

# Winding Ohmmeter RMO10TW

- Test currents 5 mA - 10 A DC
- On-load tap changer dynamic resistance measurement
- Two resistance measurement channels
- Automatic discharge circuit
- Lightweight – only 7,5 kg
- Detailed analysis of test results using DV-Win software



## Description

The Winding Ohmmeter RMO10TW is designed for the resistance measurement of inductive test objects and for on-load tap changer verification. The RMO10TW generates a true DC ripple-free current. The injection of current and discharge of energy from the inductance are both automatically regulated.

The RMO10TW injects a current at the voltage level as high as 60 V. This ensures the duration of test is as short as possible, and that the desired test current is reached faster. The two independent channels enable testing of two windings in series – primary and secondary. There is enough memory within the RMO10TW instrument to store 500 measurements. All measurements are time- and date-stamped.

The instrument is equipped with a thermal and overcurrent protection. The RMO10TW has a very high ability to cancel electrostatic and electromagnetic interferences that exist in HV electric fields. It is achieved by proprietary filtration solution applied to the instruments hardware and software design.

Automatic discharging circuit (independent of power supply) safely discharges the energy stored in the transformer windings at the end of the test in very short time. An audible and visible indication of the discharging state is provided. An automatic connections check is performed at the beginning of each test, and the instrument warns the user if an open connection is detected.

## On-Load Tap Changer Verification

The RMO10TW can be used to measure the winding resistance of individual taps on a power transformer's tap changer without discharging between the tests.

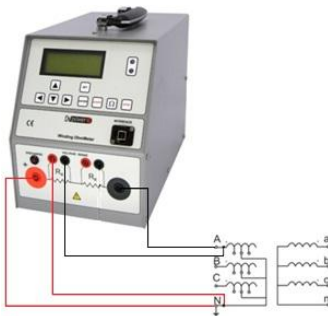
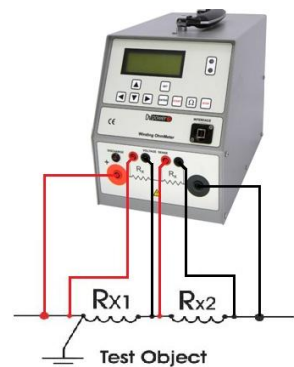
The unit also checks whether the on-load tap changer (OLTC) performs switching without an interruption. The moment a tap position is changed from one tap to another, the device detects a sudden, very short drop of the test current. These drops called "Ripple" should be consistent, where any drop out-of-line should be investigated. Defective "make before break" tap changer performance results in a 100% Ripple value, which is easy to observe. This is an indication of an interruption during the change, in which case the transition time also increases. This type of defect is one of the most troublesome ones. Other tap changer malfunctions detected analyzing measurements of Ripple, Transition time, and visualizing DRM graphs, can be observed too.

## DV-Win Software

The DV-Win software enables control and observation of the test process, as well as saving and analyzing the results on a PC. It provides a test report, arranged in a selectable form as an Excel spreadsheet, PDF, Word, or ASCII format. The software provides an OLTC (tap changer) condition assessment through analysis of the graphs representing dynamic resistance values during the tap changer transitions. Additionally, the DV-Win measures and calculates OLTC transition time, the ripple and the resistance for each tap changing operation. The standard interface is USB. RS232 is optional.

## Connecting the RMO10TW to a Test Object

The RMO10TW has two separate resistance measurement channels, which enable simultaneous measurement of the primary and secondary winding on the same phase. This significantly speeds up the measurement and reduces the total transformer testing time. The two resistances are connected in series using the provided current connection cables. The current and sense cables are connected as shown in the figure to the right. At the start of the test a cable continuity check is performed. In case of disconnection, an alarm is activated, and the error message is shown on the display.



The winding resistance of individual taps of a power transformer tap changer can be measured by using the Tap Changer (TapC) mode of the RMO10TW. There is no need to charge and discharge the transformer between tap position changes. The inputs of the instrument are protected during the switching process in order to avoid damage to the instrument in case of a faulty tap changer. Only the first channel (CH 1) is active during the TapC mode measurement.

## Accessories

### Included

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

### Recommended

- Current cables 2 x 10 m 2,5 mm<sup>2</sup> and Sense cables 2 x 10 m with TTA clamps
- Current connection cable 1 x 5 m 6 mm<sup>2</sup> with TTA clamps
- Sense cables 2 x 10 m with TTA clamps
- Cable bag
- Device bag

### Optional

- Built-in thermal printer 80 mm
- Test shunt 150 A / 150 mV
- Current cables 2 x 10 m 2,5 mm<sup>2</sup> with TTA clamps
- Sense cables 2 x 2 x 10 m with TTA clamps
- Cable plastic case
- Transport case



**Current cables with TTA clamps**



**Voltage sense cables with TTA clamps**



**Current connection cable**



**Test shunt**



**Cable plastic case**



**Transport case**



**Cable bag and device bag**

*\*The above cables are also available in several lengths. Please contact DV Power for more information.*

## Technical Data

### Static Resistance Measurement

- Test currents: 5 mA – 10 A DC
- Output voltage: up to 60 V DC
- Measurement range: 0,1  $\mu\Omega$  - 2 k $\Omega$
- Typical accuracy:  $\pm$  (0,1 % rdg + 0,1 % F.S.)

### Data Storage

- 500 internal memory positions

### Warranty

- Three years

### Printer (optional)

- Thermal printer
- Graphic and numeric printout
- Paper width 80 mm

### Mains Power Supply

- Connection according to IEC/EN60320-1; UL498, CSA 22.2
- Mains supply: 90 V - 264 V AC
- Frequency: 50/60 Hz
- Mains supply voltage fluctuations up to  $\pm$ 10 % of the nominal voltage
- Input power: 750 VA
- Fuse 15 A / 250 V, type F, not user replaceable

### Environmental conditions

- Operating temperature: -10  $^{\circ}\text{C}$  - + 55  $^{\circ}\text{C}$  / 14 F - +131 F
- Storage & transportation: -40  $^{\circ}\text{C}$  - + 70 $^{\circ}\text{C}$  / -40 F - +158 F
- Humidity 5 % - 95 % relative humidity, non condensing

### Resolution

- 0,1  $\mu\Omega$  – 999,9  $\mu\Omega$ : 0,1  $\mu\Omega$
- 1000 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  $\Omega$  – 2 k $\Omega$ : 1  $\Omega$

### OLTC Dynamic Resistance Measurement

- Sampling rate: 4 ms
- Automatic open circuit detection and warning
- Transition current ripple measurement
- Transition time measurement using DV-Win software
- Timing measurement of different transition changes using DV-Win graph analysis tools

### Computer Interface

- USB
- Optional: RS232

### Dimensions and Weight

- Dimensions: 198 mm x 255 mm x 380 mm  
7,8 in x 10 in x 15 in
- Weight: 7,5 kg / 16,5 lbs

### Applicable Standards

- Installation/overvoltage: category II
- Pollution: degree 2
- Safety: LVD 2006/95/EC (CE Conform)  
EN 61010-1
- EMC: Directive 2004/108/EC (CE Conform)  
Standard EN 61326-1:2006
- CAN/CSA-C22.2 No. 61010-1, 2nd edition, including Amendment 1

*All specifications herein are valid at ambient temperature of + 25  $^{\circ}\text{C}$  and recommended accessories. Specifications are subject to change without notice.*