

GEOHM[®] C

Ground Resistance Tester

3-349-088-03
12/8.14

Battery operated tester for the measurement of ground resistance meets international standards for performing such tests. This instrument allows measurement of soil resistivity and ohmic resistance by means of the ammeter-voltmeter test method.

Features

- 3 or 4-wire measurement selectable from menu
- No balancing required
- Continuous monitoring of interference voltage and auxiliary earth electrode resistance with indication of limit value violations
- Indication is displayed if maximum probe resistance is exceeded at the beginning of the measurement
- Voltage measurement with automatic switch-over function between direct voltage and alternating voltage:
Direct voltage measuring range 1.0 ... 250 V (with polarity display)
Alternating voltage measuring range 0 ... 300 V



Applications

The GEOHM[®]C is a compact instrument for the measurement of ground resistance in electrical systems in accordance with:

- | | |
|--------------|---|
| DIN VDE 0100 | Installation of power systems 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 | Installation and operation of telecommunications systems including data processing systems: equipotential bonding and grounding |

Testing of lightning protection systems in accordance with DIN VDE 0185

The instrument is also capable of determining soil resistivity which is essential in calculating dimensions for grounding systems. It can thus be taken advantage of for simple, geological surveys, and for the planning of grounding systems.

Beyond this, ohmic resistance can be measured at both solid and liquid conductors, as well as internal resistance at conductive elements, as long as these are capacitance and induction-free.

Special Functions

- Hold function: The measurement value is frozen at the display after the measurement key is released.
- Storage of measurement values to memory
- Data interface for the transmission of measurement values and for software updates
- Convenient report generating software, can be expanded into a comprehensive database

Display

The LCD consists of a backlit dot matrix display at which menus, setup options, measuring results and online help can be viewed. Various display languages can be selected depending upon the country in which the instrument is used.

Signal Lamps

The instrument automatically recognizes errors which occur during measurement, and signals them with four LEDs as shown in the table below.

| LED | Status | Measuring Function | Meaning |
|---|--------|--------------------------------------|--------------------------|
| U _{Stör} / U _{noise} | red | Interference voltage | U > 10 V |
| Netz Mains | red | Voltage | Mains voltage is present |
| R _S >max | red | Probe resistance | Limit value exceeded |
| R _H >max | red | Auxiliary earth electrode resistance | Limit value exceeded |

Operation

The instrument is easy to operate. A multifunction key allows for one-hand operation for menu selections and the initialization of measurements. Basic functions and sub-functions are selected with the help of four softkeys.

The instrument functions in accordance with the ammeter-voltmeter principle, and thus requires no balancing. Automatic measuring range selection, limit value monitoring and direct selection of 3 or 4-wire measurement assure easy operation as well.

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Battery Monitoring and Self-Test

A battery symbol with five segments ranging from depleted to fully charged continuously indicates the charging level of the batteries in the main menu.

Automatic shutdown ensures if the batteries are fully depleted, and the instrument includes an integrated charge monitoring circuit for safe charging of rechargeable NiMH or NiCd batteries. During the self-test, a series of test patterns can be displayed one after the other, and indicator LEDs and relays are tested.

Rugged Housing for Harsh Operating Conditions

Soft plastic jacketing protects the instrument against damage due to impact and dropping.

Data Interface

Measurement data can be uploaded to a PC via the integrated IRDA interface for processing and archiving, or for the generation of official reports

Software Updates

The test instrument can always be kept current thanks to device software updates via the IRDA interface. Software updates are performed during the course of re-calibration by our service department, or by the user himself.

Applicable Regulations and Standards

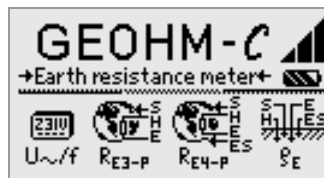
| | |
|---|---|
| IEC 61010-1/ DIN EN 61010-1/ VDE 0411-1 | Safety requirements for electrical equipment for measurement, control and laboratory use – General requirements |
| IEC 61557/ EN 61557/ VDE 0413 | Devices for testing, measuring and monitoring protective measures Part 1: General requirements Part 5: Earth resistance |
| VDE 0106-1 | Protection against electrical shock, classification of electrical and electronic equipment |
| DIN EN 60529, VDE 0470-1 | Test instruments and test procedures, protection provided by enclosures (IP code) |
| DIN EN 61326-1 VDE 0843-20-1 | Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements |

Regulations and Standards for Use of the Test Instrument

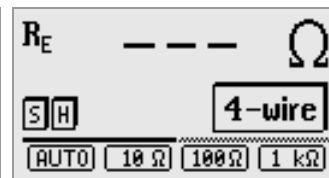
| | |
|--|---|
| DIN VDE 0413 Part 5 | Devices for testing, measuring and monitoring protective measures ; earth resistance |
| DIN VDE 0100 | Regulations for the installation of power systems with nominal voltages of up to 1000 V |
| DIN VDE 0141 | Earthing in AC systems with nominal voltages of greater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

Sample Displays

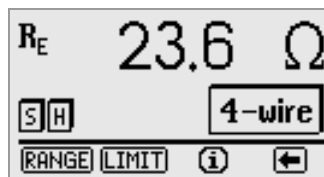
Main Menu



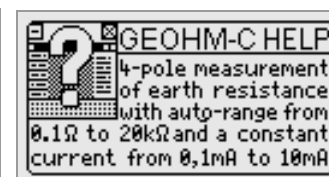
Measuring Range Selection



4-Wire Measurement



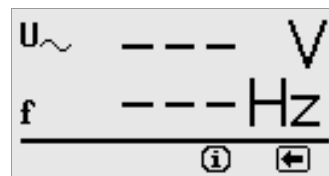
Online Help



Direct Voltage Measurement



Alternating Voltage Measurement



Characteristic Values

| Measured Quantity | Display Range | Measuring Range | Impedance / Test Current |
|-------------------|----------------|-------------------------------|--------------------------|
| RE | 0.01 ... 20 Ω | 1.0 ... 20 Ω | 10 mA |
| | 0.1 ... 200 Ω | 5 ... 200 Ω | 1 mA |
| | 1 Ω ... 2 kΩ | 50 Ω ... 2 kΩ | 100 μA |
| | 10 Ω ... 20 kΩ | 500 Ω ... 20 kΩ | 100 μA |
| | 10 Ω ... 50 kΩ | 500 Ω ... 50 kΩ ¹⁾ | 100 μA |
| U= 2) | 1.0 ... 99.9 V | 10 ... 250 V | 500 kΩ |
| | 100 ... 250 V | | |
| U~ 3) | 0 ... 99.9 V | 45 ... 200 Hz | 500 kΩ |
| | 100 ... 300 V | | |
| f 3) | 15 ... 99.9 Hz | | |
| | 100 ... 400 Hz | | |

| Measured Quantity | Intrinsic Uncertainty | Measuring Uncertainty |
|-------------------|-----------------------|---|
| RE | ±(3% rdg.+6d) | ±(10% rdg. + 6d) ±(10% rdg. + 6d) ±(10% rdg. + 6d) ±(10% rdg. + 6d) ±(16% rdg. + 10d) |
| U= 2) | ±(2% rdg.+2d) | ±(4% rdg. + 3d) |
| U~ 3) | | |
| f 3) | ±(0.1% rdg.+1d) | ±(0,2% rdg. + 1d) |

¹⁾ manual measuring range selection only

²⁾ as from software version AD

³⁾ For sinusoidal measured quantities only

Output voltage

max. 50 V_{rms} at 128 Hz ±0.5 Hz

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Reference Conditions

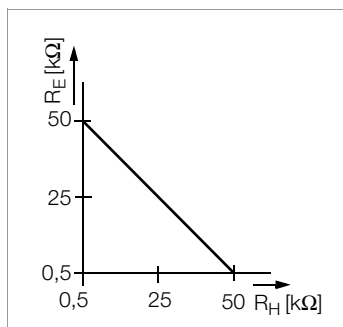
| | |
|---------------------|---------------|
| Battery Voltage | 5.5 V ± 1% |
| Ambient Temperature | + 23 °C ± 2 K |
| Relative Humidity | 40 ... 60% |

Nominal Ranges of Use

| | |
|------------------------|---|
| Temperature Range | 0 °C ... + 40 °C |
| Battery Voltage | 4.5 ... 6.5 V |
| Line Frequency | 50 Hz ± 0.2 Hz |
| Line Voltage Waveshape | sine (deviation between RMS and rectified value < 1%) |

Nominal Conditions of Use

| | |
|---|--|
| Series Mode | |
| Interference Voltage | < 3 V AC DC |
| Additional Error caused by Probe and Auxiliary Earth Electrode Resistance | < 5% of ($R_E + R_A + R_P$) |
| Max. Probe Resistance | < 70 kΩ |
| Max. Auxiliary Earth Electrode Resistance | < 50 kΩ |
| Max. Earth and Auxiliary Earth Electrode Resistance | ≤ 50 kΩ, see Figure R_E as a function of R_H |



Ambient Conditions

| | |
|-----------------------|--------------------------------------|
| Operating Temperature | -10 ... + 50 °C |
| Storage Temperature | -20 ... + 60 °C (without batteries) |
| Relative Humidity | max. 75%, no condensation allowed |
| Elevation | max. 2000 m |

Power Supply

| | |
|--------------------------------|---|
| Batteries | 4 ea. 1.5 V C-size (4 x C-Size) (alkaline-manganese per IEC LR14) |
| Battery Voltage | 4.6 ... 6.5 V |
| Battery Service Life | 30 h or 1000 measurements at R_E (with 10 s on-time, each measurement performed until the instrument switches off automatically, without display illumination) |
| Rechargeable Batteries | NiCd or NiMH |
| Battery Charger (not included) | NA 102 (Article No. Z501N), 3.5 mm jack plug |
| Charging Voltage | 9 V |
| Charging Time | approx. 9 hours |

As a rule, fewer measurements can be performed with rechargeable batteries due to their limited charging capacity.

Electrical Safety

| | |
|--------------------|--------------------|
| Safety Class | II per IEC 61010-1 |
| Operating Voltage | 250 V |
| Test Voltage | 2.3 kV |
| Measuring Category | 250 V CAT II |
| Pollution Degree | 2 |
| Fuse | F0.1H250V |

Data Interface

| | |
|--------|---|
| Type | infrared interface (SIR/IrDa) bidirectional, half-duplex |
| Format | 9600 baud, 1 start bit, 1 stop bit, 8 data bits, no parity, no handshake |
| Range | max. 10 cm recommended distance: < 4 cm |

Mechanical Design

| | |
|------------|--|
| Display | multiple dot matrix display, 128 x 64 pixels (65 mm x 38 mm), illuminated |
| Dimensions | 275 mm x 140 mm x 65 mm |
| Weight | approx. 1.2 kg with batteries |
| Protection | housing: IP 54 per EN 60529 with pressure compensating diaphragm of microporous ePTFE, non-ageing, 8 mm dia. in battery compartment lid |

Extract from table on the meaning of IP codes

| IP XY (1 st digit X) | Protection against foreign object entry | IP XY (2 nd digit Y) | Protection against the penetration of water |
|------------------------------------|--|------------------------------------|--|
| 3 | ≥ 2.5 mm Ø | 3 | spraying water |
| 4 | ≥ 1.0 mm Ø | 4 | splashing water |
| 5 | dust protected | 5 | water jets |

Standard Equipment

- GEOHM[®]C test instrument
- carrying strap
- set of batteries
- factory calibration certificate
- set of comprehensive instructions covering the following topics:
 - Measurement of earth resistance with instructions for 3 and 4-wire methods, with physical considerations regarding the potential gradient area as related to dissipation resistance of grounding systems of various size, with important tips for the performance of measurements on difficult terrain
 - Measurement of soil resistivity with geologic analysis and calculation of dissipation resistance
 - Measurement of ohmic resistance

The free PC starter software WinProfi is used for communication with GEOHM[®]C.

WinProfi is available on our website (web address is indicated under item „Order Information“) with the following content and functions:

- up-to-date test instrument software
 - for loading other user interface languages
 - for loading firmware version updates
- Transmission of measured data from test instrument to PC

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Accessories

E-Set 3, Earth Testing Set



E-Set 4, Earth Testing Set



E-Set 5, Earth Testing Set



Order Information

| Designation | Type | Article Number |
|--|----------------------|-----------------|
| Basic Instrument | | |
| Digital Earth Tester | GEOHM [®] C | M590A |
| Add-Ons | | |
| IR interface for connection to a USB port at a PC for data exchange between the PC and the GEOHM [®] C, e.g. for software updates to the tester or visualization of measurement values at the PC | IrDa-USB Converter | Z501J |
| Accessories | | |
| Adapter for charging batteries inside the GEOHM [®] C | NA102 | Z501N |
| Hard-shell case with compartment for one C series test instrument and accessories | HC30-C | Z541C |
| Earth testing set: Synthetic leather case with 2 reels, two 25 measurement cables, one 40 m measurement cable, two 3 m measurement cables, 4 earth spikes (zinc plated), 2 spike pullers and 1 hammer | E-Set 3 | GTZ3301005R0001 |
| Earth testing set: Synthetic leather case with 2 reels, two 25 m cables, one 40 m cable, two 3 m measurement cables and 4 earth drills | E-Set 4 | Z590A |
| Earth testing set: Carrying case accommodating GEOHM [®] C 1 drum with 25 m measurement cable 2 drums with 50 m measurement cable each, 4 measurement cables, 3 x 0.5 m long, 1 x 2 m long 1 test clamp 4 earth drills, each 350 mm long 1 dust cloth 2 pads of earth testing measurement data forms | E-Set 5 | Z590B |
| Reel with 25 m measurement cable and banana plugs at both ends | TR25 | GTZ3303000R0001 |
| Drum with 50 m measurement cable, banana plug / jack socket | TR50 | GTY1040014E34 |
| Earth drill, 35 cm long, can be connected by means of 4 mm banana plugs | SP350 | GTZ3304000R0001 |
| PC Analysis Software | | |
| http://www.gossenmetrawatt.com (→ Products → Electrical Testing → Insulation, Grounding, Low Ohmic ... → GEOHM C) or http://www.gossenmetrawatt.com (→ Products → Software → Software for Testers) | | |

For additional information on accessories, please refer to

- our *Measuring Instruments and Testers Catalog*
- our *website www.gossenmetrawatt.com*

Edited in Germany • Subject to change without notice • A pdf version is available on the internet.