HIGH VOLT

Test with the best.®

9.50/1 DiTAS

DiTAS – TEST SYSTEM FOR DISTRIBUTION TRANSFORMERS

- Routine tests
- Type tests
- Special tests

DISTRIBUTION TRANSFORMER TEST SYSTEM

Fig. 1 **Fully automated control system and frequency converter**

Fig. 2 **Example showing the practical implementation of a customer-specific automatic switching system with height adjustment**

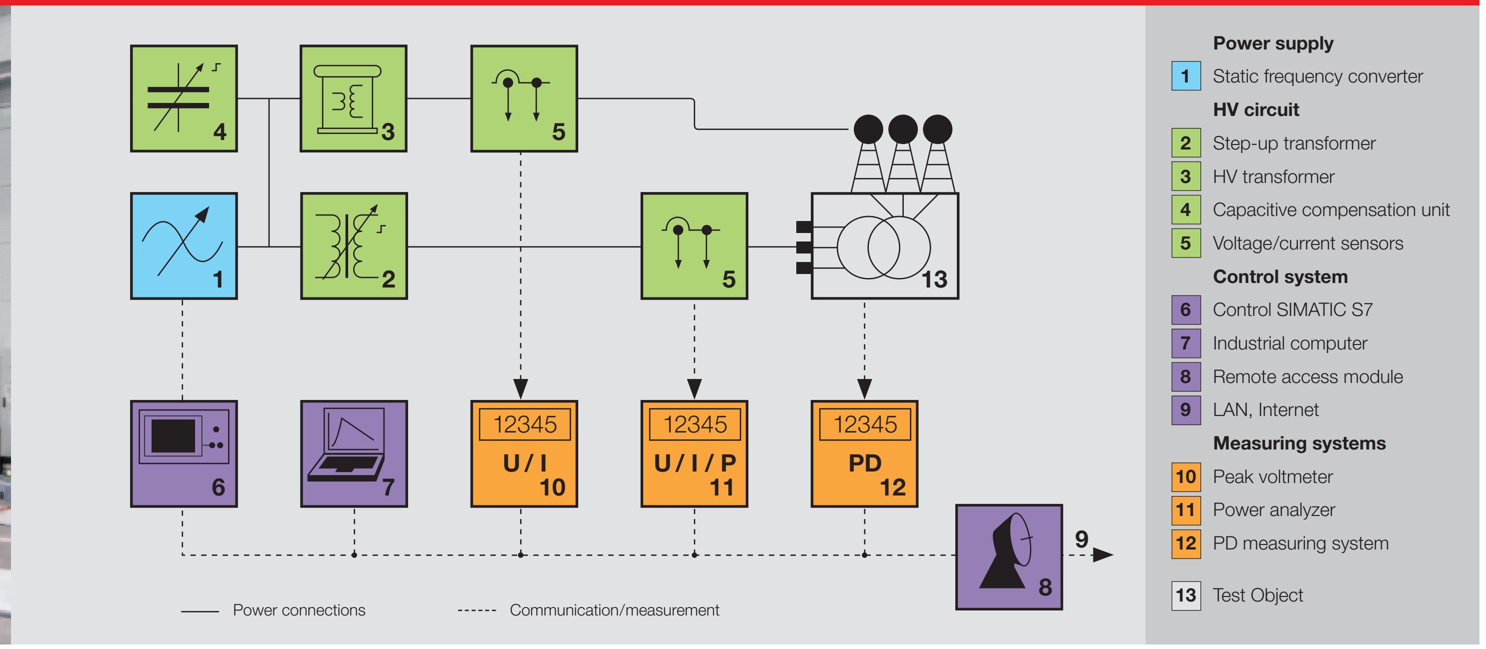

Fig. 3 **Block diagram for factory testing of transformers**

OVERVIEW

System

The test system DiTAS has been developed to meet the special requirements of distribution transformer testing. It enables to perform all high-voltage routine tests and type tests in accordance with IEC 60076 and other international standards. One particular advantage of the test system is its automatic operating mode, in which all of the internal settings are pre-selected on the basis of the corresponding test data set.

Power loss measurement

The system includes a high-precision power loss measurement system, which is fully integrated in the control of the system. In addition to the measurement of active power and apparent power, it is also used for the precise regulation of the electrical output parameters.

Control System

For the performance of individual tests, the state-of-the-art control system offers an intuitive operator interface with step-by-step instructions to support the test personnel. Once the transformer under test has been identified, the control program determines all of the relevant test data from an internal database, and then carries out the entire saved test sequence before generating the test report as the last step. The test report can be easily customized to suit the individual requirements of the customer and end user.

Upgrade for fully automatic testing

By upgrading the test system with a motorized switching system, it is also possible to carry out the entire routine test sequence fully automatically in just a few minutes. After the unit under test has been connected, the required test circuits are automatically set up by the system.

Customization

The DiTAS test system can be tailored to specific requirements, including the test setup, the test sequence, and the production environment. Optionally, it is also possible to take into account special ambient conditions and outdoor application.

BENEFITS

- MEETS ALL REQUIREMENTS FOR INTERNATIONAL STANDARDS
- INTUITIVE AND ERGONOMIC CONTROL SYSTEM
- TEST SYSTEM CAN BE CUSTOMIZED TO SUIT SPECIAL REQUIREMENTS
- SHORT TEST DURATIONS DUE TO FULLY AUTOMATED SYSTEM SETTINGS AND ADJUSTMENTS
- COMPLETE INTEGRATION OF THE TEST SYSTEM IN THE PRODUCTION PROCESS

APPLICATIONS

Routine Tests

1) Pretest with stand-alone low-power devices for measuring DC-resistance of windings, insulation resistance, winding ratio and vector group.
2) Separate source AC withstand voltage test on the high- and low-voltage windings are performed with a single-phase test voltage at 50/60 Hz, which is generated in a separate high-voltage transformer.
3) Induced AC voltage tests for testing the insulation of the windings with a frequency of ≥ 100 Hz. By measuring the partial discharge level it is possible to detect even the smallest faults in the insulation.
4) Measurement of no-load loss and current is performed with the integrated power loss measurement system. The measurement is performed at the nominal voltage and nominal frequency of the unit under test.
5) Measurement of short-circuit impedance and load loss is performed at the nominal current of the unit under test. For this test, the test system operates in constant current mode and automatically regulates the current to the defined set point current.

Type Tests

6) During the temperature-rise test, the power loss to be converted in the unit under test is set directly as a set point value that corresponds to the sum total of load losses and no-load losses.
7) Lightning impulse test (IEC 60076-3) with additional impulse generator.

- THD BELOW 5 %
- PD LEVEL BELOW 10 pC

FUNCTIONAL PRINCIPLE

The static frequency converter (1) serves as the central power supply for the test system. The output voltage is adjusted to the levels required for the different tests via a step-up transformer (2) with automatic switching between output levels. Compensation for the required inductive reactive power is provided by a capacitive compensation unit (4), which operates automatically. The test voltage, the test current and the power loss sustained in the unit under test (13) are measured by an integrated power loss measurement system (11). This measurement system incorporates precise voltage and current sensors as well as central signal processing with fully-automated correction of amplitude and phase errors. Further physical variables can be measured by adding external measuring devices (12) to the system. A separate high-voltage transformer (3) with a corresponding measuring device (10) is used for applied voltage tests. The control system is divided into a basic graphical user interface (6) and an optional PC control interface (7). A specialized database takes care of bringing together, saving and managing all the obtained measurement data. After the test has been performed, it is possible to generate an individually customized test report. In addition, it is also possible to analyze the measurement data for quality assurance purposes over a freely selectable time period.

- COMPACT AND MODULAR DESIGN ALLOWING FUTURE EXPANSION
- FREQUENCY CONVERTER 40-200 Hz FOR THE SUPPLY OF AN ENTIRE TEST RUN THROUGH ONE POWER SOURCE

AUTOMATION OF THE TEST

REDUCING THE TEST TIME FOR ROUTINE TESTS

By equipping the test field with motorized disconnecting switches, which enable automated switching between test circuits, it is possible to significantly reduce the overall time required for complete routine testing of distribution transformers. The unit under test only needs to be connected once – and no further setup work is required between the individual electrical tests, and there is no need for personnel to enter the test field again. The distribution transformer under test (9) in *fig. 4* is connected to the test system by flexible cables (8). All connections required for the individual routine tests between the high- and low-voltage sides of the unit under test and the step-up transformer (2), the high-voltage transformer (3) or the earthing are made using the motorized disconnecting switches (4). These switches have been specially developed for this application and are capable of achieving more than 100,000 switching cycles due to their exceptional mechanical and electrical reliability. In order to minimize the space requirements of the system and to keep the lengths of the connecting cables as short as possible, the disconnecting switches are installed on the roof of the test room (5) and are connected via bushings (6, 7) to the test room. Alternatively, an arrangement on a self-supporting frame above the test room is also possible, see *fig. 2.*

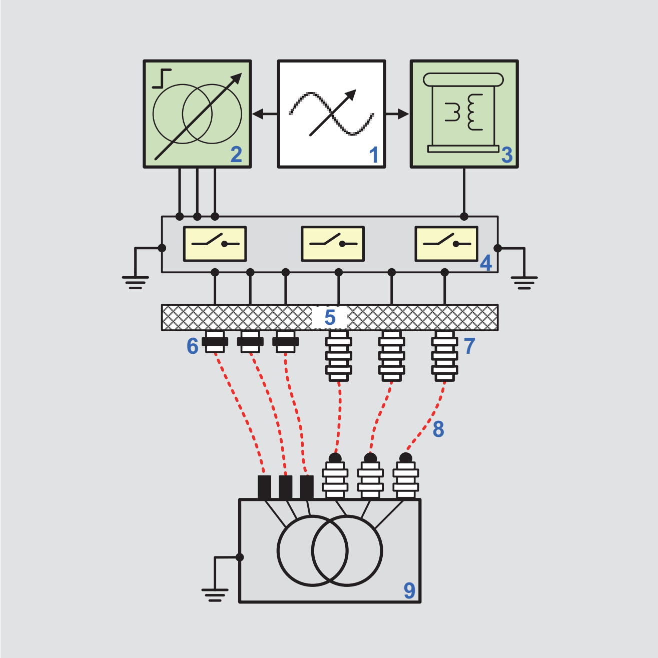

Fig. 4 **Schematic diagram of the automatic switching system**

Transformer to be tested		approx. 2.5 MVA	approx. 5 MVA
Range of hv winding	kV	3.6 to 36	3.6 to 52
Range of lv winding	V	200 to 1000	200 to 1000
Test system		MWV 80/20	MWV 170/500
Active power	kW	80	170
Apparent power	kVA	80	170
Reactive power (capacitive LV-compensation)	Kvar	250	500
Max. output voltage (routine test/separate source voltage)	kV	4.2/100	4.8/100

ADDITIONAL SERVICE

- Consultancy of cost-optimized test procedures (workflow, throughput, incl. pre-tests up to the transport preparations)
- Complete integration of the test system(s) in existing building structures
- 3D-modelling of the complete test field and building
- Planning support for new buildings and for reconditioning of existing buildings (e.g. overhead crane preparations, flooring for air cushion transport etc.)
- Customized shielding and earthing concepts
- Development of customized safety concept
- Adjustments to the test system for testing of special transformers
- Customization of the control system and the data management (database)

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