

# METRISO PRIME10

## High-Precision Insulation, Low-Resistance and Voltage Meter

3-349-923-03  
2/5.17

- **Insulation measurement** per EN 61557-2/VDE 0413, part 2
- Test voltage in fixed steps:  
50 V, 100 V, 250 V, 500 V, 1000 V, 2500 V, 5000 V, 10,000 V
- Measurement with incrementally rising voltage
- Measuring range up to 40 TΩ per IEC 61557-2
- Measurement of polarization index and absorption ratio
- Measurement with shielded measurement cable
- Protection against voltage conducting objects
- Variable adjustment of limit values
- Digital filter for stabilizing measured values
- Creation of R/I or R/U diagrams
- Storage of test results
- **Low-resistance measurement** per EN 61557-4/VDE 0413, part 4, continuity testing of protective conductors and equipotential bonding connections with a test current of > 200 mA

**CAT IV**

**CE**



### Applications

- Continuous display of measured insulation resistance or leakage current
- Automatic discharging of the device under test at the end of insulation testing
- Acoustic signal at 5 second intervals for quick generation of a time-resistance characteristic
- Adjustable measuring times of up to 99'59"
- Test times T1, T2 and T3 for measuring one or two absorption coefficients within a range of 1 to 600 s
- Polarization index (PI), absorption coefficients Ab1 and Ab2, dielectric absorption ratio (DAR)
- Display of momentarily applied test voltage during measurement
- Test current: 1.2 mA, 3 mA and 5 mA
- Insulation testing by means of 2 or 3-wire method
- Measurement can be conducted with measurement cables with lengths of up to 55 meters
- Automatic measurement of multi-core cables with the optional AutoISO-5000 test adapter (max. voltage: 5 kV)
- Capacitance measurement during RINS insulation test
- Measurement of temperature with probe as accessory
- Dielectric discharge (DD)
- Fault localization by means of pulse control mode
- Adjustable limit values for measured resistance values for  $R_{INS}$  und  $R_{CONT}$
- Measurement of leakage current during insulation test
- Direct and alternating voltage measurement from 0 to 750 V

- Graphic representation of insulation resistance at the display during measurement
- New memory structure with storage of measuring points, systems and customer data
- Use of a miniature Bluetooth keyboard (optional)
- 5.6" LCD display with background illumination
- Keyboard illumination
- Mains operation or with rechargeable lithium-ion battery
- Internal quick charger

### Applicable Regulations and Standards

<b>IEC 61010-1/EN 61010-1/ VDE 0411-1</b>	Safety requirements for electrical equipment for measurement, control and laboratory use – General requirements
<b>DIN EN 61557 / VDE0413</b>	Part 1:2007-12 General requirements Part 2:2008-02 Insulation resistance measuring instruments Part 4:2007-12 Instruments for measuring resistance at earthing conductors, protective conductors and equipotential bonding Part 10: 2001-12 Combined measuring equipment for testing, measuring or monitoring protective measures
<b>EN 60529 VDE 0470, part 1</b>	Test instruments and test procedures Degrees of protection provided by enclosures (IP code)
<b>DIN EN 61326-1 VDE 0843-20-1</b>	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements

# METRISO PRIME10

## High-Precision Insulation, Low-Resistance and Voltage Meter

### Characteristic Values

#### Alternating/Direct Voltage Measurement

Displayed Range	Resolution	Intrinsic Uncertainty
0.0 V ... 29.9 V	0.1 V	±(2% rdg. + 20 digits)
30.0 V ... 299.9 V	0.1 V	±(2% rdg. + 6 digits)
300 V ... 750 V	1 V	±(2% rdg. + 2 digits)

- Frequency range: 45 ... 65 Hz

#### Insulation Resistance Measurement

Test voltage accuracy ( $R_{\text{obs}} [\Omega] \geq 1000 \cdot U_N [V]$ ):  
-0, +10% of the selected value

Measuring range per IEC 61557-2:

$U_N = 10,000 \text{ V}$ : 10.0 M $\Omega$  ... 40.0 T $\Omega$

Measurement with Rising Alternating Voltage with AutoISO-5000 ( $U_{\text{INS}} \leq 5 \text{ kV}$ )

Displayed Range	Resolution	Intrinsic Uncertainty
000 k $\Omega$ ... 999 k $\Omega$	1 k $\Omega$	±(3% rdg. + 10 digits)
1.00 M $\Omega$ ... 9.99 M $\Omega$	0.01 M $\Omega$	
10.0 M $\Omega$ ... 9.9 M $\Omega$	0.1 M $\Omega$	
100 M $\Omega$ ... 999 M $\Omega$	1 M $\Omega$	
1.00 G $\Omega$ ... 9.99 G $\Omega$	0.01 G $\Omega$	
10.0 G $\Omega$ ... 99.9 G $\Omega$	0.1 G $\Omega$	±(3.5% rdg. + 10 digits)
100 G $\Omega$ ... 999 G $\Omega$	1 G $\Omega$	
1.00 T $\Omega$ ... 9.99 T $\Omega$	0.01 T $\Omega$	±(7.5% rdg. + 10 digits)
10.0 T $\Omega$ ... 40.0 T $\Omega$ where $U_N = 10 \text{ kV}$	0.1 T $\Omega$	±(12.5% rdg. + 10 digits)

Intrinsic uncertainty can be calculated for all other voltages using the following formula:

$$\delta_R = \pm(3\% + (U_{\text{INS}} / (U_{\text{INS}} - R_{\text{zm}} \cdot 21 \cdot 10^{-12}) - 1) \cdot 100\%) \pm 10 \text{ digits}$$

Where:

$U_{\text{INS}}$  = selected test voltage [V]

$R_{\text{zm}}$  = measured resistance [ $\Omega$ ]

Maximum values for measured resistance depend on the selected test voltage. See following list:

Voltage	Measuring Range	Measuring Range for AutoISO-5000
50 V	200 G $\Omega$	20.0 G $\Omega$
100 V	400 G $\Omega$	40.0 G $\Omega$
250 V	1.00 T $\Omega$	100 G $\Omega$
500 V	2.00 T $\Omega$	200 G $\Omega$
1000 V	4.00 T $\Omega$	400 G $\Omega$
2500 V	10.0 T $\Omega$	400 G $\Omega$
5000 V	20.0 T $\Omega$	400 G $\Omega$
10000 V	40.0 T $\Omega$	

**Note:** No degree of accuracy is specified for the  $R_{\text{INS}0\text{min}}$  measurement because the test instrument conducts this measurement with a selectable test current. This results in the following calculation:

$$R_{\text{ISO min}} = \frac{U_{\text{ISO nom}}}{I_{\text{ISO nom}}}$$

Where:

$R_{\text{INS}0\text{min}}$  = minimum insulation resistance measured without current limiting

$U_{\text{INS}0\text{nom}}$  = nominal test voltage

$I_{\text{INS}0\text{nom}}$  = nominal test current (1.2, 3 or 5 mA)

- Additional intrinsic uncertainty of 3-wire measurement (caused by "G" connection): 0.05% caused by reduced leakage current via 250 k $\Omega$  resistor with a measurement via 100 M $\Omega$  and a test voltage of 50 V
- Max. short-circuit current: 6 mA ±15%
- Remaining charge at objects depends on test current: 1.2, 3, 5 mA

#### Measurements with AutoISO-5000

Displayed Range	Resolution	Intrinsic Uncertainty
000 k $\Omega$ ... 999 k $\Omega$	1 k $\Omega$	±(3% rdg. + 10 digits) due to the tester ± 1% additional uncertainty due to the AutoISO-5000
1.00 M $\Omega$ ... 9.99 M $\Omega$	0.01 M $\Omega$	
10.0 M $\Omega$ ... 99.9 M $\Omega$	0.1 M $\Omega$	
100 M $\Omega$ ... 999 M $\Omega$	1 M $\Omega$	
1.00 G $\Omega$ ... 9.99 G $\Omega$	0.01 G $\Omega$	
10.0 G $\Omega$ ... 99.9 G $\Omega$	0.1 G $\Omega$	±(3% rdg. + 10 digits) due to the tester ± 5% additional uncertainty due to the AutoISO-5000
100 G $\Omega$ ... up to the value at which additional uncertainty of the AutoISO-5000 amounts to 5%	1 G $\Omega$	

#### Leakage Current Measurement

Displayed Range	Resolution	Intrinsic Uncertainty
0 ... 1.2 mA	*	**
0 ... 3 mA		
0 ... 5 mA		

\* The measurement's resolution and electrical unit of measure result from the measuring range and the individual insulation resistance value.

\*\* Calculation is based on the resistance measurement.

#### Capacitance Measurement

Displayed Range	Resolution	Intrinsic Uncertainty
0 nF ... 999 nF	1 nF	±(5% rdg. + 5 digits)
1.00 $\mu$ F ... 49.99 $\mu$ F	0.01 $\mu$ F	

- Capacitance measurements are conducted during RISO measurements (while the device under test is being discharged).
- Intrinsic uncertainty of the measurement corresponds to a measured capacitance value and a resistance of greater than 10 M $\Omega$  connected in parallel.
- No measuring error has been defined for measuring voltages of less than 100 V.
- Cable length L is calculated as  $C/C_x$ , and intrinsic uncertainty depends on the measuring range.
- Time constant TC is calculated as  $R_{\text{ins}} \cdot C$ , and intrinsic uncertainty depends on the measuring range.

## High-Precision Insulation, Low-Resistance and Voltage Meter

### Protective Conductor and Equipotential Bonding Conductor Measurements with $\pm 200$ mA Test Current

Measuring range per IEC 61557-4: 0.12  $\Omega$  ... 999  $\Omega$

Displayed Range	Resolution	Intrinsic Uncertainty
0.00 $\Omega$ ... 19.99 $\Omega$	0.01 $\Omega$	$\pm(2\% \text{ rdg.} + 3 \text{ digits})$
20.0 $\Omega$ ... 199.9 $\Omega$	0.1 $\Omega$	$\pm(2\% \text{ rdg.} + 3 \text{ digits})$
200 $\Omega$ ... 999 $\Omega$	1 $\Omega$	$\pm(4\% \text{ rdg.} + 3 \text{ digits})$

- Voltage with open connections: 4 V ... 24 V
- Output current where  $R < 15 \Omega$ : min. 200 mA ( $I_{SC}$ : 200 mA ... 250 mA).
- Measuring current flows bidirectionally, average resistance appears at the display.
- Compensation of measurement cables by means of offset balancing

### Temperature Measurement with sensor Z555J

Displayed Range	Resolution	Intrinsic Uncertainty
-40.0 ... 99.9 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	$\pm(3\% \text{ rdg.} + 8 \text{ digits})$
-40.0 ... 211.8 $^{\circ}\text{F}$	0.1 $^{\circ}\text{F}$	$\pm(3\% \text{ rdg.} + 16 \text{ digits})$

### Reference Conditions

Reference temperature	+23 $^{\circ}\text{C} \pm 2 \text{ }^{\circ}\text{C}$
Relative humidity	40% ... 60%
Measured quantity frequency	45 Hz ... 65 Hz
Measured quantity waveform	Sinusoidal
Battery voltage	Lithium-ion, 14.8 V, 5.3 Ah

### Electrical Safety

Protection category	II (double, compliant with EN 61010-1 and IEC 61557)
Pollution degree	2
Measuring category:	CAT IV 600 V (CAT III 1000 V) per IEC 61010-1

### Power Supply

Rechargeable battery	Lithium-ion, 14.8 V, 5.3 Ah, permanently installed
Battery test	Yes
Energy content	78 Wh
	Number of $R_{INS}$ measurements per EN 61557-2 with battery operation: at least 1000 measurements
Mains power	90 ... 260 V, 50/60 Hz, 178 W
Safety shutdown	< 11 V

### Ambient Conditions

Operating temp. range	-20 $^{\circ}\text{C}$ ... +50 $^{\circ}\text{C}$
Storage temp. range	-25 $^{\circ}\text{C}$ ... +70 $^{\circ}\text{C}$
Relative humidity	20% ... 80%, no condensation allowed
Elevation	$\leq 3000$ m

### Electromagnetic Compatibility (EMC)

Interference emission	EN 61326-1:2013, class A
Interference immunity	EN 61326-1:2013 EN 61326-2-2:2013

### Display Devices

Display	LCD segment display
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### Mechanical Design

Dimensions	390 x 310 x 180 mm
Weight	Approx. 7 kg
Protection	Per EN 60529 IP 40 (IP 67 for closed housing)

### Excerpt from Table on the Meaning of IP Codes

IP XY (1 <sup>st</sup> digit X)	Protection Against Foreign Object Ingress	IP XY (2 <sup>nd</sup> digit Y)	Protection Against Water Ingress
0	Not protected	0	Not protected
1	$\geq 50.0$ mm dia.	1	Vertically falling droplets
2	$\geq 12.5$ mm dia.	2	Dripping (15° angle)
3	$\geq 2.5$ mm dia.	3	Spraying water
4	$\geq 1.0$ mm dia.	4	Splashing water
5	Dust protected	5	Jet-water
6	Dust-proof	6	Powerful water jets
		7	Occasional submersion

### Applicable Regulations and Standards

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Quality standards for design, engineering and manufacturing are compliant with ISO 9001, ISO 14001 and PN-N-18001.

# METRISO PRIME10

## High-Precision Insulation, Low-Resistance and Voltage Meter

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### Scope of Delivery

- 1 **METRISO PRIME 10**
- 1 Set of measurement cables consisting of:
  - 11 kV cable, 3 m, (CAT IV 1000 V), with banana plug sockets, red
  - 11 kV cable, 3 m, shielded, (CAT IV 1000 V),  
with banana plug sockets, black
  - 10 kV “E” cable, 3 m, (CAT IV 1000 V),  
with banana plug sockets, blue
- 3 Alligator clips, 5.5 kV, 32 A (CAT IV 1000 V), black, red and blue
- 2 Test probes, 5.5 kV, 32 A  
with banana plug socket, red and black
- 1 Temperature probe (Z555J)
- 1 USB cable
- 1 Power cable, 230 V
- 1 Accessories pouch
- 1 Set of operating instructions
- 1 Calibration certificate
- 1 Safety data sheet
- 1 Transport document for lithium-ion batteries
- 1 Supplement safety information on measuring accessories

# METRISO PRIME10

## High-Precision Insulation, Low-Resistance and Voltage Meter

### Order Information

Description	Type	Article Number
Measurement of insulation resistance up to 40 TΩ, freely selectable test voltage from 50 to 10,000 V, auto-ranging, automatic capacitance discharging, PI / DAR, adjustable time interval, 1.2, 3 or 5 mA test current, capacitance and temperature measurement, calculation of dielectric discharging DD, digital filter, low-resistance measurement, voltage measurement from 0 to 750 V AC/DC, adjustable limit values, graphic LCD, memory management, CAT IV 600 V, IP 40, measuring case with accessories	<b>METRISO PRIME 10</b>	M555A
<b>Accessory Measurement Cables</b>		
10 kV measurement lead, CAT IV 1000 V, 3 m, red, banana plugs	MCABLE-3m-red	Z555A
10 kV measurement lead, CAT IV 1000 V, 3 m, black, banana plugs	MCABLE-3m-black	Z555B
10 kV E measurement lead, CAT IV 1000 V, 3 m, blue, banana plugs	E-MCABLE-3m-blue	Z555C
10 kV measurement lead, CAT IV 1000 V, shielded, 5 m, black, banana plugs	MCABLE-5m-black	Z555L
10 kV measurement lead, CAT IV 1000 V, 5 m, red, banana plugs	MCABLE-5m-red	Z555M
10 kV measurement lead, CAT IV 1000 V, 5 m, blue, banana plugs	MCABLE-5m-blue	Z555N
10 kV measurement lead, CAT IV 1000 V, shielded, 10 m, black, banana plugs	MCABLE-10m-black	Z555O
10 kV measurement lead, CAT IV 1000 V, 10 m, red, banana plugs	MCABLE-10m-red	Z555P
10 kV measurement lead, CAT IV 1000 V, 10 m, blue, banana plugs	MCABLE-10m-blue	Z555R
10 kV measurement lead, CAT IV 1000 V, shielded, 20 m, black, banana plugs	MCABLE-20m-black	Z555S
10 kV measurement lead, CAT IV 1000 V, 20 m, red, banana plugs	MCABLE-20m-red	Z555T
10 kV measurement lead, CAT IV 1000 V, 20 m, blue, banana plugs	MCABLE-20m-blue	Z555U
10 kV measurement cable, CAT IV 1000 V, shielded, 55 m, black, banana plugs	MCABLE-10KV-black	Z556M
10 kV measurement cable, CAT IV 1000 V, shielded, 55 m, red, banana plugs	MCABLE-10KV-red	Z556N
10 kV measurement cable, CAT IV 1000 V, shielded, 55 m, blue, banana plugs	MCABLE-10KV-blue	Z556O

Description	Type	Article Number
<b>Accessory Test Probes and Alligator Clips</b>		
5.5 kV test probe, banana plug socket, red	PINPROBE-red	Z555G
5.5 kV test probe, banana plug socket, black	PINPROBE-black	Z555H
5.5 kV alligator clip, CAT IV 1000 V, blue	CROCODILECLIP-blue	Z555D
5.5 kV alligator clip, CAT IV 1000 V, red	CROCODILECLIP-red	Z555E
5.5 kV alligator clip, CAT IV 1000 V, black	CROCODILECLIP-black	Z555F
5.5 kV alligator clip, CAT IV 1000 V, yellow	CROCODILECLIP-yellow	Z556L
<b>Accessory Adapters and Sensors</b>		
Test adapter for <b>METRISO PRIME 10</b> measuring instrument, permits automated test sequence for insulation measurement at multi-core cables	AutoISO-5000	Z555Z
<b>METRISO PRIME 10</b> temperature probe with 2 m connector cable	Temperature probe METRISO PRIME 10	Z555J
<b>Accessories Pouch</b>		
Universal carrying pouch for accessories	CASE <b>METRISO PRIME 10</b>	Z555K
Backpack for <b>METRISO PRIME 10</b> measuring instrument and accessories	<b>METRISO PRIME 10</b> Backpack	Z556K

For additional information regarding accessories please refer to:

- [www.gossenmetrawatt.com](http://www.gossenmetrawatt.com)

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## High-Precision Insulation, Low-Resistance and Voltage Meter

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Prepared in Germany • Subject to change without notice • PDF version available on the Internet

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