

Sensor and method for determination of moisture content level in the solid component of cellulose-oil insulation of a power transformer

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ABSTRACT

This innovative solution is designed to improve the reliability and safety of power transformers, which are critical components of electrical energy systems. Moisture inside transformer insulation is one of the main factors accelerating ageing and increasing the risk of failure. Traditional measurement methods are often time-consuming and affected by the properties of insulating oil, which can lead to inaccurate results.

The proposed sensor overcomes these limitations by directly analyzing the solid insulation component using a dedicated measuring structure. It combines electrodes, a pressboard layer, and a temperature sensor within a compact housing installed inside the transformer tank. By measuring one of seven electrical parameters and taking temperature into account, the system can precisely determine the moisture content based on pre-established reference characteristics.

This approach significantly reduces measurement time while improving accuracy and repeatability. It also minimizes the influence of external factors, enabling more reliable diagnostics. As a result, operators can better monitor transformer condition, plan maintenance, and prevent unexpected failures, leading to increased efficiency and reduced operational costs.