





Motor Repair Electrical Engineering Maintenance



The MotorAnalyzer-Class Unbeatable versatility

MotorAnalyzer 2	
All-purpose electric motor tester	
MotorAnalyzer 1	
All-purpose electric motor tester	
Product and accessory overview	

The MotorAnalyzer-Class

MotorAnalyzer 2 | All-purpose electric motor tester



USB PC I/O

Highlights

- 11 test methods
- surge voltage up to 3000V
- high-voltage DC up to 6000V
- large, very well-readable color display
- innovative handy input via rotary button
- structured menu and practical functioning buttons
- fully-automatic fault analysis
- · automatic switchover between the three motor connecting leads
- manual and automatic tests
- locating turn-to-turn faults
- adjusting the neutral zone
- rotary button for a quick test method selection
- integrated result storage for a subsequent transfer via USB-interface
- storing and printing of test results via PrintCom
- network or battery operation
- worldwide voltage supply 110V...250V / 47...63Hz
- low weight
- all-purpose solid case including all measuring leads "on board"

The all-purpose MotorAnalyzer 2 serves for checking electric motors and winding goods. It combines eleven different test methods within a user-friendly and mobile tester. The combination of test methods, its extremely compact design, as well as the battery operation turn the MotorAnalyzer into an ideal tool for the on-site operation, especially in difficult installation positions.

For checking a 3-phase motor the three winding connections and the motor's cabinet are connected to the tester. This should be performed in four-wire technology for a high-precise resistance measuring. Afterwards the MotorAnalyzer analyzes the motor fully-automatically via surge-voltage, resistance, and inductivity test. For this the MotorAnalyzer automatically switches the different test methods to the four measuring points one after another via its internal relay matrix. After this the motor is also tested automatically with a high-voltage test in order to evaluate the motor's quality quickly and clearly.

In addition to the motor test the MotorAnalyzer also assists in adjusting the brush holder at DC motors as well as in locating turn-to-turn faults.

The very compact case is sturdy and waterproof. On the right-hand side of the operating element there is a storage space. All measuring leads and test probes are stored here. Thus the operator can always access the necessary components during the measuring. For an optimum operator guidance the LEDs indicate the measuring leads that are activated for the respective measuring.





All control elements and connections are clearly arranged



Scanning and storing test results in Excel®



Large and high-contrast color display



Printing test results



inspection test of a pump motor

MotorAnalyzer 2 | 11 test methods in one tester

1 Automatic analysis

30.04.13	States and States	Automatik		75 %
Test	UV-VW	VW-UW	UV-UW	Prüfung bei
Widerstand	2.8 %	3.2 %	64 %	20°C
Induktivität	5%	5.2 %	25 %	100Hz
Surge	1.8 %	2.3 %	54 %	3000V
Fehler	OK	ОК	Kurzschluss	No.
Isolation	1	Riso < 1Moh	m	1000V
Details	U-V	V-W	W-U	Streubreite
Widerstand	0.563 Ω	0.575 Ω	0.572 Ω	1.9 %
Induktivität	11.41 mH	11.87 mH	4.98 mH	59 %

For the automatic test of a three-phase current motor the three winding connections and the motor cabinet have to be connected to the tester. The MotorAnalyzer analyzes the motor fully automatically via the resistance, inductivity, the surge-voltage, and the high-voltage test. It checks whether the winding is ohmically or inductively symmetrical. If the deviations of the three phases among each other are too large the motor is defect. In addition the electric strength within the winding and to the motor's cabinet is tested.

2 Surge test up to 3000V



For the inductive winding check the MotorAnalyzer generates surge pulses up to **3000V** that can be continuously adjusted. The patented automatic surge voltage comparison of the windings among each other or to a reference test object provides precise statements regarding the winding's symmetry. The MotorAnalyzer detects any nonsymmetries automatically.



The resistance test is performed with very high precision in fourwire technology. The symmetry evaluation of the three winding resistances or the comparison to a preset value is performed automatically. A temperature compensation converts the copper resistance to 20°Celsius if required. For the ambient temperature measuring an ambient temperature sensor has to be connected to the Motor Analyzer.

4 Inductivity test



The inductivity test is also performed in four-wire technology like the resistance test. The symmetry evaluation of the three winding inductivities or the comparison to a preset value is performed automatically.

5 High-voltage test DC



For the high-voltage test the MotorAnalyzer generates a very stable test voltage from 50 to **6000V** DC. At the automatic test the voltage is max. 3000V and at the manual test it is max. 6000V due to the test probes. The voltage can be set manually at the rotary button. Alternatively it can also be set automatically to a programmable value. A step voltage measuring is possible as well.

6 Insulation resistance test



For the insulation resistance test the MotorAnalyzer generates a very stable test voltage from 50 to 6000V DC. At the automatic test the voltage is max. 3000V and at the manual test it is max. 6000V due to the test probes. The voltage can be set manually at the rotary button. Alternatively it can also be set automatically to a programmable value. A step voltage measuring is possible as well.



Polarization index test



For the DAR and polarization index test the MotorAnalyzer generates a very stable test voltage from 50 to 6000V DC. The voltage can be set manually at the rotary button. Alternatively it can also be set automatically to a programmable value. The measuring time runs automatically.

8 Neutral zone setting



The graphic display of the brush holder's false position facilitates the adaptation of the "neutral zone" to direct current motors. Via a bar display with central point the user can directly see whether he is in the neutral zone or in which direction the brush holder needs to be turned.



By means of the induction test probe the operator locates the slots in which the turn-to-turn fault occurred. The probe also serves for measuring at the stator, an armature, or for searching the bar break at a squirrel-cage motor.

1 PE-resistance test



The PE-resistance test is performed with high precision in four-wire technology. It is measured with DC.

🕕 Rotary field test



At one- or three-phase motors it is displayed during the manual rotation of the motor shaft whether the shafts rotates to the left- or right-hand side.

Motor Repair Motor Repair

The MotorAnalyzer-Class

MotorAnalyzer 1 | All-purpose electric motor tester



Highlights

USB RS232 PC I/O

- ten test methods
- high-voltage up to 4KV
- fully automatic fault analysis
- · automatic switchover between the three motor connecting leads
- manual and automatic tests
- location of turn-to-turn-faults
- mains and/or battery operation
- · low weight
- can also be supplied in a sturdy measuring box
- rotary button for a quick test method selection
- integrated result storage for a later transfer via RS232- or USB-interface
- · storing and printing of test results via PrintCom

The MotorAnalyzer is an all-purpose tester for testing electric motors and winding products. It combines ten different test methods in a user-friendly, mobile tester. The combination of test methods, its very compact design, as well as the option of a battery operation turn the MotorAnalyzer into an ideal tool for the at-site use – especially at difficult installation positions.

For checking the three-phase current motor the three winding connections as well as the motor cabinet are connected to the tester. Afterwards the MotorAnalyzer analyzes the motor automatically via the surge and resistance test. After this a high-voltage test is also performed at the motor in order to evaluate the motor's quality quickly and clearly.



Search of a turn-to-turn fault at a stator with induction test probe





MotorAnalyzer 1-portable

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PrintCom – filing and printing test results in Excel®

With PrintCom you can protocol and store your test results quickly and comfortably:

- scanning test results
- storing test results in Excel®
- printing test results

For detailed information please look at page 68

Scanning and storing test results in Excel®



Motor test

Printing test results



MotorAnalyzer 1 with stator size 350

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The MotorAnalyzer-Class

MotorAnalyzer 1 | 10 test methods in one tester



1 Automatic analysis

Test	W 191		
∆ Surge	9%	0%	0%
Schluss	Ý	4	Ý
∆ Wider.	.0%	0%	0%
crigeonis	10		
SetUp	Hil	fe	0

For the automatic test of a three-phase current motor the three winding connections and the motor cabinet are connected to the tester. Afterwards the MotorAnalyzer analyzes the motor fully automatically via the surge and resistance test. It checks whether the winding is ohmically or inductively symmetrical. If the deviations of the three phases among each other are too large the motor is defect.

3 Resistance test



The resistance test is performed with high precision in four-wire technology. The symmetry evaluation of the three winding resistances or the comparison to a preset value is performed automatically. A temperature compensation converts the copper resistance to 20°Celsius if required.





4 High-voltage test DC



For the high-voltage test the MotorAnalyzer generates a very stable test voltage from 50 to 4000V DC. The voltage can be set manually at the rotary button. Alternatively it can also be set automatically to a programmable value.

2 Surge test



For the inductive winding check the MotorAnalyzer generates surge voltages with a low level. The patented automatic surge voltage comparison of the windings among each other or to a reference test object provides precise statements regarding the winding's symmetry. The MotorAnalyzer detects any nonsymmetries automatically.



I Polarization index test



For the DAR and polarization index test the MotorAnalyzer generates a very stable test voltage from 50 to 4000V DC. The voltage can be set manually at the rotary button. Alternatively it can also be set automatically to a programmable value.

6 Insulation resistance test





For the insulation resistance test the MotorAnalyzer generates a very stable test voltage from 50 to 4000V DC. The voltage can be set manually at the rotary button. Alternatively it can also be set automatically to a programmable value. A step voltage measuring is also possible.

6

PE-resistance test

SetUp VDE Hilfe



The PE-resistance test is performed with high precision in four-wire technology. It is measured with DC.

8 Neutral zone setting



The graphic display of the brush holder's false position facilitates the adaptation of the "neutral zone" to direct current motors. With the MotorAnalyzer it can thus be adjusted in a very user-friendly way. Via a bar display with central point the user can directly see whether he is in the neutral zone or in which direction the brush rocker needs to be turned.



9 Rotary field test



At one- or three-phase motors it is displayed during the manual rotation of the motor shaft whether the shafts rotates to the left- or right-hand side.

🕕 Turn-to-turn fault location



By means of the induction test probe the slots at the stator or armature are located in which the turn-to-turn fault occurred. The probe also serves for searching the bar break at a squirrel-cage motor.





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www.schleich.com

MotorAnalyzer 1 and 2 | Product and accessory overview



MotorAnalyzer 1



MotorAnalyzer 1 portable



MotorAnalyzer 2

		resistance Ω 1mΩ500KΩ four-wire measuring	low-voltage, surge voltage & autom. analysis	fault locating of the turn-to-turn fault	H	high voltage DC KV mA GQ	insulation resistance
Model	art. no.						
MotorAnalyzer 1	403101	0	• 12V	0		● 04KV	🚯 04KV DC
MotorAnalyzer 1 portable	403141	0	12V	0	•	04KV	🚯 04KV DC
MotorAnalyzer 2	403167	0	3000V	0		🔵 06KV	3 06KV DC
Test probes measuring leads							
4-wire measuring tips for armatures	4000395	0	—	—	—		—
4-wire Kelvin tongs set	40001100	0	—	_	_	_	_
A-wire Kelvin tongs small	4007209	0		_	_		

+ who kowin tongo oot	40001100	U					
4-wire Kelvin tongs small	4007209	0		—	—		_
4-wire Kelvin tongs medium	4007212	0	—	_	_	—	—
4-wire Kelvin tongs large	4007168	0	—	—	—	—	—
temperature sensor for the	403109	0	—	_	_	—	—
ambient temperature compensation							
turn-to-turn fault test probe 9mm	403106	—	—	0	—	—	—
turn-to-turn fault test probe 19mm	403107	_	—	0	_	—	—
turn-to-turn fault armature test probe	403123	—		0	—		_
Giga-Ohm measuring lead	403110	_	—	_	_	—	0
neutral zone measuring lead	403102	—	_	—	—		—
rotary field test probe for stator	403103	—		_	_		—
rotary field test probe for motor	403112	—					_

Accessories

foot switch	4010611
start buttons for test probe	403111
transport box for MA 1	403124
Netbook-holder for MA1-portable	403149
PrintCom PC-software	401871





				-3				
four-wire meas	suring tips	four-wire	Kelvin tongs	turn-	to-turn fault tes	t probe	Netbook holder	r
polarization	comparison assistance for the neutral zone at DC-motors	sense of rotation measuring at stator and motor	PE resistance mΩ ImΩ1Ω four-wire measuring	switch-over test methods test method test method switchover	clamps: U-V-W-body high-voltage	measuring lead with alligator clamps	measuring lead with test tips for the high-voltage	battery operation
3 04KV DC	4	Ø				7	2	
🚯 04KV DC	Ø	Ø	•	ě	ě	7	2	•
€ 06KV DC	0	0	•	•	0	7	2	•
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- included in the delivery extent
- **Φ** For increasing the measuring accuracy at resistances below 1Ω it is recommended to use four-wire Kelvin tongs in addition.
- **2** For locating the turn-to-turn fault an additional probe is required.
- 3 In order to measure insulation resistances above 100Ω more precisely an additional GigaOhm-measuring lead is recommended.
- For connecting the DC-motor an additional measuring lead is required.
- O For measuring the sense of rotation one additional probe is required for the stator measuring and one additional measuring lead for the motor measuring is required.
- **6** Switchover automatically up to 3KV. High-voltage test up to 6KV via separate test tips.
- \bigcirc measuring probes | measuring leads that need to be ordered in addition

— not available

MotorAnalyzer-Class Motor Repair

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Motor Repair Electrical Engineering Maintenance



Software & Accessories

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PrintCom | Software for MotorAnalyzer, GLP1 & GLP2



Highlights

- importing test results during the test and from the tester's intermediate storage
- storage of test results in the Excel[®] format during the production
- print of test results in Excel® via protocol samples
- several ready-made protocol samples included in the delivery extent
- freely configurable Excel® protocol samples to print test results
- different storage modes (single or collection results)
- OpenOffice[®]-/MS Excel[®] compatible software
- Windows 7[®] compliant

Archive and print test results in Excel®

PrintCom – the quickest and most comfortable way of protocolling and storing test results of MotorAnalyzer, GLP1- and GLP2high-voltage testers.

Importing

The software lists imported test results well-arranged on your computer screen.

Storing

The test results are user-friendly stored in the Excel® format. The basis are Excel® protocol samples preconfigured by us.

PrintCom offers you to adapt the protocol to you requirements by adding additional information or by means of an individual protocol layout, for example with your logo. In the delivery extent you will already find a large variety of easily adaptable samples. Of course, you can also create completely new protocols.

Printing

Owing to the integration of the test results in an Excel[®] file you are able to print your test results directly. Thus you can impressively document the tested quality to your customer.



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Test Protocol



An der Schleuse 11 DE-58675 Hemer Tel 02372 94980 Email info@schleich www.schleich.com

Versianianiana	4711
Kommissionsingmitter	4/11
Detenschernnummer	615
Bestell-Nr. / Kostenstelle	4567
Kunde	ISB Ingenieur-Búro-Bóhm
Straße	Alter Bösperder Weg 4a
Ort	58706 Menden
geprüft am	23.12.2011
Consentenabele	10

Elevelereshelere

Schritt	Methode	Prüfschrittbezeichnung	Grenzwert	Istwert	Prüfbedingung	Istwert	Prüfzeit	1.0.
1	PE	Schutzleiter an Schaltschranktür rechts	0,2 Ohm	0,08 Ohm	90A	10,1A	15	ю
2	PE	Schutzleiter an Schaltschranktür mitte	0,2 Ohm	0,07 Ohm	90A.	10,18	15	ю
3	PE	Schutzleiter an Schaitschranktür links	0,2 Ohm	0,11 Ohm	90A.	10,18	15	ю
4	ho	Isolationswiderstand L1 - PE	2 MOhm	30 MOhm	500V	905¥	11	ю
5	bo	Isolationswiderstand L2 - PE	2 MOhm	30 MOhm	500V	907V	15	ю
6	ho	Isolationswiderstand L3 - PE	2 MOhm	30 MOhm	500V	505V	15	ю
7	50	Isolationswiderstand N - PE	2 MOhm	30 MOhm	500V	506¥	15	ю
8	HY	Hochspennung L1 - PE	10mA	0,3mA	1500V	1525V	11	ю
9	HV	Hochspannung L2 - PE	10mA	0,3mA	1500V	1535V	15	ю
10	HY	Hochspannung L3 - PE	10mA	0,4mA	1500V	1510V	11	ю
11	HY	Hochspennung N - PE	10mA	0,3mA	1500V	1520V	15	ю
12	PE	Schutzleiterwiderstand Motor N1	0,2 Ohm	0,05 Ohm	90A	10,2A	13	ю
13	bo	Isolationswiderstand Notor M1: L1 - PE	2 MOhm	30 MOhm	500V	507V	15	ю
14	lso -	Isolationswiderstand Notor M1: L2 - PE	2 HOhm	30 MOhm	500V	505V	15	ю
15	bo	Isolationswiderstand Notor M1: L3- PE	2 MOhm	30 MOhm	500V	510V	15	ю
16	Iso	Isolationswiderstand Notor M1: N - PE	2 MOhm	30 MOhm	500V	308V	15	ю
17	HV	Hochspannung Motor M1: L1 - PE	10mA	0,2mA	1500V	1530V	15	ю
18	HY	Hochspannung Motor M1: L2 - PE	10mA	0,2mA	1500V	1535V	15	ю
19	HY	Hochspennung Motor M1: L3 - PE	10mA	0,2mA	1500V	1515V	11	ю
20	HY	Hochspannung Motor M1; N - PE	10mA	0,3mA	1500V	1510V	15	ю
21	PE .	Schutzleiterwiderstand Klemme X1:4-PE	0,2 Ohm	0,05 Ohm	90A	10,2A	15	ю
22	PE	Schutzleiterwiderstand Klemme X1:5 -PE	0.2 Ohm	0.06 Chm	90A	10.18	15	10

Die gewissenhafte Durchführung aller Prüfungen wird hiermit bestätigt.



Unleschill Pollemane

Geprüt mit einem Frühystem von SCHLEICH Gintel Einselt von FinnCom - Copyright SCHLEICH Gintel 28.12.2011 Seite 1 von 1

Connecting versions







PrintCom with MotorAnalyzer



Lead Contactings



Highlights

- · various standard contactings
- mechanical solid and persistent design
- four-wire contactings Kelvin clamps
- · customized solutions based on our standard solutions
- fast exchange of consumables

A typical task is the contacting of stripped line ends because test objects are often only equipped with line ends without a plug connection.

For contacting free line ends we can provide a wide range of clamp devices, for example for the application of stators' winding connections. They can be equipped in two- as well as four-wiretechnology.

When low resistances are to be exactly measured Kelvin clamps are used for the four-wire-measuring. The four-wire-technology compensates the transition resistances within the clamping points.

Our Kelvin clamps' special design guarantees high contact reliability, solid clamping, and a low wear and tear in the rough testing operation. Less exacting contactings are operated with our multi-purpose clamping levers.

The contactings can be supplied as loose single contacting or integrated within a clamp block. The clamp blocks can either be assembled in a fixed position within the test cover or can be moved flexibly within the testing space to always have the optimum position for being clamped to the lines.



Examples for Kelvin clamps, clamping levers, and modular contact blocks



clamp block in modular design



Kelvin clamps in small-, medium-, and large-sized design



clamp block in modular design



8-times Kelvin clamps block



Kelvin contacting in one test cage with prism



11-times clamping lever block



6-times four-wire contacting guide and 4-times clamping lever block

Test Pistols | Test Probes | Safety Accessories



High-voltage

Safety pistols are required for a safe manual high-voltage test. Depending on the test voltage level there are different models.

To achieve a particular high usability we provide test pistols with an integrated start button. Here the high-voltage test only starts after activating the button.



high-voltage test pistol without start button



high-voltage test pistol with start button



high-voltage test pistol with start through mechanical press button



high-voltage test pistol up to 8KV AC/10KV DC



adaptor between test object and test pistol



high-voltage test pistol up to 12KV AC/15KV DC



high-voltage test probe up to 1500V safety current limited



high-voltage connection lead



Warning- result lights

Warning lights show whether the test object is under voltage or voltage-free.

Result lights show the total test result of the test process. Customized special displays, which can also be controlled by the tester, are also within our product range.



warning or result light, horizontal



warning or result light, vertical



Due to safety reasons a two-hand start is used at the high-voltage test without protection cover and safety test pistols. When operating test stations the corresponding standards have to be considered.



two-hand start



safety barrier with warning message



two-hand start support with warning light and emergency stop



barrier post with warning light and emergency stop



Rolling Tables



Highlights

- solid design made of aluminum profiles
- continuously height adjustable table plates and bottoms
- horizontal or diagonal table plate designs
- diagonal table plate with horizontal front e.g. to deposit a keyboard
- · continuously height adjustable drawers with full extension
- · continuously height adjustable holder for test probe
- · continuously height adjustable windings for measuring leads
- integrated LED-warning light in the side rails
- delivery of assembled, directly usable rolling tables
- rolling tables and carriages of the company hera

Rolling tables facilitate the transport of testers that can also be combined with a test cover between the test objects. A high level usability is achieved by the large, high-resistant and lockable rubber guide rollers as well as an optional push handle at the table's front.

The rolling tables can additionally be equipped with self-closing drawer runners, in which e.g. adaptors, tools, or documentations can be stored.





rolling table with horizontal work plate and push handle

rolling table with horizontal work plate, push handle and a LED warning light integrated in the bars





rolling table with diagonal work plate and integrated high-voltage test



rolling table with diagonal work plate and drawer element



rolling table with diagonal work plate, drawer element and cable holders



rolling table with integrated test cover, push handle, LED-warning light in the bars and holders for cables, test pistols, and test probes



rolling table with integrated test cover, drawer element and cable holders

Black Boxes



black box for PE



black box for $\mathsf{PE} \mid \mathsf{IR} \mid \mathsf{HV}$



back box HV for test pistols



calibration resistor in four-wire-technology



calibration resistor high-voltage proof



high-current calibration resistor in four-wire-technology

Black Boxes

For a regular daily check of your tester a black box is used that is connected to the tester. It is tested whether the emerging measuring values correspond to the values in the black box. If this is not the case the tester is locked. The tester can only be used again when a black box test with a proper result is performed. As we only supply digital evaluating testers this test is normally not performed with a "pass-fail-black box". We only use one single black box and evaluate the emerging measuring values within tight tolerance limits.

Each black box consists of one connection possibility to the tester and one or several resistors and/or inductances. They can either be configured for one test method or for a combination of several test methods.

Each black box is delivered with the information on the resistance values and a calibration certificate so that the operator can set the tests properly.

Calibration resistors

For the calibration of testers precise calibration resistors are required as well. They make sure that certain test currents flow at different test methods and voltages.

The calibration resistors have a high precision as well as a high temperature and long-term stability. In order to conduct the heat that occurs at high currents or long measurings, reliably, we supply all calibration resistors for high test currents in special heat sink enclosures. In addition to these characteristics the resistors are designed low capacitively and low inductively.

All resistors for high test currents and low test voltages are designed in four-wire-technology.

All resistors are supplied with the information on the resistance values in the calibration certificate so that the corresponding conversions of the measuring values considering the resistance value are possible.