



PD Measurement on Power Transformers

Partial discharge (PD) can damage insulation materials in power transformer bushings and windings. This can lead to insulation breakdown and costly outages. PD is observed in power transformer bushings and windings if the insulation material between different voltage potentials is aged, contaminated or faulty.

PD measurement is a reliable and non-destructive method used to diagnose the condition of a power transformer insulation system. It is performed during factory acceptance, on-site commissioning and routine maintenance testing to detect critical defects and assess risks.

When measuring and analyzing PD activity in power transformers, the particular tests and test set-ups are determined by the type of transformer and to which standard the measurements are performed. Depending on the type of bushings used, the PD analysis system is connected either to the capacitive tap of the bushings or to an external coupling capacitor. This allows electrical PD measurements on the transformer.

PD is measured either in μV (according to IEEE standards) or in pC (according to the IEC 60270 standard). Advanced noise suppression techniques are commonly deployed in high-interference environments to minimize irrelevant data.

There are two different methods of measuring PD on power transformers. The method to be used depends whether there are bushing taps on the transformer.

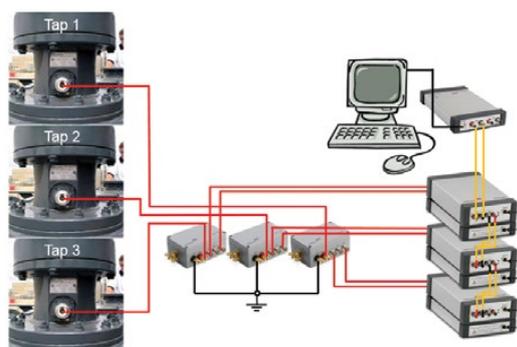


Figure 1

Conventional PD measurement on an HV bushing *with* measurement taps

Depending on their rated voltage level and construction type, some transformer bushings are equipped with measuring taps. Figure 1 shows how the bushing taps can be used to connect the coupling device (e.g. OMICRON CPL) and PD measuring system (e.g. OMICRON MPD 600 or OMS 605) to the transformer.

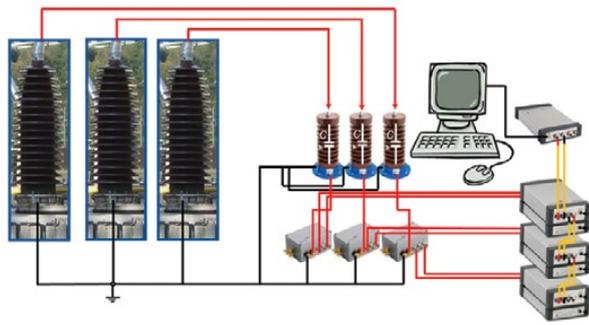


Figure.2

Conventional PD measurement on an HV bushing *without* measurement taps

Figure 2 shows the set up when there is no bushing tap on the transformers. In the above setup, coupling capacitors are used to connect the bushings and the PD measuring system.

For on-line PD measurements on power transformers, OMICRON supports three different possibilities:

- 1) Using a conventional PD measurement via bushing taps
- 2) UVS 610 UHF sensor via drain valves
- 3) High Frequency Current Transformer (HFCT) on the grounding cable from the transformer tank as shown in Figure 3.

The operator can perform a PD measurement whenever it is needed, even during normal operating conditions without shutting down the transformer.

Figure.3

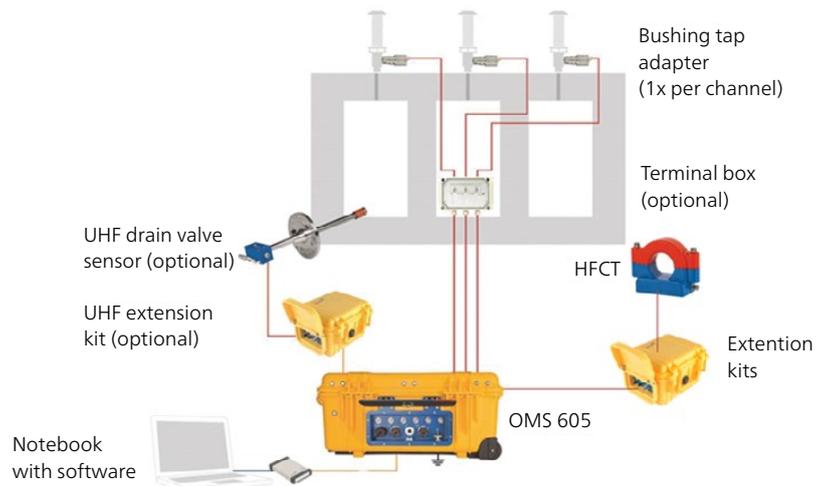
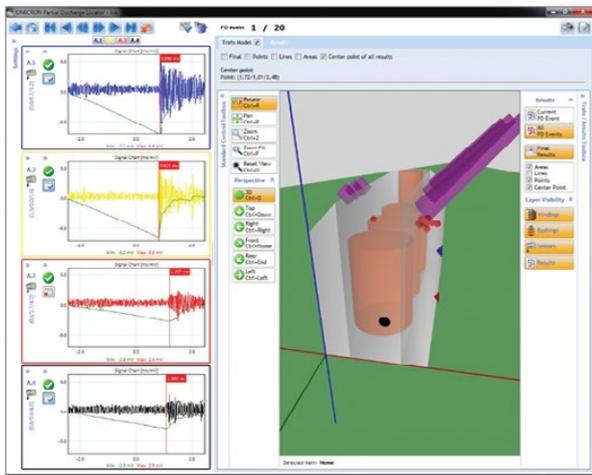


Figure.4



PDL 650 - PD localization using acoustic sensors

Additionally, OMICRON provides users with a solution for the PD localization using acoustic sensors on the transformer tank. Acoustic partial discharge measurements are performed with the PDL 650, which records the measured values of multiple acoustic sensors simultaneously. The software then calculates the fault location based on the time difference between the incoming signals.

For even more accurate results, the acoustic PD measurement can be combined with the MPD 600 and even with UHF measurements. In this way the electrical partial discharge signals trigger the acoustic evaluation, making it easier to locate the PD failure.

More information about PD measurement and analysis on power transformers is available [HERE](#).

Hands-on training is also available from OMICRON Academy, where you can learn how to perform PD measurement and analysis on a variety of electrical assets. Please click [HERE](#) for more information.