

PowerFlow

APPLICATION NOTE

PRODUCTS AND INFORMATION FOR POWER PROFESSIONALS

TurPower Associates Application Note #105

Testing On-Load Tap-Changers

Without a doubt, tap-changers are the most vulnerable part of a transformer. These mechanical devices result in more failures and outages than any other component and, therefore, require frequent testing to ensure that they are operating properly and are reliable.

Measuring the contact resistance and checking the operation of on-load tap-changers are essential tests to ensure that these components and the transformer are operating properly.

Contact Resistance

There are a number of contact fingers in each position of an on-load or off-load tap-changer. In order to handle the rated current without overheating, all of the contact fingers must make a firm contact. Often dirt and oxidation can create high resistance on contacts and lead to hot spots that will reduce the reliability of the tap-changer. Consequently, this may cause arcing and lead to carbon buildup in the oil which may cause pitting of the contact. It is critical to assess the integrity of each contact finger.

To determine if this type of problem exists, one must make two measurements on each tap position. If there is a difference, investigation is needed.

Verifying No Open-Circuit Conditions

Ensuring that both sets of tap-changer contacts operate properly and that an open-circuit condition never occurs is one of the most essential assignments of the test technician. On-load tap-changers employ a "make-before-break" contact technique that uses two sets of moving contacts with an impedance connected across them. The contacts should move one at a time, so that an open output circuit does not occur. To change from tap 1 to tap 2, the first contact will move to position 2. Then the second contact will move up to position 2. When the



AVO International's Multi-AMP Transformer Ohmmeter

first contact is on tap 2 and the second contact is on tap 1, the circulating current in the shortened position of the winding is limited by the impedance.

AVO's Transformer Ohmmeter

AVO International's Multi-AMP Transformer Ohmmeter is equipped with two independent measuring channels that provide simultaneous measurements of the two windings. These dual measuring channels allow the operator to see even small inconsistencies between the phases that might be indicative of poor contact conditions.

The unit has a sensitive surge detection and measurement shutdown circuit. While the tap-changer is being operated, the safety discharge circuitry monitors the contact operation for proper make-before-break sequence. If an open-circuit condition occurs, the tester shuts down immediately to warn the operator of a possible problem. During the shutdown, the tester safely discharges the energy stored in the inductance of the winding.

With these capabilities, the AVO Multi-AMP Transformer Ohmmeter can test on-load tap-changers safely and up to 80% faster than conventional methods.

Call TruPower Associates, Inc. for more on how the AVO Multi-AMP Transformer Ohmmeter can help improve the reliability of your transformers.