GOSSEN METRAWATT

METRA**CLIP EARTH**
Earth Clamp Meter

3-349-862-03
2/9.17

- **Clamp generator and meter in a single device –** permits simplified measurement without auxiliary earth electrodes
- **Clamp measuring functions:**
  - Ground loop resistance 0.01 to 1500 Ω
  - Loop inductance: 10 to 500 µH
  - Leakage current: 0.2 mA to 40 A AC
  - Touch voltage: 0.1 to 75 V
- **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 600 V

CE

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 overhead ground wires or interconnected transmission towers for power transmission or telecommunications.
- Measurements at distributed ground connections with a common ground plane.

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.
- **Touch voltage** is estimated by multiplying loop impedance and leakage current. The voltage value ascertained in this way is the maximum value which can occur between the measuring point and earth, because the measured loop impedance value takes the entire loop into account.

Standard or Advanced Operating Mode

The earth clamp meter has two operating modes:

- In the standard mode, the clamp functions like a conventional loop ohmmeter.
- Additional measuring functions are available in the advanced mode:
  - Impedance measurement adjusted to the selected frequency
  - Calculation of touch voltage
  - Display of ohmic and inductive components of the measured impedance

Display value storage (HOLD and PRE-HOLD functions)

The momentary measured value can be “frozen” at the display:

- **HOLD**: Activate the function by pressing the HOLD key.
- **PRE-HOLD**: Activate the function by opening the clamp – permits one-hand operation.

Safety Devices

Dangerous touch voltages are indicated as follows:

- The dangerous voltage symbol blinks in the event of touch voltages of greater than 50 V.
- If the adjustable alarm threshold for touch voltage is exceeded, a continuous acoustic signal is triggered.

Storage and Transmission of Measurement Results

Up to 2000 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 or transmitted via Bluetooth.

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Measuring Method

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 a constant level E.
- 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: $Z_{Loop} = E/I$.

In the advanced mode, an additional loop inductance measurement is performed which takes the influence of the respective line frequency into consideration.

Applicable Regulations and Standards

IEC 61010-1/EN 61010-1/ VDE 0411-1	Safety regulations for electrical equipment for measurement, control and laboratory use
IEC 61010-2-030:2010, DIN EN 61010-2-030:2010, VDE 0411-2-030:2011	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-030: Particular requirements for testing and measuring circuits
IEC 61010-2-032:2012, DIN EN 61010-2-032:2012, VDE 0411-2-032:2013	Part 2-032: Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement
DIN EN 61326-1 VDE 0843-20-1	Electrical equipment for control technology and laboratory use – EMC requirements

Technical Data

Loop Impedance Measurement Z

Loop Resistance Measurement R

Measuring Ranges	Resolution	Intrinsic Uncertainty under Ref. Conditions
0.010 to 0.099 Ω	0.001 Ω	±1.5% ±0.01 Ω
0.10 ... 0.99 Ω	0.01 Ω	±1.5% ±0.02 Ω
1.0 ... 49.9 Ω	0.1 Ω	±1.5% ±0.1 Ω
50.0 ... 99.5 Ω	0.5 Ω	±2% ±0.5 Ω
100 ... 199 Ω	1 Ω	±3% ±1 Ω
200 ... 395 Ω	5 Ω	±5 % ±5 Ω
400 ... 590 Ω	10 Ω	±10 % ±10 Ω
600 ... 1150 Ω	50 Ω	Approx. 20%
1200 ... 1500 Ω	50 Ω	Approx. 25%

Alarm threshold: adjustable within a range of 1 Ω to 199 Ω.

Measuring signal frequency	2083 Hz
Transposed impedance	Adjustable to a frequency of 50, 60, 128 or 2083 Hz
Max. permissible overload	– Continuous: 100 A (50/60 Hz) – Transient (< 5 s) 200 A (50/60 Hz)

Loop inductance measurement L

Measuring Ranges	Resolution	Intrinsic Uncertainty under Ref. Conditions
10 ... 100 µH	1 µH	±5% ±1 µH
100 ... 500 µH	1 µH	±3% ±1 µH

Determining Touch Voltage Uc

Measuring method: Voltage is calculated from the product of measured loop impedance and measured leakage current.

Measuring Ranges	Resolution	Intrinsic Uncertainty under Ref. Conditions
0.1 ... 4.9 V	0.1 V	±5% ±0.1 V
5.0 ... 49.5 V	0.5 V	±5% ±0.5 V
50.0 ... 75.0 V	1 V	±10% ±1 V

Alarm threshold: adjustable within a range of 1 V to 75 V.

A AC (TRMS) Current Measurement

Measuring ranges:

Ammeter function: 0.2 mA to 40 A, display with 4000 digits

Measuring ranges	Resolution	Intrinsic Uncertainty under Ref. Conditions
0.200 ... 0.999 mA	1 µA	±2% ±50 µA
1.000 ... 2.990 mA	10 µA	±2% ±50 µA
3.00 ... 9.99 mA		
10.00 ... 29.90 mA	100 µA	±2% ±100 µA
30.0 ... 99.9 mA		
100.0 ... 299.0 mA	1 mA	±2% ±1 mA
0.300 ... 0.990 A		
1.000 ... 2.990 A	10 mA	±2 % ±10 mA
3.00 ... 39.99 A		

Alarm threshold: adjustable within a range of 1 mA to 40 A.

Fluctuation in the Operating Range

Fluctuation is specified in accuracy classes per influencing quantity.

Influencing Quantity	Range Limits	Influenced Quantities	Fluctuation	
			Typical	Maximum
Temperature	-20 °C...+55 °C	R, Ω[1], Uc	1% rdg./10 °C+R	2 % rdg./10 °C+R
Relative humidity	10% ... 90% RH	R, Ω[1], Uc	1% rdg. + R	3 % rdg. + R
Battery voltage	4 ... 6.5 V	R, Ω[1], Uc	0.1 % rdg. + R	0.25 % rdg. + R
Conductor position	Edge/middle	R, Uc	0.1 % rdg. + R	0.2 % rdg. + R
		Ω[1]	0.05 % rdg. + R	0.1 % rdg. + R
Clamp position	±90°, 180°	Uc	0.2 % rdg. + R	0.4 % rdg. + R
		R, Ω [1]	0.1 % rdg. + R	0.25 % rdg. + R
Nearness of magnets	Steel sheet, 1 mm at air gap	R, Ω [1], Uc	0.1 % rdg. + R	0.5 % rdg. + R
Magnetic field 50 ... 60 Hz	30 A/m	R	2 mA [2]	4.5 mA [2]
		Uc	0.1 % rdg. + R	0.5 % rdg. + R
Current frequency	47 ... 800 Hz	R, Uc	1% rdg. + R	2 % rdg. + R
Leakage current 50 ... 60 Hz	I < 10 A R x I < 50 V	Ω [1]	2 % rdg. + R	8 % rdg. + R

[1] Ω stands for the quantities R, L and Z.
[2] Offset for current measurements
R = resolution in A, Ω or V
rdg. = measured value (reading)

Reference Conditions

Ambient temperature	+23 °C ±3 °C
Relative humidity	50 ±10%
Battery voltage	6.0 V ±0.2 V
Magnetic fields	DC field < 40 A/m, no AC field
Electrical fields	< 1 V/m
Clamp orientation	Horizontal
Conductor position	Centered
Surrounding conditions	No live conductors within a distance of less than 10 cm
Distance to magnets	> 10 cm
Loop resistance measurement	Without inductance (20 Ω for voltage measurements)
Current measurement	Sinusoidal waveform, frequency: 50 Hz, distortion: < 0.5%
Interference current during loop resistance measurement	None during resistance and inductance measurements, < 3,75 A during voltage measurements

LCD

Display type	OLED, 2 brightness levels
Segments	152
Active display surface	48 x 39 mm

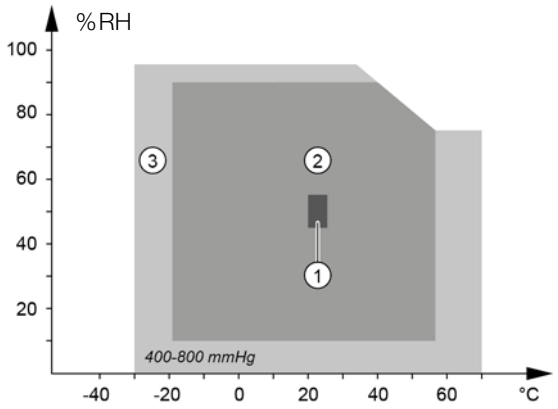
Power Supply

Batteries	4 alkaline batteries, 1.5 V, LR6 (AA)
Rechargeable batteries	4 x NiMH rechargeable batteries
Mean current consumption	Approx. 140mA
Mean operating hours	Approx. 12 hours, i.e. 1440 measurements lasting 30 seconds each
Automatic shutdown	After 5 minutes of non-use – 15 seconds before shutdown, a brief acoustic warning signal is generated and the display blinks once per second. Automatic shutdown can be disabled in the setup menu.

Electrical Safety

Protection class	III The device is equipped with double insulation or reinforced insulation per IEC 61010-1 IEC 61010-2-030 IEC 61010-2-032
Measuring category	CAT IV 600 V

Ambient Conditions



1 Reference conditions (IEC 160)
2 Operating conditions
3 Storage conditions (without batteries)
per IEC 359, category II (for indoor and outdoor use)

Elevation	Max. 2000 m

Mechanical Design

Protection	Housing: IP40
Pollution degree	Max. 2
Clamp opening	Max. 35 mm diameter (corresponds to maximum enclosing diameter)
Dimensions	L x W x D: 262 x 95 x 55 mm
Weight	Approx. 935 g with batteries

Electromagnetic Compatibility (EMC)

Interference emission / interference immunity	DIN EN 61326-1 / VDE 0843-20-1, classification: residential areas

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Scope of Delivery

1 Earth clamp meter in carrying case
4 Batteries (LR6 or AA)
1 Test certificate
1 Mini CD ROM with operating instructions in D, GB, F, E, I
1 Condensed operating instructions in D, GB, F, E, I as well as NL, PL, RO, printed
1 Safety data sheet in 20 languages
1 Calibration loop

Order Information

Description	Type	Article Number
Earth clamp meter (CAT IV 600 V) for measuring earth loop resistance from 0.01 to 1500 Ω, loop inductance from 10 to 500 µH, leakage current from 0.2 mA to 40 A AC, touch voltage from 0.1 to 75 V, 152-segment OLED, clamp opening: 35 mm, programmable alarms, pre-hold, buzzer, memory for 2000 measurements with time stamp, Bluetooth, carrying case, calibration loop	**METRACLIP EARTH**	M312N

GOSSEN METRAWATT

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