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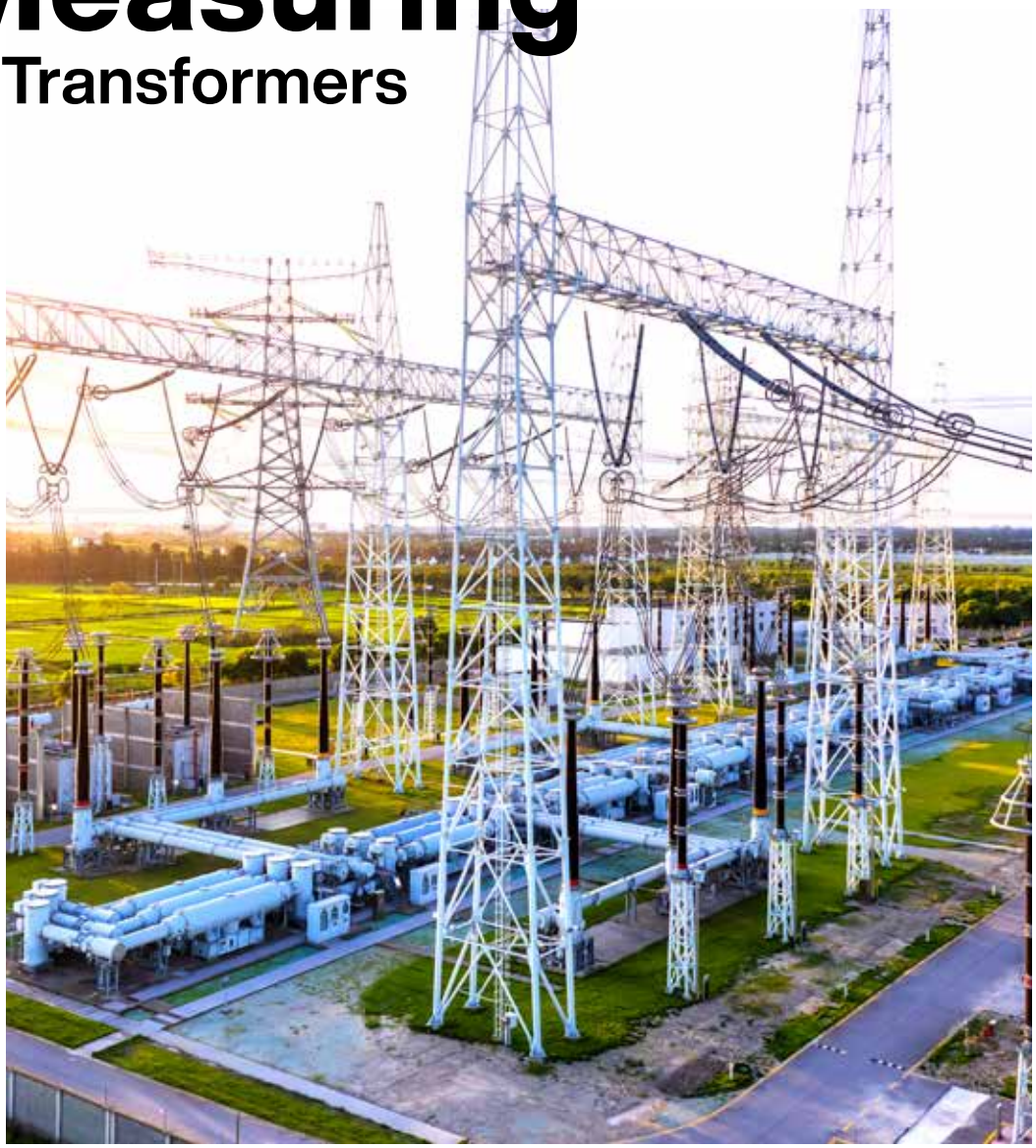
technology.

Moisture-in-Oil Measuring

in Transformers



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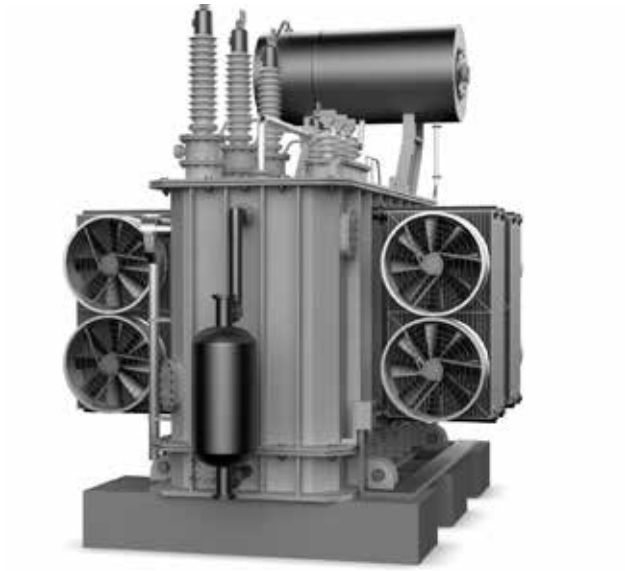
Monitoring of the Moisture Content in Transformer Oil



A too high water content in transformer oil or in the insulation system of a transformer can lead to massive damage or even total failure of the device. Whereas determining the moisture content in a transformer formerly involved considerable overhead, the E+E MOP301 moisture-in-oil-sensor now makes the measurement far easier and, above all, permanent.

Challenge: Water in the Transformer

There are several reasons for the presence of water in transformers. A low level of water content is created during production of the insulation. Water can also penetrate due to a poor seal (e.g., defective spots in welds). In addition, moisture is released when the cellulose insulation ages. A too high moisture content (in the form of free water) can lead to massive damage due to partial discharges, conductive creepage distances or flashovers between the conductors. This is why a permanently low level of water content in the transformer oil and in the insulation system is of decisive importance for maximising the service life of transformers.

Complex Measurement

Often, the water content in the transformer was determined manually by Karl Fischer Titration (reaction of sulphur dioxide and iodine with water). Although this method is accurate, it is very time-consuming and monitoring is only carried out selectively.

MOP301 - Moisture-in-oil-sensor with digital interface

MOP301 with ball valve

Solution: Condition Monitoring with the MOP301

With the MOP301 – a compact moisture-in-oil sensor – a suitable alternative was found. Optimised for high accuracy and excellent long-term stability, the MOP301 can be used in lubricating, hydraulic and transformer oils as well as diesel fuel. Water activity and oil temperature are permanently measured during operation and the water content is precisely calculated. It is now possible to obtain a correct real-time picture of the transformer oil in all operating conditions.

The sensor should preferably be installed in the cooling circuit line to assess the risk of dielectric strength reduction due to excessive oil moisture. It is essential that for the sensor to be in the oil flow to ensure good response times. The measurement results are transmitted via Modbus RTU interface to a higher-level control system. This enables the operator to detect possible risks at an early stage and initiate the necessary countermeasures promptly. Due to the permanent condition monitoring, maintenance intervals can also be adjusted and thus running costs reduced. In addition, the age profile of a transformer can be evaluated at any time with the aid of a service life forecast by estimating the insulation age. Knowledge of the actual aging of the transformer is particularly useful for future cost planning.

Full Transparency During Operations

The use of MOP301 sensors in the transformer sets new standards in the digitalisation of oil-insulated high-voltage transformers. The result is full functional transparency, improved productivity as well as extended intelligence about the health state. A typical monitoring package contains the necessary sensors for entering the most important operating parameters – such as oil moisture, temperature, oil level, undervoltage winding current and GPS position. Data input can be handled via GSM or Ethernet without the need for a secondary IT infrastructure.

The Challenge.

- Continuous moisture measurement in transformer oil
- Application range up to 120 °C oil temperature
- Replaces overly complex laboratory methods
- Inexpensive online measurement

The Solution.

- MOP301 - compact-moisture-in-oil-sensor
- Oil temperature up to 120 °C / pressure up to 20 bar
- Ouick and clean installation via ball valve
- Excellent long-term stability
- Very robust, space-saving enclosure
- High measuring precision

Product Benefits.

- Excellent support at all levels
- Digital communication interface
- Excellent price/performance ratio
- Robust, compact design
- Universally applicable
- High long-term stability

Overall Value.

- High operational safety for the transformer
- Reduction of maintenance costs
- Preventive maintenance
- Remote monitoring
- Maintaining performance
- Many years of expertise in moisture measurement
- High accuracy even in very dry oil
- Prevention of cellulose ageing

Company Headquarters &
Production Site

E+E Elektronik Ges.m.b.H.
Langwiesen 7
4209 Engerwitzdorf | Austria
T +43 7235 605-0
F +43 7235 605-8
info@epluse.com
www.epluse.com

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technology.

www.epluse.com