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 premium service offers you a detailed report with recommendations and actions.

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

<table>
<thead>
<tr>
<th>Design for vibroacoustic monitoring</th>
<th>Stand alone</th>
<th>Combined with other MR solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ETOS® IM modules</strong></td>
<td>Installation in customer control cabinet</td>
<td>Installation with further ETOS® IM modules in customer control cabinets</td>
</tr>
<tr>
<td><strong>ETOS® cabinet</strong></td>
<td>Installation in MR-cabinet</td>
<td>Installation in the ETOS® cabinet for integrated system solution</td>
</tr>
<tr>
<td><strong>ETOS® ED ETOS® TD</strong></td>
<td>Integration in motor drive</td>
<td>ETOS® ED: classic drive technology, ETOS® TD: innovative head drive</td>
</tr>
</tbody>
</table>
**MSENSE® VAM: Monitoring procedure**

### Signal recording: Vibroacoustic sensor
- Recording of vibrations during the switching process by vibroacoustic sensor on the OLTC head cover

### 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

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<thead>
<tr>
<th>db</th>
<th>msec</th>
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<tbody>
<tr>
<td></td>
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**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**

### Cause analysis and recommendations for action by MR
- Data transfer to MR via https
- Detailed analysis, interpretation and recommendations for action by MR experts

1. **Detailed analysis**
   - 50kS/s for the raw signal
   - Specific evaluation algorithms
   - Extensive database

2. **Evaluation of the results by MR experts**
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 detailed analysis 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