SPS electronic

TRUE GERMAN QUALITY

COIL TESTING SYSTEMS

FOR VERSATILE DEPLOYMENT IN PRODUCTION

S 1800

Complete solutions for testing motors and stators – customized to your individual requirements!

www.spselectronic.com

S 1800 –
Our complete solution for your requirements!

Thanks to the evolved surge test, the fully automatic stator testers reliably and quickly test your coils for possible insulation defects.

Once the DUT has been properly connected, testing proceeds with automatic switch-over between connections and testing methods. S 1800 evaluates every test stage. At the end of the entire testing sequence, it generates an unambiguous and replicable GOOD or FAIL result for you.

We capitalize on the consistent integration of PCs for measurement, control and storage in our coil testing instruments. Thanks to the use of proven Microsoft® technologies, we can offer the user clear and uncluttered visualisation of test results; for the fitter, on the other hand, extensive input options and configurations are available.

The numerous statistic analyzes of the S 1800 systems assist you in quality assurance. Due to the great number of possible reporting options, you can demonstrate certified quality to your customers.

Testing systems are manufactured according to your requirements and commensurate with the desired number of test piece connection. We can assemble the testing methods necessary for stator testing according to your requirements. It thereby does not matter whether you require a manual or automatic single-, double- or multiple testing station, which is delivered with or without test cover or test bench. Inspections in automated assembly lines are equally possible with the S 1800.

The great versatility of the hard- and software facilitates the provision of a cost-effective testing station that meets all your requirements.

SPS electronic
TRUE GERMAN QUALITY

True German Quality – That is SPS electronic

We are technology-loving experts for electric testing equipment from the heart of Germany. That is precisely the great advantage if you opt for us. Because we develop our products from a conviction only to offer the best quality. In so doing, we have always been oriented towards typical German values, such as reliability, thoroughness and diligence – in every area. From product development via customer advice to individual support. In short, with SPS electronic you always opt for real German quality.

You need to test – we have the right solution.

With our products, we generally cover all tasks in electric safety testing with an appropriate solution. Having said that, it can still happen that very particular requirements apply to a certain inspection task. Be it in the sequence of the parameters to be tested, the conditions under which the testing is to be carried out, or the modalities of ultimately administering the testing. Here we are once again happy to assist you – with special solutions that are fully tailored to your individual wishes and desired requirements. The industry is secondary in that regard – whether it involves motors, lighting fixtures, tools, or even medical equipment: The type and execution of the testing is always decisive.

Our service – Everything from a single source

If we do something, we do it thoroughly. That applies particularly to our service. After all, what good would a comprehensive offer be to you without the appropriate advice? You can thus be sure to be comprehensively attended to, before as well as after purchasing one of our products. Our services at a glance:

Calibration and maintenance

Regular firmware updates

Loan device service

OEM spare part service

After-sales support

On-site assistance

Seminars and training programes

Remote service

Good things can be so close at hand – Our distribution- and service centers:

Areas of application

Our testing systems can be flexibly adapted to your requirements and thus be optimally integrated into your production. Three areas of application can generally be distinguished:

MANUAL TESTING STATIONS

At a manual testing station, testing begins when your employee has entered the DUT into the testing system and contacted the test connection. The start of the testing may take place in various ways:

Test with inevitable contact protection
Testing begins once the protective housing has been closed.

Test without inevitable contact protection
Testing begins at activation of a two-hand start.

Test without inevitable contact protection – light curtain
Testing begins at activation of a start button. The light curtain must not be interrupted in the process.

A red warning lamp signals that the DUT carries live voltage and must not be touched. The testing system visualizes the result after the fully automatic continuous testing sequence.

SEMI-AUTOMATIC TESTING STATIONS

Semi-automatic operation combines a fully automatic process with manual interventions. For example, a fellow employee can insert the DUT into a test cluster and start the test procedure. The testing system or an additional control then checks all necessary cylinder movements for contacting the DUT and starts the testing sequence.

FULLY AUTOMATIC TESTING STATIONS

If the testing system is integrated into a fully automatic production line or production facility, testing takes place automatically, without manual intervention. The testing system will generally work in one of the two listed modes:

Mode 1:
The testing system is fully remote controlled by a system control. The superordinate control specifies all test parameters, or chooses the testing sequence set in the testing system. Contacting and all mechanical processes are carried out by the system control. As soon as the system control has prepared testing, it starts the testing system. At the end of testing, it transfers the test results back to the system control.

Mode 2:
The testing system controls all mechanical processes in the test cell via a bus system. The testing system additionally communicates with a system control and an ERP system.

A close look at the coil

We carefully scrutinize your coil – in order to find faults before they have an impact!

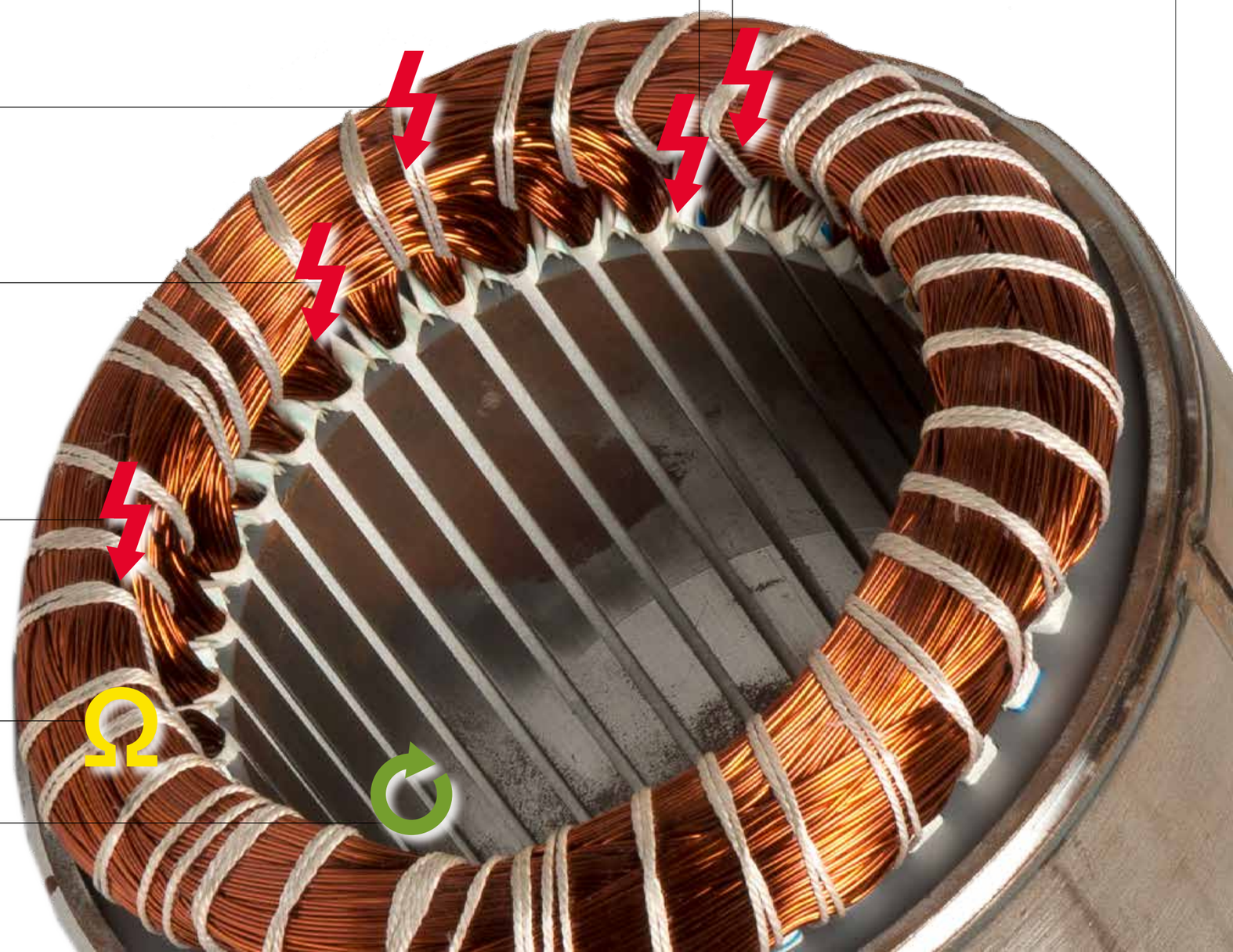
Our testing systems combine all relevant test methods in one device. You can thus detect even the smallest weakness and guarantee the quality of your products!

High voltage AC test

Among all electric safety checks, the high voltage test (also known internationally as Hipot test or HV test) has the highest priority by far. This test for dielectric strength is one of the requirements of all national standards (e.g. VDE and UL) and international standards (e.g. EN and IEC), and is thus indispensable.

Partial discharge at high voltage AC test

As the word “partial” in “partial discharge” expresses, a disruptive discharge occurs in a subsection of the insulation. During high voltage testing, crackling noises can often be heard. If such noises occur, a full disruptive discharge does not occur, but partial discharge effects happen instead. They can be measured and evaluated by means of a partial discharge test.



Surge test

Surge testing is the ideal test method to detect interturn faults and insulation faults within a winding. Surge testing is well established in the production of all types of winding goods. In use in maintenance and repair since the early 50s, this test is now essential for the production of motors, rotors and stators, electric valves and all kinds of coils.

Partial discharge at surge test

The effect of partial discharge does not only occur during conventional high voltage testing, but also during surge testing. Due to the great increase in the use of frequency inverters in engine control, this test has become very important.
As the terms “partial discharge” suggests, no full disruptive discharge occurs. Only in a subsection does a partial insulation weakness, or a deficiently manufactured area occur. This deficiency cannot withstand the increased charge and a partial disruptive discharge occurs. Because the other parts of the insulation are not affected by this, no flashover in the conventional sense of the term occurs.

Insulation resistance test

Insulation resistance testing is carried out to ascertain the resistance of the insulation of a device. Testing takes place between the active parts and the casing components, or between the different internal potentials. Insulation testing serves to ensure that no excessive leakage currents occur. If the insulation resistance of a device is too low (and a ground bond fault is potentially present, too) high contact voltage can occur in metal parts. In case of contact, so-called “touch current” would be discharged through the human body, which can be life-threatening.

Resistance test

When winding resistance is tested using four-wire technology, winding resistance must be within a tolerance window.

Direction of rotation test

The direction of rotation test aims to establish whether a product has clockwise or counterclockwise rotation. In case of stators, a static rotational direction sensor is generally inserted into the stator in order to capture the magnetic field. Motors are mainly tested by means of a retro-reflective light barrier, or an encoder.

The basic version

A solid base is the best start!

Our newly developed surge tester is the heart of our basic system. In conjunction with the insulation resistance test and the high voltage test, this represents the gateway to testing of winding goods. Numerous other test methods – such as our entirely newly developed partial discharge tester – can optionally be integrated.

A connecting unit with especially developed high voltage relays ensures that the optimal connection of your DUT is guaranteed. An integrated industrial computer with our proven and continuously enhanced testing software enables individual testing of your product. You'll be surprised how easy it can be to create complete test sequences for products. Various interfaces ensure that test results with appropriate characteristics for tracing your products are securely saved on a path in your network.

Whether the basic version is sufficient or you want to supplement it with an additional testing method, entirely depends on your individual requirements. Integration of additional modules turns our basic version into a testing system that is especially adjusted for you.

STANDARD EQUIPMENT:

Testing methods:

- Surge test up to 6 kV
- Insulation resistance test up to 6 kV
- High voltage test up to 5,5 kV AC and 6 kV DC
- Partial discharge test at surge voltage
- Partial discharge test at high voltage AC
- Direction of rotation test
- Resistance test from 5 µΩ to 5 MΩ
- Temperature compensation
- Visual inspection

Function and technology:

- High performance computer technology
- Intuitive and self-explanatory software package
- SQL- or ACCESS database connection
- Extensive evaluation options
- Automatic logbook and administration of test plan history
- 14 different languages

Communication:

- USB interfaces
- RS232 interface
- LAN / Ethernet interface
- Digital input and output interfaces

All common automation interfaces are optionally available, including:

- CAN
- ActiveX
- .net
- Profi Net

Safety:

- Construction according to EN 50191
- Integrated warning- and result lamp
- Acoustical and optical warning signals
- Output signal for "GOOD" and "FAIL"
- Status signals
- Connector for external emergency stop

+ Unlimited number of test connections

+ Fully automatic test sequence

+ Modular construction

+ Remote maintenance

The standard configuration

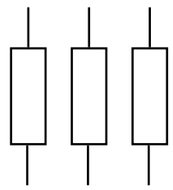
Standard – but far from boring! Discover the almost limitless possible combinations of functions, test methods and components.

The assembly of our systems is carried out according to your requirements, thus turning standard into something special. In case there isn't yet the right solution available for your application, we'll be happy to develop a tailor-made solution for you.

BASIC DEVICE WITH STANDARD EQUIPMENT

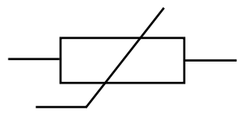
WINDING CONNECTION

Up to 12 winding connections



TEMPERATURE SENSOR

Up to 6 temperature sensors



Computation of the required total number of connections:

Number of winding connections + 2 x number of temperature sensors = number of test connections

When computing the number of connections, it must be taken into consideration that a temperature sensor always occupies two connections! The laminated core connection is included in the standard configuration of the basic device and does not need to be taken into consideration for calculation purposes!

For example:
A motor with 6 windings and 2 temperature sensors requires 10 connections:
6 winding connections + 2 x 2 temperature sensors = 10 test connections

TESTING METHODS:

Surge voltage
- up to 6 kV

Partial discharge at surge voltage
- up to 6 kV
- IEC 61934 and DIN EN 60034-18-41

High voltage DC
- up to 6 kV

High voltage AC
- up to 5.5 kV
- max. 100 mA

Partial discharge at high voltage AC
- up to 5.5 kV
- up to 100 mA

Insulation resistance
- up to 10 GΩ
- PI | DAR testing

Resistance
- 5 µΩ to 5 MΩ

Direction of rotation
- static test probe
- 1- and 3-phase motors

Visual inspection

Testing station with
connection panel

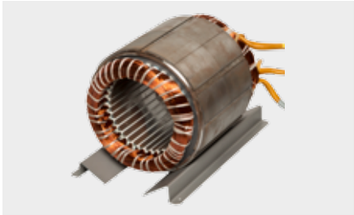
Simply extend the standard version by your preferred workstation design.

The simplest connection option for small and medium numbers is the use of a connection- and control panels. One joint panel can be used in principle for connection and operation, but separate panels for DUT connection and operation of the system are also widely applied solutions. If one of these two concepts is used, the operator can be protected with a 2-hand safety operation. Additional persons must not have access to the test area. This ensures conformity with EN 50191.

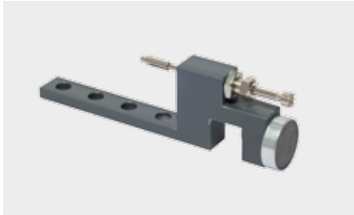
Possible contacting:

Contacting of laminated core:

VA-plate



2-part prism



Magnetic contact

Contacting DUT:

Contacting unit, firmly mounted

Contacting unit, flexibly positionable

Kelvin terminals
(can be plugged into test connection)

Testing station with
test hood

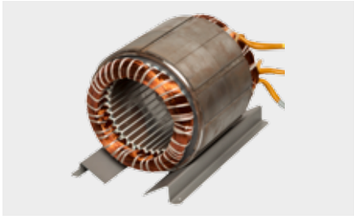
Simply extend the standard version by your preferred workstation design.

In an industrial environment it is often necessary to protect the user by means of a test hood. In this case, workstation design is significantly simplified with regard to third persons. With the test hood and integrated safety switches, workstation design in conformity with EN 50191 is guaranteed without additional equipment. The test hood is available in various standard sizes, individual production to suit customer requirements are often requested.

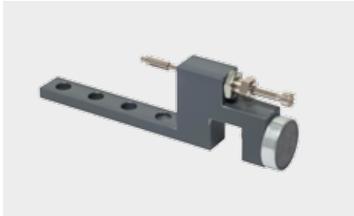
Possible contacting:

Contacting of laminated core:

VA-plate



2-part prism



Magnetic contact

Contacting DUT:

Contacting unit, firmly mounted

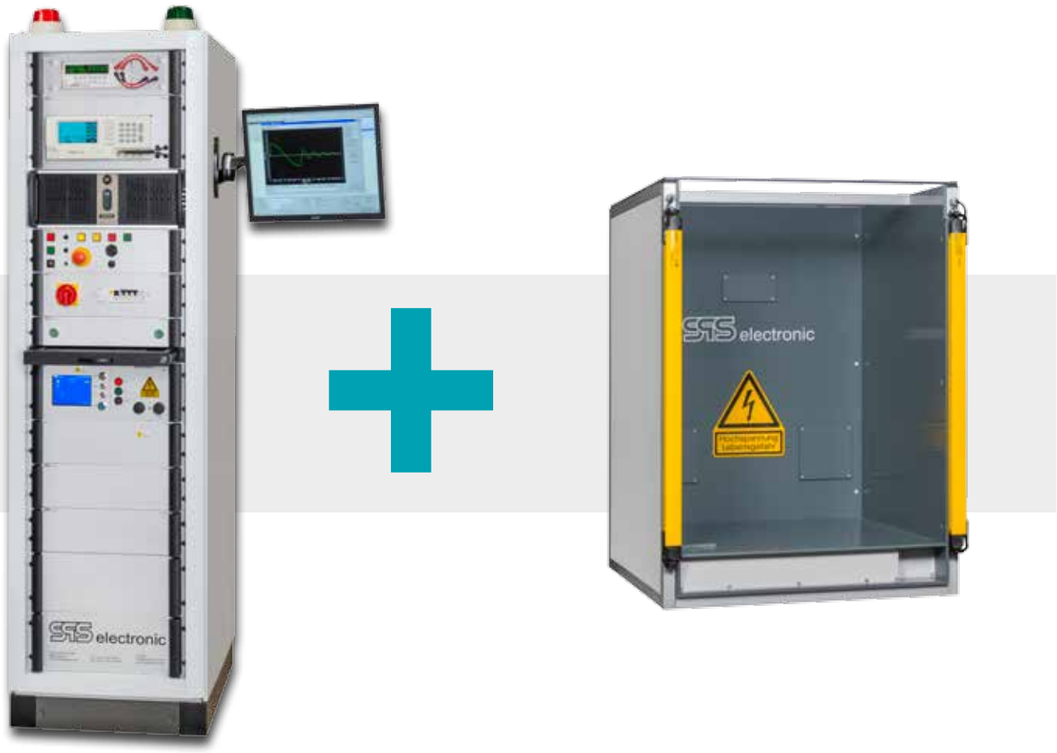
Contacting unit, flexibly positionable

Kelvin terminals
(can be plugged into test connection)

Testing station with
light curtain

Simply extend the standard version by your preferred workstation design.

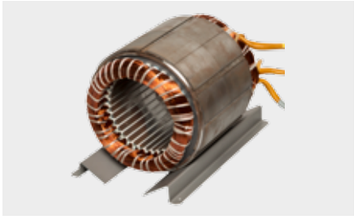
The use of a light curtain to protect against dangerous voltage permits workplace design in conformity with EN 50191, as well as smooth handling. As opposed to a conventional test hood, the light curtain does not always protect against mechanical hazards, because the test area is not closed. The safety light curtain is certified for this application and ensures that all voltages are switched off when the light curtain is interrupted. A particular advantage of this concept lies in easy mounting and dismounting.



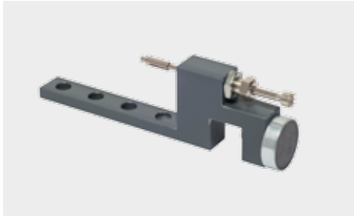
Possible contacting:

Contacting of laminated core:

VA-plate



2-part prism



Magnetic contact

Contacting DUT:

Contacting unit, firmly mounted

Contacting unit, flexibly positionable

Kelvin terminals
(can be plugged into test connection)

Testing station with
tandem test hood

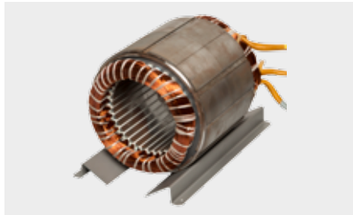
Simply extend the standard version by your preferred workstation design.

The tandem test hood optimizes testing time and handling. If both times (testing time and handling time) are similar, this concept can reduce cycle time by 50%. Technical expenditure is low, because a switching matrix provides the required testing technology for both test areas. Since all of SPS electronic's systems offer a pluggable connection of test voltages, our testing systems can be retrofitted with a tandem hood at low cost if numbers necessitate increased capacity. In this case, the use of safety switches also creates a workstation in conformity with EN 50191.

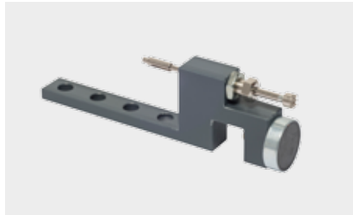
Possible contacting:

Contacting of laminated core:

VA-plate



2-part prism



Magnetic contact

Contacting DUT:

Contacting unit, firmly mounted

Contacting unit, flexibly positionable

Kelvin terminals
(can be plugged into test connection)

Customized testing systems

You haven't found the right testing system for your application yet? No problem – we're happy to develop a tailor-made solution for your individual requirements!

We wouldn't be experts if we didn't know everything about electric safety tests. That's why we are able to give quick and especially consistent answers even to new questions: in the shape of customer-specific testing systems that support and alleviate your work.

In these customer-specific testing systems, various testing methods can be combined. Both the construction of the system and the integration into your production can be individually adjusted. Apart from complete mechanical set-ups and DUT contacting, we also deliver ready-made software packages that allow a seamless integration in the production process. The options are almost limitless.

+ Data exchange with ERP-systems
+ Communication with superordinate automation systems
+ Simple traceability due to database administration of DUT
+ Extensive after-sales support

EXAMPLES OF INDIVIDUAL SOLUTIONS

A brief excerpt of the various testing systems we have already developed for our customers:

Testing system for motors

EOL tester for servomotors

Testing system for e-mobility

Rotary switch table for vehicle plugs

Testing system for servomotors

Testing system for brakes

Testing system for stators

Testing system for stators

Contacting

Winding- and temperature sensor connections

We offer a large range of standard clamping devices for contacting winding- and temperature sensor connections.

KELVIN TERMINALS

Kelvin clamps that are deployed whenever faultless measurement of low resistances is required are used in 4-wire-testing. In so doing, 4-wire-testing compensates transfer resistances within the clamping point.

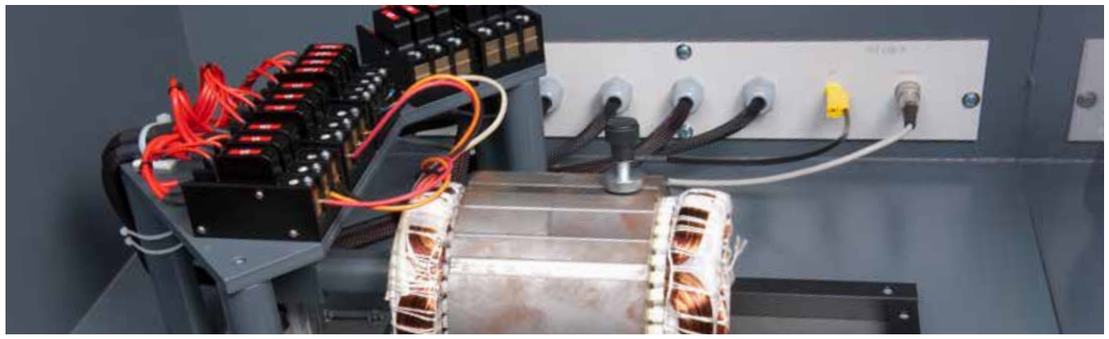
SPS electronic's high value Kelvin terminals are available for different applications in various designs. Due to the replaceable clamping jaws, threaded bolts can be connected as well as free cable ends.

CONTACTING UNITS FROM INDIVIDUAL CLAMPING MODULES

These modules are ideally suited to quick contacting of winding- and temperature sensor connections.

Individual contacting units can be constructed from single clamping modules. The configuration can thus be flexibly adjusted to the individual requirement.

The number and sequence of clamping modules, as well as the clamp type, can be freely selected. Due to the compact, modular arrangement, the test hood and work station can be optimally adjusted to any requirement.



KL 01	KL 20	KL 25
		
Simple design	Small design	Large design
With 25 mm opening	With clamping jaws	With clamping jaws

Contacting of threaded bolts:

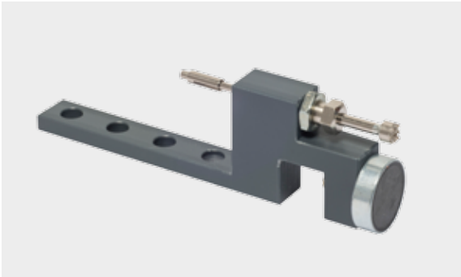
Contacting
Laminated core

In order to test insulation between the coil and the temperature sensors to the laminated core, the metal must be properly and reliably contacted. All testing methods connected to the laminate core therefore require plant control for process reliable performance. This is the only way to guarantee faultlessly implemented testing. In most application scenarios, plant control can be tested by the presence of a minimum current to be exceeded.

MAGNETIC CONTACT

Contact via a magnet represents the simplest and most flexible type of laminate core contacting. It is particularly suited for testing outside a protective hood.

As an alternative to the magnet, the measuring line can also be attached to an alligator clip.



VA-PLATE

For contacting the laminate core, the DUT can be placed on a VA-plate.

This does have the disadvantage, however, that DUT with a round external contour can easily roll. In such cases, contacting via a prism is recommended.

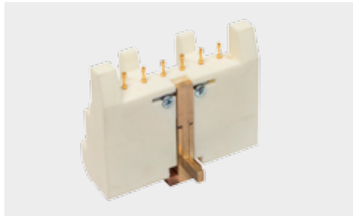
PRISMS

A prism enables contact with the laminate core by inserting the stator. The electrical connection of the core laminate and the test connection of the testing system happens via the contact surface. By using a partitioned prism, contacting of the laminate core can be carried out using Kelvin technology. Due to its V-shaped contour, the stator is centered in the middle of the prism and protected against unwanted movement. Connection of additional sensors and clamping of winding connections is thus significantly simplified.

Special contacting

Even though “electronic” is part of our company name, one of our major strengths lies in mechanical adaption of DUT and their specific contacting. Testing equipment and mechanics are manufactured to precisely meet your test task’s requirements. Pneumatically controlled, very small Kelvin pins or spring-loaded contacting modular construction kits are often used in this regard. Construction takes place directly on 3D-CAD workstations in-house. The latest facilities in our mechanics department ensure production of professional and affordable components.

Contacting with Kelvin spring pins

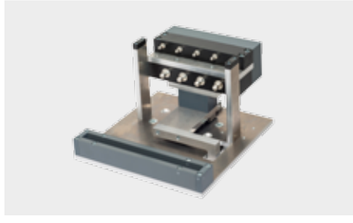

Connection via adapter cable

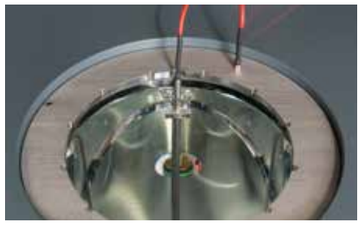


Pneumatic contacting



Customized solutions





Direction of rotation test

Direction of rotation test is mainly carried out with electric motors in order to establish whether the product has clockwise or counterclockwise rotation. Testing can be implemented either with a fully mounted motor, or with a stator:

Motors are mainly tested by means of a retro-reflective light barrier, or an encoder. In case of stators, a static rotational direction sensor is generally inserted into the stator in order to capture the magnetic field.

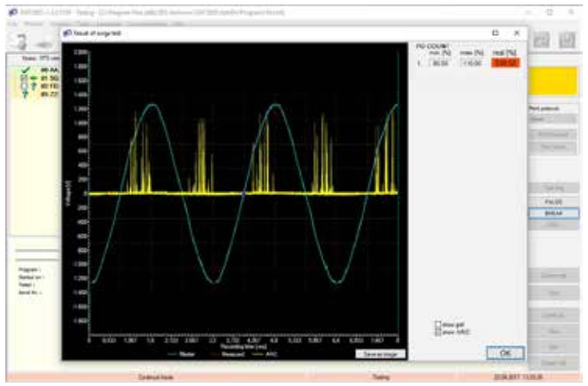
Apart from a direction of rotation test device, we also offer you the option to carry out this test in conjunction with other safety tests in a testing system. Testing can be done manually, or automated in a production line.

Software and test report

The more functions are combined in testing software, the more complex its operation. In order to keep the use of our software intuitive and self-explanatory none the less, we have taken our users' point of view into consideration already during development. The result: straightforward software that does not require prior skills or training.

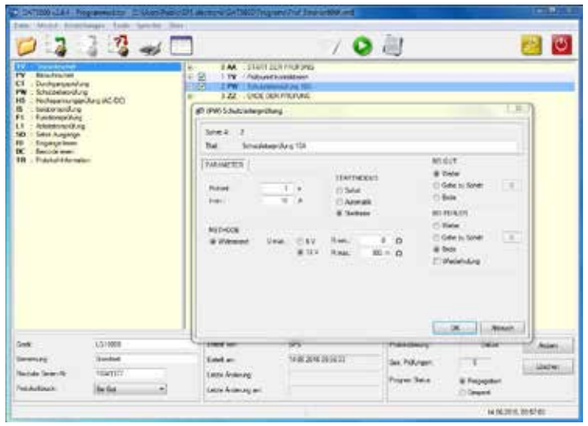
OUR TEST SOFTWARE

- Operating system Microsoft Windows
- Intuitive and simple operation, freely programmable
- SQL server
- Microsoft Access
- Password protected user hierarchy
- Many useful features, such as
  - bar code scanner (article number, device, serial number, remark)
  - Remote control via Ethernet, USB, RS232
- Ideal for integration in company networks
- Connection to CAQ and/or other ERP systems
- Integrated user management and rights management



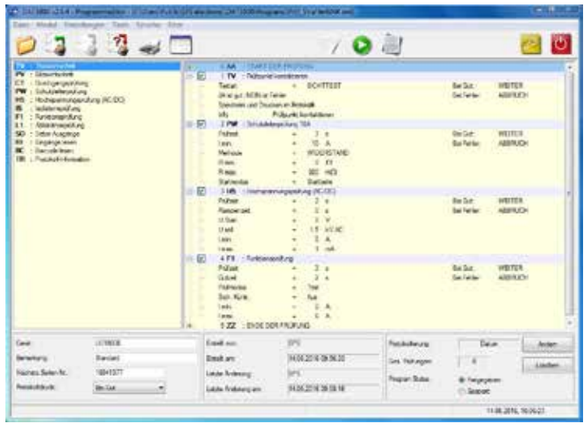
PROGRAM GENERATION

- Simple generation of complex test sequences via mouse and keyboard, or touch function
- Clear visualization of programmed testing methods, such as high voltage test, surge test, insulation test etc.
- Storage of any number of programs on the hard drive or network: XML format, ACCESS format
- Free configuration of the testing sequence within the programs
- Password protection



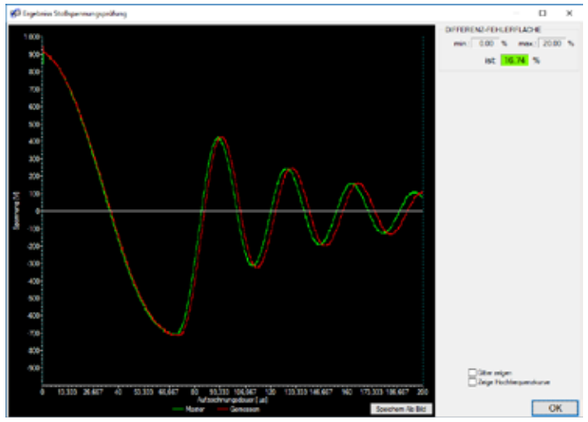
PARAMETRIZATION

- Complete and simple parametrization of the individual testing methods - e.g. the high voltage test: testing time, ramp time, test voltage, tripping current etc.
- Depending on the result of the test step, the subsequent test sequence can be regulated via conditional program jumps
- Text- and screen steps to guide the tester, or retrieve additional information
- Clearly structured entry of test parameters
- Integrated user- and setup instructions
- Plausibility check for all inputs



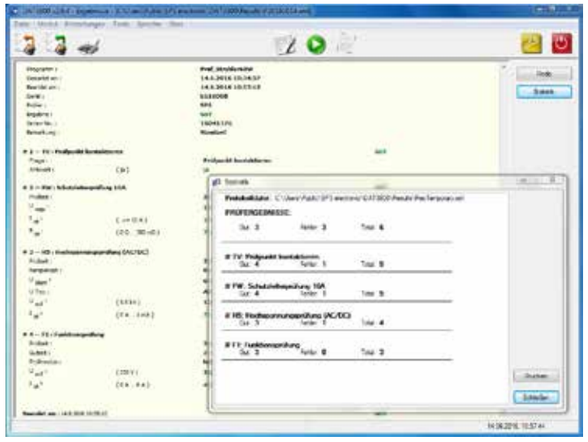
TEST

- The selected sequence of the current test program is visualized in the “TEST” module.
- In doing so, the results of the current test step are shown, and the progress of implemented steps is chronologically displayed.
- A manual single-step mode facilitates troubleshooting for complex tests
- Large GOOD/FAIL display



RESULTS / TEST REPORT

- In order to enable a seamless proof for the tests, test results are saved together with readings in XML, ACCESS or SQL format.
- Thus nothing stands in the way of processing in external programs
- Statistical function with a large selection of criteria
- Full text search
- The test reports can be printed, or saved as PDF
- Customizable report with your company data and your logo
- Printing on Windows-compatible printer
- Generating a PDF file
- Test report in various languages

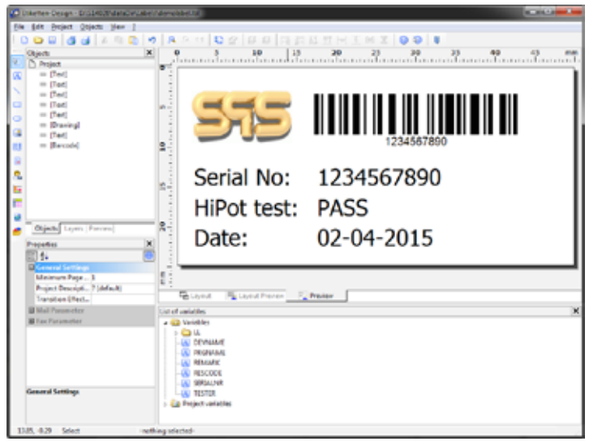


DATA EXCHANGE

- Bidirectional communication with
  - ERP systems
  - MES systems
- Exporting data in
  - CAQ-systems
  - Databases of your choice
  - CSV files
  - Excel
- Data import and export vial XML
- Configurable tools for
  - Data import
  - Data export
- Digital input and output interfaces
- Various interfaces directly to a computer
- Interfaces based on fieldbuses
- Interfaces based on industrial Ethernet systems

LABEL PRINTING

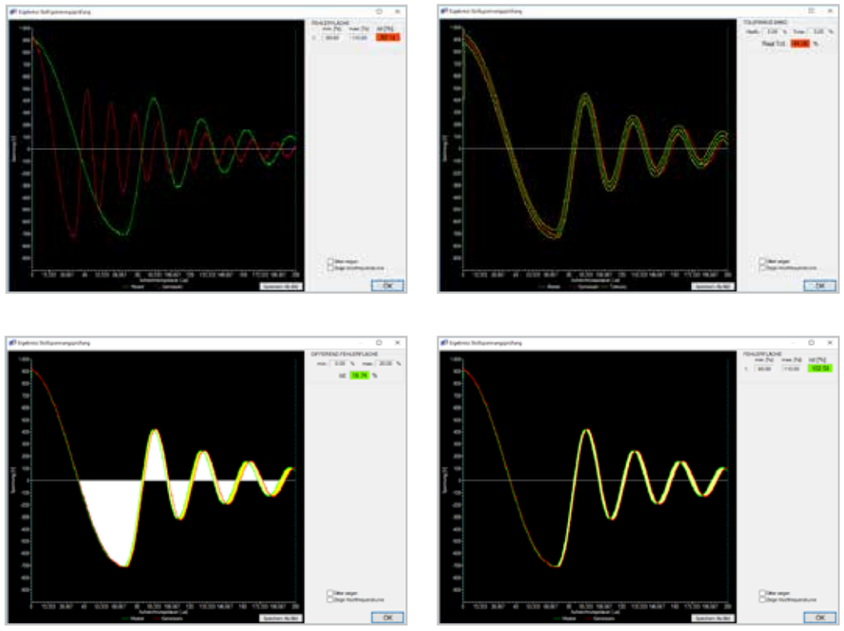
- Printing of labels, including test contents and serial number
- Type plate printing
- Not OK label printing
- Label printing for packaging boxes
- Universally usable thanks to a multitude of available label materials
- Very simple integration in the test process
- Simple operation



Glossary:
The surge test

A surge test permits the observation of insulation weaknesses of winding goods. Experts have established that 60% of engine failures originate in interturn short circuits in a coil. The surge test is the only test method that can reliably confirm insulation weaknesses in winding goods.

In the surge test, the surge impulse is generated by very fast parallel switching of a loaded capacitor to the winding to be tested. After connection, the stored energy of the capacitor is discharged to inductivity, then back to the capacitor etc.
Attenuation losses etc. result in a sinusoidal reduced sympathetic oscillation It has a frequency that is characteristic for the inductivity to be tested and a typical amplitude characteristic. Changes in the winding parameters immediately lead to changes in the waveform. The characteristics of the change is determined by the type and location of the defect. At weak points that do not cause flashover, corona discharges occur. The defects can be visualized and evaluated by various evaluation methods.

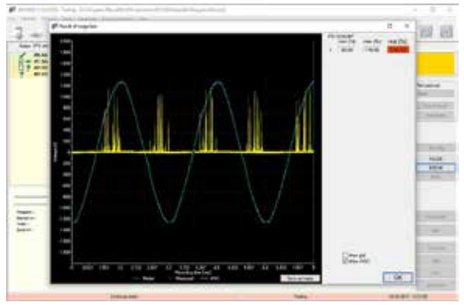


Glossary:
The partial discharge test at surge voltage

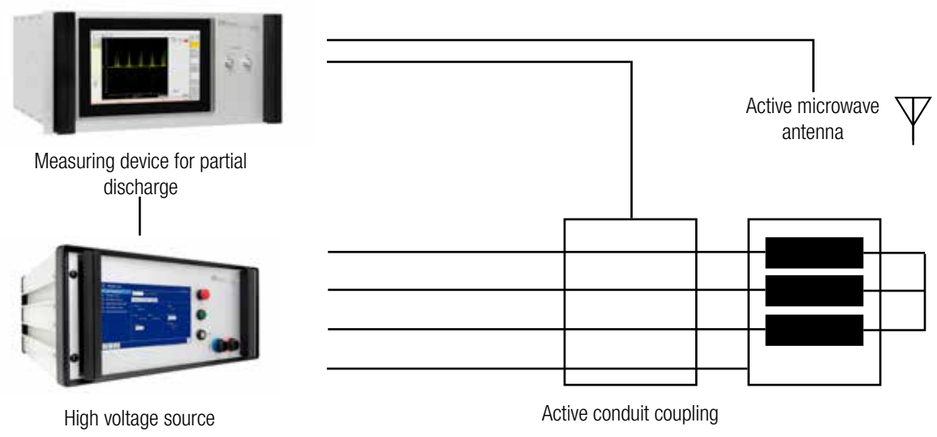
The partial discharge test is often carried out in conjunction with a high voltage test or surge test. In doing so, the intention is to uncover winding quality issues that would not be detectable with conventional surge tests alone.

Even though no full flashover occurs in the insulation, parts of the insulation show partial flashover none the less. This partial discharge needs to be measured.

A partial discharge antenna, or a partial discharge measurement coupler integrated into the test connection, serves to capture the partial discharge. The high frequency measurement and filter technology makes the system extremely resistant to disruptions. The partial discharge test is therefore perfectly suited to deployment in manufacturing. Partial discharge testing of a stator winding is carried out using a robust test antenna. For partial discharge testing of a fully enclosed motor, a special conduit coupler is deployed. Both measurement variants can be used individually, together, or in combination.



Partial discharge testing according to IEC 61934
Unique combination of partial discharge testing and simultaneous coupling via directional antenna and conduit coupling. Equally suitable for motors and stators



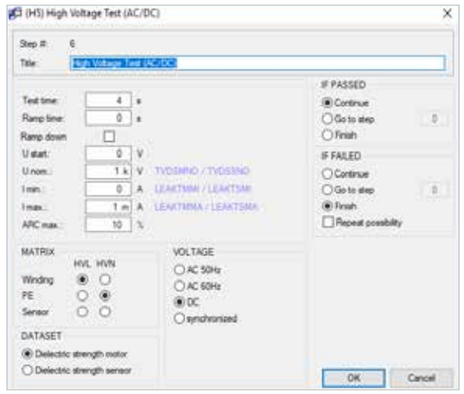
Glossary:
High voltage test

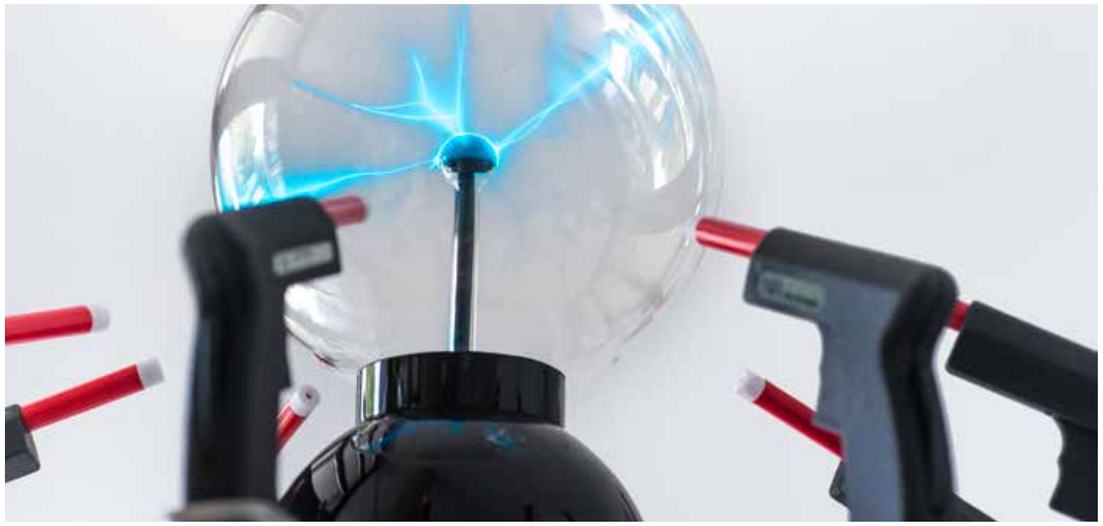
The high voltage test is the most important test in electric safety testing technology. It is applied to all electric devices, including motors and stators.

This electric safety test ascertains whether the insulation of the current-carrying conductors, and the safety distance to the plate of the DUT, are guaranteed. However, the high voltage test should not be confused with the insulation resistance test.

The high voltage test is generally carried out at the same connecting points as the insulation resistance test. They are, however, two fundamentally different testing methods and must be implemented in accordance with the applicable norm.

In almost all VDE, EN, UL and IEC norms, the high voltage test is mandatory. In these norms, distinction is made between alternating and direct current.





Glossary:
Partial discharge test at high voltage AC

The partial discharge test is often carried out in conjunction with a high voltage test or surge test. In doing so, the intention is to uncover winding quality issues that would not be detectable with conventional high voltage tests alone.

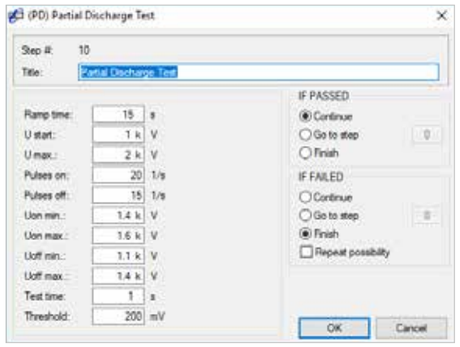
The following defects can be detected by means of the partial discharge test, among others:

- Inadequate / missing phase separator
- Inadequate / missing slot insulation
- Enamelled copper wire attached to the laminated core (to the winding head, or the slot)
- Faulty saturation process (inclusion of air bubbles)

The evaluation of the insulating system is significantly simplified, because the test, in combination with the high voltage test AC, is fully automatic. Furthermore, the measurement of partial discharge inception voltage and partial discharge extinction voltage (PDIV & PDEV) can be carried out fully automatically in production operations.

For the measurement of PDIV (partial discharge inception voltage) / PDEV (partial discharge extinction voltage), the test system automatically generates a voltage profile, which means that the test voltage is increased incrementally. If partial discharges occur, this voltage is stored as PDIV. The test program then reduces the voltage until there is no more partial discharge. This voltage is determined as PDEV and likewise stored.

In order to carry out the test as quickly as possible during production, the intensity of partial discharge can also be ascertain at a fixed test voltage. In this way, “GOOD” and “FAIL” are distinguished very quickly.



Glossary:
The resistance test

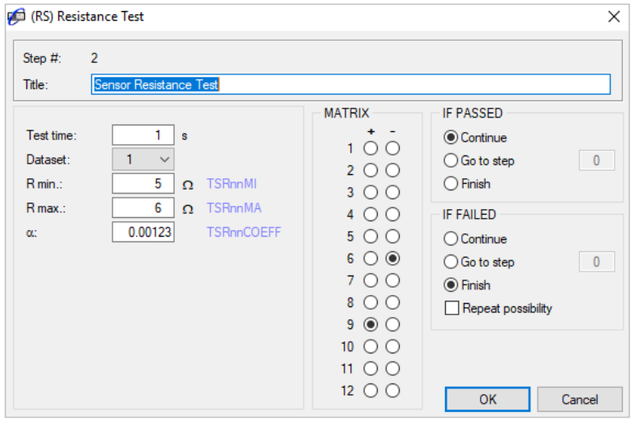
The resistance test enables fully automated testing of the windings' phase resistances.

The most important test parameter for all electrical windings, motors, stators etc. is ohmic resistance. Temperature sensors present in the DUT must also be tested by means of a resistance measurement. Reliable and precise measurement can only be achieved with 4-wire technology (Kelvin technology) Since the conductivity of copper changes with temperature, the resistance value must be normed to 20 °C. This happens by means of a temperature measuring device that captures the temperature.

The test system S 1800 automatically performs resistance measurements for any coil. Evaluation takes place either via reference setting, or the symmetry of the three phases among one another. To that end, the DUT connections are connected to the measuring device via 4-wire technology. The measurement needs to be both extremely precise, and very quick.
Various evaluations of the measurement can be configured in the test program. The user only receives a GOOD or FAIL result.

For normalization to DUT temperature, different systems are available:

- Room temperature
- DUT temperature via sensor
- DUT temperature via pyrometer
- DUT temperature via thermographic camera
- Use of the temperature sensor integrated in the DUT



Glossary:
Direction of rotation test

Direction of rotation test is mainly carried out for stators and electric motors. The aim of direction of rotation test is to assess whether circuitry was correctly implemented.

The test is contactless, using a rotary field probe that is inserted in the stator, or mounted on the DUT holder. The rotary field is generated via a connected current-limited low voltage rotary field, which simulates the 3-phased power supply to the motor. This test permits detection of wiring errors during production, already before the motor is assembled. Non-connected stators can be automatically connected as stars or triangles. Almost any type of stator can thus be tested and evaluated.

Motors are mainly tested by means of a retro-reflective light barrier, or an encoder.

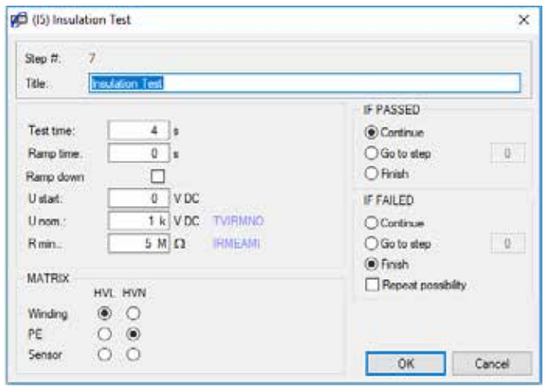
Glossary:
Insulation resistance test

Insulation resistance testing is carried out to ascertain the resistance of the insulation of a device.

Insulation resistance test takes place between the active parts and the casing components, or between the different internal potentials. Direct voltage is used as test voltage. The test voltages to be used and the corresponding authorized limits are specified in the relevant norms.

If the insulation resistance of a device is too low (and a ground bond fault is potentially present, too) high contact voltage can occur in metal parts, such as the laminated core. In case of contact, so-called “touch current” would be discharged through the human body, which can be life-threatening.

SPS electronic’s design of voltage source to insulating source is current limited for this measurement according to EN 50191. The maximum permissible current is set at 10 mA DC. Due to compliance with this limit, no additional safety measures are necessarily required for insulation testing despite the high voltage. Insulation resistance testing is generally carried out with a voltage-free DUT. However, tests at operating voltage can also be implemented. Insulation resistance testing is required for routine testing as well as repeat- and repair testing. It may however be omitted, or – depending on norms – be replaced by high voltage testing.



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