GOSSEN METRAWATT

GEOHM | 5
Earth Tester

3-349-417-01
4/3.12

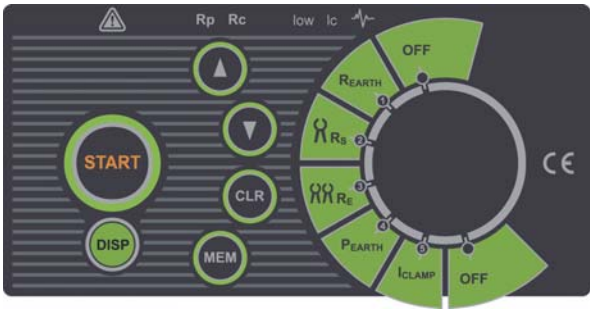
Battery operated earth tester per DIN VDE 0413, part 5, for measuring earth resistance. This instrument can also be used to ascertain or measure soil resistivity and ohmic resistance in accordance with the current-voltage measuring method.

- Measurement of:
  – Earth resistance
  – Selective earth resistance
  – Soil resistivity
  – Current (TRMS) via current clamp transformer (optional)
- Three or four-pole measuring method
- No balancing required
- Continuous monitoring of interference voltage and auxiliary earth electrode resistance with indication if allowable limit values are violated
- Data storage for 250 measurements (1000 measured values)
- Data interface for transmission of measured values to a PC
- Software (optional accessory) for measured value storage and report generation at a PC (in preparation)

Application

This instrument offers three different ways of measuring earth resistance, as well as measurement of soil resistivity and current. The current clamp transformers which are required for certain measurements are available as optional accessories.

Measurable Quantities	Switch Position	Required Accessory
Earth resistance RE (traditional 4-wire method according to Wenner)	R_{EARTH}	4 earth spikes and 4 measurement cables (included)
Selective earth resistance RS (traditional 4-wire method with additional current clamp transformers)	R_S (clip)	4 earth spikes, 4 measurement cables, 1 current clamp transformer (optional)
Earth resistance RE (two current clamp transformers) – actually, loop resistance is measured!	R_E (two current clamp transformers)	2 current clamp transformers (optional)
Soil resistivity	ρ_{EARTH}	4 earth spikes and 4 measurement cables (included)
Current (TRMS)	I_{CLAMP}	1 current clamp transformer (optional)



Applicable Regulations and Standards

IEC 61010-1/EN 61010-1/ VDE 0411-1	Safety requirements for electrical equipment for measurement, control and laboratory use – General requirements
IEC 61557/ EN 61557/ VDE 0413	Devices for testing, measuring or monitoring protective measures Part 1: General requirements Part 5: Earth resistance
EN 60529 VDE 0470, part 1	Test instruments and test procedures Degrees of protection provided by enclosures (IP code)
DIN EN 61326 VDE 0843, part 20	Electrical equipment for control technology and laboratory use – EMC requirements

Regulations and Standards for Use of the Test Instrument

DIN VDE 0413, part 5	Devices for testing, measuring or monitoring protective measures; earth resistance
DIN VDE 0100	Stipulations for the setup of electric power installations with nominal voltages of up to 1000 V
DIN VDE 0141	Grounding in AC systems with nominal voltages of greater than 1 kV
DIN VDE 0800	Setup and operation of telecommunications systems including data processing equipment; equipotential bonding and grounding
DIN VDE 0185	Lightning protection systems – general setup
International regulations and standards	
BS 7430 + BS 7671, NFC 15-100, IEC 60364	

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Technical Data

Function (per EN 61557)	**GEOHM | 5**
Measuring voltage	40 V
Measuring frequency	125/150 Hz
Rs	Max. 50 kΩ
Rh	Max. 50 kΩ
3-pole measurement	
Measuring range	0.11 Ω to 19.99 kΩ
Resolution	0.01 Ω to 10 Ω
Measuring error	± (2% rdg. + 3d)
4-pole measurement	
Measuring range	0.11 Ω to 19.99 kΩ
Resolution	0.01 Ω to 10 Ω
Measuring Error	± (2% rdg. + 3d)
3-pole selective measurement with current clamp transformer	
Measuring range	0.11 Ω to 1.99 kΩ
Resolution	0.01 Ω to 10 Ω
Measuring error	± (2% rdg. + 3d)
4-pole selective measurement with current clamp transformer	
Measuring range	0.00 Ω to 1.99 kΩ
Resolution	0.01 Ω to 10 Ω
Measuring error	± (2% rdg. + 3d)
2-clip measuring method	
Measuring range	0.0 Ω to 100 Ω
Resolution	0.1 Ω to 1 Ω
Measuring error	±(10% rdg. + 2d)

Key: d = digit(s), rdg. = reading (measured value)

Earth Resistance, 3/4-Pole Method

Measuring range RE (0.11 to 19.99 kΩ)

Display range (Ω)	**Resolution (Ω)**	**Measuring error**
0.00 to 19.99	0.01	(2% rdg. + 3 digits)
20.0 to 199.9	0.1	
200 to 999	1	
1.000 k to 1.999 k	1	
2.00 k to 19.99 k	10	(5% rdg.)

Additional error caused by the spike at Rc max. or Rp max.	±(3% rdg. + 10 digits)
Rc max. [1]	The smaller value of (4 kΩ +100·RE) or 50 kΩ
Rp max. [1]	The smaller value of (4 kΩ +100·RE) or 50 kΩ
Additional error caused by 3 V interference voltage (50 Hz)	(5% rdg. + 10 digits)
Test voltage at the test sockets	40 V AC
Type of test voltage	Sine
Test voltage frequency	125 (countries with 50 Hz) / 150 (countries with 60 Hz)
Short-circuit test current	< 20 mA
Automatic resistance test at current and potential spikes	Yes
Automatic interference voltage test	Yes

[1] $R_C = R_H$ (Hilfserder); $R_P = R_S$ (Sonde)

Earth Resistance with current clamp transformer and 4-Pole Test Method

The technical data are the same as for the 4-pole method except for display range and measuring range (see deviating values below).

Measuring Ranges RE (0.11 to 1.99 kΩ)

Display Range (Ω)	**Resolution (Ω)**	**Measuring Error**
0.00 to 19.99	0.01	(2% rdg. + 3 digits)
20.0 to 199.9	0.1	
200 to 999	1	
1.00 k to 1.99 k	10	

Additional Specifications

Additional error for interference voltage, indicated by displaying the interference voltage warning symbol (valid for maximum ratio R_{earth_total} / RS = ½)	(10% rdg. + 10 digits)
Symbol for current noise	As of approx. 2.1 A
Additional resistance ratio error	RS / R_{earth_total} · 1%
Display in case of too little current at the clip	Less than 0.5 mA
Automatic interference voltage test	Yes
Observe additional error caused by the clip.	

Earth Resistance with 2 current clamp transformer

Display Range (Ω)	**Resolution (Ω)**	**Measuring Error**
0. 0 to 19.9	0.1	(2% rdg. + 10 digits)
20 . to 100	1	(20% rdg.)

* Distance between current clamp transformer > 30 cm

Additional error at most insignificant interference voltage with warning symbol	(10% rdg. + 10 digits)
The symbol appears as of	I_{Rausch} / I_{Signal} > 100
Additional error caused by use of current clamp transformers must be taken into consideration.	

Soil Resistivity

All of the technical data for the 4-pole method apply here too, except for display range (see deviations listed below).

Display Range (Ωm)	**Resolution (Ωm)**	**Measuring Error**
0.00 to 19.99	0.01	See measuring error for RE measurement
20.0 to 199.9	0.1	
200 to 1999	1	$\rho = 2\pi$ a·RE
2.00 K to 19.99 k	10	
20.0 k to 199.9 k	0.1 k	(5% rdg.)
200 k to 999 k (at 8 m)	1 k	
200 k to 1999 k (at 8 m)		

Distance between the spikes is 1 to 30 m or 3 to 90 feet

Current (TRMS AC) by means of current clamp transformer 1000:1 (optional accessories)

Display Range I (A)	Resolution (A)	Measuring Error
0 mA to 99.9 mA	0.1 mA	(5% rdg. + 3 digits)
100 mA to 999 mA	1 mA	(5% rdg.)
1.00 A to 9.99 A	0.01 A	
10.0 A to 19.9 A	0.1 A	

Input impedance	10 Ω
Transformation ratio	1 A / 1 mA
Nominal frequency	50 / 60 Hz
Additional error caused by the current clamp transformers must be taken into consideration.	

Reference Conditions

Battery voltage	5.5 V ± 1%
Ambient temperature	+23 °C ± 2 K
Relative humidity	40 to 60%

Electromagnetic Compatibility (EMC)

Interference emission/ immunity	IEC 61326/EN 61326

Ambient Conditions

Reference temp. range	10 to +30 °C
Operating temp. range	0 to + 40 °C
Relative humidity	Max. 80% (at 0 to +40 °C) no condensation allowed

Power Supply

Batteries	4 ea. 1.5 V baby cell (4 ea. C size) (alkaline manganese per IEC LR14)
Rechargeable batteries	4.8 V (4 ea. 1.2 V NiCd, NiMH rechargeable batteries per IEC LR14)
Charger	Upon request
Charging voltage	6 V

Due to lower charging capacity, fewer measurements are possible with rechargeable batteries than with normal batteries as a rule.

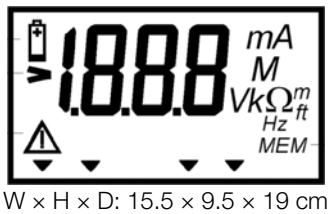
Battery saver circuit	The test instrument is switched off automatically approximately 10 minutes after the last key operation.

Electrical Safety

Safety class	Double insulated

Mechanical Design

Display	Multiple display with LCD (61 x 33 mm)



Dimensions	W × H × D: 15.5 × 9.5 × 19 cm
Weight	Approx. 1.3 kg with batteries
Protection	Housing: IP 54 per EN 60529

Table Excerpt Regarding Significance of IP Codes

IP XY (1st char. X)	Protection against penetration by solid particles	IP XY (2nd char. Y)	Protection against penetration by water
5	Dust protected	4	Splashing water

Data Interface

Type	RS 232C, serial, per DIN 19241
Format	9600 baud, no parity, 8 data bits, 1 stop bit
Connection	9-pin subminiature socket connector

Scope of Delivery

1 Earth tester
1 Case (rugged, lockable Aluminium case)
1 Neck strap
1 Set batteries
4 Earth spikes
4 Measurement cables
1 Set operating instructions
1 Proprietary calibration certificate

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Accessories

E-Clip 1 Current clamp transformer
Measuring range: 1 mA to 1200 A
Measuring category: 600 V CAT III
Max. cable diameter: 52 mm
Transformation ratio: 1000 A/1A
Frequency range: 40 Hz to 5 kHz
Output signal: 1 µA to 1.2 A
Supplied with connector cable (1.5 m) and laboratory safety plug

E-Clip 2 Current clamp transformer
Measuring range: 0.2 A to 1200 A
Measuring category: 600 V CAT III
Max. cable diameter: 52 mm
Transformation ratio: 1000 A/1A
Frequency range: 40 Hz to 5 kHz
Output signal: 0.2 mA to 1.2 A
Equipped with laboratory safety plug inputs

Charger
Input: 230 V AC, 50 Hz
Output: 4.8 V DC, 350 mA
Battery charging is indicated by means of a charging display.

Order Information

Description	Type	Article Number
Earth tester set, see page 3	GEOHM | 5	M591B
Accessories		
Charger with 4 NiMH rechargeable batteries	Z591C	Z591C
Current clamp transformer Transformation ratio: 1000 A/1A Current measuring range: 1 mA to 1200 A Output signal: 1 µA to 1.2 A	E-Clip 1	Z591A
Current clamp transformer Transformation ratio: 1000 A/1A Current meas. range: 0.2 A to 1200 A Output signal: 0.2 mA to 1.2 A	E-Clip 2	Z591B
Earth tester set: Artificial leather pouch with 2 reels, 2 measurement cables (25 m ea.), 1 measurement cable (40 m), 2 measurement cables (3 m ea.), 4 earth spikes (zinc plated), 2 spike pullers, 1 hammer	E-Set 3	GTZ3301005R0001
Earth tester set: Artificial leather pouch with two reels, 2 measurement cables (25 m ea.), 1 measurement cable (40 m), 2 measurement cables (3 m ea.), 4 earth drills	E-Set 4	Z590A
Reel with 25 m measurement cable and banana plugs on the ends	TR25	GTZ3303000R0001
Drum with 50 m measurement cable, banana plug and socket	TR50	GTY1040014E34
Earth drill, 35 cm long, connection option for 4 mm banana plug	SP350	GTZ3304000R0001

For additional information regarding accessories please refer to

- The data sheet for the respective device or our Measuring Instruments and Testers catalogue.
- www.gossenmetrawatt.com

GOSSEN METRAWATT

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