# Tap Changer Analyzer & Winding Ohmmeter RMO60TT

- Test current 5 mA – 60 A DC
- Three resistance measurement channels
- Three temperature measurement channels
- Automatic resistance/temperature measurement for the Heat Run test
- On-load tap changer dynamic resistance measurement
- Rapid automatic demagnetization
- AC Current monitoring channel
- Measuring range 0,1 μΩ - 2 kΩ
- Automatic discharge circuit
- Built-in Tap Changer Control Unit
- USB flash drive feature

## High DC Current Tap Changer Analyzer & Resistance Meter for Transformers

### Description

The Tap Changer Analyzer & Winding Ohmmeter RMO60TT is designed for tap changer analysis and for resistance measurement of inductive test objects. RMO60TT generates true DC ripple-free current. The injection of current and discharge of energy from the inductance are both automatically regulated.

RMO60TT injects the current at the voltage level 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. Three independent channels enable testing of three series windings - primary, secondary and tertiary windings. There is enough memory within RMO60TT instrument to store 500 measurements. All measurements are time- and date-stamped.

The set is equipped with thermal and overcurrent protection. The RMO60TT has very high ability to cancel electrostatic and electromagnetic interference in HV electric fields. It is achieved by very efficient filtration based on a proprietary solution method.

### On-Load Tap Changer Analysis

The RMO60TT can be used to measure winding resistance of individual taps on a power transformer's tap changer. It can also check whether the on-load tap changer (OLTC) performs switching operation steps properly. The moment a tap position is changed from one tap position to the next, the device detects a sudden, very short current drop. 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 from the RMO60TT instrument. For additional diagnostic functions, our DV Win software should be used.

### Demagnetization Feature

After a DC current test, e.g. a winding resistance measurement, the magnetic core of a power or instrument transformer may remain magnetized (remanent magnetism). Also, when disconnecting a transformer from service, some amount of magnetic flux stays trapped in the core.
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 RMO60TT can perform fully automatic demagnetization.
Demagnetizing magnetic core of a transformer requires alternating current applied with decreasing magnitude down to zero. The RMO60TT provides this alternating current by internally changing the polarity of a controlled DC current. During the demagnetization process the RMO60TT supplies current at decreasing magnitude for each step.

### DV Win

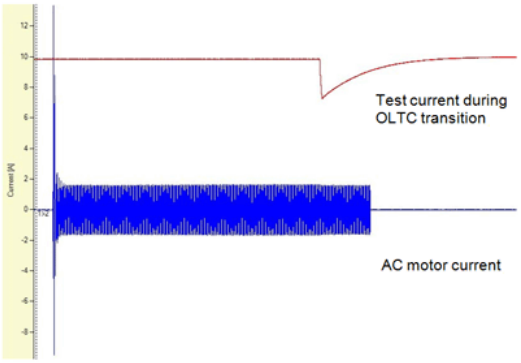
Using DV Win software, instrument can be operated and controlled from a PC, and results are obtained directly at a PC. The DV Win software allows results to be arranged in an Excel spreadsheet, which can be shown later as a diagram and printed as a report, or exported in ASCII format. This software provides 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.

### Heat Run Test Application

The DV Win software has an additional Heat Run temperature/resistance interpolation feature. After the transformer heating is switched off, the device is immediately connected to all three transformer windings and the timer is started. The winding resistance and temperature are measured at regular time intervals. This information is used to automatically interpolate these values at the moment when the transformer was switched off.

### 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 RMO60TT is measuring the resistance of:

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

## Accessories

### Included

- ✓ DV Win PC software
- ✓ Built-in Tap Changer Control Unit
- ✓ Tap Changer Control cable set 5m
- ✓ Mains power cable
- ✓ Ground (PE) cable

### Recommended

- ✓ Current cables 2 x 10 m 10 $mm^2$ and Sense cables 2 x 10 m with TTA clamps
- ✓ Current connection cable 2 x 5 m 10 $mm^2$ with TTA clamps
- ✓ Sense cables 2 x 2 x 10 m with TTA clamps
- ✓ Current clamp 30/300 A
- ✓ Cable bag

### Optional

- ✓ Built-in thermal printer 80 mm
- ✓ Test shunt 150 A / 150 mV
- ✓ Current cables 2 x 15 m 10 $mm^2$ with TTA clamps
- ✓ Sense cables 2 x 15 m with TTA clamps
- ✓ Cable plastic case

| | | |
|---|---|---|
|  |  |  |
| Current cables with TTA clamps | Voltage sense cables with TTA clamps | Current connection cable |

| | | |
|---|---|---|
|  |  |  |
| Current clamp | Shunt | Cable bag |

# 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 | 2250 VA |
| - Fuse | 15 A / 250 V, type F |

## 2 – Output data

| | |
|---|---|
| - Test current | 5 mA DC – 60 A DC |
| - Test voltage | 60 V DC |
| - Measuring range / Resolution | |
| 0,1 μΩ - 999,9 μΩ | 0,1 μΩ |
| 1,000 mΩ - 9,999 mΩ | 1 μΩ |
| 10,00 mΩ - 99,99 mΩ | 10 μΩ |
| 100,0 mΩ - 999,9 mΩ | 0,1 mΩ |
| 1,000 Ω - 99,99 Ω | 10 mΩ |
| 100,0 Ω - 999,9 Ω | 0,1 Ω |
| 1000 Ω - 2000 Ω | 1 Ω |
| - Typical accuracy | ± (0,1 % rdg + 0,1 % FS) |

## 3 – AC Current monitoring channel

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

## 4 – 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 |

## 5 – Dimensions and Weight

| | |
|---|---|
| - Dimensions | 450 mm x 175 mm x 320 mm<br>17,72 in x 6,89 in x 12,6 in<br>(W x H x D) |
| - Weight | 13 kg / 28,6 lb |

## 6 – Warranty

three years

## 7 – Applicable Standards

| | |
|---|---|
| - Installation/overvoltage | category II |
| - Pollution | degree 2 |
| - Safety | LVD 2006/95/EC, (CE Confirm)<br>Standard EN 61010-1 |
| - EMC | Directive 2004/108/EC (CE Confirm)<br>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.



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