

METRISO™ 5000 D-PI

Digital High-Voltage Insulation Tester

3-349-209-03
1/11.02

- Large measuring range from 0.1 MΩ ... 1 TΩ
- Variable test voltages, or in fixed steps of 100 V, 250 V, 500 V, 1.0 kV, 1.5 kV, 2.0 kV, 2.5 kV, 5.0 kV
- Polarization index and absorption ratio
- Voltage measurements to 1000 V
- Frequency measurement from 15 Hz to 1 kHz
- Capacitance measurement from 0.1 to 5 μF
- Measurement of electrical discharge
- Guard terminal for the elimination of surface currents
- 5 m extension cable included as accessory
- Supply power from mains, internal set of storage batteries or external 12 V supply
- Backlit dot matrix display
- Digital display of measured values and limit values, characteristic curve display for polarization index
- Timer function: 1 second to 100 minutes



Applications

Insulation measurement in large systems, and for cables, motors, generators etc.

Features

Test Voltages to 5000 V

The instrument is suitable for non-destructive measurement of insulation resistance in electrical systems, as well as in machines, transformers, cables and electrical equipment utilized in, for example, locomotives, street cars and ocean going vessels with selectable test voltages of up to 5 kV.

Voltage Measurement to 1000 V

Testing for absence of voltage at the device under test in systems of up to 1 kV can be performed with the voltage measuring range.

Discharging Capacitive Devices Under Test

Capacitive devices under test such as cables and coils, which may be charged by the test voltage, are discharged by the measuring instrument. The falling voltage value can be observed at the display.

Measurements per EN 61557 Parts 1 and 2 (VDE 0413)

Nominal current amounts to 1 mA at a test voltage of 100 V, 250 V, 500 V or 1000 V.

Highly Insulated Measurement Cables

The highly insulated measurement cables are permanently connected for safety reasons, and due to technical measuring considerations. Danger resulting from inadvertently disconnected cables, for example in the event of charging caused by capacitive devices under test, is thus avoided.

Polarization Index

A polarization index test is recommended for electrical machines. This procedure involves expanded testing of insulation resistance. DC measuring voltage from the METRISO™ 5000 D-PI is applied to the insulation for a duration of 10 minutes. Measured values are documented after one minute, and after ten minutes. If the insulation is good, 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 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.

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Characteristic Values

Measuring Ranges:

Standard	DIN EN 61557-1:1998-05 DIN EN 61557-2:1998-05
VDE Regulation	VDE 0413 Part 1:1998-05 VDE 0413 Part 2:1998-05

Insulation Resistance

Display Range [Ω]	Measuring Range	Test Voltage	Intrinsic Error	Measuring Error
0.00 M ... 50.0 G	0.10 M ... 10.0 G	100 V ... 250 V	±(10% rdg.+5 d)	±(15% rdg. + 7 d)
	>10.0 G ... 50.0 G		±(25% rdg.+5 d)	±(50% rdg. + 20 d)
0.00 M ... 250 G	0.10 M ... 50.0 G	> 250 V ... 1.00 kV	±(7% rdg.+5 d)	±(10% rdg. + 7 d)
	>50.0 G ... 250 G		±(25% rdg.+5 d)	±(50% rdg. + 20 d)
0.00 M ... 999 G	0.10 M ... 200 G	>1.00 kV ... 5.00kV	±(7% rdg.+5 d)	±(10% rdg. + 7 d)
	>200 G ... 999 G		±(25% rdg.+5 d)	±(50% rdg. + 20 d)

Test duration: automatic (until measured value is stable),
manual (1 to 120 s) or continuous measurement (lock function)

Polarization Index (PI), Absorption Ratio (DAR)

	t1	t2	Limit
PI	00:00 ... 01:00 ... 99:50 min	00:00 ... 10:00 ... 99:50 min	0.10 ... 4.00 ... 9.80 min
DAR	00:00 ... 00:30 ... 99:50 min	00:00 ... 01:00 ... 99:50 min	0.10 ... 1.60 ... 9.80 min

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

Insulation Test Voltage

Nominal Values of Test Voltage	Variable Test Voltage	Nominal Current	Intrinsic Error
100 V, 250 V, 500 V, 1.00 kV		≥ 1.0 mA	0 ... +15% rdg.
1.50 kV, 2.00 kV, 2.50 kV		≥ 0.4 mA	± 5% rdg.
5.00 kV		≥ 0.1 mA	± 3.5% rdg.
	100 V...1.00 kV	≥ 1.0 mA	± 15% rdg.
	> 1.00 kV...2.50 kV	≥ 0.4 mA	± 5% rdg.
	> 2.50 kV...5.00 kV	≥ 0.1 mA	± 3.5% rdg.

Variable test voltages are adjustable in increments of 50 V
Short-circuit current up to 1.00 kV, test voltage < 2 mA

Voltage Measurement

Measuring range	Impedance	Intrinsic Error	Measuring Error
50 V ... 5.00 kV test voltage		±(2.5% rdg. + 5 d)	±(5% rdg. + 5 d)
50 V ... 1.00 kV ac/dc	1 MΩ	±(2.5% rdg. + 2 d)	±(5% rdg. + 5 d)

Frequency of measuring quantity: 15 Hz...1 kHz

Frequency Measurement

Measuring Range	Impedance	Intrinsic Error	Measuring Error
15.0 Hz ... 1.00 kHz	1 MΩ	±(0.5% rdg. + 2 d)	±(1% rdg. + 2 d)

Voltage of measuring quantity: 50 V ... 1 kV

Breakdown Voltage

Parameters	Setting Range	Intrinsic Error	Measuring Error
Voltage range	100 ... 5000 V	±(10% rdg. + 8 d)	±(15% rdg. + 10 d)
Rise time	1 ... 300 s	—	—
Measuring time	1 ... 120 s / cont. measurement	—	—

Capacitance Measurement

Display Range	Measuring Range	Test Voltage	Intrinsic Error	Measuring Error
0.00 ... 10.0 μF	0.10 ... 5.00 μF	100...450 V	±(10% rdg. + 5 d)	±(15% rdg. + 8 d)
		500...5 kV	±(5% rdg. + 5 d)	±(10% rdg. + 8 d)

Dielectric Discharge (DD)

	Limit
DD	0.10 ... 2.00 ... 9.80

Reference Conditions

Ambient temperature	+23 °C ± 2 K
Relative humidity	40 ... 60%
Measured quantity frequency	50 Hz ± 10 Hz (during voltage measurement)
Line voltage waveshape	Sinusoidal, deviation between RMS and rectified value < 1%

Power Supply

Line voltage	207 V ... 253 V (108 V ... 132 V in preparation)
Line frequency	45 Hz ... 65 Hz
Power consumption	< 16 VA
Storage batteries	NiMH 9.6 V, 3 Ah, charging period 6 hours
Number of measurements at nominal current as per VDE 0413	700

Ambient Conditions

Accuracy	0 °C ... + 40 °C
Operating temperature	-5 °C ... + 40 °C
Storage temperature	-20 °C ... + 60 °C (without batteries)
Relative humidity	max. 75%, no condensation allowed
Elevation	to 2000 m
Deployment	indoors, outdoors: only in the specified ambient conditions

Electrical Safety

Standard	IEC 1010-1:1990, IEC 1010-1/A2:1995 EN 61010-1:1993, EN 61010-1/A2:1995
VDE regulation	VDE 0411 Part 1, 1994-03
Safety class	II
Pollution degree	2
Protection	IP 40
Overvoltage category	Insulation measurement – 5000 V DC – no overvoltage Voltage measurement – 600 V – CAT III Voltage measurement – 1000 V – CAT II

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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	C
EN 61000-4-4	Mains Connection - 2 kV	B
EN 61000-4-5	Mains Connection - 1 kV	B
EN 61000-4-6	Mains Connection - 3 V	B
EN 61000-4-11	0.5 Period / 100%	A

Mechanical Design

Display Multiple display with dot matrix
128 x 64 pixels

Dimensions W x H x D:
255 mm x 133 mm x 240 mm

Weight approx. 5 kg with batteries

List of Available Features

Features		0	01	02	03	04	05	07	08	09	10	11	12	13	14	15	17	22	40	41	42	43
Country version (user interface language, mains plug type)	A		D	GB international	GBR UK	FRA F	NLD NL	ESP E	FIN FIN	SWE S	ITA I	NOR N	BEL B	DNK DK	CZE CZ	CHE CH	KRO HR	POL PL	Port P	Slo SLO	Slow SK	USA USA
Storage batteries (not with B1, B2)	C	w/o	with																			
DKD Calibration Certificate	E ¹⁾	w/o	with																			
„Guard 5000A“ Measuring cable	G	w/o	with																			
“LEADEX 5000” extension cable	H	w/o	with																			
SECUTEST™ PSI printer module	I	w/o	with																			
Automotive charging adapter (in prep.)	J	w/o	with																			

¹⁾ The test instrument can be recalibrated by our calibration department at any time. We recommend a calibration interval of 1 to 2 years.

Specify the designation of the basic M5810 instrument in your order, as well as any features which deviate from feature number 0!

Example of a complete type designation (= article number, = order code) for a METRISO™ 5000 D-PI:

- Test instrument for German speaking countries with DKD calibration certificate and SECUTEST™ PSI printer module:
M5810 A01 E1 I1

Included with Basic Instrument

- 1 high-voltage insulation measuring instrument with permanently connected measurement cables and test probes, 2 alligator clips (5 kV version)
- 1 mains power cable
- 1 interface cable
- 1 carrying strap
- 1 operating instructions

Examples of Test Selection and Display of Final Results

The image shows six screenshots of the instrument's LCD display. Each screenshot displays test parameters, results, and status indicators.

- Function:** Insulation Test, Polarisation Ind./DAR, Withstand/Breakdown, Capacitance/DD, Voltage Measurement.
- R_{INS}:** 2.86 GΩ. Status: Ready.
- U_{INS}:** < 25 V. Status: Ready.
- PI:** 5.21. Status: Ready.
- DAR:** 2.01. Status: Ready.
- U_D:** 600 V. Status: Ready.
- U_{TEST}:** 240 V. Status: Ready.
- C:** 1.00 μF. Status: Ready.
- DD:** 1.20. Status: Ready.
- U_~:** 232 V. Status: Ready.
- f:** 49.9 Hz. Status: Ready.

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Features and Accessories

Feature I1: SECUTEST™ PSI

Values measured by the test instrument can be printed from the PSI module and comments can be added with the alphanumeric keypad. The LCD at the test instrument is used as a display for the PSI module.

The PSI module is mounted inside the lid of the test instrument in a space-saving fashion.



Please request our data sheet for the SECUTEST™ PSI for additional information.

Feature H01: F2000 Carrying Pouch

The test instrument, the PSI module, plug inserts, measuring adapter, replacement batteries, recording chart paper and more can all be conveniently stored and transported with the F2000 carrying pouch.



ISO Calibrator 1

Calibration adapter for testing the accuracy of measurement instruments for insulation resistance and low impedance resistance for test voltages of up to 1000 V.



DA-II Printer Adapter

Reports can be generated without a PC with the help of the DA-II printer adapter. It allows for direct connection of external printers with Centronics interface to the RS232 interface at the test instrument. No external power supply is required.

Order Information

Designation	Type	ID Number
Digital high-voltage insulation measuring instrument (basic instrument) - see table on page 3 for features and add-ons	METRISO™ 5000 D-PI	M5810
Accessories		
Storage battery set		
Guard cable with plug and alligator clips	Guard 5000A	Z580C
5 m extension cable	Leadex 5000	Z580D
PSI module including 2 rolls recording chart, 1 printer ribbon cartridge, batteries and operating instructions	SECUTEST PSI	GTM5016000R0001
Printer adapter for direct connection of external printers with Centronics-Interface	DA-II	Z745M
Pack of 10 recording chart rolls for PSI module (1 roll approx. 6.7 meters)	PS-10P	GTZ 3229 000 R0001
Pack of 10 printer ribbon cartridges for PSI module	Z3210	GTZ 3210 000 R0001
Universal carrying pouch for METRISO™ 5000 D-PI, PROFITEST™ 0100S-II or PROFITEST 204	F2000 ^{D)}	Z700D
Automotive charging adapter in prep.		upon request
2 alligator clips (5 kV version)	KY 5000A	Z580B
Calibration adapter for test voltages of up to 1000 V	ISO Calibrator 1	M662A

^{D)} Data sheet available