

METRACLIP EARTH PE

Earth Clamp Meter

3-447-107-03

1/1.22

- Clamp generator and meter in a single device – permits simplified measurement without auxiliary earth electrodes
- Clamp measuring functions:
 - Earth loop resistance: 0.010 Ω... 1200 Ω
 - Leakage current: 0.5 mA ... 20 A_{AC}
- Minimal influence due to interference current
- Large OLED display: up to 3 measured values can be read simultaneously
- Measured value memory for resistance and leakage current, each with date and time
- Compact and user-friendly
One-hand operation thanks to minimal weight and easy to open clamp with spring force compensation
- Extremely safe thanks to CAT IV 100 V
- Adjustable alarms for Ω and A
- Automatic freezing of the measured value when the clamp is opened (PRE-HOLD function)
- Automatic calibration of the air gap at startup
- Acoustic signals and automatic shutdown


CAT IV

Applications

The earth clamp meter can be used to test the resistance of any conductive system which demonstrates loop characteristics. The following measurements are possible:

- Earth resistance measurement if grounding is connected in series to the equipotential bonding conductor
- Other earth measurements, for example via an overhead ground wire which connects transmission towers for power transmission or telecommunications
- Earth clamp meter with elongated measuring head – ideal for checking earth loops on earth strips

Features

- Measurement of loop impedance in parallel connected grounding networks with a much simpler procedure than possible with conventional processes using two auxiliary earth electrodes
- Impedance measurement is especially accurate for low values, because inductance present in the loop is taken into consideration during resistance measurement.
- The momentary measured value can be “frozen” at the display by pressing the HOLD key or opening the clamp. This permits convenient one-hand operation.
- Up to 300 measured values can be stored at the device along with time and date (real-time clock for time-stamp), and can be subsequently read out.
- The earth clamp meter simultaneously fulfils requirements for use as a clamp generator and a clamp meter:
 - The test current which flows through the generator winding generates an alternating voltage in the enclosed conductor with constant energy level.
 - A sensor winding detects current I induced in the conductor in this way, from which the clamp meter calculates loop impedance using the following equation:

$$Z_{\text{Loop}} = E/I.$$

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Technical Data

Mechanical Design

Housing (L × W × H)	Approx. 300 × 106 × 56 mm
Weight	Approx. 1.2 kg (including batteries)
Protection	Housing: IP40 per EN 60529 (protection against ingress of solid foreign objects: ³ 1.0 mm diameter; protection against ingress of water: not protected)
Display	152-segment OLED (active surface: 48 × 39 mm)
Clamp (enclosing diameter)	Square: 30 × 40 mm Rectangular: 20 × 55 mm Round: 32 mm
Operating position	Horizontal clamp
Conductor position in measuring head	Centered

Signals

Alarms	For Z and I (optical, optionally acoustic)
Acoustic signals	Keys, alarms

Internal Memory

300 measured values with timestamp
Freeze function (manual or automatic HOLD)

Ambient Conditions

Operating temperature	-20 ... +55 °C
Storage temperature	-30 ... +70 °C (without batteries)
Relative humidity	Max. 75%, No condensation allowed
Elevation	Max. 2000 m

Power Supply

Power supply	Four 1.5 V alkaline batteries, type LR6 or AA, alternative: four rechargeable NiMH batteries
Supply voltage	5.8 ... 6.2 V
Mean current consumption	Approx. 140 mA

Operating time Approx. 20 hours, i.e. approx. 2400 measurements lasting 30 seconds each

Automatic shutdown On/off

Electrical Safety

Measuring category	100 V CAT IV, 150 V CAT III
Pollution degree	2
Protection class	II (per EN 61140)

Electromagnetic Compatibility

Electrical field strength	< 1 V/m
Magnetic field strength	< 40 A/m
Interference emission	EN 61326-1
Interference immunity	EN 61326-1
Operating position	Horizontal clamp

Product Standards

The tester has been manufactured and tested in accordance with the following safety regulations:

EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use – general requirements
EN 61010-2-032	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-032: Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement
EN 60529	Test instruments and test procedures Degrees of protection provided by enclosures (IP code)
EN 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements
EN 61326-2-2	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-2: Particular requirements – Test configurations, operational conditions and performance criteria for portable test, measuring and monitoring equipment used in low-voltage distribution systems

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Characteristic Values

Measurements in General

Distortion factor	< 0.5%
Frequency	50 Hz, sinusoidal signal

Impedance and Leakage Current Measurement

Current during impedance measurement:	0 mA
Series inductance with resistor:	0 H

Reference Range

Measuring ranges	0.010 ... 0.099 Ω	0.10 ... 0.99 Ω	1 ... 49.9 Ω	50 ... 149 Ω	150 ... 245 Ω	250 ... 440 Ω	450 ... 640 Ω	650 ... 1200 Ω
Resolution (R)	1 mΩ	10 mΩ	100 mΩ	1 Ω	5 mΩ	10 Ω	10 Ω	50 Ω
Intrinsic uncertainty (δ)	± (1.5% R + 0.01 Ω)	± (1.5% R + 2 r)	± (1.5% R + 2 r)	± (2.5% R + 2 r)	± (5% R + 2 r)	± (10% R + 2 r)	± (15% R + 2 r)	± (20% R + 2 r)
Open-circuit voltage	≤ 4.5 mV at 2083 Hz							

Reference conditions: 20 ... 26 °C at 40 ... 60% relative humidity (no condensation)

Intrinsic uncertainty is expressed as a percentage of the reading (R) and in display data points / resolution (r): (x% R + y r). It indicates deviation under reference conditions (see above).

Fluctuation within the Operating Range

Influencing quantity	Operating range	Influence			
		Typical		Maximum	
Temperature	-20 to + 55 °C	0.5 δ / 10 °C ± R		1.5 δ / 10 °C + R	
Relative humidity	10 to 75% relative humidity	1 δ ± R		2 δ ± R	
Supply voltage	4 to 6.5V	0.05 δ ± R		0.1 δ ± R	
Conductor position	From edge to middle	Z < 450 Ω 0.2 δ ± R	Z ≥ 450 Ω 0.5 δ ± R	Z < 450 Ω 0.4 δ ± R	Z ≥ 450 Ω 1 δ ± R
Clamp setting	± 180°	Z < 450 Ω 0.25 δ ± R	Z ≥ 450 Ω 0.5 δ ± R	Z < 450 Ω 0.5 δ ± R	Z ≥ 450 Ω 1 δ ± R
Distance to magnets	Steel sheet, 1 mm at opening gap	0.1 δ ± R		0.5 δ ± R	
Magnetic field strength 50/60 Hz	30 A/m	0.05 δ ± R		0.1 δ ± R	
Neighboring conductor	I < 40 A	Z < 250 Ω 0.25 δ ± R	Z ≥ 250 Ω 0.4 δ ± R	Z < 250 Ω 0.5 δ ± R	Z ≥ 250 Ω 0.8 δ ± R
Leakage current in loop 50 to 60 Hz, I < 10 A, Z × I < 75 V	Z < 100 Ω	Z × I < 20 V		1 δ ± R	
		20 V ≤ Z × I < 40		3 δ ± R	
		40 V ≤ Z × I		4 δ ± R	
	Z ≥ 100 Ω	0.5 δ ± R		1 δ ± R	
Loop inductance	0 to 500 μH	The instrument displays Z at measuring frequency (2083 Hz)			

Z = impedance I = current δ = intrinsic uncertainty (see above) R = resolution (see above)

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Current Measurement

Signal frequency:	47 ... 800 Hz
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Reference Range

Measuring ranges	0.5 to 9.995 mA	10.00 to 99.90 mA	100.0 to 299.0 mA	0.300 to 2.990 A	3.00 to 20.00 A
Resolution (R)	50 μ A	100 μ A	1 mA	10 mA	100 mA
Intrinsic uncertainty (δ)	$\pm (2\% R + 200 \mu\text{A})$	$\pm (2\% R + r)$	$\pm (2\% R + r)$	$\pm (2\% R + r)$	$\pm (2\% R + r)$

Reference conditions: 20 ... 26 °C at 40 ... 60% relative humidity (no condensation)

Intrinsic uncertainty is expressed as a percentage of the reading (R) and in display data points / resolution (r): (x% R + y r). It indicates deviation under reference conditions (see above).

Fluctuation within the Operating Range

Influencing Auanity	Operating Range	Influence	
		Typical	Maximum
Temperature	- 20 to + 55 °C	0.5 δ / 10 °C \pm R	1.5 δ / 10 °C + R
Relative humidity	10 to 75% relative humidity	0.5 δ \pm R	1 δ \pm R
Supply voltage	4 to 6.5V	0.05 δ \pm R	0.1 δ \pm R
Conductor position	From edge to middle	0.05 δ \pm R	0.2 δ \pm R
Clamp setting	\pm 180°	0.1 δ \pm R	0.25 δ \pm R
Distance to magnets	Steel sheet, 1 mm at opening gap	0.1 δ \pm R	0.2 δ \pm R
Magnetic field strength 50/60 Hz	10 A/m	0.75 mA	1.5 mA
	30 A/m	2 mA	4.5 mA
	100 A/m	8 mA	15 mA
Leakage current offset	IEC 61557-13 5% at 50 Hz and 0° 6% at 250 Hz and 180° 5% at 350 Hz and 0°	0.05 δ \pm R	0.1 δ \pm R
Neighboring conductor	I < 40 A	> 70 dB	> 66 dB
Leakage current frequency	47 to 800 Hz ¹ (for the entire current measuring range)	0.5 δ \pm R	1 δ \pm R

Z = impedance

I = current

δ = intrinsic uncertainty (see above)

R = resolution (see above)

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Scope of Delivery

- 1 METRACLIP EARTH PE (M312P)
(earth clamp meter with carrying strap)
- 4 1.5 volt batteries
- 1 Carrying case (lockable, with 2 keys)
- 1 Test certificate for the instrument (in English only)
- 1 Calibration loop (including test certificate in English)
- 1 Operating instructions

Order Information

Description	Type	Article Number
Earth clamp meter, 150 V CAT III, with carrying case and calibration loop	METRACLIP EARTH PE	M312P

Further information regarding accessories can be found:

- In our Measuring Instruments and Testers catalog
- On the Internet at www.gossenmetrawatt.com

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