



EN Manual

BENDER
The Power in Electrical Safety®

RCMB423EM



Residual current monitor

for monitoring AC-, DC- and pulsed DC currents
in TN- and TT systems

Software version: D480 V1.01



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1. Important information

1.1 How to use this manual



*This manual is intended for **qualified personnel** working in electrical engineering and electronics!*

Always keep this manual within easy reach for future reference.

To make it easier for you to understand and revisit certain sections in this manual, we have used symbols to identify important instructions and information. The meaning of these symbols is explained below:



*This signal word indicates that there is a **high risk of danger** that will result in **electrocution** or **serious injury** if not avoided.*



*This signal word indicates a **medium risk of danger** that can lead to **death** or **serious injury** if not avoided.*



*This signal word indicates a **low level risk** that can result in **minor** or **moderate injury or damage to property** if not avoided.*



*This symbol denotes information intended to assist the user in making **optimum use** of the product.*

This manual has been compiled with great care. It might nevertheless contain errors and mistakes. Bender cannot accept any liability for injury to persons or damage to property resulting from errors or mistakes in this manual.

1.2 Technical support: service and support

For commissioning and troubleshooting Bender offers you:

1.2.1 First level support

Technical support by phone or e-mail for all Bender products

- Questions concerning specific customer applications
- Commissioning
- Troubleshooting

Telephone: +49 6401 807-760*
Fax: +49 6401 807-259
In Germany only: 0700BenderHelp (Tel. and Fax)
E-mail: support@bender-service.de

1.2.2 Repair service

Repair, calibration, update and replacement service for Bender products

- Repairing, calibrating, testing and analysing Bender products
- Hardware and software update for Bender devices
- Delivery of replacement devices in the event of faulty or incorrectly delivered Bender devices
- Extended guarantee for Bender devices, which includes an in-house repair service or replacement devices at no extra cost

Telephone: +49 6401 807-780** (technical issues)
+49 6401 807-784**, -785** (sales)
Fax: +49 6401 807-789
E-mail: repair@bender-service.de

Please send the devices for **repair** to the following address:

Bender GmbH, Repair-Service,
Londorfer Str. 65,
35305 Gruenberg

1.2.3 Field service

On-site service for all Bender products

- Commissioning, configuring, maintenance, troubleshooting of Bender products
- Analysis of the electrical installation in the building (power quality test, EMC test, thermography)
- Training courses for customers

Telephone: +49 6401 807-752**, -762 **(technical issues)

+49 6401 807-753** (sales)

Fax: +49 6401 807-759

E-mail: fieldservice@bender-service.de

Internet: www.bender-de.com

*Available from 7.00 a.m. to 8.00 p.m. 365 days a year (CET/UTC+1)

**Mo-Thu 7.00 a.m. - 8.00 p.m., Fr 7.00 a.m. - 13.00 p.m

1.3 Training courses

Bender is happy to provide training regarding the use of test equipment. The dates of training courses and workshops can be found on the Internet at www.bender-de.com -> Know-how -> Seminars.

1.4 Delivery conditions

Bender sale and delivery conditions apply.

For software products the "Softwareklausel zur Überlassung von Standard-Software als Teil von Lieferungen, Ergänzung und Änderung der Allgemeinen Lieferbedingungen für Erzeugnisse und Leistungen der Elektroindustrie" (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) set out by the ZVEI (Zentralverband Elektrotechnik- und Elektronikindustrie e. V.) (German Electrical and Electronic Manufacturer's Association) also applies.

Sale and delivery conditions can be obtained from Bender in printed or electronic format.

1.5 Inspection, transport and storage

Inspect the dispatch and equipment packaging for damage, and compare the contents of the package with the delivery documents. In the event of damage in transit, please contact Bender immediately.

The devices must only be stored in areas where they are protected from dust, damp, and spray and dripping water, and in which the specified storage temperatures can be ensured.

1.6 Warranty and liability

Warranty and liability claims in the event of injury to persons or damage to property are excluded if they can be attributed to one or more of the following causes:

- 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 and the use of replacement parts or accessories not approved by the manufacturer.
- Catastrophes caused by external influences and force majeure.
- Mounting and installation with device combinations not recommended by the manufacturer.

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

1.7 Disposal

Abide by the national regulations and laws governing the disposal of this device. Ask your supplier if you are not sure how to dispose of the old equipment.

The directive on waste electrical and electronic equipment (WEEE directive) and the directive on the restriction of certain hazardous substances in electrical and electronic equipment (RoHS directive) apply in the European Community. In Germany, these policies are implemented through the "Electrical and Electronic Equipment Act" (ElektroG). According to this, the following applies:

- Electrical and electronic equipment are not part of household waste.
- Batteries and accumulators are not part of household waste and must be disposed of in accordance with the regulations.
- Old electrical and electronic equipment from users other than private households which was introduced to the market after 13 August 2005 must be taken back by the manufacturer and disposed of properly.

For more information on the disposal of Bender devices, refer to our homepage at www.bender-de.com -> Service & support.

2. Safety instructions

2.1 General safety instructions

Part of the device documentation in addition to this manual is the enclosed "Safety instructions for Bender products".

2.2 Work activities on electrical installations



Only **qualified personnel** are permitted to carry out the work necessary to install, commission and run a device or system.



DANGER

Risk of electrocution due to electric shock!

Touching live parts of the system carries the risk of:

- An electric shock
- Damage to the electrical installation
- Destruction of the device

Before installing and connecting the device, make sure that the installation has been *de-energised*. Observe the rules for working on electrical installations.

If the device is used outside the Federal Republic of Germany, the applicable local standards and regulations must be complied with. The European standard EN 50110 can be used as a guide.

2.3 Intended use

The AC/DC sensitive residual current monitoring device RCMB423EM is used for monitoring of earthed systems (TN and TT systems), in which DC or AC fault currents can occur. Part of these systems are particularly loads containing six-pulse rectifiers or one-way rectifiers with smoothing, such as converters, battery chargers, construction site equipment with frequency-controlled drives.

Since the values are measured with measuring current transformers, the RCMB423EM is almost independent of the nominal voltage and the current of the monitored system.

The response value $I_{\Delta n2}$ as well as the response delay t_{on2} can be configured directly from the standard display (quick menu).

In order to meet the requirements of the applicable standards, customised parameter settings must be made on the equipment in order to adapt it to local equipment and operating conditions. Please heed the limits of the range of application indicated in the technical data.

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

2.4 Information about factory setting

page 31 provides a summary of all factory settings.

If you want to reset the residual current monitor to its factory setting in a specific case, refer to page 29.

3. Function

3.1 Device characteristics

- AC/DC sensitive residual current monitor type B acc. to IEC 62020 and IEC 60755
- Quick menu: direct setting of the response value $I_{\Delta n2}$ as well as the response delay t_{on2}
- r.m.s. value measurement
- Alarm signalling via LEDs (AL1, AL2) and changeover contacts (K1/K2)
- CT connection monitoring

3.2 Description of functions

After connecting the supply voltage U_s , the start-up delay is active. During this start-up time, changes on the measured residual currents do not influence the positions of the output relays. The residual current is measured via an external measuring current transformer W20AB...W210AB. The currently measured insulation resistance is indicated on the LC display. This way any changes, for example when outgoing circuits are connected to the system, can be recognised easily. If the set response values are exceeded, the response delays $t_{on1/2}$ start.

Once $t_{on1/2}$ has elapsed, the selected alarm relays K1/K2 switch and the alarm LEDs AL1/AL2 light up. If the residual current falls below the release value (response value minus hysteresis), the release delay t_{off} starts. After t_{off} has elapsed, the alarm relays will switch back to their initial state and the alarm LEDs AL1/AL2 will go out. If the fault memory is activated, the alarm relays remain in alarm condition and the LEDs light until the reset button "R" is pressed or the supply voltage is interrupted. The device function can be tested using the test button "T". Parameters are assigned to the device via the LCD and the control buttons on the front panel; this function can be password-protected.

3.2.1 Connection monitoring

The connections to the measuring current transformer are constantly monitored. In the event of a fault, the alarm relays K1/K2 switch, the alarm LEDs AL1/AL2/ON flash (Error code E.01). After eliminating the fault, the alarm relays switch back automatically to their initial position, as long as the fault memory M is deactivated. When the fault memory is activated, K1/K2 switch back to their initial position by pressing the reset button "R". A cascaded second measuring current transformer is not monitored.

3.2.2 Self-test, automatic

The device automatically carries out a self test after connecting to the system to be monitored and later every 24 hours. During the self test, internal functional faults will be detected and appear in form of an error code on the display. The alarm relays are not switched during this test.

3.2.3 Self-test, manual

The device carries out a self-test by pressing and holding the test button (> 2 s) during which internal functional faults are detected and displayed as an error code. The alarm relays are not switched during this test.

While pressing the test button T all available display elements for this device are shown.

3.2.4 Malfunction

In the event of an internal malfunction, all three LEDs will flash. The display shows an error code (E01...E32). In such a case please contact the Bender Service.

3.2.5 Delay times t , t_{on} and t_{off}

The times t , t_{on} and t_{off} described below, delay alarm signalling via LEDs and relays.

Start-up delay t

After connection to the supply voltage U_s the alarm indication is delayed by the preset time t (0... 10 s).

Response delay $t_{on1/2}$

When the value drops below or exceeds the response value, the residual current monitoring device needs the response time t_{an} until indication of the alarm. A set response delay $t_{on1/2}$ (0...10 s) adds up to the device-related operating time t_{ae} and delays the alarm signalling (total delay time $t_{an} = t_{ae} + t_{on}$). Should the fault no longer persist during the response delay, the alarm signal drops out.

Delay on release t_{off}

If the alarm no longer exists during the response delay and the fault memory is deactivated, the alarm LEDs will go out and the alarm relays switch back to their initial position. The alarm state is continuously maintained for the selected period by activating the delay on release (0...99 s).

3.2.6 External, combined test or reset button T/R

- | | |
|-------|--|
| Reset | = pressing the external button briefly (< 1 s) |
| Test | = pressing and holding the external button (> 2 s) |

4. Installation and connection



Only **qualified personnel** are permitted to carry out the work necessary to install, commission and run a device or system.



DANGER

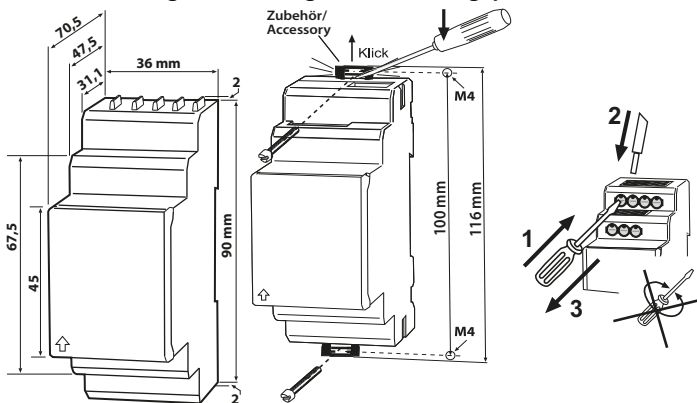
Risk of electrocution due to electric shock!

Touching live parts of the system carries the risk of:

- An electric shock
- Damage to the electrical installation
- Destruction of the device

Before installing and connecting the device, make sure that the *installation* has been *de-energised*. Observe the rules for working on electrical installations.

Dimension diagram, drawing for screw fixing, push-wire terminal



Connection

The front plate cover can be opened at the lower part marked with an arrow.

1. DIN Rail mounting:

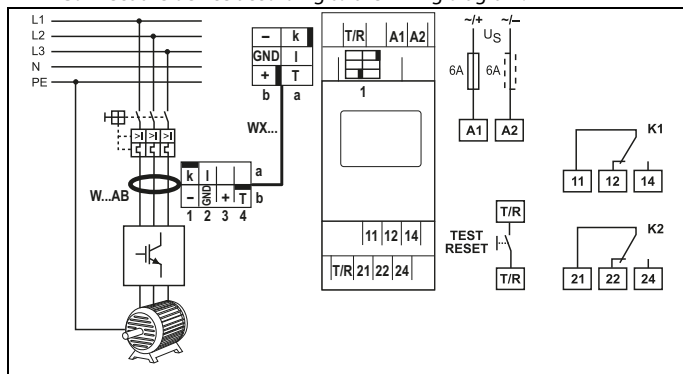
Snap the rear mounting clip of the device into place in such a way that a safe and tight fit is ensured.

Screw fixing:

Use a tool to position the rear mounting clips so that they project beyond the enclosure (a second mounting clip is required, see ordering information). Then fix the device using two M4 screws.

2. Wiring

Connect the device according to the wiring diagram.

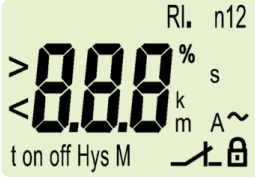




Terminal	Connections
A1, A2	Connection to supply voltage U_s
1	Socket for power supply cable WX... to measuring current transformer of type W...AB
T/R	Connection to combined test and reset button
11, 12, 14	Alarm relay K1
21, 22, 24	Alarm relay K2

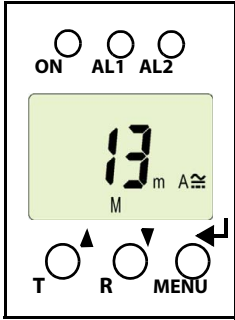
5. Operation and configuration

5.1 Display elements in use

The meaning of the display elements in use is listed in the table below.

Display elements in use	Element	Function
	RL	Reload function with memory = off (L = I.)
	I2	Response value $I_{\Delta n2}$ in mA (alarm 2, main alarm)
	I1	Response value $I_{\Delta n1}$ in % of $I_{\Delta n2}$ (alarm 1, prewarning)
	r1, 1 r2, 2	Alarm relay K1 Alarm relay K2
	I Hys, %	Response value hysteresis in %
	ton1, ton2, T, toff	Response delay t_{on1} (K1) Response delay t_{on2} (K2) Start-up delay t , Delay on release t_{off} for K1, K2
	M	Fault memory active
		Operating principle of the alarm relays
		Password protection enabled

5.2 Function of the operating elements

User interface	Element	Function
	ON, green	Lights continuously: Power On LED, flashes: system fault or malfunction of connection monitoring
	AL1, AL2	LED alarm 1 lit up (yellow): response value 1 reached ($I_{\Delta n1}$) LED alarm 2 lit up (yellow): response value 2 reached ($I_{\Delta n2}$)
	13 mA M	13 m A flow through the measuring current transformer, fault memory active
	T, ▲	Standard display: (> 2 s): display test, self-test Menu display: Up button (< 1 s)
	R, ▼	Standard display: Reset button (> 2 s): erasing the fault memory; Menu display: Down button (< 1 s)
	MENU, ←	Standard display: (< 1 s): Quick menu (> 5 s): Full menu Menu display: Enter button (< 1 s): to confirm menu item, sub- menu item and value (> 2 s): back to the next higher menu level

5.3 Menu structure

The RCMB423EM offers an quick menu for uncomplicated setting of $I_{\Delta n2}$ and t_{on2} . If the factory setting in combination with the **quick menu** is not enough, you can set the parameters individually via the **full menu** (refer to Kapitel 5.3.2).



In principle, the time during which the MENU/Enter button is pressed differs:

briefly: < 1 s

long: > 2 s

very long: > 5 s

The following diagram shows the access conditions for entering the corresponding setting menu item:

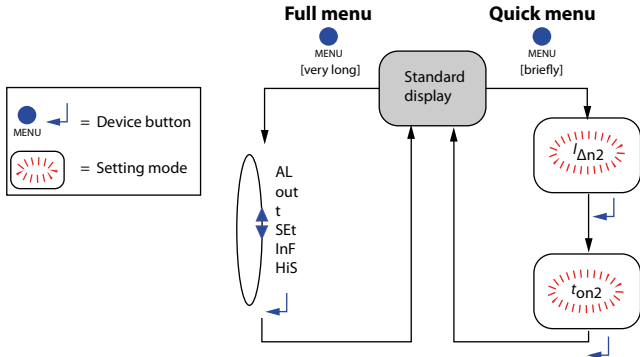


Abb. 5.1: Full and quick menu

5.3.1 Quick menu

For quick setting of $I_{\Delta n2}$ and t_{on2} , there is a direct way: the quick menu. You can access it by pressing the MENU button briefly.



In principle, the time during which the MENU/Enter button is pressed differs:

briefly: < 1 s

long: > 2 s

very long: > 5 s

Operating the quick menu:

Entering changes	Modify flashing parameters with the arrow buttons.
Saving changes	Press the MENU/Enter button in the setting menu $I_{\Delta n2}$ briefly . Automatic jump to the setting menu for t_{on2} or back to the standard display.
Discarding changes	Press and hold MENU/Enter button long . Immediate return to standard display. Changes are discarded.

For easier orientation, find an overview of the **quick menu** structure below:

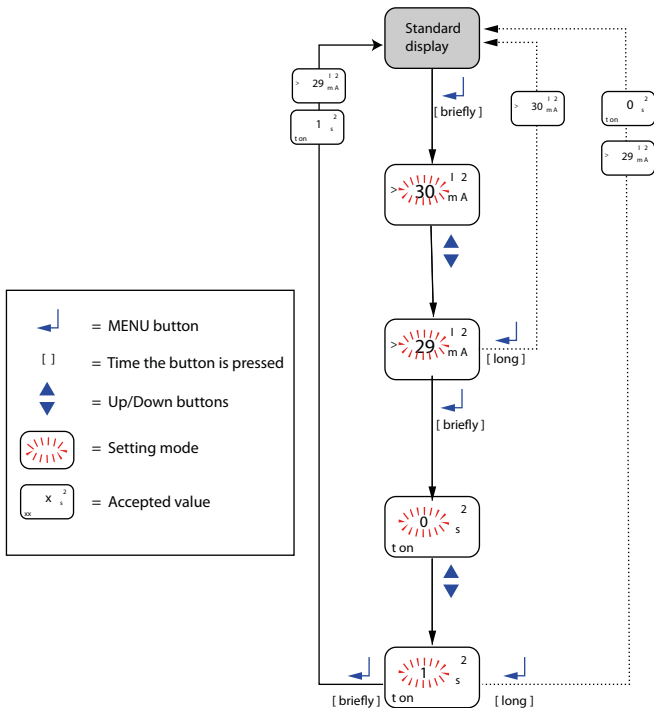


Abb. 5.2: Overview operation quick menu

5.3.2 Full menu

If the setting options of the quick menu are not enough, all parameters can be set individually in the full menu.



Querying and setting parameters in the full menu:
 press MENU button for > 5 s

Configurable parameters

Menu item	Configurable parameter
AL	Querying and setting response values: <ul style="list-style-type: none"> - Residual current I₂ (I_{Δn2}) (AL2) - Residual current I₁ (I_{Δn1}) (AL1) - Hysteresis of the response values: % Hys
out	Configuring the fault memory and the alarm relays: <ul style="list-style-type: none"> - Activate/deactivate fault memory or assign continuous mode (on/off/con) - Select N/O (n.o.) or N/C (n.c.) operation individually for each K1/K2 - Specify the number of the reload cycles - Assign the alarm category I₁ (I_{Δn1}) or I₂ (I_{Δn2}), relay test or device fault individually to K1/K2 (1, r1/ 2, r2)
t	Setting delays: <ul style="list-style-type: none"> - Response delay t_{on1} /t_{on2} - Start-up delay t - Delay on release t_{off} (LED, relay)

SEt	Set parameters for device control: <ul style="list-style-type: none">– Selectable parameters for response values: Overcurrent operation (HI), undercurrent operation (Lo) or window function (In)– Enable or disable password protection, change password– Restore factory setting– Service menu SyS blocked
InF	Query hardware and software version
HiS	Query the alarm value saved first; Erase history memory
ESC	Go to the next higher menu level (back)

Tab. 5.1: Configurable parameters (full menu)

For easier orientation, find an overview of the **full menu** structure on the next page.

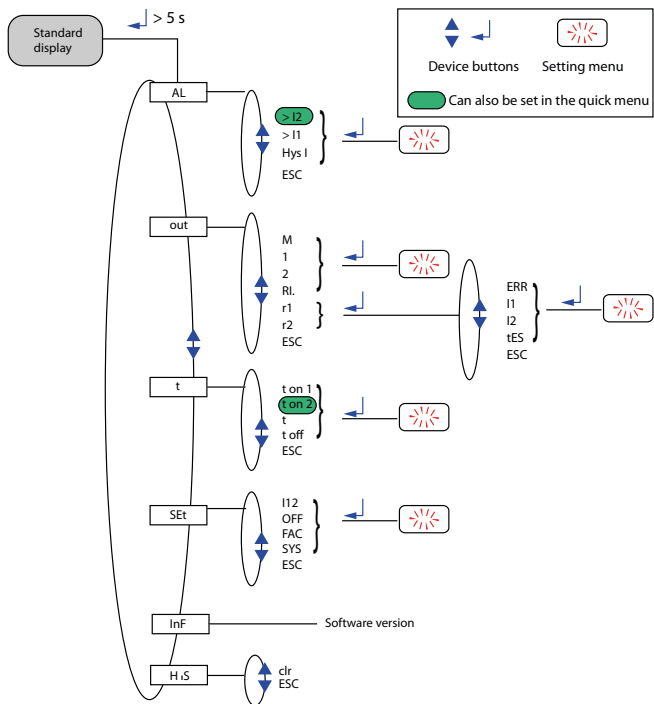


Abb. 5.3: Overview full menu (schematically)



By pressing and holding the MENU button (> 2 s) you go back one menu level.

5.4 Parameter settings

Example in the full menu: Prewarning



In principle, the time during which the MENU/Enter button is pressed differs:

briefly: < 1 s

long: > 2 s

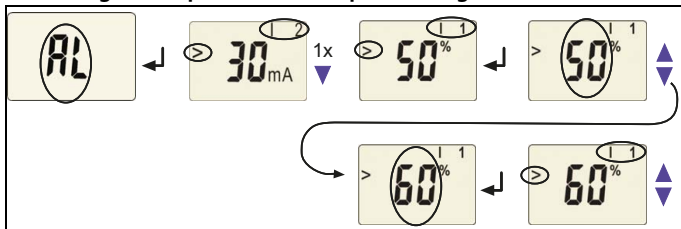
very long: > 5 s

The modification of the response value I1 (prewarning, $I_{\Delta n1}$) is described as an example. Flashing display elements are marked with an ellipse on the display diagram.

It is presumed that the option overcurrent (HI) has been selected in the SEt/I12 menu (factory setting). Proceed as follows:

1. Press and hold the MENU/Enter button very long (> 5 s). The flashing short symbol AL appears on the display.
2. Confirm with Enter (briefly). The parameter response value > I2 flashes, in addition the associated response value of 30 mA appears.
3. Press the Down button to select the prewarning response value I1. The parameter I1 flashes; in addition, the associated percentage value for prewarning 50 % of I2 appears.
4. Confirm the selection with Enter (briefly). The current value for prewarning flashes.
5. Use the Up or Down button to set the appropriate prewarning value. Confirm with Enter (briefly). I1 flashes.
6. You can exit the menu by:
 - pressing the Enter button for more than 2 seconds to reach the next higher level or
 - selecting the menu item ESC and confirming with Enter (< 1 s) to reach the next higher level.

Increasing the response value I1 (prewarning overcurrent)



5.5 Explanatory notes on the setting parameters

5.5.1 Menu out

Fault memory

The fault memory can be activated, deactivated or set to continuous mode (con). In "con" mode, the alarm remains stored even after failure of the supply voltage. Stored alarms can be reset by means of the reset button R.

Specifying the number of reload cycles

If faults occur only temporarily but recurrently in the system being monitored with the fault memory M deactivated, the alarm relays would switch synchronously to the error status.

RL in the out menu can be used to limit the number of these changeover processes. As soon as the preset number of switching cycles is exceeded, the fault memory will come on and an activated alarm remains stored.

Assigning alarm categories to alarm relays K1/K2

The alarm categories device fault, residual current $I_{\Delta n1}$, residual current $I_{\Delta n2}$ or alarm can be assigned to the alarm relays via the menu "out" using the device test.

Alarm assignment in the menu "out"



WARNING

Deactivating an alarm relay K1/K2) via the menu prevents an alarm being indicated by the respective changeover contact! An alarm will **only be signalled by the respective **alarm LED** (AL1/AL2)!**

5.5.2 Menu t (Set delay times)

The following delays can be set:

- Response delay t_{on1} (0...10 s) for K1, as well as t_{on2} (0...10 s) for K2
- Start-up delay t (0...10 s) when starting the device
- Common delay on release t_{off} (0...300 s) for K1, K2. The setting t_{off} is only relevant when the fault memory M is deactivated.

5.5.3 Menu SEt

Residual current monitoring in window mode

By switching the measurement method to window mode (SEt / In) the device triggers an alarm when exiting the mode which is generated by the response values I1 and I2.

Password protection (on, OFF)

If password protection has been enabled (on), settings can only be made subject to the correct password being entered (0...999).

Factory setting FAC

Activating the factory setting will reset all modified settings to the default upon delivery.

5.6 Menu InF (Querying device information)



This function is used to query the software version (1.xx). After activating this function, data will be displayed as a scrolling text. Once one pass is completed, you can select individual data sections using the Up/Down buttons.



5.7 Menu HiS (Erasable history memory)


The first alarm value to occur is written to this memory. Select the history memory via the menu HiS. Use the Up and Down buttons to view the next display. If Clr is flashing, the history memory can be cleared by pressing the Enter button.

6. Setting ranges, factory setting, LEDs











6.1 Parameters

Menu	Parameters	Description	Setting range	Factory setting
AL	I2 >	Alarm value main alarm I2; "Greater than"-comparison	30 mA...3.0 A	30 mA
	I2 <	Alarm value main alarm I2; "Less than"-comparison		
	I2 > (win- dow)	Alarm value main alarm I2; Window-comparison (upper limit)		
	I1 >	Alarm value prewarning I1; "Greater than"-comparison	50...100 %	50 %
	I1 <	Alarm value prewarning I1; "Less than"-comparison	100...200 %	150 %
	I1 < (win- dow)	Alarm value prewarning I1; Window-comparison (lower limit)	50...100 %	50%
	Hys	Hysteresis for alarm values	10...25 %	15%
out	M	Memory function for alarm messages	off/on/con	ON
	1 	Position N/O contact relay 1 (11-14) without alarm	n.c. / n.o.	n.c.
	2 	Position N/O contact relay 2 (21-24) without alarm	n.c. / n.o.	n.c.
	RL	Number of reload cycles	0...100	0

Menu	Parameters	Description	Setting range	Factory setting	
out	r1	1  Err	Alarm assignment of relay 1 Error message (system fault)	on / off	on
		r1 l1	Alarm message prewarning l1	on / off	on
		r1 l2	Alarm message main alarm l2	on / off	off
		r1 tES	Alarm message test	on / off	on
	r2	2  Err	Alarm assignment of relay 2 Error message (system fault)	on / off	on
		r2 l1	Alarm message prewarning l1	on / off	off
		r2 l2	Alarm message main alarm l2	on / off	on
		r2 tES	Alarm message test	on / off	on
t	ton 1	Response delay relay 1 (0 s are ≤ 30 ms)	0...10 s	1 s	
	ton 2	Response delay relay 2	0...10 s	≤ 0 s	
	t	Start-up time when starting the device	0...10 s	0.5 s	
	toff	Delay on release relay 1 and 2	0...300 s	1 s	

Menu	Parameters	Description	Setting range	Factory setting
Set	I12	"Greater than"-, "Lower than"- or "Window"-comparison	HI / Lo / In	HI
		Password for parameter setting	off/0...999	off
	FAC	Restore factory setting	YES / no	no
	SYS	For Bender Service only	0...999	-
InF	-	Software version indications		
HiS	-	Display memory for the first fault		

6.2 Meaning of the LEDs

Meaning	ON	AL1	AL2
Error message (system fault)			
Response value prewarning $I_{\Delta n1}$ reached			
Response value alarm $I_{\Delta n2}$ reached			
- Alarm message test or - Response value prewarning $I_{\Delta n1}$ and response value alarm $I_{\Delta n2}$ reached			

7. Technical data

7.1 Tabular data

()* = Factory setting

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

RCMB423EM-D-1:

Rated insulation voltage	100 V
Overvoltage category/pollution degree	III/3
Rated impulse withstand voltage	2.5 kV

RCMB423EM-D-2:

Rated insulation voltage	250 V
Overvoltage category/pollution degree	III/3
Rated impulse withstand voltage	4 kV

Supply voltage

RCMB423EM-D-1:

Supply voltage range U_s	AC 24...60 V / DC 24...78 V
Operating range of supply voltage U_s	AC 16...72 V / DC 9.6...94 V
Frequency range U_s	DC, 42...460 Hz

RCMB423EM-D-2:

Supply voltage range U_s	AC/DC 100...250 V
Operating range of supply voltage U_s	AC/DC 70...300 V
Frequency range U_s	DC, 42...460 Hz

Protective separation (reinforced insulation) between..... (A1, A2) - (k, l, T/R) - (11, 12, 14) - (21, 22, 24)

Voltage tests according to IEC 61010-1..... 2.21 kV

Power consumption

≤ 6.5 VA

Measuring circuit

External measuring current transformer type

W20AB, W35AB(P), W60AB(P), W120AB, W210AB

Rated insulation voltage (measuring current transformer)

800 V

Operating characteristics acc. to IEC 62020 and IEC/TR 60755

Type B

Rated frequency

0...2000 Hz

Relative uncertainty at $f \leq 2$ Hz or ≥ 16 Hz	0...-35 %
Relative uncertainty for $f > 2$ Hz... < 16 Hz	-35...+100 %
Operating uncertainty	0... 35 %

Response values

Rated residual operating current $I_{\Delta n1}$ (prewarning, AL1)	50... 100 % of $I_{\Delta n2}$ (50 %)*
Rated residual operating current $I_{\Delta n2}$ (alarm, AL2)	30 mA... 3 A (30 mA)*
Hysteresis	10... 25% (15 %)*

Time response

Start-up delay t	0... 10 s (0.5 s)*
Response delay t_{on1} (prewarning)	0... 10 s (1 s)*
Response delay t_{on2} (alarm)	0... 10 s (0 s)*
Delay on release t_{off}	0... 300 s (1 s)*
Operating time t_{ae} at $I_{\Delta n} = 1 \times I_{\Delta n1/2}$	≤ 180 ms
Operating time t_{ae} at $I_{\Delta n} = 5 \times I_{\Delta n1/2}$	≤ 30 ms
Response time t_{an}	$t_{an} = t_{ae} + t_{on1/2}$
Recovery time t_b	≤ 300 ms

Displays, memory

Display range measured value AC/DC	0... 6 V
Error of measured value indication	± 17.5 % / ± 2 digits
Measured-value memory for alarm value	Data record measured values
Password	off / 0... 999 (off)*
Fault memory alarm relay	on/off (on)*

Inputs/outputs

Cable length for external test/reset button	0... 10 m
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Cable lengths for measuring current transformers

Connecting cable WX... (see ordering information on page 39)	1 m / 2.5 m / 5 m / 10 m
Alternatively: single wire $6 \times 0.75 \text{ mm}^2$	0... 10 m

Switching elements

Number of switching elements	2 x 1 changeover contact
Operating principle	N/C operation or N/O operation (N/C operation)*
Electrical endurance, number of cycles	10 000

Contact data acc. to IEC 60947-5-1:

Utilisation category	AC-13	AC-14	DC-12	DC-12	DC-12
Rated operational voltage	230 V	230 V	24 V	110 V	220 V
Rated operational voltage UL	200 V	200 V	24 V	110 V	200 V
Rated operational current	5 A	3 A	1 A	0.2 A	0.1 A
Minimum contact rating					1 mA at AC/DC ≥ 10 V

Environment/EMC

EMC	IEC 62020
Ambient temperatures:	
Operating temperature	-25 ... +55 °C
Transport	-25 ... +70 °C
Long-term storage	-25 ... +55 °C
Classification of climatic conditions acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3K5 (no condensation, no formation of ice)
Transport (IEC 60721-3-2)	2K3)
Long-term storage (IEC 60721-3-1)	1K4
Classification of mechanical conditions acc. to IEC 60721	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Long-time storage (IEC 60721-3-1)	1M3

Connection

For UL application:

Copper lines	at least 60/70 °C
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Connection type **Screw-type terminals**

Connection properties:

Rigid/flexible	0.2 ... 4 / 0.2 ... 2.5 mm ² (AWG 24 ... 12)
Multi-conductor connection (2 conductors with the same cross section):	
Rigid/flexible	0.2 ... 1.5 / 0.2 ... 1.5 mm ²
Stripping length	8 ... 9 mm
Tightening torque	0.5 ... 0.6 Nm

Connection type	Push-wire terminals
Connection properties:	
Rigid.....	0.2...2.5 mm ² (AWG 24...14)
Flexible without ferrules	0.75...2.5 mm ² (AWG 19...14)
Flexible with ferrules	0.2...1.5 mm ² (AWG 24...16)
Stripping length	10 mm
Opening force.....	50 N
Test opening, diameter.....	2.1 mm

Other

Operating mode	Continuous operation
Position of normal use	Display-oriented
Degree of protection, internal components (IEC 60529)	IP30
Degree of protection, terminals (IEC 60529)	IP20
Enclosure material	Polycarbonate
Flammability class	UL94V-0
DIN rail mounting acc. to.....	IEC 60715
Screw fixing	2 x M4 with mounting clip
Software version	D480 V1.0x
Weight.....	≤ 150 g

()* = Factory setting

Residual operating current ranges of the various measuring current transformer

Residual operating current ranges	Art. no.
30 mA...500 mA	W20AB
30 mA...3 A	W35AB(P) W60AB(P) W120AB
300 mA...3 A	W210AB

7.2 Standards, approvals and certifications



7.3 Ordering information

	RCMB423EM-D-1	RCMB423EM-D-2
Response range $I_{\Delta n}$	30 mA...3 A	30 mA...3 A
Rated frequency	0...2000 Hz	0...2000 Hz
Supply voltage U_s^*	DC 9.6...94 V / 16...72 V, AC 42...460 Hz	DC 70...300 V / 70...300 V, AC 42...460 Hz
Art. no. : (B7... = push-wire terminal)	B74043038 B94043038	B74043039 B94043039
*Absolute values of the voltage range		

External measuring current transformer

Type	Internal diameter (mm)	Art. no.
W20AB	20	B 9808 0008
W35AB	35	B 9808 0016
W35ABP	35	B 9808 0051
W60AB	60	B 9808 0026
W60ABP	60	B 9808 0052
W120AB	120	B 9808 0041
W210AB	210	B 9808 0040

Connection cable measuring current transformer

Type	Length (m)	Art. no.
WX-100	1	B 9808 0503
WX-250	2,5	B 9808 0504
WX-500	5	B 9808 0505
WX-1000	10	B 9808 0506

Accessories RCMB423EM

Mounting clip for screw fixing (1 piece per device) B 9806 0008

Measuring current transformer accessories

Snap-on mounting for DIN rail: W20AB /W35AB(P)B 9808 0501

Snap-on mounting for DIN rail: W60AB(P)B 9808 0502

7.4 Error codes

If, contrary to expectations a device error should occur, error codes will appear on the display. Some of these are described below:

Error code	Meaning
E.01	Fault CT monitoring Action: Check transformer connection for short-circuit or interruption. The error code will be erased automatically once the error has been eliminated.
E.02	Fault CT monitoring during a manual self-test Action: Check transformer connection for short-circuit or interruption. The error code will be erased automatically once the error has been eliminated.
E...	Error codes > 02 Action: Perform a reset. Restore the device to the factory setting. The error code will be erased automatically once the error has been eliminated. Should the error persist, contact Bender Service.

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