

News

OLTC Scan on Power Transformers

New dynamic resistance measurement function for the CPC 100

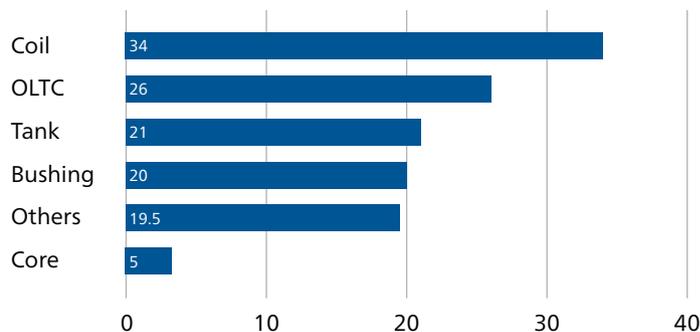
Dynamic Resistance Measurement (DRM) is a new method which can be performed as a supplementary measurement in order to analyze the switching process of an on-load tap changer (OLTC) on power transformers. By using this non-invasive testing method, failures can be detected without opening the OLTC compartment. As a result, the reliability of the OLTC can be improved, maintenance costs can be reduced and most of all, unexpected and expensive OLTC and power transformer outages can be avoided.

OLTCs are an important component of a power transformer. As its name suggests an OLTC permits tap changing and hence voltage regulation without interrupting the load current. This can be accomplished in various ways, resulting in considerably diversified tap changer designs. The two most common ones are the so called inductive and resistive type tap changers.

Studies show that about 26% of all reported outages are related to the aging effects on OLTCs. Due to this high failure rate, it is very important to monitor the condition of the power transformer's OLTC closely.

Unlike other more static components in a transformer, the OLTC consists of numerous moving parts. Manufacturers typically recommend a maintenance cycle that mostly depends on the total number of switching operations. Operating times below 100 ms ▶

Reasons for transformer failures in %



Transformer failure statistics (Viereck, Hillinger, Transform 2011)

make it difficult to detect any effects during the switching process using a conventional static winding resistance measurement. The DRM principal was developed in order to address this issue.

Static vs. dynamic winding resistance measurement

A conventional static resistance measurement can be used to check the winding as well as all of the internal connections, such as the connection from the bushings to the windings, the windings to the tap changer, the contacts of the tap selector and the main contacts of the diverter switch. An assessment can be made by comparing the results with the factory report or by calculating the deviation from the average of the three phases.

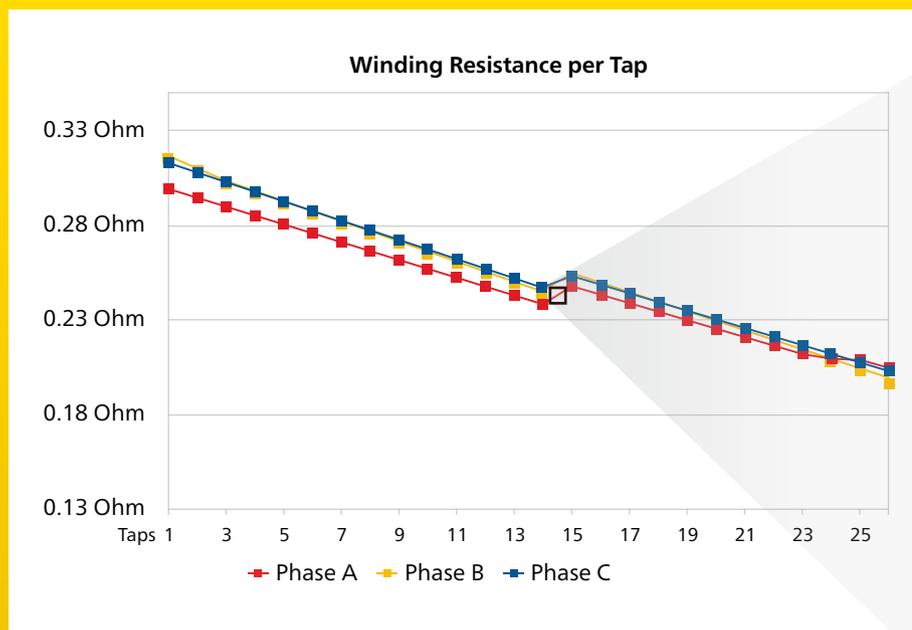
The static winding resistance measurement does not measure the switching process of the diverter switch itself. Therefore, the dynamic resistance measurement of the OLTC can be used as a supplementary diagnostic method to gain insight into the fast switching process of the diverter switch.

By using DRM you can detect the mechanical wear and tear of contacts, leads and commutating resistors. These failure modes can be observed by variations in switching times and current slope or, in some cases, interruption of the test current.

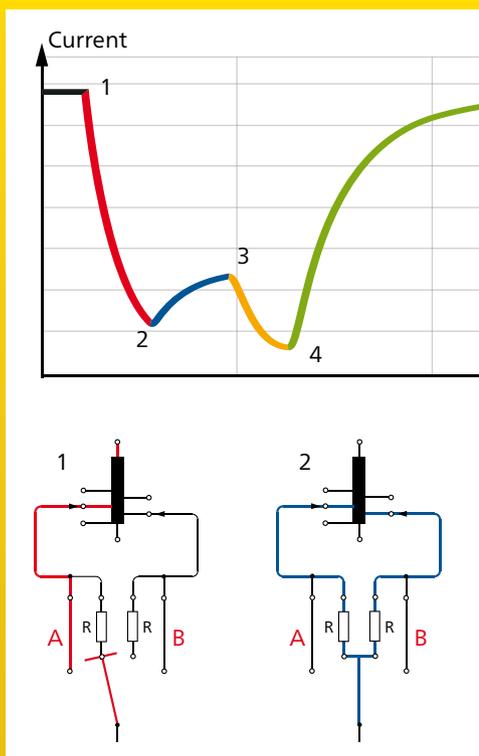
DRM with the CPC 100

The latest 3.40 software version of the CPC 100 Toolset and Primary Test Manager™ (PTM) includes the new “OLTC scan” function, which allows you to perform DRM with the CPC 100 + CP SB1 test system.

When performing DRM, the CPC 100 + CP SB1 system injects a DC current in the same way that it does for static winding resistance measurements. Unlike the static resistance measurement, the “OLTC scan” function records the current signal during the entire switching process from one tap to the other. The measurement includes the entire range of the tap positions for all three phases, both upwards and downwards.



Static winding resistance measurement of a transformer including all tap positions and the switching process in detail by using DRM.



Analysis and comparison of test results with PTM

The Primary Test Manager™ (PTM) shows the switching process of the individual taps in a single diagram so that they can be compared amongst each other easily. As the current signatures of many OLTC designs may vary by their phase and switching direction, the PTM software offers unique filter criteria for analyzing measurement results for a comprehensive failure diagnosis.

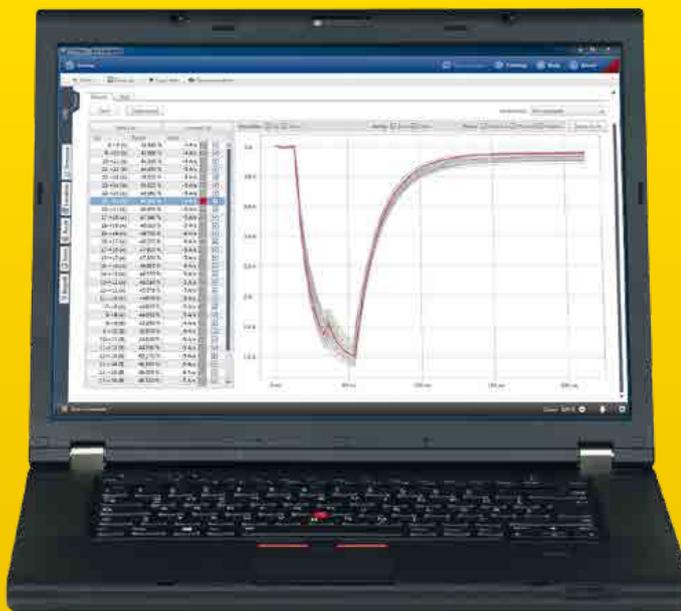
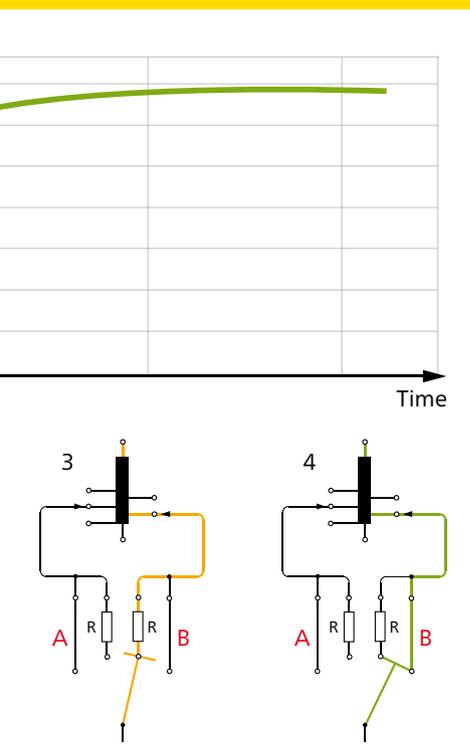
You can download the latest 3.40 software version for the CPC 100 Toolset and Primary Test Manager™ free-of-charge from the customer area on the OMICRON website. 📄



CPC 100 + CP SB1

- > Fast, automated testing of three-phase transformers (ratio, winding resistance, OLTC condition, short circuit impedance)
- > Eliminates need for time-consuming rewiring between the tests
- > Enables quick discharging of transformers
- > Demagnetizes transformers reliably
- > Automated reporting of important transformer parameters

www.omicronenergy.com/cpc100



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