TESSA®
SUBSTATION CONDITION
MONITORING
ASSET MANAGEMENT TOOL –
SMART AND SECURE.
THE TOOL FOR INTELLIGENT MAINTENANCE AND REPAIR PLANNING.
The growing amount of equipment and ever-increasing technical requirements are presenting asset managers with greater challenges. To maintain existing equipment efficiently, the correct measures (investments, maintenance, service) must be taken. The decision-making process is often impaired by unplanned outages, increasing expected useful life of the equipment and loss of expertise.

TESSA® monitors all transformers and equipment in real time and visualizes all relevant information for you. Whether you’re dealing with one transformer or an entire fleet, all data required for ideal status assessment is displayed clearly and precisely. Important information such as the oil status or the utilization of individual transformers is displayed centrally. In the event of a critical incident, the system can send you a warning by e-mail or text message. This allows for quick troubleshooting in an emergency.

But TESSA® also detects gradual changes reliably and indicates them on the integrated trend display in a timely manner. All recorded and analyzed data is saved for trend evaluation and archiving.

TESSA® supports asset managers in their responsibilities to ensure the long-term availability of equipment and to develop intelligent maintenance and repair planning.
TESSA® SUBSTATION CONDITION MONITORING.
Clear transformer overview
Illustration of trends and events
Warnings via text message and e-mail
Provision of maintenance recommendations

TESSA® substation condition monitoring
GETTING A RELIABLE OVERVIEW: TESSA®.

The core of network management is maximum reliability and availability of equipment. TESSA® helps you make this happen. Our innovative substation condition monitoring system promptly notifies you if and when you have to take action.

The primary task of a control system is the transmission of information regarding network condition, counter values and measured values. This involves sending messages to a central control center where they are processed. In the other direction, the control center sends control and adjustment commands to the process. The objective is the determination and configuration of an optimal network state by the network operation manager. Every disruption must be identified and eliminated as quickly as possible. The control system simply sends a snapshot of the state of the network and equipment.

TESSA® provides support for the long-term condition assessment of equipment. It collects and saves data. Data from field-level monitoring devices, e.g. the DGA sensor on the transformer, is recorded for evaluation and analyzed together with the operating data from the control system. The comprehensive analysis functions make it possible to provide long-term reliability determinations with regard to both the current condition of the equipment and trends over time.

Clear information for the asset manager

- Level-based map display
- Display of the events and warnings that have occurred in relation to the particular equipment
- Various analysis options for the recorded data
- Clear overview of all maintenance-related information
- Document management and assignment to the particular equipment, access via tablet or cell phone including simple upload/download function, document display directly in the web browser
- Predefined limit values and priorities, operator configurable, user management

TESSA® menu
At delivery, TESSA® is preconfigured for the equipment to be monitored. The system can be expanded for monitoring additional equipment at a later time as long as the equipment supports communication over standard control system protocols. The usability of the TESSA® monitoring and analysis functions depends on existing sensors and available measured values.

**General**
- Graphical overview of the substation and equipment with green/yellow/red collective alarm status
- Detailed status overview for individual equipment and components
- Maintenance planning for individual equipment
- Event overview for each level (from complete overview to individual equipment)
- Flexible trend analysis with evaluation of up to 8 measured values
- Creation of individual reports from the recorded data (.xls, .pdf) including graphs and diagrams

**Transformer monitoring**
- Voltage, load current, frequency, load factor
- Active, reactive and apparent power
- Temperatures, e.g. ambient, topoil, transformer hot-spot
- Aging rate and lifetime consumption
- Status of protective devices, e.g. Buchholz relay
- Transformer oil level

**Tap changer monitoring**
- Signals from the motor-drive-unit motor protective switch, motor running, door contact
- On-load tap-changer tap-position and operation statistics
  - Number of tap-change operations per level
  - Operating time per level
- Status of protective devices, e.g. Buchholz relay, RS2001
- On-load tap-changer temperature
- On-load tap-changer oil level
- Service instructions, contact wear, oil carbonization, oil filter monitoring for OILTAP®

**DGA analysis**
- Visualization of the present measured values of up to 9 corrosive gases, relative moisture in oil and relative overall gas content
- Curve display of the measured values
- Alarm limit values which are configurable for each gas
- Feedback methods based on Duval, Rogers and Dörnenburg

**Switchgear monitoring**
- Separator status (open/closed)
- Circuit breaker status (open/closed) and measured values such as SF6 gas pressure and temperature
- Voltage- and current-transformer status and measured values such as SF6 gas pressure and temperature
- Overvoltage protection status, measured values such as leakage current and operation counter

**Bushing monitoring**
- Display of the calculated capacity and tangent delta
- Configuration of limit values for event handling and alarms

**Data management**
- Central database
- Long-term event and measured-value memory
- Document manager for data storage in a variety of file formats (.pdf, .xls, .csv, .txt, .jpg, .png) for archiving service reports, tests, analysis reports and data sheets assigned to equipment

**User roles/security**
- Integrated user authorization and role-based user administration in accordance with BDEW/NERC
- Password protection with various user levels

**Communication protocol**
- IEC61850
- DNP3.0
- Modbus TCP/IP
- IEC60870-5-104
- OPC UA

**System language and visualization**
- English and German (optional: Spanish, French, Portuguese, more on request)
INTEGRATION AND COMMUNICATION.

Three different hosting options are available for the TESSA® substation condition monitoring system:
- Delivery of an industrial PC with installed and preconfigured software (on-premise solution)
- Use of your existing server (on-premise solution)
- Use of our MR server as a cloud solution in accordance with the latest security standards (cloud solution)

Parts of the existing network infrastructure can be used to integrate field devices and sensors. In the event that existing communication channels are not available for the system, a parallel communication route can be established (including wirelessly or over PLC if necessary). This can be the case if existing networks are reserved purely for operating the control system.

If desired, a time server can be integrated so that the time on all connected field devices can be synchronized.

Existing (non-proprietary) monitoring systems and intelligent sensors can be integrated into TESSA®. In order to deliver the necessary input data for monitoring and analysis functions, sensors are retrofitted onto the equipment as needed.
From initial assessment to training of your personnel to subsequent expansion - our experts are at your disposal during every step of your project and even beyond.

TURN-KEY SOLUTIONS FROM MR.

MR modules in fleet management

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The challenge

At the power plant, there are 5 machine transformers, 3 external network transformers and 2 auxiliary power transformers in operation. These were already monitored to some extent at the time of inventorying and were connected to two control systems running separately. Sensors and monitoring systems from several manufacturers were in use with different communication standards. This meant there was no uniform data structure or storage and, as a result, centralized data analysis was not possible.

The MR solution

The MR TRAFOGUARD® ISM® transformer monitoring system was retrofitted onto the transformers. All condition-related data from available systems was then integrated into TESSA®. The cooling system monitoring data from the control system was transferred using IEC 104. The data from DGA sensors, tap changer monitoring and transformer monitoring was transmitted using IEC 61850. Currents, voltages and temperatures were integrated using OPC.

The customer benefits

Thanks to TESSA®, all equipment can now be monitored from a single computer and centralized data storage is possible. The clear overview of this data and the resulting evaluation possibilities simplify the planning of maintenance and service calls for the transformers. Critical trends can be identified and remedied at an early stage, before damage to the transformers causes very costly downtime for the power plant.
MORE POWER,
MORE VALUE.

The system for monitoring substation transformers and equipment in real-time.

Maximum operational reliability
- Automated monitoring of all equipment in real-time, 24 hours a day, 7 days a week
- Central database with trend monitoring and equipment comparison
- Enables a maintenance strategy based on knowledge and actual condition
- Guarantees a detailed analysis in the event of a malfunction
- Increases equipment service life
- Errors slowly creeping up are detected before they can cause a disruption
- Automated service notification (24/7)
- Active asset-management support

Reduction in life-cycle costs
- Cost-effective elimination of defects at an early stage rather than costly repairs after the fact
- Savings with regard to service activities thanks to factors such as extended maintenance intervals and reduced need for system inspections
- Increase in equipment service life

Easy integration
- Existing communication structure and devices can be used
- Optional connection and analysis of information provided by the control system
- Integrated document management and archiving