 (prewarning)	
12	21, 22, 24	Relay K2 (main talarm)	
13	ON/AL	Combined LED; see System states: LED and output relays	
14	T	Test and reset button "T"	

4.2   Wiring diagram

| Legend | 11, 12, 14 =
Relay for prewarning | 21, 22, 24 =
Relay for main alarm | □ =
surge protection device |
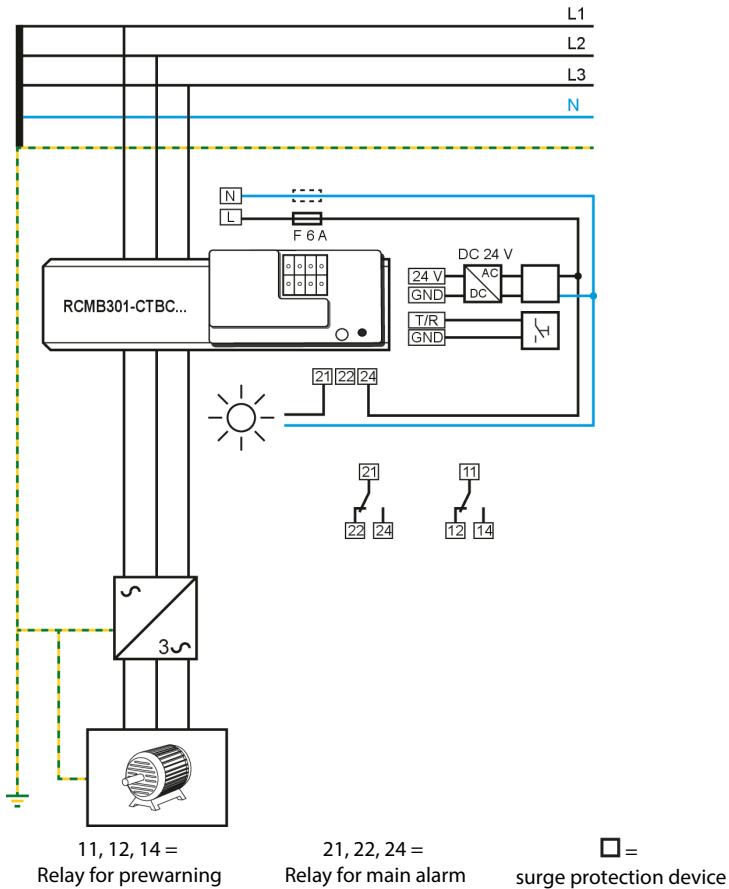
i *The use of a type 2 surge protection device (SPD) is mandatory due to possible impulse voltages and in order to comply with normative requirements.*

The surge protection device must be connected upstream of the power supply unit on the supply side.

Features of the surge protection device:
– Nominal discharge current I_n (8/20 µs): 20 kA

– Response time: 25 ns
– Two-stage: 1 varistor + 1 spark gab

Alternatively, the power supply unit must be connected to a CAT II supply without a surge protection device.

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4.3   Connection RS-485 interface (Modbus RTU)
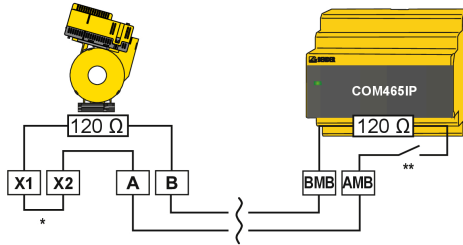
*   The internal 120 Ω terminating resistor can be connected by using the **wire jumper**.
**   The internal 120 Ω terminating resistor can be connected by means of the **DIP switch**.

4.4   Installation instructions for measuring current transformers

⚠️ **CAUTION**
Device damage due to high induction currents!
High currents can be induced into the conductor loop due to the AC/DC sensitive measurement technology used. Do not route protective conductors and low-resistance conductor loops through the measuring current transformer!

Device damage due to interference pulses!
The connecting cable (supply, analogue interface…) must not be routed directly past the current transformer core.

Risk of injury due to accessible live conductors!
The measuring current transformer must be connected to the corresponding evaluator before the first use and before commissioning of the monitored system.

ℹ️ *Application in railway vehicles / DIN EN 45545-2:2016*

If the distance to adjacent components that do not meet the requirements of DIN EN 45545-2 Table 2 is < 20 mm horizontally or < 200 mm vertically, they are to be considered grouped.
Refer to DIN EN 45545-2 chapter 4.3 Grouping rules.

ℹ️ *Do not route any shielded cables through the measuring current transformer!*

Live conductors
Ensure that **all live cables/conductors** are routed through the measuring current transformer.
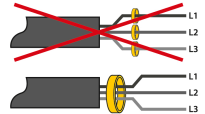
Protective conductors
Never route an existing protective conductor through the measuring current transformer. The cable diameter should not exceed half the diameter of the measuring current transformer.
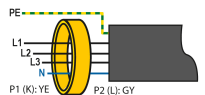
Bending of cables

The cables/conductors should only be bent at a certain distance from the measuring current transformer.

* Distance to the 90° angle of the conductors: 2 x outer diameter of the measuring current transformer.
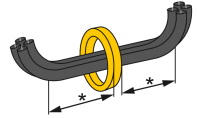
Route cables in the centre

The cables/conductors must be centred in the middle of the measuring current transformer.
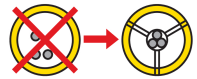
i *Application in railway vehicles / DIN EN 45545-2:2016*

If the distance to adjacent components that do not meet the requirement of DIN EN 45545-2 Table 2 is horizontally < 20 mm or vertically < 200 mm, they are to be considered as grouped. See DIN EN 45545-2 chapter 4.3 Grouping rules

5 Commissioning

5.1 Setting addresses

Every RCMB30… has a factory-set Modbus address. The address is 1XX, where XX = the last two digits of the serial number.

ℹ️ *Example: Serial number = 123456**78** --> Modbus address = 1**78***

If the preset address is to be changed, this can be done

- via a COMTRAXX® gateway,
- via Modbus,
- directly on the device.

The address can be changed on the device before installation and offset calibration.

ℹ️ *The electronic module must not be connected to the measuring current transformer during address setting.*

ℹ️ *Each address in the bus system may only be assigned once.*

The LED has various flashing patterns, which indicate the state of the module:
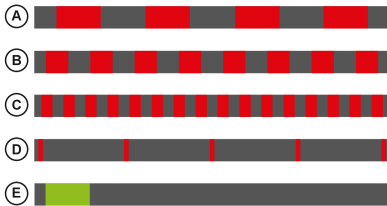
Address modification procedure

Phase	Action	LED
1	Supply the electronic module with power	Flashes red (**A**, error: no measuring current transformer)
2	Press and hold "T" until the LED flashes red very quickly; release afterwards	Flashes red (**A**, error)
		Flashes red quickly (**B**, mode change)
		Flashes red quickly (**C**, ready for address setting mode)
3	Set address (address setting range: 1…247)	Flashes red very quickly (**D**, address setting mode)

Phase		Action	LED
3a	Units place	Press "T" repeatedly until reaching the desired digit of the units place	Each keystroke is confirmed with green (**E**)
		Acknowledge the entry: Press and hold "T" until the LED flashes red; release afterwards	Lights green shortly (**E**)
			LED flashes red (**C**)
3b	Tens place	Press "T" repeatedly until reaching the desired digit of the tens place	Each keystroke is confirmed with green (E)
		Acknowledge the entry: Press and hold "T" until the LED flashes red; release afterwards	Lights green shortly (**E**)
			LED flashes red (**C**)
3c	Hundreds place	Press "T" repeatedly until reaching the desired digit of the hundreds place	Each keystroke is confirmed with green (**E**)
		Acknowledge the entry: Press and hold "T" until the LED flashes red; release afterwards	Lights green shortly (**E**)
			LED flashes red (**C**)
4	Check address setting: LED indicates the address by flashing [1]		
		Digit hundreds place	Flashes green for each number (**E**)
		Pause	off
		Digit tens place	Flashes green for each number (**E**)
		Pause	off
		Digit units place	Flashes green for each number (**E**)
		Pause	off
5	Address set		Flashes red (**A**, error: no measuring current transformer)

[1] Example for "Check address setting". Address "124" is to be set. Successful configuration results in the following flashing pattern:

5.2 Offset calibration

The residual current monitoring module must be calibrated to the system to be monitored so that the selected protective function can be fulfilled. Each electronic module RCMB30… can be individually calibrated to the CTBC… **built-in measuring current transformer**. Calibration can be carried out by means of the "T" button or via the Modbus interface.

In case of response values > 300 mA, no offset calibration is required.

Note that during the offset calibration no current flows through the measuring current transformer.

If a current flows through the measuring current transformer despite the system being switched off, this indicates a device error. Replace the measuring current transformer immediately.

ⓘ *The alarm relays switch to safe state during offset calibration.*

Procedure of the first offset calibration

Phase	Action	LED
1	Install the measuring current transformer in the system	off
2	Plug the electronic module and the measuring current transformer together (see "Assembly", page 13), do not apply any supply voltage.	off
3a	Press and hold the "T" button	off
3b	Supply the electronic module with supply voltage U_S. Press and hold the "T" button,	lights red permanently (not ready for operation)
		flashes red slowly (**A**)
		flashes red quickly (**B**) (calibration mode)
4	Start calibration: release the "T" button	
5	Calibration in progress	flashes red quickly (**B**)
6	Calibration successful, values are accepted, relay switches	lights green permanently
7	Calibration finished, normal operating status	lights green permanently

5.3   Completing and checking installation

The installation should be completed with a function test.
This is done by means of a manual self test (for details refer to "Manual self test", page 21).

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6 Test, reset, function test

6.1 Periodic self test

The RCMB30… electronic module carries out a self diagnosis at regular intervals and thus ensures the device function. The electronic module feeds a test current into the test winding of the measuring current transformer.

> **i** *During a periodic self test, the electronic module **does not switch the changeover contacts**. However, if a system error is detected, an alarm is issued via the output relay and the interface.*

6.2 Manual self test

6.2.1 Integrated "T" button

Reset   Press the button for 1.5…5 s
Test   Press the button for 5…10 s

The integrated "T" button allows local performance of a function test at any time. The button is useful during commissioning, repair measures and recurring tests by the plant operator.

The "T" button can be used to delete a fault message of the tripped RCMB (reset).

The integrated "T" button is electrically decoupled from the external test/reset connection. This ensures that, of all RCMBs connected via the T/R connection, only the local RCMB acts.

6.2.2 External test/reset button

Reset   Press the button for 1.5…5 s
Test   Press the button for 5…10 s

The external test/reset button can be used to perform function tests without having to open a control cabinet or reach an installation location that is difficult to access. Another option is to carry out a collective test, i.e. a function test of several installed RCMBs at the same time.

7 Modbus register

This chapter provides a complete description of the Modbus register for the MRCDB300/RCMB300 series to allow access to information.

The following Modbus function codes are supported

- Holding register for reading out values (Read Holding Register; function code 0x03)
- Register for device programming (Write Multiple Registers; function code 0x10)
- Register for diagnostic functions (Diagnostic; function code 0x08)
- Register for event counter (Get Com Event Counter; function code 0x0B)
- Register for server ID (Report Server ID; function code 0x11)
- Register for device identification (Read Device Identification; function code 0x2B)

For a complete Modbus protocol specification, visit https://www.modbus.org.

7.1 Overview

7.1.1 Read and write accesses

RO	Read Only (read access only)
RW	Read/Write (read and write access)
WO	Write Only (write access only)

7.1.2 Formats used

Float32	IEEE754 32-bit (single precision floating point number)
INT16	Signed 16-bit integer
INT32	Signed 32-bit integer
UINT16	Unsigned 16-bit integer
UINT32	Unsigned 32-bit integer
String UTF8	ASCII character string

7.1.3 Register areas

Area	Start address	End address
Info	0	3999
Detailed measured values	4000	7999
Simple measured values	8000	11999
History	12000	15999
Parameters	16000	19999
Control commands	20000	23999
Reserved	24000	27999
Reserved	60000	60099

7.1.4 Representation of values

	Value	Description		Value	Description
Test status	0	No test		6	Hertz
	1	Internal test		7	Baud
	2	External test		8	Farad
Alarm status	0	No alarm		9	Henry
	1	Prewarning		10	Degree Celsius
	2	Error		11	Degree Fahrenheit
	3	Reserved		12	Second
	4	Warning		13	Minute
	5	Main alarm		14	Hour
Range	0	=	Unit	15	Day
	1	<		16	Month
	2	>		17	Watt
	3	Invalid		18	var
Unit	0	Invalid		19	VA
	1	None		20	Wh
	2	Ohm		21	varh
	3	Ampere		22	VAh
	4	Volt		23	Degree
	5	Percent		24	Hertz/second*

*   Unit of the df/dt function

7.1.5 Alarm assignments

Bit number	Description
0	Start alarm (relay 1)
1	Device error (relay 1)
2	Manual self test (relay 1)
3	AC residual current (relay 1)
4	DC residual current (relay 1)
5	RMS residual current (relay 1)
6…15	Reserved
16	Start alarm (relay 2)

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Bit number	Description
17	Device error (relay 2)
18	Manual self test (relay 2)
19	AC residual current (relay 2)
20	DC residual current (relay 2)
21	RMS residual current (relay 2)
22…31	Reserved

7.1.6 Descriptions

Description	Value
Device error	115
DC fault current	155
AC fault current	156
RMS fault current	420
"inactive"	1021
"none"	1022
"invalid"	1023

7.2 Device information

Modbus registers device information

Register	Format	Pro-perty	Description	Value/unit/comment	Factory settings
0…999	Reserved				
1000	UINT32	RO	Modbus test register	Is used to configure the interface (endianess, byte order, etc.)	0x12345678
1002	String UTF-8	RO	Device name	Maximum 32 characters (\0 = end character) Character is in the LoByte	RCMB30…\0
1034	String UTF-8	RO	Article number		Example: Bxxxxxxx\0
1066	String UTF-8	RO	Serial number		Example: yyyyyyyy\0
1098	String UTF-8	RO	Manufacturer name	Maximum 96 characters (\0 = end character) Character is in the LoByte	Bender GmbH & Co. KG\0
1194	UINT16	RO	Application D-number		610
1195	UINT16	RO	Application version	Version number multiplied by 100	Example: 123 = V1.23
1196	UINT16	RO	Application Build number		
1197	UINT16	RO	Bootloader D-number		

Register	Format	Pro-perty	Description	Value/unit/comment	Factory settings
1198	UINT16	RO	Bootloader version	Version number multiplied by 100	Example: 123 = V1.23
1199	UINT16	RO	Bootloader Build number		
1200	UINT32	RO	Counter offset measurement	Counts how often complete, successful offset measurements were carried out.	
1202…1233	String UTF-8	RO	Internet address manufacturer	Character is in the LoByte in each case. Maximum 32 characters. \0 = NULL character = string end	www.bender.de\0
1234…1265	String UTF-8	RO	Installation location[1]		
1266	UINT16	RO	Application Modbus modul version	Version number multiplied by 100	Example: 123 = V1.23
1267…3999			Reserved		

[1] When writing this parameter, it must be ensured that the entire character string is structured in 8-character blocks and that one block must always be written completely with one Modbus command. This means that characters 1…8, 9…16, 17…24 and/or 25…32 must be written. If the string does not fill a block completely, it must be filled with NULL characters. The installation location is also added to the server ID (function code 17) up to the first NULL character.

7.3   Detailed measured values

With the detailed measured values, status information and units etc. are also transmitted in addition to the measured values. This function is mainly required for the Bender COMTRAXX® system. However, it can also be of interest for direct readout of the Modbus registers, as these registers can be used to query the measured values and associated status information all at once and in direct succession.

Register	Format	Pro-perty	Description		Value/unit
4000	UINT16	RO		Measuring channel number (1)	
4001	Float32	RO		Residual current measured value (AC)	A
4003	UINT16	RO	AC	Test and alarm status [1]	
4004	UINT16	RO		Range and unit [2]	
4005	UINT16	RO		Description	
4006…4015			Reserved		
4016	UINT16	RO		Measuring channel number (2)	
4017	Float32	RO		Residual current measured value (DC)	A
4019	UINT16	RO	DC	Test and alarm status [1]	
4020	UINT16	RO		Range and unit [2]	
4021	UINT16	RO		Description	
4022…4031			Reserved		

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Register	Format	Pro- perty		Description	Value/unit
4032	UINT16	RO		Measuring channel number (3)	
4033	Float32	RO		Residual current measured value (RMS)	A
4035	UINT16	RO	RMS	Test and alarm status [1]	
4036	UINT16	RO		Range and unit [2]	
4037	UINT16	RO		Description	
4038…4047				Reserved	
4048	UINT16	RO		Measuring channel number (4)	
4049	Float32	RO		Device error and status information [3]	Device/info code
4051	UINT16	RO	Device error/ status information	Test and alarm status [1]	
4052	UINT16	RO		Range and unit [2]	
4053	UINT16	RO		Description	
4054…7999				Reserved	

1) HiByte: Test status
   LoByte: Alarm status
2) HiByte: Bereich
   LoByte: Einheit
3) see "Error codes", page 27

i *The data of the individual measured value blocks (AC, DC, RMS, device error/status information) belong together and must always be read out as a complete block. Background: While the registers are being read out, some time passes during which the data could theoretically change. To avoid this, the detailed measured values in the respective block are only updated when the measuring channel number is read.*

7.4   General measured values

Measured values AC   Only AC component of the residual current, effective value

Measured values DC   Only DC component of the residual current

Measured values RMS   Combination of AC and DC components of the residual current, effective value

Max. measured values   Maximum value of the respective measured value since the last Modbus polling of the corresponding register

Unfiltered values   Raw values without software filter (all filter settings are pure software filters), i.e. full frequency range DC…100 kHz

Register	Format	Pro-perty	Description	Value/unit/comment
8000	Float32	RO	Measured value $I_{\Delta n}$ (AC)	A
8002	Float32	RO	Measured value $I_{\Delta n}$ (DC)	A
8004	Float32	RO	Measured value $I_{\Delta n}$ (RMS)	A
8006	Float32	RO	Device error and status information [1]	Device/info code
8008	UINT32	RO	Number of alarms	-
8010	Float32	RO	Measured value $I_{\Delta n}$ (AC unfiltered)	A
8012	Float32	RO	Measured value $I_{\Delta n}$ (RMS unfiltered)	A
8014	UINT32	RO	Tripping status (alarm assignment that led to tripping)	Bit, binary coded HiWord: relay 2 | LoWord: relay 1
8016	Float32	RO	Measured value $I_{\Delta n\,max.}$ (AC) [2]	A
8018	Float32	RO	Measured value $I_{\Delta n\,max}$ (DC) [2]	A
8020	Float32	RO	Measured value $I_{\Delta n\,max}$ (RMS) [2]	A
8022	Float32	RO	Device error and status information [1][2]	Device/info code
8024	UINT32	RO	Number of alarms [2]	-
8026	Float32	RO	Measured value $I_{\Delta n\,max}$ (AC unfiltered) [2]	A
8028	Float32	RO	Measured value $I_{\Delta n\,max}$ (RMS unfiltered) [2]	A
8030	UINT32	RO	Trigger status [2]	Bit, binary coded HiWord: relay 2 | LoWord: relay 1
8032…11999			Reserved	

1) see "Error codes", page 27
2) Same data as register 8000…8014, but the maximum values or cumulative values are output since the last readout. In the case of the DC measured value, the highest value is stored.

7.5   Error codes

Error code	Error group	Error	Description	Action
0.10	Connection fault	Connection	CT connection faulty	Check connection between electronic box and measuring current transformer.
3.30	Component malfunction	Manual self test	The manual self test was not run without errors.	Return the device or contact Bender service.
6.00	Calibration error			The error is deleted either by switching the device off/ on or by performing a reset. The device restarts completely (switching of relays possible). If the error persists, return the device or contact Bender service.
6.10	Calibration error	No initial offset measurement	No offset measurement has been performed in the customer installation.	Perform offset measurement.

Error code	Error group	Error	Description	Action
6.20	Calibration error	Offset measurement	Measured offset is outside the limits.	Does a (DC) current still flow through the measuring current transformer? Check circuit breaker. The error is deleted either by switching the device off/on or by performing a new offset measurement (if this is successful).
7.10	Internal interface error			If error occurs frequently, return the device or contact Bender service.
8.00, 8.43 8.44, 8.46 8.47, 8.49; 8.60, 8.71	Hardware error			If error occurs frequently, return the device or contact Bender service.
9.03	µC system error			Switch the device off and on again. If error persists, return the device or contact Bender service.
9.60	µC system error	Parameter error	Parameter outside permissible limits	Switch the device off and on again. Reset device to factory settings: Modbus register 20007 or 20008. If error persists, return the device.
9.70 9.90	µC system error			Switch the device off and on again. If error persists, return the device or contact Bender service.

7.6   History

A maximum of 50 events can be stored. The events are sorted chronologically in such a way that the most recent event is number 1 and the oldest event is number 50. The history memory is buffered and is only updated by reading register 12000 so that the sequence does not change during readout (due to a new history event).

The parameter "Overwrite history memory" (register: 16089) can be used to set
- whether the history memory fills to a maximum of 50 events and then has to be cleared manually (register: 20004)
- whether the oldest event (number 50) is overwritten automatically (factory setting).

Register	Format	Pro-perty	Description	Value/unit/comment
12000	UINT16	RO	Event 1 measuring channel number	[1]
12001	UINT32	RO	Event 1 start	[2]
12003	UINT32	RO	Event 1 end	
12005…12006			Reserved	
12007	Float32	RO	Event 1 min. value	
12009	Float32	RO	Event 1 max. value	
12011	UINT16	RO	Event 1 unit/test status	HiByte: unit | LoByte: test status
12012	UINT16	RO	Event 1 alarm status min/max	HiByte: min. value | LoByte: max. value
12013	UINT16	RO	Event 1 range min/max	

Register	Format	Pro-perty	Description	Value/unit/comment
12014	UINT16	RO	Event 1 description	
12015…12017			Reserved	
12018… 12035		RO	Event 2	
12036… 12899		RO	Event 3…50	
12900…15999			Reserved	

1) When register 12000 is read out, the entire history memory is updated. This way, the data remains consistent.
2) If no time has been set in register 16084: time in s from the occurrence of the event to the readout of register 12000 (indicates how long before the history memory was read out the event occurred)
   If a time is set in register 16084: UNIX time of the event.

7.7   Device parameters and factory settings

t_{on} = response delay

t_{off} = delay on release

()* = factory settings

Register	Format	Property	Description		Value range Unit {Step size}	()*
						RCMB301
16000	Float32	RW	AC	Limit value main alarm	0.03… 3.00 A {1 mA}	0.03 A
16002	Float32	RW		Limit value prewarning	50…100 % {1 %}	60 %
16004	Float32	RW		Hysteresis	10…25 % {1 %}	15 %
16006	Float32	RW		t_{on} main alarm	50 ms…60 min {10 ms}	50 ms
16008	Float32	RW		t_{on} prewarning		1 s
16010	Float32	RW		t_{off}		1 s
16012	Float32	RW	DC	Limit value main alarm	0.03… 3.00 A {1 mA}	0.03 A
16014	Float32	RW		Limit value prewarning	50…100 % {1 %}	60 %
16016	Float32	RW		Hysteresis	10…25 % {1 %}	15 %
16018	Float32	RW		t_{on} main alarm	50 ms…60 min {10 ms}	50 ms
16020	Float32	RW		t_{on} prewarning		1 s
16022	Float32	RW		t_{off}		1 s

Register	Format	Property	Description		Value range Unit {Step size}	()* RCMB301
16024	Float32	RW	RMS	Limit value main alarm	0.03…3.00 A {1 mA}	0.03 A
16026	Float32	RW		Limit value prewarning	50…100 % {1 %}	60 %
16028	Float32	RW		Hysteresis	10…25 %	15 %
16030	Float32	RW		t_{on} main alarm	50 ms…60 min {10 ms}	50 ms (fixed)
16032	Float32	RW		t_{on} prewarning		1 s
16034	Float32	RW		t_{off}		1 s
16036	Float32	RW	Start-up delay		0…3600 s {10 ms}	0 s
16038	UINT16	RW	Relay 1	Relay mode	1 = N/C principle 2 = N/O principle	1
16039	UINT16	RW		Alarm assignment start alarm	1 = inactive 2 = active	2
16040	UINT16	RW		Alarm assignment device error		2
16041	UINT16	RW		Alarm assignment test		2 (fixed)
16042	UINT16	RW		Alarm assignment limit value violation $I_{\Delta n}$ prewarning (AC)		1
16043	UINT16	RW		Alarm assignment limit value violation $I_{\Delta n}$ prewarning (DC)		1
16044	UINT16	RW		Alarm assignment limit value violation $I_{\Delta n}$ prewarning (RMS)		2
16045…16054			Reserved			—
16055	UINT16	RW		Fault memory mode	1 = off 2 = on 3 = permanent	1

Register	Format	Property	Description		Value range Unit {Step size}	()* RCMB301
16056	UINT16	RW	Relay 2	Relay mode	1 = N/C principle 2 = N/O principle	1
16057	UINT16	RW		Alarm assignment start alarm	1 = inactive 2 = active	2
16058	UINT16	RW		Alarm assignment device error		2
16059	UINT16	RW		Alarm assignment test		2 (fixed)
16060	UINT16	RW		Alarm assignment limit value violation $I_{\Delta n}$ main alarm (AC)		1
16061	UINT16	RW		Alarm assignment limit value violation $I_{\Delta n}$ main alarm (DC)		1
16062	UINT16	RW		Alarm assignment limit value violation $I_{\Delta n}$ main alarm (RMS)		2
16063…16072			Reserved			—
16073	UINT16	RW	Fault memory mode		1 = off 2 = on 3 = permanent	2
16074	UINT16	RW	Filter mode		see Register 16074 "Filter mode"	4
16075			Reserved			—
16076			Reserved			—
16078	UINT16	RW	2)	Modbus address	1…247	Last 2 digits of the serial number + 100
16079	UINT32	RW		Baud rate	1200/2400/ 4800/ 9600/ 19200/38400/ 57600/19200	19200
16081	UINT16	RW		Parity/stop bit	1 = 8N2 2 = 8O1 3 = 8E1 4 = 8N1 5 = 8O2 6 = 8E2	3
16082…16083			Reserved			—
16084	UINT32	RO	Time 3)		UNIX time	0
16086	Float32	RW	Time zone 3)		-12…+14 {0.25}	0

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Register	Format	Property	Description	Value range Unit {Step size}	()* RCMB301
16088	UINT16	RW	Summer time 3)	0 = off 1 = on 2 = CEST (Automat. switchover: Central Europe) 3 = DST (Automatic switchover: USA/ CDN)	0
16089	UINT16	RW	Overwrite history memory	1 = do not overwrite 2 = overwrite automatically	2
16090…19999			Reserved		—

1) Registers 16075 and 16076: If contact monitoring is active, the disconnected state is always checked after 500 ms (not configurable). If and when the connected state is checked depends on register 16076.
2) Wired interface (RS-485)
3) Is not saved when the device is switched off.

Register 16074 "Filter mode"

Register- eintrag	Meaning	Adjustable for RCMB301
1	Normal (full bandwidth: 100 kHz)	X
2	Low pass 60 Hz	X
3	Low pass 500 Hz	X
4	Low pass 1 kHz	X
5	Low pass 2 kHz	X
6	Low pass 5 kHz	X
7	Low pass 10 kHz	X
8	Low pass 20 kHz	X
9	Low pass 50 kHz	X
10	Type B	X
11	Reserved	—
12	Type B+ (up to 100 kHz)	X
13	Reserved	—
14	Fire protection (up to 100 kHz)	X
15	Reserved	—
16	Reserved	—
17	Low pass 180 Hz	X

7.8 Control commands

Register	Format	Pro-perty	Description	Value/unit/comment	Factory setting
20000	UINT16	RW	Device test	Manual device tripping test. Same behaviour as test button. **Read** 1 = test inactive/completed 2 = test running **Write** 2 = start test	1
20001	UINT16	WO	Device reset	Deleting fault and alarm messages. Same behaviour as reset button. 1 = perform reset	
20002	UINT16	RW	Relay 1 test	1 = test inactive (normal function)	1
20003	UINT16	RW	Relay 2 test	2 = relay energised 3 = relay de-energised Switches automatically back to 1 = test inactive after one minute at the latest.	1
20004	UINT16	WO	Clear history memory	1 = perform deletion (secured via reg. 20005)	
20005	UINT16	RW	Allow register write access	Flag to allow changing important registers. Is automatically deactivated after five seconds. 1 = deny 2 = allow	1
20006	UINT16	RW	Activate device signalling	Makes the LED flash quickly red and green in alternation to detect the device in its environment faster. Is automatically deactivated after one minute. 1 = inactive; 2 = active	1
20007	UINT16	WO	Load factory settings (without interface)	Loads all factory settings except the interface parameters. Secured via register 20005. 1 = restore factory settings	
20008	UINT16	WO	Load factory settings (all parameters)	Loads all factory settings including the interface parameters. Secured via register 20005. 1 = restore factory settings	
20009	UINT16	RW	Start offset measurement	**Read** 1 = offset measurement inactive/completed 2 = offset measurement running **Write** 2 = start offset measurement (secured via reg. 20005)	1
20010	UINT16	RW	Test alarm [1]	0 = no test alarm 1 = test alarm channel 1 2 = test alarm channel 2 3 = test alarm channel 3 4 = test alarm channel 4	0
20011…32999				Reserved	

1) Test alarm: Output a test alarm on a measuring channel. The test alarm refers only to bus messages. No relays switch. The test alarm is deactivated after 1 minute (= 0).

7.9 Additional function codes

Diagnostic (function code 0x08)

Sub-function code name	Sub-function code number (decimal)	Error counter	Supported	Notes
Return Query Data	0		X	
Restart Communication	1		X	
Return Diagnostic Register	2		X	1)
Change ASCII Input Delimiter	3			
Force Listen Only Mode	4		X	
Reserved	5…9			
Clear Counters and Diagnostic Register	10		X	
Return Bus Message Count	11		X	
Return Bus Communication Error Count	12	X	X	
Return Bus Exception Error Count	13	X	X	
Return Server Message Count	14		X	2)
Return Server No Response Count	15		X	
Return Server NAK Count	16	X	X	
Return Server Busy Count	17	X	X	
Return Bus Character Overrun Count	18	X	X	
Reserved	19			
Clear Overrun Counter and Flag	20		X	
Reserved	21…65535			

1) The diagnostic register is 0 if all error counters are 0. Otherwise it is 1.
2) It is a 16-bit counter. This means that a maximum of 65535 is counted. There is no overflow.

Get Com Event Counter (function code 0x0B)

Response	Notes
Status	If a previously received command is still being processed, then the answer is 0xFFFF. Otherwise it is 0x0000. (Current implementation: always 0x0000).
Event Count	It is a 16-bit counter. This means that a maximum of 65535 is counted. There is no overflow

Report Server ID (function code 0x11)

Response	Notes
Byte Count	Number of bytes from "Server ID" to "Installation location"
Server ID	Is always 0x01.
Run Indicator Status	Is always 0xFF.

Response		Notes
Manufacturer name	Same information as register 1098.	Output as ASCII string.
Device name	Same information as register 1002.	
Application D number	Same information as register 1194.	
Application version	Same information as register 1195.	
Application Build number	Same information as register 1196.	
Installation location	Same information as register 1234.	

Device Identification (function code 0x2B)

Object ID	Object name / Description	Data type	Category	Supported	Notes
0x00	Manufacturer name	ASCII-String	Basic	X	Corresponds to register 1098
0x01	Article number			X	Corresponds to register 1034
0x02	Application software, version and build number			X	Corresponds to registers 1194, 1195 and 1196
0x03	Internet address manufacturer		Regular	X	Corresponds to register 1202
0x04	Device name			X	Corresponds to register 1002
0x05	Model name				
0x06	User application name				
0x07…0x7F	Reserved				
0x80…0xFF	Non-public objects		Extended		

8 Technical data

8.1 System states: LED and output relays

Ⓐ	A	slowly	Error
Ⓑ	B	medium	Mode change
Ⓒ	C	quickly	Ready for address setting mode
Ⓓ	D	slowly flashing	Address setting mode
Ⓔ	E	once	Confirmation

The LED indicates the system state by means of colours and lighting/flashing. The changeover contacts of relay outputs K1 and K2 have defined switching positions for each system state.

System state	LED		Notes	Changeover contact	
	ON (green)	Alarm (red)		K1	K2
Device switched off	off	off	Device is de-energised, no monitoring, no monitoring function	de-energised	de-energised
Normal operating state	lights	off	The device is supplied with the specified voltage and monitors the primary circuit. No residual current flows which would lead to tripping.	energised	energised
Prewarning	lights	flashes briefly	The device is supplied with the specified voltage and monitors the primary circuit. A fault current flows which exceeds the set limit of the prewarning.	de-energised	energised
Main alarm	off	lights	The device is supplied with the specified voltage and monitors the primary circuit. A fault current flows which exceeds the set limit of the main alarm.	de-energised	de-energised
Device error	off	flashes slowly	The device is supplied with the specified voltage and monitors the primary circuit. An error is detected by the periodic self tests.	de-energised	de-energised
Device in calibration mode	offset calibration procedure: see "Offset calibration", page 19			de-energised	de-energised
Device in address mode	for procedure, refer to "Setting addresses", page 18				
Device signalling	flash quickly in alternation		Use Modbus register 20006 = 2 to detect the device in its environment faster. Is automatically deactivated after one minute.		

| System state	LED		Notes	Changeover contact	
	ON (green)	**Alarm (red)**		**K1**	**K2**
Reset	off	Flashes slowly	The reset status is achieved by pressing and holding the "T" button in the alarm status. To perform the reset, release the "T" button when the red LED flashes slowly (1.5...5 s).		
Test	flashes quickly	off	The test status is achieved by pressing and holding the "T" button in normal operating mode. To carry out the test, release the "T" button when the green LED flashes quickly (5...10 s).	wechselt	wechselt

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8.2   Diagrams
8.2.1   Frequency responses
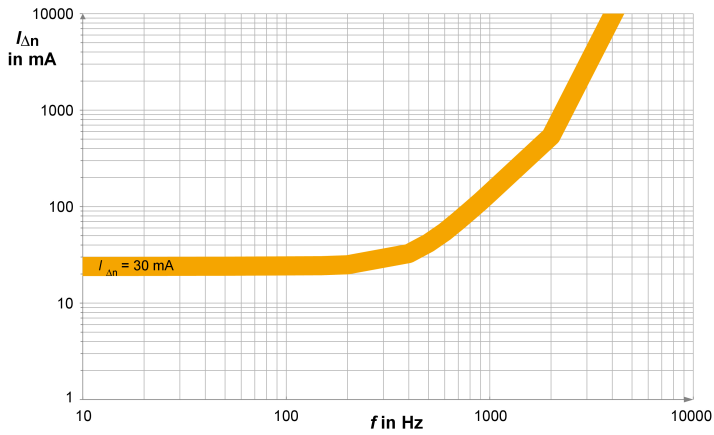
Low passes TP
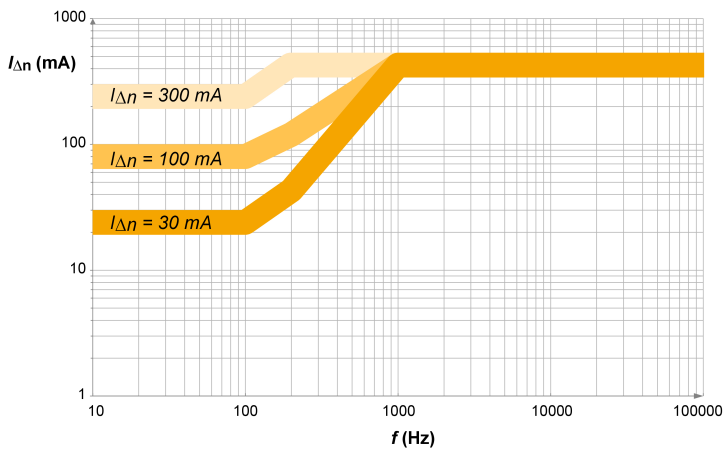

Type B+

BENDER
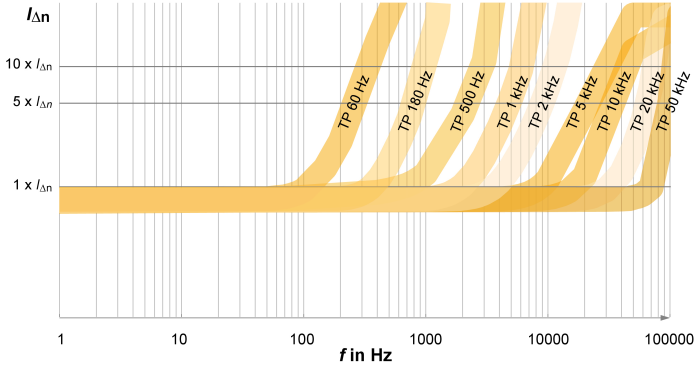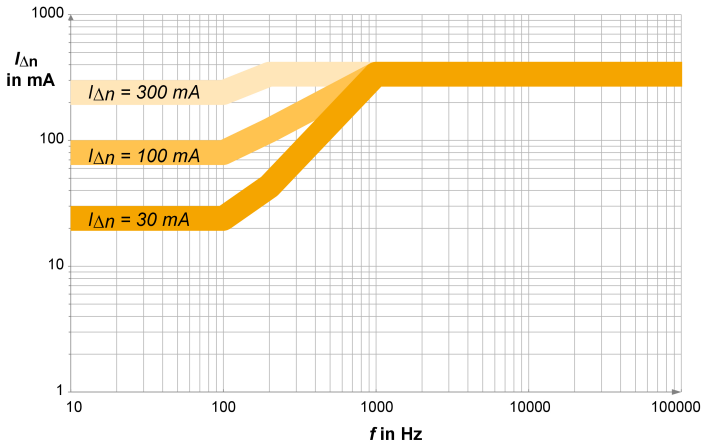
Type B

Fire protection 100 kHz

8.3   Tabular data

( )* = factory setting

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

Definitions

Measuring circuit (IC1)	Primary conductors routed through the current transformer
Secondary (IC2)	Terminal block 1 (24 V, GND, T/R, GND, A, B, X1, X2)
Control circuit 1 (IC3)	Terminal block 2 (11, 12, 14)
Control circuit 2 (IC4)	Terminal block 3 (21, 22, 24)
Rated insulation voltage	800 V
Overvoltage category	III
Pollution degree	2
Operating altitude	≤ 2000 m AMSL

Rated impulse voltage

IC1/(IC2-IC4)	8 kV
IC2/(IC3-IC4)	4 kV
IC3/IC4	4 kV

Rated insulation voltage

IC1/(IC2-IC4)	800 V
IC2/(IC3-IC4)	250 V
IC3/IC4	250 V

Safe isolation (reinforced insulation) between

IC2/(IC3-IC4)	300 V

Basic insulation between

IC1/(I2-IC4)	800 V
IC3/IC4	300 V

Voltage tests (routine test) acc. to IEC 61010-1

IC2/(IC3-IC4)	AC 2.2 kV
IC3/IC4	AC 2.2 kV

Supply voltage

Supply voltage U_S	DC 24 V
Operating range of U_S	±20 %
Ripple U_S	≤ 1 %
Power consumption	≤ 2.5 W
Inrush current	1.7 A for 1 ms

Measuring circuit

Internal diameter measuring current transformer	see "Dimension diagrams", page 12
Characteristics according to IEC 62020 and IEC/TR 60755	AC/DC sensitive, type B
Response value $I_{\Delta n}$	see "Frequency responses", page 38 30 mA…3 A (freely configurable), (30 mA)* siehe "Frequency responses", page 38
Prewarning	50…100 % $I_{\Delta n}$ (freely configurable), (60 %)*
Rated current I_n	
CTBC20 at $I_{\Delta n}$ = 30 mA	40 A
CTBC20 bei $I_{\Delta n}$ = 300 mA	63 A
CTBC20P	80 A
CTBC35 at $I_{\Delta n}$ = 30 mA	80 A
CTBC35 at $I_{\Delta n}$ = 300 mA	125 A
CTBC35P	160 A
CTBC60 at $I_{\Delta n}$ = 30 mA	160 A
CTBC60 at $I_{\Delta n}$ = 300 mA	250 A
CTBC60P	320 A
CTBC120 at $I_{\Delta n}$ = 100 mA	330 A
CTBC120P at $I_{\Delta n}$ = 100 mA	630 A
CTBC210 at $I_{\Delta n}$ = 300 mA	630 A
CTBC210P at $I_{\Delta n}$ = 100 mA	630 A
CTBC210P at $I_{\Delta n}$ = 300 mA	1000 A
Operating uncertainty	±17.5 %
Relative uncertainty	0…−35 %
Test winding	yes

Possible response values (to be set on the evaluator)

CTBC20, CTBC20P	10…500 mA
CTBC35, CTBC35P, CTUBC60, CTBC60P	30 mA…10 A
CTBC120P, CTBC210P	100 mA…10 A
CTBC120, CTBC210	300 mA…10 A

Time response

Response delay t_{on}	50 ms…60 min (freely configurable), (50 ms)*
	Note: To satisfy IEC 62020-01, t_{on} may not be set to more than 9.8 s
Start-up delay t	0 s…60 min (freely configurable), (0 s)*
Delay on release t_{off}	0 s…60 min (freely configurable)
Operating time t_{ae}	
at 1 x $I_{\Delta n}$	≤ 230 ms
at 2 x $I_{\Delta n}$	≤ 180 ms
at 5 x $I_{\Delta n}$	≤ 70 ms
Response time	$t_{an} = t_{ae} + t_{on}$
Recovery time t_b	≤ 1 s

Indication

Multicolour LED	red/green, Refer to "System states: LED and output relays", page 36

Inputs

Label	T/R, GND
Maximum length connecting cable	10 m

Outputs

Number of changeover contacts	2
Relay mode	N/C principle or N/O principle, (freely configurable), (N/C principle)*
Switching outputs (K1, K2)	250 V, 5 A
Switching capacity	1500 VA / 144 W
Contact data acc. to IEC 60947-5-1	
Rated operational voltage AC	250 V/250 V
Utilisation category	AC-13/AC-14

Rated operational current AC	5 A/3 A
Rated operational current AC (for UL applications)	3 A/3 A
Rated operational voltage DC	220/110/24 V
Utilisation category	DC12
Rated operational current DC	0.1/0.2/1 A
Minimum current	10 mA at DC 5 V
Electrical endurance, number of cycles	10.000

Environment/EMC

EMC	IEC 62020-01
Operating temperature	−25…70 ℃

Classification of climatic conditions acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3K23
Transport (IEC 60721-3-2)	2K11
Long-term storage (IEC 60721-3-1)	1K22

Classification of mechanical conditions acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3M11
Transport (IEC 60721-3-2)	2M4
Long-term storage (IEC 60721-3-1)	1M12

Connection

Required terminals are included in the scope of delivery .

Terminal block 1	
Manufacturer	Phoenix Contact
Type	DFMC 1,5/5-ST-3,5 BK
The connection conditions of the manufacturer apply.	
Connection properties	
rigid	0.2…1.5 mm² (AWG 24…16)
flexible	0.2…1.5 mm² (AWG 24…16)
with ferrules	0.25…0.75 mm² (AWG 24…19)
Terminal block 2, 3	
Manufacturer	Phoenix Contact
Type	FKCVW 2,5/ 3-ST-5,08
The connection conditions of the manufacturer apply.	

Connection properties

rigid	0.2…2.5 mm² (AWG 24…13)
flexible	0.2…2.5 mm² (AWG 24…13)
with ferrules	0.25…2.5 mm² (AWG 24…13)

Mounting CTBC…

Screw type

CTBC20…60(P)	DIN EN ISO 7045 - M5
CTCB120…210(P)	DIN EN ISO 7045 - M6

Washer type

CTBC20…60(P)	DIN EN ISO 7089/7090 - 5
CTCB120…210(P)	DIN EN ISO 7089/7090 - 6

Tightening torque

CTBC20…35 (P)	0.6 Nm
CTCB60…210(P)	1 Nm

Other

Operating mode	continuous operation
Mounting	any position
Degree of protection, internal components (DIN EN 60529)	IP40
Degree of protection, terminals (DIN EN 60529)	IP20
Flammability class	UL94 V-0
Software	D0610

Weight

RCMB301	≤ 100 g
CTBC20	≤ 160 g
CTBC20P	≤ 220 g
CTBC35	≤ 240 g
CTBC35P	≤ 320 g
CTBC60	≤ 460 g
CTBC60P	≤ 620 g
CTBC120	≤ 1390 g
CTBC120P	≤ 1750 g
CTBC210	≤ 4220 g

Weight	
CTBC210P	≤ 4870 g

8.4 Standards and certifications

CE UKCA c(UL)us LISTED LR APPROVED TYPE APPROVAL SCHEME

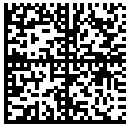## 8.5 Conformity

EU Declaration of Conformity

The EU Declaration of Conformity is available at the following Internet address:

https://www.bender.de/fileadmin/content/Products/CE/CEKO_RCMB30x.pdf

8.6 Ordering details

Electronic modules

Supply voltage	Variant	Type	Art.No.
DC 24 V (19.2…28.8 V)	Modbus RTU	RCMB301	B74043100

Measuring current transformers

Type	Description	Art. No.
CTBC20	Measuring current transformer, internal diameter 20 mm	B98120001
CTBC20P	Measuring current transformer shielded, internal diameter 20 mm	B98120002
CTBC35	Measuring current transformer, internal diameter 35 mm	B98120003
CTBC35P	Measuring current transformer shielded, internal diameter 35 mm	B98120004
CTBC60	Measuring current transformer, internal diameter 60 mm	B98120005
CTBC60P	Measuring current transformer shielded, internal diameter 60 mm	B98120006
CTBC120	Measuring current transformer, internal diameter 120 mm	B98120007
CTBC120P	Measuring current transformer shielded, internal diameter 120 mm	B98120020
CTBC210	Measuring current transformer, internal diameter 210 mm	B98120008
CTBC210P	Measuring current transformer shielded, internal diameter 210 mm	B98120021

Accessories

Description	Art. No.
USB to RS-485 interface converter	B95012045
Terminal set for RCMB301 module *	B74043124
Snap-on mounting for CTBC20 and CTBC20P *	B91080111
Snap-on mounting for CTBC35 and CTBC35P *	B91080112

*   Included in scope of delivery

Suitable system components

Description	Max. number of current transformers	Type	Art. No.
Voltage supply	4	STEP-PS/1 AC/24 DC/0.5	B94053110
	14	STEP-PS/1 AC/24 DC/1.75	B94053111
	34	STEP-PS/1 AC/24 DC/4.2	B94053112

8.7   Document revision history

Date	Document version	Starte/Changes
08.2024	04	*Editorial revision* Entire document