Application Note

How to Select a Winding Ohmmeter Model

Transformer winding resistance testing is not an easy task and it requires an appropriate tool. If a proper instrument is not available, the measurement may need to be repeated several times, and still not absolutely positive that the result is correct.

Due to the inductance of a power transformer there are two processes that require time before it is possible to accurately measure the winding resistance value. First, some time is required to establish the current. Then, once the current is flowing it has to stabilize in order to avoid **Ldi/dt** error. This process may take several minutes or even half an without a powerful enough source. This source needs to have both voltage and current capability: voltage to establish the current and the current to saturate the core. Winding resistance should be tested by applying about 5-10% of the nominal current. DV Power RMO-T units have a 55 V voltage source which enables quick establishment of the set test current.

Testing the high voltage winding is usually an easier task since the number of turns is large, nominal current is lower and current of about 10 A -15 A may be sufficient to saturate the core. When testing the low voltage winding, it may not be possible for the current to stabilize if less powerful units are used. There is an alternative method to connect both primary and secondary windings on the same core leg in series to boost the number of turns. DV Power provides the current connection cable for this purpose with all RMO-T units.

DV Power produces powerful, and yet small and lightweight units for field testing of even the largest power transformers. There are models in the RMO-T series with test currents of up to 100 A, which enables fast winding resistance measurement of LV windings on large transformers. Even transformers of 1100 MVA have been successfully measured with DV Power devices.

The RMO-TW series of units are affordable winding ohmmeters mounted in metal case. This units enable winding resistance measurement and tap changer open-circuit detection. Their three-channel measurement capability enables simultaneous connection and measurement of primary, secondary and tertiary transformer winding. The RMO-TW models provide up to 50 A current for the measurement purposes (depending on the selected model).

The RMO-TD series provide more advanced tap changer analysis options. The sampling frequency of 10 kHz which they provide enables non-intrusive detection of tap changer contact problems even in their early stages. An additional AC current measuring channel enables the tap changer motor current measurement, which helps with detecting of tap changer motor and mechanical problems. Also, the demagnetization feature enables removing the remnant magnetism from the transformer core which is apparent after the DC current test. In this way, it is possible to avoid problems with protection relays tripping after the transformer is connected to the network due to high inrush currents, as well as faulty FRA and excitation current measurements. Some additional features include exporting the results to a

Postal address
IBEKO Power AB
Box 1346
181 25 Lidingö
Sweden

Delivery address
IBEKO Power AB
Stockholmsvägen 18
181 50 Lidingö
Sweden

Contact
phone: +46 8 731 76 99
fax: +46 8 731 77 99
sales@dv-power.com

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USB flash drive and built-in tap changer control unit. The RMO-TD instruments are mounted in a compact plastic case suitable for field testing. These instruments provide up to 60 A of test current, depending on the selected model.

The RMO-TT series, in addition to all the features of RMO-TD instruments, have an additional third voltage measurement channel which enables the simultaneous meausurement of the primary, secondary and tertiary winding. They also provide temperature measurement capability, which provides additional features for the Heat Run test. The RMO100TT can produce test currents of up to 100 A, which makes it the most powerfult field winding ohmmeter in the world.

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IBEKO Power AB
Box 1346
181 25 Lidingö
Sweden

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181 50 Lidingö
Sweden

Contact
phone: +46 8 731 76 99
fax: +46 8 731 77 99
sales@dv-power.com