

LINETRAXX® CTUB100 series

AC/DC sensitive measuring current transformers (type B)




CTUB100 series

Device features

- Combined test and reset button
- Multicolour LED for operation, fault and status messages
- Exchangeable electronic module without mechanical separation of the primary conductors
- Extension/retrofitting or modification of functionalities in case of changed monitoring requirements
- Insensitive to load currents due to full magnetic shield (CTUB10x-CTBC20P...210P only)
- Monitoring of the connection to the measuring current transformer
- Supply voltage DC ± 12 V/DC 24 V
- CTUB10x-CTBC20...210 for residual current monitoring systems of the RCMS460/490 series as well as for RCMA420/423 residual current monitors
- CTUB10x-CTBC20P...210P for residual current monitoring systems of the RCMS460/490 series as well as for RCMA420/423 residual current monitors. Can be used for very high system-related peak load currents.
- CTUB104-CTBC20...210(P) for insulation fault locators of the EDS440 and EDS441LAB series

Certifications



Product description

The CTUB100 series measuring current transformers are combinations of CTBC... measuring current transformer cores and CTUB10... electronic modules, which convert AC and DC currents into an evaluable measurement signal. The measurement signals can be evaluated using devices of the RCMA420/423, RCMS460/490 or EDS440/EDS441LAB series.

The measuring current transformers are connected to the respective devices via a 2- or 6-core cable. They can be used in DC, AC, and 3(N)AC systems.

The CTUB101-CTBCxx measuring current transformers are intended for connection to devices of the RCMA420/423 series and are supplied directly from the evaluator with the supply voltage DC ± 12 V via the 6-core cable.

The CTUB102-CTBCxx measuring current transformers are intended for connection to an RCMS460/490. If the CTUB102-CTBCxx measuring current transformers are connected to an RCMS460/490 system, a DC 24 V power supply unit is required for the measuring current transformers, which is available as an accessory.

The CTUB104-CTBCxx measuring current transformers are intended for connection to an EDS440 or EDS441LAB. If the CTUB104-CTBCxx measuring current transformers are connected to such an insulation fault locator, a DC 24 V power supply unit is required for the measuring current transformers, which is available as an accessory.

The measuring current transformer cores of the CTBC20P...210P series feature an integrated magnetic shield and are suitable for applications with high load currents or inrush currents.

Standards

CTUB10x series measuring current transformers comply with the following device standard:

- IEC 62020-1 for CTUB101 and CTUB102 in combination with a residual current monitor/residual current monitoring system (RCMS460/490 or RCMA420/423)
- IEC 61557-9 for CTUB104 in combination with an insulation fault locator (EDS440 or EDS441LAB)

CTUB100 series measuring current transformers comply with the requirements of the standard DIN EN 45545-2 for application in railway vehicles.

Variants

A measuring current transformer always consists of a measuring current transformer core and an electronic module, which is required for signal conversion and can be connected to an evaluator. Each electronic module can be combined with all measuring current transformer cores.

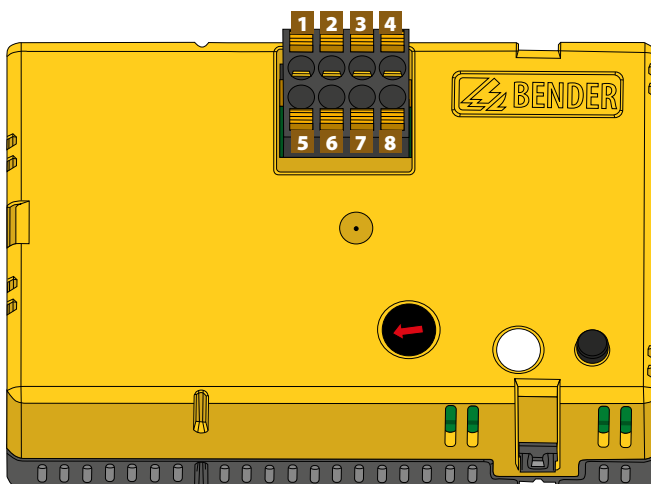
Electronic modules

- **CTUB101**
Electronic module for conversion of the residual current signal from the measuring current transformer core for the connection to RCM devices via terminals S1 and S2, supply voltage DC ±12 V
- **CTUB102**
Electronic module for conversion of the residual current signal from the measuring current transformer core for the connection to RCM devices via terminals S1 and S2, supply voltage DC 24 V
- **CTUB104**
Electronic module for conversion of the residual current signal from the measuring current transformer core for the connection to EDS devices via terminals S1 and S2, supply voltage DC 24 V

Measuring current transformer cores

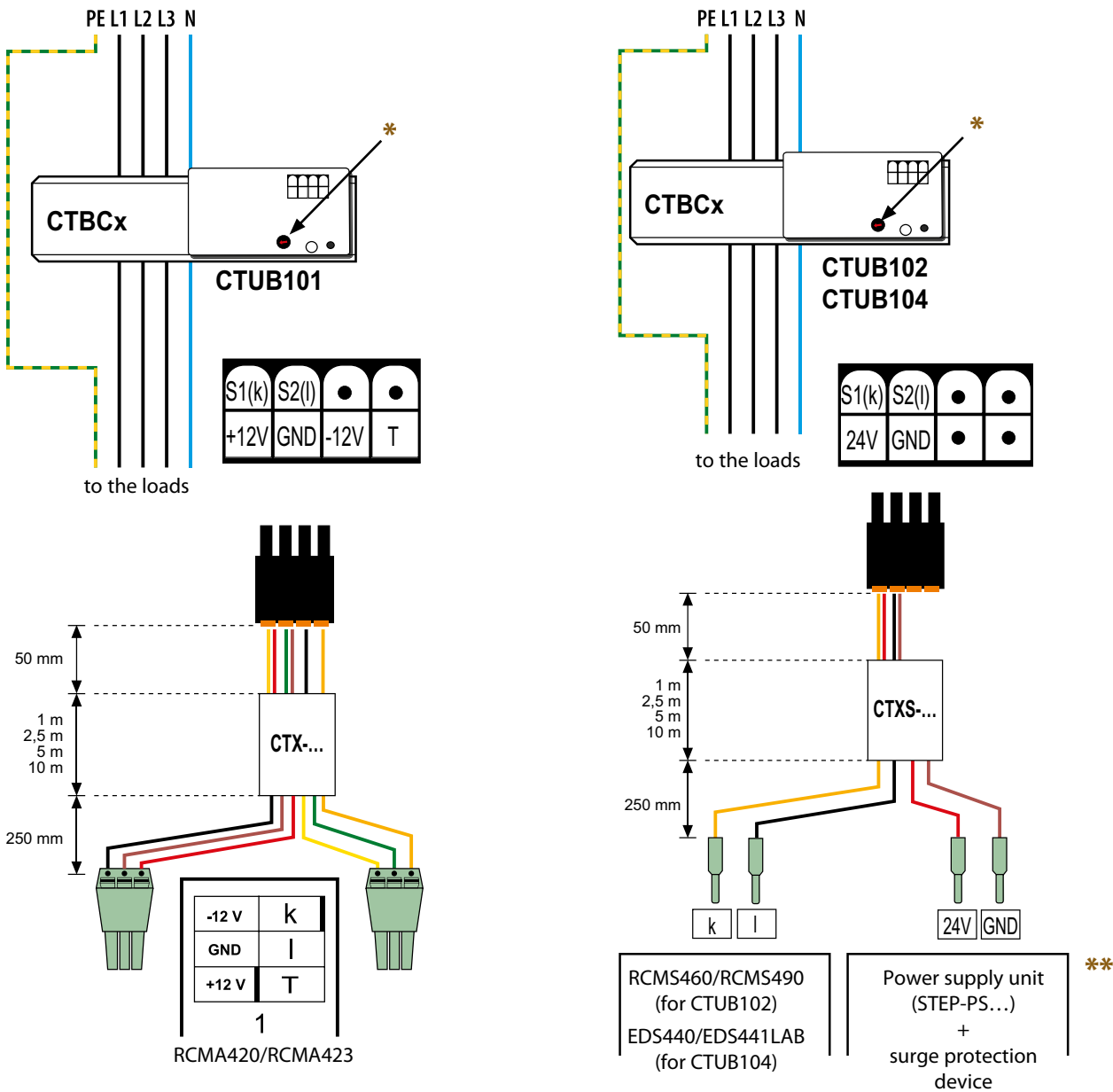
- **CTBC20**
Measuring current transformer core, internal diameter 20 mm
- **CTBC20P**
Measuring current transformer core shielded, internal diameter 20 mm
- **CTBC35**
Measuring current transformer core, internal diameter 35 mm
- **CTBC35P**
Measuring current transformer core shielded, internal diameter 35 mm
- **CTBC60**
Measuring current transformer core, internal diameter 60 mm
- **CTBC60P**
Measuring current transformer core shielded, internal diameter 60 mm
- **CTBC120**
Measuring current transformer core, internal diameter 120 mm
- **CTBC120P**
Measuring current transformer core shielded, internal diameter 120 mm
- **CTBC210**
Measuring current transformer core, internal diameter 210 mm
- **CTBC210P**
Measuring current transformer core shielded, internal diameter 210 mm

Wiring diagram of the electronic module



Connection CTUB10x								
Type	1	2	3	4	5	6	7	8
CTUB101	S1 (k)	S2 (l)	•	•	+12 V	GND	-12 V	T
CTUB102	S1 (k)	S2 (l)	•	•	24 V	GND	•	•
CTUB104	S1 (k)	S2 (l)	•	•	24 V	GND	•	•

Wiring diagram



* The measuring range must be selected according to the response value $I_{\Delta N}$ set on the RCMS460 or RCMA420/423 evaluator. If, however, a larger measuring range is selected, the resolution deteriorates. For the CTUB104, a selection of the measuring range is not required.

Setting measuring range (not required for CTUB104)				
#	Potentiometer setting	Response value RCMA/RCMS	Measuring range rms	Measuring range peak
1		$I_{\Delta n} \leq 0.1 \text{ A}$	0...450 mA	0...900 mA
2		$0.1 \text{ A} < I_{\Delta n} \leq 0.5 \text{ A}$	0...0.75 A	0...3.5 A
3		$I_{\Delta n} > 0.5 \text{ A}$	0...10 A	0...20 A

- ** – The use of a type 2 surge protection device (SPD) is mandatory due to possible impulse voltages and in order to comply with normative requirements (not required for CTUB104).
- The surge protection device must be connected upstream of the power supply unit on the supply side.
 - The surge protection device 7P.22.8.275.1020 from Finder or an equivalent alternative can be used.

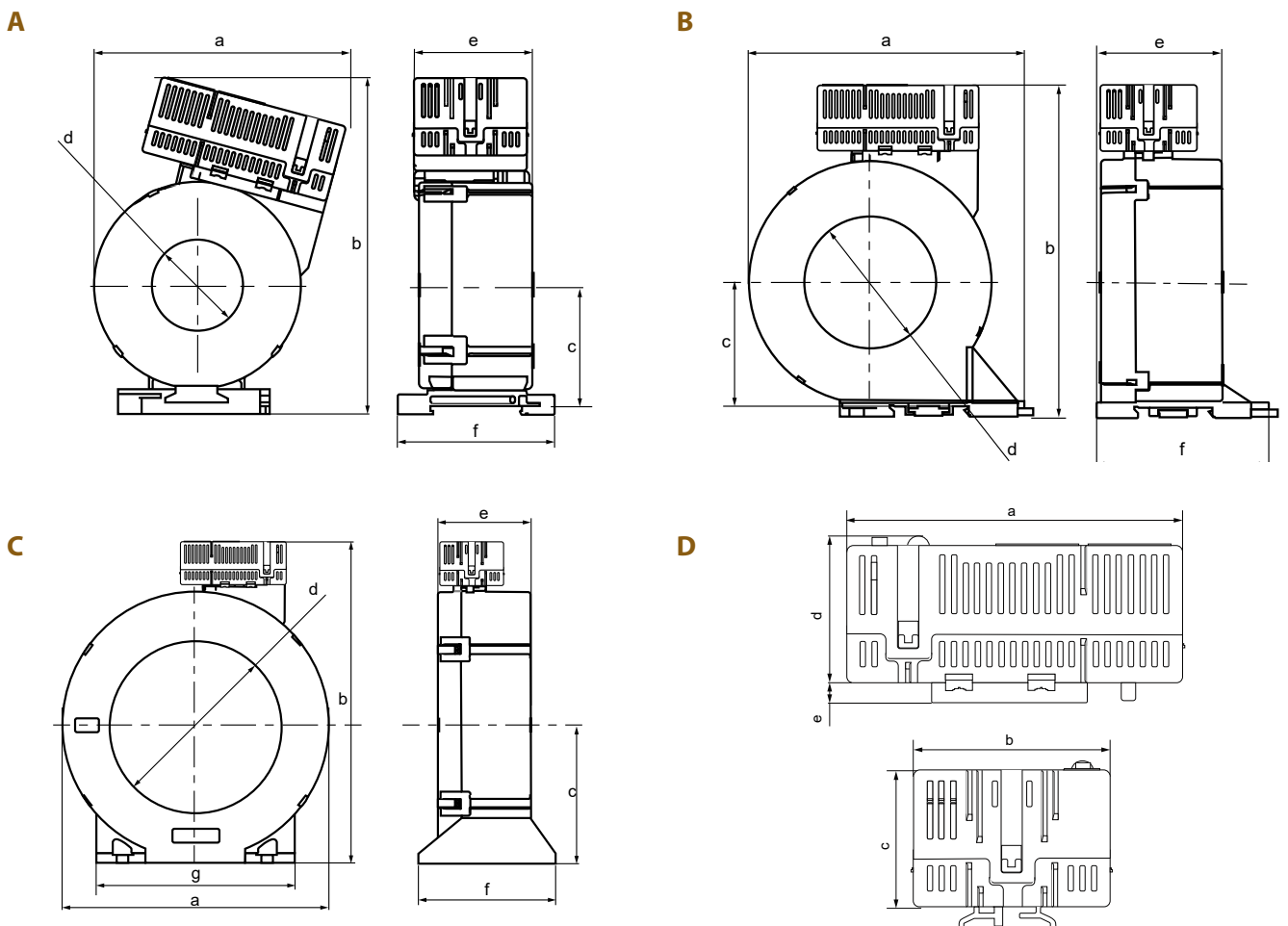
⚠ Caution!
 When using several CTUB100 measuring current transformers, the power supply (24V, GND) must not be daisy-chained from current transformer to current transformer but should be star-shaped (e.g. using a potential distributor).

System states: LED

The LED indicates the system state by means of colours and lighting/flashing.

System state	LED		Notes
	green (ON)	red (alarm)	
Device switched off	off	off	Device is deenergised
Normal operating state	lights	off	The device is supplied with the specified voltage and the measuring current transformer core is connected to the electronic module.
Device error	off	flashes	The device is supplied with the specified voltage but there is no connection to the measuring current transformer core or some other device error has occurred.

Dimension diagrams

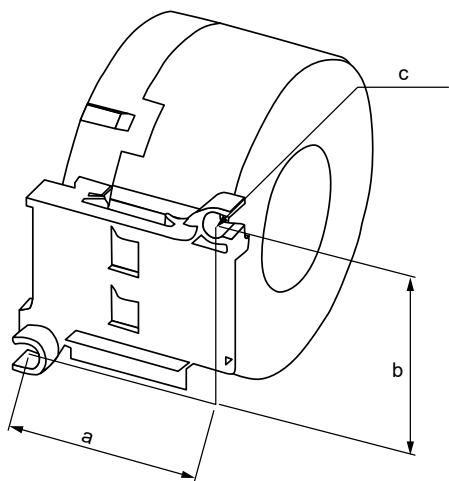


Dimensions (mm)								
	Type	a	b	c	d	e	f	g
A	CTUB10...-CTBC20(P)	75	83	37	∅ 20	46	60.5	–
	CTUB10...-CTBC35(P)	97	130	47	∅ 35	46	61	–
B	CTUB10...-CTBC60(P)	126	151	57	∅ 60	56	78	–
C	CTUB10...-CTBC120(P)	188	225	96	∅ 120	65	96	139
	CTUB10...-CTBC210(P)	302	339	153	∅ 210	67	113	277
D	CTUB10...	74	44	30	32	4.6	–	–

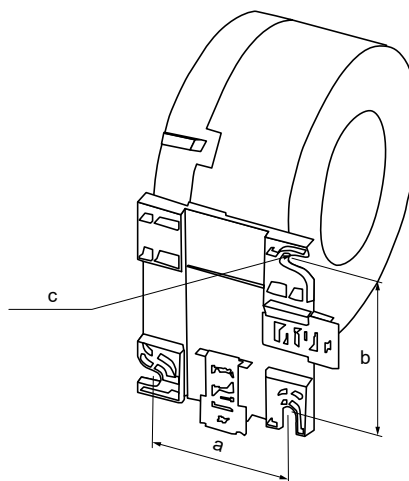
Tolerance: ±0.5 mm

Mountings

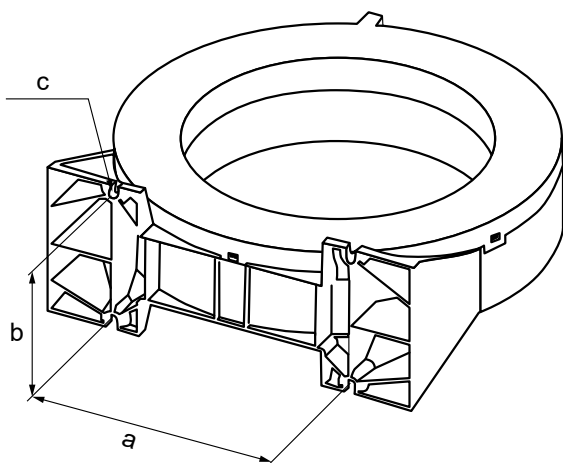
CTBC20(P)/CTBC35(P)



CTBC60(P)



CTBC120(P)/CTBC210(P)



Dimensions (mm)			
Type	a	b	c
CTBC20(P)	49	49.80	2 x Ø 5.5
CTBC35(P)	49	49.80	2 x Ø 5.5
CTBC60(P)	56	66	3 x Ø 6.5
CTBC120(P)	103	81	4 x Ø 6.5
CTBC210(P)	180	98	4 x Ø 6.5

Technical data

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

Definitions:	
Measuring circuit (IC1)	primary conductors routed through the current transformer
Secondary (IC2)	connections terminal block
Rated insulation voltage	800 V
Overvoltage category	III
Area of application	≤ 2000 m AMSL
Rated impulse voltage:	
IC1/IC2	8 kV
Rated insulation voltage (reinforced insulation):	
IC1/IC2	800 V
Pollution degree	2

Supply voltage

CTUB101	
Description	+12 V, GND, -12 V
Supply voltage U_s	DC ±12 V
Operating range of U_s	±2 %
Ripple U_s	≤ 1 %
Power consumption	≤ 2.5 W
CTUB102, CTUB104	
Description	24 V, GND
Supply voltage U_s	DC 24 V
Operating range of U_s	±20 %
Ripple U_s	≤ 1 %
Power consumption	≤ 2.5 W
Inrush current	1A for 1 ms

Measuring circuit

Internal diameter measuring current transformer	see dimension diagrams
Rated current /	RCM application / MRCD application
CTBC20 at $I_{dn} \geq 30$ mA	63 A / 40 A
CTBC20 at $I_{dn} \geq 300$ mA	80 A / 63 A
CTBC20P	80 A / 80 A
CTBC35 at $I_{dn} \geq 30$ mA	125 A / 80 A
CTBC35 at $I_{dn} \geq 300$ mA	160 A / 125 A
CTBC35P	160 A / 160 A
CTBC60 at $I_{dn} \geq 30$ mA	200 A / 160 A
CTBC60 at $I_{dn} \geq 300$ mA	400 A / 250 A
CTBC60P	400 A / 320 A
CTBC120 at $I_{dn} \geq 100$ mA	400 A / 330 A
CTBC120P at $I_{dn} \geq 100$ mA	630 A / 630 A
CTBC210 at $I_{dn} \geq 300$ mA	630 A / 630 A
CTBC210P at $I_{dn} \geq 100$ mA	630 A / 630 A
CTBC210P at $I_{dn} \geq 300$ mA	1000 A / 1000 A
Measurement accuracy	±1 % of full scale value
Test winding	yes
Rated continuous thermal current ¹⁾ I_{th}	125 A
at UL applications	30 A
Rated short-time thermal current ¹⁾ I_{th}	2.4 kA/1 s
Rated dynamic current ¹⁾ I_{dyn}	6 kA/40 ms
¹⁾ refers to the residual current	

Possible response values (to be set on the evaluator)

CTBC20, CTBC20P	10...500 mA
CTBC35, CTBC35P, CTBC60, CTBC60P	30 mA...10 A
CTBC120, CTBC120P, CTBC210P	100 mA...10 A
CTBC210	300 mA...10 A

Measuring ranges (CTUB101, CTUB102)

Measuring range 1 ($I_{dn} \leq 0.1$ A)	0...900 mA (peak)
Measuring range 2 (0.1 A < $I_{dn} \leq 0.5$ A)	0...3.5 A (peak)
Measuring range 3 ($I_{dn} > 0.5$ A)	0...20 A (peak)

Measuring range (CTUB104)

Measuring range	DC 0...70 mA
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Indication

Multicolour LED	table on pageSeite 5
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Output

Name	S1 (k), S2 (l)
Scaling	400 mV/1 A
Max. voltage	±10 V
Max. connector length	10 m
Output resistance	172 Ω

Input

Name	T (for CTUB101 only)
Current load	< 300 mA

Environment/EMC

EMC (CTUB101, CTUB102)	IEC 62020-1
EMC (CTUB104)	IEC 61326-2-4
Operating temperature	-25...70 °C

Classification of climatic conditions acc. to IEC 60721 (except condensation and formation of ice)

Stationary use (IEC 60721-3-3)	3K24
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

Max. connection length	10 m
<i>Connecting cables are optionally available.</i>	
<i>Use 60/75 °C copper lines only.</i>	

Terminal block

Manufacturer	Phoenix Contact
Type	DFMC 1.5/4-ST-3.5 BK
The connection conditions of the manufacturer apply.	

Connection properties

rigid	0.2...1.5 mm ² (AWG 24...16)
flexible	0.2...1.5 mm ²
with ferrule	0.25...0.75 mm ²

Mounting CTBC...

Screw type	
CTBC20...60(P)	DIN EN ISO 7045 - M5x
CTBC120...210(P)	DIN EN ISO 7045 - M6
Washer type	
CTBC20...60(P)	DIN EN ISO 7089/7090 - 5
CTBC120...210(P)	DIN EN ISO 7089/7090 - 6
Tightening torque	
CTBC20...35 (P)	0.6 Nm
CTBC60...210(P)	1 Nm

Other

Operating mode	continuous operation
Mounting	any position
Degree of protection, internal components (DIN EN 60529)	IP40
Degree of protection, terminals (DIN EN 60529)	IP20
Flammability class	UL94 V-0
Software	D591
Documentation number	D00362
Weight	
CTUB10x- CTBC20	≤ 230 g
CTUB10x- CTBC20P	≤ 290 g
CTUB10x- CTBC35	≤ 310 g
CTUB10x- CTBC35P	≤ 390 g
CTUB10x- CTBC60	≤ 530 g
CTUB10x- CTBC60P	≤ 690 g
CTUB10x- CTBC120	≤ 1460 g
CTUB10x- CTBC120P	≤ 1820 g
CTUB10x- CTBC210	≤ 4290 g
CTUB10x- CTBC210P	≤ 4940 g

The use of the power supply units listed at "Accessories" is recommended.
The use of a surge protection device is mandatory (not required for CTUB104).

Ordering details

Suitable for evaluator	Supply voltage	Current transformer diameter	Shielding	Type	Art. No.
RCMA420 RCMA423	DC ±12 V	ø 20	–	CTUB101-CTBC20	B78120010
		ø 20	■	CTUB101-CTBC20P	B78120020
		ø 35	–	CTUB101-CTBC35	B78120012
		ø 35	■	CTUB101-CTBC35P	B78120022
		ø 60	–	CTUB101-CTBC60	B78120014
		ø 60	■	CTUB101-CTBC60P	B78120024
		ø 120	–	CTUB101-CTBC120	B78120016
		ø 120	■	CTUB101-CTBC120P	B78120026
RCMS460 RCMS490	DC 24 V	ø 210	–	CTUB101-CTBC210	B78120018
		ø 210	■	CTUB101-CTBC210P	B78120028
		ø 20	–	CTUB102-CTBC20	B78120011
		ø 20	■	CTUB102-CTBC20P	B78120021
		ø 35	–	CTUB102-CTBC35	B78120013
		ø 35	■	CTUB102-CTBC35P	B78120023
		ø 60	–	CTUB102-CTBC60	B78120015
		ø 60	■	CTUB102-CTBC60P	B78120025
EDS440 EDS441LAB	DC 24 V	ø 120	–	CTUB102-CTBC120	B78120017
		ø 120	■	CTUB102-CTBC120P	B78120027
		ø 210	–	CTUB102-CTBC210	B78120019
		ø 210	■	CTUB102-CTBC210P	B78120029
		ø 20	■	CTUB104-CTBC20P	B78120033
		ø 35	■	CTUB104-CTBC35P	B78120034
		ø 60	■	CTUB104-CTBC60P	B78120035

Ordering details for accessories and spare parts

Electronic modules

Suitable for evaluator	Supply voltage U_s	Type	Art. No.
	DC		
RCMA420/423	±12 V	CTUB101	B78120050
RCMS460/490	24 V	CTUB102	B78120051
EDS440/441LAB	24 V	CTUB104	B78120053

Required terminals are included in the scope of delivery.
Connecting cables are optionally available.

Connecting cables

Length (m)	Connection to	Name	Art. No.
1	RCMA42...	CTX-100	B98110080
2.5		CTX-250	B98110081
5		CTX-500	B98110082
10		CTX-1000	B98110083
1	RCMS46... RCMS49... EDS44...	CTXS-100	B98110090
2.5		CTXS-250	B98110091
5		CTXS-500	B98110092
10		CTXS-1000	B98110093

Accessories

Name	Art. No.
DIN rail mounting clip for CTBC20 and CTBC20P	B91080111
DIN rail mounting clip for CTBC35 and CTBC35P	B91080112

Included in the scope of delivery

Measuring current transformer cores

Internal diameter	Type	Art. No.
20 mm	CTBC20	B98120001
	CTBC20P	B98120002
35 mm	CTBC35	B98120003
	CTBC35P	B98120004
60 mm	CTBC60	B98120005
	CTBC60P	B98120006
120 mm	CTBC120	B98120007
	CTBC120P	B98120020
210 mm	CTBC210	B98120008
	CTBC210P	B98120021

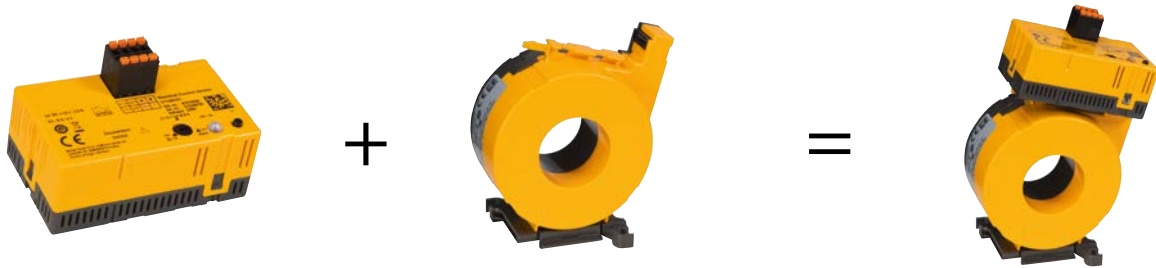
P = full magnetic shield

The measuring current transformers of the CTUB10x series comply with the requirements of the standard DIN EN 45545-2.

Suitable system components

Description	Max. connected current transformers	Type	Art. No.
Voltage supply	4	STEP-PS/1 AC/24 DC/0.5	B94053110
	14	STEP-PS/1 AC/24 DC/1.75	B94053111
	34	STEP-PS/1 AC/24 DC/4.2	B94053112

Composition example of a measuring current transformer from the individual components



Electronic module: CTUB101

Measuring current transformer core: CTBC35

Measuring current transformer: CTUB101-CTBC35*

* For connection to an evaluator, a complete measuring current transformer is required. Both components can be ordered separately as spare parts.

Installation instructions

- Do not route any shielded cables through the measuring current transformer.
- Existing protective conductors and low-resistance conductor loops must not be routed through the measuring current transformer! Otherwise, high currents could be induced into the conductor loop due to the AC/DC sensitive measuring technology used.
- The connecting cable (supply, secondary connection etc.) must not be routed directly past the current transformer core, otherwise interference pulses may occur.

<p>Never route an existing protective conductor through the measuring current transformer.</p>		<p>The primary conductors may only be bent from the specified minimum distance. The minimum bending radius specified by the manufacturers for the conductors used must be observed.</p> <p>* Distance to 90° angle: 2x current transformer external diameter</p>	
<p>All current-carrying cables must be routed through the measuring current transformer.</p>		<p>The cables must be aligned with the centre of the measuring current transformer.</p>	



Bender GmbH & Co. KG

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



BENDER Group