



# MotorAnalyzer2 R2

Universal tester for electric motors and windings



**SHOCK  
PROTECTION**

DESIGNED & PRODUCED  
IN GERMANY

**TEST  
AT ITS  
BEST**

# The MotorAnalyzer2 R2 – incredible versatility

The universal MotorAnalyzer2 R2 serves for testing electric motors and windings. It combines **20 different test methods** in a user-friendly and mobile tester. Compared to its predecessor, the tester offers twice as many test methods and many extended functions. The combination of test methods, the compact design and the battery operation make the MotorAnalyzer2 R2 an ideal tool for on-site use – even if the DUT is difficult to access.

By means of a user-friendly auto-test with surge, resistance, insulation-resistance and inductivity test, the MotorAnalyzer2 R2 analyzes the motor fully automatically. Via its internal relay matrix, the MotorAnalyzer2 R2 automatically connects the individual test methods to the four test points one after the other.

In addition to motor testing, the MotorAnalyzer2 R2 helps to adjust the brushes to neutral on DC Motors with adjustable brush holders. It can also be used to check for broken rotor bars at squirrel-cage rotors, to locate turn-to-turn faults in the slots of the stator and much more.

## KEY FACTS

- 20 test methods in one testing device
- Surge voltage up to 3000 V
- Insulation resistance and high voltage DC up to 6000 V
- Large, well readable color display
- Innovative and comfortable input via rotary switch
- Structured menu and practical function keys
- Fully-automatic fault analysis
- Automatic test-method switch-over at the 4 motor-connection leads
- Manual and automatic tests
- Rotary switch for a fast selection of test methods
- Integrated result storage
- Real-time clock for storing with time and date
- Entering motor and order data
- Storing test results
- Lifetime free updates for your MotorAnalyzer2 R2
- Increased productivity by working with AC power or battery power
- High-capacity lithium-ion battery
- Power supply, world-wide 90-250 V/47-63 Hz
- Integrated voltage-measurement function before starting the test for the protection of the testing device
- Light weight
- Quick reference guide in the cover of the device
- Robust, high-impact carrying case with all test leads "on board"



- > Surge voltage up to **3 kV** / 0.45 joule
- > High voltage DC up to **6 kV**
- > Insulation up to 500 GΩ
- > LCR measurement
- > Battery operation
- > Automatic switch-overs

## Contents

|   |    |
|---|----|
| Outstanding technology in a robust design ..... | 4  |
| Test methods .....                              | 6  |
| Test protocol with PrintCom G2 .....            | 14 |
| Technical data   Test methods .....             | 16 |
| Technical data   Testing device .....           | 19 |
| Accessories .....                               | 20 |
| Company profile .....                           | 22 |

# Outstanding technology in a robust design

The MotorAnalyzer2 R2 combines 20 methods for testing motors in one device. This great variety of test methods is unique. The combination of the test methods with the compact and robust case makes the MotorAnalyzer2 R2 your perfect companion for every application – on the shop floor or in the field. All necessary test leads are kept inside the case of the MotorAnalyzer2 R2. Together with the battery operation, the tester is thus ready to operate any time at any place.

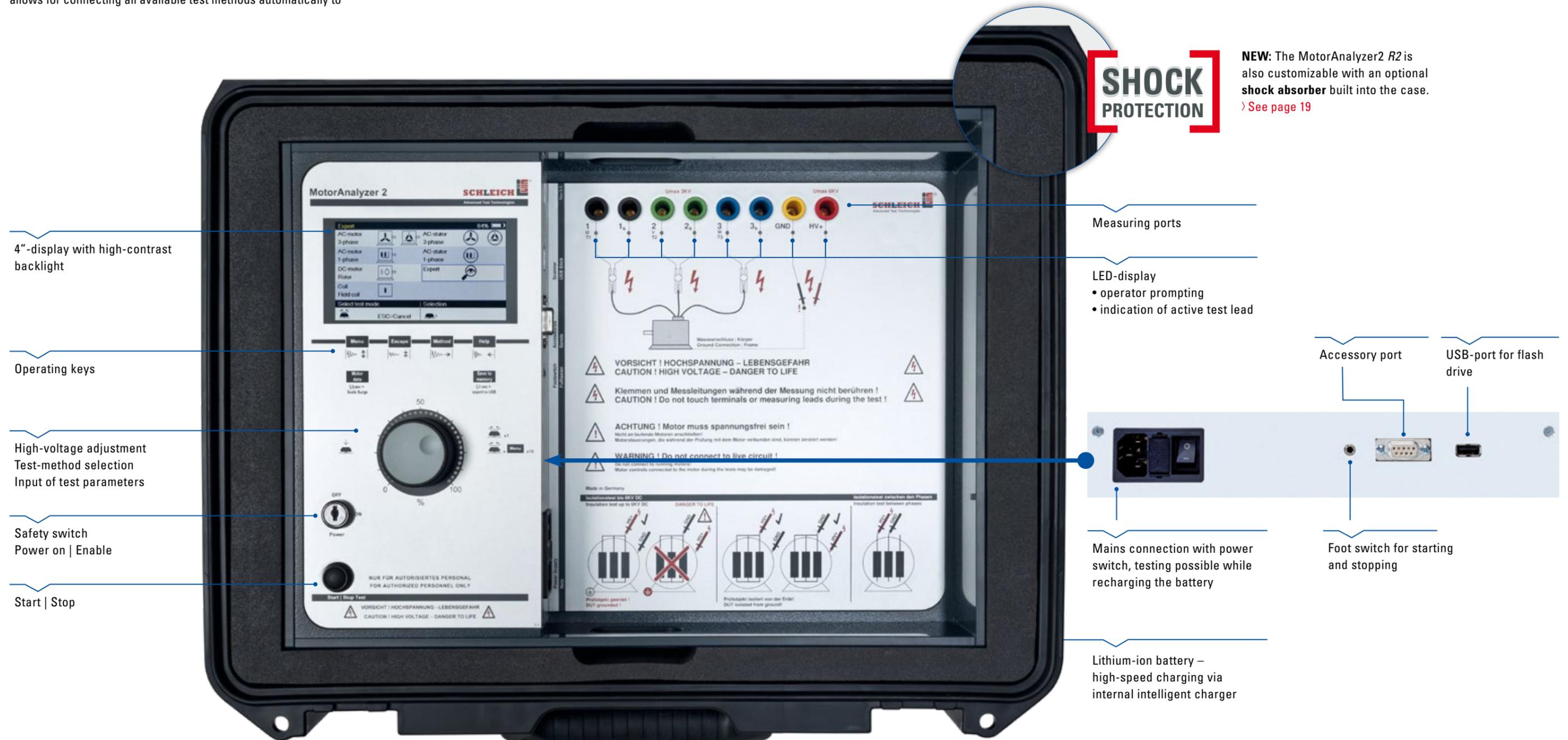
The MotorAnalyzer2 R2 has a unique test-method switch-over, which allows for connecting all available test methods automatically to

the winding leads. A manual reconnection of the test leads between individual tests is not necessary!

According to our philosophy – Made in Germany – we design and manufacture hardware and software in our factory in the Sauerland region in the heart of Germany. With numerous innovations, we keep setting technological benchmarks in the area of winding analysis.

**ROBUST  
INDUSTRIAL  
STANDARD**

DESIGNED & PRODUCED  
IN GERMANY



4"-display with high-contrast backlight

Operating keys

High-voltage adjustment  
Test-method selection  
Input of test parameters

Safety switch  
Power on | Enable

Start | Stop

**SHOCK  
PROTECTION**

**NEW:** The MotorAnalyzer2 R2 is also customizable with an optional **shock absorber** built into the case.  
> See page 19

Measuring ports

LED-display  
• operator prompting  
• indication of active test lead

Accessory port

USB-port for flash drive

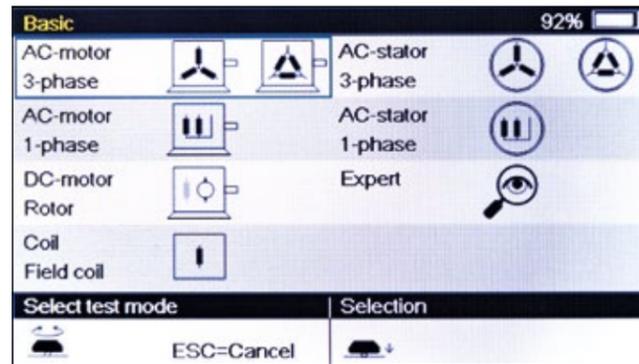
Mains connection with power switch, testing possible while recharging the battery

Foot switch for starting and stopping

Lithium-ion battery – high-speed charging via internal intelligent charger

# Test methods

Test mode: Basic or Expert

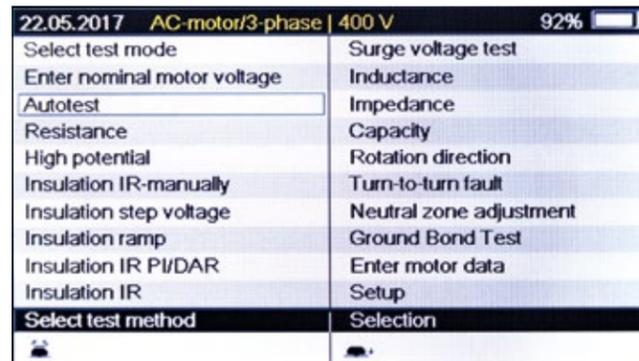


The DUT type is selected with the rotary knob.

In Basic mode, you can select the 6 indicated DUT variants. Further options to adjust the test are reduced to a minimum. Especially for inexperienced users – this optimizes reliable testing. To avoid that the test voltage is accidentally set too high, the nominal voltage of the DUT has to be entered, as well. Based on the nominal voltage, the MotorAnalyzer automatically adjusts the ideal test voltage.

In Expert mode, all possible inputs are enabled. This gives the specialist maximum possibilities to configure the test.

## Selection menu

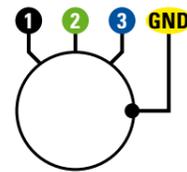


In the main menu, the test method is selected via the rotary knob.

Here, you can also select the additional input of motor data. Motor data are additional information, for example, serial number, customer number, etc. This information is stored together with the test results and will later be printed via the PC-software PrintCom G2 in the test protocol.

## 1 Automatic test up to 3 kV | auto-test

| Test            | 1-2              | 1-3      | 2-3      | Test at                               |
|-----------------|------------------|----------|----------|---------------------------------------|
| Resistance      | 0.192 Ω          | 0.192 Ω  | 0.192 Ω  | 20.0°C max<br>20.0°C-Cu<br>max. 10.0% |
| deviation       | 0.1 %            |          |          |                                       |
| Inductance      | 2.006 mH         | 2.012 mH | 1.990 mH | 50Hz<br>max. 10.0%                    |
| deviation       | 0.8 %            |          |          |                                       |
| Impedance       | 0.661 Ω          | 0.663 Ω  | 0.657 Ω  | 50Hz<br>max. 10.0%                    |
| deviation       | 0.6 %            |          |          |                                       |
| 1-2-3 ↔ housing |                  |          |          |                                       |
| Capacity        | 16.6 nF          |          |          | 4000Hz<br>500V<br>min. 2MΩ            |
| Insulation      | 507 V >1.000 T Ω |          |          |                                       |
| Surge Peak      | 1-2              | 2-3      | 3-1      | 1800V<br>max. 15.0%                   |
|                 | 2.5 %            | 1.8 %    | 2.0 %    |                                       |

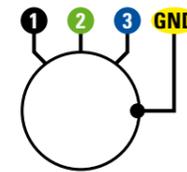
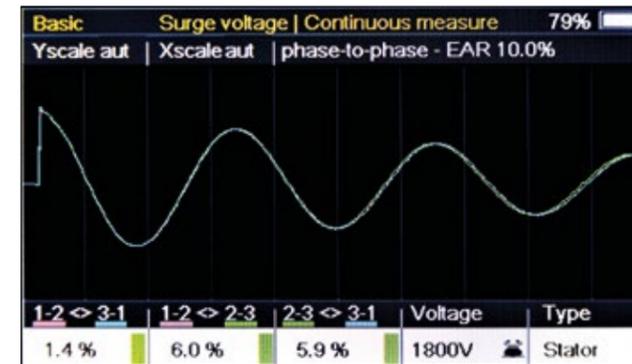


Automatic test between the connections:

- Resistance 1 ↔ 2 | 1 ↔ 3 | 2 ↔ 3
- Inductance 1 ↔ 2 | 1 ↔ 3 | 2 ↔ 3
- Impedance 1 ↔ 2 | 1 ↔ 3 | 2 ↔ 3
- Capacity 1+2+3 ↔ GND
- Insulation 1+2+3 ↔ GND
- Surge voltage 1 ↔ 2+GND | 1 ↔ 3+GND | 2 ↔ 3+GND

For the automatic test of a three-phase motor, the three winding leads and the motor frame have to be connected to the tester. By means of resistance, inductance, impedance, capacity, insulation-resistance, surge, and high-voltage test, the MotorAnalyzer analyzes the test object fully automatically. The windings should be ohmic and inductively symmetrical. If the deviations are too large, there is a defect. In addition, the dielectric strength within the windings and to the core is checked.

## 2 Surge test up to 3 kV

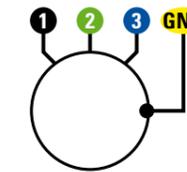
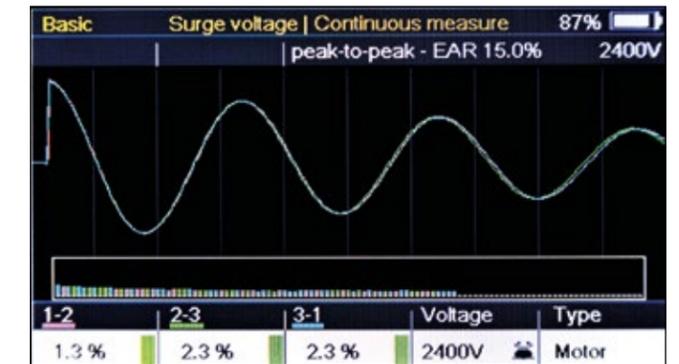


Automatic test between the connections:

- 1 ↔ 2+GND | 1 ↔ 3+GND | 2 ↔ 3+GND

For testing the windings, the MotorAnalyzer generates surge pulses up to 3 kV. The automatic surge-voltage comparison is effected between the 3 test steps or alternatively to a reference DUT. The patented comparison provides precise information about the symmetry of the windings. Greater asymmetries are automatically identified as an error.

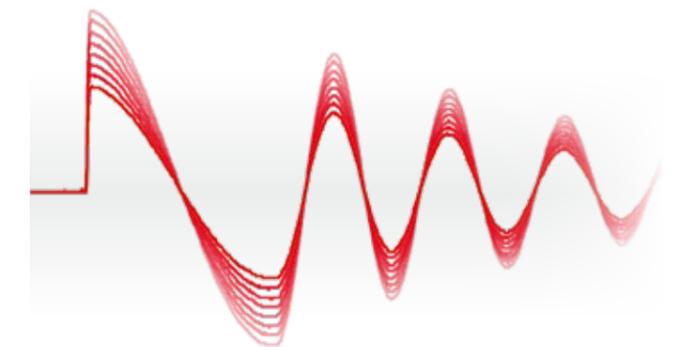
## 3 Surgetest peak-to-peak up to 3 kV



Automatic test between the connections:

- 1 ↔ 2+GND | 1 ↔ 3+GND | 2 ↔ 3+GND

For the peak-to-peak method, the test voltage is increased step by step. If there is a larger deviation from one step to the next, the test is interrupted. The deviation from step to step is indicated in percent. The bar chart shows the deviations from step to step for the individual test voltages.

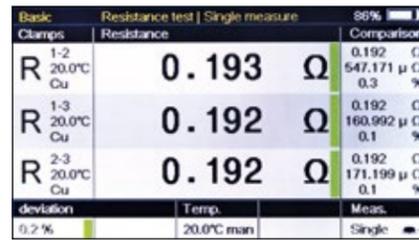


Graphical display of the step-by-step increase of the test voltage



# Test methods

## 4 Resistance test



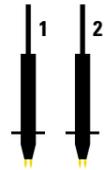
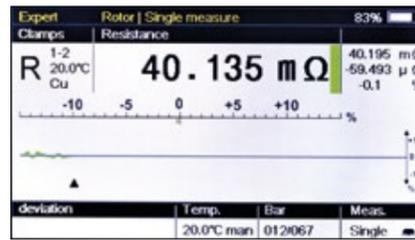
Automatic test between the connections:  
1 ↔ 2 | 1 ↔ 3 | 2 ↔ 3

The resistance test is done with high-precision four-wire method. The symmetry evaluation of the winding resistances or the comparison to a preset value is performed automatically.

Temperature sensors for winding protection installed in the DUT can also be tested individually.

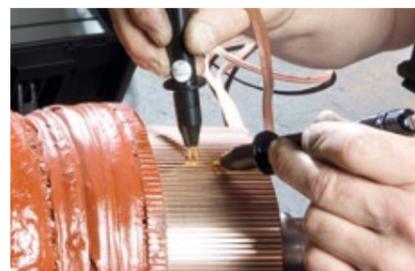
If required, the temperature compensation converts the resistance to 20 or 25 °C (68 or 77 °F). This requires an additional ambient-temperature sensor.

## 5 Resistance at DC armature

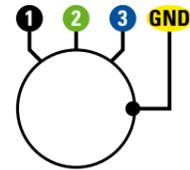
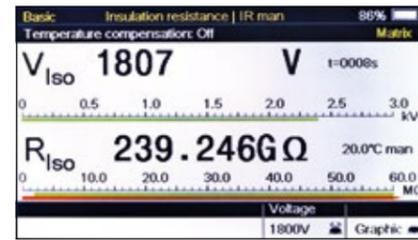


Manual test with two test probes:  
bar ↔ bar

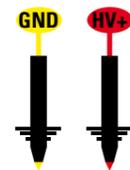
DC armatures are tested according to the bar-to-bar method. This is done by measuring the resistance between all neighboring bars. It is possible to measure collectors with up to 400 bars. The first resistance measurement is taken as reference. All further measurements will be compared to this reference value. The bar chart shows the deviation between the bars.



## 6 Insulation-resistance test



Automatic test between the connections:  
1+2+3 ↔ GND with max. 3 kV



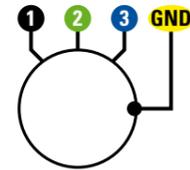
Manual test with two test probes:  
between any desired test points with max. 6 kV

Quality control, maintenance checks and preventive maintenance at stators, motors, generators, transformers, cables, etc.

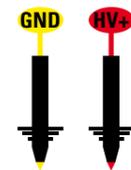
The automatic test via the 4 test leads is performed with max. 3000 V; the manual test with two test probes and max. 6000 V.

The voltage can either be adjusted manually via the rotary knob or adjusts to a value entered in the menu. If required, the temperature compensation converts the insulation resistance to 40 °C (104 °F). This requires an additional ambient-temperature sensor.

## 7 + 8 Diagnostic function: Polarization index PI and DAR



Automatic test between the connections:  
1+2+3 ↔ GND with max. 3 kV



Manual test with two test probes:  
between any desired test points with max. 6 kV

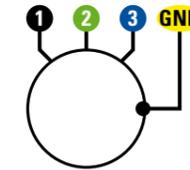
The test serves to diagnose the insulation at stators, motors, generators, transformers, cables, etc.

The automatic test via the 4 test leads is performed with max. 3000 V; the manual test with two test probes and max. 6000 V.

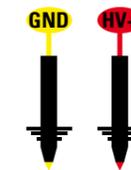
The voltage is adjusted manually via the rotary knob. Alternatively it can be automatically adjusted to a programmable value. If required, the temperature compensation converts the insulation resistance to 40 °C (104 °F). This requires an additional ambient-temperature sensor.

The PI, the insulation-resistance and the step-voltage test can be combined.

## 9 Diagnostic function: Insulation with step voltage



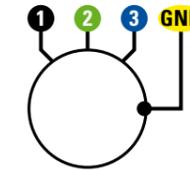
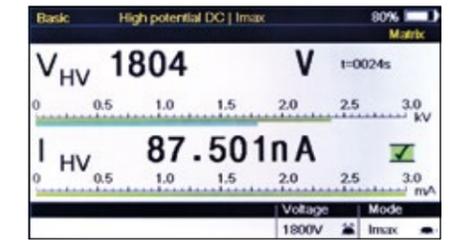
Automatic test between the connections:  
1+2+3 ↔ GND with max. 3 kV



Manual test with two test probes:  
between any desired test points with max. 6 kV

The test voltage is increased automatically in steps to a final value. The insulation resistance must be the same for all voltage steps. The insulation resistance must not be reduced with increasing voltage. Should this be the case, the reason could be that the test object is wet.

## 10 High-voltage test DC



Automatic test between the connections:  
1+2+3 ↔ GND with max. 3 kV



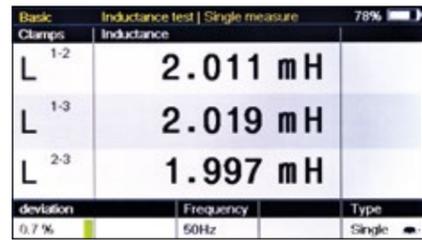
Manual test with two test probes:  
between any desired test points with max. 6 kV

The voltage can either be adjusted manually via the rotary knob or adjusts to a value entered in the menu. During the test, the insulation must not break down.



# Test methods

## 11 Inductance test

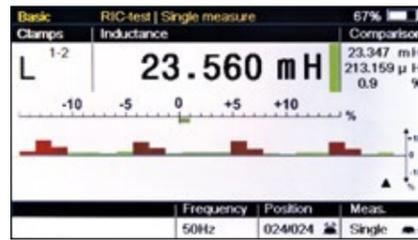


Automatic test between the connections:  
1 ↔ 2 | 1 ↔ 3 | 2 ↔ 3

The inductance test is performed with high-precision 4-wire method. For the test frequency, you can choose between 50 or 60 Hz. Compared to other inductance-measurement methods, the test current is a lot higher. The advantage is that the higher field strength excites the core stronger. This leads to a more accurate test result.

The symmetry evaluation of the inductances or the comparison to a preset value is performed automatically.

## 12 Squirrel-cage-motor test | RIC-test



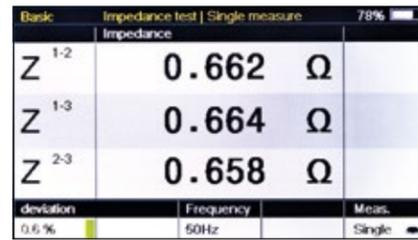
Test between the connections:  
1 ↔ 2

If a squirrel-cage motor has a broken-rotor bar, this affects the inductance of the phase under which the broken-rotor bar is located. For testing, therefore, the inductance is measured with the motor phase. The rotor is turned by a complete revolution in several test steps with identical angle distances. A 2-pole motor with broken-rotor bar shows two inductance deviations within the complete revolution. A 4-pole motor shows four deviations.

If you have a double-bar rotor, where only one of the two double bars is broken, it is possible that the RIC-test doesn't identify the fault.



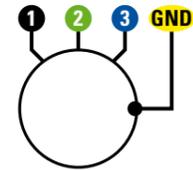
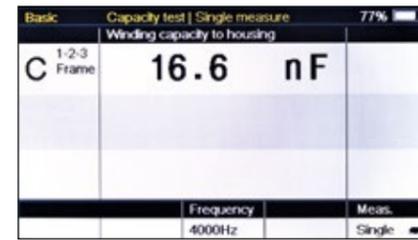
## 13 Impedance test



Automatic test between the connections:  
1 ↔ 2 | 1 ↔ 3 | 2 ↔ 3

The impedance test is performed with high-precision 4-wire method. For the test frequency, you can choose between 50 or 60 Hz. Compared to other impedance-measurement methods, the test current is a lot higher. The advantage is that the higher field strength excites the core stronger. This leads to a more accurate test result. The symmetry evaluation of the impedance or the comparison to a preset value is performed automatically.

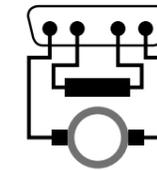
## 14 Capacity test



Test between the connections:  
1, 2, 3 ↔ GND

The capacity test is performed between the winding and the motor frame. The capacity is compared to a preset value.

## 15 Neutral-zone adjustment

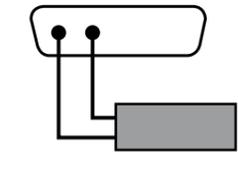


Test with special test leads

Feature to support the adjustment of the neutral zone at DC motors. Via a bar chart with center, the user can directly see, whether the brush holder is in the neutral zone or whether it needs to be adjusted. Graphically displaying the incorrect position of the brush holder facilitates the adjustment of the neutral zone considerably. The user can see right away, in which direction the brushes have to be turned in order to get into the neutral zone.



## 16 Localization of turn-to-turn faults at stators or rotors



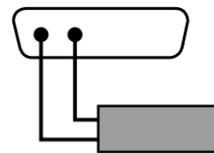
Test with special stator- or rotor-test probes

By means of an induction-test probe, the user can locate the slots with turn-to-turn faults. The user holds the test probe directly over a slot and stores the test value. Now, the checks the remaining slots. Compared to the first measurement, the test values must be the same or similar.



# Test methods

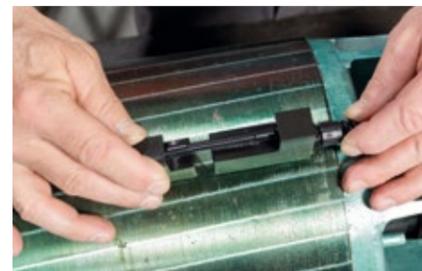
## 17 Localization of broken-rotor bars at squirrel-cage motors



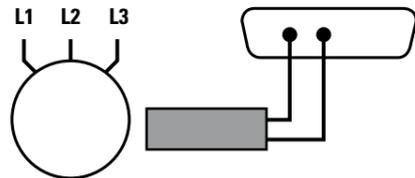
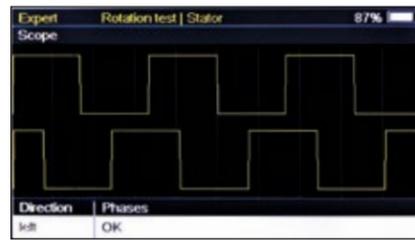
Test with special rotor-test probes

By means of an induction-test probe, the user can locate the slots with broken-rotor bars. The user holds the test probe directly over a slot and stores the test value. Now, the checks the remaining slots. Compared to the first measurement, the test values must be the same or similar.

This test is only possible, if the bars are not completely integrated in the lamination stack of the rotor. If you have a double-bar rotor, where only one of the two double bars is broken, this method cannot locate the fault.

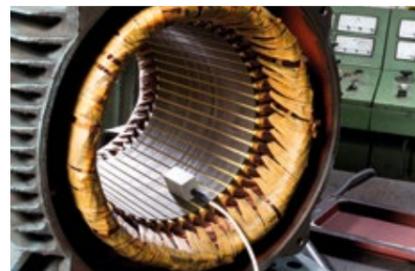


## 18 Rotary-field test at stators

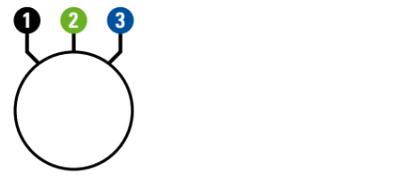
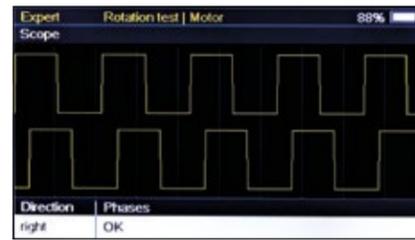


Test with special rotary-field probe  
 At L1, L2 and L3, 3-phase current with low voltage from your test field is connected.

For testing, the single-phase or three-phase stator is supplied with external three-phase current. A rotary-field probe, placed in the stator, detects the rotary direction of the magnetic field.



## 19 Rotary-field test at motors

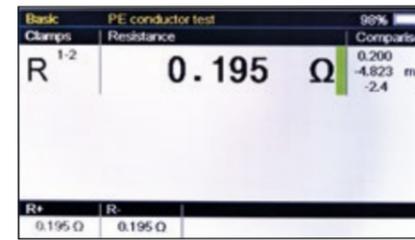


Test between the connections:  
 1, 2 and 3

The motor shaft of a single-phase or three-phase motor is manually turned to the right. It is checked, whether the rotary field of the winding also turns to the right.



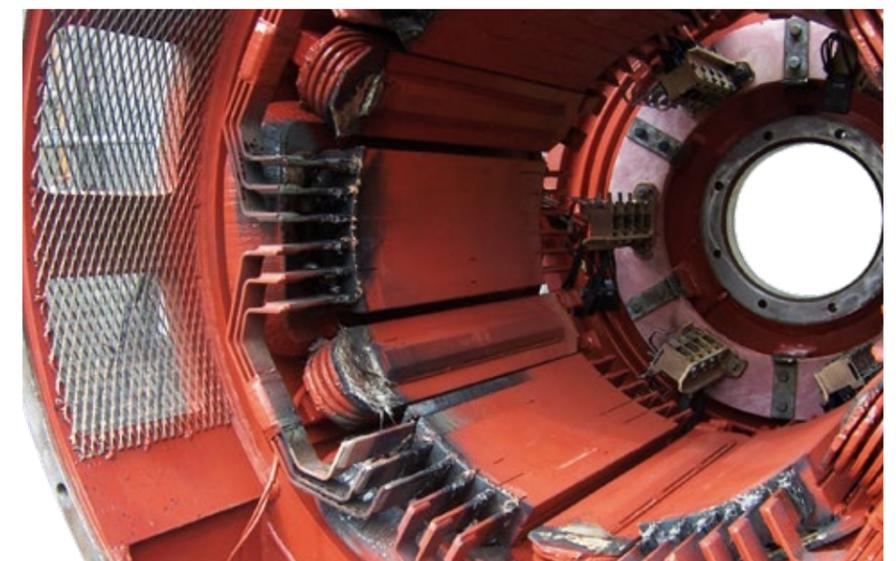
## 20 PE/GB-resistance test



Manual test with two test probes

The PE/GB-test is performed with high-precision four-wire method. Measurement with DC.

The two test probes are held to the beginning (e.g. a power plug) and to the end (e.g. the enclosure of the DUT) of the PE/GB-lead. The measurement is performed, then the test probes are exchanged, so that the polarity changes. This is followed by a new measurement. The higher one of the two resistances is the PE/GB-resistance.



# Test protocol with PrintCom G2



With the PrintCom G2 software, you can send all test results from the MotorAnalyzer2 R2 to the PC. The test results can be printed directly after the test or later with the modern standard protocol.

With PrintCom G2, it is possible to create a clearly structured test protocol with all necessary information, in no time at all.



## Test protocol

Editable field with your company logo and address

Sample Inc.  
Any Street 89  
12345 Any 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 test 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

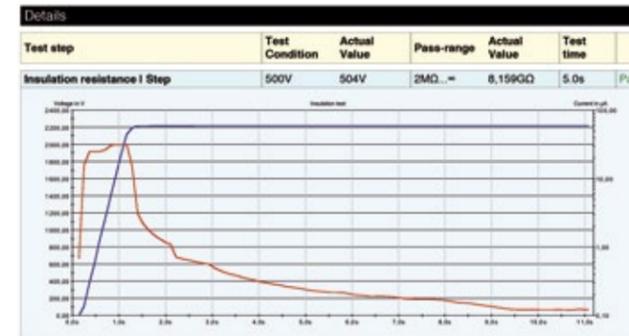
- Editable protocol with your company data and your logo
- Representative test protocol with test values and graphics
- Printing on all Windows-compatible printers
- Creating PDF-files
- Test protocols in various languages

### Details: 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 or 25 °C (68 or 77 °F)
- Winding temperature
- Deviation
- Set values (if available)

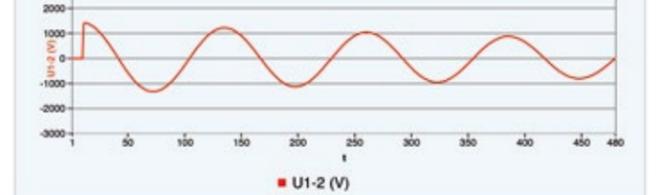
### Details: insulation resistance



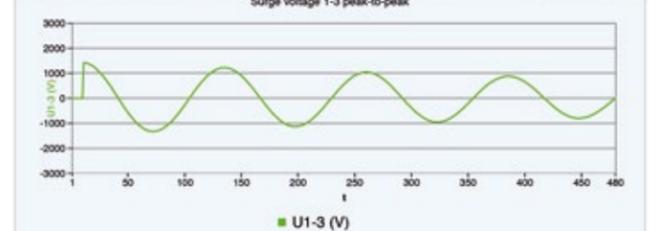
- Signal characteristics:  
Voltage-current | resistance-current | resistance-voltage
- Insulation resistance at measured temperature
- Insulation resistance compensated to 40 °C (104 °F)
- Set values (if available)

### Details: surge voltage

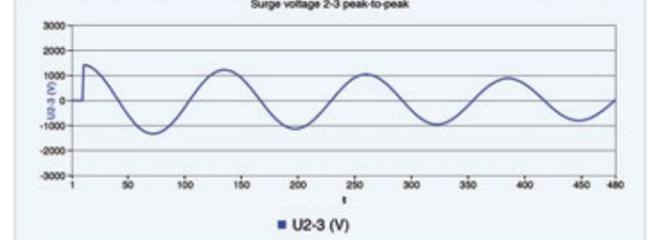
| Test step                      | Test Condition | Actual Value | Pass-range | Actual Value | Test time |
|--------------------------------|----------------|--------------|------------|--------------|-----------|
| Surge voltage 1-2 peak-to-peak | 1525V          | 1423V        | 0..15,00%  | 1,50% 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

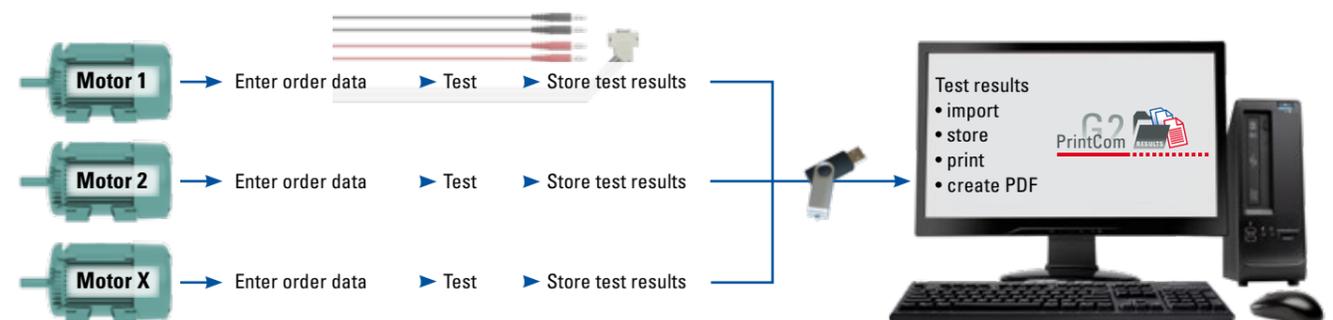


| Test step                      | Test Condition | Actual Value | Pass-range | Actual Value | Test time |
|--------------------------------|----------------|--------------|------------|--------------|-----------|
| Surge voltage 2-3 peak-to-peak | 1525V          | 1423V        | 0..15,00%  | 1,50% 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



- Signal characteristics of all three phases in one diagram
- Display of the symmetry of all 3 phases one below the other
- Deviation to the reference coil in percent
- Set values (if available)

### Order processing



# Technical data

## Test methods

### Surge voltage



|   |   |
|---|---|
| Test voltage                                  | max. 3 kV   |
| Surge capacity                                | 100 nF  |
| Pulse rise time                               | 100 to 200 ns according to IEEE Std 522-2004                      |
| Energy  | 0.45 J  |
| Surge current                                 | 200 A   |
| Evaluations                                   | EAR<br>Diff. EAR<br>Peak-to-peak<br>Correlation (SCHLEICH Patent) |
| Deviation display                             | in %  |
| Comparison method                             | between the phases<br>to a reference stator                       |
| Automatic switch-over of the test connections | yes   |

### Resistance



|   |   |
|---|---|
| Measuring range   | 100 $\mu\Omega$ to 500 k $\Omega$   |
| Resolution  | 0.5 $\mu\Omega$   |
| Accuracy  | 1 m $\Omega$ to 9.99 m $\Omega$ $\pm$ 0.3 % from 10 m $\Omega$ $\pm$ 1 digit<br>10 m $\Omega$ to 99.9 m $\Omega$ $\pm$ 0.3 % from 100 m $\Omega$ $\pm$ 1 digit<br>100 m $\Omega$ to 999.9 m $\Omega$ $\pm$ 0.3 % from 1 $\Omega$ $\pm$ 1 digit<br>1 $\Omega$ to 9.9 $\Omega$ $\pm$ 0.3 % from 10 $\Omega$ $\pm$ 1 digit<br>10 $\Omega$ to 99.9 $\Omega$ $\pm$ 0.3 % from 100 $\Omega$ $\pm$ 1 digit<br>100 $\Omega$ to 999.9 $\Omega$ $\pm$ 0.3 % from 1 k $\Omega$ $\pm$ 1 digit<br>1 k $\Omega$ to 9.9 k $\Omega$ $\pm$ 0.3 % from 10 k $\Omega$ $\pm$ 1 digit<br>10 k $\Omega$ to 499.9 k $\Omega$ $\pm$ 0.5 % from 500 k $\Omega$ $\pm$ 1 digit |
| Display of deviations/asymmetries   | in %  |
| Comparison method   | between the phases<br>to preset set values  |
| Test current  | max. 1 A  |
| Test time manual  | without test time   |
| automatic process   | presettable   |
| 4-wire method   | yes   |
| Automatic switch-over of the test connections   | yes   |
| Temperature compensation to 20 °C / 68 °F (25 °C / 77 °F) with ambient-temperature sensor | yes*  |

\* The ambient-temperature sensor needs to be ordered separately (part number 403109)

### Insulation resistance | PI & DAR



|  |  |  |
|--|--|--|
| Test voltage   | max. 6 kV  |  |
| Test-voltage selection manual  | rotary knob  |  |
| Test-voltage selection   | from 250 V in steps of 50 V  |  |
| Rise time voltage ramp   | 1, 2.5, 5, 10, 25, 50, 100, 250, 500, 1000, 2000 V/s<br>100, 250, 500, 1000, 2000, 3000 V/min  |  |
| Insulation resistance  | max. 1 T $\Omega$  |  |
| Accuracy   |  |  |
| Test voltage 250 V   | < 200 k $\Omega$<br>100 k $\Omega$ to 10 G $\Omega$<br>10 G $\Omega$ to 200 G $\Omega$<br>> 200 G $\Omega$                                   | without specification<br>$\pm$ 5 %<br>$\pm$ 20 %<br>without specification                            |
| Test voltage 500 V   | < 300 k $\Omega$<br>100 k $\Omega$ to 100 G $\Omega$<br>100 G $\Omega$ to 400 G $\Omega$<br>> 400 G $\Omega$                                 | without specification<br>$\pm$ 5 %<br>$\pm$ 20 %<br>without specification                            |
| Test voltage 1000 V  | < 500 k $\Omega$<br>100 k $\Omega$ to 200 G $\Omega$<br>200 G $\Omega$ to 500 G $\Omega$<br>500 G $\Omega$ to 1 T $\Omega$<br>> 1 T $\Omega$ | without specification<br>$\pm$ 5 %<br>$\pm$ 20 %<br>without specification<br>outside measuring range |
| Test voltage 3000 V  | < 1 M $\Omega$<br>1 M $\Omega$ to 400 G $\Omega$<br>400 G $\Omega$ to 1 T $\Omega$<br>> 1 T $\Omega$   | without specification<br>$\pm$ 5 %<br>$\pm$ 20 %<br>outside measuring range                          |
| Suppression of induced AC current  | yes  |  |
| Polarization index (PI)  | yes  |  |
| Dielectric absorption ratio (DAR)  | yes  |  |
| Current  | max. 3 mA  |  |
| Automatic switch-over of the test connections                              | yes – up to 3 kV   |  |
| Measurement between 2 test probes  | yes – up to 6 kV   |  |
| With graphic progress display  | yes  |  |
| Test time manual   | without test time  |  |
| automatic process  | presettable  |  |
| Temperature compensation to 40 °C (104 °F) with ambient-temperature sensor | yes*   |  |

\* The ambient-temperature sensor needs to be ordered separately (part number 403109)

# Technical data

## Test methods

### High voltage DC



|   |                   |                   |
|---|-------------------|-------------------|
| Test voltage                                  |                   | max. 6 kV         |
| Current                                       |                   | max. 3 mA         |
| Automatic switch-over of the test connections |                   | yes – up to 3 kV  |
| Measurement between 2 test probes             |                   | yes – up to 6 kV  |
| Test time                                     | manual            | without test time |
|   | automatic process | presetable        |

### Inductance | Impedance | RIC-test



|   |                   |                                  |
|---|-------------------|----------------------------------|
| Measuring range inductance (L)                |                   | 10 $\mu$ H to 1500 H             |
| Measuring range impedance (Z)                 |                   | 0.001 $\Omega$ to 500 K $\Omega$ |
| Accuracy                                      |                   | $\leq$ 2 %                       |
| Measuring frequency                           |                   | 50, 60 Hz                        |
| Test current                                  |                   | max. 0.5 A                       |
| Test time                                     | manual            | without test time                |
|   | automatic process | presetable                       |
| 4-wire method                                 |                   | yes                              |
| Automatic switch-over of the test connections |                   | yes                              |

### Capacity



|   |                   |  |
|---|-------------------|--|
| Measuring range capacity (C)                  |                   | 1 nF to 50 $\mu$ F   |
| Accuracy                                      |                   | $\leq$ 2.5 %, 1 nF to 5 $\mu$ F<br>$\leq$ 5 %, 5 $\mu$ F to 50 $\mu$ F |
| Measuring frequency                           |                   | 4 kHz  |
| Test time                                     | manual            | without test time  |
|   | automatic process | presetable   |
| 4-wire method                                 |                   | yes  |
| Automatic switch-over of the test connections |                   | yes  |

# Option: SHOCK PROTECTION

Thanks to the optional SHOCK PROTECTION model of the case, your MotorAnalyzer2 R2 becomes the perfect travel companion. Not only on the „long haul“ in the field, but also on the „short haul“ in your workshop, from one device under test to the next.

The MotorAnalyzer2 R2 is the best tool in your collection – and thanks to SHOCK PROTECTION, the high-end measurement technology is properly protected.

P. S.: No worries when shutting the case: If the high-voltage release key should be inadvertently left in the lock and the case lid is already closing, a recess protects both insulation and lock.



The test equipment is permanently installed in an additional inner housing. This can be lifted out. This means that the MotorAnalyzer2 R2 can also be used as a table-top unit without a case, for example in the workshop.

# Technical data

## Testing device

### Delivery extent

- Set of Kelvin clamps consisting of 3 test leads
- Test probe HV
- Test probe GND
- Power cable
- Safety key
- Calibration certificate
- Operating manual

### Technical data testing device

|  |  |
|--|--|
| Line voltage                               | worldwide 90-250 V/47-63 Hz  |
| Battery                                    | lithium-ion battery 12 V, 2.6 Ah, airworthy (UN38.3)               |
| Battery charging time                      | 2.5 h, fully charged   |
| Battery operating time                     | 3 to 8 h, depending on the tests                                   |
| Interface                                  | USB  |
| Storage capacity                           | 1000 motors  |
| Dimensions without   with SHOCK PROTECTION | 420 x 328 x 160 mm   488 x 386 x 185 mm (W x D x H)                |
| Weight without   with SHOCK PROTECTION     | 7,5 kg   9,5 kg  |
| MotorAnalyzer2 R2 in standard case         | Part #: 403168   |
| Option: Case with SHOCK PROTECTION         | Part #: 4031105 ( <i>Order in addition to the standard case!</i> ) |

# Accessories

## Robust Kelvin clamps

Robust 4-wire Kelvin clamps for high-precision resistance tests



| Type                     | small           | medium           | large            |
|--------------------------|-----------------|------------------|------------------|
| Opening width            | 10 mm           | 20 mm            | 33 mm            |
| Pressure force           | 20 N            | 30 N             | 100 N            |
| 4-wire method            | yes             | yes              | yes              |
| Measuring lead pluggable | yes             | yes              | yes              |
| Dimensions (L x H x W)   | 90 x 35 x 13 mm | 165 x 65 x 20 mm | 255 x 95 x 25 mm |
| Part #                   | 4023184         | 4023122          | 4023109          |

> Note: additional connection cables per Kelvin clamp are required.

## Robust Kelvin clamp for the pins of terminal boards

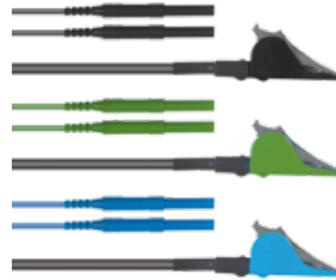


Special Kelvin clamp for contacting terminal boards

|               |          |          |
|---------------|----------|----------|
| Pin diameter  | 4-10 mm  | 8-14 mm  |
| 4-wire method | yes      | yes      |
| Part #        | 40001182 | 40001183 |

> Note: additional connection cables per Kelvin clamp are required.

## Set of Kelvin clamps



Set consisting of 3 Kelvin clamps for high-precision resistance measurement incl. connection cables – the set is part of the delivery extent.

|               |               |
|---------------|---------------|
| Cable length  | 1.1 m         |
| Opening width | approx. 20 mm |
| 4-wire method | yes           |
| Part #        | 403180        |

## 4-wire test probe



For high-precision resistance measurement, for example at DC-motor bars

|                  |        |
|------------------|--------|
| Cable length     | 3 m    |
| Part # (1 piece) | 403172 |

> Note: for testing, you require 2 four-wire test probes.

## Connection cables



Connection cable per robust Kelvin clamp

|                  |        |
|------------------|--------|
| Cable length     | 2 m    |
| Part # (1 piece) | 403184 |



The connection cables can be plugged into the Kelvin clamps (4023184, 4023122 and 4023109)! For testing, you require 3 connection cables.

## Ambient-temperature sensor



Ambient-temperature compensation for resistance- and insulation-resistance test

|        |        |
|--------|--------|
| Part # | 403109 |
|--------|--------|

## Start/Stop button for 4-wire test probes



Ideally suited for starting and stopping the test, when holding both test probes.

|              |        |
|--------------|--------|
| Cable length | 3.2 m  |
| Part #       | 403111 |

> Note: suitable for test probes 4000395 and 403172.

## Induction probes for fault location



Probe for testing stator and armature windings according to the induction method. The probes serve to locate turn-to-turn faults.

| Slot distance          | 1 19 mm            | 2 9 mm flexible  | 3 9 mm             |
|------------------------|--------------------|------------------|--------------------|
| Dimensions (L x H x W) | 130 x 30 x 25.5 mm | 115 x 40 x 20 mm | 120 x 20 x 25.5 mm |
| Cable length           | 3 m                | 3 m              | 3 m                |
| Part #                 | 403107             | 403123           | 403106             |

## Neutral-zone measuring lead



To adjust the neutral zone at DC-motors, the field and the armature (the carbon brushes) are connected to the MotorAnalyzer. The "neutral zone" is adjusted by turning the brushes.

|              |          |
|--------------|----------|
| Type         | standard |
| Cable length | 1.5 m    |
| Part #       | 403102   |

## Rotary-field probe to measure sense of rotation of stators



The sense of rotation of a stator is detected by means of a Hall rotary-field probe. In the test field, the stator is operated with a low rotary-field voltage and the rotary-field probe is put into the stator to be tested.

|              |        |
|--------------|--------|
| Cable length | 3 m    |
| Part #       | 403103 |

## Foot switch for starting the test



|              |         |
|--------------|---------|
| Cable length | 2 m     |
| Part #       | 4010611 |

## Software



PrintCom allows you to log and store your test results in a fast and convenient manner.

|        |         |
|--------|---------|
| Part # | 4018712 |
|--------|---------|

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|                           |               |
|---------------------------|---------------|
| SCHLEICH.Care   Europe    | Part # 403174 |
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The periodic calibration of test equipment is an essential precondition for quality assurance. We calibrate your test equipment according to standards – on site or in our factory in Hemer. It goes without saying that we calibrate in accordance with national and international standards.

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**SCHLEICH**  <sup>®</sup>  
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SCHLEICH GmbH  
An der Schleuse 11  
58675 Hemer | Germany  
Phone +49 (0) 2372 9498-9498  
Fax +49 (0) 2372 9498-99  
info@schleich.com  
www.schleich.com

Presented by:

