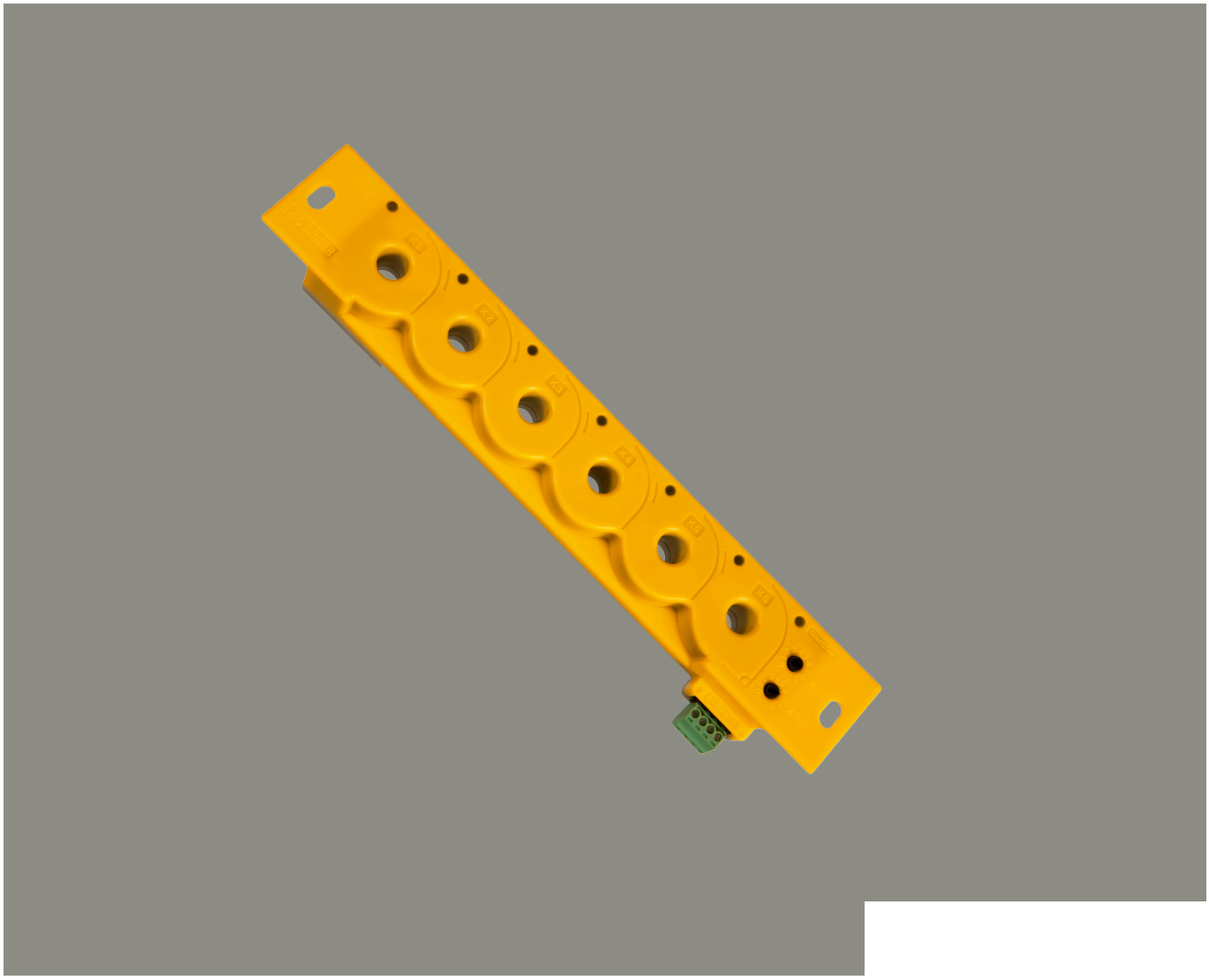
LINETRAXX® RCMS150 series

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



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BENDER

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

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

Intended use

The RCMS150 devices are suitable for measuring residual currents up to I_{Δ} = 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.

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 valuese $I_{\Delta n2...}$ 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.

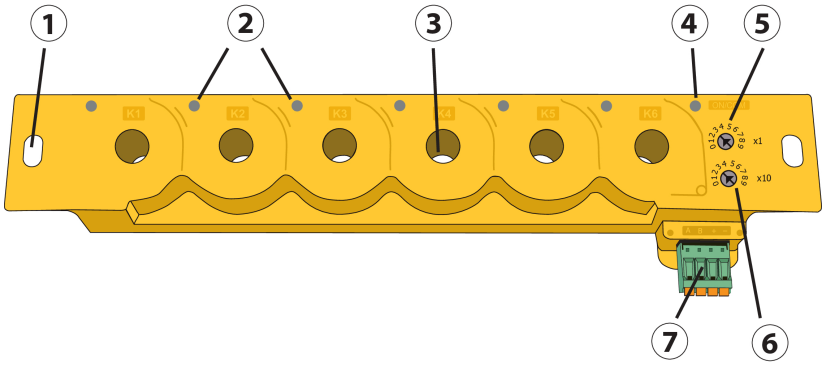
All devices can be accessed via the network from any PC using a standard web browser. Like this, all relevant measurement data of the monitored system are available. All device-related parameters of the RCMS150… can be set via the gateway technology.

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.

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 **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	Plug: Connection to the supply voltage Connection RS-485 (BMS bus or Modbus RTU)

Operating elements

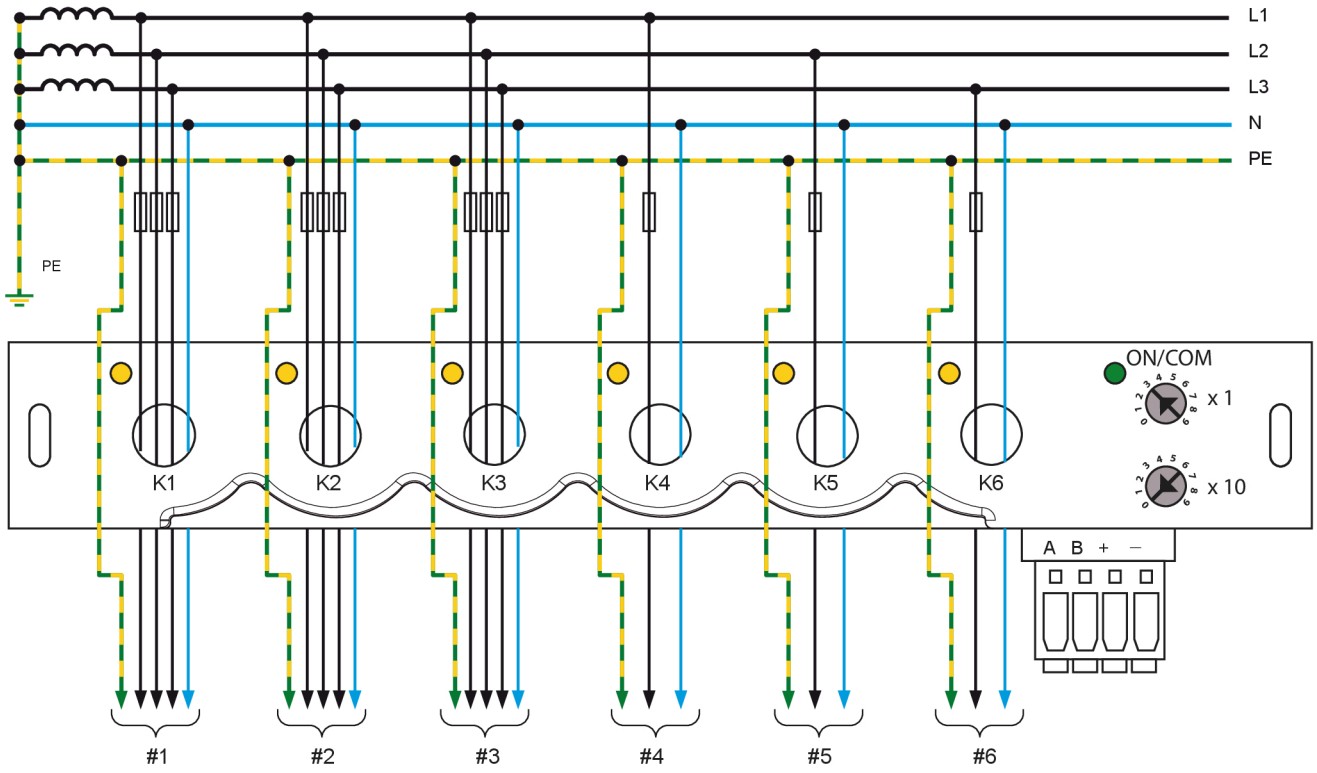
RCMS150-01
If both detent potentiometers are set to 0, the device uses the address parameterised via Modbus (1…247).

Display elements (LEDs)

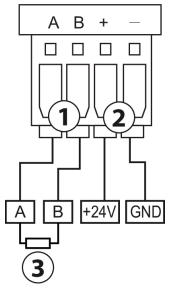
Meaning of the LEDs

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 K1…K6 (yellow)	lights	Main alarm (response value $I_{\Delta n}$ exceeded)
	flashes	Device error channel

Wiring diagram



Terminal

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

Technical data

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[1)]	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 ≥ 10 mA.

Time response

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

Indication (LEDs)

For a description of the LEDs, refer to page 3	
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 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
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 mm² / AWG 24…16
Multi-conductor connection (2 conductors with the same cross section)	
Rigid	0.2…1.5 mm²
Flexible	0.2…1.5 mm²
Flexible with ferrule without plastic sleeve	0.25…1.5 mm²
Flexible with ferrule with plastic sleeve	0.25…0.75 mm²
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

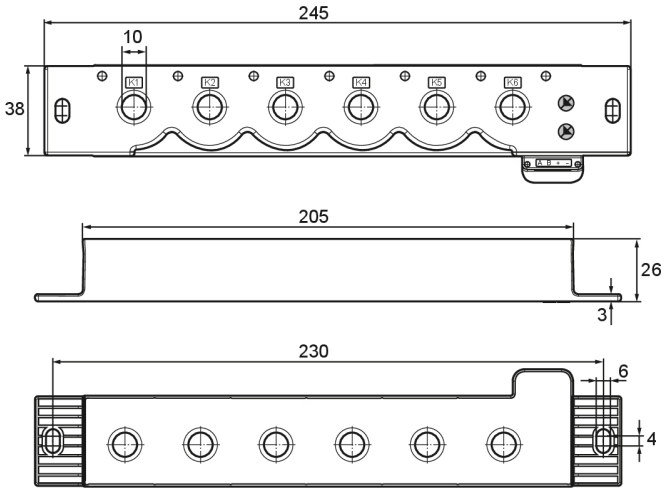
Diameter cable gland	10 mm
Load current	32 A

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

Dimension diagram



Dimensions in mm

Standards, approvals, certifications

B94053026W only

Approvals

- UL508
- CSA
- LR (B94053026W only)

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

Example of a system design

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.

Bender GmbH & Co. KG

Londorfer Straße 65
35305 Grünberg
Germany

Tel.: +49 6401 807-0
info@bender.de
www.bender.de

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Subject to change!
The specified standards take into account the edition valid until 07.2025 unless otherwise indicated.