

LINETRAXX® SmartDetect RCMS410

Four-channel residual current monitor sensitive to AC, pulsed DC, and smooth DC for earthed AC, AC/DC, and DC systems



LINETRAXX® SmartDetect RCMS410

Four-channel residual current monitor sensitive to AC, pulsed DC, and smooth DC for earthed AC, AC/DC, and DC systems



LINETRAXX® RCMS410

Device features

- AC, pulsed-DC, and smooth-DC sensitive residual-current monitor type A, type F, type B and type B+ according to IEC 62020-1 (depending on the connected measuring-current transformers and activated function modules)
- Four channels
- Measurement modes for each channel: overcurrent (standard), undercurrent, or window mode (out-of-range-values). Every channel can alternatively also be configured as digital input
- One digital input, one digital input/output, and one multifunctional digital/analogue output
- Measurement of the r.m.s. value
- Residual operating current
 - Type A: 6 mA...30 A
 - Type F: 6 mA...30 A (15 Hz...20 kHz)
 - Type B/Type B+: 10 mA...10 A (only with function module B "AC/DC sensitive measuring and evaluation of values")
- Separate evaluation of AC/DC (RMS), AC, and DC
- Prewarning: 10...100 % of the residual operating current
- Supply voltage 24 V DC
- Alarm-LED for each channel
- Device status and Alarm LEDs
- Fault-memory behaviour selectable
- RS-485 with Modbus RTU
- NFC interface for device parameter setting via Bender Connect App with the device energised or de-energised
- Continuous CT-connection monitoring
- Expanded functions available by enabling these function modules:
 - Harmonic analysis (FFT)
 - AC/DC sensitive measuring and evaluation of values
 - Connection of Type A external transformers

Product description

The LINETRAXX® SmartDetect RCMS410 is an AC, pulsed DC, and smooth DC sensitive residual-current monitor for earthed power-supply systems. It measures residual currents between 2 mA and 70 A with direct voltage as well as alternating voltage in a frequency range from 15 Hz to 20 kHz and has been developed for flexible use in the most varied applications.

Despite its small size and compact design the RCMS410 is a top performer. It can monitor up to 4 residual-current channels simultaneously. The response values can be adjusted separately. Therefore the RCMS410 can distinguish between a prewarning and a main alarm as well as between the RMS value of AC and DC combined, and the RMS value of the individual AC or DC component. Specific analysis functions serve to measure and evaluate harmonics up to the 400th harmonic.

Apart from 4 residual-current inputs, the RCMS410 has a digital input, a digital output, and a multi-functional output. Corresponding measuring-current transformers (e. g. from the CTUB100 or CTAC series) need to be connected to the residual-current inputs.

With its numerous interfaces the RCMS410 can be easily integrated into new and already existing electrical installations. Among other things, the device is furnished with a standardised Modbus-RTU interface.

The display and operating elements of the RCMS410 have been reduced to a minimum. Several multi-coloured LEDs show the current status of the device and of the installation. Furthermore there is a test/reset button. The parameters needed for the electrical installation are set via Modbus RTU or via the NFC interface using the Bender Connect App (which is also possible even when the device is powered off). Default operating parameters already preset on the delivered device are also offered.

Bender Connect App



Function modules

To expand its application range, optionally function modules can be enabled for the RCMS410.

These function modules can be ordered and activated both when first ordering the device and also later on.

Function module A: Harmonic analysis (FFT)

Function module A permits analysing harmonics.

i With ordering number B84604042 the harmnoic analysis is already enabled as a default.

Function module B:

AC/DC sensitive measuring and evaluation of values

All RCMS410 devices evaluate measuring-current transformers of the types "A" and "F". With function module B also measuring-current transformers of the types "B" and "B+" can be used.

i With ordering numbers B84604041 and B84604042 the AC/DC-sensitive measuring and evaluation of values is already enabled as a default.

Function module C:

Connection of Type A external current transformers

Function module C permits the use of measuring-current transformers by manufacturers other than Bender. When an external current transformer is used, a number of turns must be selected in the corresponding Modbus register (33104...33107).

i With ordering number B84604042 the connection of external current transformers is already enabled as a default.

Licences

For a list of the open-source software used see our [homepage](#).

Standards

The RCMS410 device has been developed in accordance with the following standards:

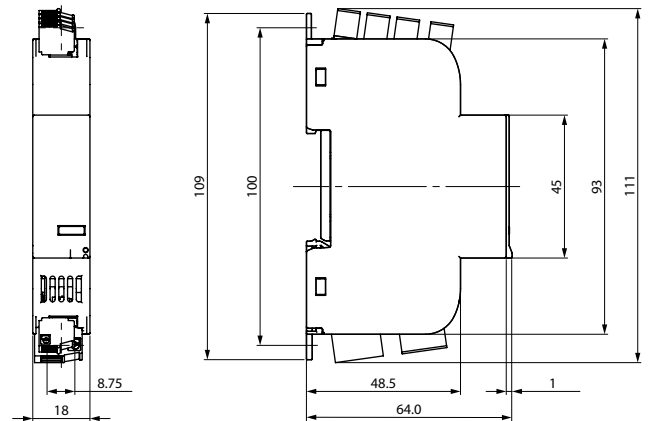
- DIN EN IEC 62020-1
- DIN EN 50155
- UL508

Approvals

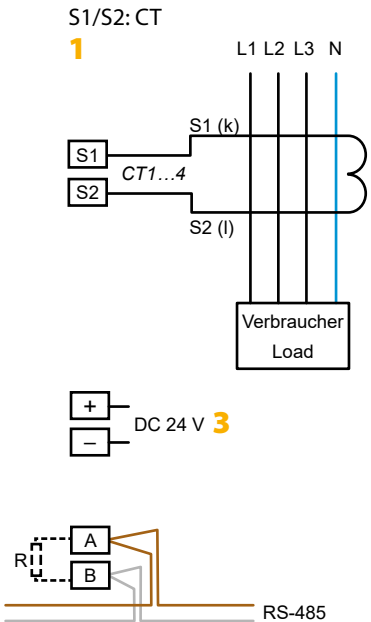
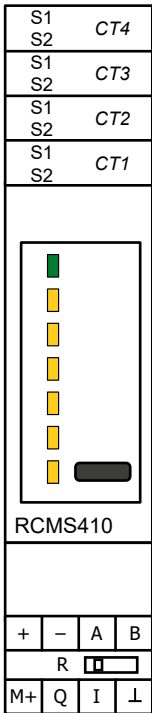


Dimension diagram

Dimensions in mm



Wiring diagrams



- 1 - S1/S2 CT Measuring-current-transformer connection
- 2 - S1/S2 DI CT1...4 as digital input
- 3 - DC 24 V The device must be operated with a voltage of 24 V DC. The connection is made at the bottom side of the device.

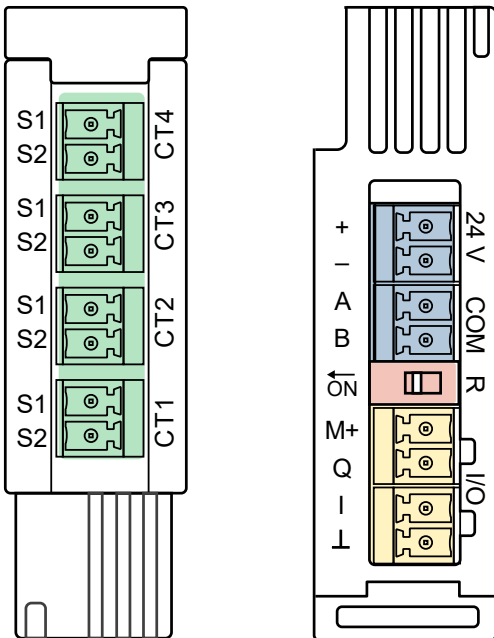
i The RCMS410 and all connected CTUB102-CTBCxx devices must be supplied from the same mains part.

i Ensure that the 24-V-DC supply is connected correctly. Otherwise the RCMS410 can be destroyed!

i **For UL applications:**
Use 60/75 °C copper conductors only!

i Only power supply units of protection class 2 or 3 shall be used.

Connections



	Terminal	Verbindung
Top	S1, S2 (CT4)	Measuring-current transformer CT4
	S1, S2 (CT3)	Measuring-current transformer CT3
	S1, S2 (CT2)	Measuring-current transformer CT2
	S1, S2 (CT1)	Measuring-current transformer CT1
Bottom	+	Supply voltage 24 V DC
	-	
	A	RS-485 A - Modbus RTU
	B	RS-485 B - Modbus RTU
	ON (R)	Termination of RS-485 interface
	M+	Multifunctional output
	Q	Digital output (configurable)
	I	Digital input
⊥	Ground	

The cables are connected to the device via plug-in terminals. The maximum permissible conductor cross section is 1.5 mm².

Technical data
Insulation coordination (IEC 60664-1/IEC 60664-3)

Rated voltage	50 V
Overvoltage category	III
Rated impulse voltage	800 V
Rated insulation voltage	50 V
Pollution degree	2

Supply voltage

Connection	+, -
Supply voltage U_s	24 V DC
Protection class of power supply unit	2 or 3
Permissible tolerance	-30...+25 %
Permissible ripple	5 %
Power consumption	≤ 2 W
Inrush current (5 ms)	< 10 A

Measuring circuit

Burden (internal)	33 Ω
Frequency range	DC, 15 Hz...20 kHz
for details	see chapter 8.1 in the manual
Measuring range (peak)	3 mA...100 A
Measuring range rms	2 mA...70 A
Rated residual operating current	
Type A, type F	30 A
Type B, type B+	10 A
Residual operating current $I_{\Delta n}$ (main alarm, AL2) ¹⁾	
Type A, type F	6 mA...30 A (30 mA)*
Type B, type B+	10 mA...10 A (30 mA)*
Prewarning (AL1)	10...100 % $I_{\Delta n}$ (50 %)*
Operating uncertainty	±10 % (at 0.5...5 $I_{\Delta n}$)
Relative response uncertainty	0...-20 %
for Lloyds applications	0...-50 %
for railway applications as per EN 50121-3-2/-4 and EN 50155	0...-50 %
Hysteresis	10...25 % (15 %)*
Fault-memory alarm messages	on/off (off)*
permissible continuous residual current with	
single-channel use	85 A
dual-channel use	60 A
use of three channels	49 A
use of four channels	42 A

Measuring-current transformers

Connection	of CT1, CT2, CT3, CT4
Measuring-current transformer series	
Type A	CTAC, CTAS, W, WR, WS
Type F	CTAC
Type B, type B+	CTUB-CTBC, CTBS
CT connection monitoring	yes
Rated voltage U_n	see measuring-current-transformer manual
Connecting wires	see measuring-current-transformer manual
For UL applications	60/75 °C copper conductors
External transformers	
permissible continuous secondary current with	
single-channel use	140 A
dual-channel use	100 A
use of three channels	80 A
use of four channels	70 A
Permissible number of windings	100...1000

Time response

Start-up delay t	0...999 s (0 s)*
Response delay t_{on}	0...10 s (0 s)*
Delay on release t_{off}	0...999 s (1 s)*
Operating time t_{ae}	
with 1 x $I_{\Delta n}$	≤250...ms
with 5 x $I_{\Delta n}$	40...100 ms
Response time t_{an}	= $t_{ae} + t_{on}$
Recovery time t_b	≤ 500 ms
Response time for CT connection monitoring	≤ 10 s

Operation

Display	status LED, alarm LEDs, channel LEDs
Buttons	reset/test / NFC / address setting
Terminating resistor DIP switches	on/off (off)*

RS-485 interface

Connection	A, B
Protocol	Modbus RTU
Baud rate	max 115.2 kbits/s (19.2 kbits/s)*
Parity	even, no, odd (even)*
Stop bits	1/2/auto (auto)*
Cable length (at 9.6 kbits/s)	≤ 1200 m
Device address	1...247 (100+ last 2 digits of SN)*
Recommended lines, shield on one side connected to PE	
CAT6/CAT7	min AWG23
min. J-Y(St)Y 2 x 0.6 mm ²	twisted pair

NFC interface

Frequency	13.56 MHz
Transmitting power ²⁾	0 W

Input I

Connection	I, I
max. cable length (recommended)	10 m
external connections	potential-free contact

Input/output Q

Connection	Q, I
max. cable length (recommended)	10 m
max. load	20 mA
Low voltage level (output)	0...2 V
High voltage level (output)	10 V... U_s
External voltage (passive mode)	DC 0...($U_s - 1$ V)

Output M+

Connection	M+, I
max. cable length (recommended)	10 m
max. load	20 mA
Burden	
current output	≤ 600 Ω
voltage output	≥ 10 kΩ
Tolerance with respect to final current/voltage value	±20 %
External voltage (passive mode)	DC 0... U_s

Connections		Other	
terminals	plug-in screw-type terminals	Operating mode	continuous operation
Terminal series	Phoenix Contact MC 1,5/ -ST-3,5 BK	Mounting	vertical
Connection properties		Degree of protection (DIN EN 60529)	
rigid	0.14...1.5 mm ²	internal components	IP30
flexible, without plastic sleeve	0.25...1.5 mm ²	terminals	IP20
flexible, with plastic sleeve	0.25...0.5 mm ²	Enclosure material	polycarbonate
Stripping length	7 mm	DIN rail mounting acc. to	IEC 60715
Tightening torque	0.22...0.25 Nm	Flammability class	UL94 V-0
Conductor cross section AWG	28...16	Documentation number	D00424
EMC/Environment		Weight	< 65 g
EMC	DIN EN IEC 62020-1	* Factory setting	
Operating temperature	-40...+70 °C	1) The requirements of the respective standards are only met with a response value from 30 mA to 9.9 A	
Transport	-40...+85 °C	2) EMC influences may lead to communication interruptions at the NFC interface	
Long-time storage	-40...+70 °C		
Classification of climatic conditions acc. to IEC 60721			
(except condensation and formation of ice)			
Stationary use (IEC 60721-3-3)			3K22
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

Ordering information

Type	Supply voltage U_s	Measuring-current transformers that can be used		Configurable at the factory	Enabled function modules *	Art. No.
		Type A Type F	Type B Type B+			
RCMS410-24	DC 24 V	X	(X) with function module B	Factory settings**, function modules	Customised (A, B, C can be bought later)	B84604040
		X	X	–	B (A and C can be bought later)	B84604041
		X	X	–	A, B, C	B84604042

* Function modules:

- A: Harmonic analysis (FFT)
- B: AC/DC sensitive measuring and evaluation of values
- C: Connection of type A external current transformers

** As part of the ordering process, customer-specific factory settings can be defined together with our sales department for some parameters (e.g. response values and interface settings) with which the units are delivered. The reference to a customer-specific configured variant can then be found on the packaging of the individual product as well as in the delivery note (the changed parameters are listed there, the assignment is made via the item number in the delivery note and the serial number of the unit).



Bender GmbH & Co. KG

Londorfer Straße 65 • 35305 Grünberg • Germany
Tel.: +49 6401 807-0 • info@bender.de • www.bender.de



BENDER Group