




MotorAnalyzer 1+2

Multi-purpose testers for electric motors and windings



 Made in Germany

> Expect more.

The MotorAnalyzer 2 – unbeatably versatile

The all-purpose MotorAnalyzer 2 is used for checking electric motors and windings. It combines 13 different test methods within a user-friendly and mobile tester. The combination of test methods, its compact design, as well as the battery operation, turn the MotorAnalyzer 2 into an ideal tool for on-site operation, especially in difficult applications.

For checking a 3-phase motor the three winding connections and the motor's frame are connected to the tester. This testing is done with four wire technology, providing high precision resistance measurements. After the Kelvin resistance test, the MotorAnalyzer 2 performs fully automatic testing via surge test, resistance and inductance. The MotorAnalyzer 2 automatically switches between different tests via its internal relay matrix. Finally, a high voltage test is done to evaluate the motors quality.

In addition, the MotorAnalyzer 2 provides information on brush holders and turn-to-turn faults within DC motors.

KEY-FACTS

- 13 test methods
- Surge voltage up to **3000 V**
- High-voltage DC up to **6000 V**
- Large, highly readable color display
- Innovative 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
- Locate turn-to-turn faults
- Adjust the neutral zone
- Rotary button for quick test method selection
- Integrated result storage for a subsequent transfer via USB interface
- Store and print test results via PrintCom
- AC or battery operation
- Worldwide power supply 100-250 V/47-63 Hz
- Low weight
- All-purpose solid case including all test leads on board



- > Surge voltage up to **3000 V** with 0.45 joule
- > High-voltage DC up to **6000 V**
- > LCR measuring bridge
- > Battery operation
- > Automatic switchover



The MotorAnalyzer 2 – State-of-the-art technology, robust packaging


The MotorAnalyzer 2 combines 13 methods for testing motors in one single device. This test method variety is unique in this tester class. The combination of test methods with its compact and sturdy case, turn the MotorAnalyzer 2 into an ideal tool for on-site operation or production.

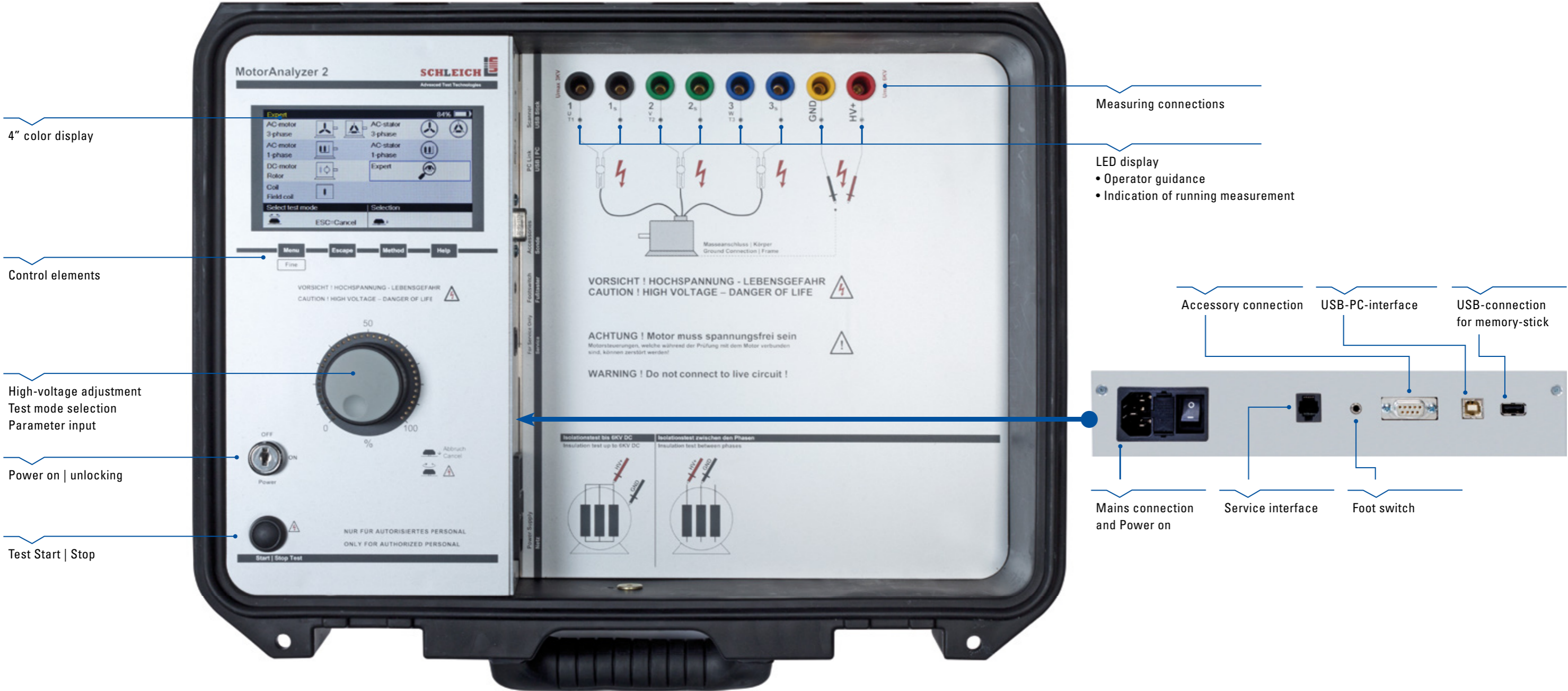
All required measuring leads are stored within reach in the MotorAnalyzer 2's case and, due to the battery operation option; it is immediately ready for use at all times and places.

The MotorAnalyzer 2 is equipped with a unique integrated test method switchover, which automatically switches all integrated test methods to the winding connections. Clamping between single test methods is not necessary.

The complete hardware and software is developed by SCHLEICH itself and – according to our motto "Made in Germany". Our innovations set technological standards for modern winding inspection.

**ROBUST
INDUSTRIAL
STANDARD**

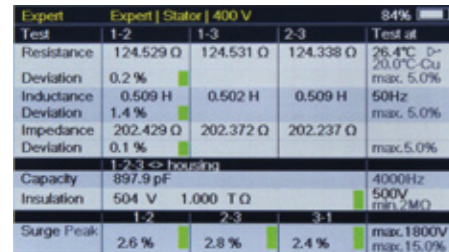
 Made in Germany



The MotorAnalyzer 2 – the test methods

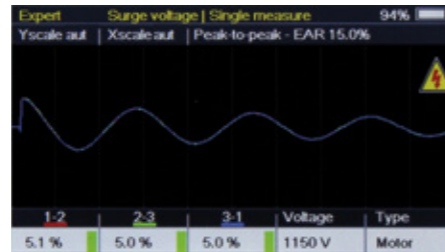
- > Surge voltage up to 3000 V
- > High-potential DC up to 6000 V
- > IR up to 500 GΩ

Automatic analysis



For the automatic test of a three-phase motor, the three winding connections and the motor frame are connected to the tester. The MotorAnalyzer 2 analyzes the motor automatically via resistance, inductance, impedance, capacity, insulation resistance, surge, and high-potential tests. It checks whether the winding is ohmically or inductively symmetrical. If there are large deviations within the three phases, the motor may be defective. Along with this, the dielectric strength between the motor and motor frame is also tested.

Surge test up to 3000 V



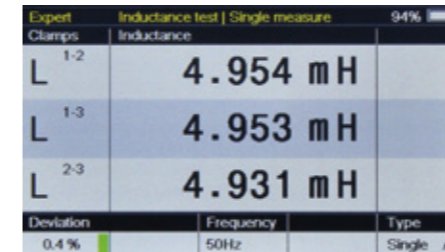
For the inductive winding check, the MotorAnalyzer 2 generates surge pulses up to **3000 V** that can be continuously adjusted. The patented automatic surge voltage comparison of the windings to each other or to a reference test object provides precise data regarding winding symmetry. The MotorAnalyzer 2 detects any non-symmetries automatically.

Resistance test



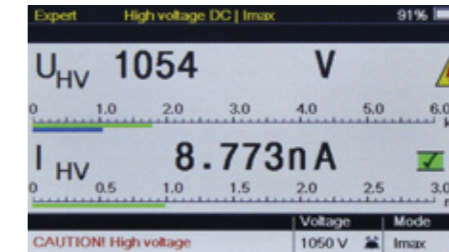
The resistance test is performed with very high precision four-wire technology. The symmetry evaluation of the three winding resistances or the comparison to a preset value is performed automatically. If required, temperature compensation converts the copper resistance to 20° C/68° F. For ambient temperature measuring, an ambient temperature sensor needs to be connected to the MotorAnalyzer 2.

Inductance test | Impedance test



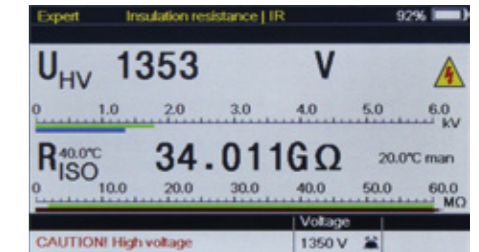
The inductance and the impedance test also utilizes the four-wire technology. The symmetry evaluation of the three winding inductances or the comparison to a preset value is performed automatically.

High-potential test DC



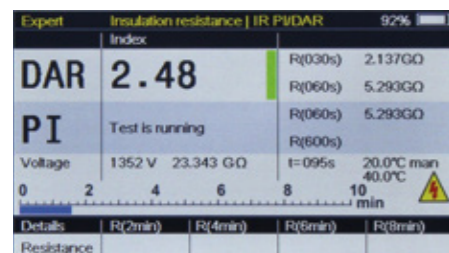
For the high-potential test, the MotorAnalyzer 2 generates a test voltage from 50 to 6000 V DC. In the automatic test, the voltage is max. 3000 V and at the manual test it is max. 6000 V due to the test probes. The voltage can be set manually at the rotary button, set automatically to a programmable value and a step voltage measurement is possible as well.

Insulation resistance test



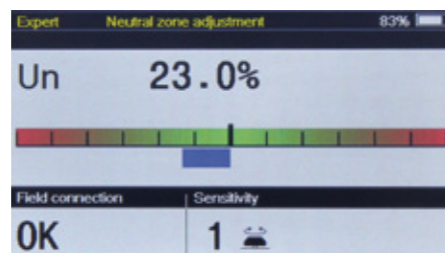
For the insulation resistance test the MotorAnalyzer 2 generates a test voltage from 50 to 6000 V DC. The automatic test has a 3000V max voltage, whereas, the manual test has a max voltage of 6000 V. This is due to the test probes. The voltage is set manually at the rotary button, it can be automatically set for a programmable value and also step voltage measuring is possible. If required, temperature compensation converts the insulation resistance to 40° C/104° F.

Polarization Index test | PI/DAR



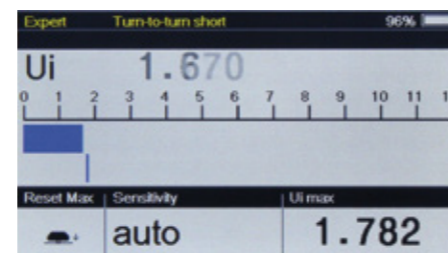
For the DAR and polarization index test, the MotorAnalyzer 2 generates a test voltage from 50 to 6000 V DC. The voltage can be set manually on the rotary button or automatically as a programmable value. The measuring time runs automatically. The PI, the insulation resistance and the step voltage tests can be combined together.

Neutral-zone-setting



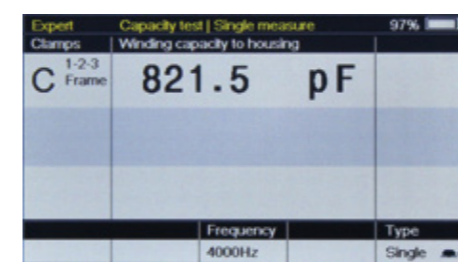
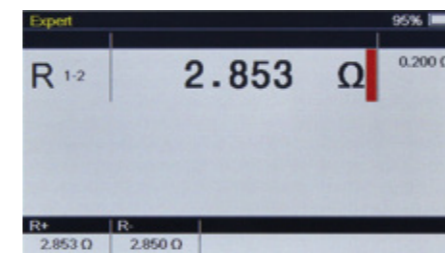
The graphic display of the brush holder's false position facilitates the location of the neutral zone for DC motors. Via a bar graph with central point, the user can see whether it is in the neutral zone or in which direction the brush holder needs turned.

Turn-to-turn fault location



With use of the induction test probe, the operator can locate the slots in which the turn-to-turn fault occurred. The probe also serves for measuring stators, armatures and for searching for bar-to-bar problems in a squirrel-cage motor.

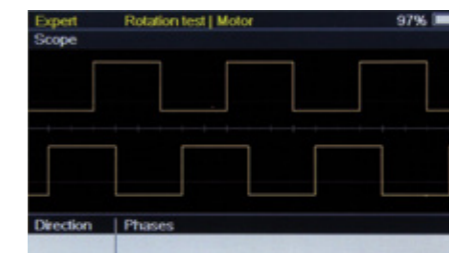
GB-resistance test | Capacity test



The DC earth/ground-bond resistance test is performed with high precision in four-wire technology.

The capacity measurement is performed between the winding and the motor housing.

Rotation direction test at stator or motor



In single- or three-phase motors, it is displayed during the manual rotation of the motor shaft if the shaft rotates to the left or right.



The safety-current-limitation

The high voltage- and insulation resistance test is safety-current-limited, this means, that no extra protection against accidental contact is required when working with test probes. However, during high voltage- or insulation resistance tests the test object is electrically charged! The maximum permissible charging energy, stored in the test object, is clearly defined in the respective, country-dependent safety regulations. Based on the measured insulation capacity and the connected test voltage, the MotorAnalyzer automatically reduces the test voltage to a safe maximum value. If requested, this function may also be disabled in the expert mode.

The MotorAnalyzer 1 – the multi-purpose tool

The MotorAnalyzer 1 is an all-purpose tester for testing electric motors and windings. It combines 10 different test methods in a user-friendly, mobile case. The combination of test methods, its compact design, as well as the option of a battery operation turns the MotorAnalyzer 1 into an ideal tool for the on-site use – especially in difficult installation positions.

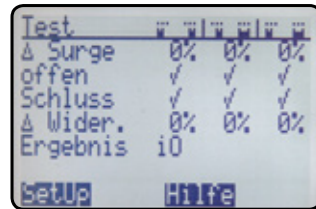
For checking three-phase motors, the three winding connections as well as the motor cabinet are connected to the tester. The MotorAnalyzer 1 analyzes the motor automatically using the surge and resistance test. Lastly, a high potential test is also performed at the motor in order to evaluate the motor's quality.

KEY-FACTS

- 10 test methods
- High-voltage up to 4 KV
- Fully automatic fault analysis
- Automatic switchover between 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 case
- Rotary button for quick test method selection
- Integrated result storage for later transfer via RS232 or USB interfaces
- Storing and printing of test results via PrintCom

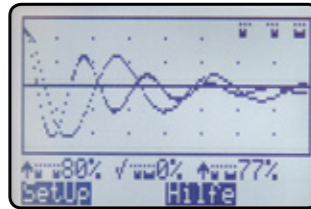
The test methods

Automatic analysis



For automatic testing of a three-phase current motor, the three winding connections and the motor frame are connected to the tester. The MotorAnalyzer 1 analyzes the motor automatically via the surge and resistance test. It checks whether the winding is ohmically or inductively symmetrical. If deviations within the three phases are too large the motor is defective.

Surge test



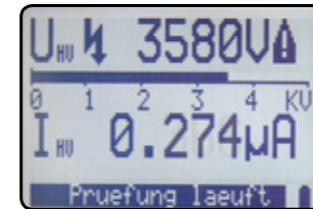
For the inductive winding check, the MotorAnalyzer 1 generates low-level surge voltages. The patented automatic surge voltage comparison of the windings or to a reference test object provides precise data regarding the winding's symmetry. The MotorAnalyzer 1 detects any non-symmetries automatically.

Resistance test



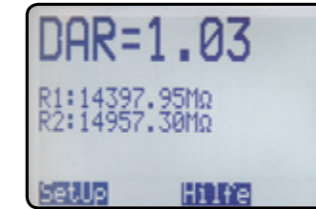
The resistance test is performed with high precision four-wire technology. The symmetry evaluation of the three winding resistances or the comparison to a preset value is performed automatically. If required, temperature compensation converts the copper resistance to 20° C/68° F.

High-potential test DC



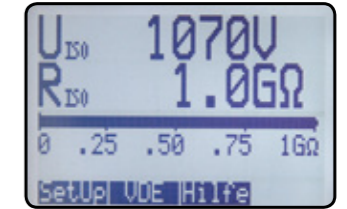
For the DC high-potential test, the MotorAnalyzer 1 generates a test voltage ranging from 50 to 4000 V DC. The voltage can be set manually with the rotary button or automatically as a programmable value.

Polarization index



For the DAR and polarization index test, the MotorAnalyzer 1 generates a test voltage ranging from 50 to 4000 V DC. The voltage can be set manually with the rotary button, or automatically as a programmable value.

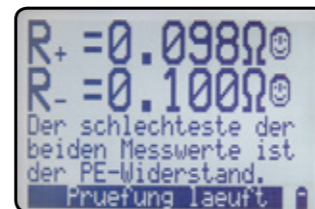
Insulation resistance test



For the insulation resistance test, the MotorAnalyzer 1 generates a test voltage ranging from 50 to 4000 V DC. The voltage can be set manually with the rotary button, automatically as a programmable value or a step voltage measurement is also possible.

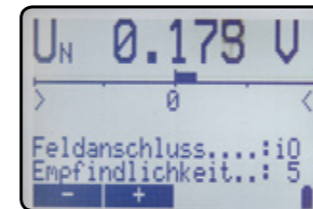


GB-resistance test



The DC ground bond-resistance test is performed with high precision in four-wire technology.

Neutral-zone-setting



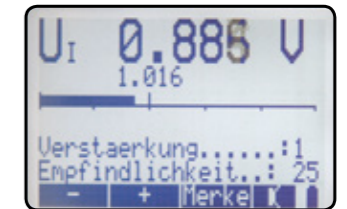
The graphic display of the brush holder's false position facilitates the adaptation of the "neutral zone" for direct current motors. Via a bar display with central point, the user can see whether it is in the neutral zone or in which direction the brush holder needs turned.

Rotation direction test at stator or motor



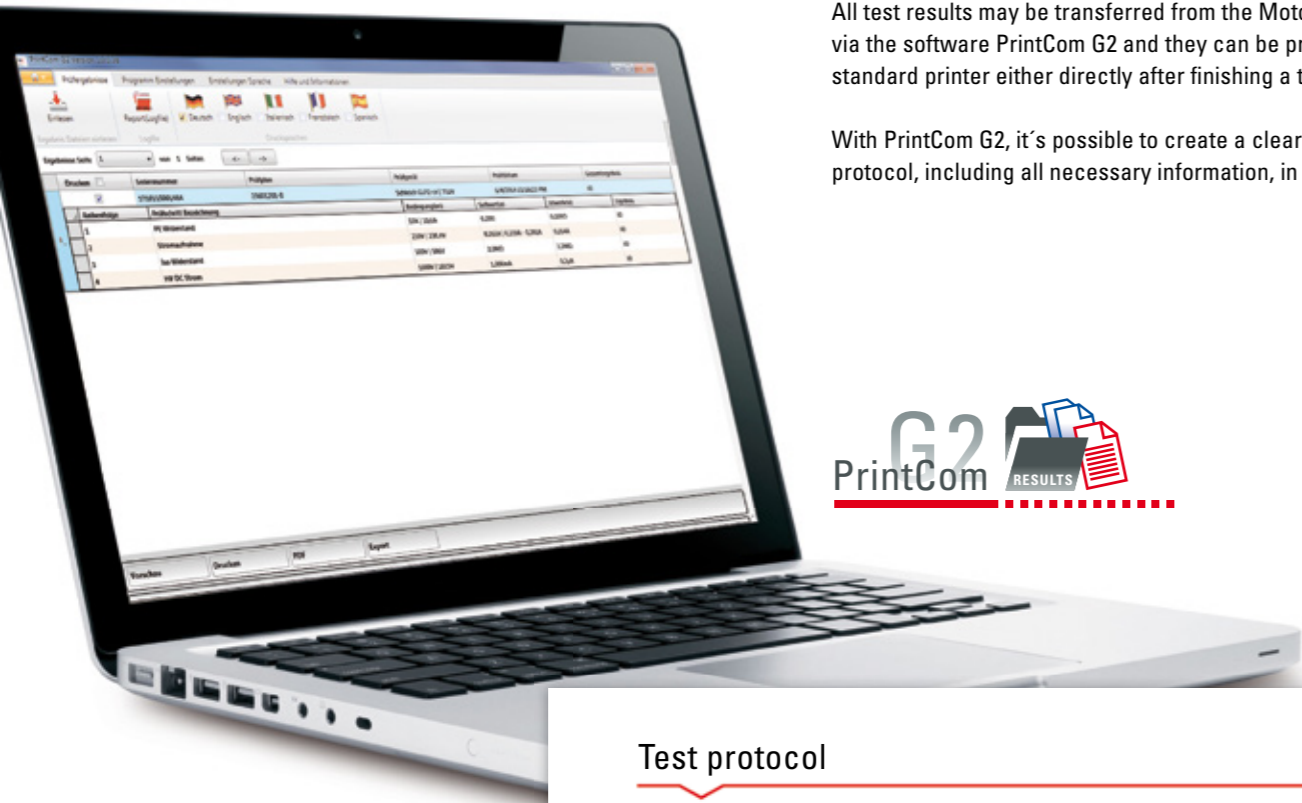
In single or three-phase motors, it is displayed during the manual rotation of the motor shaft if the shaft rotates to the left or right.

Turn-to-turn fault location



With use of the induction test probe, the operator can locate the slots in which the turn-to-turn fault occurred. The probe also serves for measuring stators, armatures or for searching for bar to bar problems in a squirrel-cage motor.

The test protocol with PrintCom G2



All test results may be transferred from the MotorAnalyzer to PC via the software PrintCom G2 and they can be printed on a modern standard printer either directly after finishing a test or later.

With PrintCom G2, it's possible to create a clearly structured test protocol, including all necessary information, in no time.



Test protocol

Customizable content with company logo and address

Sample Company Ltd
Sample Street 89
12345 Sample City

Your Logo

General motor data, date and time etc.

Serialnumber Tester	11700 MotorAnalyzer 2
Serialnumber Test Object	11070500230H
Total result	Pass
Test date	03 September 2014

Order data	
Type	K21R71K2
Serialnumber Test Object	11070500230H
Manufacturer	VEMmotorsThurm
Order number	1-14-258

Overview of all results

Summary		
Resistance test 1-2	4,478Ω	Pass
Resistance test 1-3	4,458Ω	Pass
Resistance test 2-3	4,496Ω	Pass
Resistance test deviation	0,4%	Pass
Inductance test 1-2	28,681mH	Pass
Inductance test 1-3	28,594mH	Pass
Inductance test 2-3	28,593mH	Pass
Inductance test deviation	0,3%	Pass
Impedance test 1-2	10,115Ω	Pass
Impedance test 1-3	10,113Ω	Pass
Impedance test 2-3	10,106Ω	Pass
Impedance test deviation	0,1%	Pass
Capacity test 1-2-3 ↔ housing	71,0pF	Pass
Insulation resistance I Step	8,159GΩ	Pass
Surge voltage 1-2 peak-to-peak	1,50%	Pass
Surge voltage 1-3 peak-to-peak	1,50%	Pass
Surge voltage 2-3 peak-to-peak	1,50%	Pass

KEY-FACTS

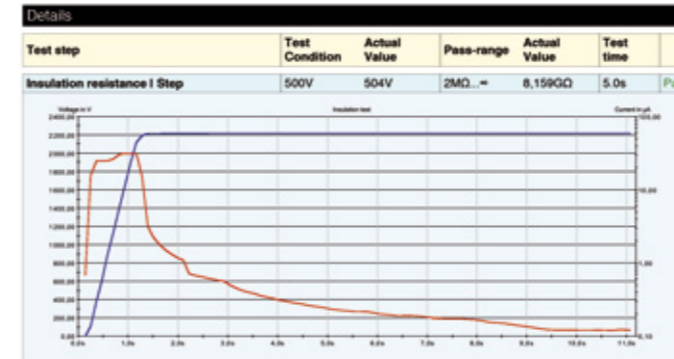
- Customizable protocol with company data and logo
- Immediate printing on a Windows® compatible printer
- Generation of a PDF-file
- Test protocol in numerous languages

Detailed view resistance

Test step	Test Condition	Actual Value	Pass-range	Actual Value	Test time
Resistance test 1-3	20,0°C	27,9°C		4,458Ω	Pass
Resistance test 2-3	20,0°C	27,9°C		4,496Ω	Pass
Resistance test deviation	20,0°C	27,9°C	0..5,0%	0,4%	Pass

- Phase resistances compensated to 20° C | 68° F
- Winding temperature
- Deviation
- Set values (if existing)

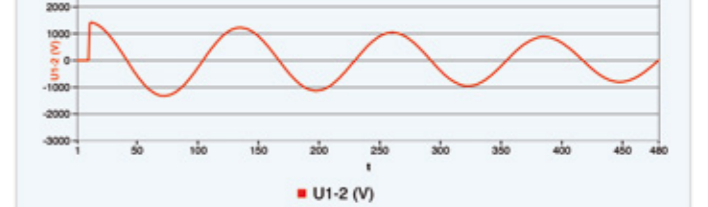
Detailed view insulation resistance



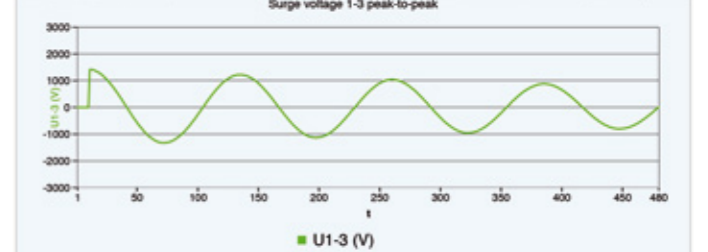
- Signal plot:
Voltage-current | resistance-current | resistance-voltage
- Insulation resistance at measured temperature
- Insulation resistance compensated to 40° C | 104° F
- Set values (if existing)

Detailed view surge voltage

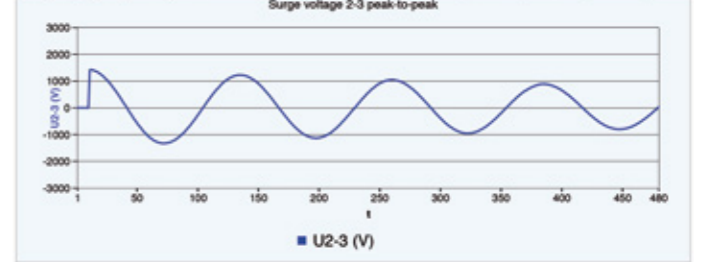
Test step	Test Condition	Actual Value	Pass-range	Actual Value	Test time
Surge voltage 1-2 peak-to-peak	1525V	1423V	0..15,00% 1,50%		Pass



Test step	Test Condition	Actual Value	Pass-range	Actual Value	Test time
Surge voltage 1-3 peak-to-peak	1525V	1423V	0..15,00% 1,50%		Pass



Test step	Test Condition	Actual Value	Pass-range	Actual Value	Test time
Surge voltage 2-3 peak-to-peak	1525V	1423V	0..15,00% 1,50%		Pass



- Signal plots of all three phases in a single diagram
- Display of the symmetry of all 3 phases
- Percentage deviation to reference coil
- Set values (if existing)



Technical data

MotorAnalyzer 1



MotorAnalyzer 1 portable



MotorAnalyzer 2



Technical specifications

Model	art. no.	resistance	surge voltage	turn-to-turn faults	inductivity	capacity	impedance
MotorAnalyzer 1	403101	●	12 V	●	—	—	—
MotorAnalyzer 1 portable	403141	●	12 V	●	—	—	—
MotorAnalyzer 2	403168	●	3000 V	●	●	●	●

high voltage DC	insulation resistance	polarization	neutral zone	sense of rotation	PE resistance	switch-over test methods	matrix	battery operation
0-4 KV 0-4 KV	0-4 KV DC 0-4 KV DC	0-4 KV DC 0-4 KV DC	● ●	● ●	● ●	● ●	● ●	● ●
0-6 KV	0-6 KV DC	0-6 KV DC	●	●	●	●	●	●



Surge voltage test

Test voltage	max. 3 KV
Surge capacity	max. 100 nF
Pulse rise time	100-200 ns
Evaluations	in addition to our patented correlation method, further evaluation methods are included in the tester: EAR, diff. EAR, peak to peak

Deviation display	in %
Comparison	Comparison between phases or to a reference stator
Switchover	automatically between test methods and the 3 connections
Symmetry evaluation	yes, between the three phases

Model	MotorAnalyzer 1	MotorAnalyzer 2
Test voltage	12 V	3 KV
Joules	-	0.45 J
Surge current	-	200 A
Capacitor	-	100 nF



Resistance test

Resistance test	in 4-wire-technology
Measuring range	100 μΩ-500K Ω-high accuracy
Ambient temperature compensation	yes, optional
Switchover	automatically between test methods and the 3 connections
Symmetry evaluation	yes, between the three phases

Model	MotorAnalyzer 1	MotorAnalyzer 2
Measuring range	2 mΩ-500 kΩ	100 μΩ-500 kΩ
Resolution	1 μΩ	0.5 μΩ
4-wire-technology	yes	yes
Test current	max. 1 A DC	max. 2 A DC
Automatic switchover	yes	yes
Ambient temperature compensation	optional*	optional*

* part. no. 403109



High-potential test DC

Model	MotorAnalyzer 1	MotorAnalyzer 2
Test voltage	max. 4 KV	max. 6 KV
Current	3 mA	3 mA
Automatic switchover	no	yes, up to 3 KV
Test time	manually, continuous operation or automatic test program	



Polarization index (PI)

Model	MotorAnalyzer 1	MotorAnalyzer 2
Test voltage	max. 4 KV	max. 6 KV
Automatic switchover	no	yes, up to 3 KV



Capacity test

Measuring range	0.001 μF-50 μF
Measuring frequency	4 KHz
Accuracy	<= 2.5 % at < 5 μF
4-wire-technology	yes
Automatic switchover	yes

> Note: Only included in MotorAnalyzer 2



Impedance | Inductivity

Measuring range	0.01 Ω-10 kΩ	0,05 mH-5 H
Measuring frequency	50-4000 Hz	50-4000 Hz
Accuracy 0.01Ω up to 0.5 Ω	<= 3 %	<= 3 %
Accuracy 0.5 Ω up to 10k Ω	<= 2 %	<= 2 %
4-wire-technology	yes	yes
Test current	max. 1 A _{eff}	max. 1 A _{eff}
Automatic switchover	yes	yes

> Note: Only included in MotorAnalyzer 2

The accessory

Kelvin clamp | sturdy design

Sturdy 4-wire kelvin clamps for high-precision resistance tests



Type	small	medium	large
Opening width	10 mm/0.4 inch	20 mm/0.8 inch	33 mm/1.3 inch
Pressure intensity	20 N	30 N	100 N
4-wire-technology	yes	yes	yes
Measuring lead pluggable	yes	yes	yes
Dimensions (L x H x W)	90 x 35 x 13 mm/3.5 x 1.4 x 0.5 inch	165 x 41(65) x 20 mm/6.5 x 1.6(2.6) x 0.8 inch	255 x 95 x 25 mm/10 x 3.7 x 1 inch
Part no.	4023184	4023122	4023109

> Note: additional connection leads (403154 or 403184) are required.

Kelvin clamp for terminal boards



Special Kelvin clamp for contacting terminal boards

Model	MotorAnalyzer 1	MotorAnalyzer 2
Pin diameter	4-10 mm/0.2-0.4 inch	8-14 mm/0.3-0.6 inch
4-wire-technology	yes	yes
Part no.	40001182	40001183

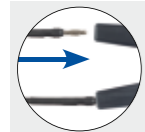
> Note: additional connection leads (403154 or 403184) are required.

Connection leads



Connection leads for sturdy Kelvin clamps

Model	MotorAnalyzer 1	MotorAnalyzer 2
Lead length	2 m/6.6 ft	2 m/6.6 ft
Part no.	403154	403184



The measuring leads can be plugged into the Kelvin clamps (4023184, 4023122 and 4023109).

Temperature probe



Ambient temperature compensation for resistance- and insulation resistance test

Model	MotorAnalyzer 1 + 2
Part no.	403109

Kelvin clamps



4-wire Kelvin clamps for high-precision resistance test

Model	MotorAnalyzer 1	MotorAnalyzer 2
Lead length	1.1 m/3.6 ft	1.1 m/3.6 ft
Opening width	approx. 20 mm/0.8 inch	approx. 20 mm/0.8 inch
4-wire-technology	yes	yes
Part no.	403180	40001100

4-wire test probe



For high-precision resistance tests e.g. for measurements at DC-motor bars

Model	MotorAnalyzer 1	MotorAnalyzer 2
Lead length	3 m/9.8 ft	3 m/9.8 ft
Part no.	4000395	403172

> For further accessory please take a look at our website.

Start/Stop button with 4-wire test probe



Ideally suited for starting and stopping a test, when holding both test probes in hand.

Model	MotorAnalyzer 1 + 2
Lead length	3,2 m/10.5 ft
Part no.	403111

> Note: Suitable for test probes 4000395 and 403172.

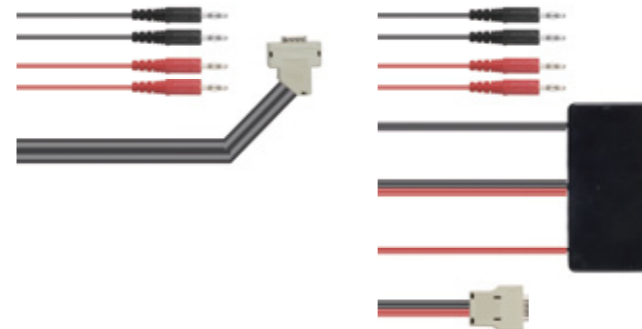
Induction probe for fault location



Probe for testing stator and armature windings according to the induction method. The probes are used for localization of a winding short.

Model	MotorAnalyzer 1 + 2		
Slot distance	1 19 mm/0.75 inch	2 9 mm/0.35 inch flexibel	3 9 mm/0.35 inch
Dimensions (L x H x W)	130 x 30 x 25.5 mm/ 5.1 x 1.2 x 1 inch	115 x 40 x 20 mm/ 4.5 x 1.6 x 0.8 inch	120 x 20 x 25.5 mm/ 4.7 x 0.8 x 1 inch
Lead length	3 m/9.8 ft	3 m/9.8 ft	3 m/9.8 ft
Part no.	403107	403123	403106

Neutral-zone measuring lead



To adjust the neutral zone at DC-motors the field and the armature (via the coal brushes) are connected to the MotorAnalyzer. By moving the brushes the "neutral-zone" is adjusted.

Model	MotorAnalyzer 1 + 2	
Type	Standard	with booster for large motors
Lead length	1.5 m/4.9 ft	1.5 m/4.9 ft
Part no.	403102	403133

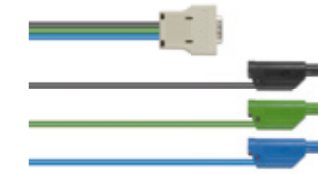
Rotary field probe for stator's sense of rotation measurement



A stator's sense of rotation is determined by a hall rotary field probe. For this, the stator is run with a low three phase voltage and the rotary field probe is laid into the stator to be tested.

Model	MotorAnalyzer 1 + 2
Lead length	3 m/9.8 ft
Part no.	403103

Motor rotation direction measuring lead



This connection lead is required to determine the motor's rotation direction. The tension-free, assembled and connected 3-phase motor (squirrel cage rotor) is connected to the tester and the motor shaft is then manually turned.

Model	MotorAnalyzer 1
Lead length	1.5 m/4.9 ft
Part no.	403112

> Note: With the MotorAnalyzer 2, the measurement is performed directly via the supplied test leads.

Foot switch for starting a test



Model	MotorAnalyzer 1 + 2
Lead length	2 m/6.6 ft
Part no.	4010611

Software



With PrintCom it's easy to log and save test results.

Model	MotorAnalyzer 1	MotorAnalyzer 2
	PrintCom	PrintCom G2
Part no.	4018182	4018712

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