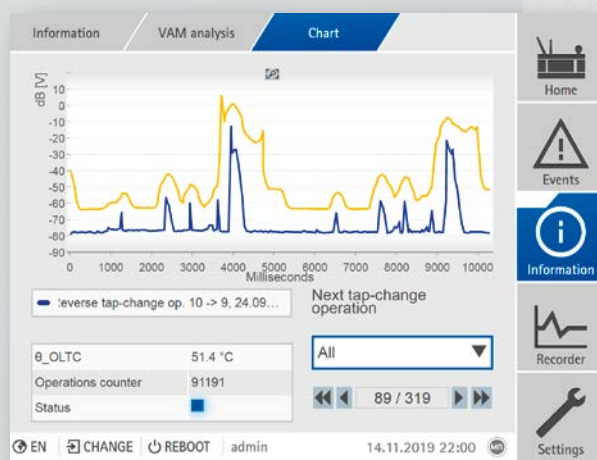




MSENSE[®] VAM ONLINE OLTC MONITORING.

WWW.REINHAUSEN.COM



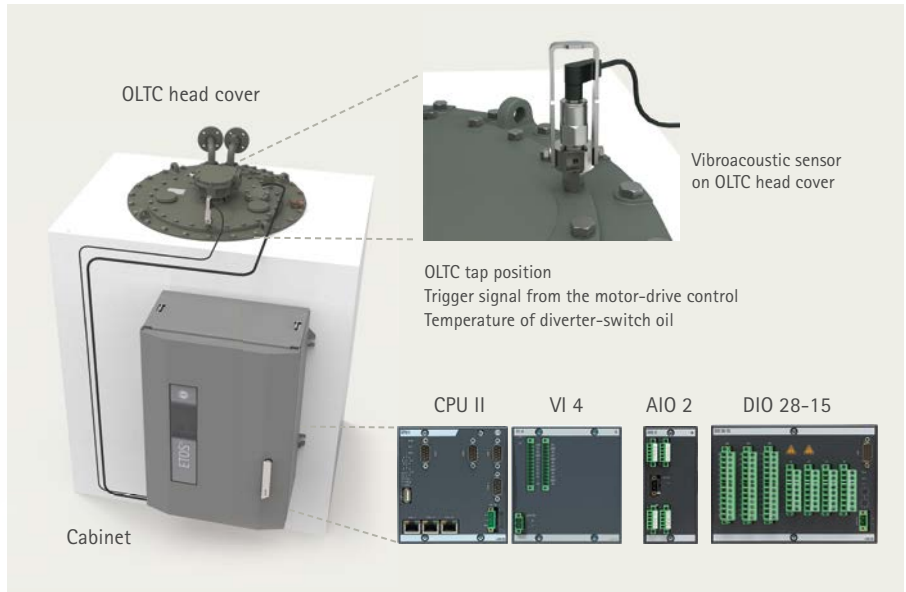
UNIQUE DIAGNOSTICS TECHNOLOGY. ENGINEERED BY MR.

Vibroacoustic measurement detects operating-time deviations and mechanical inconsistencies of OLTCs.

Open for all types of OLTC

On-load tap-changers are among the most important and critical components of power transformers. It is therefore crucial for grid operators to be able to ascertain their condition at any time. Based on our experience from over 20 years of tap-changer monitoring, we have developed a unique online diagnostic tool: MSENSE® VAM. VAM stands for vibro-acoustic measurement and this device can be used universally for all types and brands of OLTC.

The basis of MSENSE® VAM is a vibro-acoustic measurement system with high resolution which analyzes vibrations generated during the switching sequence of an OLTC. Using various mathematical methods, envelope curves are generated from the time-frequency spectra emitted during the switching sequence. These envelope curves are then evaluated with the help of a dynamic, limit-value curve which uses a self-learning algorithm






to more closely approximate the envelope curve with every switching sequence.

The measurement makes it possible to recognize operating-time deviations and mechanical inconsistencies that affect the tap-change switching sequence.

Good to know

Our service goes even one step further. Our VAM ANALYSIS SERVICE offers a detailed report with recommendations and actions.

MSENSE® VAM models: Choose the optimum design, as new product or as retrofit solution

Design for vibroacoustic monitoring	Stand alone	Combined with other MR solutions
ETOS® IM modules 	Installation in customer control cabinet	Installation with further ETOS® IM modules in customer control cabinets
ETOS® cabinet 	Installation in MR cabinet	Installation in the ETOS® cabinet for integrated system solution
ETOS® ED ETOS® TD 		Integration in motor drive ETOS® ED: classic drive technology ETOS® TD: innovative head drive

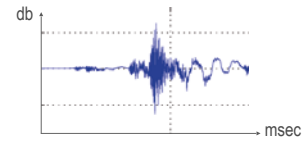
MSENSE® VAM: Monitoring procedure

1

Signal recording: Vibroacoustic sensor

- Recording of vibrations during the switching process by vibroacoustic sensor on the OLTC head cover

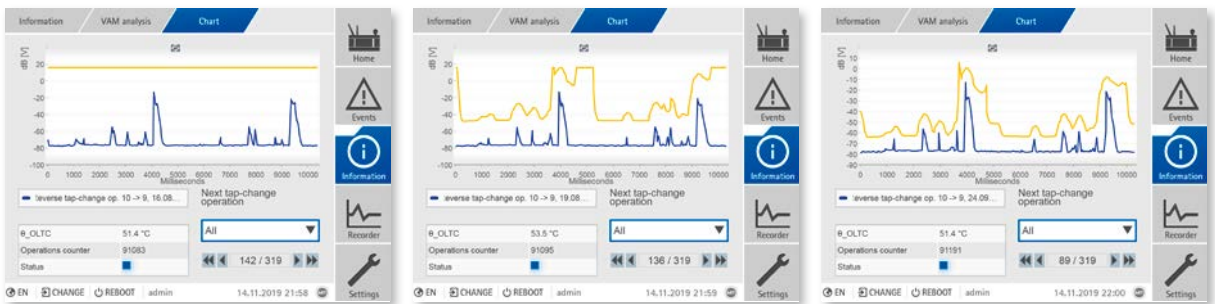
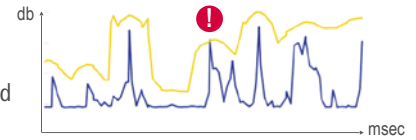
Autonomous online function



2

Signal evaluation and early warning

- Creation of an envelope curve using multi-stage mathematical operations
- Adjustment with self-learned limit value curve, event message when exceeded



Autonomous generation of a limit-value curve using a self-learning algorithm

- Learning phase approx. 10 switching operations per switching type, usually learned after 1 day
- Continuously narrowing tolerance band
- Works for every transformer and on-load tap-changer!

Event message when limit value is exceeded

3

VAM ANALYSIS SERVICE

Cause analysis and recommendations for action by MR

- Data transfer to MR via MR customer portal (<https://portal.reinhausen.com>)
- Detailed analysis, interpretation and recommendations for action by MR experts



Optional VAM ANALYSIS SERVICE by MR



MORE POWER, MORE VALUE.

MSENSE® VAM ensures that your on-load tap-changers reliably remain in operation.



Carried out quickly

- Self-learning algorithm with gradual narrowing of the limit values
- For all OLTCs and easily retrofittable



Recording of the vibroacoustic signal during OLTC switching

- Automatic triggering
- Subsequent classification in circuit switching clusters (depending on step direction and tap position)
- Creation of an event message if an anomaly occurs
- Storage of envelope curves and raw data
- Detailed analysis, interpretation and recommendations for action by MR experts through a simple upload of the generated data



Increased operational security and cost optimization

- First online solution for vibroacoustic monitoring gives early warning of faults that would not otherwise be detected
- Optional VAM ANALYSIS SERVICE by MR provides probable causes and clear recommendations on how to avoid incidents
- Self-learning algorithm ensures easy integration into any transformer and on-load tap-changer
- Flexible combination possibilities with further ETOS® modules enable an integrated, smart system solution

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THE POWER BEHIND POWER.

