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1 Primary testing device for generating up to 2,000 A with connection cables to provide a primary supply. 2 Current transformer testing with the CT Analyzer on a current transformer in the bushing of a 30 kV E-reactor. 3 Current transformer testing with the CT Analyzer on a current transformer in the high-voltage bushing of a 380 kV power transformer.



A class of its own

Efficient testing of current transformers with the CT Analyzer

50Hertz Transmission GmbH is based in Berlin and is responsible for operating, maintaining, planning, and expanding the 380/220 kV transmission grid in the north and east of Germany. The company operates conventional current transformers at 380 kV, 220 kV, 110 kV, and 30 kV as freely accessible units (in outdoor switchgear installations), bushing type on major systems (power transformers, compensation coils) and those incorporated in gas insulated switchgear systems (GIS). 50Hertz Transmission has been exclusively using the CT Analyzer from OMICRON for its current transformer testing for three years.

The company policy states that a test of the current transformers, using the secondary-side testing method, is performed during commissioning, at stipulated intervals, after faults or if any unusual behavior has been observed. This test should at least include a load measurement, insulation test, and a check of all of the cores. Other current transformer data is also relevant from a technical perspective, including overcurrent limiting factor for measurement cores or the accuracy limiting factor and the determination of the accuracy class for protection cores.

The old approach to current transformer testing

With conventional testing devices, such as those used at 50Hertz Transmission up until 2008, high currents were generated, the current transformer was energized via the primary connections, and measurements were taken on the secondary side. This approach enabled the minimum requirements of testing at the secondary-side to be met. However, it was not possible to test the saturation characteristics of the current transformers or determine the overcurrent characteristic. As such, it was not possible to define their exact class.

Current transformer testing with the CT Analyzer

Today, 50Hertz Transmission uses the CT Analyzer from OMICRON for all of its current transformer testing. As well as the load measurement, various additional tests are performed on the protection and measurement cores. These include the measurement of the winding resistance, the magnetization characteristic curve, the turns ratio, and the determination of the accuracy/overcurrent limiting factor. The results are documented in a test report for each current transformer core. This report is then made available in the company's monitoring and maintenance system for further analysis and evaluation.

»The CT Analyzer facilitates effective, affordable and practicable current transformer testing.«

Dipl.-Ing. (FH) Mathias Mieth

Process Coupling Specialist, 50Hertz Transmission



Practical experience

"Using the optimum test set-up increases measurement accuracy," explains Mathias Mieth, Process Coupling Specialist at 50Hertz Transmission. Practical tests and experience gained using the CT Analyzer have, for example, shown that measurements taken on the secondary-side should generally use a four-wire measurement. Here, the secondary-side test cable and measurement cable are connected directly to the test object. Parallel connection of the measurement and testing cables to the live terminals should also be minimized, and contact resistance reduced (e.g. when connecting the primary-side measurement cable to fixed ball points). "To avoid interference, we jumper all cores of the current transformer that are not included in the test or connect them on the secondary side," adds Mathias Mieth.

For current transformers in bushings, GIS systems, or those which do not allow connection of the measurement cable on the primary-side, 50Hertz Transmission performs a "reduced current transformer test". This includes a resistance measurement, a recording of the magnetization characteristic curve (with knee point determination), and the determination of the indirect security factor and accuracy limiting factor.

CT Analyzer as reference

In existing GIS systems, 50Hertz Transmission currently uses split-core current transformers for 110 kV cables which are intended to supplement those in the GIS system. Since some of these transformers are also used for the accounting measurement, they need to be calibrated. In its Advanced Version (measurement up to class 0.1), the CT Analyzer serves as a reference testing unit for initial calibration or recalibration of these current transformers during on-site measurements.

Effective and practical

"With the CT Analyzer, we have a device that allows effective, low-cost, and practicable testing of current transformers," adds Mathias Mieth. "Another powerful argument is that additional functional modules can be integrated in to the CT Analyzer at any time."

50Hertz Transmission

50Hertz Transmission's 380/220 kV transmission grid stretches over an area of 109,000 km² (42,085 mi²), has a total length of 9,750 km (6,058 mi), and provides power to more than 18 million people. The grid also integrates around half of all wind power currently generated in Germany.

www.50hertz-transmission.net