

METRATESTER[®] 5

Tester for DIN VDE 0701 and 0702

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Applications

Electrical safety testing of electrical equipment:

per **DIN VDE 0701-1: 2000** and **DIN VDE 0702: 2004**
by means of measurement of:

- Protective conductor resistance
- Insulation resistance
- Protective conductor current
 - equivalent leakage current method
 - residual current method
- Contact current

per **DIN VDE 0701 Part 240** by testing of:

- absence of voltage by means of current measurement

as well as measurement of the following **performance quantities**:

- Line voltage
- Load current



QUALITY MANAGEMENT SYSTEM



DQS certified per
DIN EN ISO 9001 Reg. No.1262



Features

Convenient Connection

The test instrument is intended for the testing and measurement of repaired or modified devices. The device under test is connected to the measuring instrument via the integrated test socket. The quick connector safety jacks are wired in parallel to the test socket and provide for measurements at DUTs without earthing contact plugs, or at permanently connected DUTs. The DUT is connected to the integrated mains outlet at the test instrument for testing for the absence of voltage at exposed, conductive parts (per DIN VDE 0701 Part 240), as well as for load current measurement.

Contacting Surface for Contact Finger

Protective conductor potential can be tested with the contact finger contacting surface. The PE signal lamp lights up if a potential difference of greater than 100 V occurs between the contacting surface and the earthing contact at the mains outlet.

Rugged Design

This handy instrument is equipped with a compact plastic housing with a fold-out carrying handle. Mains and measurement cables are permanently connected. The mains cable can be wound onto a cable holder at the back of the housing, and the measurement cables can be stowed in the integrated cable compartment. The measured quantity is selected with the rotary switch.

Safety Devices

Thermal overload protection to 253 V in all ranges (except for 16 A). The test instrument can be immediately placed back into service after the overload has been eliminated. Excessive temperatures are displayed at the LCD. The PE signal lamp indicates whether or not voltage is present at the mains protective conductor.

Display Functions

All measurement values are read out to a large digital display for easy reading. Beyond this, exceeded limit values are signalled optically as well as acoustically in some cases.

Residual Current Measurement

Measurement of differential current complies with regulations per DIN VDE 0701-1: 2000 and DIN VDE 0702: 2004.

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Applicable Regulations and Standards

IEC 61 010-1 DIN EN 61 010-1/ VDE 0411-1	Safety regulations for measuring, control, regulating, and laboratory devices – general requirements
DIN VDE 0404	Devices for technical safety inspection of electrical equipment
DIN VDE 0470 Part 1	Test instruments and test methods – degree of protection provided by enclosures (IP code)
DIN EN 61 326 VDE 0843 Part 20	Electrical equipment for measurement, control and laboratory use – EMC requirements

Regulations and Standards for Use of the Test Instrument

DIN VDE 0701 Part 1: 2000-9 Part 240	Repair, modification and testing of electrical devices, general requirements, information technology devices
DIN VDE 0702: 2004	Periodic testing of electrical devices
BGV A2 (VBG 4)	Trade association regulations for accident prevention

Characteristic Values

Measured Quantity	Measuring Range	Resolution	U _{NO-LOAD}	R _i	I _k	I _N
PE resistance	0 ... 19.99 Ω	10 mΩ	< 20 V –	—		> 200 mA
Insulation resistance	0.05 ... 19.99 MΩ	10 kΩ	600 V –	approx. 100 kΩ	< 10 mA	> 1 mA
Equivalent leakage current	0 ... 19.99 mA ~	10 μA	28 V ~	2 kΩ	< 20 mA	—
Substantiation of absence of voltage by means of current measurement (contact/leakage current)	0 ... 1.999 mA ~	1 μA		2 kΩ		
Residual current	0.01...19.99mA ~	10 μA				

Field Measurements

Measured Quantity	Measuring Range	Resolution
Line voltage	207 ... 253 V ~	1 V
Load current at mains outlet	0 ... 16.00 A ~	10 mA

Overload Capacity

Consumer current via mains outlet, differential current	19 A, 5 min.
All other measuring quantities	250 V permanent

Intrinsic Error and Service Error

Measured Quantity	Intrinsic Error	Service Error
Protective conductor resistance	± (2.5% rdg. + 2 d)	± (10% rdg. + 5 d)
Insulation resistance 0 ... 19.99 MΩ	± (2.5% rdg. + 2 d)	± (10% rdg. + 5 d)
Equivalent leakage current	± (2.5% rdg. + 2 d)	± (10% rdg. + 5 d)
Substantiation of absence of voltage by means of contact current measurement	± (2.5% rdg. + 2 d)	± (10% rdg. + 5 d)
Residual current	± (4% rdg. + 5 d)	± (10% rdg. + 5 d)
Line voltage	± (2.5% rdg. + 2 d)	± (10% rdg. + 5 d)
Load current at mains outlet	± (2.5% rdg. + 2 d)	± (10% rdg. + 5 d)

Influence Quantities and Influence Error

Influence quantity / sphere of influence	Designation per DIN VDE 0404	Influence error ± ... % of measured value
Change of position	E1	—
Change in supply voltage of test equipment	E2	2.5
Temperature fluctuations 0 ... 21 °C and 25 ... 40 °C	E3	indicated influence errors apply for a change in temperature of 10 K each: 1 for protective conductor resistance 0.5 for all other measuring ranges
Level of DUT current	E4	2.5
Low-frequency magnetic fields	E5	2.5
Impedance of DUT	E6	2.5
Capacitance during insulation measurements	E7	2.5
Waveshape of measured current	E8	
49 ... 51 Hz		2 for capacitive load (for equivalent leakage current)
45 ... 100 Hz		1 (for contact current) 2.5 for all other measuring ranges

Reference Conditions

Ambient Temperature	+23 °C ± 2 K
Relative Humidity	40 ... 60 %
Line Voltage	230 V ± 1 %
Measured Quantity	
Frequency	50 Hz ± 0.2 %
Measured Quantity	
Waveshape	sine (deviation between effective and rectified value ± 0.5%)

Ambient Conditions

Service Temperatures	–10 ... + 55 °C
Storage Temperatures	–25 ... + 70 °C
Relative Humidity	max. 75%, no condensation allowed
Elevation	to 2000 m

Power Supply

Line Voltage	230 V / 50 Hz
Throughput Rating	max. 3700 VA, dependent upon load at mains outlet

Electrical Safety

Safety Class	II
Nominal Line Voltage	230 V
Test Voltage	mains + PE (mains) + 2 mA for testing for the absence of voltage at test socket, connector jacks for phase and protective conductors and pick-off clip: 3 kV~ mains to PE (mains) + 2 mA socket: 1.5 kV~
Measuring Category	II
Fouling Factor	2
Safety Shutdown	if the test instrument overheats

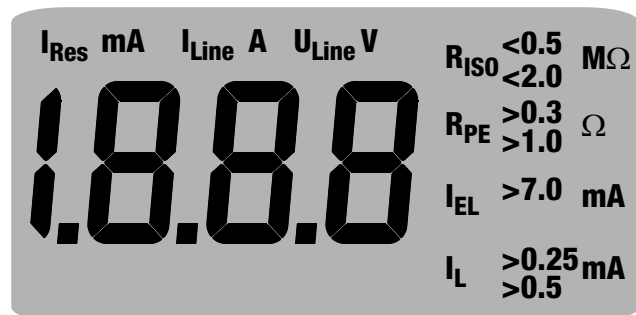
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Display and Signaling Devices

LCD

Display Range 0 ... 1999 digits, 3½ places
 Character Height 17 mm and special characters
 Overflow indicated at display with „OL“ symbol
 ExcessiveTemp. for long duration short-circuit:
 “R_{iso}” and “MΩ” segments blink



Display text subject to change without notice.

PE Signal Lamp

Indicates whether voltage is present at the mains protective conductor.

The following limit values are indicated

Measurement	Error Condition Per Standard	Test Instrument Indicates When Limit Values Are Exceeded		
		Red Error Lamp Continuously Lit	Limit Values are Displayed	Continuous Acoustic Signal (Beeper)
Protective Conductor Resistance	R _{PE} > 0.3 Ω ¹⁾	•	> 0.3 Ω	—
	R _{PE} > 1 Ω ²⁾	•	> 1 Ω	•
Insulation Resistance	Heating ³⁾ : R _{ISO} < 0.3 MΩ	•	< 0.5 MΩ ⁴⁾	•
	SCI: R _{ISO} < 1.0 MΩ	•	< 2.0 MΩ	—
	SCII: R _{ISO} < 2.0 MΩ	—	< 2.0 MΩ	—
Equivalent Leakage Current	I _{EL} > 3.5 mA	•	—	—
		•	> 7.0 mA ⁵⁾	•
Leakage/Contact Current (Substantiation of Absence of Voltage)	Part 240: I _L > 0.25 mA	•	> 0.25 mA	—
	I _L > 0.5 mA	•	> 0.5 mA	•
Differential Current	I _{Diff} ≥ 3.5 mA	•	—	•

¹⁾ Resistance between housing and mains plug in connector cables up to a length of 5 m

²⁾ For extension cables, there is an additional resistance of 0.1 Ω for each additional 7.5 m, up to a maximum, however, of 1 Ω.

³⁾ For safety class I devices with activated heating elements (if heating power > 3 kW and R_{ISO} < 0.3 MΩ: leakage current measurement required)

⁴⁾ Limit value per DIN VDE 0702:1995

⁵⁾ This limit value applies for all-pole switches (corresponds to a doubling of the limit value or, respectively, a 50% reduction in the actual measuring current)

Mechanical Design

Dimensions W x H x D: 190 mm x 140 mm x 95 mm
 Weight 1.3 kg
 Protection Housing: IP 40, terminals: IP 20
 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
2	≥ 12.5 mm Ø	0	not protected
4	≥ 1.0 mm Ø	0	not protected

Electromagnetic Compatibility EMC

Product standard EN 61326-1: 1997
 EN 61326: 1997/A1: 1998

Interference Emission		Class
EN 55022		A
Interference Immunity	Test Value	Power Feature
EN 61000-4-2	Contact/Air – 4 kV/8 kV	B
EN 61000-4-3	10 V/m	B
EN 61000-4-4	Mains Connection – 2 kV	B
EN 61000-4-5	Mains Connection – 1 kV	A
EN 61000-4-6	Mains Connection – 3 V	B
EN 61000-4-11	0.5 Period / 100%	A

Standard Equipment

- 1 test instrument
- 1 operating instructions

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Accessories

Brush Probe



The brush probe is suitable for contacting exposed conductive parts which rotate or vibrate during operation, e.g. drill chucks, vibrating sanders and tool mounts. The brush must be plugged onto the test

probe.

KS13 Cable Set



The KS 13 cable set consists of an adapter socket with 3 permanently connected cables, 3 measurement cables, 3 plug-on pick-off clips and 2 plug-on test probes. With the KS 13, the test instrument and the device under test can be

connected even if no earthing contact socket is available for the mains connection, or no earthing contact plug is present at the device under test.

Order Information

Designation	Type	Article Number
Device for testing the electrical safety of electric equipment per DIN VDE 0701 and DIN VDE 0702	METRATESTER 5	M700D
Same as METRATESTER®5 as panel mount version	METRATESTER®5-F-E	M700T
Accessory		
Probe for the measurement of protective conductor resistance, e.g. on rotating DUTs	Brush probe	Z745G
Cable set for mains connection without earthing contact outlet and for connecting DUTs, consisting of adapter socket with 3 permanently connected cables, 3 measurement cables, 3 plug-on pick-off clips, 2 plug-on test probes	KS13	GTY 3624 065 P01

Please refer to our *Measuring Instruments and Testers Catalog* for additional information concerning accessories.