

METRISO G1000+

Insulation, Low Resistance and Voltage Measurement Instrument

3-349-635-03
3/5.12

- Insulation measurement per IEC/EN 61557-2
- Test voltages in fixed increments, variable or as a ramp 50 V, 100 V, 250 V, 500 V, 1000 V
- Polarization index and absorption ratio
- Backlit dot matrix display
- Digital display of measured and limit values
- Timer function 1 s ... 100 min
- Signalling of dangerous contact voltage
- **Overvoltage protection**
Protects the instrument in the event of inadvertent connection to mains power
 - Fuse link for all resistance measuring ranges
 - Electronic fuse for the protection of low resistance and resistance measurement R_{LO} and R
- Voltage measurement up to 1000 V
- Low resistance measurement per IEC 61557-4
- Guard terminal for compensating surface current
- **Compact and rugged**
For service calls under harsh conditions and laboratory use
- Test resistance of 10 M Ω per EN 50110
- Structurable memory
- Integrated in ETC memory



Application

The insulation and resistance measuring instrument allows for quick and effective testing of protective measures in accordance with DIN VDE 0100, ÖVE-EN 1 (Austria), NIV/NIN SEV 1000 (Switzerland) and regulations specific to other countries as well. The instrument complies with IEC/EN 61557 regulations:

Part 1: General requirements

Part 2: Insulation resistance

Part 4: Resistance at earthing conductors, protective conductors and equipotential bonding

Part 10: Electric safety in low voltage systems up to AC 1000 V and DC 1500 V – Equipment for testing, measuring and monitoring protective measures

as well as requirements per VDE 0701-0702:

Repair, modification and testing of electrical devices

The insulation measuring instruments are suitable for the following tasks:

- Measurement of insulation resistance at voltage-free devices and systems, up to 1000 V depending upon variant
- Checking of test objects for absence of voltage in systems up to 1 kV
- Testing of the resistance of earthing conductors, protective conductors and equipotential bonding
- Testing of electrostatic discharge capacity at floor coverings (using shielded measurement cables) – EN 1081
- With the so-called 1 mA test per DIN VDE 0845/EN 61645, the instrument also allows to perform on-site tests of the response voltage of overvoltage components (varistors, Zener diodes, etc.) of requirement categories B and C / SPD Type 2 and 3) and to evaluate the test results in accordance with manufacturer's data.

Features Overview

| METRISO G1000+ | Article number | M550B |
|---|----------------|--------------------|
| Measurements | | |
| R_{ISO} Ufixed = 50, 100, 250, 500, 1000 V (Limit values VDE 0100) | | ✓ |
| R_{ISO} Uvariable = 50 ... 1000 V (Limit value+ = 1 MOhm) | | ✓ |
| R_{ISO} Uramp = 50 ... 1000 V Display of breakdown voltage | | ✓ |
| PI/DAR Polarization Index Measurement | | ✓ |
| R 10 ... 10 k Ω | | ✓ |
| R_{LO} 0,01 ... 10 Ω (Limit value VDE 0100) | | ✓ |
| U 0 ... 1000 V | | ✓ |
| Display functions | | |
| Backlit display | | ✓ |
| Limit value LED (green/red) for: Additional acoustic signal, limit values per VDE 0100 | | R_{ISO} R_{LO} |
| Limit value LED Uramp for: Signalling of ramp sequence | | R_{ISO} |
| LED for dangerous contact voltage (when switched off) | | ✓ |
| Battery level display | | ✓ |
| Special functions | | |
| Discharge of capacitive devices under test | | ✓ |
| Safety shutdown (UBatt < 8 V) | | ✓ |
| Data storage in the instrument (database max. 50,000 structural elements) | | ✓ |
| Features | | |
| Measuring category CAT II 1000 V / CAT III 600 V | | ✓ |
| 10 M Ω test resistor | | ✓ |
| Terminals: charging socket, USB interfacee (slave), RS232 interface | | ✓ |
| DKD calibration certificate | | ✓ |

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Polarization Index

A polarization index test is recommended for electrical machines with coil modules (generator and motor coils). This procedure involves expanded testing of insulation resistance. A reduced insulation resistance is an indication of humidity absorption and fouling.

To this end, the DC measuring voltage of the **METRISO G1000+** is applied to the insulation for a duration of 10 minutes. The respective measured value is read after one and after ten minutes. If the insulation is faultless, the value measured after ten minutes is higher than the value measured after one minute. The relationship between the two measurement values is the polarization index.

Charged material within the insulation is aligned due to the application of DC measuring voltage over a long period of time, resulting in polarization. The polarization index indicates whether or not

the charged material contained in the insulation can still be moved, thus allowing for polarization. This, in turn, is an indication of the condition of the insulation. The more the charged material can be moved, the better is the state of the insulation.

Discharging of Capacitive DUTs

Capacitive devices under test such as cables and coils which may charge up to test voltage are discharged via the test instrument while the voltage decrease can be monitored at the display.

Data Management and Report Generation

A complete distribution structure with customer, building and distributor data can be set up in the test instrument. This structure allows for the assignment of measurements to the distributors of different buildings and customers.

Characteristic Values

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| Meas. Qty. | U _{ISO} | | | | Range | Measuring Range | Resolution | Test Current | Intrinsic Uncertainty | Measuring Uncertainty | Overload Capacity |
|------------------|--|-------|---------------------|-------|--|------------------------------------|------------------|-------------------------|-----------------------|-----------------------|---------------------------------|
| R _{ISO} | 50 V 100 V 250 V / 500 V 1000 V | 100 k | 10 kΩ ... 99.9 kΩ | 0.1 k | I _N = 1 mA I _K ≤ 5 mA | ±(5% rdg. + 3 d) | ±(7% rdg. + 3 d) | 1000 V AC/DC TRMS | | | |
| | | 1 M | 100 kΩ ... 999 kΩ | 1 k | | | | | | | |
| | | 10 M | 1.00 MΩ ... 9.99 MΩ | 10 k | | | | | | | |
| | | 100 M | 10.0 MΩ ... 99.9 MΩ | 100 k | | | | | | | |
| | | 1 G | 100 MΩ ... 999 MΩ | 1 M | | | | | | | |
| | | 10 G | 1.00 GΩ ... 9.99 GΩ | 10 M | | | | | | | |
| | | 100 G | 10.0 GΩ ... 99.9 GΩ | 100 M | | | | | | | |
| | | 1 T | 100 GΩ ... 999 GΩ | 1 G | ±(8% rdg. + 3 d) ¹⁾ | ±(10% rdg. + 3 d) ¹⁾ | | | | | |
| | | | | | ±(25% rdg. + 5 d) ¹⁾ | ±(50% rdg. + 20 d) ¹⁾²⁾ | | | | | |
| U AC/DC | | | | | 100 V | 10.0 V ... 99.9 V | 0.1 V | | ±(2.5% rdg. + 3 d) | ±(5% rdg. + 3 d) | 1000 V AC/DC TRMS ³⁾ |
| | | | | | 1000 V | 100 V ... 999 V | 1 V | | | | |
| R _{LO} | | | | | 10 Ω | 0.17 ... 9.99 Ω | 0.01 Ω | I _N ≥ 200 mA | ±(2.5% rdg. + 3 d) | ±(5% rdg. + 3 d) | 1000 V AC/DC TRMS |
| R | Display range as of 01.0 Ω | | | | 100 Ω | 10.0 ... 99.9 Ω | 0.1 Ω | I _N ≥ 1 mA | ±(2.5% rdg. + 3 d) | ±(5% rdg. + 3 d) | 1000 V AC/DC TRMS |
| | | | | | 1 kΩ | 100 ... 999 Ω | 1 Ω | | | | |
| | | | | | 10 kΩ | 1.00 ... 9.99 kΩ | 10 Ω | | | | |

¹⁾ the indicated accuracy is only achieved with the shielded high-resistance measuring cable KS-C (article no. Z541F)* as optional accessory.

²⁾ does not conform to DIN EN 61557-2

³⁾ display range up to 1.2 kV

Breakdown Voltage (Uramp)

| Parameter | Range | Intrinsic Uncertainty | Measuring Uncertainty |
|--------------------|--|-----------------------|-----------------------|
| Voltage range | 100 ... 1000 V | ±(10% rdg. + 8 d) | ±(15% rdg. + 10 d) |
| Rise time | 5 ... 30 s | — | — |
| Measuring duration | 1 ... 120 s / auto / permanent measurement | — | — |

Polarization Index (PI), Absorption Ratio (DAR)

| | t1 [min] | t2 [min] | Limit [min] |
|-----|----------|----------|---|
| PI | 01:00 | 10:00 | > 4.0 / > 3.0 / > 2.0 / > 1.5 / > 1.1 / > 1.0 |
| DAR | 00:30 | 01:00 | > 1.60 / > 1.25 |

PI and DAR are calculated values. The specifications of the insulation measurement apply.

Reference Conditions

| | |
|-----------------------------|--|
| Reference temperature | + 23 °C ± 3 K |
| Relative humidity | 40 ... 75 % |
| Measured quantity frequency | 45 Hz ... 65 Hz |
| Measured quantity waveshape | Sine, deviation between TRMS and rectified value < 1 % |
| Battery voltage | 9.5 V ± 0.1 V |
| Test resistor | 10 MΩ ± 1 % |

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Electrical Safety

| | |
|--------------------|---|
| Protection class | II per IEC/EN 61 010-1 |
| Pollution degree | 2 |
| Measuring category | CAT II 1000 V / CAT III 600 V |
| Fuses | |
| Fuse link | FF315mA/1000V, effective in all resistance measuring ranges, 1 additional replacement fuse in the battery compartment |
| Elektronik fuse | for protecting low-resistance and resistance measurement R_{LO} and R |


Ambient Conditions

| | |
|----------------------------|--|
| Accuracy temperature range | 0 ... +40 °C |
| Operating temperatures | -10 ... +50 °C |
| Storage temperatures | -25 ... +70 °C (without batteries) |
| Relative humidity | up to 75% (max. 85% during storage/transport), no condensation allowed |
| Elevation | max. 2000 m |
| Calibration interval | 1 year (recommended) |

Electromagnetic Compatibility (EMC)

| | |
|-----------------------|--------------------------|
| Interference emission | EN 61 326-1:2006 class B |
| Interference immunity | EN 61326-1:2006 |

Displays

| | |
|---|---|
| Digital display | Multiple display via dot matrix 128 x 128 pixels, backlit (transflective); Dimensions: 65 mm x 65 mm |
| LED Limit | LED lights up red to indicate an exceeded limit value LED lights up green to indicate adherence to the limit value |
| LED  | LED lights up red to indicate the presence of an external voltage (with the instrument switched off) or high test voltage during insulation measurement (Riso/Rins, PI and DAR) at the measuring terminals |
| LED Uramp | LED lights up green to indicate the ramp sequence, LED lights up red to indicate the interruption of the ramp sequence (e. g. in case of breakdown) |


Mechanical Design

| | |
|------------|--|
| Dimensions | 225 mm x 130 mm x 140 mm |
| Weight | approx. 1.5 kg with (rechargeable) batteries |
| Protection | Housing IP 52, measurement cables and connectors IP 40 per DIN VDE 0470 part 1/ EN 60529 |

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 Penetration by Water |
|------------------------------------|---|------------------------------------|---|
| 2 | ≥ 12.5 mm dia. | 2 | Dripping (at 15° angle) |
| 3 | ≥ 2.5 mm dia. | 3 | Spraying water |
| 4 | ≥ 1.0 mm dia. | 4 | Splashing water |
| 5 | Dust protected | 5 | Jet-water |

Power Supply

| | |
|---|---|
| Batteries (rechargeable batteries as an option) | 8 ea. 1.5 V mignon cell (8 ea. size AA) (alkaline manganese per IEC LR14) or 8 rechargeable NiMH batteries |
| Battery charger Z502R (as an option) | Broad band charger with jack plug, Input: 100 ... 240 V AC; Output: 16.5 V DC, 1 A (Mascot) |
| Nominal range of use | 8 ... 12 V |
| Battery test | Battery capacity display with battery symbol in 4 segments „  “. Querying of momentary battery voltage via menu function. |
| Battery saver circuit | Automatic shutdown of display illumination after 10 ... 30 seconds (after the last time the rotary switch is actuated) can be set in the SETUP menu. The test instrument is automatically switched to the standby mode when the measured value remains unchanged for approx. 15 minutes and none of the controls are activated during this time. The instrument switches off automatically if the measured value remains constant for a lengthy period of time and no key or rotary switch is activated for seconds during on-time. |
| Service life | for R_{INS} (1000 V/1 M Ω), R_{LO} with 25 s on-time and 1 subsequent measurement each for a duration of 5 seconds: – with a set of batteries (alkaline manganese): 400 measurements – with a set of rechargeable batteries (2200 mAh): 650 measurements |
| Safety shutdown | If supply voltage is too low ($U < 8$ V), the instrument is switched off, or cannot be switched on. |
| Charging socket | Inserted rechargeable batteries can be directly recharged by connecting a charger to the charging socket: Charger MPRO MxTRA G1000+ (Z502R) |
| Charging time | approx. 2 hours * |

* maximum charging time for totally depleted batteries.
A timer in the charger restricts the charging time to a maximum of 4 hours

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Data Interfaces

Type USB slave for PC connection
 Type RS232 for barcode and RFID scanners

Applicable Regulations and Standards

| | |
|---|--|
| IEC 61010-1/ EN 61010-1 VDE 0411-1 | Safety requirements for electrical equipment for measurement, control and laboratory use Part 1: General requirements (IEC 61010-1:2010 + Cor. :2011); German edition EN 61010-1:2010 Part 31: Safety requirements for handheld measuring and testing accessories (IEC 61010-031:2002 + A1:2008); German edition EN 61010-031:2002 + A1:2008 |
| IEC 61557/ EN 61557/ VDE 0413 | Part 1: General requirements (IEC 61557-1:2007); German edition EN 61557-1:2007 Part 2: Insulation resistance (IEC 61557-2:2007); German edition EN 61557-2:2007 Part 4: Resistance of earth conductors, protective conductors and equipotential bonding conductors (IEC 61557-4:2007); German edition EN 61557-4:2007 Part 10: Electrical safety in low voltage systems up to AC 1000 V and DC 1500 V – Equipment for testing, measuring or monitoring protective measures (IEC 61557-10:2000); German edition EN 61557-10:2001 |
| EN 1081 | Testing of electrostatic discharge capacity for floor coverings in potentially explosive atmospheres |
| EN 60529 VDE 0470-1 | Test instruments and test procedures Degrees of 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 |

Scope of delivery

- 1 Insulation and resistance measuring instrument
- 1 DKD calibration certificate
- 1 Set of batteries
- 1 Carrying strap
- 1 Alligator clip
- 1 Cable set KS17-4
- 1 Condensed operating instructions
- 1 CD ROM with the following content:
 - comprehensive operating instructions
 - data sheet

Accessories (not included)

Akku-Pack Master Z502H



Charger G1000+ (Z502R)



ISO Kalibrator 1

Calibration adapter for the rapid, efficient testing of the accuracy of measuring instruments for insulation resistance and low-impedance resistances.



Cable Set KS-C

Cable set consisting of measurement cable and high resistance measuring cable, for measurements in the G-Ω range.



Cable Set KS24

Cable set KS 24 consists of a 4 m long extension cable with a permanently mounted test probe at one end and a contact protected socket at the opposite end, as well as an alligator clip for plugging onto the test probe.

Telem 1



METRISO G1000+ Insulation, Low Resistance and Voltage Measurement Instrument



Floor Probe

The 1081 floor probe can be used for measuring the resistance of insulating floors in accordance with DIN VDE 0100 Part 600 and EN 1081.

Reel TR25



Drum with Measurement Cable TR50



50m measurement cable coiled around a metal drum. Connection to one end of the cable is accomplished with a jack which is integrated into the drum. The other end is equipped with a banana plug. The drum axle with handle can be removed for space saving storage. Cable resistance component can be compensated for in selector switch position R_{LO} .

Test Probe for Remote Triggering Z550A

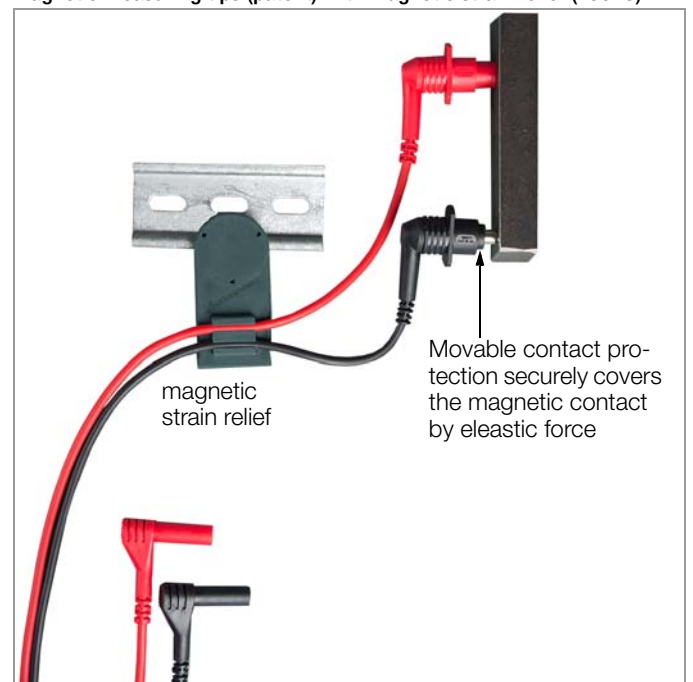
Connection example: module slot for METRISO G ...



Operating Case METRISO G (Z550C)



Magnetic measuring tips (patent) with magnetic strain relief (Z502U)



METRISO G1000+

Insulation, Low Resistance and Voltage Measurement Instrument

Order Information

| Description | Type | Article Number |
|--|--|-----------------|
| Insulation measuring instrument for DIN VDE 0100, ÖVE-EN 1 (Austria), NIV/NIN SEV 1000 (Switzerland), complies with IEC/EN 61 557/VDE 0413, parts 1+2+4+10 | | |
| Test voltage up to 1000 V, voltage measurement up to 1000 V, low-resistance measurement, measurement of polarity and absorption index | METRISO G1000+ | M550B |
| METRISO G1000+ (M550B) inclusive Test Probe for Remote Triggering (Z550A) and Operating Case (Z550C) | METRISO G1000+-Set | M550F |
| Accessories (not included) | | |
| 8 LSD NiMH batteries with reduced self-discharge (mignon cells, AA) (eneloop/Sanyo) ea. 2000 mAh with heat-sealed cells | Akku-Pack Master | Z502H |
| Charger for charging the rechargeable batteries inserted in the METRISO G1000+ Broad band charger Input: 100 ... 240 V AC; Output: 16.5 V DC, 1 A | Charger PROFITEST MASTER MPRO MXTRA G1000+ | Z502R |
| Calibration adapter for testing the accuracy of instruments used for measuring insulation resistances and low-resistance for test voltages up to 1000 V (per VDE 0413, part 1, 2 and part 4) | ISO-Kalibrator 1 | M662A |
| Cable set consisting of measurement cable and shielded high resistance measurement cable, for measurements in the GΩ range | KS-C | Z541F |
| Triangular probe for floor measurements per EN 1081, DIN VDE 0100 | 1081 probe | GTZ3196000R0001 |
| Cable set consisting of a 4 m long extension cable with a permanently attached test probe at one end and a contact protected socket at the other end, and 2 alligator clips which can be plugged onto the test probe | KS24 | GTZ3201000R0001 |
| Telescoping rod for PE measurement | Telearm 1 | GTZ3232000R0001 |
| Reel with 25 m measurement cable | TR25 reel | GTZ3303000R0001 |
| Drum with 50 m measurement cable | TR50 drum | GTY1040014E34 |
| Test probe with START/STOP key and an additional key for illuminating the measuring point, including shielded cable and test probe holder for carrying belt | Test Probe for Remote Triggering METRISO G | Z550A |
| Operating case for METRISO G500(MM)/G1000(+) with outer bag for measuring leads | Operating Case METRISO G | Z550C |

| Description | Type | Article Number |
|---|---------------------------------|-----------------|
| Magnetic Measuring Tip with contact protection – Set with magnetic holder 5,5 mm in diameter insulated with angled multilam plug according (for METRISO G series), CAT III 1.000 V / 4 A, temperature between –10 °C and 60 °C, under standard conditions and flat-head screws holding force 1.200 g vertical to contact area | Set 1 – Magnetic Measuring Tips | Z502U |
| Description | | |
| Type | | |
| Article Number | | |
| Report Generation Accessories (not included) | | |
| Barcode scanner for RS232 interface (laser sensor), variable barcode length, increased scanning accuracy, with coiled cable | Barcode-Profiscanner-RS232 | Z502F |
| Barcode scanner for RS232 interface (LED sensor) | Barcodeleser B3261 | GTZ3261000R0001 |
| RFID read/write for RS232 interface (13.56 MHz) | SCANBASE RFID | Z751G |
| For further information on barcode scanner, barcode printer and RFID scanner see separate datasheet „ID systems“ | | |
| PC Analysis Software | | |
| Additional information regarding software is available on the Internet at http://www.gossenmetrawatt.com (→ Products → Electrical Testing → Insulation; Grounding; Low Ohmic ... → METRISO G1000+) | | |
| or http://www.gossenmetrawatt.com (→ Products → Software → Software for Testers) | | |

For additional information on accessories, please refer to

- our website www.gossenmetrawatt.com

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