

Current transformers for industrial use with screwless connection technology „Cage Clamp“



Application

The current transformer series are characterized by their screwless connection technology with spring-loaded terminals „Cage Clamp“. This innovative connection technology enables the secondary lines to be connected directly to the secondary terminals both from the front and from above. Both solid and flexible cables up to a cross-section of 4 mm² can be connected directly without wire end sleeves. **The current transformers of the CSW type are UL-certified.**



With the „Quick-Fix“ quick fastenings, the current transformers can also be fixed to the primary cables or rails using screwless clamping technology.



Available series

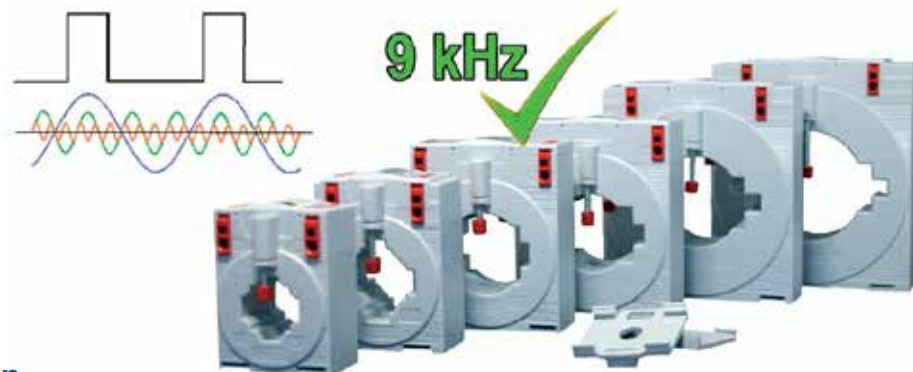
The current transformers with screwless connection technology are available in the following series:

Type CSW	Standard plug-in current transformers For busbars 30 x 10 up to 100 x 10 mm Accuracy class 0,5 - 1 - (3)
Type ECTB	Standard plug-in current transformers with MID approval Extension of the type CSW For busbars 30 x 10 up to 100 x 10 mm Accuracy class 0,2S - 0,2 - 0,5S - 0,5 You can find detailed technical documents at www.mueller-ziegler.de
Type XCSW	Current transformers for power quality applications up to 20 kHz (description see page 31) High precision harmonic measurement up to 20 kHz For busbars 30 x 10 up to 100 x 10 mm Accuracy class 0,2S - 0,2 - 0,5S - 0,5 - 1 You can find detailed technical documents at www.mueller-ziegler.de

Technical data

General data	Standards	DIN EN 60044-1, DIN 42 600, IEC 185, DIN EN 61 010 part 1
	Max. operating voltage	1,2 kV, use in 690 V networks possible
	Test voltage	6 kV
	Rated frequency	50 / 60 Hz, XCSW up to 20 kHz
	Rated cont. thermal current I _{cth}	1,2 x I _N
	Rated dynamic current I _{dyn}	2,5 x I _{th}
	Connection	spring loaded terminals up to 4 mm ²
	UL-certified	Certification no. 20100426-E336996

Current transformers for power quality applications *up to 20 kHz* with screwless connection technology „Cage Clamp“ Type XCSW



Application / Description

New measuring requirements for inductive current transformers in the area of low voltage and changes in the generation and consumer structure require new ways of current measurement and transmission through current transformers. The current transformers of the XCSW series for power quality applications up to 20 kHz meet these requirements.

Over the last few years, the proportion of renewable energy has grown massively. Wind, biomass, photovoltaic and hydroelectric plants now make up approximately 30% of the energy mix. Unlike in conventional nuclear or coal-fired power stations, where all synchronous generators are used to produce electricity, here inverters or frequency converters are used. As such, it is not always possible to achieve a clean sine wave.

The distortions are caused by the switching semiconductor elements in the inverter. Harmonics generated in this way are whole multiples of the first harmonic and can extend far into the single-digit kilohertz range. The total harmonic distortion (THD) factor¹ specifies the undesirable distortion ratio of the 50 Hz sinusoidal oscillation and regularly reaches between 10 and 30%.

In addition to the harmonics produced by inverters on the generator side, there have also been changes on the consumer side in recent years. Non-linear consumers such as LED or energy-saving lamps are pushing linear ones, like traditional incandescent bulbs, out of our daily lives almost completely. Plug-in power supply units for mobile phones and laptops are no longer made from small transformers either, but from semiconductor circuits known as switched-mode power supplies. It would not be possible to create such small, light power supply units any other way. But these benefits are set against one big disadvantage: the current is drawn from the public grid not as a sinusoidal waveform, but in pulses. The figure below illustrates this:

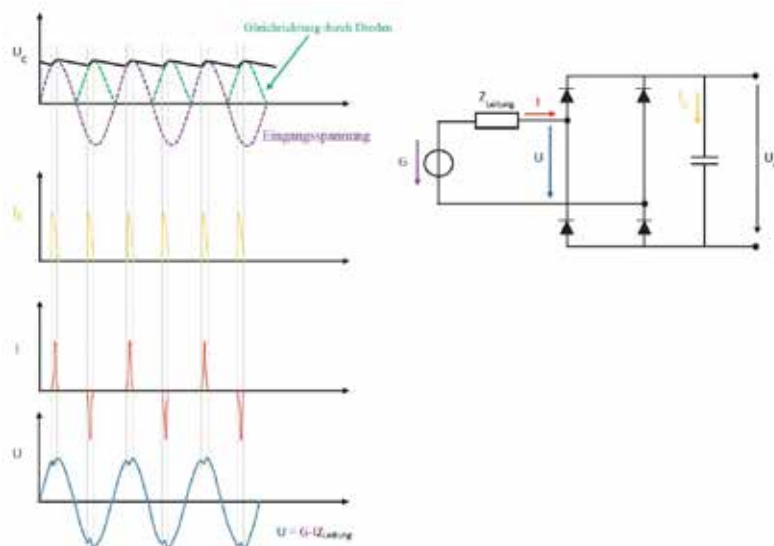


Figure: Bridge rectifier with pulsed current draw

The filter capacitor shown in the diagram not only smooths the required output voltage, it is also recharged in pulses by the rectifier diodes. These steep current peaks generate reactive power on the one hand, and harmonics on the other.

Grid operators are primarily interested in the economic effects of harmonics. When it comes to harmonic currents, the most important phenomena are as follows:

- Overloading of neutral conductors
- Overheating of transformers
- False tripping of circuit breakers / miniature circuit breakers
- Overstressing of power-factor correction capacitors
- Skin effects

The versions and dimensions of type XCSW are identical to type CSW. Detailed technical information, functional description and selection tables for the type XCSW current transformers can be found as PDF files for download on our website