



TAPSCAN<sup>®</sup> VAM

VIBROACOUSTIC MEASUREMENTS  
FOR ASSESSING TAP CHANGERS.

TRANSFORMER CONTROL



# OLTC DIAGNOSE USING VIBROACOUSTICS. ANY TIME. QUICKLY.

Assessing the state of on-load tap-changers quickly and cost-effectively as needed—this is the great advantage of TAPSCAN® VAM. With this new vibroacoustic diagnostic process we can quickly assess the condition of any on-load tap-changer, regardless of manufacturer.

## TAPSCAN® VAM – an important building block in our diagnostic portfolio

The idea of determining the condition of on-load tap-changers using vibroacoustic measurements emerged back in the early 1990s. The Hydro Québec power utility company in Canada was searching for a method of quickly classifying a large number of on-load tap-changers in different variants. Maintenance and repair services were to be scheduled based on the result. Today, many utility companies are faced with the task of reliably operating an aging population of transformers. For on-load tap-changers that have not been inspected for a prolonged period, vibroacoustic measurement provides a good option for quickly providing an initial overview. Carrying out the measurements during an acceptance test or during commissioning provides a sort of „fingerprint“. This fingerprint makes it possible to compare measurements easily at a later time in order to derive appropriate measures.

We generally offer TAPSCAN® VAM as part of a diagnostic package. Coupling it with thermographic measurements, for example, is especially useful for assessing bolt-on tap changers. A further measurement method in our portfolio is the dynamic resistance measurement TAPSCAN® DRM which enables a comprehensive analysis of the switching sequence in all phases and also enables a determination of the winding resistance. We would be pleased to advise you as to when such a measurement is suitable. We can also combine these measurements with diagnostic measurements on the transformer including the bushings.

## The benefit – a snapshot of the tap change operation sequence

With TAPSCAN® VAM we offer a quick diagnosis of the condition of an on-load tap-changer – including set up, the diagnosis can often be completed in less than an hour. This allows for a prompt condition assessment of the on-load tap-changer's switching sequence. If you need a comprehensive diagnosis, we will provide a detailed report with recommendations. Our measurement and analysis methods as well as our recommendations are based on our decades of experience with all models of on-load tap-changer.

The measurement makes it possible to easily recognize operating time deviations and mechanical inconsistencies that affect the tap-change switching sequence. This can include problems at the contacts or the energy accumulator or even irregularities in the gearing.

## Good to know

On-load tap-changers produce a sound pattern corresponding to the temporal operation of their mechanisms. The frequency range significant for the analysis is between a few kHz and 100 kHz.

Therefore, an on-load tap-changer moves in an frequency band which deviates significantly from the noises produced by the transformer which are generally many times 100 Hz and can therefore be filtered.

On request, we would be pleased to explain our interpretation method or provide you with further documents.

## Transformer in operation – measurement in progress

We perform these measurements throughout the world and would be happy to carry them out on site. The transformer does not have to be switched off for the measurement. The measurement takes place in five steps:

- 1) **Attaching the accelerometer to the outside of the transformer tank** at the height of the diverter switch or selector (for switched-on transformer) or **Attaching the accelerometer to the head cover for the on-load tap-changer** at a cover bolt (for a switched-off transformer). We have various adapters for this



*Fastening possibilities on the head cover*

- 2) **Connecting the accelerometer to the measuring device.**

- 3) **Performing the measurement.**

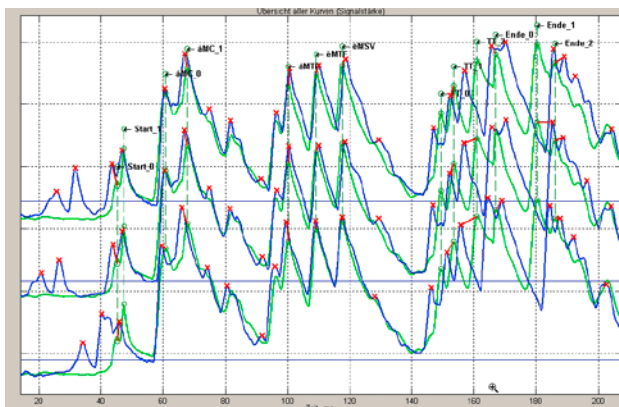
Tap-change operations with recording. If the transformer is in operation, it is sufficient for a complete assessment of the diverter switch insert to switch one position higher and one position lower. The measured signals are processed using evaluation algorithms. Automatic peak detection and peak mapping are performed and assigned maximum deviations.

- 4) **Evaluating on site.**

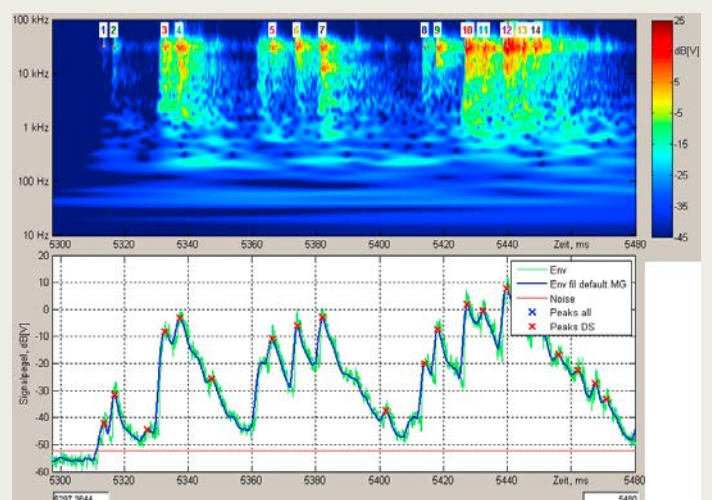
Our experts check the recording for irregularities and compare it against reference curves if necessary. Then they provide you with a measurement log.



*Measurement device in action*



*Processing the sound pattern*



*Quick overview of switching sequence*

- 5) **Creating the diagnostic report.**

Our specialists in Regensburg carry out a comprehensive analysis if necessary. For this purpose, they also make use of our constantly growing database. Afterwards, you receive a detailed report with recommendations for action.

# MORE POWER, MORE VALUE.

Our expert measurements reliably ensure you are on the safe side.  
And your on-load tap-changers reliably remain in operation.



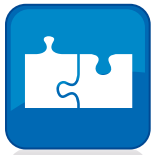
## Carried out quickly

- TAPSCAN® VAM provides you with a statement on the mechanical condition of your on-load tap-changer in less than an hour—frequently without having to disconnect the transformer from the grid
- Assignment of noise patterns to mechanical events during the tap-change switching sequence and processing recorded in a log as part of the measurement
- The accelerometers can be attached quickly and can be firmly affixed in place with adhesives or magnets as needed



## Usable anywhere

- We inspect every kind of on-load tap-changer, regardless of whether it is a bolt-on or in-tank tap-changer or a reactor or high-speed resistor-type tap-changer
- Portable measuring system ideal for any climate conditions



## Flexible combinations possible

- We combine vibroacoustic measurements with dynamic resistance measurement (TAPSCAN® DRM), thermographic analysis or oil diagnostics as needed
- Optimal times include measurements for acceptance tests or commissioning or when inspecting a substation
- At the same time, we offer a measuring package for transformer diagnostics or a functional test of important components



## Diagnostics run by experts

- Measurement and diagnostics using in-house MR evaluation program with specially developed and patented algorithms
- Access to a database with reference curves for a vast assortment of on-load tap-changer types
- Measurement by MR experts with extensive knowledge of and experience with the principles behind on-load tap-changers and the tap-change operation sequence

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THE POWER BEHIND POWER.

