



# Tap Changer Analyzer & Winding Ohmmeter RMO25TD

- Test current 5 mA – 25 A DC
- Rapid automatic demagnetization
- AC Current monitoring channel
- Lightweight – 9,5 kg
- Measuring range 0,1  $\mu\Omega$  - 2 k $\Omega$
- Two voltage sense channels
- Extremely quick measurement
- Automatic discharge circuit



## High DC current tap changer analyzer & resistance meter for transformers

### Description

The Tap Changer Analyzer & Winding Ohmmeter RMO25TD is designed for resistor type on-load tap changer analysis and for resistance measurement of inductive test objects. RMO25TD generates true DC ripple free current. Both injection of current and discharge of energy from the inductance are automatically regulated.

RMO25TD injects current with a voltage as high as 60 V. This ensures that the duration of test is as short as possible, and that the desired test current is reached faster. Two independent channels enable testing of two series windings, or primary and secondary windings. There is enough memory within RMO25TD instrument to store 500 measurements (EEPROM memory). All measurements are time and date stamped.

The set is equipped with thermal and overcurrent protection. The RMO25TD has very high ability to cancel electrostatic and electromagnetic interference in HV electric fields. It is achieved by very efficient filtration. The filtration is made utilizing proprietary hardware and software.

### On Load Tap Changers

The RMO25TD can be used to measure winding resistance of individual taps of a power transformer's tap changer. It can also check whether the on-load tap changer (OLTC) switches without an interruption. The moment a tap position is changed from one tap to another, the device detects a sudden, very short drop of the current. A properly working tap changer results differ from a malfunctioning one. This is obvious if an interruption during the change occurs, by the magnitude of the current ripple, the value of measured resistances, and also by different transition times. The instrument displays resistance value and ripple in percents. The Tap Changer Control Unit allows the operator to control the Tap Changer operation box from the RMO25TD instrument. For additional diagnostic functions, our software DV-Win should be used.

## Demagnetization Feature

After a DC current test, such as a winding resistance measurement, the magnetic core of a power or instrument transformer may be magnetized (remanent magnetism). Also, when disconnecting a transformer from service, some amount of magnetic flux trapped in the core could be present.

The remanent magnetism can cause various problems such as erroneous diagnostic electrical measurements on a transformer, or an Inrush current at start-up of power transformer, or incorrect operation of protective relays due to magnetized CT cores.

To eliminate this source of potential problems, demagnetization should be performed. When a discharging process has terminated, the RMO25TD can perform fully automatic demagnetization.

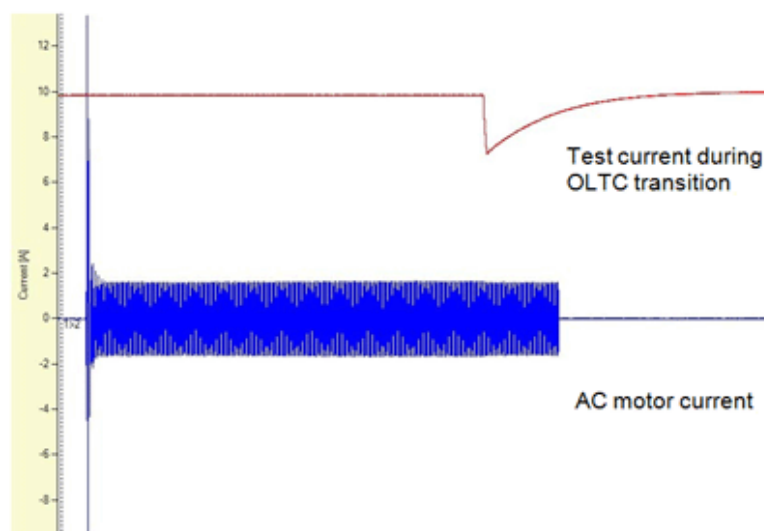
Demagnetizing magnetic core of a transformer requires alternating current applied with decreasing magnitude down to zero. The RMO25TD provides this alternating current by internally changing the polarity of a controlled DC current. During the demagnetization process the RMO25TD supplies current at decreasing magnitude for each step, following a proprietary developed program.

## DV-Win

Using DV-Win software, instrument can be operated and controlled from a PC, and results are obtained directly at a PC. The DV-Win software allows results to be arranged in an Excel spreadsheet, which can be shown later as a diagram and printed as a report, or exported in ASCII format. This software provides more detailed condition assessment of an OLTC (tap changer) by recording the graph which represents dynamic resistance during the tap change and motor current. The DV-Win measures OLTC transition time, an important characteristic for condition assessment. The standard interface is USB and optional RS232.

## AC Current monitoring channel

AC current monitoring channel is intended for monitoring and recording the OLTC mechanical-drive motor-current during tap changer operation. The motor current waveform is also printed on the DV Win generated graph, and can help in detecting OLTC mechanical problems. An AC current clamp is provided.



## Typical application

Typical application of RMO25TD is measuring the resistance of:

- ✓ Power transformers
- ✓ On-Load Tap Changers
- ✓ Generators and electrical motors
- ✓ High-current bus-bar joints
- ✓ Cable splices

## Accessories

### Included

- ✓ DV-Win PC software
- ✓ Mains power cable
- ✓ Ground (PE) cable

### Recommended

- ✓ Current cables 2 x 10 m 10 mm<sup>2</sup> and Sense cables 2 x 10 m with TTA clamps
- ✓ Current connection cable 1 x 5 m 10 mm<sup>2</sup> with TTA clamps
- ✓ Sense cables 2 x 10 m with TTA clamps
- ✓ Current clamp 20/200 A
- ✓ Cable bag

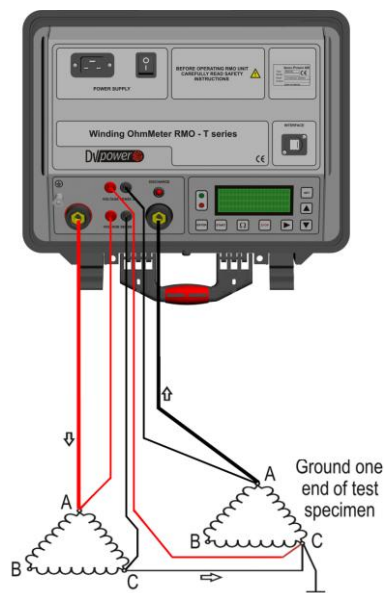
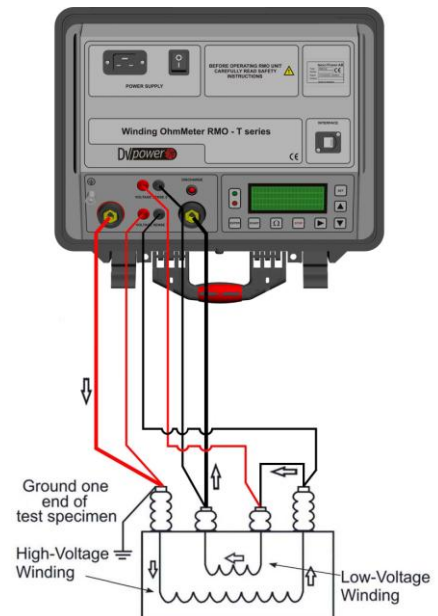
### Optional

- ✓ Built-in thermal printer 80 mm (in bigger plastic case)
- ✓ Test shunt 150 A / 150 mV
- ✓ Current cables 2 x 15 m 10 mm<sup>2</sup> with TTA clamps
- ✓ Sense cables 2 x 15 m with TTA clamps
- ✓ Cable plastic case

<p>Current cables and sense cables with TTA clamps</p>	<p>Voltage sense cables with TTA clamps</p>	<p>Current connection cable</p>
<p>Current clamp</p>	<p>Shunt</p>	<p>Cable bag</p>

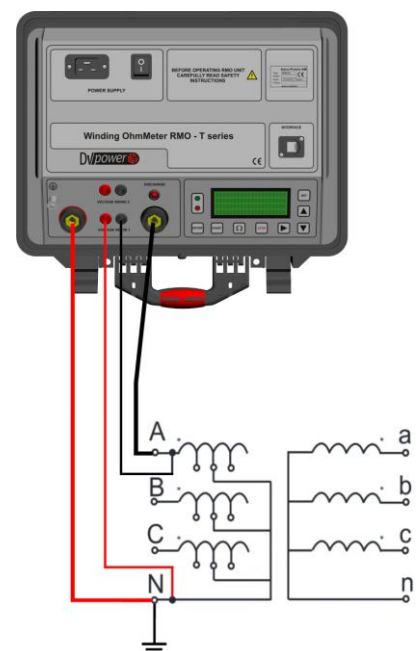
## Connecting a Test Object to RMO25TD

The RMO25TD should be turned off, connection between RMO25TD and the test object is such that the measuring cables from the "Voltage Sense" sockets are attached as close as possible to the measured resistance, while they are connected between the current feeding cables. That way, resistance of cables and clamps is almost completely excluded from the resistance measured. The figure to the right shows simultaneous testing of both windings (high and low) on a single-phase transformer. In such a way, it is possible to speed up the measurement when two channels are used to test both windings of the transformer.



Testing of a Delta-delta winding resistance is usually a very time consuming procedure. The two windings represent two closed loop inductors. When energy is brought into the inductors, this energy (in the form of D.C. current) continually circulates within each winding. To test this configuration quickly, both high and low sides should be connected in series with the current source of a Transformer Ohmmeter. By having these two windings in opposing polarity, the internal circulating currents settle very quickly to obtain a balance, and discharge with the same speed. Even if only one side of the transformer needs to be tested, connecting both high and low windings in series will speed up the test considerably.

Using RMO25TD's Tap Changer menu, the power transformer winding resistance of individual tap positions can be measured. Also, you can check whether the on-load tap changer switches without an interruption. The RMO25TD current output injects a constant current into a power transformer. This current and voltage value is measured, and the winding resistance is calculated.



## Technical data

### 1 – Mains Power Supply

- Connection	according to IEC/EN60320-1; C320
- Voltage	90 V – 264 V AC, 50 / 60 Hz, single-phase
- Power consumption	1800 VA
- Fuse	12 A / 250 V, type F

### 2 – Output data

- Test current	5 mA DC – 25 A DC
- Measuring range / Resolution	
0,1 $\mu\Omega$ - 999,9 $\mu\Omega$	0,1 $\mu\Omega$
1,000 m $\Omega$ - 9,999 m $\Omega$	1 $\mu\Omega$
10,00 m $\Omega$ - 99,99 m $\Omega$	10 $\mu\Omega$
100,0 m $\Omega$ - 999,9 m $\Omega$	0,1 m $\Omega$
1,000 $\Omega$ - 99,99 $\Omega$	10 m $\Omega$
100,0 $\Omega$ - 999,9 $\Omega$	0,1 $\Omega$
1000 $\Omega$ - 2000 $\Omega$	1 $\Omega$
- Typical accuracy	$\pm$ (0,1 % rdg + 0,1 % FS)

### 3 – AC Current monitoring channel

- Current monitoring resolution:	0,1 ms
- Amplitude resolution:	16 bit

### 4 - Current clamp meter specifications:

- Nominal current:	20 A r.m.s
- Measuring range:	5 mA - 30 A max
- Accuracy:	20 A (< 1 kHz): $\pm$ (1 % of rdg + 2 mA)
	20 A (1 to 20 kHz): $\pm$ (3 % of rdg + 2 mA)

### 5 – Environmental conditions

- Operating temperature	-10 °C - +55 °C / 14 F - +131 F
- Storage and transportation	-25 °C - +70 °C / -13 F - +158 F
- Humidity	5 % - 95 % relative humidity, non condensing

### 6 – Dimensions and Weight

- Dimensions	410 mm x 180 mm x 320 mm 16,14 in x 7,08 in x 12,59 in (W x H x D)
- Weight	9,5 kg / 20,9 lb

### 7 – Warranty

three years

### 8 – Applicable Standards

- Installation/overvoltage:	category II
- Pollution:	degree 2
- Safety	LVD 2006/95/EC, (CE Conform) Standard EN 61010-1
- EMC	Directive 2004/108/EC (CE Conform) Standard EN 61326:2006

\*All specifications herein are valid at ambient temperature of + 25 °C and standard accessories.

\*Specifications are subject to change without notice.

