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## Freely configurable, flexible test systems

Deutronic test systems combine an individual, modular component configuration with the flexibility of the DTS-PS software solution suitable for all applications. The result of this symbiosis is application-specifically designed test systems. Possible applications know no boundaries.

In this context, the type of the product to be tested and the degree of automation specify the boundary conditions for the overall concept. This approach ensures electrical and physical safety and function of the products in line with standards and regulations applicable worldwide.



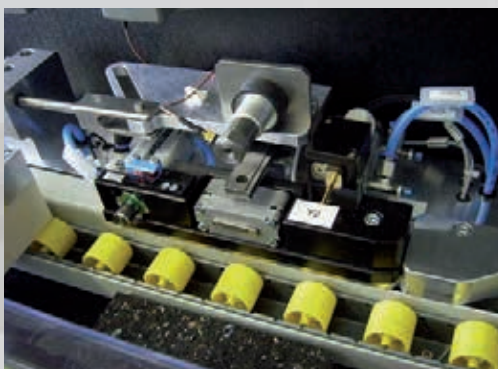
### ► Software

The Deutronic DTS-PS test software is designed for a maximum range of applications as Windows® desktop application. Operation is easy and programming can be learned easily and quickly without prior knowledge. Test sequence, parameters, limit values, durations, handling, and other properties of the individual test steps can be freely programmed. Relevant measured data is documented and archived in a modern SQL database.



### ► Hardware

Hardware of all Deutronic test systems is designed fully modularly. Components of leading manufacturers are used. This allows an application-specific, high-quality component configuration, retrofitting and modernisation.



### ► Handling

The motion sequences meet highest requirements regarding versatility, precision and speed. Handling can be freely programmed using the DTS-PS application software.



### ► Housing

Depending on the requirements, the housing design consists of prefabricated cabinet and aluminium profile systems. This enables an application-specific system design. This way, a connection to all common transport systems (chain conveyors, work piece carrier transfer conveyors, etc.) with horizontally or vertically becomes possible.



## T est and Measurement Systems for any application



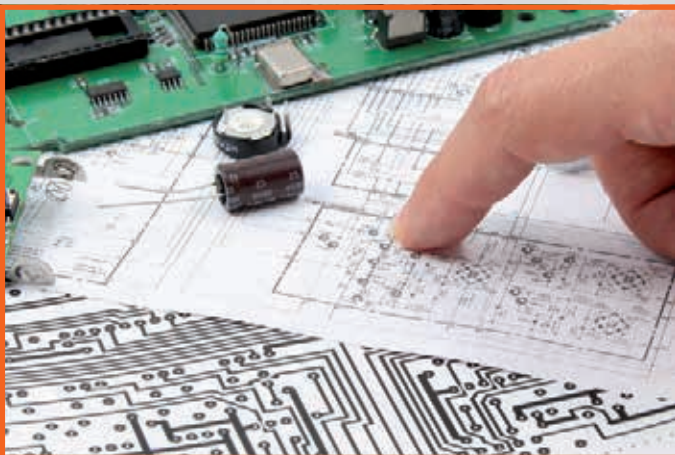
Individual configuration with test equipment from leading suppliers. Retrofits and modernisation are possible.

- ▶ Maximum flexibility
- ▶ Reliable components
- ▶ Tested quality
- ▶ Highest reliability and accuracy



Highly flexible and easy to use Deutronic DTS-PS test software. All imaginable areas of application covered by one software solution.

- ▶ Can be used without programming skills
- ▶ High system stability
- ▶ Windows® interface
- ▶ Freely programmable
- ▶ Comprehensive test spectrum



Customised test and measurement systems

- ▶ Maximum flexibility and variability
- ▶ Fully network-capable
- ▶ Safe, fast and reliable
- ▶ Covers all applications
- ▶ Cost-efficient retrofitting possible





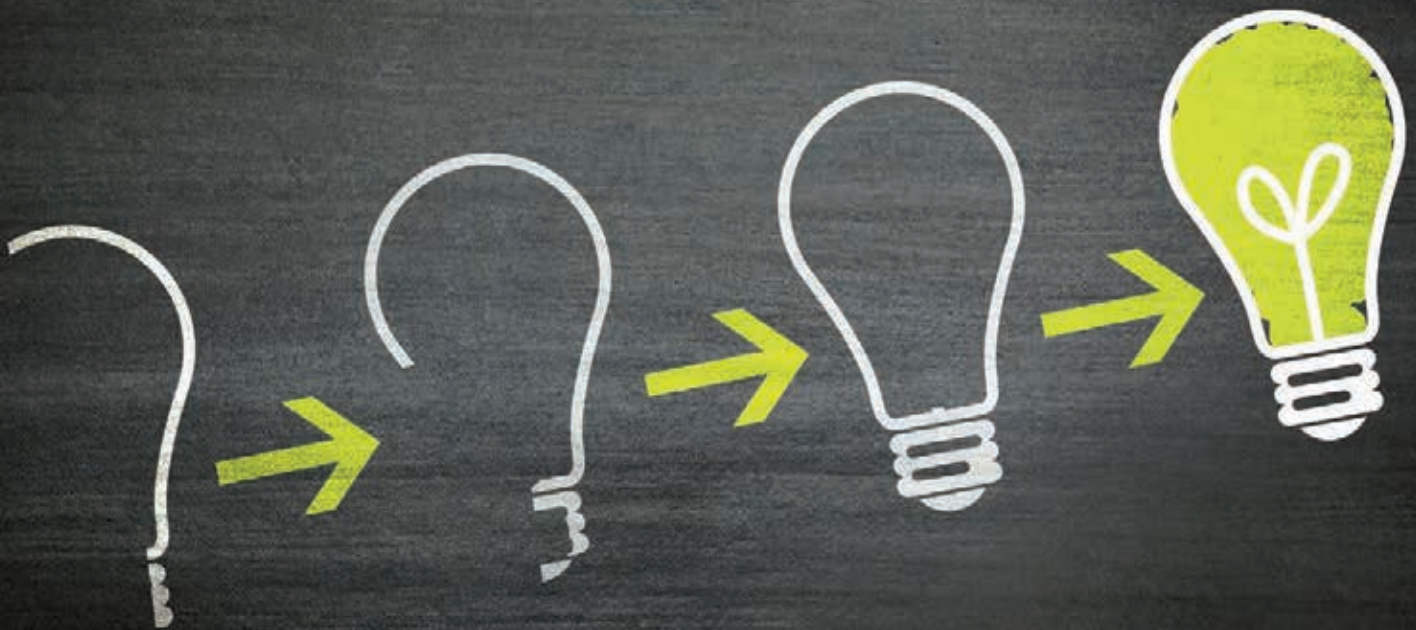
## Advantages

Deutronic meets all requirements on a test and measurement system:

- ▶ Simple and fast program generation
- ▶ Short setup and test times
- ▶ Minor adoption effort
- ▶ Simple operation
- ▶ Constant quality due to high testing depth
- ▶ Short cycle times
- ▶ High reliability

Deutronic test and measurement systems can be configured for any imaginable application thanks to their individual, modular design:

Power supplies, transformers, electric motors, semiconductor relays, mechanical relays, batteries, lights and lamps, fuses, lines and cables, solenoid valves, fans, switches, sensors, household appliances, medical devices, entertainment electronics, rail couplers, automotive industry and many more.





## **T**est methods

Deutronic test and measurement systems can be configured for any test scenario thanks to their tailored, modular design:

### ▶ **Safety tests**

- HV test AC / DC
- Productive conductor test
- Insulation test
- Leakage current test
- Continuity test

### ▶ **Function tests**

- Idle test
- Digital/analogue inputs and outputs
- Harmonics / ripple / spikes / noise
- Communication tests (CAN, RS232, IEEE, Ethernet, etc.)
- Shorted coil
- Inductances
- Capacitances
- Brake test
- Pulse counter
- Hysteresis
- Temperature compensation
- Test currents up to 10,000 A
- etc.

### ▶ **Power tests**

- Current / voltage under load
- Apparent / active / reactive power
- Power factor / phase angle
- etc.

### ▶ **Physical tests**

- EMF / KE test
- Torque / speed test
- Structure-borne noise test
- Axial eccentricity, pin eccentricity
- Spectrum analysis
- Mass flow

### ▶ **Contacting**

- Pneumatic, manual and fully automated contacting

### ▶ **Other tests**

- Partial discharge tests
- Surge voltage tests, leakage test
- etc.

## Test software DTS-PS

The Deutronic DTS-PS test software is designed for a maximum range of applications with a Windows® user interface. Operation is easy. The user can learn programming easily and quickly without programming skills. Test sequences, parameters, limit values, durations, handling, and other properties of the individual test steps can be freely programmed. Relevant measured data is documented and archived in a modern SQL database.

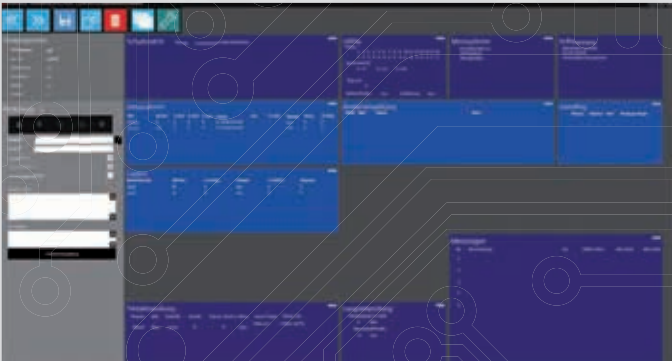
Test schedules can be created with any number of test steps. The test sequence can be freely programmed as well as parameters, limit values, durations and other properties of the individual test steps. The presentation of images, graphics, instructions, technical documents etc. on the monitor can be integrated into the test sequence, e.g., to guide and support testing personnel in their work.



- ▶ Freely programmable, screen-oriented settings of test programmes and test sequences (e.g., creation of test programmes, parameter settings) without programming skills
- ▶ Data output in PDF possible
- ▶ Connection to ERP systems possible
- ▶ Test schedules and measurement results are stored in a modern SQL database
- ▶ Update-capable, modularly extendible, compatible with third-party equipment and third-party software
- ▶ Remote diagnostics and maintenance



## T est software DTS-PS

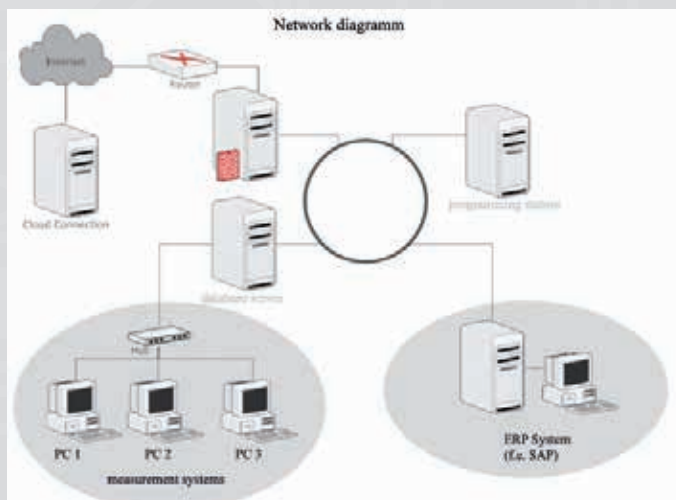
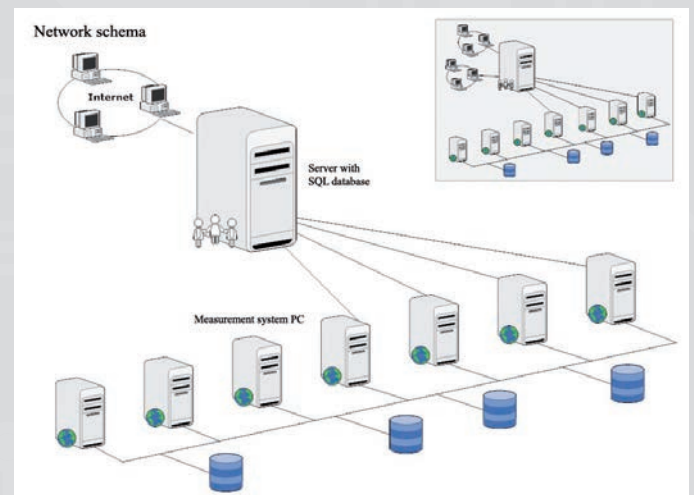


### Flexible test programme creation

- ▶ Freely configurable test sequence, parameters, limit values, durations and other properties of the individual test steps
- ▶ Presentation and management of images, graphics, instructions and other technical documents
- ▶ Nearly unlimited number of test programmes and test steps
- ▶ All measured values can be stored in variables for further processing (calculation and handover)
- ▶ Complex calculations possible via MATLAB®

### Networking

- ▶ The test system database can be integrated into the company-internal network
- ▶ If several test systems are networked, the computer of one test system can manage and provide test programmes as well as technical documentation centrally as server
- ▶ Further PCs can be integrated as programming stations



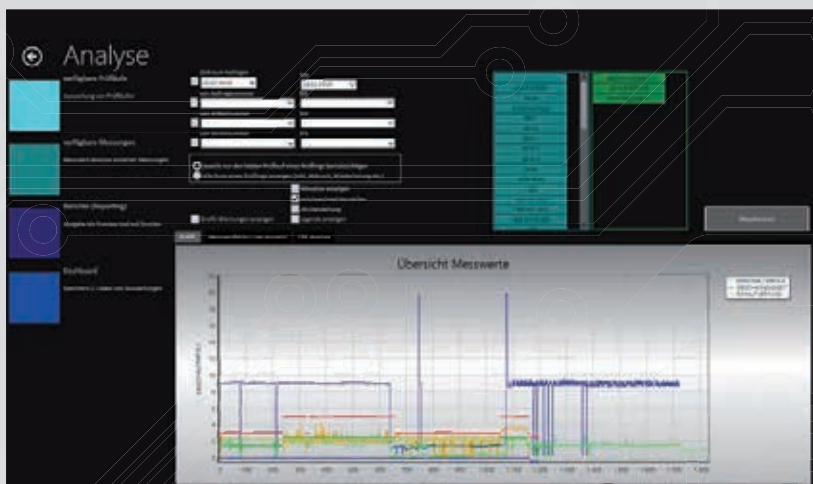
### Modern SQL database

- ▶ Test results, test programmes, users, etc. are stored in a modern SQL database
- ▶ Completely rational database
- ▶ High reliability and scalability
- ▶ Use of inquiry scripts for test data analysis



## Statistics software DTS-Tablo

The Deutronic DTS-Tablo statistics software is designed for statistical test and measurement analysis and evaluation. The functions include analysis, evaluation, visualisation and reporting. This enables a survey of the production quality and uncovers improvements potentials.



- ▶ Test and measurement analysis and visualisation
- ▶ Comprehensive selection possibilities by time frames, order and article numbers, up to three filter levels
- ▶ Integrated Cpk analysis
- ▶ Flexible detail filters via SQL wizard
- ▶ Adjustable 2D or 3D presentation as bar, line or scatter chart
- ▶ Reports for screen and print output
- ▶ Clear graphical user interface
- ▶ Versatile setting possibilities regarding data acquisition and analysis
- ▶ Graphical and logged measured data analysis (e.g., PASS / FAIL)
- ▶ Visual presentation of the characteristic values of a process possible without statistical assessment

### ▶ Statistics

Relevant measured data is archived in a SQL database. Determined and archived measured data can be analysed using statistical methods in real time or in retrospect. The current process capability index as well as the process potential are determined during the ongoing test. This allows an immediate reaction to process changes.

### ▶ Statistical data

The data of all networked test systems is stored in a data pool and is available at any time, e.g., to test field management, production management or quality control (office license required).

## Lifecycle service

With respect to service, Deutronic test systems also convince with an outstanding value proposition. Deutronic offers their customer comprehensive and competent service for all steps, starting from first conceptual design to test system modernisation.

### Conceptual design

As solution provider, our experts develop a concept based on the technical specification of the test object and the overall requirements.

### Realisation

Within the scope of the realisation phase, modular design and test software are combined into a tailored test system solution. The focus here is particularly on on-time realisation.

### Commissioning

To meet highest quality demands, user training as well as sound support are provided in addition to several acceptances.

### Maintenance

Within the scope of a maintenance agreement, Deutronic assumes the entire test system maintenance. Calibrations can also be performed upon request.

### Upgrade

A new product generation often also includes changed test sequence requirements. Together with the flexible test software, the modular design allows a cost-efficient test system adjustment to changes requirements.

## Customer-specific examples



- ▶ Resistance test of motor windings
- ▶ Determination of current / voltage / power
- ▶ Resolver curve calculations
- ▶ Structure-borne noise test
- ▶ Function test of motor, brake, non-return device, rotary encoder

Drum motors must withstand highest electrical and physical loads. This requires thorough quality control at end of production.

The shown test system was designed as standing workstation with handling system based on a linear transfer system. A touch panel installed on the side is used for operation. A ball table integrated into the test system enables loading of test objects of different weight and size. For this requirement, the product-specific work piece carriers were divided into two pieces to omit test object transfer.

The actual test chamber is shielded with a light curtain of safety category 4. The mechanical handling systems realised using compressed air is inside the chamber. It comprises stoppers to move the work piece carrier into the final position, an adapter fastening and the structure-borne sound sensor feed via separately controllable compressed air cylinders.

Using an armoured chain principle, the speed is determined during the function test. The speed sensor can be variably fastened depending on the motor dimensions.





## T esting of railway couplers, cables and plugs



- ▶ Test time reduction through intelligent sequence automation
- ▶ 100 % function check
- ▶ High production throughput
- ▶ Customer-specific labels



Railway couplers are used worldwide under most extreme conditions. Here, the internal electronics must function without problems in addition to high physical stability. The problem-free function is determined and validated using the shown test system.

The function test system shown here is used as wiring test system for railway couplers. Using a customer-specific adapter cart, the test object is entered into the test room and locked fully automatically. The contacting box is located outside the test room. Here, the loose strands are contacted. Using the area gantry installed in the test room, the individual contacts of the coupler are approached. It is determined, whether and which cable is wired to which contact. Based on an intelligent test sequence, the test time can be significantly reduced.

Using the enclosed label printer, the respective contact number is printed on the individual cables. After test completion, all data determined during the test are written into a SQL database. With that, they are available for later use (e.g., statistical analysis).

## Calibration tester for gas blower systems



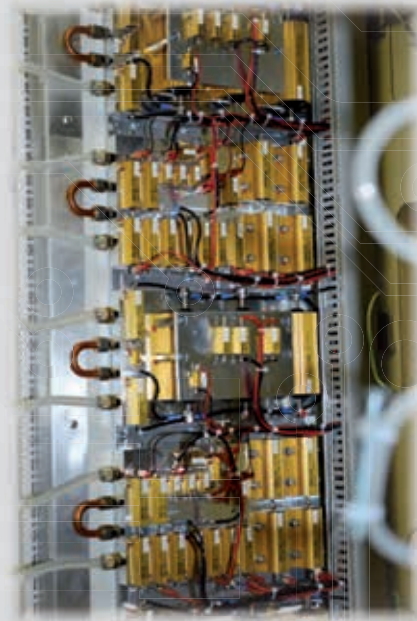
- ▶ Automated adaptation with leak-tight connection from test object to test unit
- ▶ Leakage detection
- ▶ Flow calibration
- ▶ Programming of the mass flow sensor via CanBus interface

Condensing boilers can only ensure an efficient and low-emission combustion process, if the gas-air mixture ratio is provided accurately. The basic requirement for this is a highly accurately calibrated gas blower system.

With the mass flow calibration tester, Deutronic offers solutions for the calibration of flow-related applications – here, in particular, for gas blower systems for condensing boilers. The setup mainly consists of a host computer with measuring and control electronics, a vacuum chamber with critically operated Venturi nozzles and the test cart. During calibration, different mass flows are generated through the combination of several Venturi nozzles. A characteristic curve depending on pressure, temperature and air humidity is generated. This characteristic curve is then written into the test object via the CAN interface integrated into the gas blower system and stored with the determined ambient conditions. Finally, the stored comparison parameters are compared with the determined data and filed in a database.



## Run-in tester for UPS assemblies



Water-cooled ohmic loads

- ▶ Freely programmable sources DC/AC 1ph./3ph.
- ▶ Electronic AC/DC loads or water-cooled resistance loads
- ▶ Freely programmable load profiles / load phases
- ▶ Freely programmable measuring cycles
- ▶ Easy adaptation
- ▶ Communication test

UPS assemblies ensure a secure supply of power. To complete this function, proper function must be ensured.

Using the run-in tester, several UPS assemblies are subjected to a burn-in via an increased ambient temperature. For this purpose, resistances are applied to seven different voltage outputs per test object. Loading is realised in the form of configured load resistors that are mounted on liquid coolers. The cooling plates are integrated into the heating circuit of the customer, who also supplies them with cooling water. These loads can be switched on and off individually. During operation, currents, voltages and temperatures are determined and documented. The test objects can be switched off individually as needed (e.g., non-compliance with limit parameters). To protect against overheating, a smoke detector is integrated into the system, which switches off the system components in the case of danger. The PC unit is excluded to avoid data losses. The mechanical test object receptacle and the electrical adaptation of ten slots is located inside. On optical status indicators for evaluation (red/green) and assignment (load board activation) are mounted well visibly to the front side for every test object.



## Test systems for winding goods, (high current) transformers, chokes etc.



- ▶ 100 % safety and function test
- ▶ Can be integrated into production line
- ▶ Cost-efficient electrical source
- ▶ Test currents up to 10,000 A



Electrical components, such as winding goods, transformers and chokes must achieve a constant quality level to ensure proper function of the final application.

In addition to a significant test time reduction, Deutronic test systems for transformers and chokes offer a consistently high test reliability due to a freely programmable switch matrix.

The test system consists of a generator, measuring devices and an impedance matching transformer.

Equipped with the relevant safety technology, the test objects can be tested in line with the freely configurable test sequences. Detailed analyses and meaningful quality data are provided as well.

In addition with the highly flexible test software, the modular test system configuration with high-precision components ensures a first-class, tailored test system.

## T est systems for capacitive sensors and proximity switches



- ▶ Individual test procedures
- ▶ Accessible test room
- ▶ Simulation of fault conditions

Capacitive sensors and proximity switches are increasingly used in our day-to-day life. For example, for operating elevators or opening train doors. Depending on their area of application, the buttons differ, e.g., in their sensitivity. Furthermore, they must meet different requirements (e.g., resistance against vandalism). The proper and reliable function of sensor buttons is based on triggering through contact without actuating force. Feedback is optical through different-colour LEDs, acoustically through a signal sound, or tactile through vibration.

An electrode is moved at a defined distance to the test object (sensor) using a linear drive. Using laser distance sensors, based on the triangulation principle, the distances between electrode and sensor can be determined for certain switching processes. Intelligent signal analysis enables high-precision sensor operation regardless of colour and surface.

## Test systems for power supplies, inverters, assemblies and components



The requirement on electronic components to function in continuous operation across a long time frame, requires consistent product safety with the related quality test.

This test system series is used for function and safety tests of (line-operated) assemblies and/or devices and can be used for series as well as type approval tests.

Due to the flexibility of the test systems, all power supplies from low-cost wall power supplies to sophisticated, programmable multi-power supplies can be tested for their function. In addition to electrical safety and function tests, different physical variables can be recorded and evaluated individually for the production process.

Product tracing can be ensured using customer-specific product marking (pad printing, hot die stamp, laser labelling etc.).



## Test systems for white / brown / red goods, power tools etc.



- ▶ Determination of consumption values
- ▶ Burn-in test
- ▶ Test object programming and calibration



The market for household appliances and power tools is in a transition phase. The requirements on the devices are increasing rapidly. In addition to standards, such as low energy consumption, particularly the function scope (e.g., smart home) is increasing drastically.

These facts require a precise product test to offer customers high quality.

Among others, the modular design of Deutronic test systems enables the acquisition of performance data (e.g., consumption data). The test object can be programmed and calibrated as well.

## Test systems for the automotive sector



▶ Can be fully integrated into the production line

▶ Modular design enables adjustment to changed requirements

The development of vehicle components is becoming increasingly complex. The test effort to ensure high quality is increasing accordingly. To meet these requirements, Deutronic applied all of their know-how to the development of test systems meeting these requirements.

Thanks to the modular design and the resulting possibility of exchanging individual components, test systems can be upgraded to the state-of-the-art of test technology over a long time frame.

The test system shown here is divided into two test cells due to different torques (up to 500 Nm). The system is used for checking brushless disc-type motors and/or generators for their electronic and physical values (in idling and under load).

A universal controller interface (CAN Open Norm Interface) ensures the integration of different control types into test system.



## Inline test systems



- ▶ Full integration into the assembly line and integration into the central ERP control
- ▶ Automatic test object feeding and discharge

Deutronic test systems can be designed as stand-alone testers or as inline systems. Here, the system is fully integrated into the production line. As development partner, Deutronic consults their customers already in the planning process to adjust the test process individually to test object and production process.

The shown system is a fully automated and fully integrated inline test system. The engine production line comprises assembly and test stations, where different test tasks are completed.

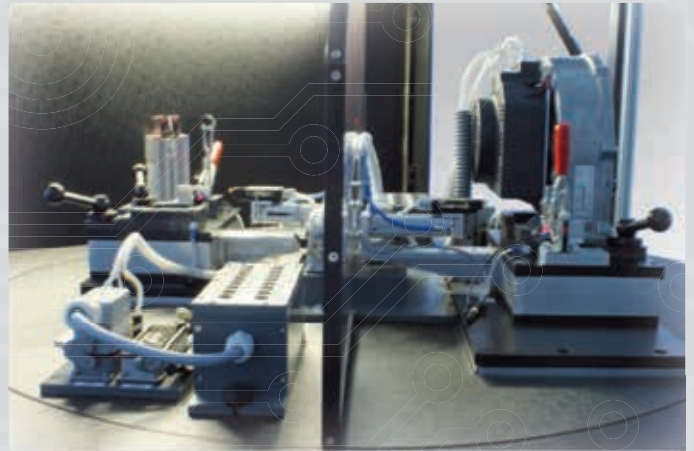




## Accessories

### Test cages in many designs

- ▶ Single/double test chambers
- ▶ Rotary tables with dual/fourfold test cells
- ▶ Test cage with vertical/horizontal door locking
- ▶ Test cell with cat. IV light barrier
- ▶ Test hood for laser protection class 1
- ▶ Controllable automated chambers, e.g., for conveyor belts
- ▶ Accessible test cage



### Production

- ▶ Variable designs and dimensions
- ▶ Made of high-insulating plastic
- ▶ Safety contacts integrated (among others, safety limit switches)
- ▶ Accessible test room
- ▶ Customer-specific contact field



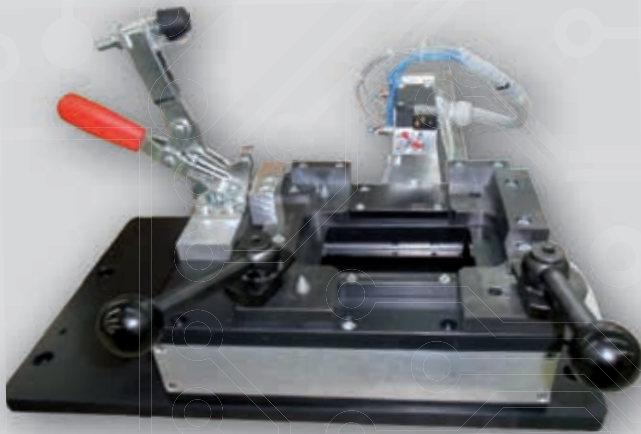
Design with light curtain



## Accessories

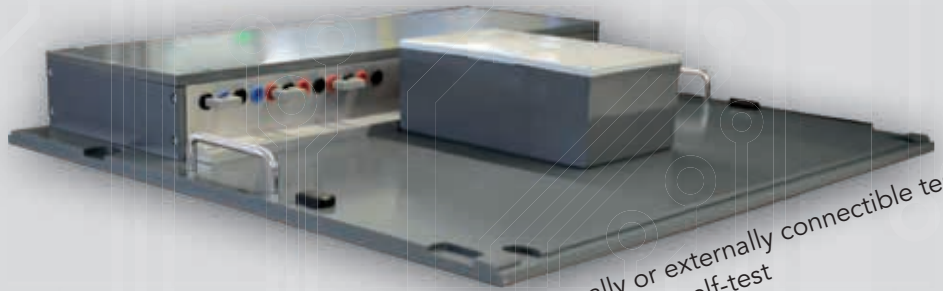
### Customer-specific test adapter

- ▶ Variable designs
- ▶ Industry standard plugs and sockets
- ▶ Pneumatic connections



### Customer-specific test dummy

- ▶ Internal / external contacting
- ▶ PE test simulation
- ▶ HV test simulation
- ▶ Insulation test simulation



Internally or externally connectible test dummies for self-test



### Cameras / light analysis modules / stamping lasers

Different application possibilities, such as

- ▶ Distance measurement
- ▶ Brightness measurement
- ▶ Colour breakdown
- ▶ Temperature distribution measurement

## Conception 1

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Individual configuration with test equipment from leading suppliers.

**Retrofits and modernisation are possible.**

- Maximum flexibility
- Reliable components
- Tested quality
- Highest reliability and accuracy

## Conception 2

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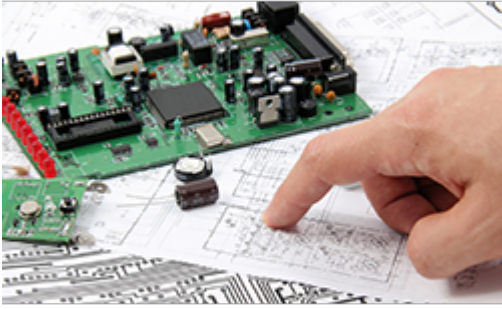
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- Can be used without programming skills
- High system stability
- Windows© interface
- Freely programmable
- Comprehensive test spectrum



## Conception 3

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### **Customised test and measurement systems**

- Maximum flexibility and variability
- Fully network-capable
- Safe, fast and reliable
- Covers all applications
- Cost-efficient retrofitting possible

## Test software 1

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## Test software 2

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Test schedules can be created with any number of test steps. The test sequence can be freely programmed as well as parameters, limit values, durations and other properties of the individual test steps. The presentation of images, graphics, instructions, technical documents etc. on the monitor can be integrated into the test sequence, e.g., to guide and support testing personnel in their work.

- Freely programmable, screen-oriented settings of test programs and test sequences (e.g., creation of test programs, parameter settings) without programming skills
- Data output in PDF possible
- Connection to ERP systems possible
- Test schedules and measurement results are stored in a modern SQL database
- Update-capable, modularly extendible, compatible with third-party equipment and third-party software
- Remote diagnostics and maintenance

## Power supply test system

Test and measurement systems for functional and safety tests of power supplies, DC/DC converters, electronic assemblies, medicinal power supplies, UPS-systems, etc.



### EXTENSIVE FUNCTIONAL AND SAFETY TESTS LIKE:

- HV-Test AC/DC, PE, ISO
- Voltage, current, power
- Idle tests
- Power factor, phase angle
- Apparent power, effective power, idle power
- Communication tests
- Harmonic waves, ripple, spikes
- Leakage current measurement
- Etc.

### • Typelist:

**Test system for components**



**Test system for AS interfaces**



**Test system for assembly parts**





# Test system for synchronous servomotors

Test and measurement systems for functional and safety tests of drives like AC/DC servomotors, fan motors, pump drive systems, draft fan motors, encoder, stators and rotors out of drive production, etc.



## EXTENSIVE FUNCTIONAL AND SAFETY TESTS LIKE:

- HV-Test AC/DC, PE/ISO
- Voltage, current, power
- Idle tests
- Turns ration measurement
- Torque and speed measurement
- Rotating direction detection
- Structure-born noise test
- Commutation tests
- Brake test
- Force/displacement measurement
- Communication with current speed sensor interfaces
- KE and EMK measurement
- Etc.

## • Itemlist:

### Drum motor test system



### Test system for engine driven fans



### Test system for shutter drives



## Test system for large transformers up to 100kVA

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Test and measurement systems for functional and safety tests of electronic winding goods like transformers, chokes, coils, rotors, stators, input filters, etc.



### EXTENSIVE FUNCTIONAL AND SAFETY TESTS LIKE:

- HV-Test AC/DC, PE, ISO, leakage current
- Measuring of primary and secondary voltages, currents and power
- Idle tests
- Measurement of turns ratio, Interturn fault and winding resistance
- Capacitive measurements
- Inductive measurements
- Phase shift
- Load tests
- Etc.

### • Typelist:

**Test system for chokes**



**Dual chamber test system for transformers**



**Transformer test system with roller conveyor**



# Safety test system for pumps, actuators and connection cables

Test and measurement systems for safety tests of electronic components, assemblies and all kinds of devices.



## EXTENSIVE FUNCTIONAL AND SAFETY TESTS LIKE:

- HV-Test AC/DC
- PE test
- Insulation test
- Leakage current measurement
- Continuity test
- Freely configurable relais switching matrix
- Optimal functional tests possible
- Etc.

## • Typelist:

**Safety test system for pump motors**



**Safety test system for central fire alarm systems**



**Safety test system for DC/DC converter**





## Run-in test system for power supplies

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Next to test and measurement systems for functional and safety tests we manufacture Run-In tester that prove the reliability of assemblies and other products.



### EXTENSIVE FUNCTIONALITIES:

- Freely programmable sources AC 1ph./3ph.,
- Electronic AC/DC loads
- Freely programmable load profiles
- Freely programmable measuring cycles
- Easy adaptation
- Communication tests
- Possibility of integrating a climate chamber
- Etc.

### • Typelist:

#### Run-In test system for components



## Safety test system for railway couplers

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Next to test and measurement systems for functional and safety tests of electronic devices, assemblies and components we manufacture customer specific test systems.



### EXTENSIVE FUNCTIONAL AND SAFETY TESTS LIKE:

- HV-Test AC/DC, PE, ISO
- Voltage, current, power
- Idle tests
- Load tests
- Continuity tests
- Communication tests
- Leakage current tests
- Etc.

### • Typelist:

#### Functional test system for proximity switches



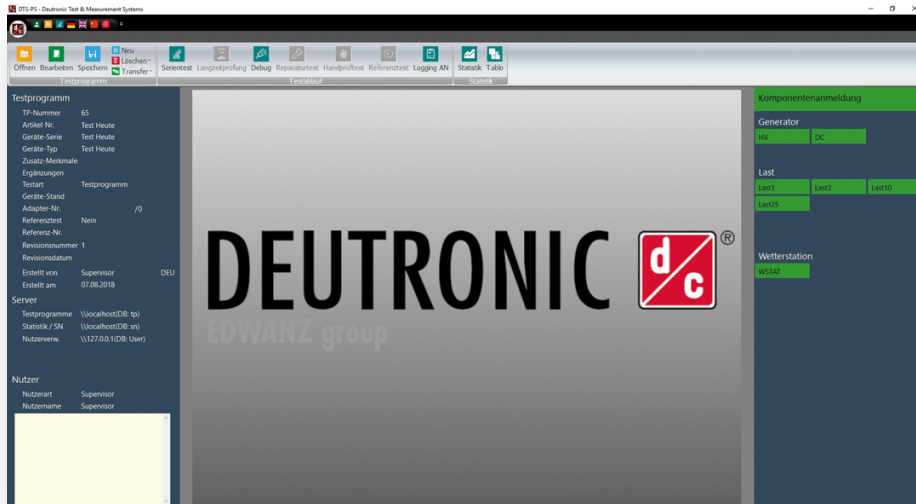
#### Test system for battery charging computers



#### Wiring test system for railway couplers

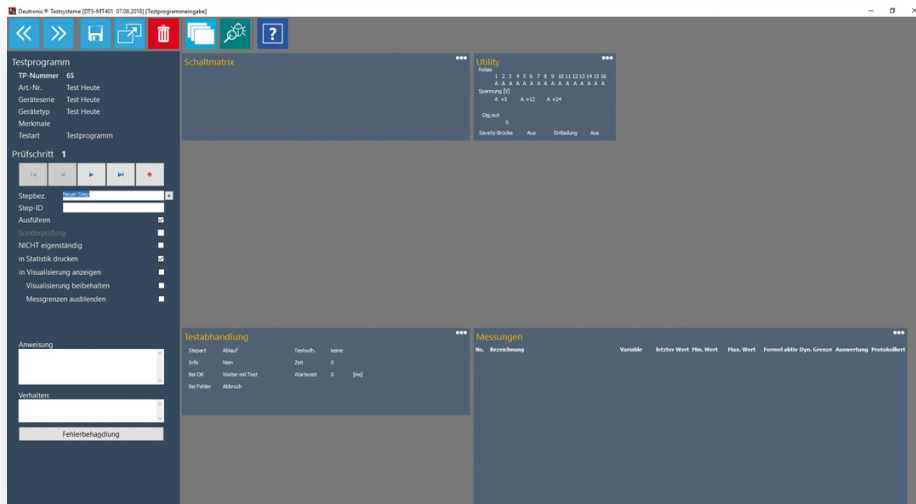
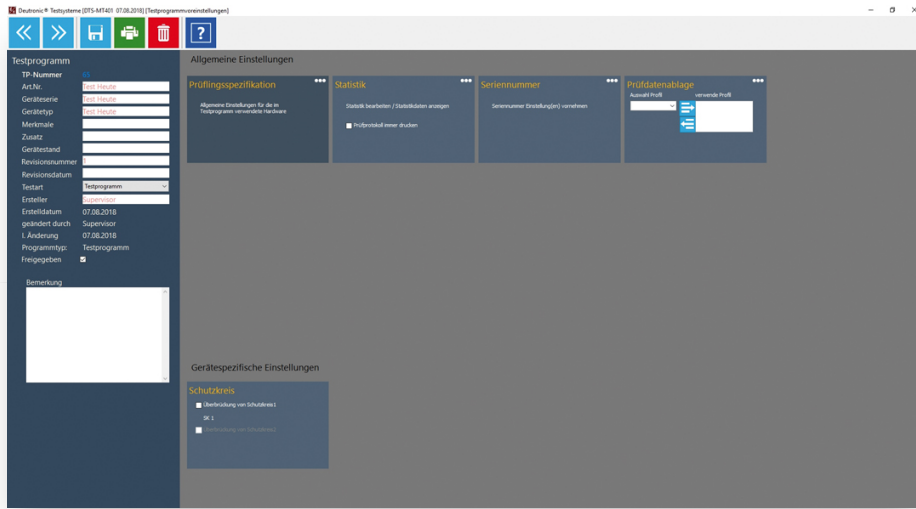


# TEST SOFTWARE DTS



The **Deutronic DTS** test software is designed for a maximum range of applications and works as Windows® desktop application. It can be easily connected to an existing data transfer network. The documentation and archiving of relevant measurement data is realized in a modern SQL database.

- ✓ Can be used without programming skills
- ✓ The test system SQL database can be integrated in the company network, data transfer via SPS or directly to a control system via industry-approved bus systems (e.g. Profinet)
- ✓ Connection to ERP systems possible
- ✓ Flexible test program creation



- ✓ Remote diagnostics and maintenance
- ✓ Presentation and management of images, graphics, instructions and other technical documents
- ✓ Complex calculations possible via MATLAB®



# Safety test system for electric railroad couplers



## Scope of testing

- ✓ Intelligent test run for a maximum time saving
- ✓ HV test up to 6.0kVAC
- ✓ Insulation test
- ✓ Resistance measurement

This test system is used for safety testing of electrical railroad couplings. By means of a customer-specific adapter carriage, the test specimen is guided into the test area and locked in place fully automatically.

# Test system for high frequency internal vibrators



## Scope of testing

- ✓ Optical visual inspection
- ✓ Continuity test
- ✓ High voltage test
- ✓ Protective earth test
- ✓ Current consumption of specimen via 6 current sensors
- ✓ Calculation of the power consumption
- ✓ Function test PRCD
  - Under voltage release
  - Residual current
- ✓ Rotation per minute measurement

A product and service range that is addressed to “professional users” in the construction industry, garden and landscape construction industry and industry companies, requires the development of a test system that does not only have high safety standards but also a suitable construction that is fitted to the test scope.

To compensate for the strong vibrations of the vibration body on the test system, the housing of the test cell, which is designed as a standing workstation, is mounted on a reinforced base frame and made to ensure permanent, reliable decoupling.

The test system is developed and designed with various connection possibilities to cover a high amount of different specimen. It is possible to carry out two functional tests (rotation speed, current input and power) of two identical high frequency internal vibrators in one test chamber. The safety tests need to be carried out separately. During the running test, the inactive chamber can be assembled with new specimen, without influencing the function of the active chamber.

Additionally, the required sensors for the rotation speed measurement are integrated so that a change between the different diameters is always possible without a “modification” or without great effort.

It is possible to store as many as desired test programs on the test system. The test plans can be created freely in the test system software. In the individual test steps, the components can be freely configured within the scope of their technical properties, and the time sequence can be set as well. The test program can be loaded automatically by the tester with the help of a scanner.

# Mass flow sensor calibration test system (simple) for gas blower



## Significant test time reduction by MathWorks® MATLAB®

Calorific value devices may only guarantee an efficient and low-emission combustion process if the gas air mixture is provided exactly. For this purpose, a high-precision calibrated gas blower system is necessary.

An exact calibration of the gas blower system is enabled by the measurement of airflow via critically operated Venturi nozzles. The measuring and calibration are carried out depending on several parameters such as the ambient temperature and the humidity. However, this process portrays a great mathematical challenge to each test software. The reduction of the lead times, thus, requires a quick calculation of very complex mathematical formulas.

MathWorks® MATLAB® and the Deutronic test software DTS are used in order to enable this complex process.

The test time of the gas blower system by a worldwide leading manufacturer of electro motors and gas blower systems can be reduced from eleven to seven minutes on average.



# Test system for ventilators



## Scope of testing

- ✓ PE test according to EN60335 and EN60204
- ✓ HV test up to 3,6kVDC and 5kVAC
- ✓ Input power of the specimen
- ✓ Rotation speed measurement
- ✓ Flow of air mass measurement
- ✓ Volume flow measurement
- ✓ Air pressure measurement

With this test system, ventilators are inspected for their safety, electrical and physical functions.

The test system has a specimen specific test trolley and a frame construction which includes the system components. This system is secured by a light barrier of the safety category 4. The mechanical and electrical specimen handling is located inside of the test cell. The specimen trolley is identified by the identification of the installed Phoenix component so that different trolleys can be inserted into the system. Different needle board adapters for the specimen contacting/programming can be inserted because of a 10 bit adapter coding.

# In drive generator (IDG) test system



# Laboratory testing station for stators



## Scope of testing

- ✓ Winding resistance with temperature compensation
- ✓ Capacity and loss factor
- ✓ Test of the dielectric strength
- ✓ Dielectric strength / Impulse voltage in comparison
- ✓ Weighing (before and after the impregnation)

The flexible test system enables fast and uncomplicated functional testing of hairpin or wound stators for electrical machines in prototype production, manufacturing and repair.

Manual operation for the laboratory. Flexible and dynamic test sequences.  
Customer-specific measuring equipment.

# End of Line (EOL) e-motor test system



## Scope of testing

- ✓ Resistance measurement of winding resistances, temperature sensors, insulation resistance of the winding, contact resistance of the shield connections
- ✓ HV testing
- ✓ Determination of the resolver offset angle
- ✓ Residual magnetism at the shaft end of the rotor
- ✓ Idle values of the motor
- ✓ Determination of the nonlinearity of the resolver
- ✓ Electromagnetic force (EMF)
- ✓ Total Harmonic Distortion (THD)
- ✓ Speedripple of the motor speed
- ✓ Structure-borne noise measurement
- ✓ Determination of the friction losses
- ✓ Etc.

Modern test concepts for various electro mobility components do not only require a deep understanding of the drive technology but also a high degree of



automation to optimize the cycle time in a series production. Because of the high specimen performance, the mechanical setup requires a suitable construction. The focus of this EOL test station is on the fully automated test sequence which also includes the mechanical and electrical contacting. Flexible production uses are possible because of the fast and uncomplicated change of the contacting unit. The test sequence is defined and loaded by the recorded barcode on the work piece carrier. The collection and permanent storage of test data ensures the unrestricted reproducibility of measured values, even across systems.

# Fully automated test systems for the electric mobility



## Scope of testing

- ✓ Winding inductance/ -resistances with spreading width
- ✓ Capacity and loss factor with spreading width
- ✓ Dielectric strength/ impulse voltage with a comparison
- ✓ Impulse partial discharge
- ✓ Weighing (before and after the impregnation)

Stators of electric vehicles have to be tested for safety and functioning during the production process and all data has to be saved permanently. The test is fully automated and takes place before and after the impregnation. The stators will be placed on product-specific workpiece carriers which will be adjusted and then placed into the test system. The contacting takes place without any partial discharge and, thus, provides unrestricted and reproducible measured values which are also valid across systems.

# Drum motor test system



## A customer specific mass production requires dynamic test plans

A worldwide leading manufacturer of key products of the material handling, internal logistics and automation offers his customers drum motors in a customer specific serial production. A modular system allows the configuration of application specific drum motors. Because of the high amount of variants, the motors can be used in different branches such as food processing, supermarkets, airports and in parcel logistics.

This diversity represents a challenge to the quality assurance at the end of the production. Conventional test systems cannot meet the demands of an individual test process for each specimen.

Deutronic therefore offers a customized solution. With the help of dynamic test plans, each specimen will be tested individually with regards to its specification. In order to ensure this, the required information will be transferred from the SAP<sup>®</sup> ERP system to the test system. The Deutronic test software then calculates the individual test plan. This allows a highly efficient and variable test. An automated test process replaces the previous manual test process and ensures a constantly high, protocolled product quality.

# Customer specific function test system for actuators



## Scope of testing

- ✓ Noise level
- ✓ High voltage test
- ✓ Protective conductor test
- ✓ Speed counterclockwise/clockwise rotation
- ✓ Pin assignment of the potentiometer / direction of rotation
- ✓ Pin assignment of the motor / direction of rotation
- ✓ Independent linearity of the potentiometer with rising/falling characteristic [%]

The test system controls the flawless function of actuators. These serve the positioning of various adjusting shafts within pressure machines where a potentiometer serves as an integrated feedback system. The noise level will be evaluated via the user (subjective) with a verity test where the user can enter the test area. The light curtain can be deactivated via a setting of the switching matrix. The independent linearity, rise, rotation speed and the current consumption will be evaluated via the complete Poti range via the system whether at a rising or at a falling characteristic curve.



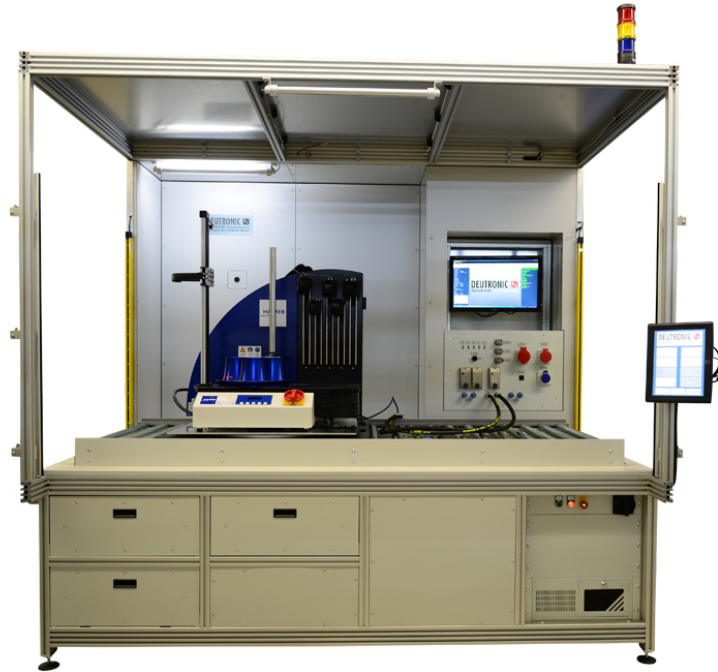
# Motor test system



# Test system for battery chargers



# Shrink-fitting machine test system



# Structure-borne sound measurement – for a smart quality assurance of the production process



## Scope of testing

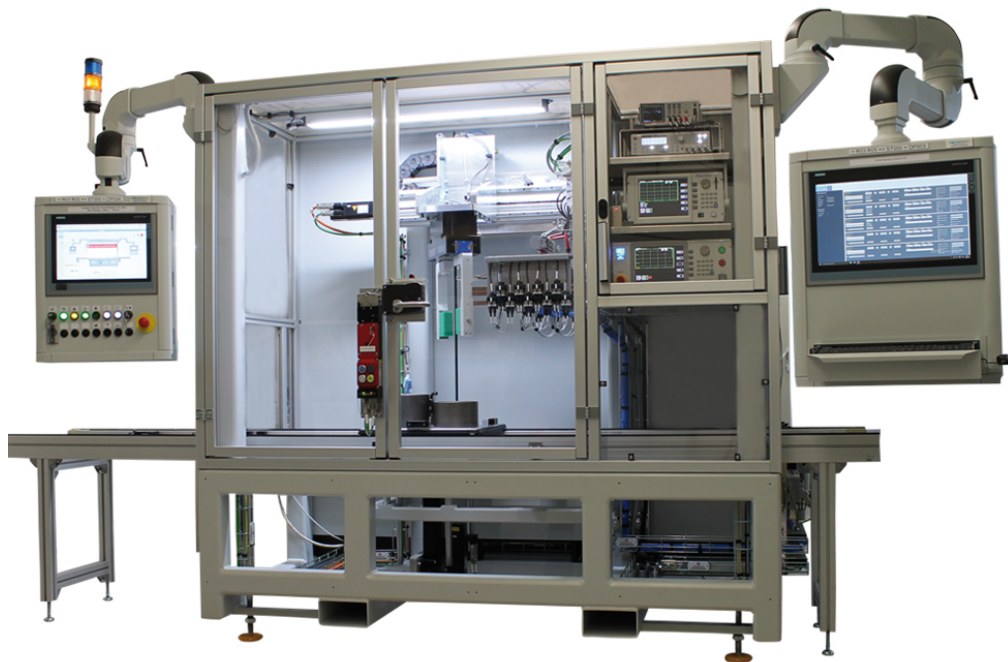
- ✓ Fully automated sound detection software
- ✓ Detection and identification of numerous sound patterns
- ✓ Convenient teach-in of “good” and “bad” test objects
- ✓ Determination of similarity for teach-in test objects
- ✓ Naming of different body sound failures

Conventional function tests for electric motors are not able to fulfil the high standards of a state-of-the-art quality assurance. To satisfy the high requirements of the quality assurance and an efficient test sequence, cutting edge test methods are required. Motor faults in every operating mode are manifested by vibration signals. Structure-borne sound measurement is able to detect and identify these signals. This enables the detection of individual



component faults as well as the identification of characteristic error indications. Structure-borne sound measurement takes place parallel to function tests, therefore, it requires no additional testing time. This objective testing method enables reproducibility and comparability of testing results.

# Test system for rotors



## Scope of testing

- ✓ Winding inductivity and resistances with spread width
- ✓ Capacity and loss factor with spread width
- ✓ Dielectric strength / impulse voltages with comparison
- ✓ Impulse and partial discharge AC/DC
- ✓ Insulation test
- ✓ Temperature measurement on the test specimen
- ✓ etc. ...

An example of a fully automatic test system for rotors as part of a production line for electric motors. A flexible test piece fixture has been integrated into the system, which makes it possible to contact all required test pieces without having to convert the test station.

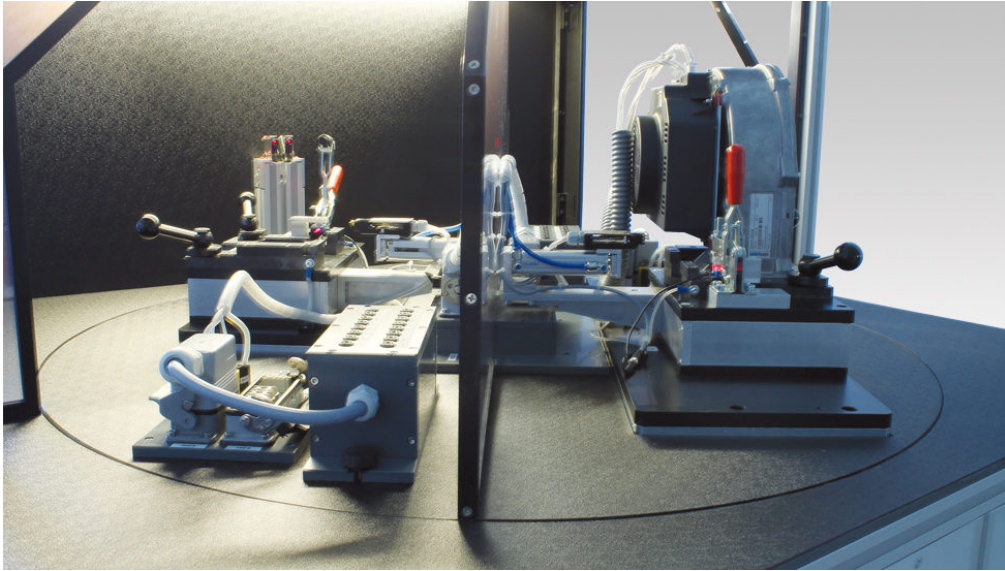
Patented, fully automatic contacting. High-precision partial discharge testing pulse and AC. Surge testing. Connection to the customer's system.

# Production



- ✓ Variable designs and dimensions
- ✓ Made of high-insulating plastic
- ✓ Safety contacts integrated (among others, safety limit switches)
- ✓ Accessible test room
- ✓ Customer-specific contact field

# Test cages in many designs



- ✓ Single/double test chambers
- ✓ Rotary tables with dual/fourfold test cells
- ✓ Test cage with vertical/horizontal door locking
- ✓ Test cell with cat. IV light barrier
- ✓ Test hood for laser protection class 1
- ✓ Controllable automated chambers, e.g., for conveyor belts
- ✓ Accessible test cage



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