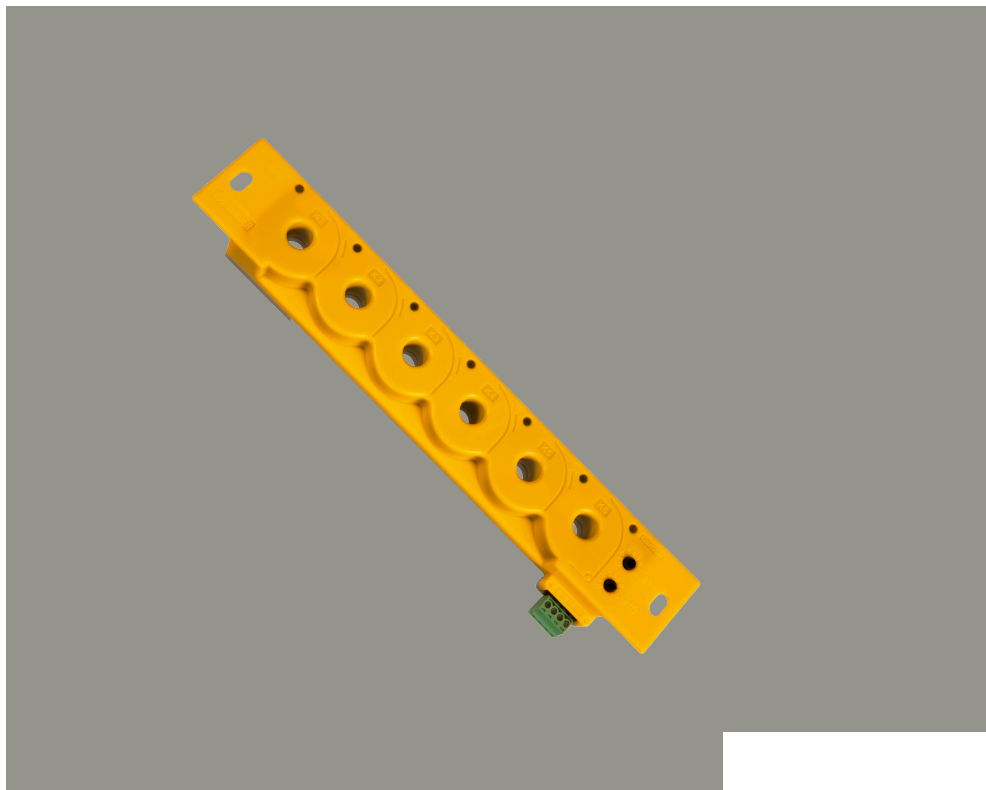




# **LINETRAXX® RCMS150 series**

Residual current monitor type B

with integrated measuring current transformers for earthed AC/DC systems  
(TN and TT systems)





## Table of contents

|          |                                                           |           |
|----------|-----------------------------------------------------------|-----------|
| <b>1</b> | <b>General information.....</b>                           | <b>5</b>  |
| 1.1      | How to use the manual.....                                | 5         |
| 1.2      | Indication of important instructions and information..... | 5         |
| 1.3      | Service and Support.....                                  | 5         |
| 1.4      | Training courses and seminars.....                        | 5         |
| 1.5      | Delivery conditions.....                                  | 5         |
| 1.6      | Inspection, transport and storage.....                    | 6         |
| 1.7      | Warranty and liability.....                               | 6         |
| 1.8      | Disposal of Bender devices.....                           | 6         |
| 1.9      | Safety.....                                               | 7         |
| <b>2</b> | <b>Product description.....</b>                           | <b>8</b>  |
| 2.1      | Intended use.....                                         | 8         |
| 2.2      | Device features.....                                      | 8         |
| 2.3      | Functional description.....                               | 8         |
| 2.4      | Device overview, operating and display elements.....      | 9         |
| <b>3</b> | <b>Mounting.....</b>                                      | <b>11</b> |
| 3.1      | Important information on mounting.....                    | 11        |
| 3.2      | Type of mounting.....                                     | 11        |
| 3.3      | Dimension diagram.....                                    | 12        |
| <b>4</b> | <b>Connection.....</b>                                    | <b>13</b> |
| 4.1      | Wiring diagram.....                                       | 13        |
| <b>5</b> | <b>Commissioning.....</b>                                 | <b>15</b> |
| <b>6</b> | <b>Display via web server.....</b>                        | <b>17</b> |
| 6.1      | Example of a system design.....                           | 17        |
| 6.2      | Starting the web browser.....                             | 17        |
| 6.3      | User interface web browser.....                           | 17        |
| 6.4      | Web application: Menu overviews.....                      | 18        |
| <b>7</b> | <b>Overview Modbus registers (RCMS150-01 only).....</b>   | <b>21</b> |
| 7.1      | General overview.....                                     | 21        |
| 7.1.1    | Read and write permissions.....                           | 21        |
| 7.1.2    | Used formats.....                                         | 21        |
| 7.1.3    | Overview of the register ranges.....                      | 21        |
| 7.2      | Device information.....                                   | 21        |

7.3 Measured values.....23

7.3.1 Status K1...6.....26

7.3.2 Error codes.....27

7.4 Interface parameters.....27

7.5 Parameters.....28

7.6 Control commands.....32

**8 Glossary..... 34**

**9 Technical data..... 36**

9.1 Factory settings of the Modbus interface.....36

9.2 Tabular data..... 36

9.3 Standards, approvals, certifications.....41

9.3.1 Approvals.....41

9.3.2 Conformity.....41

9.4 Ordering information.....42

9.5 Document revision history.....43

## 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.*



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

### 1.3 Service and Support

Information and contact details about customer service, repair service or field service for Bender devices are available on the following website: <https://www.bender.de/en/service-support>.

### 1.4 Training courses and seminars

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

<https://www.bender.de/en/know-how/seminars>

### 1.5 Delivery conditions

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

## 1.6 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. Please use the contact form at the following address: <https://www.bender.de/en/service-support/take-back-of-old-devices/>.

When storing the devices, observe the information under Environment / EMC in the technical data.

## 1.7 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.

## 1.8 Disposal of Bender devices



Electrical and electronic equipment must not be disposed of with unsorted household waste but must be collected separately from household waste.

The symbol of a crossed-out wheeled bin indicates the requirement for separate collection.

Before returning a used device, used batteries and accumulators that are not enclosed within the device, as well as lamps that can be removed without damage, must be separated from the device and disposed of separately.

Please observe the applicable national regulations regarding the disposal of waste electrical and electronic equipment.

Waste electrical and electronic equipment may contain personal data. The end user is responsible for deleting this data prior to disposal.

Bender GmbH & Co. KG is registered in the Waste Electrical and Electronic Equipment Register (EAR) under WEEE number DE 43 124 402. To fulfill its legal take-back and disposal obligations, Bender has established appropriate return and disposal options. Information on available collection points and the process for returning waste electrical and electronic equipment can be found at: <https://www.bender.de/en/service-support/take-back-of-old-devices/>

## 1.9 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:*

- *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 is de-energised.*

*Observe the rules for working on electrical systems.*

## 2 Product description

### 2.1 Intended use

The RCMS150 devices are suitable for measuring residual currents up to  $I_{\Delta} = 500$  mA in a frequency range of DC...2 kHz. The monitored circuit is rated for a voltage of 300 V and a load current of 32 A. If cables with double or reinforced insulation are routed through the measuring current transformers, higher voltages may occur. The device can be operated at an altitude of up to 2000 m above mean sea level.

In order to meet the requirements of 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 other use than that described in this manual is regarded as improper.

### 2.2 Device features

- Continuous residual current monitoring by means of periodic verification
- AC/DC sensitive residual current monitoring system type B with 6 channels K1...6  
(each channel features 2 measuring channels: 1 x RMS, 1 x DC)
- Ideal for applications with space limitations
- Easy DIN rail or screw mounting to standard distribution panels
- 2 separately adjustable response values (DC or RMS) per channel
- Continuous self monitoring
- Fully shielded measuring current transformers to avoid external influences due to magnetic fields that may cause disturbances
- Compatible with Bender gateways of type COM465IP or CP9...

#### **RCMS150** (RS-485 interface with BMS protocol)

- Compatible with RCMS460/490 in a system setup
- Address range 2...90, can be adjusted directly on the device
- Up to 89 RCMS150 can be used on the bus

#### **RCMS150-01** (RS-485 interface with Modbus RTU protocol)

- Compatible with other Modbus RTU-capable device series from Bender, such as the RCMB300 series and RCMB13...-01 in a system setup
- Address range 1...99, can be adjusted directly on the device via detent potentiometers
- Address range 1...247, can be adjusted via the bus
- Up to 247 RCMS150-01 can be used on the bus

### 2.3 Functional description

The residual currents are recorded and evaluated as RMS values in the frequency range DC...2 kHz. The response values can be set via the interface. The user can set four response values per channel K1...6:

$I_{\Delta n1}$  RMS,  $I_{\Delta n2}$  RMS,  $I_{\Delta n1}$  DC,  $I_{\Delta n2}$  DC



*The response values  $I_{\Delta n1}$ ... apply to the **prewarnings**,  
the response values  $I_{\Delta n2}$ ... apply to the **main alarms**.*

If one of the four set response values  $I_{\Delta n}$ ... is exceeded, the assigned response delay  $t_{on}$ ... starts. If the response value continues to be exceeded, the corresponding alarm message (prewarning or main alarm) is indicated



on the gateway after the response delay  $t_{on...}$  has elapsed. In the event of a main alarm, the alarm LED of the respective channel K1...6 lights up yellow.

A pending alarm message is emitted via the BMS or Modbus interface with address and measuring channel indication and can be evaluated by means of a gateway.

If the recorded residual current falls below the release value (response value minus hysteresis) the delay on release  $t_{off}$  begins. If the value remains below the release value after  $t_{off}$  has elapsed, the LED of the respective channel goes out. The alarm message is reset on the interface. If the fault memory is enabled (only applicable to RCMS150-01), the alarm message remains on the bus despite the LED going out.

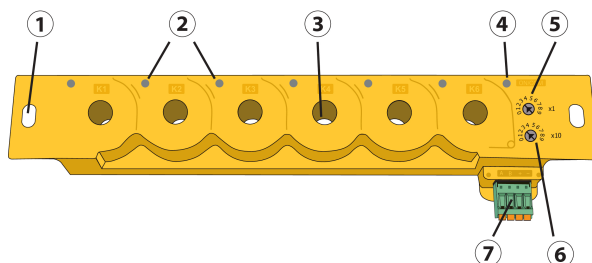
All devices can be accessed via the network from any PC using a standard web browser. Like this, all relevant measurement data of the monitored system are available. All device- related parameters of the RCMS150... can be set via the gateway technology.

To ensure the device function, a continuous automatic self test is run, which monitors the function of all measuring current transformers. In the event of a device error, the alarm LED of the respective channel flashes and an error message is output via the interface.

During the manual self test, a residual current is induced in the respective current transformer at each individual channel K1...6 one after the other via test windings and it is checked whether the corresponding main alarm is triggered. The duration of the test depends on the response delays of the main alarms.

## 2.4 Device overview, operating and display elements

### Device overview



|   |                                                                                                |
|---|------------------------------------------------------------------------------------------------|
| 1 | Slot for screw mounting                                                                        |
| 2 | Alarm LEDs for channels K1...6 (yellow)                                                        |
| 3 | Line feed-through of the measuring current transformers for the channels K1...6                |
| 4 | ON LED: Power on LED (green)                                                                   |
| 5 | Detent potentiometer: Setting the <b>unit place</b> of the bus address (BMS bus or Modbus RTU) |
| 6 | Detent potentiometer: Setting the <b>tens place</b> of the bus address (BMS bus or Modbus RTU) |
| 7 | Plug: Connection to the supply voltage Connection RS-485 (BMS bus or Modbus RTU)               |

### Operating elements

**i** RCMS150-01  
If both detent potentiometers are set to 0, the device uses the address parameterised via Modbus (1...247).

**Display elements (LEDs)**

Meaning of the LEDs

| LED                          |                      | Meaning                                                  |
|------------------------------|----------------------|----------------------------------------------------------|
| ON (green)                   | lights               | Normal operation indicator                               |
|                              | flashes quickly      | RCMS150: Device error or BMS bus address set incorrectly |
|                              | flashes slowly       | RCMS150-01: Device error                                 |
|                              | flashes very quickly | RCMS150-01: Identify device (via Modbus RTU)             |
|                              | Flash code           | Interface address output                                 |
| ALARM<br>K1...K6<br>(yellow) | lights               | Main alarm (response value $I_{\Delta n}$ exceeded)      |
|                              | flashes              | Device error channel                                     |

### 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.*



*If you are familiar with the configuration of computer networks, you can connect the RCMS150... yourself. Otherwise please contact your EDP administrator!*

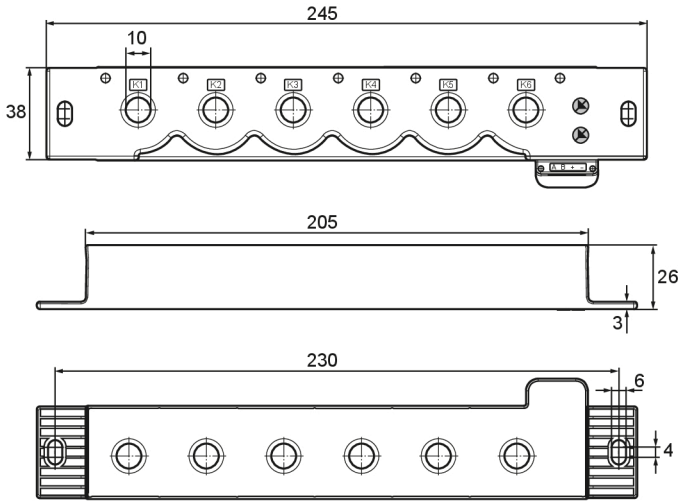
#### 3.1 Important information on mounting

- Mounting is to be carried out with suitable equipment and tools according to the documentation.
- The device must only be installed by appropriately qualified personnel in deenergised state. Disconnect the switchboard cabinet from the power supply and protect the system against accidental switch-on.
- The general safety conditions as well as the prevailing national accident prevention regulations are to be adhered to. Electrical installation is to be carried out according to all applicable local laws (e.g. wire cross section, protection, PE connection).
- The climatic conditions must be complied with. The device is only permitted to be used in closed rooms.

#### 3.2 Type of mounting

The devices of the RCMS150 series are intended for screw mounting. As an alternative, they can also be mounted on a DIN rail using the optionally available fastening set.

3.3 Dimension diagram



Dimensions in mm

## 4 Connection



### DANGER

**Risk of electric shock!**

Follow the basic safety rules when working with electricity. Observe the information on **rated voltage** and **supply voltage** specified in the technical data!

### 4.1 Wiring diagram

#### Wiring diagram



### CAUTION

**Risk of short circuit!**

Only insulated conductors with an insulation that is suitable for at least the monitored voltage may be routed through the measuring current transformer. The rated voltage of the RCMS150... must not be exceeded.



### CAUTION

**For UL applications**

The conductors passing through the current transformer (primary conductors) shall be UL R/C isolated cables:

- isolation voltage min. 300 V
- min. 80 °C

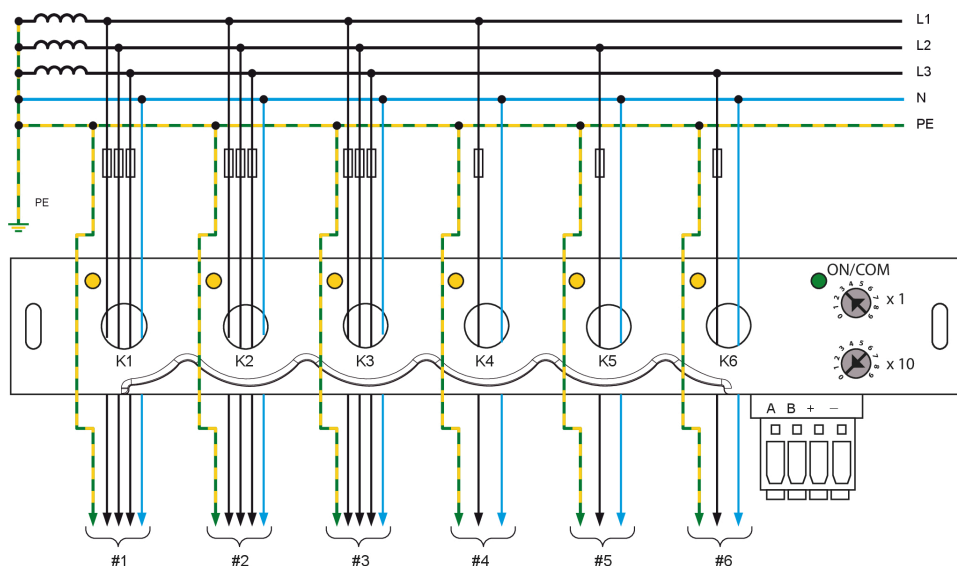
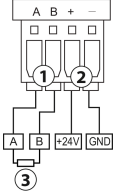


Figure 4-1: Wiring diagram RCMS150

Terminal

| Detail: Terminal |                                                                                            |                                                                                   |
|------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 1                | RS-485 interface<br>(BMS-Bus or Modbus RTU)                                                |  |
| 2                | Supply voltage $U_S$<br>DC 24 V                                                            |                                                                                   |
| 3                | Terminating resistor 120 $\Omega$<br>(required for both the first and the last bus device) |                                                                                   |

## 5 Commissioning

### 1. Mount the RCMS150

### 2. Set the bus address



*When assigning the bus addresses make sure that each address is only assigned once on the bus!*

| Address setting RCMS150 (BMS bus)                            |                                                                                                                                                              |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Factory setting bus address                                  | 2                                                                                                                                                            |
| Setting range BMS bus                                        | 2...90                                                                                                                                                       |
| Adjustment on the device                                     | Move the detent potentiometers to the corresponding position using a screwdriver.                                                                            |
| Address setting RCMS150-01 (Modbus RTU)                      |                                                                                                                                                              |
| Factory setting bus address<br>(Detent potentiometers to 00) | Last two digits of the serial number + 100                                                                                                                   |
| Setting range Modbus RTU                                     | 1...247                                                                                                                                                      |
| Addresses 1...99: Adjustment on the device                   | Move the detent potentiometers to the corresponding position using a screwdriver.                                                                            |
| Addresses 1...247: Adjustment via the bus                    | Set the detent potentiometers to 00 using a screwdriver. Now the internally stored address (factory setting) is active. It can be changed via the interface. |

### 3. Bus installation

Please note that both the beginning and end of the bus require a 120-Ω terminating resistor.

### 4. Route outgoing circuits to be monitored through the current transformers



#### CAUTION

#### *Risk of short circuit!*

*Only insulated conductors with an insulation that is suitable for at least the monitored voltage may be routed through the measuring current transformer. The rated voltage of the RCMS150... must not be exceeded.*



*Do not route any protective earth conductors through the measuring current transformers (see wiring diagram)!*

### 5. Connect the RCMS150... to the **supply voltage** (DC 24 V).

#### *RCMS150 (BMS bus)*

The ON LED flashes to indicate the set BMS bus address after the device has been switched on or after the address has been changed: Unit place - Pause - Tens place.

Example: \*\*\*\*\* designates the BMS bus address 35.

After indicating the address, the RCMS150 automatically switches to the standard display state. If the ON LED flashes quickly, the BMS bus address has been set incorrectly.

*RCMS150-01 (Modbus RTU)*

The set Modbus address is only indicated by the ON LED flashing after an address change via the detent potentiometers on the device: Hundreds place – Pause – Tens place – Pause – Unit place.

Example: \* \*\*\*\*\* \* designates the Modbus address 153.

After indicating the address, the RCMS150-01 automatically switches to the standard display state.

The ON LED does not indicate address changes via the bus.

6. **Connect RCMS150... to master** (e.g. COM465IP, software version  $\geq 2.1$ , option C or CP9...).



## 6 Display via web server

The measured values (measuring channels) of the individual measuring current transformers of the RCMS150... can be displayed in the web browser.

### 6.1 Example of a system design



### 6.2 Starting the web browser

After commissioning the RCMS150..., start the web browser. Enter the IP address of the gateway (CP9... or COM465IP).

BMS bus  
Modbus RTU

You can find the RCMS150 in the bus overview.

You can add the RCMS150-01 to your system in the browser:

**Tools > Device management > Modbus devices > Manage devices > Add device > Search and configure devices**

### 6.3 User interface web browser

Basic operation: see manual of the gateway (CP9... or COM465IP).

6.4 Web application: Menu overviews

Web application: Menu overview RCMS150

| Menu overview RCMS150 (BMS-Bus) |          |                  |                                                                                                                                                                                                                                                                  | Description                                                                                                                  |
|---------------------------------|----------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Overview                        |          |                  |                                                                                                                                                                                                                                                                  | Current measured values and alarm states of the 12 measuring channels<br>(1...6: RMS; 7...12: DC)                            |
| Configure e-mail                |          |                  |                                                                                                                                                                                                                                                                  | Generate e-mails to report device failure. Set recipients via the gateway for each channel. Details: refer to gateway manual |
| Report                          |          |                  |                                                                                                                                                                                                                                                                  | Create a report of all active devices                                                                                        |
| Menu                            | Settings | Edit texts       | Device                                                                                                                                                                                                                                                           | Screen and printout: Specify alarm text for device and device failure                                                        |
|                                 |          |                  | Channel 1 - 12                                                                                                                                                                                                                                                   | Screen and printout: Specify alarm text for measuring channel 1...12 for prewarning and main alarm                           |
|                                 |          | Channel          | General                                                                                                                                                                                                                                                          | Channel K1...6: Hysteresis, $t_{off}$ , $t_{start-up}$                                                                       |
|                                 |          |                  | RMS                                                                                                                                                                                                                                                              | Channel K1...6: $t_{on1/2\ RMS}$ , $I_{\Delta n1/2\ RMS}$ (measuring channels 1...6)                                         |
|                                 |          |                  | DC                                                                                                                                                                                                                                                               | Channel K1...6: $t_{on1/2\ DC}$ , $I_{\Delta n1/2\ DC}$ (measuring channels 7...12)                                          |
|                                 |          |                  |  <i>When setting the response values <math>I_{\Delta n2}</math>, the ratio of <math>I_{\Delta n2RMS}</math> to <math>I_{\Delta n2DC}</math> must only be between 0.2 and 5.</i> |                                                                                                                              |
|                                 |          | Factory settings |                                                                                                                                                                                                                                                                  | Reset to factory settings; texts are not affected by this action.                                                            |
|                                 | Control  | TEST             | Run device test                                                                                                                                                                                                                                                  |                                                                                                                              |
|                                 | Info     |                  |                                                                                                                                                                                                                                                                  | Device, software and manufacturer information                                                                                |

**Web application: Menu overview RCMS150-01**

| Menu overview RCMS150-01 (Modbus RTU) |                                                                                            |                                                                                                                                                                                                                                                   |                | Description                                                                      |
|---------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------|
| Overview of the 12 measuring channels |                                                                                            |                                                                                                                                                                                                                                                   |                | Current measured values/alarm states, software                                   |
| Alarms/<br>measured<br>values         | Graphical representation K1...6, each $I_{\Delta \text{ RMS}}$ and $I_{\Delta \text{ DC}}$ |                                                                                                                                                                                                                                                   |                |                                                                                  |
| Settings                              | Edit texts                                                                                 | Device                                                                                                                                                                                                                                            |                | Alarm text device/device failure                                                 |
|                                       |                                                                                            | Measuring<br>channel<br>1...12                                                                                                                                                                                                                    | Description    | Alarm texts of the measuring channels in the event<br>of a prewarning/main alarm |
|                                       |                                                                                            |                                                                                                                                                                                                                                                   | Main alarm     |                                                                                  |
|                                       |                                                                                            |                                                                                                                                                                                                                                                   | Prewarning     |                                                                                  |
|                                       | Alarm settings                                                                             | General                                                                                                                                                                                                                                           | Channel K1...6 | Hysteresis, $t_{\text{off}}$ , $t_{\text{start-up}}$ , fault memory              |
|                                       |                                                                                            | RMS                                                                                                                                                                                                                                               |                | $t_{\text{on1/2 RMS}}$ , $I_{\Delta \text{n1/2 RMS}}$ (measuring channels 1...6) |
|                                       |                                                                                            | DC                                                                                                                                                                                                                                                |                | $t_{\text{on1/2 DC}}$ , $I_{\Delta \text{n1/2 DC}}$ (measuring channels 7...12)  |
|                                       |                                                                                            |  When setting the response values $I_{\Delta \text{n2}}$ , the ratio of $I_{\Delta \text{n2RMS}}$ to $I_{\Delta \text{n2DC}}$ must<br>only be between 0.2 and 5. |                |                                                                                  |
| System                                | Interface                                                                                  | Device address                                                                                                                                                                                                                                    |                | The address set here is only used if both detent<br>potentiometers are set to 0. |
|                                       |                                                                                            | Baud rate                                                                                                                                                                                                                                         |                |                                                                                  |
|                                       |                                                                                            | Parity/Stop bits                                                                                                                                                                                                                                  |                |                                                                                  |
|                                       |                                                                                            | Identify devices                                                                                                                                                                                                                                  |                | LED flashes green very quickly                                                   |
|                                       | Clock                                                                                      | Clock                                                                                                                                                                                                                                             |                |                                                                                  |
|                                       |                                                                                            | UTC offset                                                                                                                                                                                                                                        |                |                                                                                  |
|                                       |                                                                                            | Summer time                                                                                                                                                                                                                                       |                |                                                                                  |
|                                       | Factory settings                                                                           | Write access                                                                                                                                                                                                                                      |                | This box must be ticked for security reasons.                                    |
|                                       |                                                                                            | Channel 1...6                                                                                                                                                                                                                                     |                | Reset to factory settings; texts are not affected by<br>this action.             |
|                                       |                                                                                            | Without interface                                                                                                                                                                                                                                 |                |                                                                                  |
| With interface                        |                                                                                            |                                                                                                                                                                                                                                                   |                |                                                                                  |

| Menu overview RCMS150-01 (Modbus RTU) |                    |                          | Description                                                                                       |
|---------------------------------------|--------------------|--------------------------|---------------------------------------------------------------------------------------------------|
| Control                               | Test               | Channel 1...6            | Run response test. A current is induced in the measuring current transformers via a test winding. |
|                                       | Reset              | Channel 1...6            | Clear fault memory                                                                                |
|                                       | Communication test | Measuring channel 1...12 | A test alarm is set at the selected measuring channel on the interface.                           |
|                                       | Offset calibration | Write access             | This box must be ticked for security reasons.                                                     |
|                                       |                    | Channel 1...6            | Perform offset calibration                                                                        |
| Info                                  |                    |                          | Device name, article number, serial number, installation location, operating time, manufacturer   |

## 7 Overview Modbus registers (RCMS150-01 only)

This chapter provides a complete description of the Modbus registers to facilitate access to information.

RCMS150-01 supports the following Modbus functions:

1. Register for reading values (Read Holding Register; function code 0x03)
2. Register for writing values (Write Multiple Registers; function code 0x10)

The device exchanges the data in big-endian order. The counting method of the registers is 0-based. To check these properties, the UINT32 register 0 can be read and compared with the target value 0x12345678.

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

### 7.1 General overview

#### 7.1.1 Read and write permissions

|    |                                        |
|----|----------------------------------------|
| RO | Read Only (read permission only)       |
| RW | Read/Write (read and write permission) |
| WO | Write Only (write permission only)     |

#### 7.1.2 Used formats

|             |                                                                                                                               |
|-------------|-------------------------------------------------------------------------------------------------------------------------------|
| 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 string<br>- String terminated with null character \0<br>- 16-bit Word: one character in HiByte, one character in LoByte |

#### 7.1.3 Overview of the register ranges

| Range                | Start address | End address |
|----------------------|---------------|-------------|
| Info                 | 0             | 999         |
| Measured values      | 1000          | 31999       |
| Interface parameters | 32000         | 32099       |
| Parameters           | 32100         | 57999       |
| Control commands     | 59000         | 59999       |

### 7.2 Device information

Device information (Registers 0...999)

\* = Factory setting

| Register      | Format      | Property | Description                          | Comment/Factory settings (*)                                                     |
|---------------|-------------|----------|--------------------------------------|----------------------------------------------------------------------------------|
| 00000         | UINT32      | RO       | Modbus test register                 | 0x12345678*<br>Is used to configure the interface (endianess, byte order, etc.). |
| 00002         | String UTF8 | RO       | Device name                          | RCMS150-01\0*                                                                    |
| 00018         | String UTF8 | RO       | Article number                       | B94053026\0*                                                                     |
| 00034         | String UTF8 | RO       | Serial number                        | —                                                                                |
| 00050         | String UTF8 | RO       | Manufacturer name                    | Bender\0*                                                                        |
| 00066         | String UTF8 | RO       | Manufacturer Internet address        | www.bender.de\0*                                                                 |
| 00082         | UINT16      | RO       | Device version                       | Version number multiplied by 100.<br>Example: 123 = V1.23                        |
| 00083         | UINT16      | RO       | Device patch version                 | —                                                                                |
| 00084         | UINT16      | RO       | IU application D number              | 657*                                                                             |
| 00085         | UINT16      | RO       | IU application Version               | —                                                                                |
| 00086         | UINT16      | RO       | IU application Build number          | —                                                                                |
| 00087         | UINT16      | RO       | IU application Modbus module version | —                                                                                |
| 00088         | UINT16      | RO       | IU Bootloader D number               | 711*                                                                             |
| 00089         | UINT16      | RO       | IU Bootloader Version                | —                                                                                |
| 00090         | INT16       | RO       | IU Bootloader Build number           | —                                                                                |
| 00091         | UINT16      | RO       | MU1 Application D number             | 489*                                                                             |
| 00092         | UINT16      | RO       | MU1 Application Version              | —                                                                                |
| 00093         | INT16       | RO       | MU1 Application Build number         | 0                                                                                |
| 00094         | UINT16      | RO       | MU1 Bootloader D number              | 0                                                                                |
| 00095         | UINT16      | RO       | MU1 Bootloader Version               | 0                                                                                |
| 00096         | INT16       | RO       | MU1 Bootloader Build number          | 0                                                                                |
| 00097...00126 |             | Reserved |                                      |                                                                                  |
| 00127         | String UTF8 | RW       | Installation location <sup>1)</sup>  | <location>\0*                                                                    |
| 00143...00999 |             | 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 the characters 1...8, 9...16, 17...24 and/or 25...32 must be written in each case. If the string does not fill a block completely, it must be filled with NULL characters.

### 7.3 Measured values

| Register | Format  | Property | Description                                | Comment/unit                                                                                                                                                                                                                       |
|----------|---------|----------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01000    | Float32 | RO       | Residual current measured value (K1 RMS)   | Current instantaneous value. For status, refer to table Status K1...6                                                                                                                                                              |
| 01002    | Float32 | RO       | Residual current measured value (K1 DC)    |                                                                                                                                                                                                                                    |
| 01004    | UINT32  | RO       | Status K1                                  |                                                                                                                                                                                                                                    |
| 01006    | Float32 | RO       | Residual current measured value (K2 RMS)   |                                                                                                                                                                                                                                    |
| 01008    | Float32 | RO       | Residual current measured value (K2 DC)    |                                                                                                                                                                                                                                    |
| 01010    | UINT32  | RO       | Status K2                                  |                                                                                                                                                                                                                                    |
| 01012    | Float32 | RO       | Residual current measured value (K3 RMS)   |                                                                                                                                                                                                                                    |
| 01014    | Float32 | RO       | RO Residual current measured value (K3 DC) |                                                                                                                                                                                                                                    |
| 01016    | UINT32  | RO       | Status K3                                  |                                                                                                                                                                                                                                    |
| 01018    | Float32 | RO       | Residual current measured value (K4 RMS)   |                                                                                                                                                                                                                                    |
| 01020    | Float32 | RO       | Residual current measured value (K4 DC)    |                                                                                                                                                                                                                                    |
| 01022    | UINT32  | RO       | Status K4                                  |                                                                                                                                                                                                                                    |
| 01024    | Float32 | RO       | Residual current measured value (K5 RMS)   |                                                                                                                                                                                                                                    |
| 01026    | Float32 | RO       | Residual current measured value (K5 DC)    |                                                                                                                                                                                                                                    |
| 01028    | Float32 | RO       | Status K5                                  |                                                                                                                                                                                                                                    |
| 01030    | Float32 | RO       | Residual current measured value (K6 RMS)   |                                                                                                                                                                                                                                    |
| 01032    | Float32 | RO       | Residual current measured value (K6 DC)    |                                                                                                                                                                                                                                    |
| 01034    | UINT32  | RO       | Status K6                                  |                                                                                                                                                                                                                                    |
| 01036    | Float32 | RO       | Device error and status information        | If device errors are present, the error code is output here with a factor of 100, see "Error codes", page 27. If there are several errors, the error with the highest error number is output. Example: 800 = 8.00 (hardware error) |

| Register | Format  | Property | Description                                  | Comment/unit                                                                                                                        |
|----------|---------|----------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 01038    | Float32 | RO       | Residual current measured value min (K1 RMS) | Indicates the smallest value since the last readout. In the case of signed measured values, the lowest value is stored temporarily. |
| 01040    | Float32 | RO       | Residual current measured value min (K1 DC)  |                                                                                                                                     |
| 01042    | UINT32  | RO       | Status K1 min                                |                                                                                                                                     |
| 01044    | Float32 | RO       | Residual current measured value min (K2 RMS) |                                                                                                                                     |
| 01046    | Float32 | RO       | Residual current measured value min (K2 DC)  |                                                                                                                                     |
| 01048    | UINT32  | RO       | Status K2 min                                |                                                                                                                                     |
| 01050    | Float32 | RO       | Residual current measured value min (K3 RMS) |                                                                                                                                     |
| 01052    | Float32 | RO       | Residual current measured value min (K3 DC)  |                                                                                                                                     |
| 01054    | UINT32  | RO       | Status K3 min                                |                                                                                                                                     |
| 01056    | Float32 | RO       | Residual current measured value min (K4 RMS) |                                                                                                                                     |
| 01058    | Float32 | RO       | Residual current measured value min (K4 DC)  |                                                                                                                                     |
| 01060    | UINT32  | RO       | RO Status K4 min                             |                                                                                                                                     |
| 01062    | Float32 | RO       | Residual current measured value min (K5 RMS) |                                                                                                                                     |
| 01064    | Float32 | RO       | Residual current measured value min (K5 DC)  |                                                                                                                                     |
| 01066    | UINT32  | RO       | Status K5 min                                |                                                                                                                                     |
| 01068    | Float32 | RO       | Residual current measured value min (K6 RMS) |                                                                                                                                     |
| 01070    | Float32 | RO       | Residual current measured value min (K6 DC)  |                                                                                                                                     |
| 01072    | UINT32  | RO       | Status K6 min                                |                                                                                                                                     |
| 01074    | Float32 | RO       | Device error and status information min      |                                                                                                                                     |



| Register | Format   | Property | Description                                      | Comment/unit                                                   |
|----------|----------|----------|--------------------------------------------------|----------------------------------------------------------------|
| 01076    | Float32  | RO       | Residual current measured value average (K1 RMS) | Indicates the arithmetic average value since the last readout. |
| 01078    | Float32  | RO       | Residual current measured value average (K1 DC)  |                                                                |
| 01080    | Reserved |          |                                                  |                                                                |
| 01082    | UINT32   | RO       | Residual current measured value average (K2 RMS) |                                                                |
| 01084    | Float32  | RO       | Residual current measured value average (K2 DC)  |                                                                |
| 01086    | Reserved |          |                                                  |                                                                |
| 01088    | Float32  | RO       | Residual current measured value average (K3 RMS) |                                                                |
| 01090    | Float32  | RO       | Residual current measured value average (K3 DC)  |                                                                |
| 01092    | Reserved |          |                                                  |                                                                |
| 01094    | Float32  | RO       | Residual current measured value average (K4 RMS) |                                                                |
| 01096    | Float32  | RO       | Residual current measured value average (K4 DC)  |                                                                |
| 01098    | Reserved |          |                                                  |                                                                |
| 01100    | Float32  | RO       | Residual current measured value average (K5 RMS) |                                                                |
| 01102    | Float32  | RO       | Residual current measured value average (K5 DC)  |                                                                |
| 01104    | Reserved |          |                                                  |                                                                |
| 01106    | Float32  | RO       | Residual current measured value average (K6 RMS) |                                                                |
| 01108    | Float32  | RO       | Residual current measured value average (K6 DC)  |                                                                |
| 01110    | Reserved |          |                                                  |                                                                |
| 01112    |          |          |                                                  |                                                                |

| Register      | Format  | Property | Description                                  | Comment/unit                                                                                                                        |
|---------------|---------|----------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 01114         | Float32 | RO       | Residual current measured value max (K1 RMS) | Indicates the highest value since the last readout. In the case of signed measured values, the highest value is stored temporarily. |
| 01116         | Float32 | RO       | Residual current measured value max (K1 DC)  |                                                                                                                                     |
| 01118         | UINT32  | RO       | Status K1 max                                |                                                                                                                                     |
| 01120         | Float32 | RO       | Residual current measured value max (K2 RMS) |                                                                                                                                     |
| 01122         | Float32 | RO       | Residual current measured value max (K2 DC)  |                                                                                                                                     |
| 01124         | UINT32  | RO       | Status K2 max                                |                                                                                                                                     |
| 01126         | Float32 | RO       | Residual current measured value max (K3 RMS) |                                                                                                                                     |
| 01128         | Float32 | RO       | Residual current measured value max (K3 DC)  |                                                                                                                                     |
| 01130         | UINT32  | RO       | Status K3 max                                |                                                                                                                                     |
| 01132         | Float32 | RO       | Residual current measured value max (K4 RMS) |                                                                                                                                     |
| 01134         | Float32 | RO       | Residual current measured value max (K4 DC)  |                                                                                                                                     |
| 01136         | UINT32  | RO       | Status K4 max                                |                                                                                                                                     |
| 01138         | Float32 | RO       | Residual current measured value max (K5 RMS) |                                                                                                                                     |
| 01140         | Float32 | RO       | Residual current measured value max (K5 DC)  |                                                                                                                                     |
| 01142         | UINT32  | RO       | Status K5 max                                |                                                                                                                                     |
| 01144         | Float32 | RO       | Residual current measured value max (K6 RMS) |                                                                                                                                     |
| 01146         | Float32 | RO       | Residual current measured value max (K6 DC)  |                                                                                                                                     |
| 01148         | UINT32  | RO       | Status K6 max                                |                                                                                                                                     |
| 01150         | Float32 | RO       | Device error and status information max      |                                                                                                                                     |
| 01152...31999 |         | Reserved |                                              |                                                                                                                                     |

7.3.1 Status K1...6

| Bit number | Description      |
|------------|------------------|
| 0          | DC prewarning    |
| 1          | DC main alarm    |
| 2          | RMS prewarning   |
| 3          | RMS main alarm   |
| 4          | Manual self test |
| 5          | Device error     |
| 6...31     | Reserved         |

### 7.3.2 Error codes

Register 01036

| Error code | Error                        | Description                                                                                                                                                                   | Action                                                                                                                                                                                                                                                                                                         |
|------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.40       | Channel error                | Possible error cause:<br>Temperature too high.                                                                                                                                | Check if ambient temperature is within the permissible range. Check if supply voltage DC 24 V is within the permissible range. Check if the residual current through the channel is too high or if there are high pulses. If the above points do not apply and the error occurs frequently, return the device. |
| 6.00       | Calibration error            | Calibration data faulty.                                                                                                                                                      | Switch the device off and on again. If the error persists, return the device.                                                                                                                                                                                                                                  |
| 6.50       | Production data faulty       | Values outside the limits or checksum incorrect.                                                                                                                              | Error is only cleared by switching the device off/ on. If the error persists, return the device.                                                                                                                                                                                                               |
| 7.10       | Internal communication error | Device-internal communication is disturbed.                                                                                                                                   | Switch the device off and on again. If the error persists, return the device.                                                                                                                                                                                                                                  |
| 7.62       |                              |                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                |
| 8.46       | Internal supply voltage      | Impermissible deviation                                                                                                                                                       | If the error occurs frequently, return the device.                                                                                                                                                                                                                                                             |
| 9.10       | µC parameter error           | Parameters outside permissible limits or error while saving.<br>Affected channel: Gateway<br>> Overview measuring channels or Modbus registers 1004...1034 (5 = device error) | Switch the device off and on again. Reset the corresponding channel to factory settings: via the gateway or Modbus registers 59013...59018. If the error persists, return the device.                                                                                                                          |
| 9.60       | µC parameter error           | Parameter outside permissible limits                                                                                                                                          | Switch the device off and on again. Reset device to factory settings: Modbus register 59020. If the error persists, return the device.                                                                                                                                                                         |
| 9.70       | µC task/ programme sequence  | General software error                                                                                                                                                        | Switch the device off and on again. If the error persists, return the device.                                                                                                                                                                                                                                  |
| 9.90       | Error µC cycle generation    | Unacceptable deviation or failure of the µC cycle source.                                                                                                                     |                                                                                                                                                                                                                                                                                                                |

### 7.4 Interface parameters

| Register      | Description             | Format   | Property | Unit | Setting range                                                  | Factory setting                                |
|---------------|-------------------------|----------|----------|------|----------------------------------------------------------------|------------------------------------------------|
| 32000         | Modbus address*         | UINT16   | RW       | —    | 1...247                                                        | The last two digits of the serial number + 100 |
| 32001         | Modbus baud rate        | UINT32   | RW       | Baud | 1200 / 2400 / 4800 / 9600 / 19200 / 38400 / 57600              | 19200                                          |
| 32003         | Modbus parity/ stop bit | UINT16   | RW       | —    | 0 = 8N2<br>1 = 8O1<br>2 = 8E1<br>3 = 8N1<br>4 = 8O2<br>5 = 8E2 | 2 (8E1)                                        |
| 32004...32099 |                         | Reserved |          |      |                                                                |                                                |

\* The address is only used if both detent potentiometers are set to 0.

## 7.5 Parameters

### Parameter K1

| Register | Description               | Format  | Unit | Prop. | Setting range     | Step size | Factory setting |
|----------|---------------------------|---------|------|-------|-------------------|-----------|-----------------|
| 32100    | Reserved                  |         |      |       |                   |           |                 |
| 32102    | Response value Hysteresis | Float32 | %    | RW    | 10...25 %         | 0.1 %     | 15 %            |
| 32104    | $t_{off}$                 | Float32 | s    | RW    | 0 s ... 10 min    | 10 ms     | 1 s             |
| 32106    | $t_{start-up}$            | Float32 | s    |       | 0.5 s ... 10 min  | 10 ms     | 0.5 s           |
| 32108    | Fault memory              | UINT16  | —    | RW    | 0 = off<br>1 = on | —         | 0 (aus)         |
| 32109    | Reserved                  |         |      |       |                   |           |                 |
| 32110    | $I_{\Delta n2}$ RMS       | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 30 mA           |
| 32112    | $t_{on}$ main alarm RMS   | Float32 | s    | RW    | 0 s ... 10 min    | 10 ms     | 0 s             |
| 32114    | $I_{\Delta n1}$ RMS       | Float32 | %    | RW    | 50...100 %        | 0.1 %     | 50 %            |
| 32116    | $t_{on}$ prewarning RMS   | Float32 | s    | RW    | 0 s ... 10 min    | 10 ms     | 1 s             |
| 32118    | $I_{\Delta n2}$ DC        | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 6 mA            |
| 32120    | $t_{on}$ main alarm DC    | Float32 | s    | RW    | 0 s ... 10 min    | 10 ms     | 0 s             |
| 32122    | $I_{\Delta n1}$ DC        | Float32 | %    | RW    | 50...100 %        | 0.1 %     | 50 %            |
| 32124    | $t_{on}$ prewarning DC    | Float32 | s    | RW    | 0 s ... 10 min    | 10 ms     | 1 s             |

### Parameter K2

| Register | Description               | Format  | Unit | Prop. | Setting range     | Step size | Factory setting |
|----------|---------------------------|---------|------|-------|-------------------|-----------|-----------------|
| 32126    | iert                      |         |      |       |                   |           |                 |
| 32128    | Response value Hysteresis | Float32 | %    | RW    | 10...25 %         | 0.1 %     | 15 %            |
| 32130    | $t_{off}$                 | Float32 | s    | RW    | 0 s ... 10 min    | 10 ms     | 1 s             |
| 32132    | $t_{start-up}$            | Float32 | s    |       | 0.5 s ... 10 min  | 10 ms     | 0.5 s           |
| 32134    | Fault memory              | UINT16  | —    | RW    | 0 = off<br>1 = on | —         | 0 (aus)         |
| 32135    | Reserved                  |         |      |       |                   |           |                 |
| 32136    | $I_{\Delta n2}$ RMS       | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 30 mA           |
| 32138    | $t_{on}$ main alarm RMS   | Float32 | s    | RW    | 0 s ... 10 min    | 10 ms     | 0 s             |
| 32140    | $I_{\Delta n1}$ RMS       | Float32 | %    | RW    | 50...100 %        | 0.1 %     | 50 %            |
| 32142    | $t_{on}$ prewarning RMS   | Float32 | s    | RW    | 0 s ... 10 min    | 10 ms     | 1 s             |
| 32144    | $I_{\Delta n2}$ DC        | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 6 mA            |
| 32146    | $t_{on}$ main alarm DC    | Float32 | s    | RW    | 0 s ... 10 min    | 10 ms     | 0 s             |
| 32148    | $I_{\Delta n1}$ DC        | Float32 | %    | RW    | 50...100 %        | 0.1 %     | 50 %            |

| Register | Description            | Format  | Unit | Prop. | Setting range | Step size | Factory setting |
|----------|------------------------|---------|------|-------|---------------|-----------|-----------------|
| 32150    | $t_{on}$ prewarning DC | Float32 | s    | RW    | 0 s...10 min  | 10 ms     | 1 s             |

### Parameter K3

| Register | Description               | Format  | Unit | Prop. | Setting range     | Step size | Factory setting |
|----------|---------------------------|---------|------|-------|-------------------|-----------|-----------------|
| 32152    | Reserved                  |         |      |       |                   |           |                 |
| 32154    | Response value Hysteresis | Float32 | %    | RW    | 10...25 %         | 0.1 %     | 15 %            |
| 32156    | $t_{off}$                 | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 1 s             |
| 32158    | $t_{start-up}$            | Float32 | s    |       | 0.5 s...10 min    | 10 ms     | 0.5 s           |
| 32160    | Fault memory              | UINT16  | —    | RW    | 0 = off<br>1 = on | —         | 0 (aus)         |
| 32161    | Reserved                  |         |      |       |                   |           |                 |
| 32162    | $I_{\Delta n2}$ RMS       | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 30 mA           |
| 32164    | $t_{on}$ main alarm RMS   | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 0 s             |
| 32166    | $I_{\Delta n1}$ RMS       | Float32 | %    | RW    | 50...100 %        | 0.1 %     | 50 %            |
| 32168    | $t_{on}$ prewarning RMS   | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 1 s             |
| 32170    | $I_{\Delta n2}$ DC        | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 6 mA            |
| 32172    | $t_{on}$ main alarm DC    | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 0 s             |
| 32174    | $I_{\Delta n1}$ DC        | Float32 | %    | RW    | 50...100 %        | 0.1 %     | 50 %            |
| 32176    | $t_{on}$ prewarning DC    | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 1 s             |

### Parameter K4

| Register | Description               | Format  | Unit | Prop. | Setting range     | Step size | Factory setting |
|----------|---------------------------|---------|------|-------|-------------------|-----------|-----------------|
| 32178    | Reserved                  |         |      |       |                   |           |                 |
| 32180    | Response value Hysteresis | Float32 | %    | RW    | 10...25 %         | 0.1 %     | 15 %            |
| 32182    | $t_{off}$                 | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 1 s             |
| 32184    | $t_{start-up}$            | Float32 | s    |       | 0.5 s...10 min    | 10 ms     | 0.5 s           |
| 32186    | Fault memory              | UINT16  | —    | RW    | 0 = off<br>1 = on | —         | 0 (aus)         |
| 32187    | Reserved                  |         |      |       |                   |           |                 |
| 32188    | $I_{\Delta n2}$ RMS       | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 30 mA           |
| 32190    | $t_{on}$ main alarm RMS   | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 0 s             |
| 32192    | $I_{\Delta n1}$ RMS       | Float32 | %    | RW    | 50...100 %        | 0.1 %     | 50 %            |
| 32194    | $t_{on}$ prewarning RMS   | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 1 s             |
| 32196    | $I_{\Delta n2}$ DC        | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 6 mA            |

| Register | Description            | Format  | Unit | Prop. | Setting range | Step size | Factory setting |
|----------|------------------------|---------|------|-------|---------------|-----------|-----------------|
| 32198    | $t_{on}$ main alarm DC | Float32 | s    | RW    | 0 s...10 min  | 10 ms     | 0 s             |
| 32200    | $I_{\Delta n1}$ DC     | Float32 | %    | RW    | 50...100 %    | 0.1 %     | 50 %            |
| 32202    | $t_{on}$ prewarning DC | Float32 | s    | RW    | 0 s...10 min  | 10 ms     | 1 s             |

**Parameter K5**

| Register | Description               | Format  | Unit | Prop. | Setting range     | Step size | Factory setting |
|----------|---------------------------|---------|------|-------|-------------------|-----------|-----------------|
| 32204    | Reserved                  |         |      |       |                   |           |                 |
| 32206    | Response value Hysteresis | Float32 | %    | RW    | 10...25 %         | 0.1 %     | 15 %            |
| 32208    | $t_{off}$                 | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 1 s             |
| 32210    | $t_{start-up}$            | Float32 | s    |       | 0.5 s...10 min    | 10 ms     | 0.5 s           |
| 32212    | Fault memory              | UINT16  | —    | RW    | 0 = off<br>1 = on | —         | 0 (aus)         |
| 32213    | Reserved                  |         |      |       |                   |           |                 |
| 32214    | $I_{\Delta n2}$ RMS       | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 30 mA           |
| 32216    | $t_{on}$ main alarm RMS   | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 0 s             |
| 32218    | $I_{\Delta n1}$ RMS       | Float32 | %    | RW    | 50...100 %        | 0.1 %     | 50 %            |
| 32220    | $t_{on}$ prewarning RMS   | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 1 s             |
| 32222    | $I_{\Delta n2}$ DC        | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 6 mA            |
| 32224    | $t_{on}$ main alarm DC    | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 0 s             |
| 32226    | $I_{\Delta n1}$ DC        | Float32 | %    | RW    | 50...100 %        | 0.1 %     | 50 %            |
| 32228    | $t_{on}$ prewarning DC    | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 1 s             |

**Parameter K6**

| Register | Description               | Format  | Unit | Prop. | Setting range     | Step size | Factory setting |
|----------|---------------------------|---------|------|-------|-------------------|-----------|-----------------|
| 32230    | Reserved                  |         |      |       |                   |           |                 |
| 32232    | Response value Hysteresis | Float32 | %    | RW    | 10...25 %         | 0.1 %     | 15 %            |
| 32234    | $t_{off}$                 | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 1 s             |
| 32236    | $t_{start-up}$            | Float32 | s    |       | 0.5 s...10 min    | 10 ms     | 0.5 s           |
| 32238    | Fault memory              | UINT16  | —    | RW    | 0 = off<br>1 = on | —         | 0 (aus)         |
| 32239    | Reserved                  |         |      |       |                   |           |                 |
| 32240    | $I_{\Delta n2}$ RMS       | Float32 | A    | RW    | 3...300 mA        | 0.1 mA    | 30 mA           |
| 32242    | $t_{on}$ main alarm RMS   | Float32 | s    | RW    | 0 s...10 min      | 10 ms     | 0 s             |
| 32244    | $I_{\Delta n1}$ RMS       | Float32 | %    | RW    | 50...100 %        | 0.1 %     | 50 %            |

| Register | Description             | Format  | Unit | Prop. | Setting range | Step size | Factory setting |
|----------|-------------------------|---------|------|-------|---------------|-----------|-----------------|
| 32246    | $t_{on}$ prewarning RMS | Float32 | s    | RW    | 0 s...10 min  | 10 ms     | 1 s             |
| 32248    | $I_{\Delta n2}$ DC      | Float32 | A    | RW    | 3...300 mA    | 0.1 mA    | 6 mA            |
| 32250    | $t_{on}$ main alarm DC  | Float32 | s    | RW    | 0 s...10 min  | 10 ms     | 0 s             |
| 32252    | $I_{\Delta n1}$ DC      | Float32 | %    | RW    | 50...100 %    | 0.1 %     | 50 %            |
| 32254    | $t_{on}$ prewarning DC  | Float32 | s    | RW    | 0 s...10 min  | 10 ms     | 1 s             |

### Parameter K1...K6

| Register      | Description       | Format   | Unit      | Prop. | Setting range                            | Step size | Factory setting |
|---------------|-------------------|----------|-----------|-------|------------------------------------------|-----------|-----------------|
| 32256         | Copy parameters   | UINT32   | —         | RW    | 1)                                       |           | 0               |
| 32258         | Time 2) 3)        | UINT32   | Unix time | RW    | 0... 0xFFFFFFFF                          | 1         | 0               |
| 32260         | Time zone 2) 4)   | Float32  | h         | RW    | -12 ... +14                              | 0.25      | 0               |
| 32262         | Summer time 2) 5) | UINT16   | —         | RW    | 0 = off<br>1 = on<br>2 = CEST<br>3 = DST | —         | 0 (off)         |
| 32263...57999 |                   | Reserved |           |       |                                          |           |                 |

- 1) Used to copy the parameters of one channel to other channels. Source channel and target channels are binary coded. In the low word, the source is indicated and in the high word, the targets are indicated. The source channel may also be set for the target channels (it is automatically omitted during the copying process). Bit 0 is reserved (must not be set), bit 1 corresponds to channel 1, bit 2 corresponds to channel 2, etc. Timeout: Up to 200 ms are required per selected target channel. If all 6 channels are selected as target, the process can take up to one second.
- 2) Lost when the device is switched off.
- 3) Unix time: Second count since 01.01.1970, 00:00 h
- 4) Offset of the time zone
- 5) CEST = automatic switching: Central Europe  
DST = automatic switching: USA, CDN



Wait for at least 10 s before changing the response values. If the measured values do not normalise afterwards, a device restart/reset (or similar) must be carried out.



When setting the response values  $I_{\Delta n2}$ , the ratio of  $I_{\Delta n2}$  RMS to  $I_{\Delta n2}$  DC must only be between 0.2 and 5.

## 7.6 Control commands

| Register | Description                                                   |                       | Format | Property | Setting range                                                                                                                            | Factory setting | Comment |
|----------|---------------------------------------------------------------|-----------------------|--------|----------|------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| 59000    | Allow register write access                                   |                       | UINT16 | RW       | 0 = Deny<br>1 = Allow                                                                                                                    | 0               | 1)      |
| 59001    | K1                                                            | Test                  | UINT16 | RW       | <b>Read</b><br>0 = No test performed yet<br>1 = Test running<br>2 = Test successful<br>3 = Test failed<br><b>Write</b><br>1 = start test | 0               | 2)      |
| 59002    | K2                                                            |                       | UINT16 | RW       |                                                                                                                                          |                 |         |
| 59003    | K3                                                            |                       | UINT16 | RW       |                                                                                                                                          |                 |         |
| 59004    | K4                                                            |                       | UINT16 | RW       |                                                                                                                                          |                 |         |
| 59005    | K5                                                            |                       | UINT16 | RW       |                                                                                                                                          |                 |         |
| 59006    | K6                                                            |                       | UINT16 | RW       |                                                                                                                                          |                 |         |
| 59007    | K1                                                            | Fault memory reset    | UINT16 | WO       | 1 = Perform reset                                                                                                                        | —               | 3)      |
| 59008    | K2                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59009    | K3                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59010    | K4                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59011    | K5                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59012    | K6                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59013    | K1                                                            | Load factory settings | UINT16 | WO       | 1 = Apply factory settings                                                                                                               | —               | 4)      |
| 59014    | K2                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59015    | K3                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59016    | K4                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59017    | K5                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59018    | K6                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59019    | Load channel-independent factory settings (without interface) |                       | UINT16 | WO       | 1 = Apply factory settings                                                                                                               | —               | 5)      |
| 59020    | Load channel-independent factory settings (with interface)    |                       | UINT16 | WO       | 1 = Apply factory settings                                                                                                               | —               | 6)      |
| 59021    | Device signalling                                             |                       | UINT16 | RW       | 0 = off<br>1 = on                                                                                                                        | 0               | 7)      |
| 59022    | Test alarm                                                    |                       | UINT16 | RW       | 0...12                                                                                                                                   | 0               | 8)      |
| 59023    | K1                                                            | Offset measurement    | UINT16 | WO       | 1 = Perform offset measurement                                                                                                           | —               | 9)      |
| 59024    | K2                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59025    | K3                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59026    | K4                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59027    | K5                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |
| 59028    | K6                                                            |                       | UINT16 | WO       |                                                                                                                                          | —               |         |



| Register      | Description | Format | Property | Setting range | Factory setting | Comment |
|---------------|-------------|--------|----------|---------------|-----------------|---------|
| 59029...59999 | Reserved    |        |          |               |                 |         |

#### Notes

- 1) Flag to allow modification of important registers. Is automatically deactivated after five seconds.
- 2) Manual test on corresponding channel. The duration of the test depends on the set response times.
- 3) Reset the fault memory on the corresponding channel.
- 4) Loads all factory settings of the corresponding channel (e.g. parameters of channel 1: registers 32100 to 32124). Secured via register 59000.
- 5) Loads the following channel-independent factory settings without interface parameters:
  - Register 1269: Installation location
  - Register 16162: Time
  - Register 16164: Time zone
  - Register 16166: Summer time
  - Secured via register 59000.
- 6) Loads the following channel-independent factory settings with interface parameters (secured via register 59000)
  - Register 1269: Installation location
  - Register 16158: Modbus address
  - Register 16159: Modbus baud rate
  - Register 16161: Modbus parity/stop bit
  - Register 16162: Time
  - Register 16164: Time zone
  - Register 16166: Summer time
- 7) The Power on LED flashes green quickly to identify the device more quickly in a cluster of devices. Is automatically deactivated after one minute.
- 8) Output a test alarm on a measuring channel. The test alarm is deactivated after 1 minute (= 0).  
0 = No test alarm/end test alarm  
1...12 = Output test alarm on corresponding channel/active
- 9) Perform an offset measurement on the corresponding channel. Secured via register 59000.

## 8 Glossary

| Term                             | Explanation                                                                                                                                                                                                                                                                                                                        |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #                                | In the overview: measuring channel number 1...12<br>1...6: RMS of channels K1...6<br>7...12: DC of channels K1...6                                                                                                                                                                                                                 |
| Channel                          | RCMS150... has 6 measuring current transformers (= channels). 2 measuring channels (RMS and DC) are available for each channel, which makes 12 measuring channels in total:<br>1...6: residual current AC/DC sensitive (RMS)<br>7...12: residual current DC                                                                        |
| Configure e-mail                 | Functionality of the gateway: To which user group should a device failure be reported?                                                                                                                                                                                                                                             |
| Device error (at > Edit texts)   | Specification of the text that is displayed in the event of a device <b>error</b>                                                                                                                                                                                                                                                  |
| Device failure (at > Edit texts) | Specification of the text that is indicated in the event of a device <b>failure</b>                                                                                                                                                                                                                                                |
| Edit texts                       | It is essential that each measuring channel is clearly identified in the overview or in the reports. The alarm texts that are indicated in the event of prewarnings/main alarms can be identical or different for all channels. If no individual text is assigned, the general text will be indicated in the event of an alarm.    |
| Factory settings                 | All settings are reset.                                                                                                                                                                                                                                                                                                            |
| Hysteresis                       | The hysteresis prevents constant setting and resetting of the alarm when the measured value varies around the response value. If, for example, a hysteresis of 20 % is set, the alarm state will not be exited until the measured value is 20 % below the response value.<br>Setting range: 10...25 %, resolution of setting 0.1 % |
| I <sub>Δn</sub>                  | Response value residual current<br>I <sub>Δn1</sub> RMS : Response value prewarning RMS<br>I <sub>Δn2</sub> RMS : Response value main alarm RMS<br>I <sub>Δn1</sub> DC : Response value prewarning DC<br>I <sub>Δn2</sub> DC : Response value main alarm DC                                                                        |
| Main alarm                       | In the event of a main alarm, a message is sent via the bus and the respective LED lights up on the RCMS. Is triggered by: <ul style="list-style-type: none"> <li>Exceeding the set response value during residual current measurement</li> <li>Fault of measuring current transformer</li> <li>Device error</li> </ul>            |
| Message                          | 2 message levels are distinguished: prewarning and main alarm.                                                                                                                                                                                                                                                                     |
| Overview                         | The current state and the measured value are indicated for all 12 measuring channels (#).                                                                                                                                                                                                                                          |

| Term                      | Explanation                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Prewarning                | <p>Preliminary stage to main alarm, the less severe response value has been reached (e.g. 50 % of the main alarm response value). If there is a prewarning, a message is sent via the bus. Is triggered by:</p> <ul style="list-style-type: none"> <li>• Exceeding the set response value during residual current measurement</li> <li>• Fault of measuring current transformer</li> <li>• Device error</li> </ul> |
| Report                    | <p>The report includes:</p> <ul style="list-style-type: none"> <li>• The current measured values for each channel</li> <li>• Values of the general settings for hysteresis, <math>t_{\text{off}}</math>, <math>t_{\text{start-up}}</math></li> <li>• Response values and <math>t_{\text{on}}</math> for prewarnings and main alarms</li> <li>• Information regarding the RCMS150...</li> </ul>                     |
| Response value main alarm | Response value of the main alarm ( $I_{\Delta n2}$ )                                                                                                                                                                                                                                                                                                                                                               |
| Response value prewarning | Indication of the response value alarm (50...100 %) ( $I_{\Delta n1}$ ) as a percentage value                                                                                                                                                                                                                                                                                                                      |
| RMS                       | <b>Root Mean Square:</b> The currents are detected and evaluated as RMS values in the frequency range of 0...2000 Hz.                                                                                                                                                                                                                                                                                              |
| t(off)                    | <p>Delay on release <math>t_{\text{off}}</math></p> <p>Starts when the condition that triggers the message (for prewarning or main alarm) no longer exists. The RCMS150... only stops signalling if the condition that triggers the message no longer exists after the delay on release has elapsed. Setting range: 0...10 minutes.</p>                                                                            |
| t(on)                     | <p>Response delay <math>t_{\text{on}}</math></p> <p>Starts when a condition that triggers the message (for prewarning and main alarm) exists. Signalling is only done by the RCMS150... if the condition that triggers the message still exists after the response delay has elapsed. Setting range: 0...10 minutes.</p>                                                                                           |
| t(start-up)               | <p>Start-up delay <math>t_{\text{start-up}}</math></p> <p>Time delay after the RCMS150 has been switched on. No alarm message is generated during this time period. This time delay is required if the RCMS150... and the system to be monitored are switched on simultaneously. Currents caused by switching operations are ignored. Setting range: 500 ms...10 minutes.</p>                                      |

**9 Technical data**

**9.1 Factory settings of the Modbus interface**

For an overview of the factory-set parameters, see table “Parameters”, page 28.

**9.2 Tabular data**

( )\* = factory settings

**Insulation coordination according to IEC 60664-1**

|                                                                                                                                                                  |                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Output circuit                                                                                                                                                   | (+, −, A, B)                                              |
| Primary circuit                                                                                                                                                  | Primary conductors routed through the current transformer |
| Rated insulation voltage                                                                                                                                         | 300 V                                                     |
| Overvoltage category                                                                                                                                             | III                                                       |
| Rated impulse withstand voltage monitored circuit/output circuit                                                                                                 | 4 kV                                                      |
| Range of use                                                                                                                                                     | ≤ 2000 m above sea level                                  |
| Rated insulation voltage                                                                                                                                         | 250 V                                                     |
| Pollution degree                                                                                                                                                 | 3                                                         |
| Insulation                                                                                                                                                       |                                                           |
| To achieve double insulation (DI) for overvoltage category III, insulated primary conductors with sufficient rated voltage must be used on the application side. |                                                           |
| Basic insulation (BI)                                                                                                                                            | Overvoltage category III                                  |
| Double insulation (DI)                                                                                                                                           | Overvoltage category II                                   |
| Voltage test acc. to IEC 61010-1                                                                                                                                 | AC 2.2 kV                                                 |

**Power supply**

|                              |         |
|------------------------------|---------|
| Nominal supply voltage $U_S$ | DC 24 V |
| Operating range $U_S$        | ±20 %   |
| Power consumption            | < 4 W   |

**Residual current measuring range**

|                           |                               |
|---------------------------|-------------------------------|
| Frequency range           | 0...2000 Hz                   |
| Measuring range           | ±500 mA                       |
| Resolution measured value | 1 % of the set response value |

## Response values

|                                                |                                       |
|------------------------------------------------|---------------------------------------|
| Residual current $I_{\Delta n2}$ RMS           | RMS 3...300 mA (30 mA)*               |
| For LR applications                            | RMS 10...300 mA (30 mA)*              |
| Residual current $I_{\Delta n2}$ DC            | DC 3...300 mA (6 mA)*                 |
| For LR applications <sup>1)</sup>              | DC 10...300 mA (6 mA)*                |
| Ratio $I_{\Delta n2}$ RMS / $I_{\Delta n2}$ DC | 0.2...5                               |
| Prewarning $I_{\Delta n1}$ RMS/DC              | 50...100 % of $I_{\Delta n2}$ (50 %)* |
| Response tolerance                             |                                       |
| DC, 10...500 Hz                                | -20...0 %                             |
| 500 Hz...2 kHz                                 | -20...+100                            |
| Hysteresis                                     | 10...25 % (15 %)*                     |

1) For LR applications,  $I_{\Delta n2}$  DC must be changed to a value  $\geq 10$  mA.

## Time response

|                                      |                      |
|--------------------------------------|----------------------|
| Start-up delay $t_{\text{Start-up}}$ | 0.5...600 s (0.5 s)* |
| Response delay                       |                      |
| $t_{\text{on1}}$ RMS/DC              | 0...600 s (1 s)*     |
| $t_{\text{on2}}$ RMS/DC              | 0...600 s (0 s)*     |
| Delay on release                     |                      |
| $t_{\text{off}}$                     | 0...600 s (1 s)*     |

## Indication (LEDs)

For a description of the LEDs, refer to page 10

|               |        |
|---------------|--------|
| ON            | Green  |
| ALARM K1...K6 | Yellow |

## Interface

|                                   |                                                     |
|-----------------------------------|-----------------------------------------------------|
| Interface                         | RS-485                                              |
| Connection                        | Terminals A/B                                       |
| Cable                             | Shielded, shield on one side to PE                  |
| Recommended                       | CAT6/CAT7 min. AWG23                                |
| Alternative                       | J-Y(St)Y min. 2 x 0.8                               |
| Bus terminating resistor external | (2 x) 120 $\Omega$ (0.25 W)                         |
| Protocol                          | BMS                                                 |
| Cable length                      | $\leq 1200$ m                                       |
| Device address                    | 2...90 (2)*                                         |
| Protocol                          | Modbus RTU                                          |
| Cable length                      | $\leq 1200$ m                                       |
| Device address                    | 1...247 (last 2 digits of the serial number + 100)* |

## Environment/EMC

|                       |              |
|-----------------------|--------------|
| EMC                   |              |
| Immunity              | IEC 62020-1  |
| Emission              | IEC 62020-1  |
| Operating temperature | -25...+70 °C |
| for UL applications   | -25...+65 °C |

### 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

|                                                                       |                                         |
|-----------------------------------------------------------------------|-----------------------------------------|
| Connection type                                                       | Dual plug-in push-wire terminal         |
| Connection properties                                                 |                                         |
| Rigid/flexible / conductor sizes                                      | 0.2...1.5 mm <sup>2</sup> / AWG 24...16 |
| Multi-conductor connection (2 conductors with the same cross section) |                                         |
| Rigid                                                                 | 0.2...1.5 mm <sup>2</sup>               |
| Flexible                                                              | 0.2...1.5 mm <sup>2</sup>               |
| Flexible with ferrule without plastic sleeve                          | 0.25...1.5 mm <sup>2</sup>              |
| Flexible with ferrule with plastic sleeve                             | 0.25...0.75 mm <sup>2</sup>             |
| Stripping length                                                      | 10 mm                                   |

## Other

|                                                           |                             |
|-----------------------------------------------------------|-----------------------------|
| Operating mode                                            | Continuous operation        |
| Position of normal use                                    | Any                         |
| Enclosure material                                        | Polycarbonate               |
| Flammability class                                        | UL94 V-0                    |
| Screw mounting to standard distribution panels with 12 DU | 2 x M6                      |
| DIN rail mounting                                         | Mounting clip (accessories) |
| Tightening torque                                         | 1.5 Nm                      |
| Weight                                                    | 170 g                       |

Measuring current transformer

|                      |       |
|----------------------|-------|
| Diameter cable gland | 10 mm |
| Load current         | 32 A  |

Bus parameters

|                |                                                          |
|----------------|----------------------------------------------------------|
| Alarm          | Threshold value exceeded, system fault                   |
| Measured value | Measured value, DC component, r.m.s. (resolution 0.1 mA) |
| Times          | Response delay, delay on release, start-up delay         |

( )\* = Factory settings



### 9.3 Standards, approvals, certifications



B94053026W  
only

#### 9.3.1 Approvals

- UL508
- CSA
- LR (B94053026W only)

#### 9.3.2 Conformity

##### EU Declaration of Conformity

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

[EU declaration of conformity RCMS150](#)

##### UKCA Declaration of Conformity

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

[UKCA declaration of conformity RCMS150](#)

9.4      **Ordering information**

| Type                                | Supply voltage $U_S$ | Protocol   | Art. No.   |
|-------------------------------------|----------------------|------------|------------|
| RCMS150                             | DC 24 V              | BMS        | B94053025  |
| RCMS150-01                          |                      | Modbus RTU | B94053026  |
| RCMS150-W-01                        |                      |            | B94053026W |
| Mounting clip for DIN rail mounting |                      |            | B91080110  |

**Suitable system components**

The use of the listed power supply units is recommended. The use of a surge protection device is mandatory for these power supply units.

| Description  | Type                    | Art. No.  |
|--------------|-------------------------|-----------|
| Power supply | STEP-PS/1 AC/24 DC/0.5  | B94053110 |
|              | STEP-PS/1 AC/24 DC/1.75 | B94053111 |
|              | STEP-PS/1 AC/24 DC/4.2  | B94053112 |

**Accessories**

| Description                                                                                   | RCMS 150 | RCMS 150-01 | Type                                    | Art. No.  |
|-----------------------------------------------------------------------------------------------|----------|-------------|-----------------------------------------|-----------|
| Condition monitor with integrated gateway                                                     | X        | X           | COM465IP                                | B95061065 |
|                                                                                               | X        | X           | CP907-I (flush-mounted enclosure)       | B95061031 |
|                                                                                               | X        | X           | CP907-I (control cabinet door mounting) | B95061032 |
| RS-485 repeater                                                                               | X        | X           | DI-1DL                                  | B95012047 |
| Residual current monitoring system (In this case, no condition monitor/gateway is necessary)* | X        | —           | RCMS460-D-1                             | B94053001 |
|                                                                                               | X        | —           | RCMS460-D-2                             | B94053002 |
|                                                                                               | X        | —           | RCMS490-D-1                             | B94053005 |
|                                                                                               | X        | —           | RCMS490-D-2                             | B94053006 |

\* Suitable for measured value and alarm indication only, not suitable for parameter setting.

## 9.5 Document revision history

| Date    | Document version | State/Changes                                                                                  |
|---------|------------------|------------------------------------------------------------------------------------------------|
| 08/2016 | 00               | First edition                                                                                  |
| 07/2021 | 01               | <i>Added</i><br>Device variant RCMS150-01 with Modbus RTU interface<br>UKCA logo               |
| 08/2022 | 02               | <i>Added</i><br>Chapter 8.1: Operating temperature UL<br>Chapter 8.3: UL Logo                  |
| 02.2024 | 03               | <i>Added</i><br>Device variant RCMS150-W-01 with LR approval                                   |
| 03.2024 | 04               | <i>Editorial revision</i><br>Layout of entire document                                         |
| 07.2025 | 05               | <i>Corrected</i><br>Figure "Example of a system design", page 17<br><i>Deleted</i><br>Logo EAC |
| 07.2026 | 06               | <i>Corrected</i><br>Faulty Modbus register numbering in the 'Parameters' section               |



**Bender GmbH & Co. KG**

Londorfer Straße 65  
35305 Grünberg  
Germany

Tel.: +49 6401 807-0  
[info@bender.de](mailto:info@bender.de)  
[www.bender.de](http://www.bender.de)

All rights reserved.  
Reprinting and duplicating only with  
permission of the publisher.



© Bender GmbH & Co. KG, Germany  
Subject to change!  
The specified standards take into  
account the edition valid until 07.2026  
unless otherwise indicated.