Selection guide for measuring current transformers

Design the future of energy

BENDER

Table of contents

5 Important criteria

6 Type A sensors

8 Type B sensors

10 Sensor sizes and cable cross-sections

12 Installation instructions

13 Contact persons

The right sensor for your electrical installation

Current transformers and suitable evaluators or measuring devices are required for monitoring electrical installations and locating insulation faults. The current transformers act as sensors. They ensure that the measured values are recorded and transmitted to the evaluator. However, every electrical installation is different. Depending on the type of system used and the voltages, currents, frequencies, etc. present in the installation, different sensors are required.

Choosing the right measuring current transformer is crucial to ensure accurate measurements.
This brochure provides an overview of our sensor portfolio. It is also intended to help you select a sensor that is suitable for your application.

Important criteria

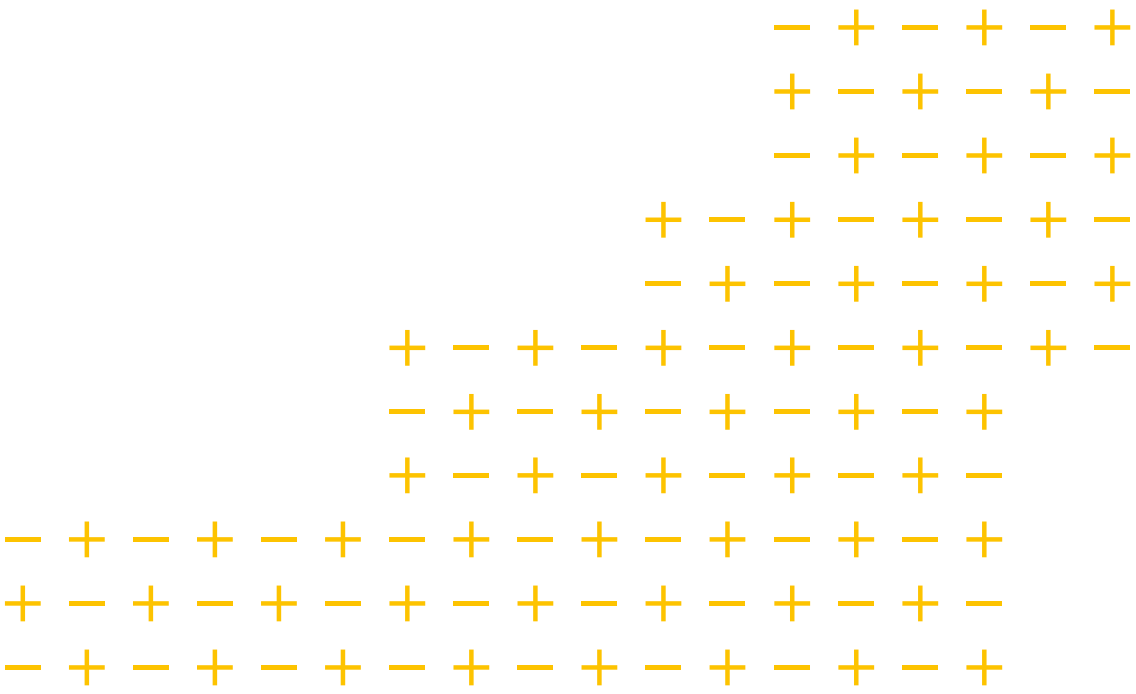
Present currents

First of all, it is important to determine which currents the sensors should measure.

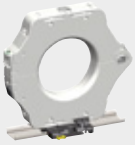
- For alternating currents (AC currents) and pulsating direct currents, **type A sensors** can be used (see table on pages 6 and 7).
- To measure alternating currents with direct current components or direct currents, **type B sensors** must be selected (see table on pages 8 and 9).

Size and design

The internal diameter of the sensor depends on the number of conductors or rails to be routed through it and their cross-section. To minimise interference, the measuring current transformers should be **as small as possible, yet as large as necessary.** Split-core sensors are suitable for installations that are already in operation. Non-splittable sensors should be used for new installations. These are available in both circular and rectangular designs (see table on page 11).



Type A sensors for alternating or pulse currents

Type A																									
	CTAC series							CTAS series						W series							WS series				
Shape / Feature	circular							circular, split-core						circular							rectangular, split-core				
Measuring current transformer type	CTAC20	CTAC20/01	CTAC35	CTAC35/01	CTAC60	CTAC120	CTAC210	CTAS50	CTAS50/01	CTAS80	CTAS80/01	CTAS120	CTAS120/01	W10/600	W0-S20	W1-S35	W2-S70	W3-S105	W4-S140	W5-S210	WS20x30	WS50x80	WS80x120	WS20x30-8000	WS50x80-8000
Dimensions (mm) Internal diameter	20	20	35	35	60	120	210	50	50	80	80	120	120	10	20	35	70	105	140	210	–	–	–	–	–
Width x Height	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	20x 30	50x 80	80x 120	20x 30	50x 80
Band length	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Rated continuous thermal current (A)	125							125						100							100				
For device family Monitoring Type A/B RCMS410/425	✓	–	✓	–	✓	✓	✓	✓	–	✓	–	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–
Monitoring Type A/B RCMS460/490	✓	–	✓	–	✓	✓	✓	✓	–	✓	–	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–
Monitoring Type A RCM420	✓	–	✓	–	✓	✓	✓	✓	–	✓	–	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–
Monitoring Type A RCM410R	✓	–	✓	–	✓	✓	✓	✓	–	✓	–	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–
Insulation fault location EDS440	✓	–	✓	–	✓	✓	✓	✓	–	✓	–	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–
Insulation fault location EDS441	–	✓	–	✓	–	–	–	–	✓	–	✓	–	✓	–	–	–	–	–	–	–	–	–	–	✓	✓
Approvals UL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	✓	✓	✓	✓	✓	–	–	–	–	–
Lloyds	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	–	–	–	–	–
Art. No.	B98110005	B98110006	B98110007	B98110008	B98110017	B98110019	B98110020	B98110009	B98110012	B98110010	B98110013	B98110011	B98110014	B911761	B911787	B911731	B911732	B911733	B911734	B911735	B98080601	B98080603	B98080606	B98080602	B98080604
Product details (product area at www.bender.de)																									

Type A transformers

[1] not suitable for product standard DIN VDE 62020-1

	WS...S series				WR series								WF series [1]											
	rectangular, split-core				rectangular								flexible											
	WS50x80S	WS80x80S	WS80x120S	WS80x160S	WR70x175S	WR115x305S	WR150x350S	WR200x500S	WR70x175S(P)	WR115x305S(P)	WR150x350S(P)	WR200x500S(P)	WF170-1	WF170-2	WF250-1	WF250-2	WF500-1	WF500-2	WF800-1	WF800-2	WF1200-1	WF1200-2	WF1800-1	WF1800-2
	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	50x 80	80x 80	80x 120	80x 160	70x 175	115x 305	150x 350	200x 500	70x 175	115x 305	150x 350	200x 500	–	–	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	170	170	250	250	500	500	800	800	1200	1200	1800	1800
	100				100								1000											
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–	–
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–	–
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–	–
	B911741	B911742	B911743	B911755	B911738	B911739	B911740	B911763	B911790	B911791	B911792	B911793	B78080201	B78080202	B78080203	B78080204	B78080205	B78080206	B78080207	B78080208	B78080209	B78080210	B78080221	B78080222

Type B sensors for alternating currents with direct current components or direct currents

Type B																	
		CTBC series										CTUB100-CTBC series					
Shape / Feature		circular										circular					
Measuring current transformer type		CTBC20	CTBC20P [1]	CTBC35	CTBC35P [1]	CTBC60	CTBC60P [1]	CTBC120	CTBC120P [1]	CTBC210	CTBC210P [1]	CTUB101-CTBC20	CTUB101-CTBC20P [1]	CTUB101-CTBC35	CTUB101-CTBC35P [1]	CTUB101-CTBC60	
Dimensions (mm)	Internal diameter	20	20	35	35	60	60	120	120	210	210	20	20	35	35	60	
	Width x Height	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
	Band length	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Rated continuous thermal current (A)		125 for UL: 30 A										125 for UL: 30 A					
For device family Monitoring	TYPE A/B: RCMS410/RCMS425	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
	TYPE A/B: RCMS460/490	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
	Type B: RCMA420/423	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	
	Type B: RCMB300 series	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	
	Type B: MRCDB423	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	
	Type B: MRCDB300 series	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	
	EDS441-LAB	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Approvals	UL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Lloyds	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Art. No.		B98120001	B98120002	B98120003	B98120004	B98120005	B98120006	B98120007	B98120020	B98120008	B98120021	B78120010	B78120020	B78120012	B78120022	B78120014	
Product details (product area at www.bender.de)																	

Type B transformers

[1] CTUB100-CTBC series: Shielded measuring current transformers for measurements that are less sensitive to load current

CTUB100-CTBC series															CTBS
circular															circular, split-core
CTUB101-CTBC60P [1]	CTUB101-CTBC120	CTUB101-CTBC120P [1]	CTUB101-CTBC210	CTUB101-CTBC210P [1]	CTUB102-CTBC20	CTUB102-CTBC20P [1]	CTUB102-CTBC35	CTUB102-CTBC35P [1]	CTUB102-CTBC60	CTUB102-CTBC60P [1]	CTUB102-CTBC120	CTUB102-CTBC120P [1]	CTUB102-CTBC210	CTUB102-CTBC210P [1]	CTBS25
60	120	120	210	210	20	20	35	35	60	60	120	120	210	210	25
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
							125 for UL: 30 A								68
–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	✓	–	✓	–	✓	–	–	–	–	–
✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–
✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–
B78120024	B78120016	B78120026	B78120018	B78120028	B78120011	B78120021	B78120013	B78120023	B78120015	B78120025	B78120017	B78120027	B78120019	B78120029	B98120060

Sensor sizes and cable cross-sections

The table on page 11 shows the suitable sensor sizes depending on the cables used.

Please note:
The dimensions specified in the table are theoretical sensor dimensions according to the installation instructions in the data sheets. In practice, deviations may occur depending on the cables used and the installation conditions. If the installation conditions require it, a larger sensor can also be used for better connectivity.

The specifications for the maximum conductor cross-section apply exclusively to circular conductors. When using sector conductors, these values may differ.

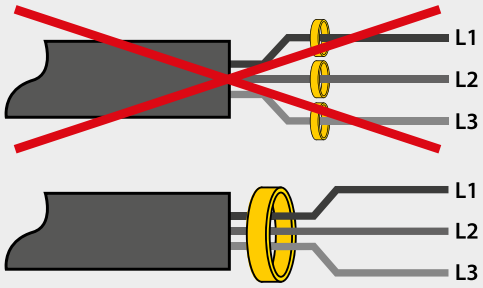
	Sensor types					
	CTAC series, CTBC series	CTAS series	W0-S20… W5-S210	WS	WS50x80S… WS80x160S	WF
Cables / Cross-sections (mm^2) - Basic insulation only - Number of conductors routed through the sensor (without PE)	circular (mm)	circular (mm)	circular (mm)	rectangular (mm)	rectangular (mm)	flexible (mm)
3x1.5	20	50	20	20x30	–	170
4x1.5	20	50	20	20x30	–	170
6x1.5	20	50	20	20x30	–	170
2x2.5	20	50	20	20x30	–	170
3x2.5	20	50	20	20x30	–	170
4x2.5	20	50	20	20x30	–	170
6x2.5	20	50	20	20x30	–	170
2x4	20	50	20	20x30	–	170
3x4	20	50	20	20x30	–	170
4x4	20	50	20	20x30	–	170
2x6	20	50	20	20x30	–	170
3x6	20	50	20	20x30	–	170
4x6	20	50	20	20x30	–	170
2x10	20	50	20	20x30	–	170
3x10	35	50	35	20x30	–	170
4x10	35	50	35	20x30	–	170
2x16	35	50	35	20x30	50x80	170
3x16	35	50	35	20x30	50x80	170
4x16	35	50	35	50x80	50x80	170
2x25	35	50	35	50x80	50x80	170
3x25	35	50	35	50x80	50x80	170
4x25	35	50	35	50x80	50x80	170
2x35	35	50	35	50x80	50x80	170
3x35	35	50	35	50x80	50x80	170
4x35	60	50	60	50x80	50x80	170
2x50	60	50	70	50x80	50x80	170
3x50	60	50	70	50x80	50x80	170
4x50	60	50	70	50x80	50x80	170
2x70	60	50	70	50x80	50x80	170
3x70	60	50	70	50x80	50x80	170
4x70	60	80	70	50x80	50x80	250
2x95	60	80	70	50x80	50x80	250
3x95	60	80	70	50x80	50x80	250
4x95	60	80	70	50x80	50x80	250
2x120	60	80	70	50x80	50x80	250
3x120	60	80	70	50x80	50x80	250
4x120	120	80	105	80x120	80x80	250
2x150	60	80	70	50x80	50x80	250
3x150	120	80	105	80x120	80x80	250
4x150	120	80	105	80x120	80x80	250
2x185	120	80	105	80x120	80x80	250
3x185	120	80	105	80x120	80x80	250
4x185	120	120	105	80x120	80x80	500
2x240	120	120	105	80x120	80x80	500
3x240	120	120	105	80x120	80x120	500
4x240	120	120	105	80x120	80x120	500

Installation instructions

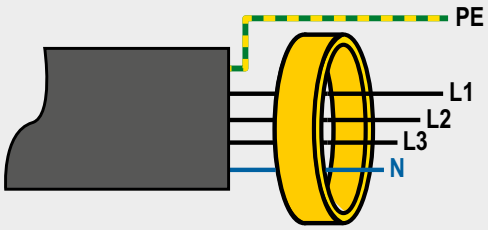
To ensure optimum operation of the measuring current transformers, a few instructions must be observed during installation.

Product-specific installation instructions and specifications must be observed and can be found in the respective data sheet.

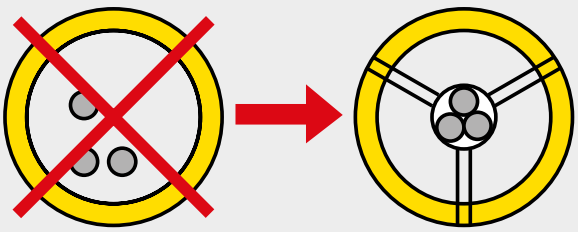
1. All current-carrying cables must be routed together through the sensor.



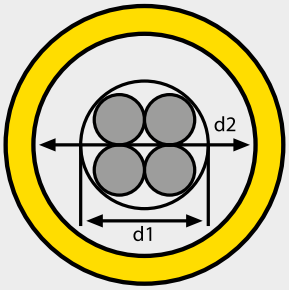
2. If there is a protective conductor, it must never be routed through the sensor.



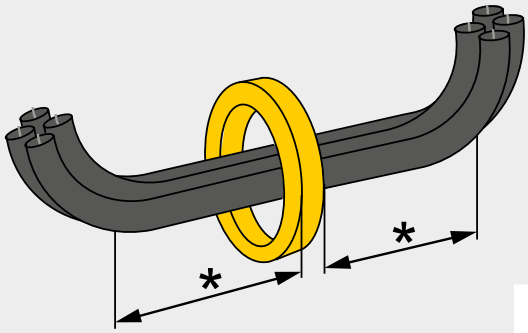
3. The conductors must be centred in the sensor. Cables and busbars should be routed through the measuring current sensor as symmetrically and at right angles as possible.



4. Ideally, the internal diameter of the sensor should be d2 ≥ 2 x d1 (cable diameter)



5. The primary conductors should only be bent from the specified minimum distance. The minimum bending radius specified by the manufacturers must be observed. If the bending radius cannot be observed, a shielded sensor can be used.



6. The measuring current transformer should not be placed near large magnetic fields, as these stray fields may interfere with the sensor's output signal.

Contact persons

Our experts are at your disposal to support you with planning and configuration.

Find your Bender contact persons here:

Sales department Germany

Tel.: +49 6401 807 -0
E-mail: vertrieb.inland@bender.de

Bender. Making your world safe.

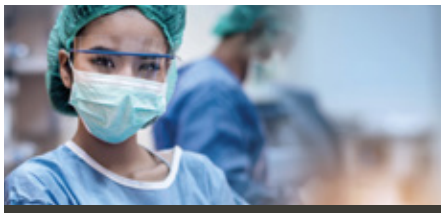
Our world is networked on a global scale; it is digital, mobile and highly automated. And no matter whether in hospitals, in industry, inside or outside buildings, in power stations, in trains, underwater or underground: it never stands still and it is more dependent than ever on a reliable and, above all, safe electrical power supply.

And exactly that is our mission: we make electricity safe. With our technologies, we ensure that electricity is permanently available and guarantee faultless protection against the hazards of electric shock. We protect buildings, plants and devices and therefore your investments and plans. But what we primarily protect are the lives of the people who are involved with electricity.

Mechanical and plant engineering

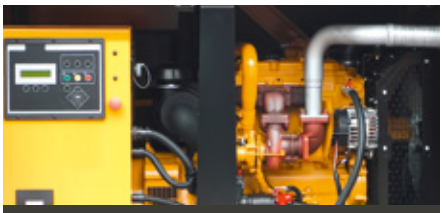
Oil, gas

Renewable energy

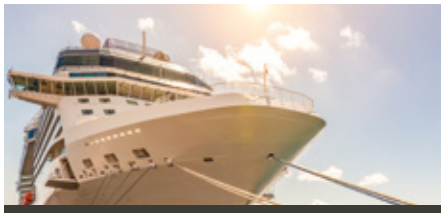


Healthcare

Public power supply network



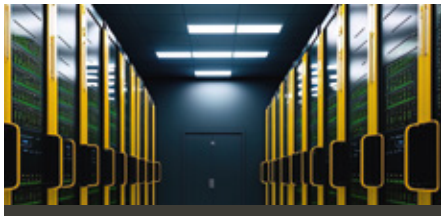
Mobile generators



Ships and ports

Railway

eMobility



Data centres

Mining

Battery energy storage systems (BESS)

bender.de

Bender GmbH & Co. KG

Londorfer Straße 65
35305 Grünberg
Germany

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

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