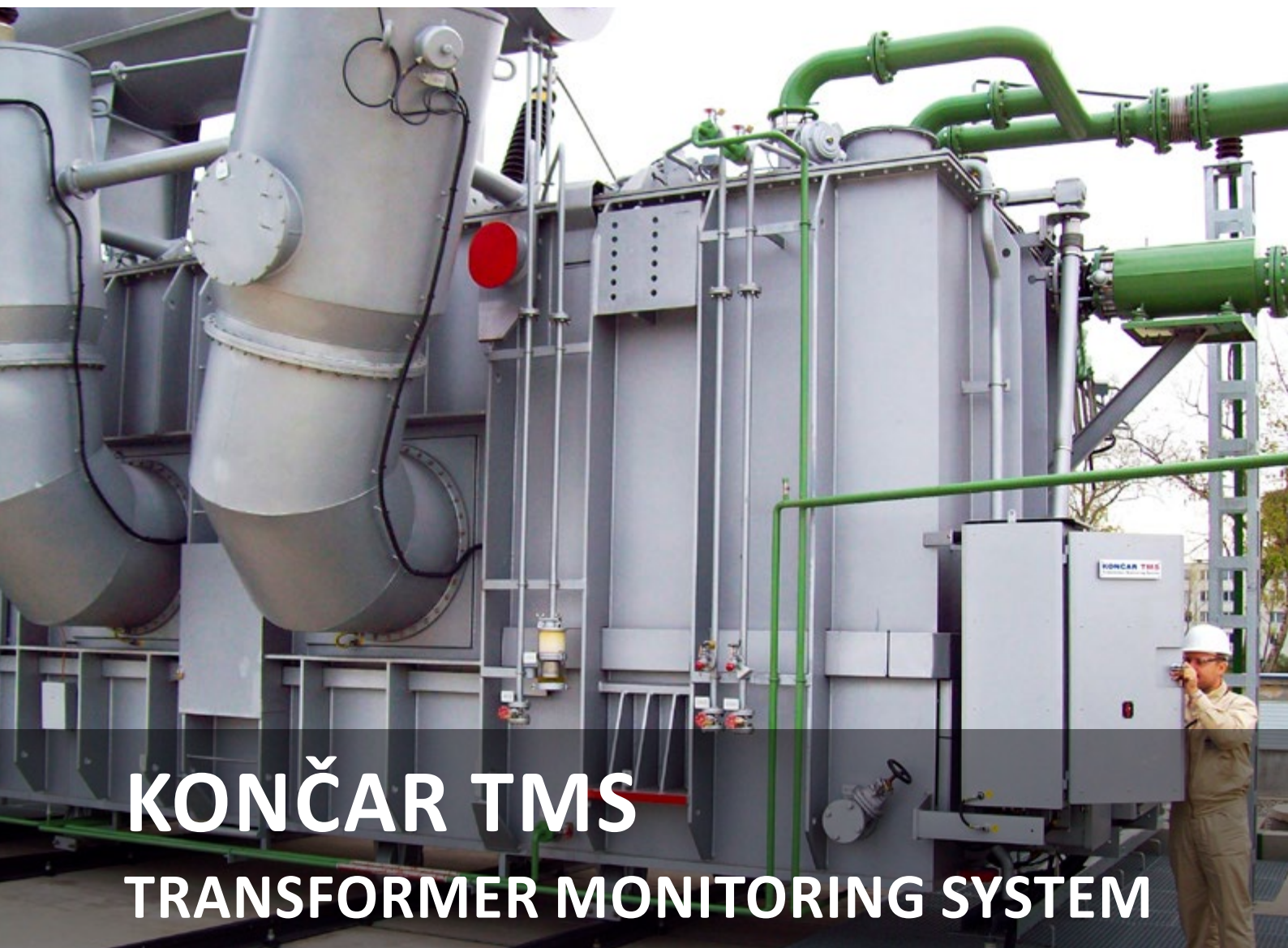


tradition. knowledge. responsibility.



# KONČAR TMS

## TRANSFORMER MONITORING SYSTEM

## Overview

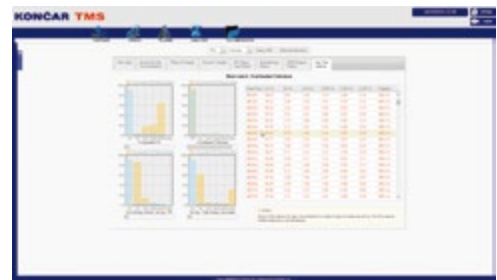
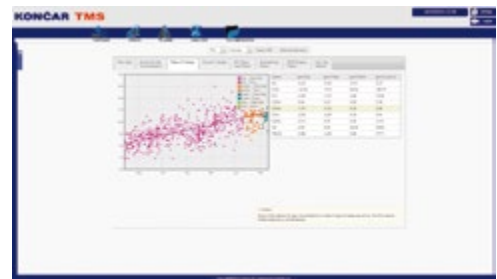
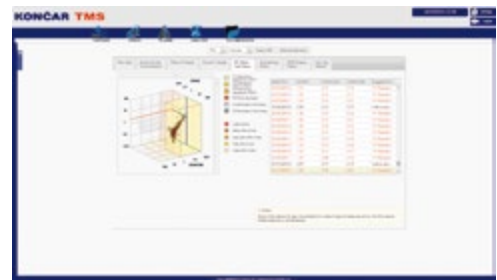
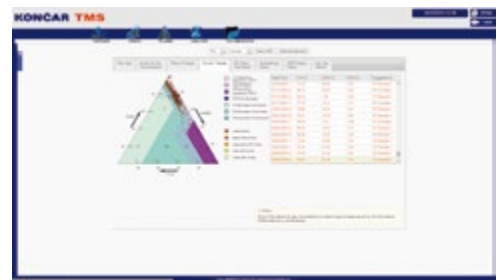


Transformers are one of the key and most valuable components in a power system. Equipping them with an on-line monitoring system is essential for information gathering, condition assessment, better management and decision making.

Decades of experience in transformer design, production and on-site diagnostics as well as a field-proven hardware platform are built into Končar TMS – a state-of-the-art monitoring and diagnostic system.

## Features

- » Comprehensive on-line monitoring system for all types of power transformers and shunt reactors
- » Modular and expandable system for a new or an existing transformer (retrofitting), open to any transformer manufacturer
- » Provides monitoring and diagnostic for all vital transformer parts by integrating the available sensors and supporting various IED communication protocols
- » Built-in models for transformer condition assessment (bushings, thermal model, insulation ageing, cooling efficiency, OLTC)
- » Advanced trending analysis tools
- » Interpretation methods of fault gas analysis according to the relevant IEC and IEEE standards
- » User defined alarm limit and gradient setting
- » Long term archival of data and event logging
- » Periodic automatic report generation
- » Various remote access options



## Benefits

- » Detects incipient faults and assists in preventing failures and unplanned outages
- » Enables the condition based maintenance
- » Improves staff safety and environmental protection
- » Provides valuable data for a root cause analysis and an investigation in case of a failure event
- » Helps in optimizing transformer performance and enables better asset management (overloading, lifetime expectancy estimations)
- » Makes your transformer ready for the 'Smart Grid'

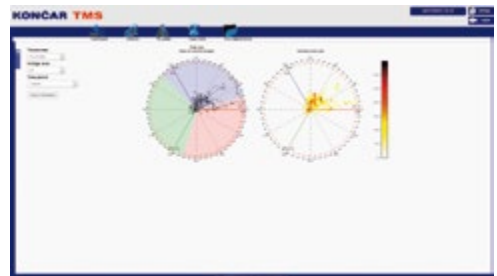


## Monitoring functions

Due to modularity any of the following functions may be included in the system:

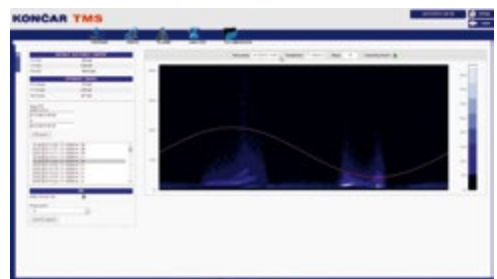
### Bushings

- » Operating voltages
- » Overvoltages
- » Change of bushing capacitance
- » Tan delta /power factor
- » Loading current (single or three phase)



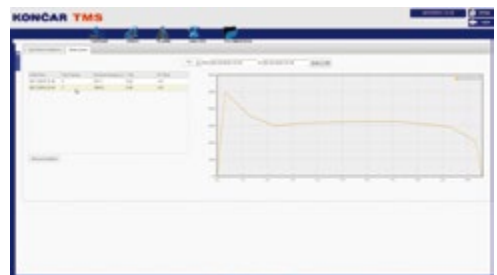
### Active part

- » Power (apparent, active, reactive)
- » Losses
- » Oil temperature (top, bottom)
- » Ambient temperature
- » Hot-spot temperature (calculation or fiber optic measurement)
- » Gas in oil (single or multi gas sensors)
- » Moisture in oil and paper
- » Paper insulation ageing and lifetime



### Partial discharges

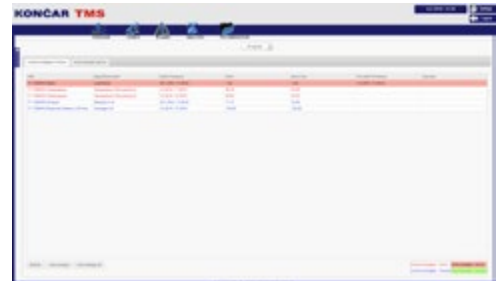
- » Electrical, acoustic and UHF methods available





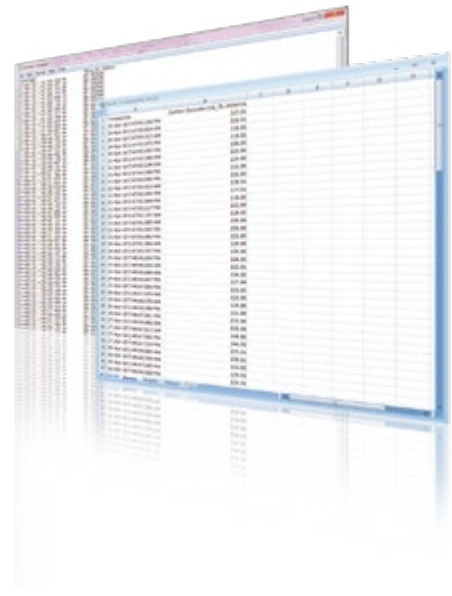
### On-Load Tap Changer

- » Tap position
- » Number of switching operations
- » Switching time
- » Power consumption of the OLTC motor drive
- » OLTC oil temperature and differential
- » Sum of switched current
- » Contact wear



### Cooling system

- » Oil temperatures at the cooler inlets and outlets
- » Cooling efficiency
- » Running hours of pumps and fans
- » Content of gas in the Buchholz relay
- » Oil level in the conservator
- » Intelligent cooling control
- » Auxiliary equipment statuses and alarms (pressure relief device, OTI, WTI, Buchholz relay, etc.)

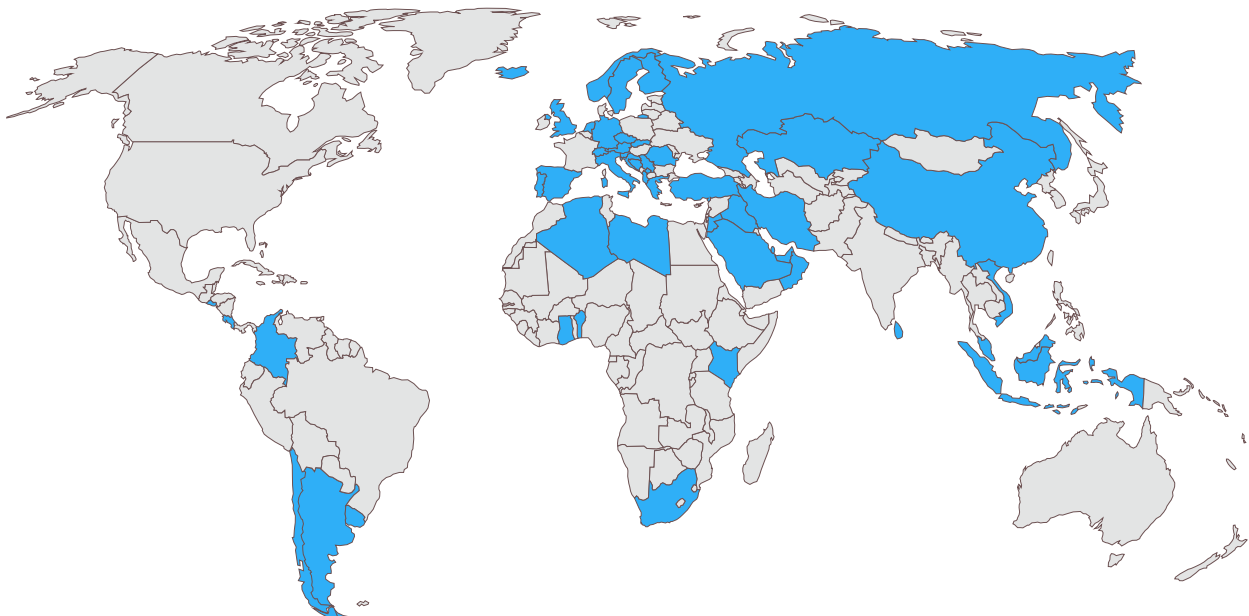


### Tools

- » Trend analysis
- » Alarms and events logging
- » Loading forecast
- » Data export to text and Microsoft Excel
- » Automatic report generation

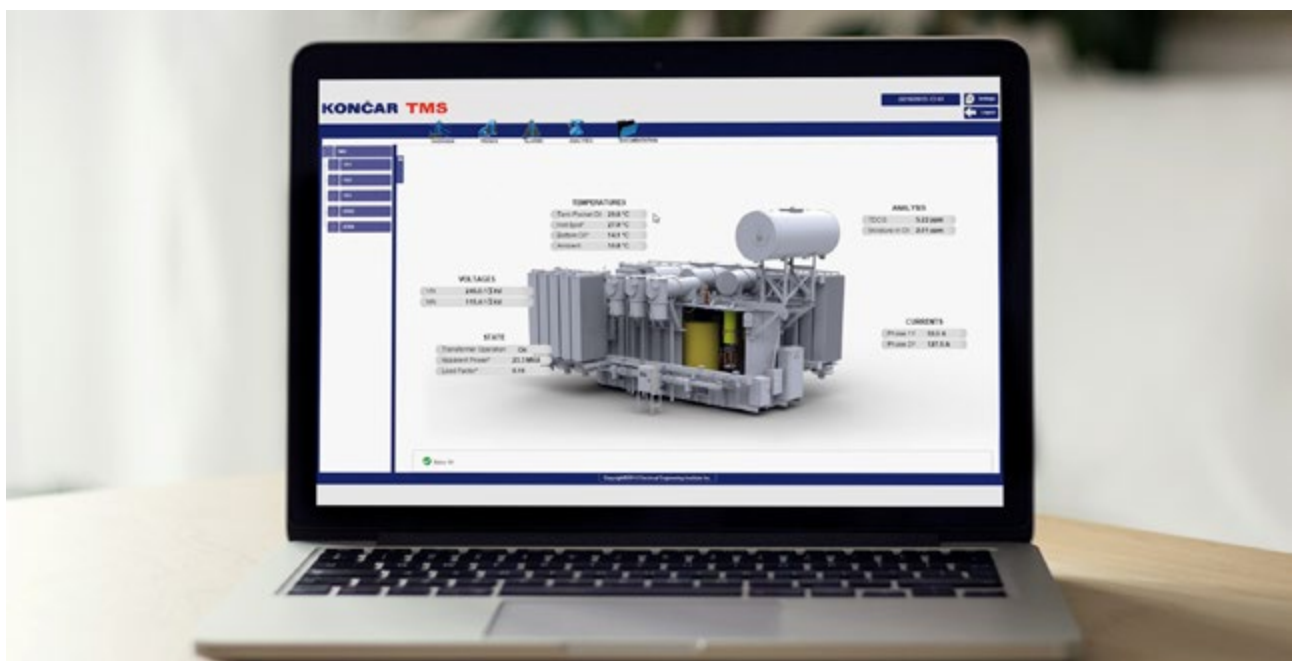
## Services

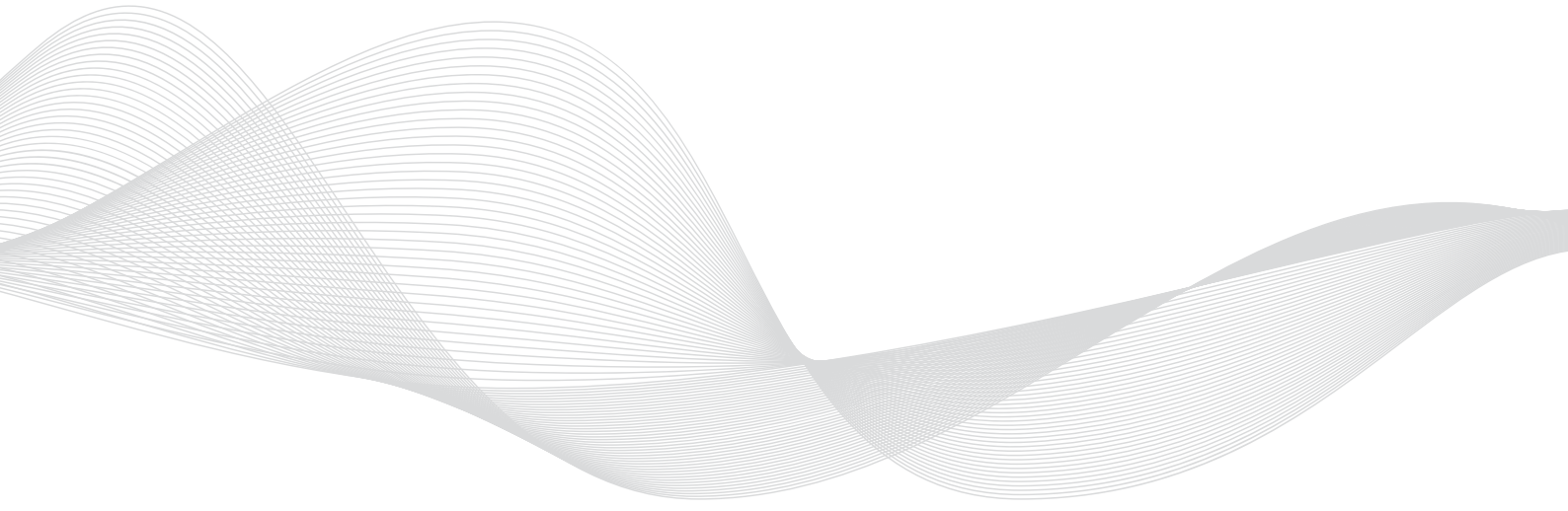
- » Consulting services on how to select the optimal condition monitoring system for a new or an old transformer
- » Installation and commissioning
- » Staff training
- » Recommendation of limit values (alarms) settings
- » Expertise in interpretation of the acquired monitoring results



# Monitoring System Specification

Architecture	Data acquisition unit with the real-time controller installed on the transformer and Industrial PC installed in the control/telecom room
Inputs and outputs	DC analog inputs: 4-20 mA; 0-10 V DC AC analog inputs (CT): 0-1/5 A RTD inputs: Pt-100 Digital inputs: dry contacts with 24V wetting Analog outputs: 4-20 mA Digital outputs: potential free contacts (SPDT relays) Quantity: as per requirement All channels protected from overvoltages and overcurrents
Data logging	SQL database used for long-term data, alarms and events archival Event driven data acquisition results in a reduced database size
Data visualization	Web browser or client application for local and remote access
Communication	Physical layer: RS-232, Ethernet 10/100, Fiber optic
Supported protocols	IEC 61850; IEC 60870-5-101 and 104; Modbus; OPC
Power supply	Universal switching power supply Voltage: 85 V AC - 264 V AC, single phase Frequency: 45 – 65 Hz
Cabinet	Material: Painted stainless steel (color selection per RAL scale) Rating: IP66 (standard) IP68 (on request). Mounting: on a tank wall or a stand
Operating temperature	-40 to +60°C
Standards compliance	EMC Directive 2004/108/EC and standards: EN 61000-6-2:2005; EN 61000-6-4:2007; EN 61000-3-2:2006; EN 61000-3-3:2008 LVD Directive 2006/95/EC and standards: EN 60950-1:2006+A11:2009





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