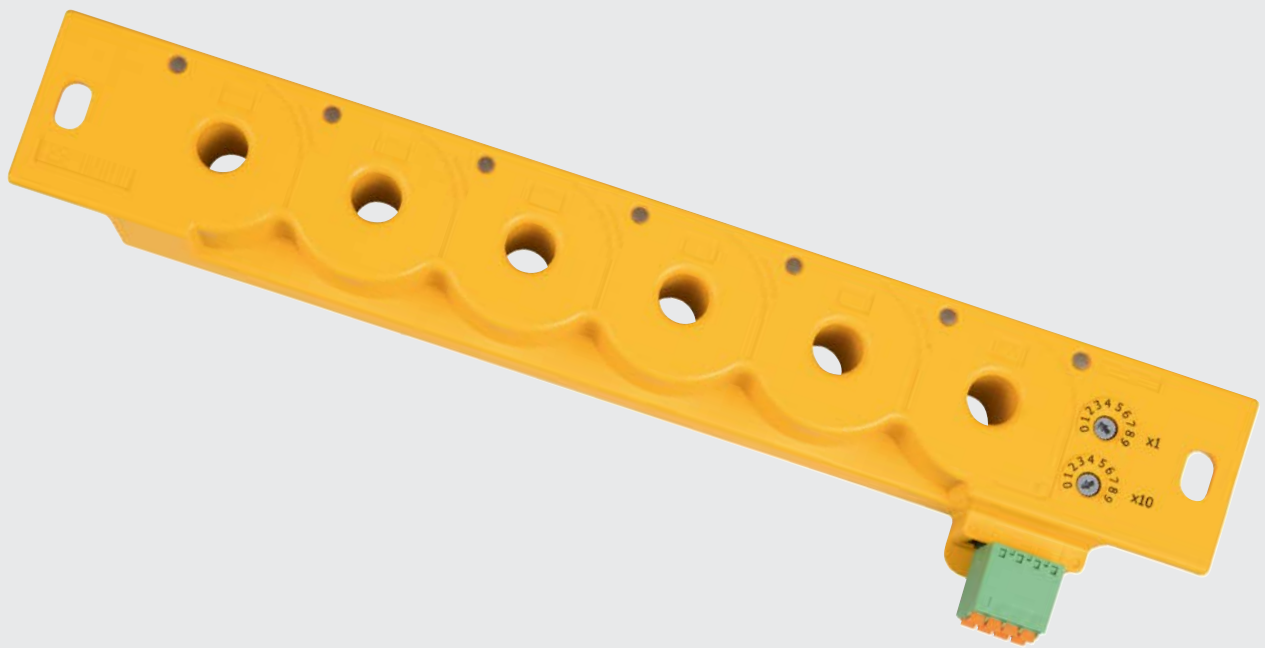
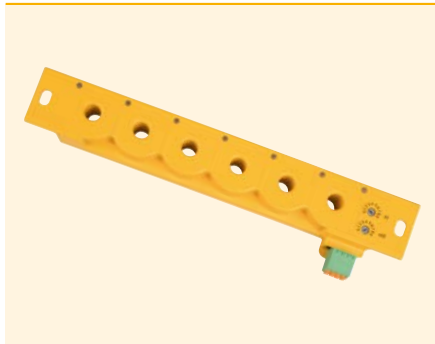


## **LINETRAXX® RCMS150 series**

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





LINETRAXX® RCMS150

## 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

## Product description

The six-channel RCMS150... residual current monitors are intended for measuring AC and DC fault currents in earthed power supplies which can be caused by insulation faults on loads. The devices are able to measure residual currents up to  $I_{\Delta} = 500$  mA in a frequency range of DC...2 kHz. They are suitable for applications with a load current of up to 32 A and are thus intended in particular for monitoring final circuits. Two separately adjustable response values allow a distinction to be made between prewarning and alarm.

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

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.

## 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.

## Approvals and certifications



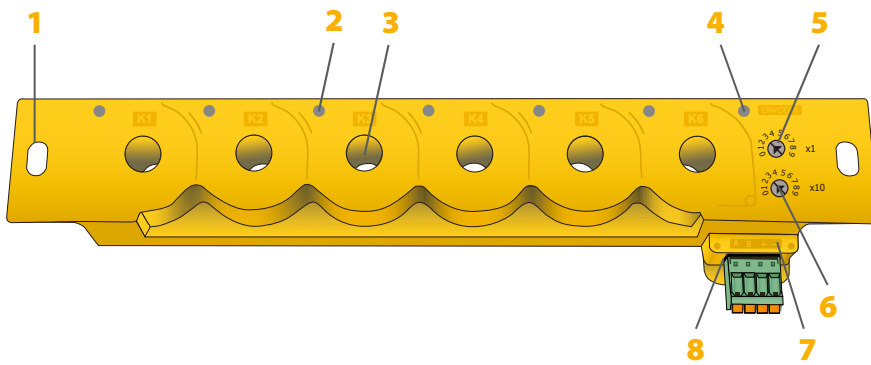
only B94053025

**UL508** in preparation

**CSA** in preparation

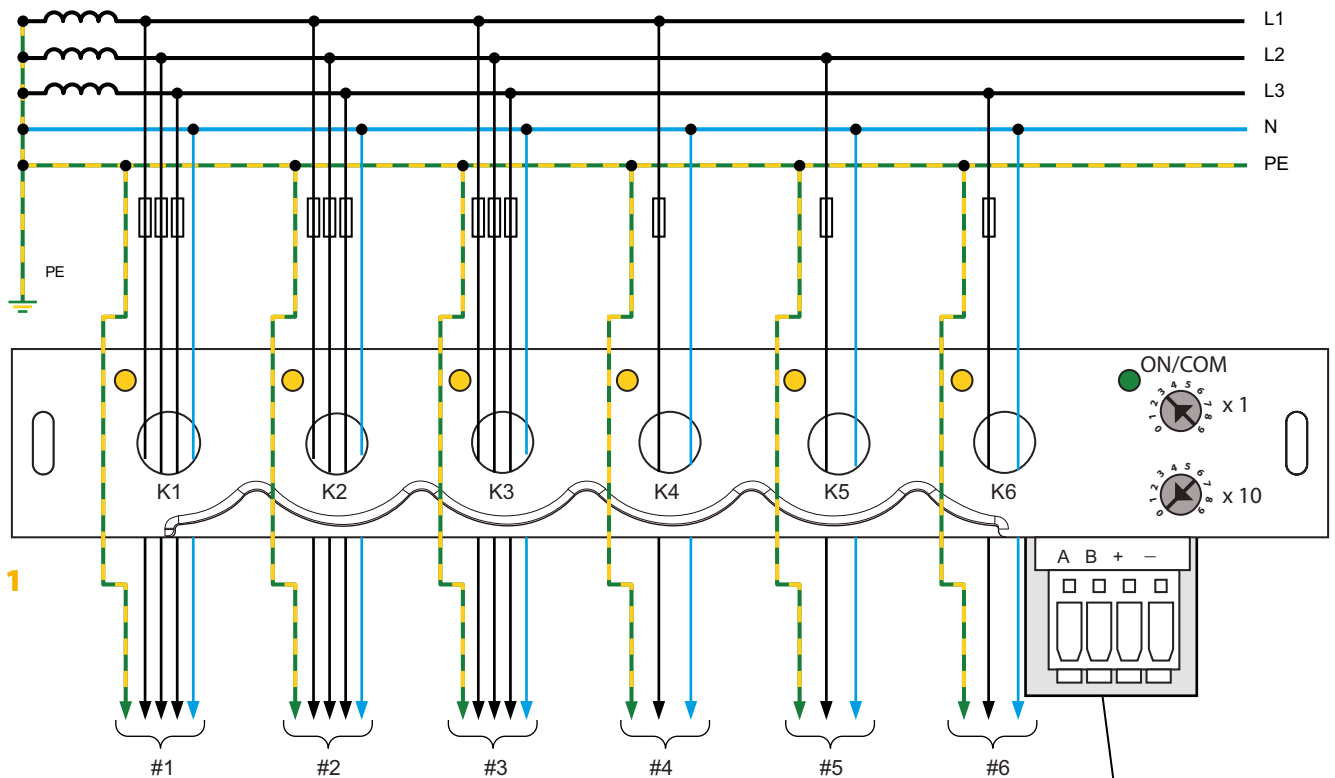
**LR** in preparation

Display and operating elements



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

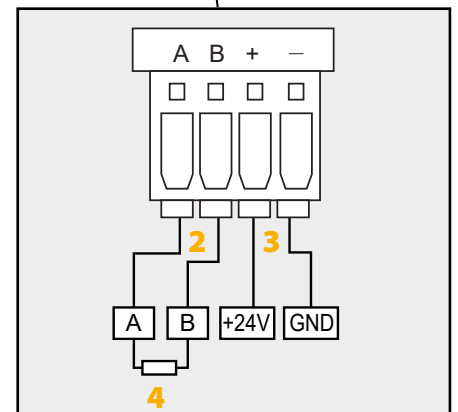
Wiring diagram



- 1 - Residual current monitor RCMS150...
- 2 - RS-485 interface (BMS bus or Modbus RTU)
- 3 - Supply voltage  $U_s$  DC 24 V
- 4 - Terminating resistor 120  $\Omega$  (required for both the first and the last bus device)



**Note:** Only insulated primary conductors suited for the indicated rated voltages are to be used!



## Technical data

### Insulation coordination according to IEC 60664-1

The data are valid for the monitored primary circuit to the output circuit

Primary circuit	Primary conductors routed through the current transformer
Output circuit	(+, -, A, B)
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.
BI	Overvoltage category III
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)*
Residual current $I_{\Delta n2}$ DC	DC 3...300 mA (6 mA)*
Ratio $I_{\Delta n2}$ RMS / $I_{\Delta n2}$ DC	0.2...0.5
Prewarning $I_{\Delta n1}$ RMS/DC	50...100 % of $I_{\Delta n2}$ (50 %)*
Response tolerance $I_{\Delta n1/2}$	
DC, 10...500 Hz	-20...0 %
500 Hz...2 kHz	-20...+100 %
Hysteresis	10...25 % (15 %)*

### 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)

ON	green
ALARM K1...K6	yellow

### Interface

Interface	RS-485
Connection	terminals A/B
Cable	shielded, shield connected to PE on one side
recommended	CAT6/CAT7 min. AWG23
alternative	J-Y(St)Y min. 2 x 0.8
Bus terminating resistor external	(2 x) 120 Ω (0.25 W)
Protocol	BMS
Cable length	≤ 1200 m
Device address	2...90 (2)*
Protocol	Modbus RTU
Cable length	≤ 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

### 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

Anschlussart	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 TE	2 x M6
DIN rail mounting	mounting clip (accessories)
Tightening torque	1.5 Nm
Weight	170 g

### Measuring current transformer

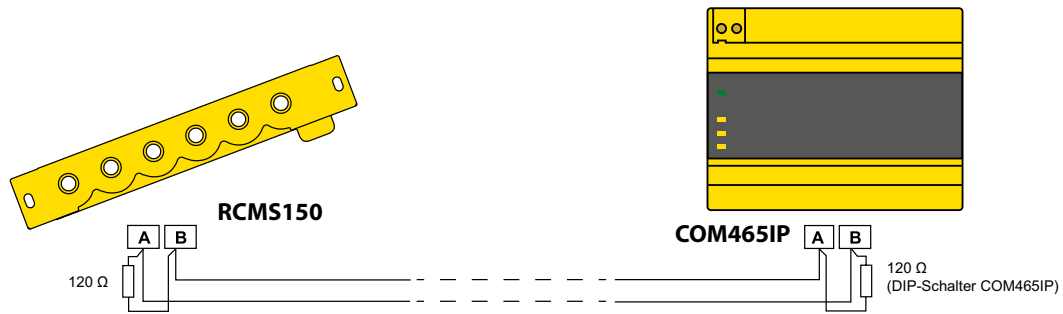
Diameter cable gland	10 mm
Load current	32 A

### 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

**Example of a system design**



**Ordering information**

Nominal supply voltage $U_s$	Protocol	Type	Art. No.
DC	BMS Modbus RTU	RCMS150	B94053025
24V		RCMS150-01	B94053026

**Accessories**

Description	Art. No.
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.
Voltage 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

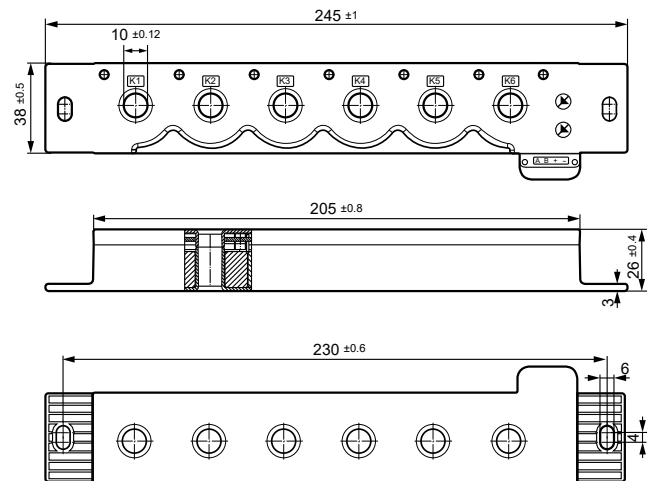
**Accessories**

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

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

**Dimension diagram**

Dimensions in mm





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