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ILEA SMZ 201

Operating instructions
and technical data*



www.ilea.uni-stuttgart.de

Current probe

ILEA SMZ 201



Application

- Potential-free current measurement in power electronic circuits such as inverters or switching power supplies
- Potential-free current measurement of current pulses
- Potential-free current measurement of current signals containing both AC and DC components

Measurement range

- Measurement range $-200\text{ A} \leq I \leq +200\text{ A}$
- Maximum detectable current slew rate: $\frac{di}{dt} = \pm 1500\text{ A}/\mu\text{s}$
- Measurement error $< 1\%$ (related to the nominal value 200 A)

Safety Instructions

Warning! The current probe ILEA SMZ 201 should only be used by technical personnel. To prevent any injuries and damages, please follow the necessary precautions and the operating information:

- Use only the power cable which is delivered with the current probe. Make sure that the cable is not damaged. Plug the power cable only in a properly installed grounded socket. The power cable should be accessible for full length.
- Make sure that the current probe is not used in humid or wet environments. Do not place the current probe on a humid or a wet ground.
- Do not expose the current probe to direct sunlight.
- Use the current probe only at usual room temperature.
- Avoid mechanical shocks or vibrations.
- The current probe is suitable only for operation in closed rooms.
- The current probe must not be operated in an environment with explosion hazards.
- Before starting with the measuring operation, make sure that the current probe is stabilized at ambient temperature (Important when transporting from cold to warm rooms and vice versa).
- Only currents through contact safe insulated conductors may be measured.
- Before attaching the current sensor to the conductor, where the current is to be measured, the conductor must be disconnected from voltage (de-energized).
- The 4-mm connector on the front side of the amplifier is connected to the signal ground of the current probe.

This connector is not connected to the potential of the protective earth (PE)!

- Place the amplifier of the current probe in such a way that a sufficient cooling is possible. For this purpose, a surrounding free space of 50 cm is recommended.
- Before each operation of the current probe, check whether the current probe (sensor, amplifier and cable) is damaged. If so, it must not be used.
- Use the current probe only as it is specified in this manual.
- All the applicable regulations of the operation site, norms, regulations and terms should be adhered to.
- Do not make any changes to the current probe. In particular, the device must not be opened.

*Subject to technical modifications without prior notice

Guide

The current clamp ILEA SMZ 201 is suitable for the potential-free measurement of arbitrary alternating currents, mixed currents and direct currents. Therefore, it is ideal for the development of power electronic circuits. For example, figure 1 shows an inverter, in which currents are measured at various points.

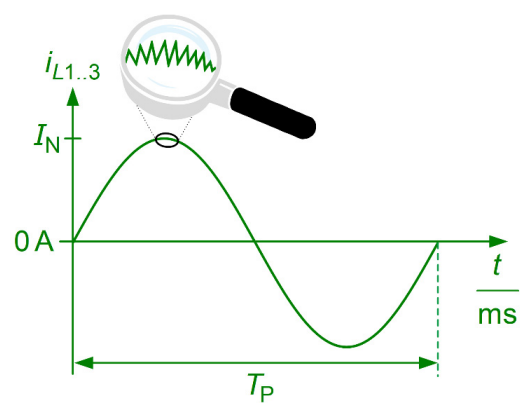
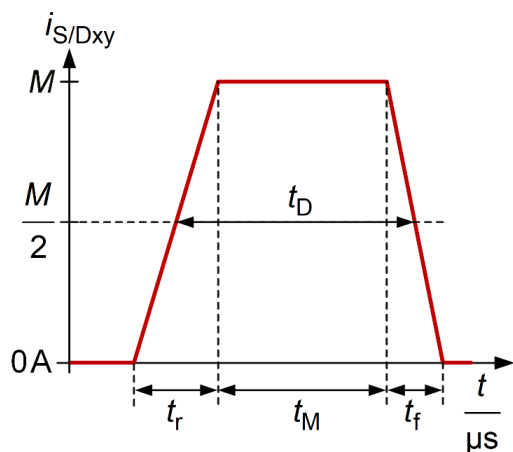
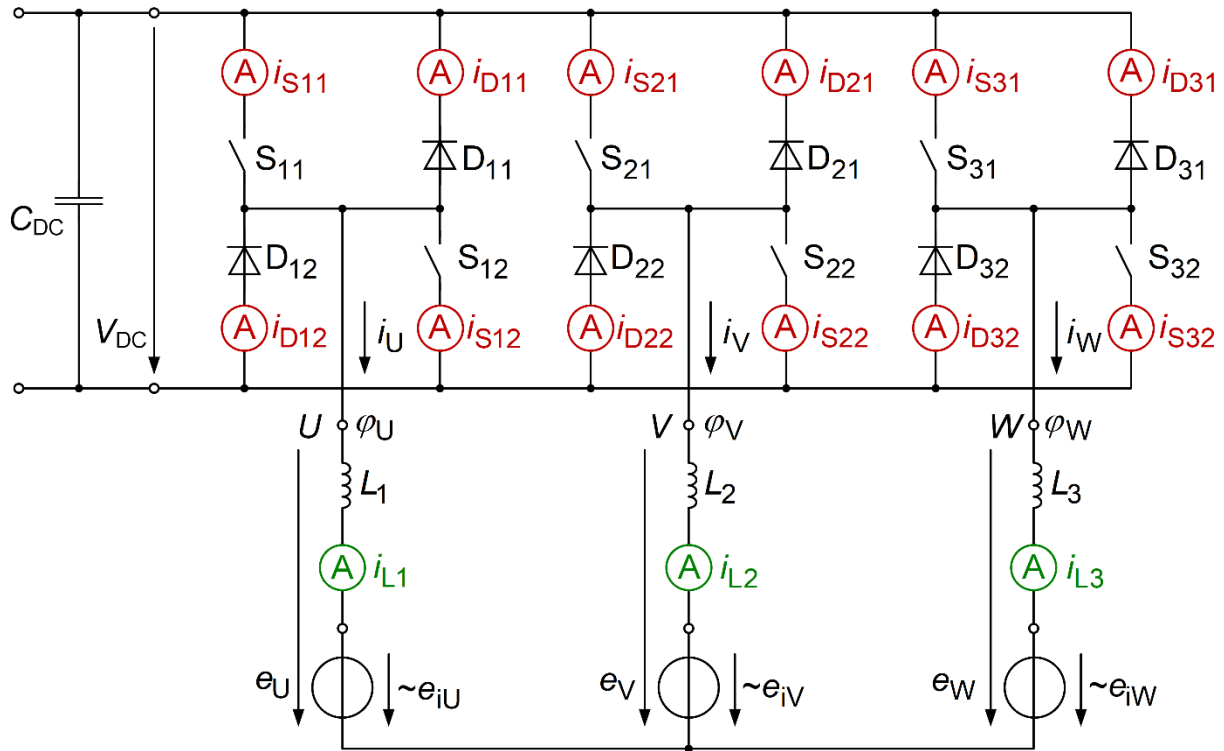


Figure 1 Current measurement in an inverter

Instruction Guide

The measurement setup of the current probe together with an oscilloscope is shown in figure 2 below.

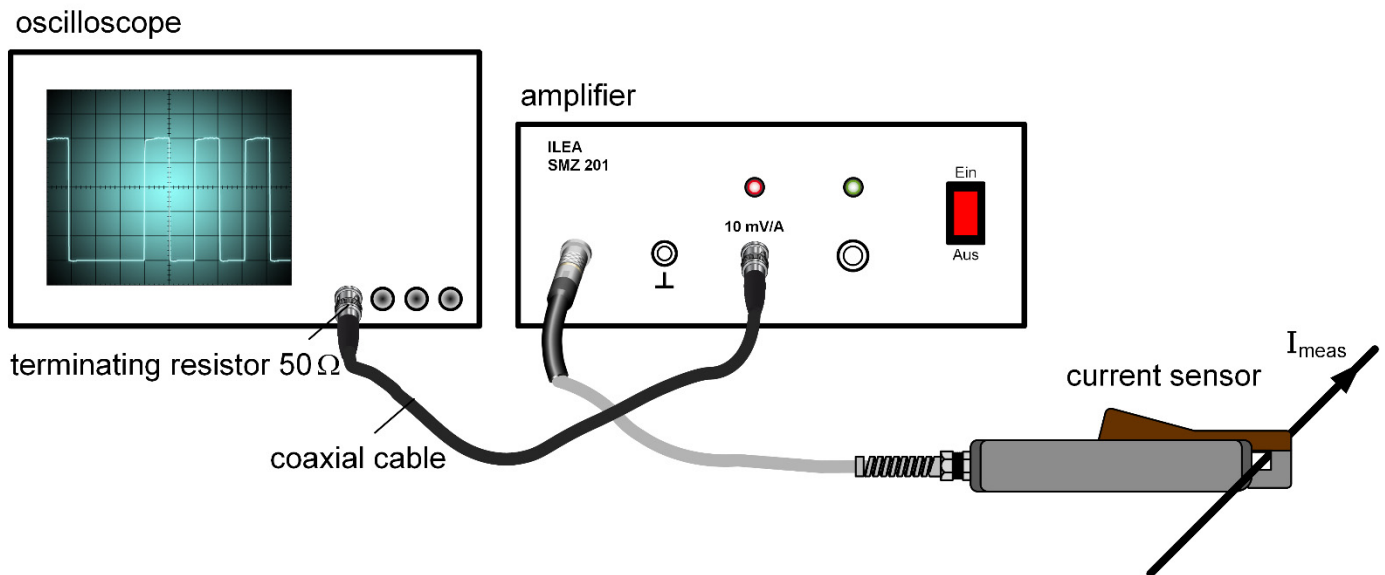


Figure 2 Measurement setup

The measurement signal is provided through the connected coaxial cable as voltage signal and refers to 10 mV per 1 A measuring current when a terminating resistor of 50 Ω (2 W) is used.

Illustrative current flow

For DC measurement, the maximum value of 200 A should not be exceeded. During transition between two DC current values a maximum current slew rate of $\pm 1500 \frac{\text{A}}{\mu\text{s}}$ can be detected.

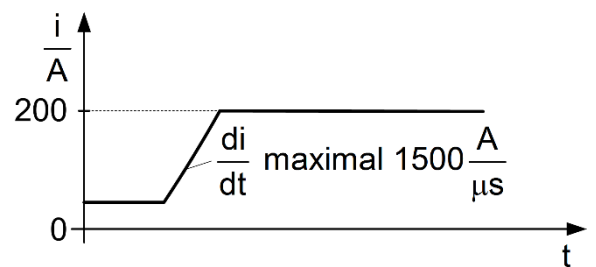


Figure 3 Transition between two DC currents

In case of a current step with overshoot, a peak value of 250 A should not be exceeded.

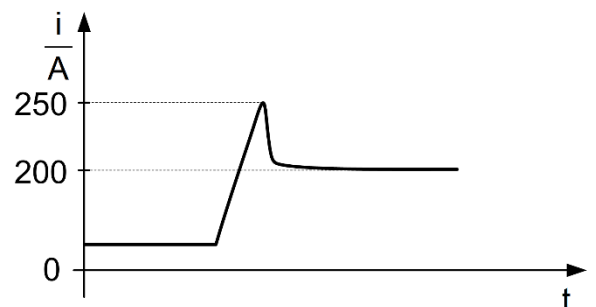


Figure 4 Current step with overshoot

When the device is switched on, an offset correction of the output signal is done automatically. The duration of this process is about two seconds and is indicated by a green LED light on the front panel of the amplifier. During this process the current sensor should be kept closed; furthermore, the conductor located in the opening window of the current sensor must not carry any current during this process.

The mentioned offset adjustment process can be triggered by pressing the corresponding button on the front panel, even when the device is switched on. This may be necessary if the current probe was overloaded or if the thermal conditions in the device have changed significantly.

The stated measurement accuracy is only guaranteed with the current sensor related amplifier (same serial number) and the provided 2m BNC-cable (RG223).

The 4 mm plug socket on the front of the amplifier is connected to the ground of the signal of the current probe.



The plug socket is not connected to the protective earth potential!

Attention! The current probe ILEA SMZ 201 is a sensitive measuring device, which requires careful mechanical handling!

Throwing, dropping, leverage etc. are prohibited.

The magnetic circuit of the current sensor is formed by an U-shaped and I-shaped ferrite core, which can break as a result of strong external forces.

To counteract changes in the electronic due to aging, a calibration interval of one year is proposed.

Technical Data of ILEA SMZ 201

Electrical Features

Measuring current I

Measurement range	$-200\text{ A} \leq I \leq +200\text{ A}$
Nominal value I_N	200 A

Maximum current value

Pulsed current ($t_p < 1\text{ s}$)	250 A
Maximum detectable current slew rate $\frac{di}{dt}$	$\pm 1500\text{ A}/\mu\text{s}$

Measurement error

Offset error (in terms of I_N); in the range	$< 0.5\%$
Other error (in terms of I_N); in the range	for $ I \leq I_N < 0.5\%$ for $I_N < I \leq I_{\max} < 1.0\%$

Dynamic measuring range

Response delay	$< 20\text{ ns}$
Insertion inductance	$< 45\text{ nH}$

Measurement output

Provided over the connected coaxial cable (BNC) with a terminating resistor of $50\ \Omega$ (2 W):	
Output-Ratio	10 mV/A

Constructive Features

Ingress Protection Code	IP 40
Application environment	in a closed room

Main connection/Power supply

Supply voltage	$230\text{ V} \pm 10\%$ with 50 Hz
Max. power input	40 VA
Mains fuse	200 mA, delayed

Amplifier

Dimensions	(w × d (including handle) × h) 210 mm × 270 mm × 80 mm
Mass	1.8 kg
Output plug socket	BNC-socket (must be connected with $50\ \Omega$)

Measuring current sensor

Diameter of the current sensor (= maximum diameter of the measuring conductor)	9 mm
Dimensions	see figure 5, page 7
Mass	0.14 kg
Case material of the current sensor	Teluran 969 T (ABS)
Cable length of the current sensor	145 cm

Mechanical Features

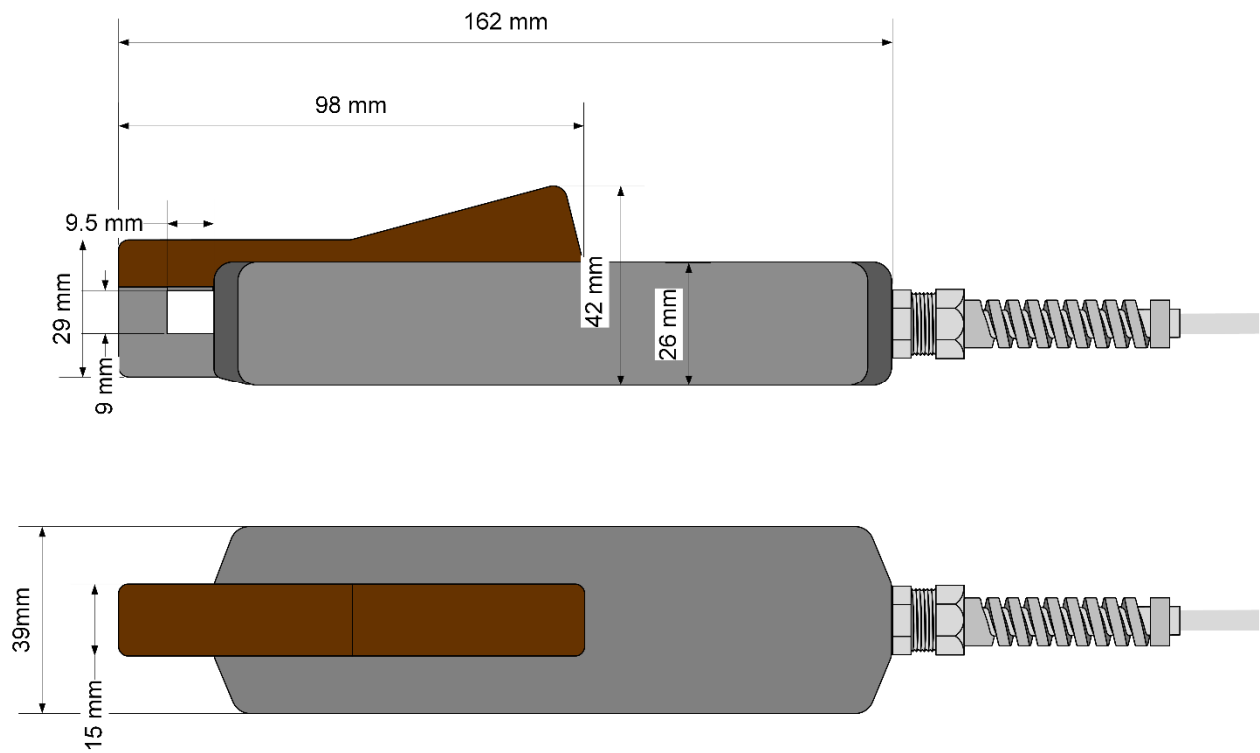


Figure 5 Dimensions of the current sensor