



# MTC2

## Multi-purpose winding testers



# A deeper look into the winding – the surge voltage tester par excellence

The MTC2 is a high-end surge voltage tester – no other tester offers such a variety of applications. With the MTC2 you precisely analyze coils, stators, armatures, etc. according to state-of-the-art technology – without compromise.

Innovations, technical leadership and a patented surge voltage evaluation methods characterize the MTC2 surge voltage testers of the 6th generation. You can choose from a finely graded tester variety from 6 kV to 50 kV.

Based on 25 years of experience, extensive know-how and a consistent optimization you purchase a state-of-the-art surge voltage tester.



The housing variants are ideally suitable for universal usage and almost every application. Whether stationary application or mobile operation – the MTC2 provides the right solution.

## KEY FACTS

- Digital surge voltage test with patented evaluation method
- Surge voltage with 100 nF/200 nF (device-dependent) and up to 2000 A surge current
- Partial discharge analysis to detect certain insulation faults according to standards
- Resistance measurement in 4-wire-technology with temperature compensation
- Insulation resistance test with automatic PI-measurement
- Inductance test | LCR inductance measuring bridge
- Fully automatic switchover between different test methods
- 4 winding connections (windings and neutral point) plus frame connection
- Automatic testing with GO/NO GO comparison
- Integrated armature test assistant, armature adapter and armature booster
- Remote-controlling of an AC high voltage tester and scanning the test results
- Integrated PC with Windows®
- Simple and intuitive operation by touch screen or mouse and keyboard
- Optional remote maintenance and calibration
- Database for numerous test plans and test results

- › Surge voltage up to **50 kV**
- › Analysis of motors and generators up to 500 MW
- › 2000 A surge current
- › 125 joules surge energy
- › Rise time up to 60 ns
- › Automatic test method switchover
- › Unique evaluation methods
- › Fully integrated partial discharge test



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# Fields of application

## Motor repair | Manual inspection

The MTC2 is immediately ready for use to perform spontaneous measurements. By means of the unique manual mode all test methods (resistance, surge voltage, insulation resistance, and partial discharge) can be started. It is not necessary to parameterize the tests in advance. You only have to adjust the requested test voltage and the test is ready to be started.

The software always delivers you the current test results, similar to a multimeter. Thus, an evaluation of the winding and the insulation system is immediately possible and you can instantly decide, if and which part of the motor has to be repaired.

Furthermore, a variety of motor data can be entered, which will be printed on the SCHLEICH standard protocol in addition to the test results.

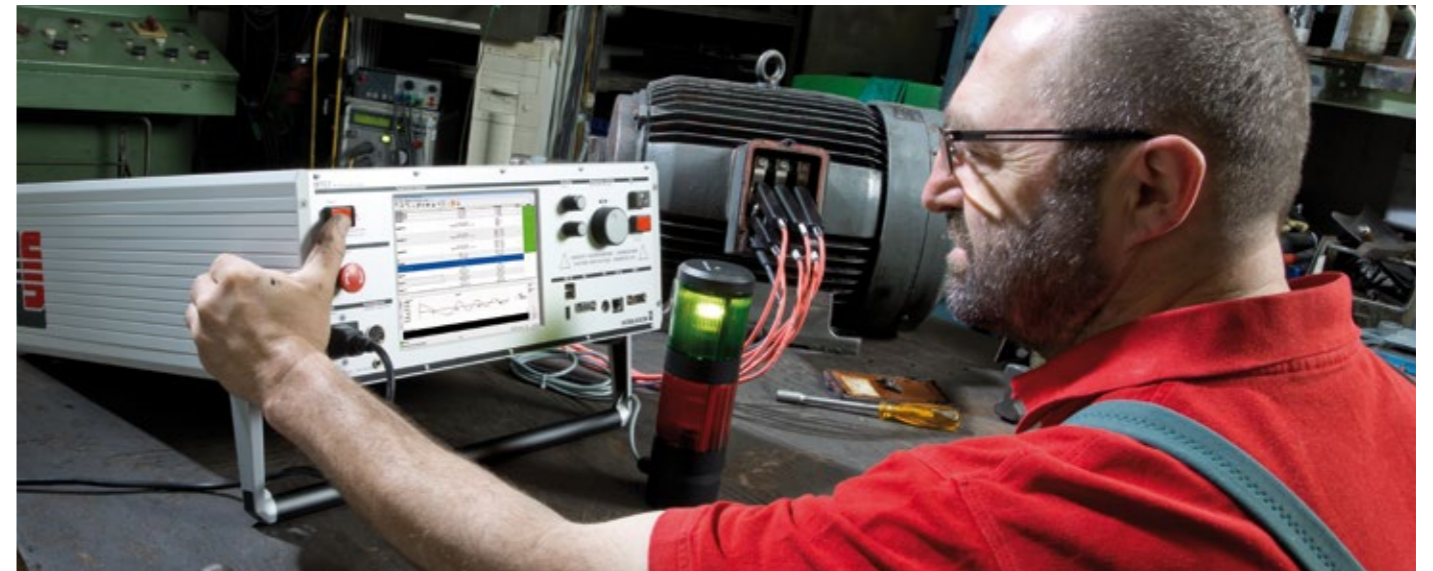


## Motor repair | Fully automatic inspection

A great variety of motors and generators can be automatically inspected in the repair sector. For this, the MTC2 offers a fully automatic mode, which performs the test according to a freely definable test sequence. The tester evaluates the test results automatically and indicates the result by means of a GO/NO GO signal in the display. For the evaluation of the test results no technically qualified personnel is required!

The MTC2 is already equipped with a variety of test plans for any nominal voltage class. As a result, you can also start at once in the fully automatic mode. Nearly unlimited test sequences may be entered, which can be individually adapted to and optimized for your test application.

Furthermore, a variety of motor data can be entered, which will be printed on the SCHLEICH standard protocol in addition to the test results.



## Motor production

The MTC2 can be easily integrated in a production line. Its dimensions are based on a 19" housing, which allows a perfect implementation of the tester. The additional interfaces do not only allow a complete remote control but also a connection to a master computer.

Nearly unlimited test sequences for different types of test objects may be entered in the MTC2 and selected and started via interface. All test results can be retrieved via interface and may be stored in a central database via master computer. Furthermore it is possible to store the results locally on the tester or directly in the network.




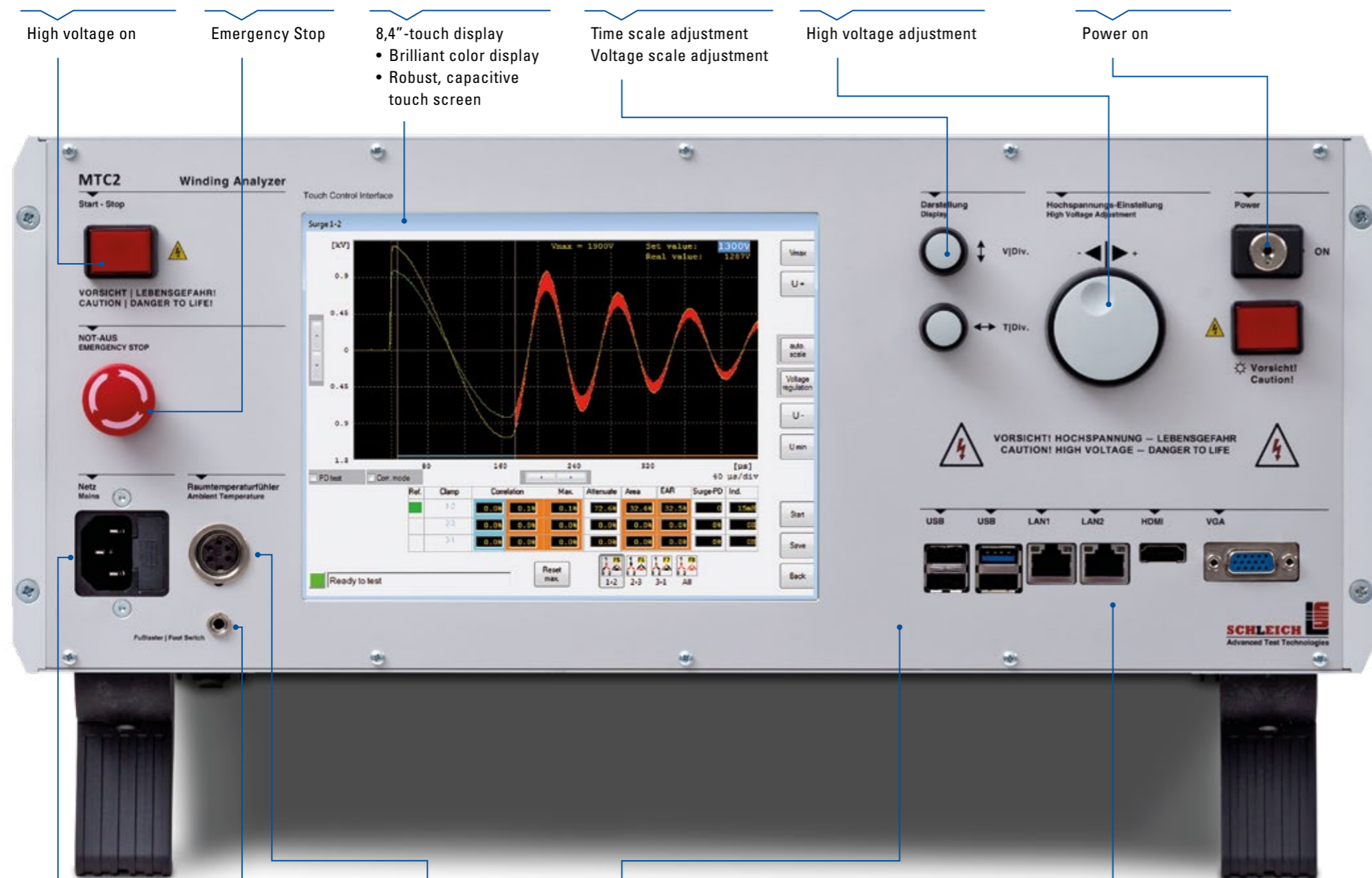
# The basic device – State-of-the-art technology in a compact design

The integration of so many different test methods in one tester is unique. All necessary tests are included in only one compact device. The system offers a clearly arranged test overview and the intuitive operating concept facilitates the operator's daily working routine.

The complete hardware and software is made by SCHLEICH according to our motto „Made in Germany“. Our innovations set technological standards for the modern winding inspection.

**ROBUST  
INDUSTRIAL  
STANDARD**

 Made in Germany



Power connection

Connection foot switch

Connection temperature probe

Integrated PC

- Maintenance-free industrial PC
- Extended working temperature range
- Fanless
- WIN10® operating system
- 2 GB RAM
- 256 GB SSD

Connections

- 3 x USB 2.0, 1 x USB 3.0
- 2 x Ethernet
  - Remote maintenance (service&support)
  - Online calibration
  - VoltageAnalyzer
- HDMI, VGA-monitor



MTC2 6 kV

Measuring ports at the rear panel

- 6 kV-measuring leads, pluggable
- 4 mm plug for alligator clips



MTC2 6 kV-50 kV

Measuring ports at the rear panel

- Measuring leads firmly installed
- 4 mm plug for alligator clips



MTC2 6 kV-50 kV

Control plug (basic equipment) at the rear panel

- Connection to a safety circuit
- GO/NO GO output
- Start input
- Warning light output
- Connection to optional devices
- Armature booster | rotor-stator-check

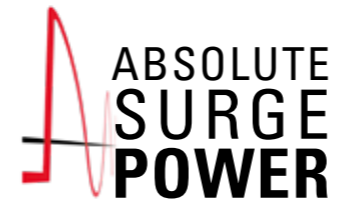
# The surge test

With the excellent evaluation methods of the MTC2 you are able to detect even the smallest faults. The variety of evaluation methods, which can be combined in any way you like, allows a detailed, reliable, and very exact fault analysis. This reduces misinterpretations to a minimum.

The parameterization to the signals to be evaluated takes place almost automatically. The tester independently selects the most convenient settings for the signal to reach the maximum sensitivity.

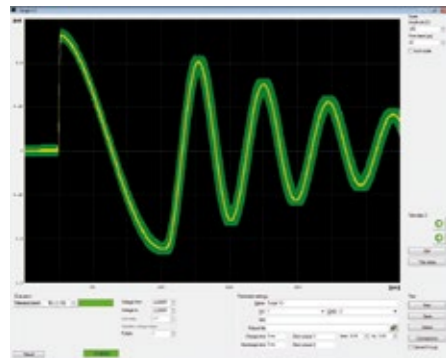
Additionally the MTC2 is equipped with an automatic voltage correction which assures, that the test voltage is always perfectly adjusted, depending on the particular test object. These features significantly facilitate the fault analysis. Thus, a reliable statement regarding the motor's condition can be promptly made.

The evaluation is based on a reference signal which has been taught-in before or on an automatic comparison between all three phases among each other.



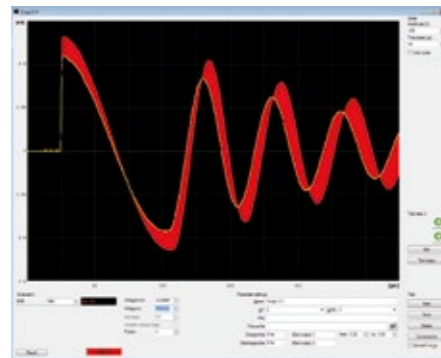
- > 125 joules surge energy
- > 2000 A surge current
- > Rise time up to 60 ns
- > Patented evaluation method

Tolerance band



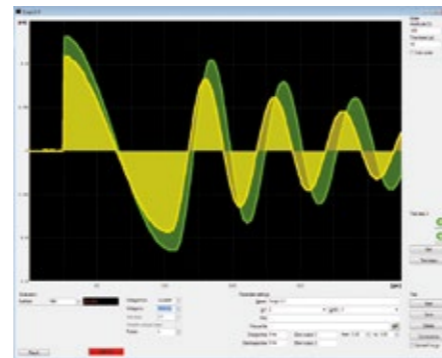
The tolerance band belongs to the simpler evaluation methods, at which an envelope curve is placed around the signal. The surge wave has to be within a certain tolerance band.

Error area | EAR



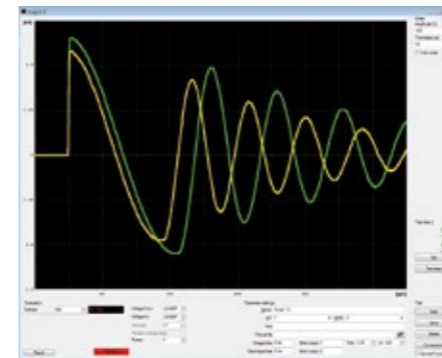
The error area is the differential area between 2 signals (surge waves). The difference in area between reference surge wave and currently measured surge wave is automatically determined and the deviation is indicated in %.

Difference in area



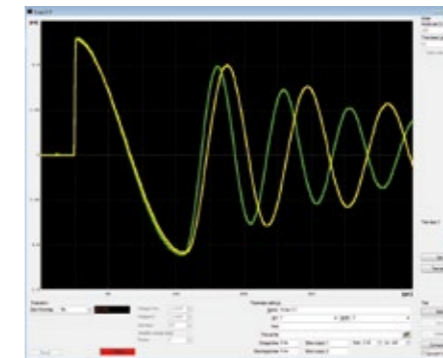
The difference in area is the subtraction of the single areas below the two surge waves. The result leads to a deviation in percentages compared to the reference area.

Correlation (patented by SCHLEICH)



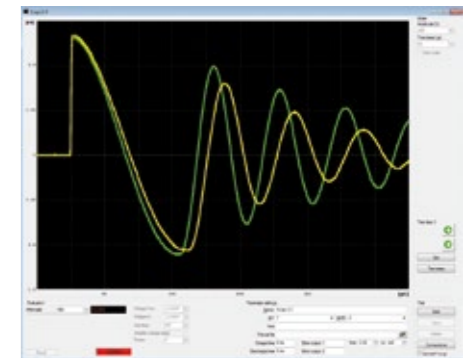
The relation between reference surge wave and currently measured surge wave is automatically determined and the deviation is indicated in %.

Frequency



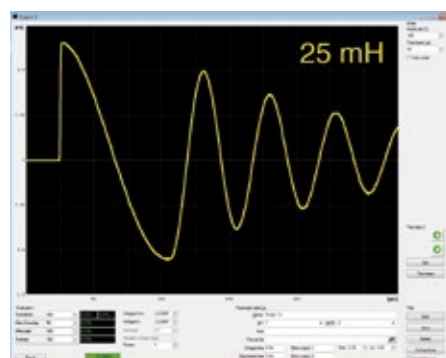
The difference in frequency between reference surge wave and currently measured surge wave is automatically determined and the deviation is indicated in %.

Attenuation



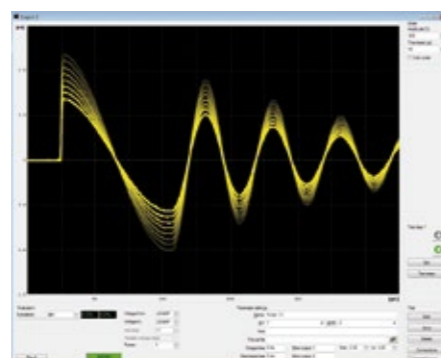
The difference in the attenuation course between reference surge wave and currently measured surge wave is automatically determined and the deviation is indicated in %.

Inductance | mH



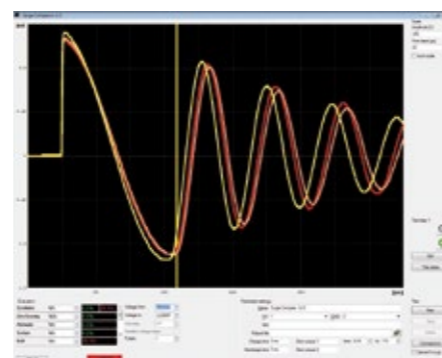
The inductance is calculated from the surge voltage test's signal. The result is indicated in "H".

Peak-to-peak



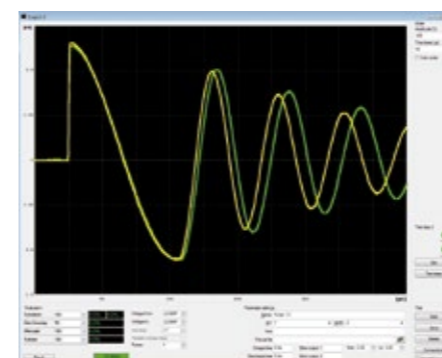
At the peak-to-peak-method the test voltage is gradually increased. If a bigger deviation occurs between two steps, the test is stopped. The deviation from step to step is indicated in %.

Phase comparison



At the phase comparison all three phases of a motor are automatically compared with each other and displayed in a diagram. In this way the symmetry can be directly determined and evaluated. Normally this method is used in the motor repair sector.

Reference comparison



The comparison to a reference is possible, in case a good test object has been taught-in before. Normally this method is used in production.



# The insulation resistance test

The insulation resistance test which is integrated in the basic device is specifically intended for testing electrical drives. The test voltage is automatically switched on the measuring lead, which is also used for the surge voltage- and the resistance test. A re-clamping at the test object during the single measurements is not necessary. The switchover takes automatically place in the tester up to a test voltage of 50 kV.

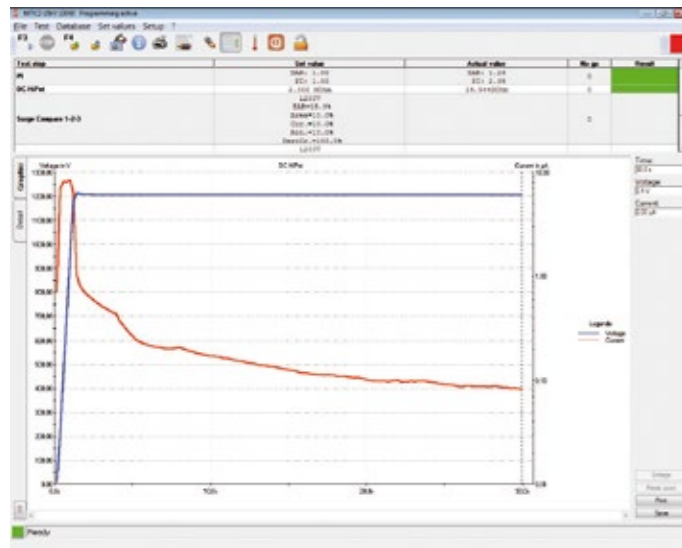
The software provides preconfigured test plans for PI, DAR, High voltage DC, Mega Ohm and step voltage, which clearly facilitates

the operation of the tester. To be able to configure the tester also for special applications, all parameters may be adjusted separately.

The MTC2 is very flexible in its application – no matter whether it is used in production or in the service and repair sector.

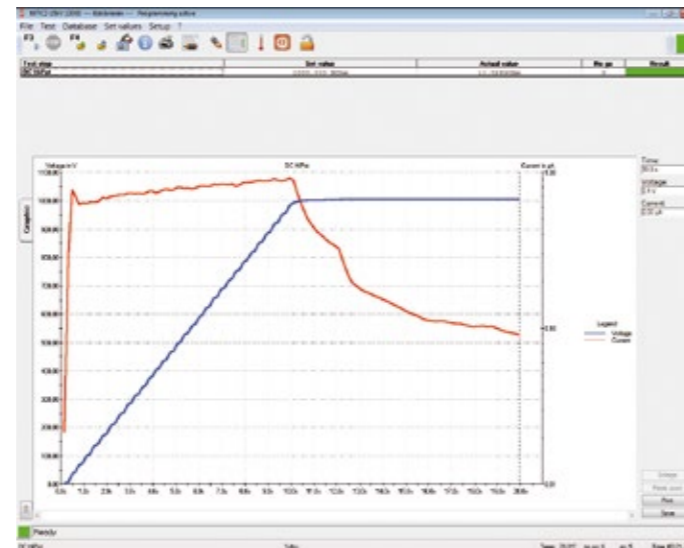
- > High voltage DC up to 50 kV
- > PI | DAR
- > Up to 100 GΩ

Insulation resistance test



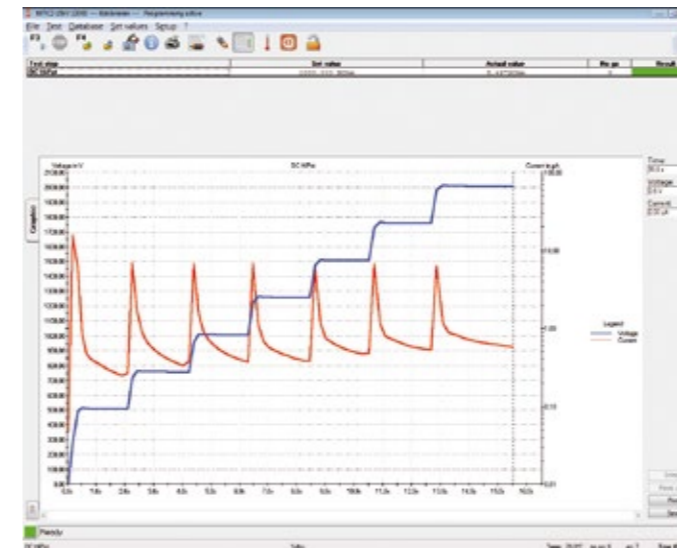
- Adjustable test time

Insulation resistance test with ramp



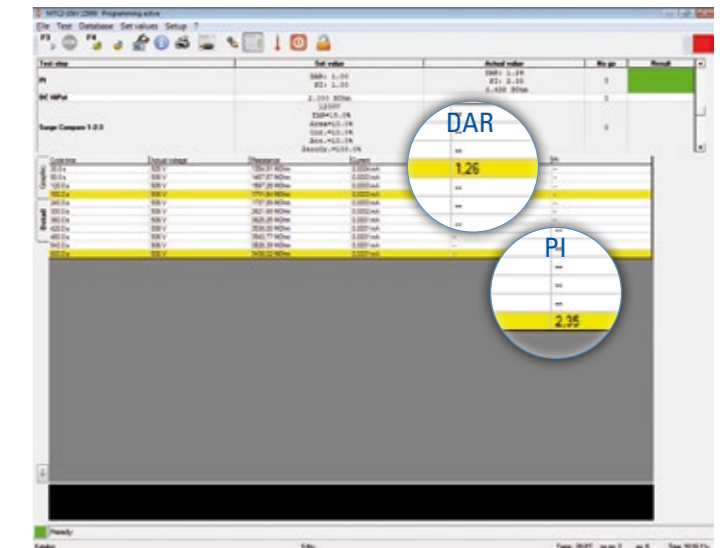
- Ramp and test time adjustable

Step voltage test

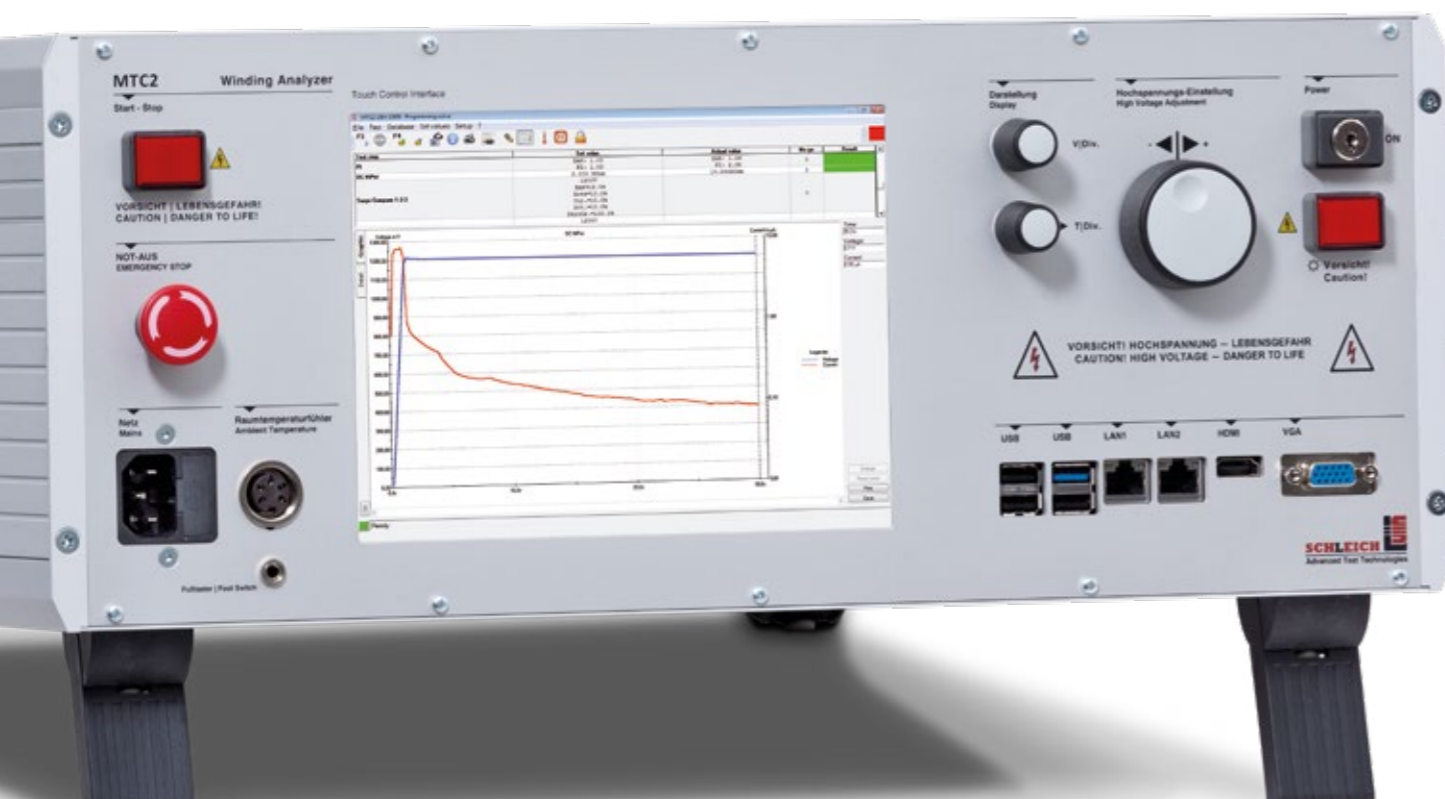


- Adjustable step voltage
  - Test time per step
  - Final test time at the last step
  - Voltage step size per step
  - Start voltage at the first step

PI | DAR test



- Measurement logging every 60 s
- The first two measurements are logged in a 30 s interval



## KEY FACTS

- Adjustable minimum current monitoring (current connection control)
- Fully automatic or manual process
- Burning mode
- Automatic discharge
- Selectable display variants:
  - Voltage-current
  - Resistance-current
  - Resistance-voltage

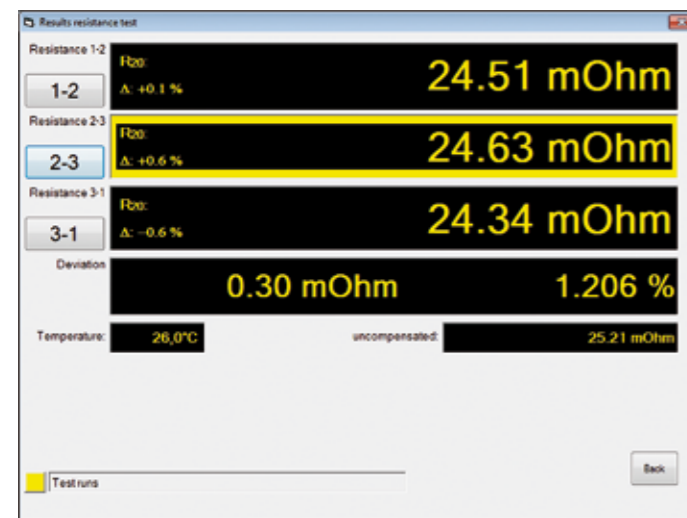
## Optional extension: The resistance test

By extending the MTC2 with the resistance test it is possible to test the phase resistances of an electric motor fully automatically. A re-clamping is not required for the resistance test. The test is automatically performed via the test leads which are already connected to the test object.

The evaluation is either based on a direct set value specification or on the symmetry ratio (deviation) of all three phases.

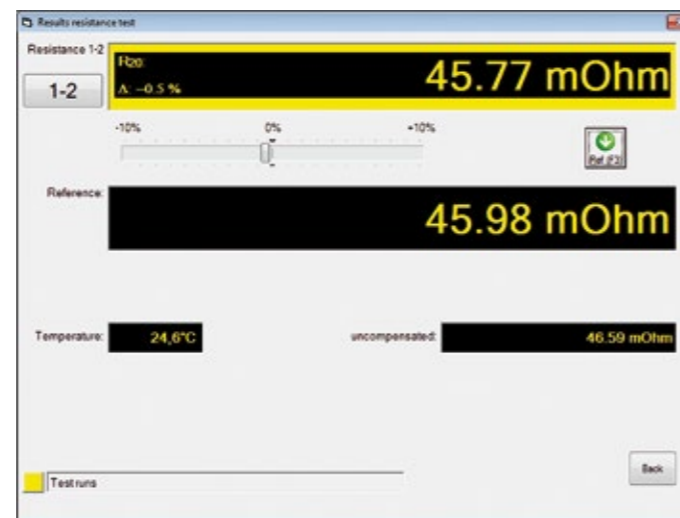
**KEY FACTS**

- Highly accurate resistance measurement in 4-wire-technology
- Same measuring leads in use as at the HV-test
- No re-clamping required
- Manual or fully automatic resistance test
- Automatic GO/NO GO evaluation
- Firm set value entry possible
- Ambient temperature compensation



Resistance test at a 3-phase machine

- Automatic measurement of all three phase resistances
- Deviation determination



Resistance test e.g. at an air-core coil or bar-to-bar

- Comparison of several individual coils possible
- Resistance measurement of DC-armatures (bar-to-bar)

### Ambient temperature compensation

Model MTC2	6 kV/12 kV/15 kV
Measuring range	0-100° C   32-212° F
Part no.	401404

- Adjustable reference temperature
- Compensation of temperature dependence of copper and aluminum
- Allows the comparison between nominal and actual values, also at fluctuating temperatures

> Note: Extension to the resistance test

### Resistance test

Model MTC2	6 kV	12 kV/15 kV	25 kV/30 kV/40 kV/50 kV
Measuring range	1 mΩ-100 KΩ	1 mΩ-100 KΩ	1 mΩ-100 KΩ
Resolution	1 μΩ	1 μΩ	1 μΩ
4-wire-technology	yes	yes	yes
Automatic switchover	yes	yes	no (optionally available)
Part no.	4023103	4023193	4023150

## Optional extension: The high-voltage test AC

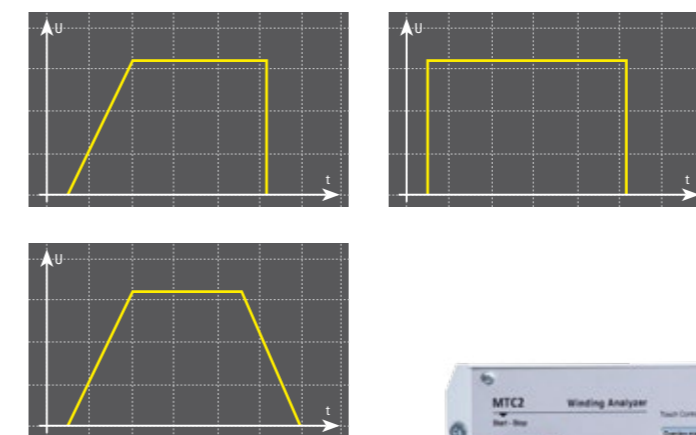
The high-voltage test is integrated in the MTC2 and automatically switched on the measuring leads. A re-clamping is not required. The test is automatically carried out with the measuring leads, which are already connected to the test object.

As an option, also the high-voltage tester of the GLP1-and GLP2-class can be connected with the MTC2 via the RS232-interface. The test results are then automatically transferred from the external tester to the MTC2.

**KEY FACTS**

- High-voltage test according to standards
- Fully-electronic control
- Fast switch-off at flashover
- Freely adjustable ramps
- Automatic GO/NO GO evaluation

### Test with and without voltage ramp profile



### High-voltage test AC

Test voltage	up to 3 kV	up to 6 kV
Test current	max. 25 mA	max. 100 mA
Fast disconnection	adjustable	adjustable
Part no.	4023158	4023207



Optional extension:

# The partial discharge test according to IEC 61934 and DIN EN 60034-18-41

The partial discharge test serves for checking the quality of windings. The test can be performed in combination with the high-voltage test (sine wave) as well as with the surge test. The main idea is detecting any quality faults in windings that cannot be detected with conventional high-voltage test or surge testing.

Due to the coupling technology combined with a high-frequency filter technology the system is free of disturbances. It is highly useful for on-site or production applications. The partial discharge measuring (filtering and analysis) is completely integrated in the MTC2. Only the uncoupling (measuring) of the actual partial discharge signal is performed outside the tester. This is necessary for the respective measuring situation.

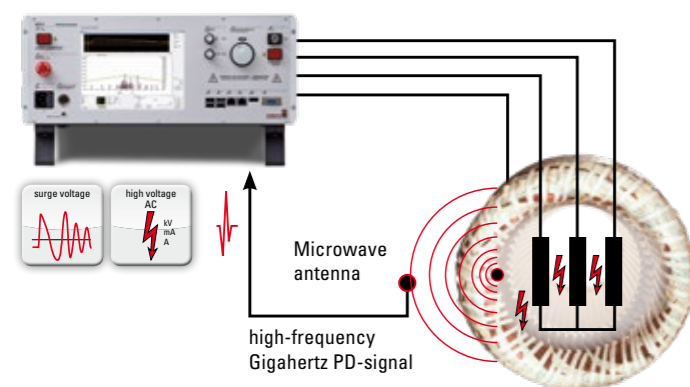
Testing at an open stator winding is carried out with a highly sensitive measuring antenna and at a completely assembled motor with a special coupler. The antenna as well as the special coupler can be optionally connected to the MTC2 making the MTC2 well equipped for most applications.

## KEY FACTS

- Determination of the inception and extinction voltage according to IEC 61934
- High reproducibility due to special filter technology
- Special coupling technology for measuring completely assembled motors
- Free of any disturbances due to special high-frequency filter technology
- No shielding of the test area necessary
- Partial discharge test up to 25 kV
- Qualification of enameled copper wire (twisted pair), Enamel-insulation and Impregnation procedure

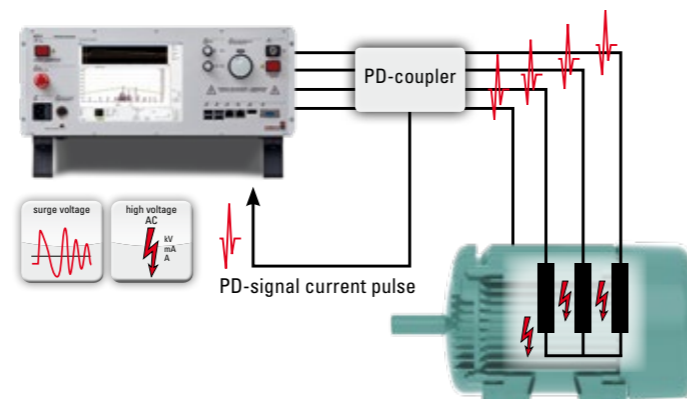
### Partial discharge test at an open stator winding

The partial discharge measurement at an open stator winding is performed via a highly sensitive measuring antenna, which is put inside the test object or placed close to the test object.



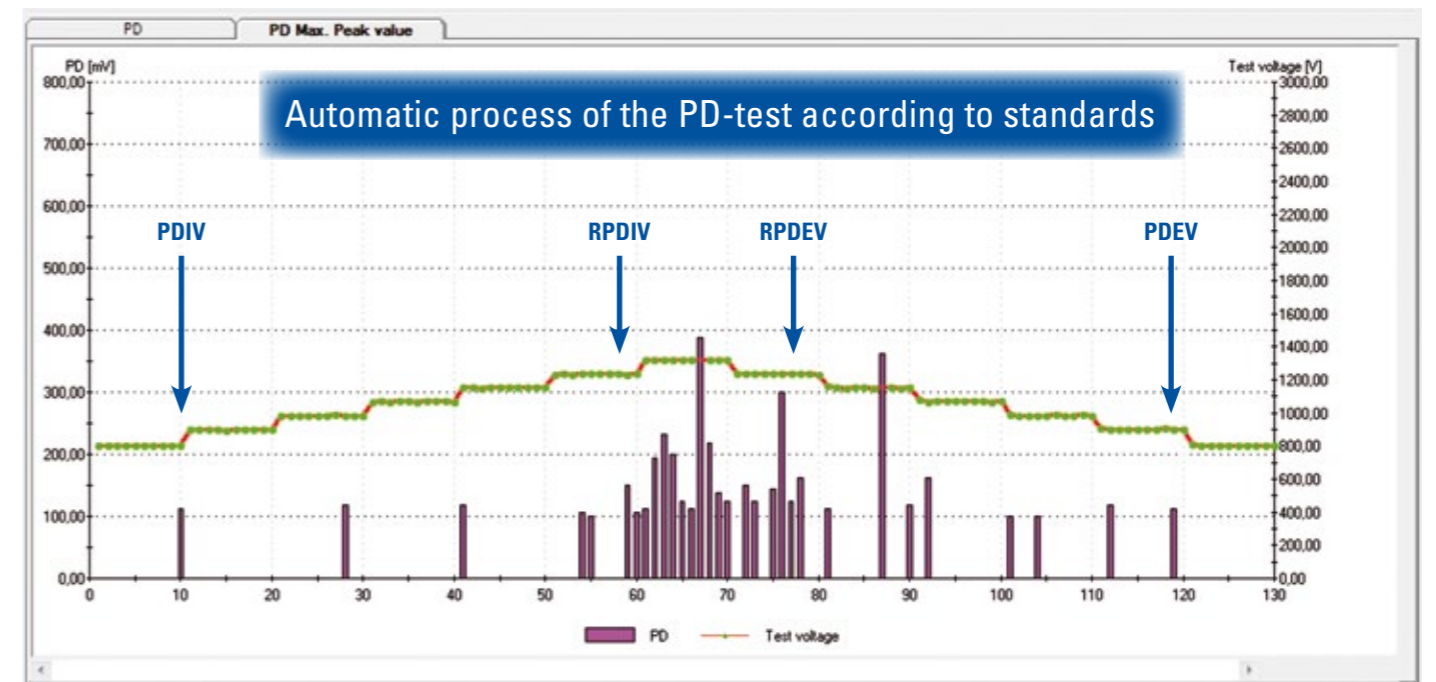
### Partial discharge test at a completely assembled motor

The measuring at a completely assembled motor cannot be performed via an antenna as the high-frequency signals are shielded by the closed motor cabinet. In these cases the measuring is performed via a special coupler which is attached to the measuring lead.



> The combination of these two PD-test methods is unique in the world!

### Partial discharge using the surge voltage



The test is performed either manually or automatically. In the manual mode the operator increases the voltage continuously while monitoring the partial discharge signal. Via a test sequence the automatic operation provides an analysis of all three phases. The following values are determined per phase:

- PDIV (Partial Discharge Inception Voltage)
- RPDIV (Repetitive Partial Discharge Inception Voltage)
- RPDEV (Repetitive Partial Discharge Extinction Voltage)
- PDEV (Partial Discharge Extinction Voltage)

Here it is also not necessary to run the complete ramp. If it has to be distinguished quickly between "GO" and "NO GO" in production, it can be operated with a preset test voltage.



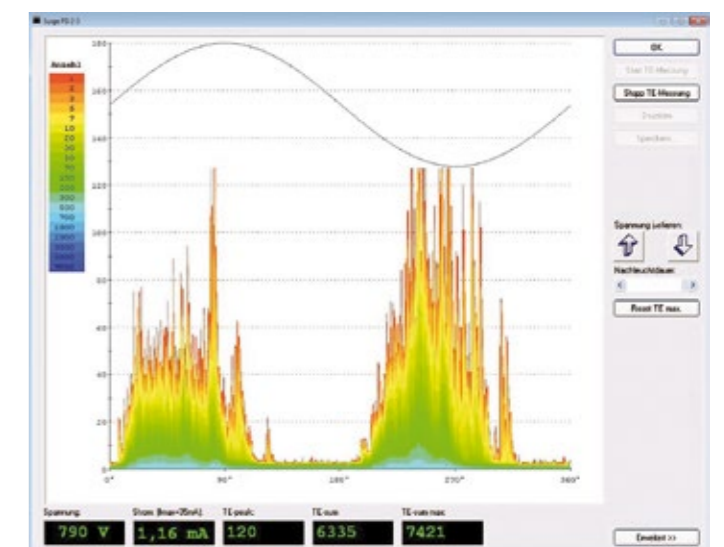
Surge voltage pulse with 150 ns, rise time, and PD-effects

### Partial discharge test at HV-AC

The test is performed automatically via a test sequence set beforehand. A ramp function is run, in which the test voltage is continuously increased. As soon as the first partial discharges occur, this voltage is stored as PDIV (inception voltage).

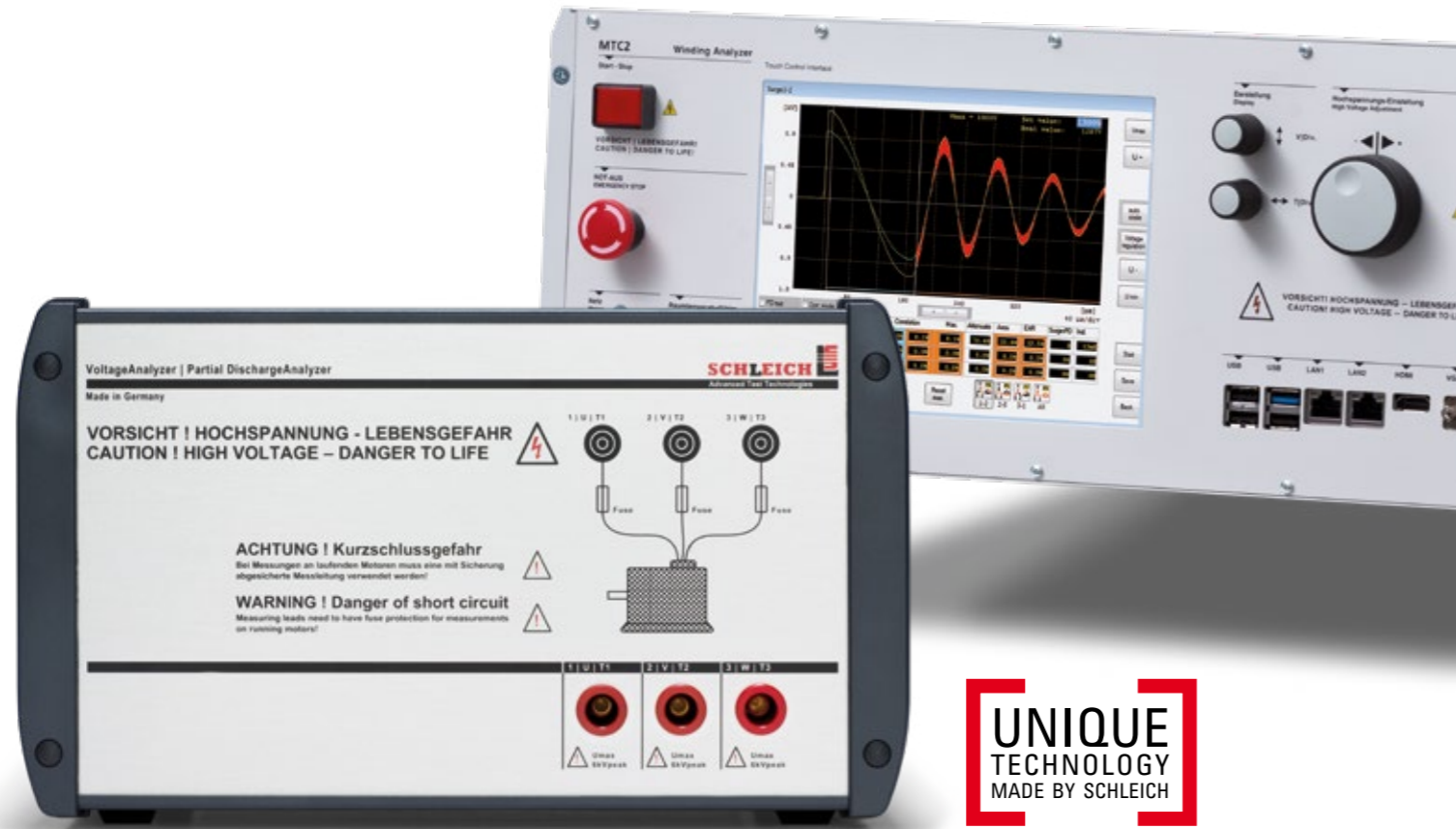
Next, the voltage is reduced until the partial discharge disappears. This point is identified as PDEV (extinction voltage) and also stored. Due to preferably short test times in production the partial discharge's intensity can also be determined at a preset voltage. Thus it can be quickly distinguished between "GO" and "NO GO".

In addition it is also possible to perform the test manually. Here the operator continuously increases the voltage while monitoring the partial discharge signal.

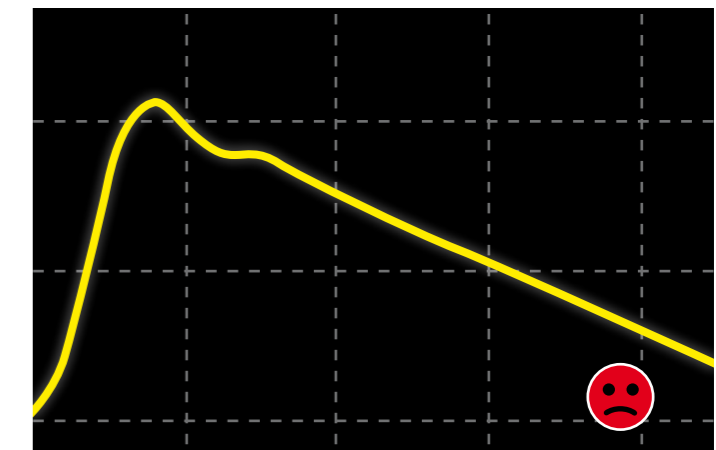
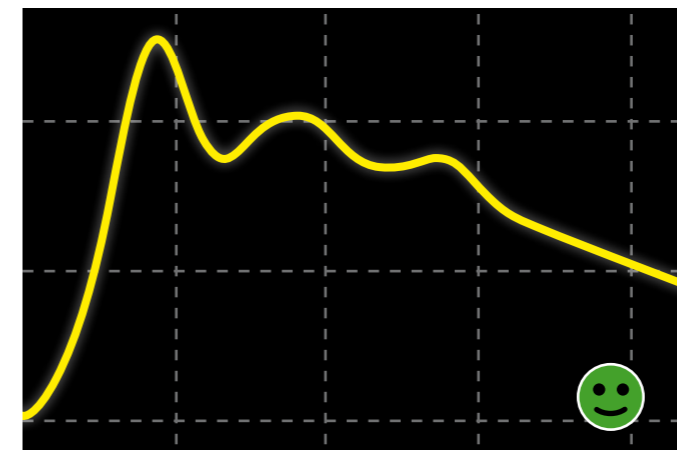
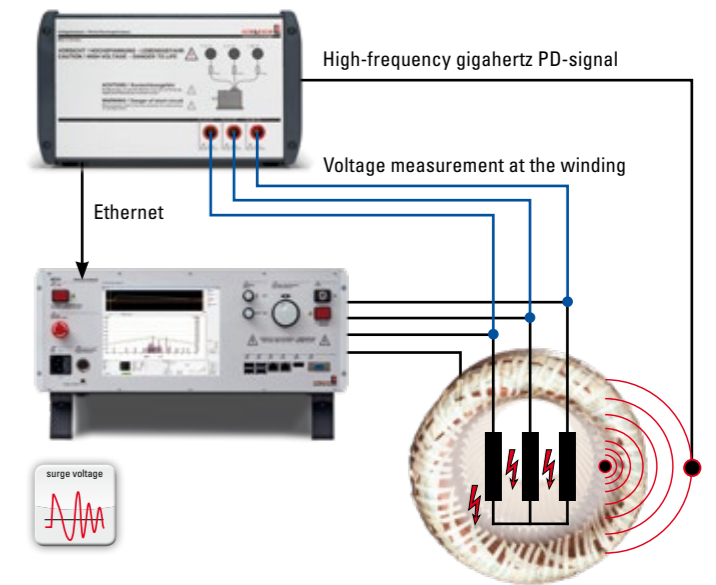




# Optional extension: VoltageAnalyzer



For testing three-phase motors or stators quickly and without reconnecting, the VoltageAnalyzer has three test ports. They are connected to the terminals U, V and W of the DUT via preferably short test leads. The test-point switch-over between the three test connections in the VoltageAnalyzer is fully automatic and synchronous to the surge test.



## Measurement accuracy at its best

The VoltageAnalyzer serves for measuring surge-voltage signals directly at the winding of the motor. The frequency response covers a range from DC up to very high pulse frequencies in the MHz-range. This makes the VoltageAnalyzer the ideal tool for high-precision surge-voltage and partial-discharge measurements.

With the VoltageAnalyzer, voltages and voltage peaks can be measured right where they occur, e.g. in the motor at the motor-terminal board or right at the winding connections.

### Voltage measurement for surge voltage and partial discharge

It may happen that the voltage measured in the surge tester does not exactly match the voltage at the DUT. This is caused by the fact that the unavoidable lead inductances and capacitances between the test leads can change the voltage curve of the surge signal on its way to the DUT. This effect becomes more intense the steeper the surge pulse rises.

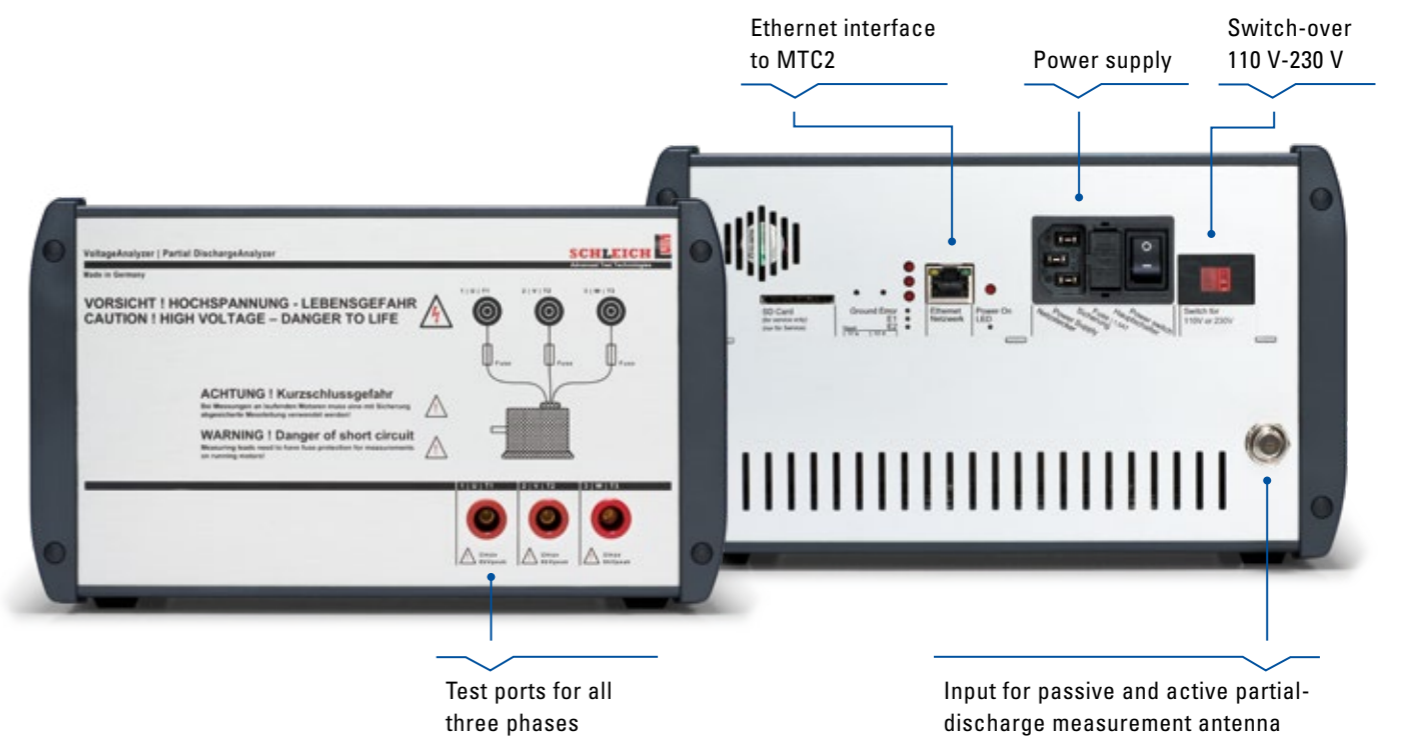
E.g. for an accurate measurement of the partial-discharge inception voltage actually applied to the motor-terminal board during a partial-discharge test, a measurement via the VoltageAnalyzer directly at the terminal board is required.

### KEY FACTS

- Accurate surge measurement directly at the winding or at the motor-terminal board
- Active test probe with integrated switch-over between three phases
- Potential-free voltage measurement
- Influencing the signal characteristic by the test lead is eliminated
- Accurate measurement of partial-discharge voltages – PDIV, RPDIV, PDEV, RPDEV
- Perfect for standard-compliant measurement according to DIN EN 60034-18-41:2014
- Detection and logging of pulse rise times

- Surge impulse measured by the VoltageAnalyzer
- measured directly at the motor terminals
  - precise overshoot measurement
  - exact peak and peak to peak voltage measurement

- Surge impulse measured without VoltageAnalyzer
- signal waveform is not measured at the motor terminals
  - high damping of the overshoot signal



# Optional extension: Armature booster



For the armature test an additional armature booster is available for MTC2-testers. This is necessary for testing of larger, low-inductive DC-armatures. With the armature booster the surge current is increased by factor 10, to find short-circuits and insulation faults between bars.

The evaluation is performed automatically via the patented instrument developed by SCHLEICH.

The armature booster is connected to the MTC2's measuring leads. At the booster's output, there are two solid test probes with an integrated start button available. In addition a warning light shows whether the clamps are voltage-free and an acoustic signal indicates whether the test is GO or NO GO.

## Booster-Pack

Model MTC2	6 kV   12 kV   15 kV
Output current	>2000 A possible
Output voltage	≤1500 V
4-wire-technology	no
Pluggable	yes
Part no.	4023227

## Collector test probes

Set of test probes to connect individual commutator coil sets manually



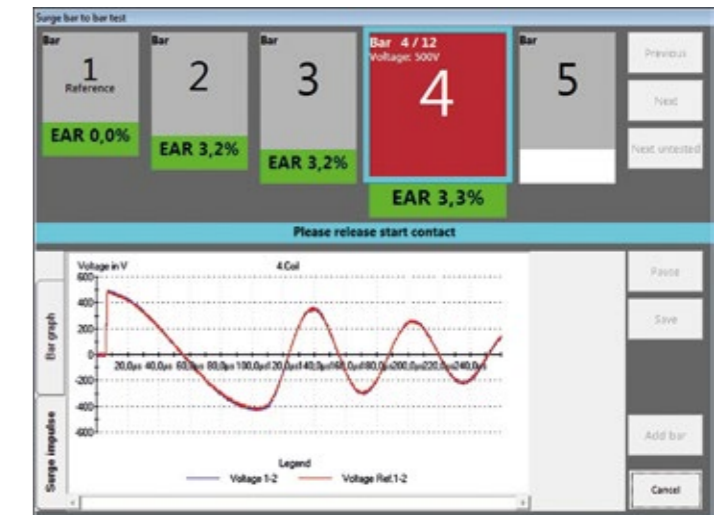
Adjustable collector contacting tool



Adjustable width: 2.5-22 mm/0.1-0.87 inch  
Collector diameter: 100-700 mm/3.9-25.6 inch

The test is performed with two test probes that are pushed on the bars (bar to bar method). Here the test can be performed directly between bar-bar or between ¼ of the commutator. The test is started via the two start buttons in the test probes.

The test is evaluated via an automatic test process which guides the operator through the measuring. It can also be tested manually without the preset test step sequence. With both methods the MTC2 compares the surge graphs to the previously stored reference measurements. It is possible to remove any faults and repeat the test at these points.



# Optional extension: Squirrel cage

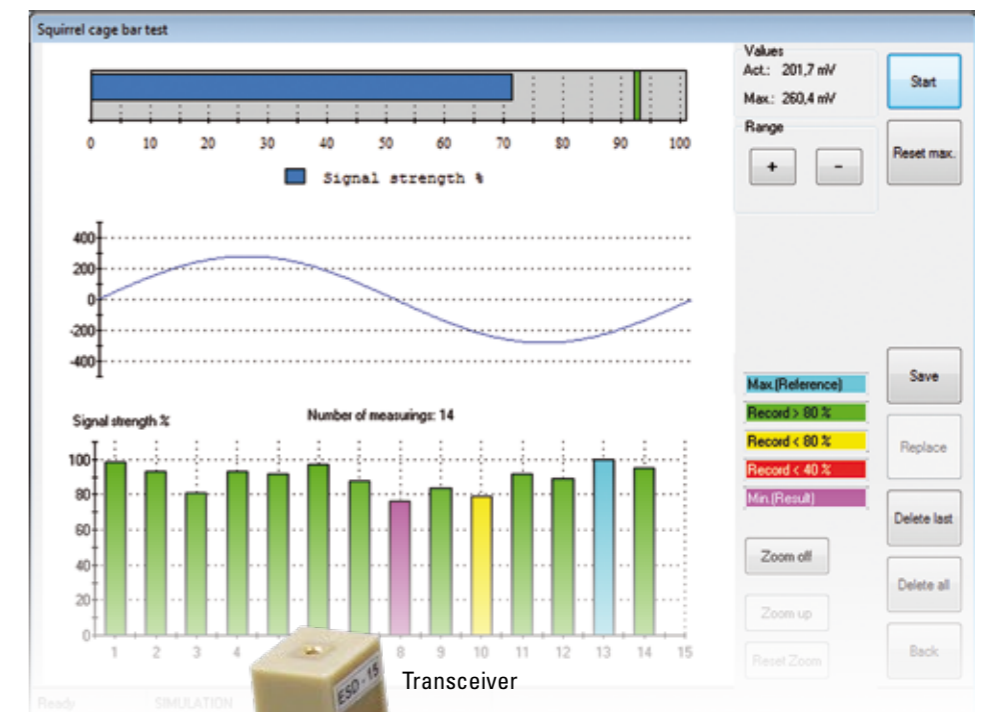


Two test probes are used for the test. They are connected at the test object's exterior above the slots. The first probe (Transceiver) transmits a signal to the test object; the second probe (Receiver) receives the signal. The receipt signal is measured in the MTC2 and the signal strength is displayed on the screen.

Number the individual slots in advance. At the subsequent measuring, position the probes above the individual slots at the test object's opposite outer edges in a way that the maximum signal strength is indicated in the MTC2. Using the MTC2 software, after

finding the best probe position, store the signal in the corresponding slot number. Perform these measurements at each slot storing all the data.

During measuring, the MTC2 compares the available values and detects any irregularities of the resistances within the slots. The slots' measuring values should all be the same. If the differences are too high there is a fault. Based on slot numbering, locate the defect quickly and efficiently, making repair easier.

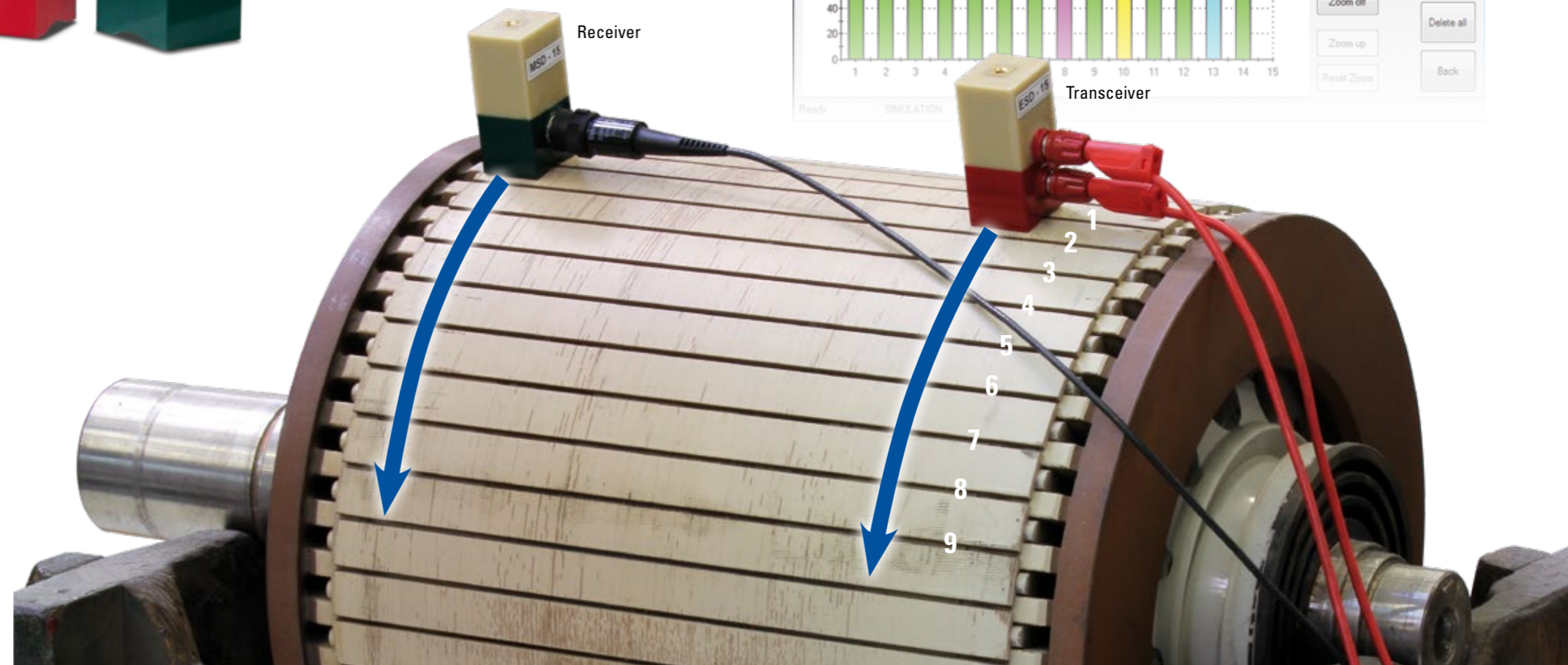


Ideal test accessory for checking and locating faults in squirrel-cage motors, armatures, stators, and generators. The accessory operates in combination with the MTC2.

## Rotor-stator-check

Model MTC2	6 kV-50 kV
Test probes small	slot distance 9-15 mm/0.35-0.59 inch
Test probes medium	slot distance 15-30 mm/0.59-1.18 inch
Test probes large	slot distance 30-50 mm/1.18-1.97 inch
Part no.	4023227

> **Note:** in this set all 3 test probe sizes are included!



# Testing in manual mode

In manual mode the different test methods (surge voltage, insulation resistance, resistance, high voltage AC...) are called up by the operator in any order. Suitable for each test method an operator-friendly display is indicated. It is not necessary to enter more data or parameters for testing.

Before starting the single tests the operator selects the type of test object. The tester automatically adjusts itself to the respective test configuration.

The following selection is possible:

- Single coil
- Single-phase winding with three leads
- Single-phase winding with four leads
- Winding with delta or star connection and three leads
- Winding with star connection and a separate star point with four connections

During each test method, depending on the type of test object, measuring values are collected at several connections. The MTC2 automatically collects the measuring values in a result overview.

The MTC2 offers 2 approaches to perform the manual measurements:

- The unique auto test can be easily used to collect the measuring values. The MTC2 automatically performs all integrated test methods. The test voltage level is automatically calculated from the test object's formerly entered nominal voltage. Afterwards the MTC2 automatically analyzes the collected results and indicates, if the winding is o.k. or not o.k. This approach is particularly suitable for inexperienced operators.
- The operator is also able to perform the single measurements and collect the measuring results independently. After finishing the measurements, the MTC2 automatically also provides the operator the analysis of the measuring results.

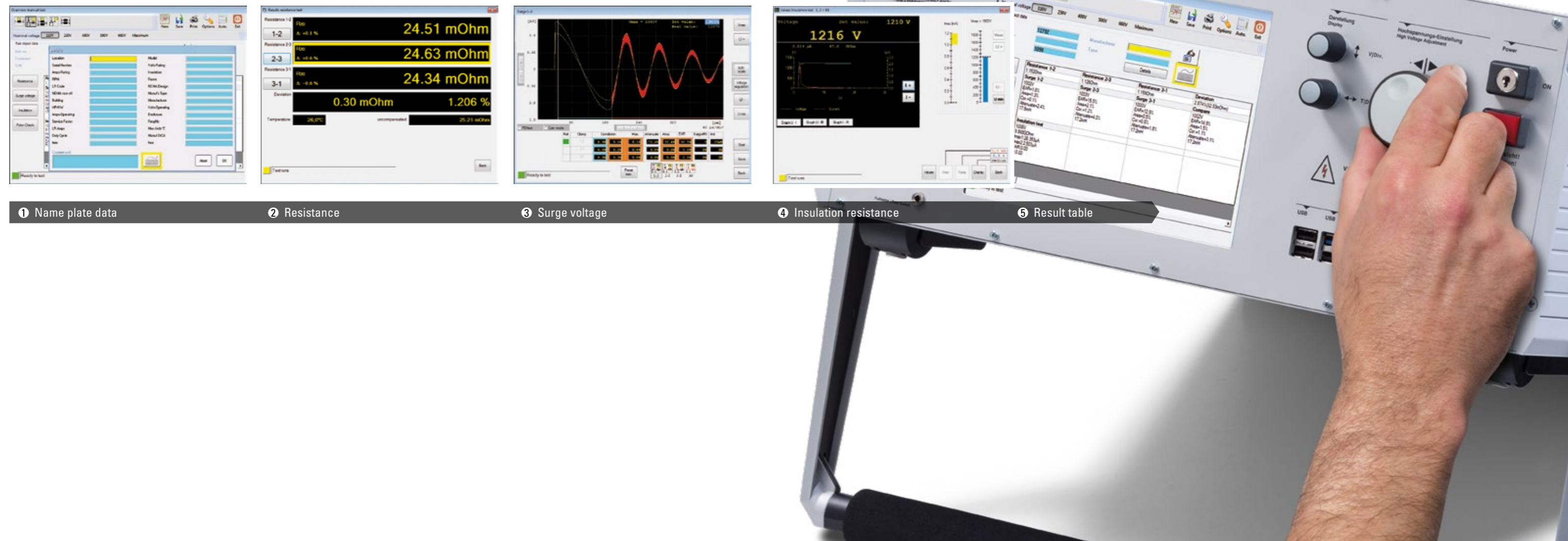
In addition to the collected measuring values further, different name plate data can be entered. As each company has its own idea regarding name plate data to be stored, the MTC2 can be easily configured according to your expectations. Up to 30 different name plate data can be freely configured.

As soon as all measuring values and name plate data are collected, all data is stored in the Access® database integrated in the tester. The data may be printed either immediately or at a later time. In case you want to print the data at a later print in time, the test results can be easily searched for in the data base. As search key, numerous name plate data as well as motor description and serial no. can be used.

**KEY FACTS**

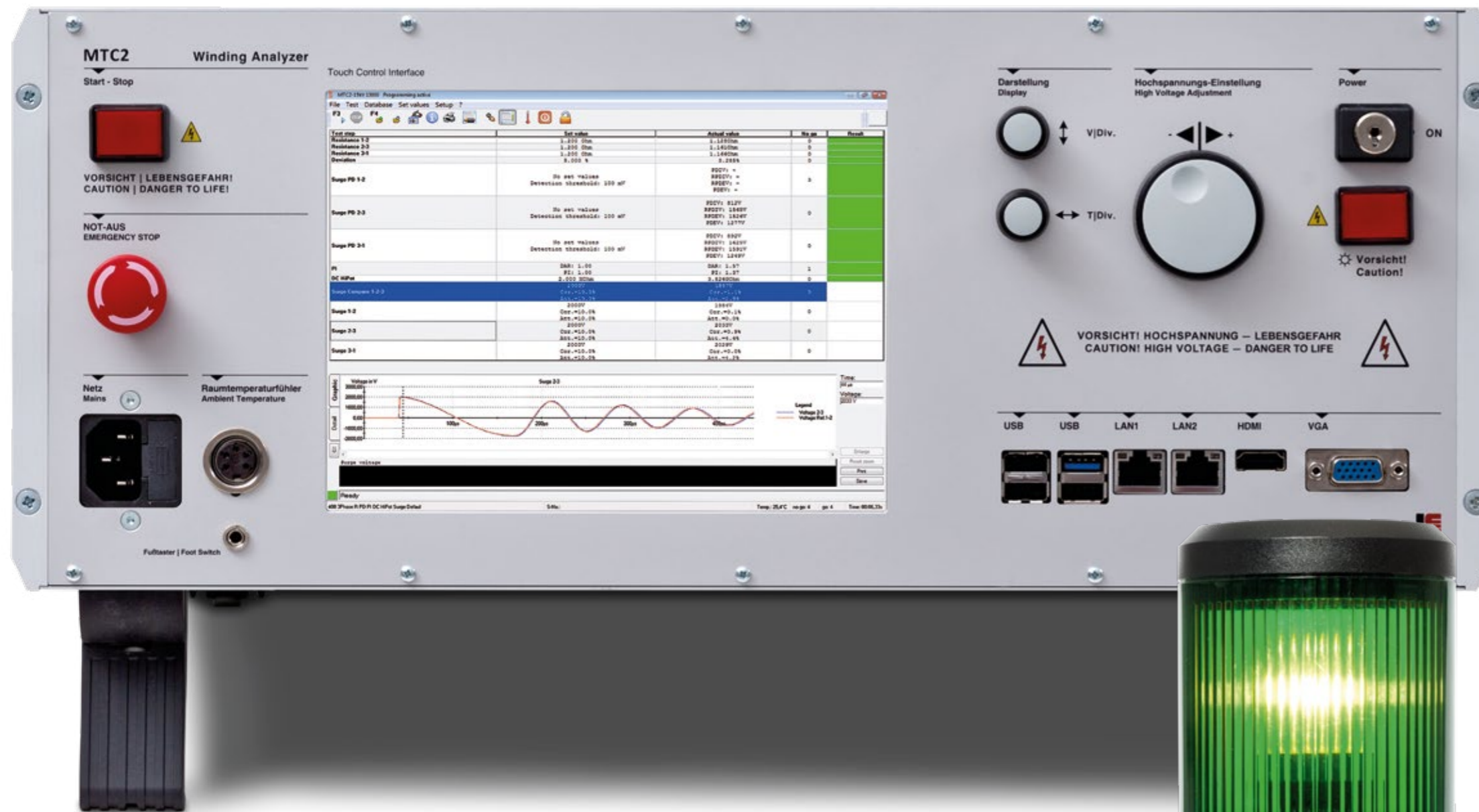
- Immediate testing without parameterization
- Possibility to enter motor data
- Protocol print after testing
- Easy and intuitive operation

## > The test program – only 5 steps to a perfect result



1 Name plate data      2 Resistance      3 Surge voltage      4 Insulation resistance      5 Result table

# Testing in automatic mode



## KEY FACTS

- Fully automatic testing
- Simple GO/NO GO evaluation
- Easy and intuitive operation
- Clear display presentation
- Printing, logging and evaluating
- Integrated user- and setter notifications
- High data safety and long-time storage of data
- Printing of labels, name plates etc.
- Scanning of DMCs (Data matrix code)

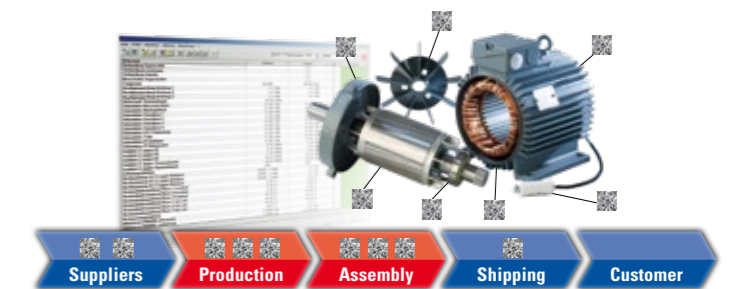
In automatic mode all tests, contained in the tester, are automatically carried out. All test results are continuously indicated and evaluated. That is why a direct evaluation during running tests is already possible. A clear GO/NO GO notification visualizes the automatic evaluation.

The test sequence's adjustment is carried out by adding or deleting test steps. In this way the test program can be perfectly adapted to different tasks. Via double-click, each single test step can be edited and adjusted separately.

An integrated user management ensures that only authorized persons are able to execute the changes in the test steps. The work instructions which may be additionally integrated make the MTC2 a tester according to ISO 9001.

## Traceability

The traceability allows you to receive clear and complete information about the complete production process, even afterwards.



### KEY FACTS:

- Clear traceability
- Marking and identification
- Scanning of DMCs (Data matrix code)
- Networking of SCHLEICH testers

› For more information see: [www.schleich.com/en/traceability](http://www.schleich.com/en/traceability)

## The automatic mode in the repair sector

Even new motors may be easily inspected with the SCHLEICH automatic mode. Therefore the test program automatically adapts to the new motor. This is how a variety of different motors can be tested fully automatically without additional parameterization.

The MTC2 contains fully automatic test plans for a variety of different motor nominal voltage classes, which significantly facilitate testing. Only a test plan, e.g. for a 480 V motor, has to be loaded and the MTC2 fully automatically inspects the complete machine, followed by a GO/NO GO evaluation.

### KEY FACTS:

- Automatic GO/NO GO evaluation
- The test programs adapts to the motor
- Pre-defined test program
- Testing possible without special knowledge
- Automatic test logging
- Integrated user management

# The test protocol

All test results can be printed on the modern standard protocol either directly after finishing a test or later.

The protocol language can be set individually before printing. Standard languages are German, English, French, Dutch, Spanish, Italian, and Russian.

Depending on your needs, the protocol can be printed in different ways:

- Printing on paper  
You can connect a Windows 10®-compatible printer to the MTC2. As usual in Windows®, only a click on the printer symbol is required and all test results are automatically printed.

- Creating a PDF-file  
On request, the MTC2 creates a PDF-file which is automatically stored on a USB-stick, the internal hard drive or under any network path. The storage on the USB-stick happens fully automatic in the root directory. "Copy and paste" in Windows® is not necessary.
- Creating a CSV-file  
Optionally, the MTC2 can also automatically generate a CSV-file after a test program. The file is stored under any network path. The data which is transferred into the CSV-file are freely configurable and can be adapted to your requirements.

## Test protocol

Sample Company Ltd  
Sample Street 89  
12345 Sample City

# Your Logo

Test system	Testsystem Entwicklung   SCHLEICH MTC2-12kV   4590		
Test program	Triangle test complete		
Result	PASS		
Serial number	35601		
Test date	28.02.2014 13:51:46		
Job no.	1010		
Customer	Hermes		
Manufacturer	Schleich		

### Summary

Test step	Set value(s)	Real value(s)	Result
Resistance 1-2	76.00, (66.40 - 83.60) mOhm	76.52 mOhm (25.2°C)	PASS
Resistance 2-3	76.00, (66.40 - 83.60) mOhm	76.41 mOhm (25.2°C)	PASS
Resistance 3-1	76.00, (66.40 - 83.60) mOhm	76.48 mOhm (25.2°C)	PASS
Deviation	5.000 %	0.148 %	PASS
Surge PD	PDIV: 800V, RPDIV: 1500V, RPDEV: 1400V, PDEV: 1000V, Detection threshold: 300 mV	PDIV: 1394V, RPDIV: 1583V, RPDEV: 1509V, PDEV: 1509V, Background noise signal: 31.25mV, Detection system noise signal: 31.25mV	PASS
Surge 1-2	1000V, EAR=15.0%, Cor.=10.0%, Att.=15.0%, Inductance=1.00mH	1033V, EAR=0.0%, Cor.=0.1%, Attenuate=0.0%, Inductance=1.65mH	PASS
Surge 2-3	1000V, EAR=15.0%, Cor.=10.0%, Att.=15.0%, Inductance=1.00mH	1056V, EAR=8.1%, Cor.=0.3%, Attenuate=4.9%, Inductance=1.67mH	PASS
Surge 3-1	1000V, EAR=15.0%, Cor.=10.0%, Att.=15.0%, Inductance=1.00mH	1062V, EAR=5.7%, Cor.=0.1%, Attenuate=5.1%, Inductance=1.63mH	PASS
Compare	1000V, EAR=15.0%, Cor.=10.0%, Att.=15.0%	1014V, EAR=6.0%, Cor.=0.2%, Attenuate=0.7%	PASS
Insulation test	2000V, 1.000 MOhm	2214V, 6.503 GOhm (40.0°C), 18.139GOhm (25.2°C), I <sub>max1</sub> =35.953µA, I <sub>max2</sub> =0.122µA	PASS

Customizable content with your company logo and your address

General motor data, date and time etc.

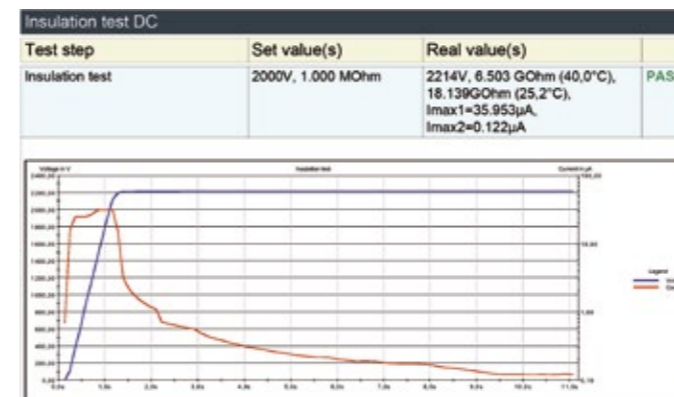
Overview of all test results

### Detailed display: resistance

Test step	Set value(s)	Real value(s)	Result
Resistance 1-2	76.00, (66.40 - 83.60) mOhm	76.52 mOhm (25.2°C)	PASS
Resistance 2-3	76.00, (66.40 - 83.60) mOhm	76.41 mOhm (25.2°C)	PASS
Resistance 3-1	76.00, (66.40 - 83.60) mOhm	76.48 mOhm (25.2°C)	PASS
Deviation	5.000 %	0.148 %	PASS

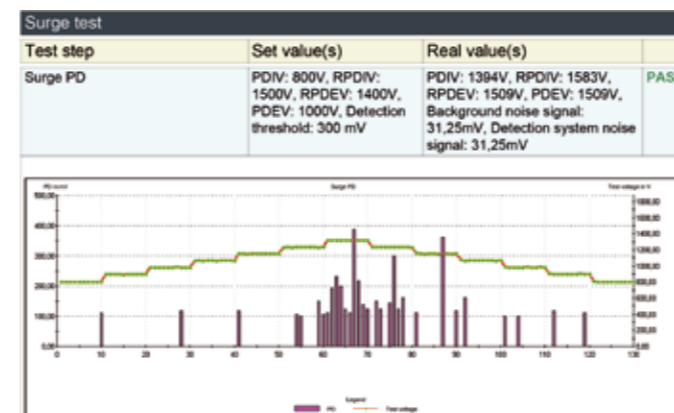
- Phase resistances compensated to 25° C | 68° F
- Winding temperature
- Deviation
- Set values (if existing)

### Detailed display: insulation resistance



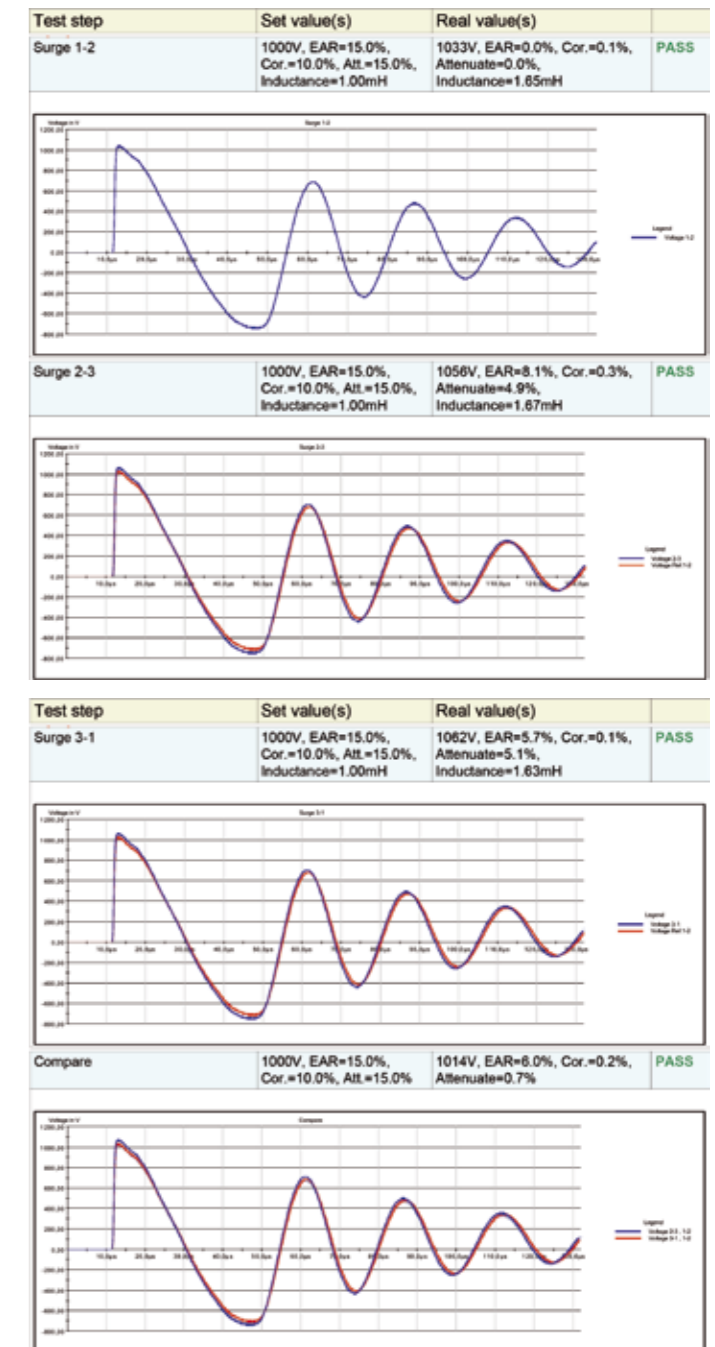
- Signal course:  
Voltage-current | resistance-current | resistance-voltage
- Insulation resistance at measured temperature
- Insulation resistance compensated to 40° C | 104° F
- Set values (if existing)

### Detailed display: partial discharge test



- Logging according to IEC 61934
- Measured values:  
PDIV | RPDIV | RPDEV | PDEV
- Interference level in the background
- Detection system interference level
- Set values (if existing)

### Detailed display: surge voltage



- Signal courses 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)

### KEY FACTS

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

# Technical data

## Product overview

### 6 kV-tester

1 MTC2-desktop unit 6 kV

2 MTC2-19"-Rack 6 kV

3 MTC2-Caddy 6 kV



Model	Tester type	Winding connection leads	Ground connection leads	Surge voltage	Surge capacity 100 nF	Surge capacity 200 nF	Ohmic resistance	Kelvin clamps	Partial discharge at surge voltage	PD antenna	PD coupling box	High voltage DC	Insulation resistance	Polarization index	Inductivity measurement	High voltage AC	Sense of rotation test at stator	Visual test
MTC2 6kV	1	4	1	●	●	—	—	—	—	—	—	●	●	●	—	—	●	
MTC2 6kV-HE	1	4	1	●	—	●	—	—	—	—	—	●	●	●	—	—	●	
MTC2 6kV-R	1	4	1	●	●	—	●	○	—	—	—	●	●	●	—	—	●	
MTC2 6kV-R-HE	1	4	1	●	—	●	●	○	—	—	—	●	●	●	—	—	●	
MTC2 6kV-R-PD	1	4	1	●	●	—	●	○	●	●	●	●	●	●	—	—	●	
MTC2 6kV-R-PD-HE	1	4	1	●	—	●	●	○	●	●	●	●	●	●	—	—	●	
MTC2 6kV-Rack	2	4	1	●	●	—	—	—	—	—	—	●	●	●	—	○	●	
MTC2 6kV-R-Rack	2	4	1	●	●	—	●	○	—	—	—	●	●	●	—	○	●	
MTC2 6kV-R-HE-Rack	2	4	1	●	—	●	●	○	—	—	—	●	●	●	—	○	●	
MTC2 6kV-R-PD-Rack	2	4	1	●	●	—	●	○	●	●	●	●	●	●	—	○	●	
MTC2 6kV-R-PD-HE-Rack	2	4	1	●	—	●	●	○	●	●	●	●	●	●	—	○	●	
MTC2 6kV-R-HVAC-Rack	2	4	1	●	●	—	●	○	—	—	—	●	●	●	●	○	●	
MTC2 6kV-Caddy	3	4	1	●	●	—	—	—	—	—	—	●	●	●	—	—	●	
MTC2 6kV-HE-Caddy	3	4	1	●	—	●	—	—	—	—	—	●	●	●	—	—	●	
MTC2 6kV-R-Caddy	3	4	1	●	●	—	●	○	—	—	—	●	●	●	—	—	●	
MTC2 6kV-R-HE-Caddy	3	4	1	●	—	●	●	○	—	—	—	●	●	●	—	—	●	
MTC2 6kV-R-PD-Caddy	3	4	1	●	●	—	●	○	●	●	●	●	●	●	—	—	●	
MTC2 6kV-R-PD-HE-Caddy	3	4	1	●	—	●	●	○	●	●	●	●	●	●	—	—	●	

- basic equipment
- optionally available for an additional charge
- not available

- R: Resistance test with automatic switchover of the test methods between the winding connections.
- RF: Resistance test via 2 test connections on the front panel of the tester. The measuring leads have to be reconnected manually between the winding connections.
- PD: Partial discharge test
- HE: Surge test with high energy - 200 nF
- 3L: Surge testers from 25 to 50 kV are equipped with 2 measuring connections. Variant 3L is equipped with 3 test connections and automatic switchover between the winding connections.

# Technical data

## Product overview

### 12 kV and 15 kV-tester

1 MTC2-desktop unit 12 | 15 kV

2 MTC2-Caddy 12 kV



Modell	Tester type	Winding connection leads	Ground connection leads	Surge voltage	Surge capacity 100 nF	Surge capacity 200 nF	Ohmic resistance	Kelvin clamps	Partial discharge at surge voltage	PD antenna	PD coupling box	High voltage DC	Insulation resistance	Polarization index	Inductivity measurement	High voltage AC	Sense of rotation test at stator	Visual test
MTC2 12kV	1	4	1	●	●	—	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 12kV-HE	1	4	1	●	—	●	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 12kV-R	1	4	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 12kV-R-HE	1	4	1	●	—	●	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 12kV-R-PD	1	4	1	●	●	—	●	○	●	●	●	●	●	●	●	—	—	●
MTC2 12kV-R-PD-HE	1	4	1	●	—	●	●	○	●	●	●	●	●	●	●	—	—	●
MTC2 12kV-Caddy	2	4	1	●	●	—	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 12kV-R-Caddy	2	4	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 12kV-R-PD-Caddy	2	4	1	●	●	—	●	○	●	●	●	●	●	●	●	—	—	●
MTC2 15kV	1	4	1	●	●	—	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 15kV-HE	1	4	1	●	—	●	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 15kV-R	1	4	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 15kV-R-HE	1	4	1	●	—	●	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 15kV-R-PD	1	4	1	●	●	—	●	○	●	●	●	●	●	●	●	—	—	●
MTC2 15kV-R-PD-HE	1	4	1	●	—	●	●	○	●	●	●	●	●	●	●	—	—	●

- basic equipment
- optionally available for an additional charge
- not available

- R: Resistance test with automatic switchover of the test methods between the winding connections.
- RF: Resistance test via 2 test connections on the front panel of the tester. The measuring leads have to be reconnected manually between the winding connections.
- PD: Partial discharge test
- HE: Surge test with high energy - 200 nF
- 3L: Surge testers from 25 to 50 kV are equipped with 2 measuring connections. Variant 3L is equipped with 3 test connections and automatic switchover between the winding connections.



# Technical data

## Product overview

### 25, 30, 40 and 50 kV-tester



Modell	Tester type	Winding connection leads	Ground connection leads	Surge voltage	Surge capacity 100 nF	Surge capacity 200 nF	Ohmic resistance	Kelvin clamps	Partial discharge at surge voltage	PD antenna	PD coupling box	High voltage DC	Insulation resistance	Polarization index	Inductivity measurement	High voltage AC	Sense of rotation test at stator	Visual test
MTC2 25kV	1	2	1	●	●	—	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 25kV-3L	1	3	1	●	●	—	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 25kV-RF	1	2	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 25kV-R	1	2	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 25kV-R-3L	1	3	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 25kV-RF-PD	1	2	1	●	●	—	●	○	●	●	—	●	●	●	●	—	—	●
MTC2 25kV-R-PD	1	2	1	●	●	—	●	○	●	●	—	●	●	●	●	—	—	●
MTC2 25kV-R-PD-3L	1	3	1	●	●	—	●	○	●	●	—	●	●	●	●	—	—	●
MTC2 30kV	2	2	1	●	●	—	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 30kV-3L	2	3	1	●	●	—	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 30kV-RF	2	2	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 30kV-R	2	2	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 30kV-R-3L	2	3	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 40kV	3	2	1	●	●	—	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 40kV-3L	3	3	1	●	●	—	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 40kV-RF	3	2	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 40kV-R-3L	3	3	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●
MTC2 50kV	4	2	1	●	●	—	—	—	—	—	—	●	●	●	●	—	—	●
MTC2 50kV-RF	4	2	1	●	●	—	●	○	—	—	—	●	●	●	●	—	—	●

- basic equipment
- optionally available for an additional charge
- not available

- R: Resistance test with automatic switchover of the test methods between the winding connections.
- RF: Resistance test via 2 test connections on the front panel of the tester. The measuring leads have to be reconnected manually between the winding connections.
- PD: Partial discharge test
- HE: Surge test with high energy - 200 nF
- 3L: Surge testers from 25 to 50 kV are equipped with 2 measuring connections. Variant 3L is equipped with 3 test connections and automatic switchover between the winding connections.

# Technical data

## Test methods



### Surge voltage test

Test voltage	max. 15 kV
Surge capacity	100 nF   optionally 200 nF
Pulse rise time	100-500 ns according to IEEE Std 522-2004 (faster rise time on request)
Evaluations	in addition to our patented correlation method, 6 further evaluation methods are included in the tester: tolerance band, EAR, peak to peak...
Deviation display	in %
Comparison	Comparison between phases or to a reference stator
Switchover	automatically between test methods and the 4 connections
Symmetry evaluation	yes, between the three phases

Test voltage	6 kV	12 kV	15 kV	25 kV	30 kV	40 kV	50 kV
Joule	1.8 J	7.2 J	11.25 J	31.25 J	45 J	80 J	125 J
Surge current	800 A	1000 A	1000 A	1600 A	2000 A	2000 A	2000 A
Capacitor	100 nF	100 nF	100 nF	100 nF	100 nF	100 nF	100 nF
Part no.	4023157	4023202	4023199	4023195	4023155	4023206	4023203
Part no. Caddy version	4023170	4023149	-	-	-	-	-



### Partial discharge test at the surge voltage test (optional)

Test voltage	max. 20 kV
PD-detector	high-frequency antenna or coupler module (measurement in Gigahertz range)
Inception/ extinction voltage	automatic evaluation according to standard
Pulse rise time	100-500 ns according to IEEE Std 522-2004 (60 ns rise time optional available)
Switchover	automatically between test methods and the 4 connections

Model MTC2	6-50 kV	Caddy -12 kV
Part no.	40001574	40001697



### Resistance test (optional)

Resistance test	in 4-wire-technology
Measuring range	1 mΩ-100 KΩ-high accuracy
Switchover	automatically between test methods and the 4 connections
Evaluation deviation	yes, between the 3 phase resistances

Model MTC2	6 kV	12 kV/15 kV	25 kV/30 kV/40 kV/50 kV
Measuring range	1 mΩ-100 KΩ	1 mΩ-100 KΩ	1 mΩ-100 KΩ
Resolution	1 μΩ	1 μΩ	1 μΩ
4-wire-technology	yes	yes	yes
Room temperature compensation	yes, optional (401404)	yes, optional (401404)	yes, optional (401404)
Automatic switchover	yes	yes	no
Part no.	4023103	4023193	4023150



### High-voltage test DC

Test voltage DC	max. 50 kV
Current	max. 3 mA
Test time	manually, continuous operation or automatic test program up to 60 min.



### Polarization index (PI)

Test voltage DC	max. 15 kV
Current	max. 3 mA
Test time	automatic test program



### Insulation resistance

Test voltage DC	max. 50 kV
Current	max. 3 mA
Measuring range	1 mΩ-100 KΩ
Safety current limiting	3 mA
Resolution	0.001 μA
Quick switch-off	adjustable
Residual ripple	<0.01 %
Test time	manually, continuous operation or automatic test program up to 60 min.



### High-voltage test AC (optional)

Test voltage AC	max. 6 kV
Current	max. 100 mA



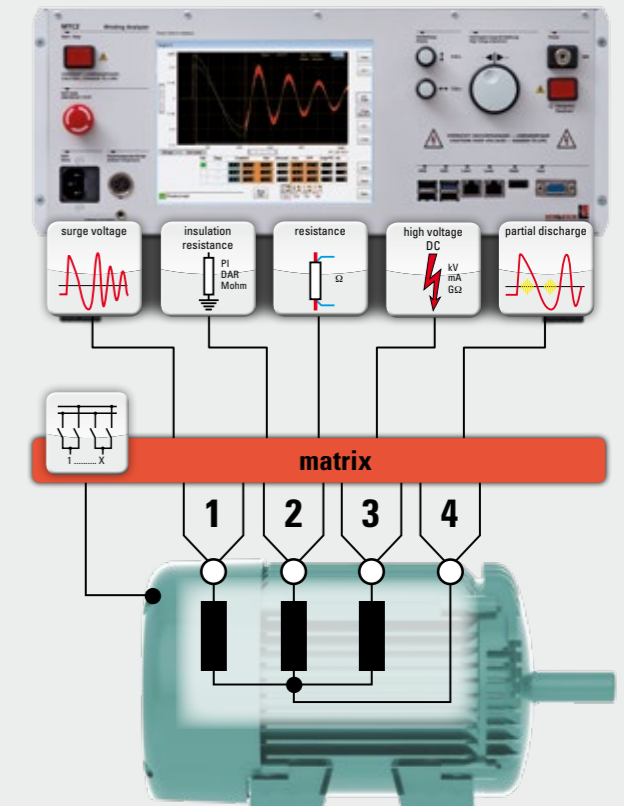
### Partial discharge test at the HVAC-test (optional)

Test voltage AC	max. 6 kV
PD-detector	high-frequency antenna or coupler module (measurement in Gigahertz range)
Inception/extinction voltage	yes, automatic measurement

# Connections

Depending on the tester's configuration, the MTC2 features up to four connections for connecting the winding to the tester. Each MTC2 design also provides an additional connection for connecting the enclosure of the test object.

### Connecting scheme of the four-wire measuring leads with a connected motor



There are the following measuring paths:

1 <-> 2 | 2 <-> 3 | 3 <-> 1  
1 <-> 4 | 2 <-> 4 | 3 <-> 4

The test leads are switched to the different connections based on a relay matrix in the tester.

The integrated automatic test method and measuring lead switchover capabilities, offer the ability to switch between test methods on different test leads. With a tester with four connections and a test object with an accessible start point, the user can measure phases individually. This increases the tester's sensitivity, compared to competitive products.

# Accessories

## Kelvin clamp | sturdy design

Sturdy 4-wire kelvin clamps for high-precision resistance tests. The already existing measuring leads can be plugged on the Kelvin clamps.



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

## 4-wire test probe



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

Test voltage	1 only resistance test	2 1 kV
Lead length	3 m/9.8 ft	3 m/9.8 ft
4-wire-technology	yes	yes
Part no.	40001979	4023132

## Foot switch to start the test



Lead length	2 m/6.6 ft
Part no.	4010611

## Warning lights



The warning light indicates the following conditions:  
Green= high-voltage switched off  
Red= high-voltage switched on

Indications	red/green
Lead length	2 m/6.6 ft
Part no.	4023239

## RS232-interface

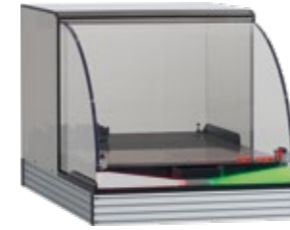
- Remote-control of the tester via e.g. a PLC
- Read-out of test results
- Transfer of order data

Part no.	4003779
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## Connection extension to 8 winding connections

Test voltage	max. 15 kV
Surge current	max. 2000 A
4-wire-technology	yes
Part no.	4023270

## Test cover model 1



Overall dimensions (W x D x H)	546 x 775 x 520 mm/21.5 x 30.5 x 20.5 inch
Inside dimensions (W x D x H)	495 x 730 x 305 mm/19.5 x 28.7 x 12 inch
Integrated result lights	2 pcs. (1 x GO/ 1x NO GO)
Test voltage	max. 8 kV AC
Safety	CAT IV
Part no.	400201

## Test cover model 10



Overall dimensions (W x D x H)	935 x 880 x 585 mm/36.8 x 34.7 x 23 inch
Inside dimensions (W x D x H)	800 x 810/730 x 500 mm/31.5 x 34.2/28.7 x 23 inch
Integrated result lights	2 pcs. (1 x GO/ 1x NO GO)
Test voltage	max. 8 kV AC
Safety	CAT IV
Part no.	400281

## Rolling tables



Overall dimensions (Wx Dx H)	700 x 870 x 1010 mm 27.6 x 34.2 x 39.8 inch	700 x 870 x 1010 mm 27.6 x 34.2 x 39.8 inch
Drawer	no	yes
Additional shelf	no	yes
Base plate	no	yes
Castors	yes	yes
Castor diameter	120 mm/4.7 inch	120 mm/4.7 inch
Push handle	yes	yes
Part no.	124.982.0	124.981.0

> Note: The rolling tables may also be manufactured according to your request.

## Carrying handle | Mounting kit



Model MTC2	1 6 kV/12 kV/15 kV	2 6 kV/12 kV/15 kV
Swiveling	yes	-
Part no.	4023236	40103100

## Transport cases



- Solid outdoor housing
- Perfectly suitable for wind turbines, military application, on-site service etc.



Model MTC2	1 6 kV/12 kV/15 kV	2 6 kV/12 kV/15 kV
Castors	yes	yes
Shock absorber	yes	yes
Color	black	black
Weight (tare)	19.5 kg/43 lbs	20.5 kg/45,19 lbs
Dimensions (W x D x H)	625 x 980 x 333 mm/24.6 x 38.6 x 13.1 inch	700 x 850 x 450 mm/27.5 x 33.4 x 17.7 inch
Part no.	4023225	4023116

> Note: Tester is firmly installed in the transport case 1

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

# Another word for “Made in Germany”: SCHLEICH



Comprehensive production facilities allow designing and manufacturing almost all tester components at our site in Hemer.

For example, our measuring and electronic PCBs are produced with an ultra-modern in-line-SMD-placement system, which assures a stable quality of our products.

Modern high-end processors in our testers process the test tasks in a fast, precise and reliable manner. With our modern CNC-machines, we also design and manufacture a great number of accessory components such as test covers, contacting units, workpiece carriers with DUT-holders or robot gripping tools as well as complete automatic production lines.

## Whatever you want to test... ...SCHLEICH has the solution!

SCHLEICH is a leading system provider in the area of testing motors and windings. Our extensive range of products allows us to provide you with testers, test systems and complete production lines for almost every test task.

Decades of experience, listening to our customers and satisfying their wishes – facing individual tasks with technical creativity and realize them in a team of highly skilled engineers and designers – this is what we do. This is SCHLEICH.

Every single one of our more than 130 employees works on guaranteeing and optimizing the high quality standard of our testing devices each and every day. Our customers, our sales department, our motivated engineers and manufacturing staff – with their ideas and suggestions for improvement they are all part of the innovation process.



# Service without limits. We are there for you – wherever you are.

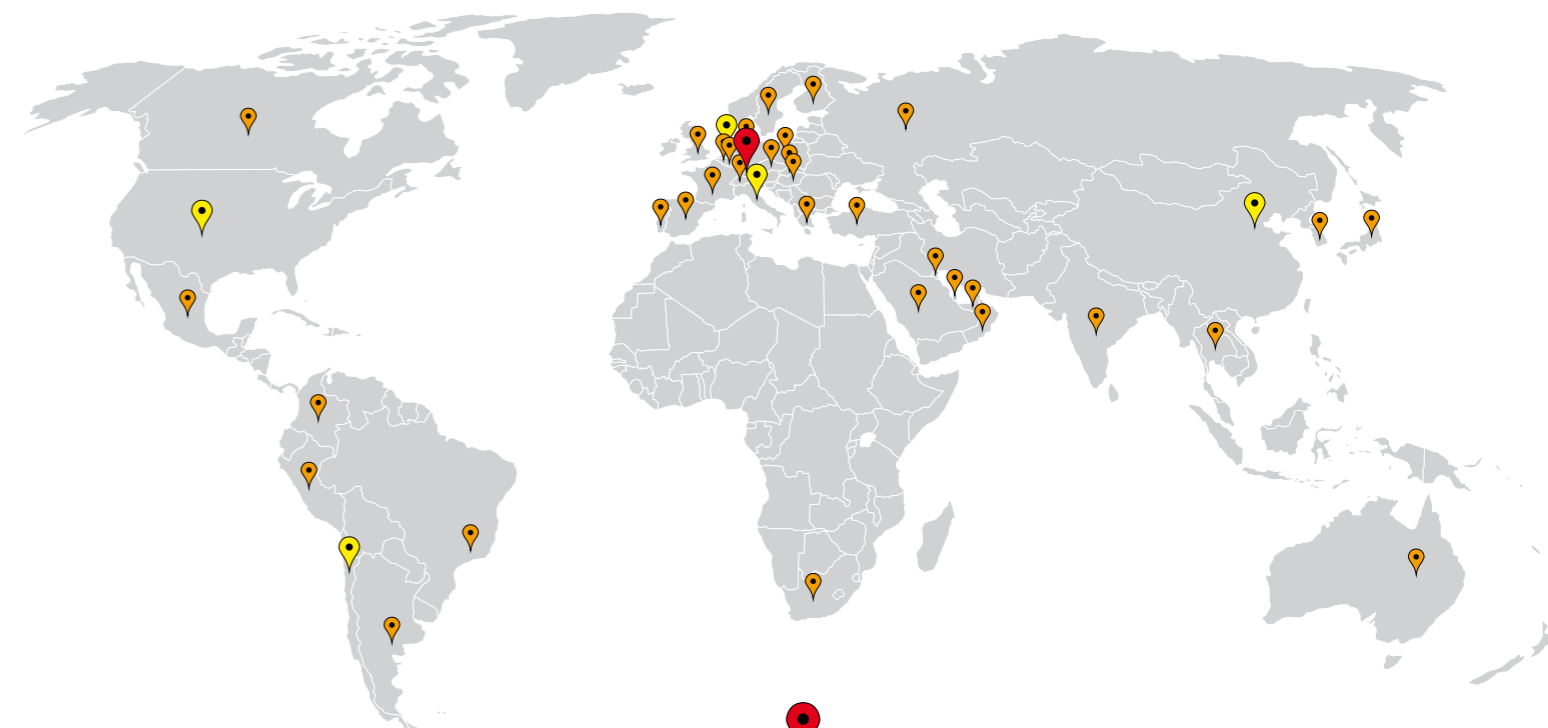





First-class customer service is our top priority. From detailed consulting during the planning phase to training and After-Sales-Service – we support you during the entire process.

In training sessions adapted to your requirements, our technicians will teach you the necessary know-how allowing you to avail yourself of the functional variety of our testing devices to the full extent. Should there be questions or technical problems, our technical support team will assist you by phone, on-line or on-site fast and reliably. Constant software updates and extensions make sure that you can always work with state-of-the-art test software. The periodic calibration of test equipment is an essential precondition for quality assurance. We calibrate your test equipment according to standards – on site or via remote maintenance.

It goes without saying that we calibrate in accordance with national and international standards. Our Service Centers support you around the world – with dedication, competence and reliability.

## Sales and Service Centers



-  Production, Headquarters & Sales Center Germany
-  Sales and Service Centers
-  Sales Centers

# Expect more!

Whatever you want to test, SCHLEICH has the solution! As a leading supplier of electric safety and function test systems as well as motor and winding testers we offer solutions for any task in this sector. Our owner-managed company, founded more than 50 years ago, is present in over 40 markets all around the globe.

## Testers for electric motors and windings



## Electrical safety- and function testers



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