

METRISO® 5000 D-PI

Digital High-Voltage Insulation Tester

 3-349-209-03
 3/6.03

- Large measuring range from $0.4 \text{ M}\Omega \dots 1 \text{ T}\Omega$
- 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 compensation 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	0.60 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	0.40 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	0.40 M ... 200 G	>1.00 kV ... 5.00 kV	±(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 [min]	t2 [min]	Limit [min]
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 ... +25% 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	5 ... 300 s	—	—
Measuring time	1 ... 120 s / auto / 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 500...5 kV	±(10% rdg. + 5 d) ±(5% rdg. + 5 d)	±(15% rdg. + 8 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 / 49 Hz ... 61 Hz or (depending on country-specific version) 108 V ... 132 V / 59 Hz ... 61 Hz
Power consumption	< 18 VA
Storage batteries	NiMH 9.6 V, 3 Ah, charging period 6 hours
Number of measurements at nominal current as per VDE 0413	700

Power Supply PROFITEST 204HP/HV

Line voltage	207 V ... 253 V / 49 Hz ... 61 Hz
Power consumption	PROFITEST 204HP/2.5kV: max. 700 VA PROFITEST 204HV/5.4kV: max. 100 VA

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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
Pollution degree	2
Protection	IP 40

METRISO® 5000 D-PI

Overvoltage category	Insulation measurement – 5000 V DC – no overvoltage Voltage measurement – 600 V – CAT III Voltage measurement – 1000 V – CAT II
Safety class	II

PROFITEST 204HP/HV

Safety class	I
Safety shutdown	if instrument overheats
Fuse	mains: F 3.15 / 250

Electromagnetic Compatibility (EMC) METRISO® 5000 D-PI

Product standard	EN 61326-1: 1997 EN 61326: 1997/A1: 1998
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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 METRISO® 5000 D-PI

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

Mechanical Design

METRISO® 5000 D-PI and PROFITEST 204HP/HV (Feature B1/B2)

Dimensions	PROFITEST 204HP/HV: W x D x H: 254 mm x 130 mm x 285 mm
	METRISO® 5000 D-PI and PROFITEST 204HP/HV completely mounted on Caddy204: W x D x H: 380 mm x 250 mm x 650 mm
Weight	PROFITEST 204HP/HV: approx. 8 kg
	METRISO® 5000 D-PI and PROFITEST HP/HV: completely assembled: approx. 13 kg

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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
PROFITEST204HP/2.5kV (not with C1)	B ²⁾	w/o	with																			
PROFITEST204HV/5.4kV (not with C1)	B ²⁾	w/o		with ⁴⁾																		
Storage batteries (not with B1, B2)	C	w/o	with																			
Caddy 204	D	w/o	with																			
DKD Calibration Certificate	E ¹⁾	w/o	with																			
„Signal 204“ External signal lamp	F ³⁾	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.

2) If the high-voltage module is purchased after the basic instrument, it can only be retrofitted by our service department.

3) The external signal lamp can only be connected to the high-voltage module (Feature B1 or B2).

4) Only for line voltage 207 V ... 253 V / 49 Hz ... 61 Hz

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

PC Program WinProfi for communication with METRISO®5000 D-PI

The PS3 CD ROM includes the PC program WinProfi (for this tester valid as from V2.2.9) with the following contents and functions:

- up-to-date test instrument software
 - for loading a different language
 - for loading an updated software version
- exchange of measurement data between test instrument and PC
- preparation and modification of templates for test reports at the PC and transmission of the templates to the test instrument
- preparation, printout and filing of test reports at the PC

Interface cable Z3241 is required for communication between test instrument and PC.

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Features and Accessories for High-Voltage Tests

Features B1 (PROFITEST 204HP-2.5kV) and B2 (204HV-5.4kV)
Expanded features for high-voltage tests



- Test voltage selectable in 50 V steps
- Rise time (ramp) adjustable from 0.1 to 99 s
- Test duration adjustable from 1 to 120 s
- Floating test voltage outputs
- Electronically controlled test sequence
- Test sequence can be started with test pistol
- Breakdown voltage display
- Pulse-arc operation
- Phase angle display
- Measured values can be saved to memory
- Acoustic and optical error messages
- Key switch for protection against unauthorized start-up
- Connector terminals for external signal lamps

Features B1 (PROFITEST 204HP-2.5kV)

- Voltage test per EN 60204 / VDE 0113
- Test power: 500 VA (intermittent)
- Breaking current adjustable in 1 mA steps

Features B2 (PROFITEST 204HV-5.4kV)

- Test power: 50 VA
- Breaking current adjustable in 0.5 mA steps

The respective high-voltage module which is firmly attached to the METRISO® 5000 D-PI basic instrument by the factory (i.e. it cannot be removed or subsequently fitted by the user) is intended for high-voltage testing.

Voltage, current and phase angle can be measured via fixed measuring cables.

Technical Data PROFITEST 204HP-2.5kV

	Nominal Range of Use	Resolution	Measuring Error	Intrinsic Error
Test Voltage U AC	250 V ... 2.5 kV	1 V 10 V	±(5% rdg. + 5 d)	±(2.5% rdg. + 5 d)
Meas. Quantity				
Current I AC	10.0 ... 200 mA	0.1 mA 1 mA	±(7% rdg. + 5 d)	±(5% rdg. + 5 d)

Technical Data PROFITEST 204HV-5.4 kV

	Nominal Range of Use	Resolution	Measuring Error	Intrinsic Error
Test Voltage U AC	650 V ... 1.00 kV 1.00 kV ... 5.35 kV	1 V 10 V	+2 ... -7% rdg. +2 ... -5% rdg.	0 ... -5% rdg. 0 ... -3% rdg.
Meas. Quantity				
Current I AC	1.0 ... 10.0 mA	0.01 mA 0.1 mA	±(7% rdg. + 5 d)	±(5% rdg. + 5 d)

Feature D: Trolley Caddy 204



Trolley for basic instrument combined with high-voltage module, includes cover with side pockets.

Feature F1: Signal 204



Signal lamp set mounted to a magnetic base for indicating high-voltage testing in accordance with DIN VDE 0104.

Accessory: Claim 204



Set of various items used to warn unauthorized persons and for securing large areas, machines or machine components during the performance of high-voltage testing.

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General 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.

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.



* this means the printer must be capable of interpreting characters, pure Windows printers are not suitable.

Order Information

Designation	Type	ID Number
Digital high-voltage insulation measuring instrument (basic instrument) - see table on page 4 for features and add-ons	METRISO® 5000 D-PI	M5810
Standard type available from stock, M5810 with Features A01 and C1	M5810-V001	M5810-V001
Accessories		
Trolley for PROFITEST 204 and 204HP/HV, including rubber straps for fastening test cables and protective hood	Caddy 204	Z504A
Signal lamp set mounted to a magnetic base for signalling high-voltage testing in accordance with DIN VDE 0104	Signal 204	Z504D
Plug-on cable lug for secure attachment of the test probe to terminals	Kabelschuh 204	Z504E
Emergency stop switch for PROFITEST 204HP/HV	STOP 204	Z504F
Set of items to secure high-voltage testing locations against unauthorized persons	Claim 204-Set	Z504G
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 ^{D)}	GTM5016000R0001
Printer adapter for direct connection of external printers with Centronics-Interface	DA-II	Z745M
Interface cable RS232, 2 m	Z3241	GTZ 3241 000 R0001
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
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

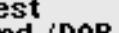
For further information on accessory equipment see our Catalog „Measuring Instruments and Testers“.

METRISO® 5000 D-PI

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Examples of Menu-driven Operation

Test Selection

Function      

Insulation Test

Polarisation Ind./DAR

Withstand/Breakdown

Capacitance/DD

Voltage Measurement

Setting of Parameters

Test voltage: U_{nom.}
U_{INS} : 5.00kV
Limit R_{INS}: 500MΩ
Test durat.: 60 s



MENU next,  **Change value**
START start tests, 

Display of Final Results

Insulation Test

R_{INS}  2.86 GΩ
U_{INS} < 25 V

R_{lim}: 500MΩ  U<25V TEST OK

High-Voltage Test Feature B1/B2

U_P  2.51 kV
I_P 0.6mA

U_{MAX}: 2.50kV  PHASE  TEST OK

IMAX: 100mA  Φ= --- TEST OK

Polarisation Index Test

PI  5.21
DAR  2.01

PI: 4.0 | DAR: 1.6  U<25V TEST OK

UN : 1.00kV

Measurement of Breakdown Voltage

U_D 600 V
U_{TEST} 240 V

t_{on} : 10.0 s  IN=1mA TEST IS
UN : 5.00kV  U>25V RUNNING..

Capacitance Measurement

C  1.00 μF
DD  1.20

CLim: 150nF  U<25V TEST OK

DDLim: 1.0

Voltage Measurement

U_~ 232 V
f 49.9 Hz

ton: DDDDD  MAX: 1000V TEST IS
tlim: 5.00 s  AC/DC RUNNING..

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Printed in Germany • Subject to change without notice

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