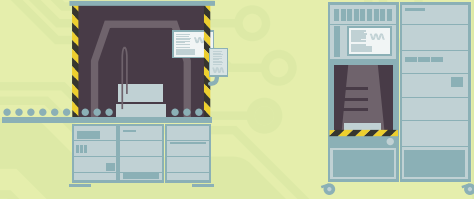




## Test Systems



Power and More

## 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.



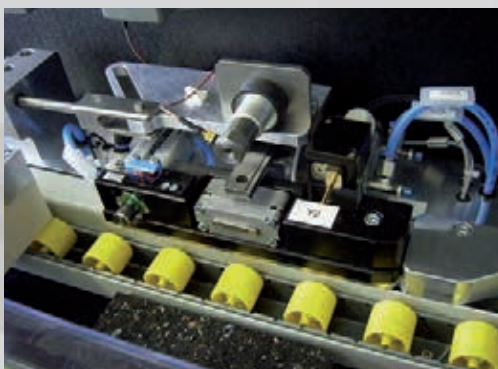
### ► Software

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



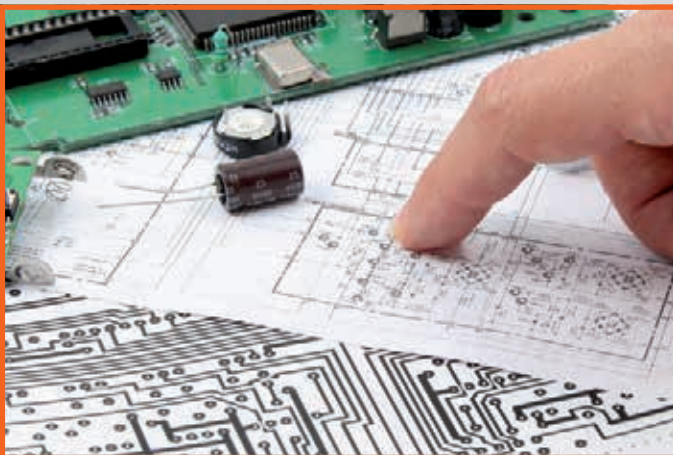
Individual configuration with test equipment from leading suppliers. Retrofits and modernisation are possible.

- ▶ 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



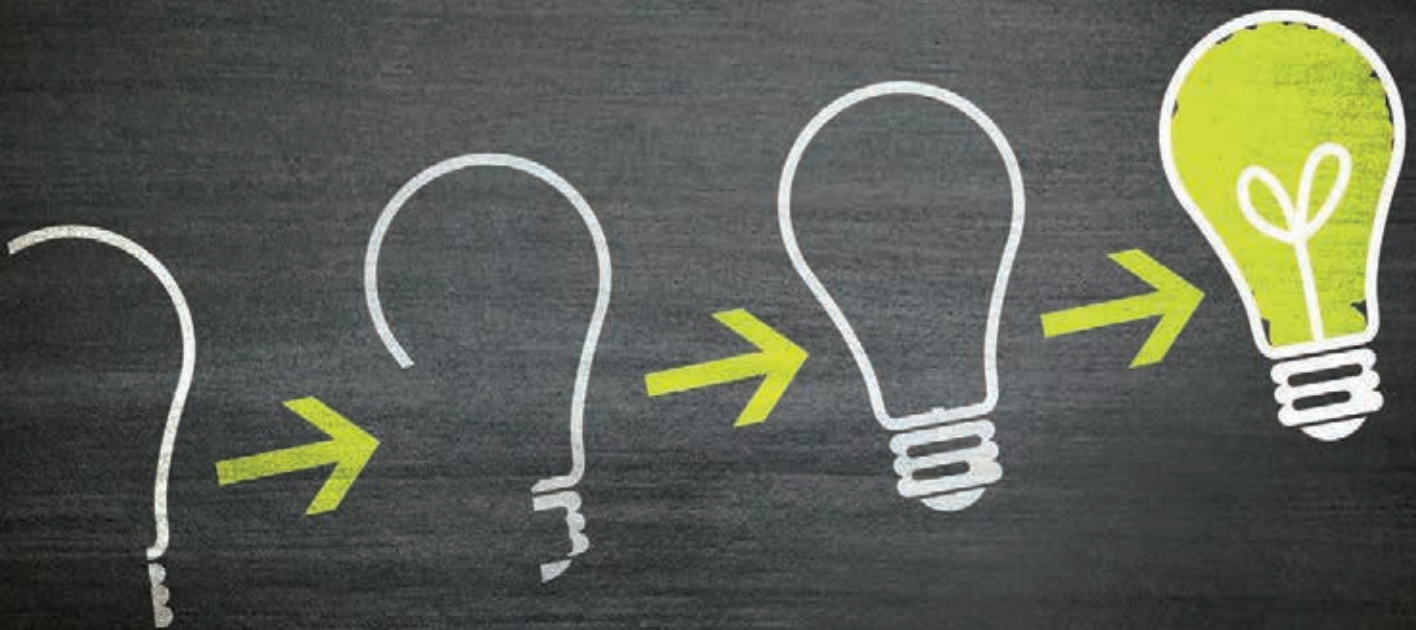
## Advantages

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.

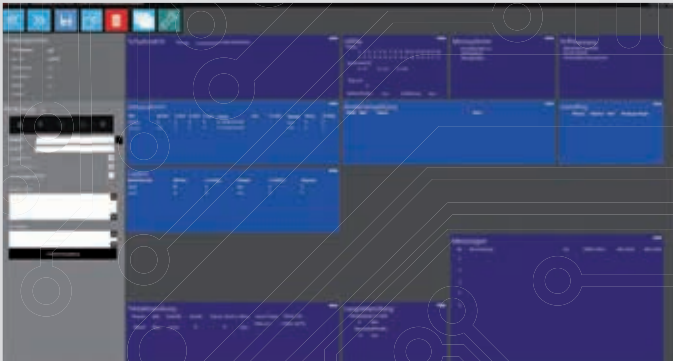
Test schedules can be created with any number of test steps. The test sequence can be freely programmed as well as parameters, limit values, durations and other properties of the individual test steps. The presentation of images, graphics, instructions, technical documents etc. on the monitor can be 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

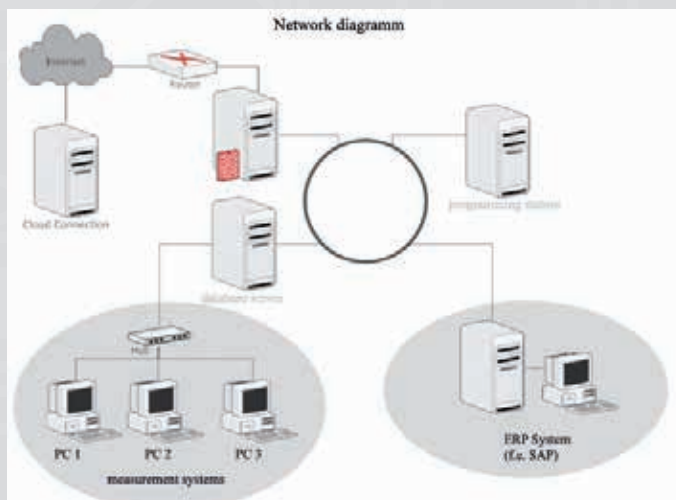
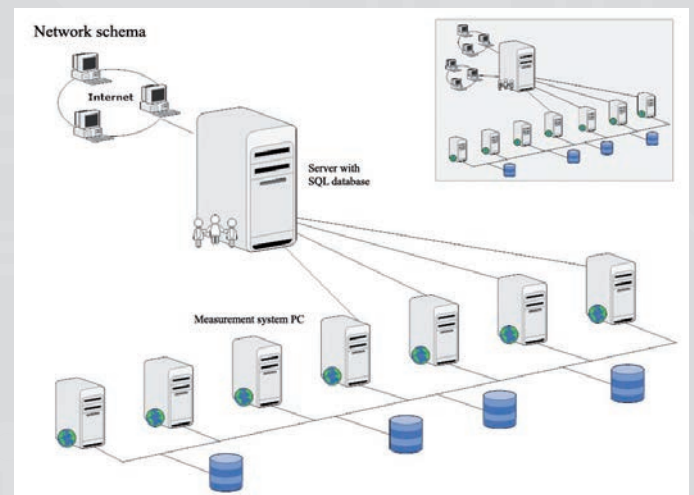


### Flexible test programme creation

- ▶ 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®

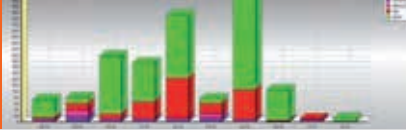
### Networking

- ▶ 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



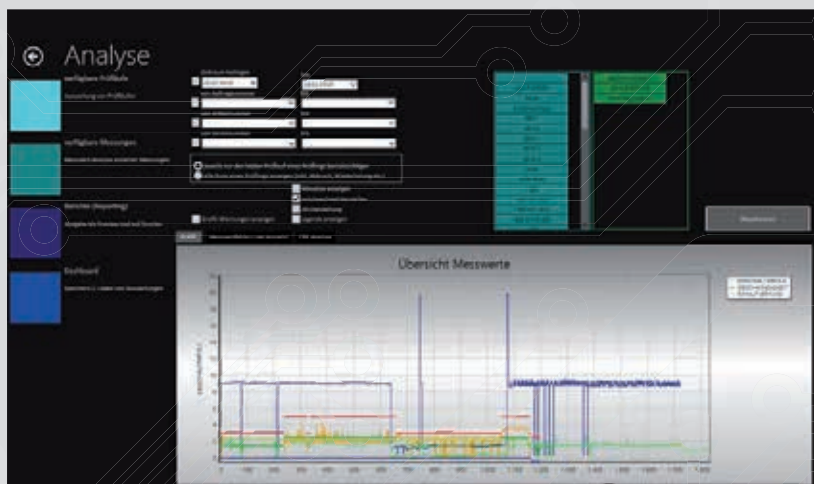
### Modern SQL database

- ▶ 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

### Test system for drum motors



- ▶ 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

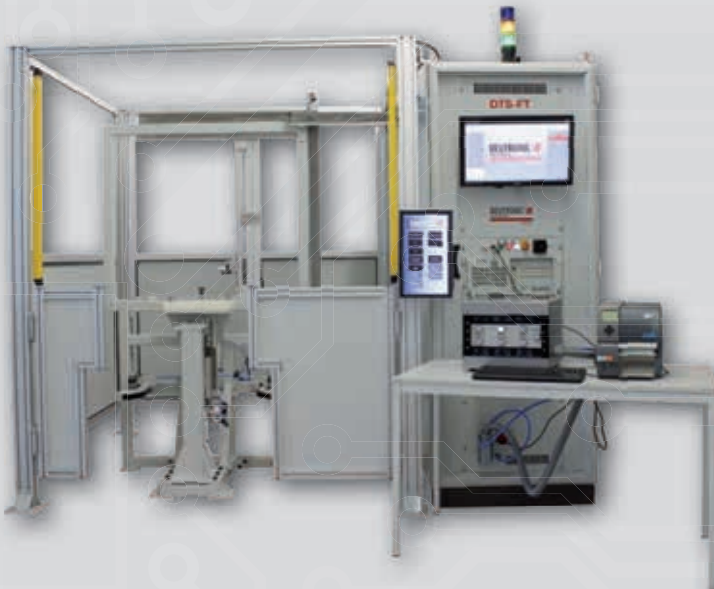
Drum motors must withstand highest electrical and physical loads. This requires thorough quality control at end of production.

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



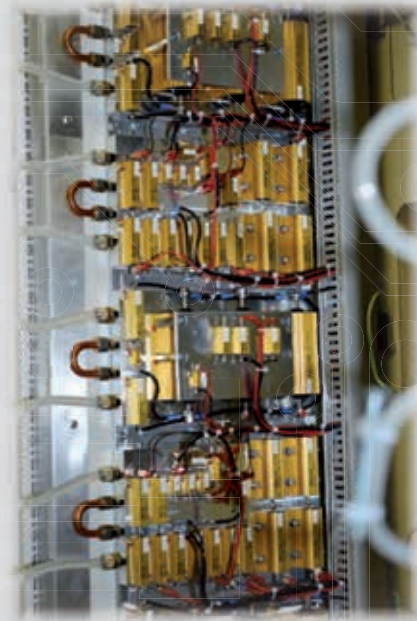
- ▶ Automated adaptation with leak-tight connection from test object to test unit
- ▶ Leakage detection
- ▶ Flow calibration
- ▶ Programming of the mass flow sensor via CanBus interface

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.

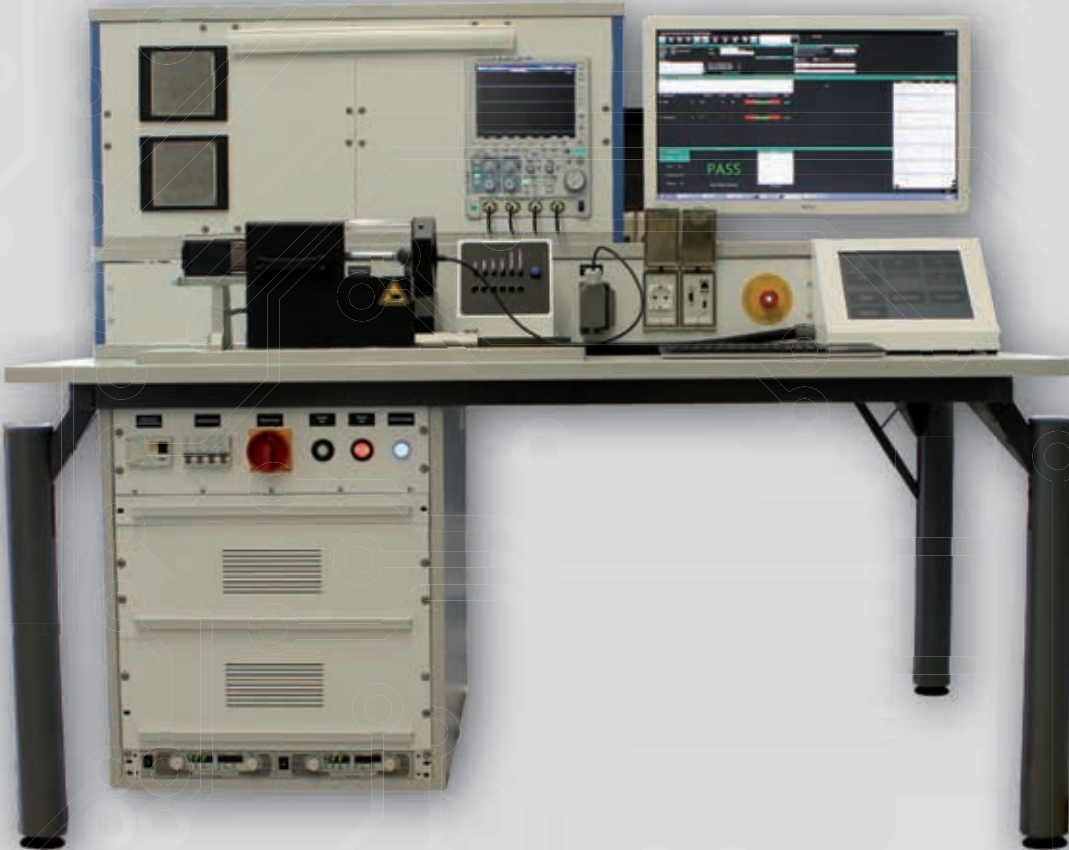
In addition to a significant test time reduction, Deutronic test systems for transformers and chokes offer a consistently high test reliability due to a freely programmable switch matrix.

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.

## T est 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.

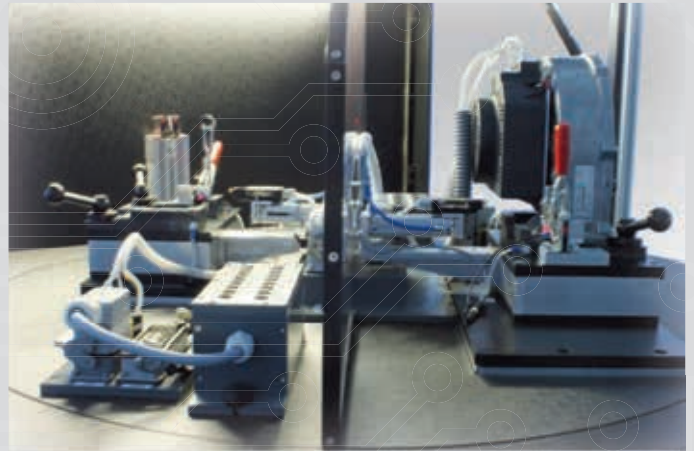
The shown system is a fully automated and fully integrated inline test system. The engine production line comprises assembly and test stations, where different test tasks are completed.



## 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



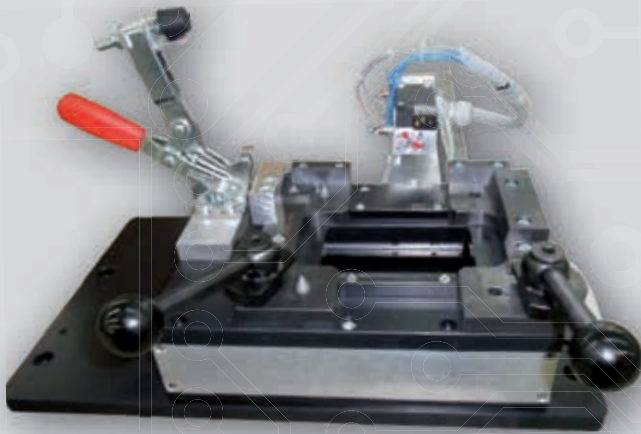
Design with light curtain



## Accessories

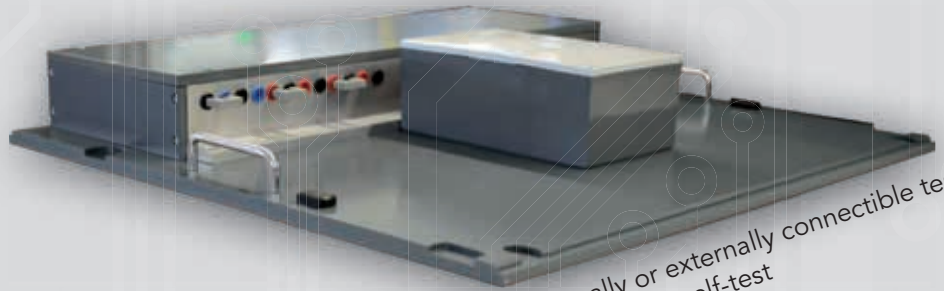
### Customer-specific test adapter

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



### Customer-specific test dummies

- ▶ 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

## Information

Deutronic supplies the industry with technologically leading solutions. As expert for power electronics, Deutronic develops innovative products, systems and services with outstanding added value in the following areas: Battery chargers, test and measurement systems, power supplies and DC/DC converters.



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