

# Winding Resistance Ohmmeter

## RMO-TW

- Three resistance measurement channels
- One temperature measurement channel
- Accuracy (0,1% rdg + 0,1% F.S.)
- Lightweight
- On-load tap changer verification
- Automatic resistance measurement for the Heat Run test
- Rapid automatic demagnetization
- Automatic discharge circuit



### Description

The Winding Resistance Ohmmeter of the RMO-TW series is designed for winding resistance measurement of inductive objects. The RMO-TW instrument is based on the state of the art technology, using the most advanced switch mode technology available today. The RMO-TW instrument is accurate (0,1% rdg + 0,1% F.S.), powerful (up to 50 A) and lightweight. It generates a true DC ripple free current with automatically regulated measurement and discharging circuit.

RMO-TW instrument can perform a simple, quick and reliable transformer on-load tap changer verification. This instrument enables measurements of a winding resistance in every

tap position of an on-load tap changer without discharging between the tests. Problems with switching of the OLTC, such as interruption, can be detected with these measurements. The results are displayed on a backlit LCD display.

RMO-TW instruments are equipped with thermal and overcurrent protection. They have a very high ability to cancel electrostatic and electromagnetic interference that exists in HV electric fields. It is achieved by a proprietary filtration solution applied to both the hardware construction and the application software implementation

### Application

The list of the instrument application includes:

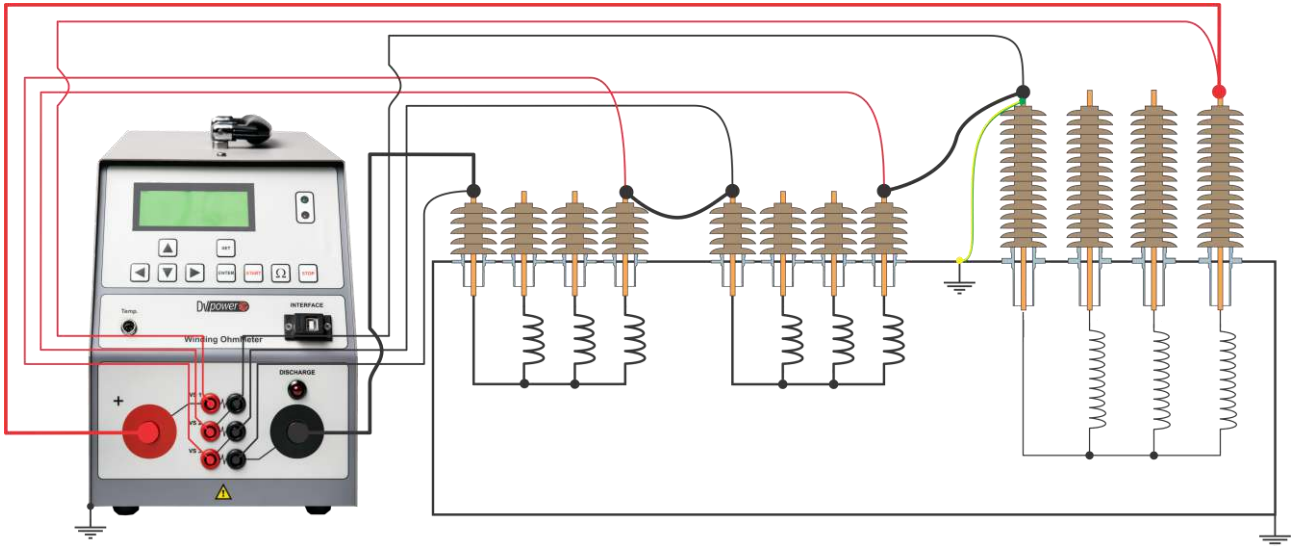
- Winding resistance measurement of inductive test objects, such as transformers and rotating machines
- Winding resistance measurement of resistive test object
- On-load tap changer verification
- Heat run test
- Transformer demagnetization

## Connecting RMO-TW to Test Object

### Three-phase Transformer

RMO-TW is a single-phase device, which means it can be connected to a one phase of a transformer at a time. It has 3 resistance measurement channels, which allows

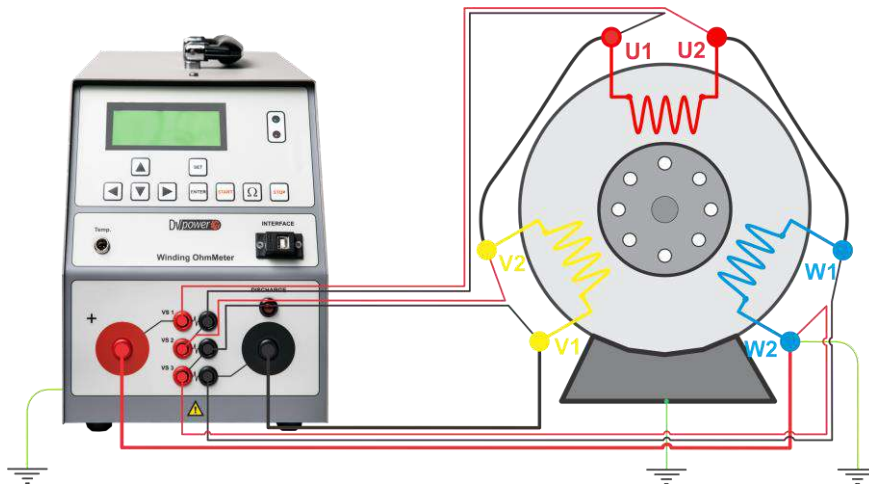
simultaneous testing of up to 3 windings (e.g. primary, secondary, and tertiary winding). Those windings need to be externally connected in series.



### Three-phase Motor/Generator

Using three separate resistance measurement channels available in RMO-TW, it is possible to simultaneously measure all 3 phases of a

motor/generator stator windings. To do this, all 3 phases need to be externally connected in series.



## Benefits and Features

### Test Voltage up to 55 V DC

RMO-TW injects the current with a voltage value as high as 55 V. This ensures that the magnetic core is saturated quickly, and duration of the test is as short as possible.

### Simultaneous Three-Channel Winding Resistance Measurement

Three independent resistance measurement channels enable simultaneous testing of up to 3 windings connected in series – a primary, a secondary, and a tertiary transformer winding. This significantly speeds up the measurement and reduces the total transformer testing time. At the same time, by saturating the magnetic core through the primary winding, which has the higher number of turns, the stabilization time and subsequently the total testing time is further reduced.

### On Load Tap Changer Verification

RMO-TW can be used for measuring winding resistance of individual taps of a power transformer with on-load tap changer (OLTC) without test current interruption between the tests. This way it checks whether the OLTC switches without an interruption. If interruption is detected (test current drops to zero) during tap change, the instrument produces a warning message to the operator.

### Transformer Demagnetization

After a DC current test, such as a winding resistance measurement, the magnetic core of a power or a measurement transformer may be magnetized. Also, when disconnecting a transformer from a service, some amount of magnetic flux trapped in the core could be present. Demagnetizing the magnetic core of a transformer requires alternating current applied with decreasing magnitude down to zero. Instruments provide this alternating current by internally changing the polarity of a controlled DC current. During the demagnetization

process the test current is supplied with decreasing magnitude for each step, following the proprietary developed program

### DV-TR Software

The DV-TR application 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, or Word. The software provides additional OLTC (tap changer) verification option by recording the test current during the transition. The standard interface is USB. RS232 is optional.

### Heat Run Test Application

The DV-TR application software has an additional Heat Run temperature/resistance extrapolation feature. After the transformer heating is switched off, the RMO-TW is immediately connected to up to three transformer windings and the timer is started. The winding resistance is measured at regular time intervals. This information is used to automatically extrapolate the values of temperature and resistance at the moment when the transformer was switched off.

### Built-in Printer

Built-in thermal printer, 58 mm (2.3 in) wide, is an optional accessory. All numerical results can be printed either right after the test or later from any previously saved result.

## Technical Data

### Mains Power Supply

- Connection according to IEC/EN60320-1; UL498, CSA 22.2
- Mains supply: 90 – 264 V AC, 50/60 Hz
- Input power: 2 250 VA

### Winding Resistance Measurement

- Test currents:  
RMO10TW: 5 mA – 10 A DC  
RMO20TW: 5 mA – 20 A DC  
RMO30TW: 5 mA – 30 A DC  
RMO50TW: 5 mA – 50 A DC
- Output voltage: up to 55 V DC
- Measurement range: 0,1  $\mu\Omega$  - 100 k $\Omega$
- Measurement range / Typical accuracy:  
0.1  $\mu\Omega$  – 1.999 k $\Omega$ :  $\pm$  (0.1% rdg + 0.1% F.S.)  
2 k $\Omega$  – 9.999 k $\Omega$ :  $\pm$  (0.2% rdg + 0.1% F.S.)  
10 k $\Omega$  – 100 k $\Omega$ :  $\pm$  (1.0% rdg + 1.0% F.S.)
- Measurement 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  $\Omega$  – 9.999  $\Omega$ : 1 m $\Omega$   
10.00  $\Omega$  – 99.99  $\Omega$ : 10 m $\Omega$   
100.0  $\Omega$  – 999.9  $\Omega$ : 0.1  $\Omega$   
1.000 k $\Omega$  – 9.999 k $\Omega$ : 1  $\Omega$   
10.00 k $\Omega$  – 99.99 k $\Omega$ : 10  $\Omega$

### OLTC DVtest (DRM)

- Sampling rate: 4 ms

### Temperature Measurement

- Measurement range  
-50  $^{\circ}\text{C}$  – +180  $^{\circ}\text{C}$  / -58  $^{\circ}\text{F}$  – +356  $^{\circ}\text{F}$
- Thermometer Pt100 class B
- Resolution 0.1  $^{\circ}\text{C}$

### Data Storage

- 1000 memory positions (standard)
- 5000 memory positions (optional)

### Display

- LCD screen 20 characters by 4 lines, with backlight, visible in bright sunlight

### Computer Interface

- USB (standard)
- RS232 (optional)
- Bluetooth (optional)

### Printer (optional)

- Built-in thermal printer
- Paper width 58 mm / 2.3 in
- Printer operating temperature:  
-20  $^{\circ}\text{C}$  – +70  $^{\circ}\text{C}$  / -4  $^{\circ}\text{F}$  – +158  $^{\circ}\text{F}$

### Environmental Protection

- Ingress protection rating: IP40

### Environmental Conditions

- Operating temperature:  
-20  $^{\circ}\text{C}$  – +60  $^{\circ}\text{C}$  / -4  $^{\circ}\text{F}$  – +140  $^{\circ}\text{F}$
- Storage & transportation temperature:  
-40  $^{\circ}\text{C}$  – +70  $^{\circ}\text{C}$  / -40  $^{\circ}\text{F}$  – +158  $^{\circ}\text{F}$
- Humidity: 0 – 95% relative humidity, non-condensing

### Dimensions and Weight

Device	Weight	Dimensions (WxHxD)
RMO10TW RMO20TW	8 kg / 17.6 lbs	198 x 250 x 350 mm 7.8 x 9.8 x 13.8 in
RMO30TW RMO50TW	8,5 kg / 18.7 lbs	198 x 250 x 350 mm 7.8 x 9.8 x 13.8 in

### Warranty

- 3 years + 1 additional year upon registration on [DV Power official website](#)

### Applicable Standards


- Installation/Overvoltage category: II
- Pollution degree: 2
- Safety: LVD 2014/35/EU (CE Conform)
  - Standard EN 61010-1:2010
  - CAN/CSA-C22.2 No. 61010-1, 2nd edition, including Amendment 1
- EMC: Directive 2014/30/EU (CE Conform)
  - Standard EN 61326-1:2010

All specifications herein are valid at ambient temperature of +25 °C / +77 °F and standard accessories.  
 Specifications are subject to change without notice.  
 Specifications are valid if the instrument is used with the standard set of accessories.


<b>Current and sense cables with TTA clamps</b>	<b>Voltage sense cables with TTA clamps</b>	<b>Current connection cable with TTA clamps</b>	<b>Transport bag</b>
<b>Cable plastic case – large size</b>	<b>Cable plastic case with wheels – large size</b>	<b>Cable plastic case – medium size</b>	<b>Cable plastic case with wheels – medium size</b>
<b>Bluetooth communication module</b>	<b>Test shunt</b>	<b>Temperature sensor with cable</b>	<b>Cable bag</b>

## RMO-TW Series – Models


### RMO50TW

	<p><b>Test current:</b> 5 mA – 50 A</p> <p><b>Open voltage:</b> Up to 55 V</p> <p><b>Output power:</b> 1000 W</p>	<p><b>Dimensions (W x H x D):</b> 198 x 250 x 350 mm 7.8 x 9.8 x 13.8 in</p> <p><b>Weight:</b> 8,5 kg 18.7 lbs</p>
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### RMO30TW

	<p><b>Test current:</b> 5 mA – 30 A</p> <p><b>Open voltage:</b> Up to 55 V</p> <p><b>Output power:</b> 850 W</p>	<p><b>Dimensions (W x H x D):</b> 198 x 250 x 350 mm 7.8 x 9.8 x 13.8 in</p> <p><b>Weight:</b> 8,5 kg 18.7 lbs</p>
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### RMO20TW

	<p><b>Test current:</b> 5 mA – 20 A</p> <p><b>Open voltage:</b> Up to 55 V</p> <p><b>Output power:</b> 750 W</p>	<p><b>Dimensions (W x H x D):</b> 198 x 250 x 350 mm 7.8 x 9.8 x 13.8 in</p> <p><b>Weight:</b> 8,0 kg 17.6 lbs</p>
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### RMO10TW

	<p><b>Test current:</b> 5 mA – 10 A</p> <p><b>Open voltage:</b> Up to 55 V</p> <p><b>Output power:</b> 500 W</p>	<p><b>Dimensions (W x H x D):</b> 198 x 250 x 350 mm 7.8 x 9.8 x 13.8 in</p> <p><b>Weight:</b> 8,0 kg 17.6 lbs</p>
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## Order Info

Instrument with Included accessories	Article No
Winding Ohmmeter RMO-TW	RMOXXTW-N-02
DV-TR PC software including USB cable	
Mains Power cable	
Ground (PE) cable	
Transport bag	

Standard accessories	Article No
Current cables 2 x 10 m 2,5 mm <sup>2</sup> (32.8 ft, 13 AWG) and Sense cables 2 x 10 m (32.8 ft) with TTA clamps*	CS-10-02BPWC
Current cables 2 x 10 m 10 mm <sup>2</sup> (32.8 ft, 7 AWG) and Sense cables 2 x 10 m (32.8 ft) with TTA clamps**	CS-10-10LMWC
Sense cables 2 x 10 m (32.8 ft) with TTA clamps	S2-10-02BPWC
Current connection cable 1 x 5 m 6 mm <sup>2</sup> (16.4 ft, 9 AWG) with TTA clamps*	CX-05-062XWC
Current connection cable 1 x 5 m 10 mm <sup>2</sup> (16.4 ft, 7 AWG) with TTA clamps**	CX-05-102XWC
Cable bag	CABLE-BAG-00

\* For the RMO10TW and RMO20TW models

\*\* For the RMO30TW and RMO50TW models

Optional accessories	Article No
Current cables 2 x 5 m 2,5 mm <sup>2</sup> (16.4 ft, 14 AWG) with TTA clamps*	C2-05-02BPWC
Current cables 2 x 5 m 10 mm <sup>2</sup> (16.4 ft, 7 AWG) with TTA clamps**	C2-05-10LMWC
Current cables 2 x 10 m 2,5 mm <sup>2</sup> (32.8 ft, 14 AWG) with TTA clamps*	C2-10-02BPWC
Current cables 2 x 10 m 10 mm <sup>2</sup> (32.8 ft, 7 AWG) with TTA clamps**	C2-10-10LMWC
Current cables 2 x 10 m 16 mm <sup>2</sup> (32.8, 5 AWG) with TTA clamps**	C2-10-16LMWC
Current cables 2 x 15 m 2,5 mm <sup>2</sup> (49.2 ft, 14 AWG) with TTA clamps*	C2-15-02BPWC
Current cables 2 x 15 m 10 mm <sup>2</sup> (49.2 ft, 7 AWG) with TTA clamps**	C2-15-10LMWC
Current cables 2 x 15 m 16 mm <sup>2</sup> (49.2 ft, 5 AWG) with TTA clamps**	C2-15-16LMWC
Current cables 2 x 20 m 2,5 mm <sup>2</sup> (65.6 ft, 14 AWG) with TTA clamps*	C2-20-02BPWC
Current cables 2 x 20 m 10 mm <sup>2</sup> (65.6 ft, 7 AWG) with TTA clamps**	C2-20-10LMWC
Current cables 2 x 20 m 16 mm <sup>2</sup> (65.6 ft, 5 AWG) with TTA clamps**	C2-20-16LMWC
Current cables 2 x 10 m 2,5 mm <sup>2</sup> (32.8 ft, 14 AWG) and Sense cables 2 x 10 m (32.8 ft) with TTA clamps*	CS-10-02BPWC
Current cables 2 x 10 m 10 mm <sup>2</sup> (32.8 ft, 7 AWG) and Sense cables 2 x 10 m (32.8 ft) with TTA clamps**	CS-10-10LMWC
Current cables 2 x 10 m 16 mm <sup>2</sup> (32.8 ft, 5 AWG) and Sense cables 2 x 10 m (32.8 ft) with TTA clamps**	CS-10-16LMWC
Current cables 2 x 15 m 2,5 mm <sup>2</sup> (49.2 ft, 14 AWG) and Sense cables 2 x 15 m (49.2 ft) with TTA clamps*	CS-15-02BPWC
Current cables 2 x 15 m 10 mm <sup>2</sup> (49.2 ft, 7 AWG) and Sense cables 2 x 15 m (49.2 ft) with TTA clamps**	CS-15-10LMWC
Current cables 2 x 15 m 16 mm <sup>2</sup> (49.2 ft, 5 AWG) and Sense cables 2 x 15 m (49.2 ft) with TTA clamps**	CS-15-16LMWC
Current cables 2 x 15 m 25 mm <sup>2</sup> (49.2 ft, 3 AWG) and Sense cables 2 x 15 m (49.2 ft) with TTA clamps**	CS-15-25LMWC

Current cables 2 x 20 m 2,5 mm <sup>2</sup> (65.6 ft, 14 AWG) and Sense cables 2 x 20 m (65.6 ft) with TTA clamps*	CS-20-02BPWC
Current cables 2 x 20 m 10 mm <sup>2</sup> (65.6 ft, 7 AWG) and Sense cables 2 x 20 m (65.6 ft) with TTA clamps**	CS-20-10LMWC
Current cables 2 x 20 m 16 mm <sup>2</sup> (65.6 ft, 5 AWG) and Sense cables 2 x 20 m (65.6 ft) with TTA clamps**	CS-20-16LMWC
Current cables 2 x 20 m 35 mm <sup>2</sup> (65.6 ft, 2 AWG) and Sense cables 2 x 20 m (65.6 ft) with TTA clamps**	CS-20-35LMWC
Sense cables 2 x 5 m with (16.4 ft) TTA clamps	S2-05-02BPWC
Sense cables 2 x 10 m with (32.8 ft) TTA clamps	S2-10-02BPWC
Sense cables 2 x 15 m with (49.2 ft) TTA clamps	S2-15-02BPWC
Sense cables 2 x 20 m with (65.6 ft) TTA clamps	S2-20-02BPWC
Current connection cable 1 x 5 m 6 mm <sup>2</sup> (16.4 ft, 9 AWG) with TTA clamps*	CX-05-062XWC
Current connection cable 1 x 5 m 10 mm <sup>2</sup> (65.6 ft, 7 AWG) with TTA clamps**	CX-05-102XWC
Current connection cable 1 x 5 m 16 mm <sup>2</sup> (65.6 ft, 5 AWG) with TTA clamps**	CX-05-162XWC
Current connection cable 1 x 12 m 6 mm <sup>2</sup> (65.6 ft, 9 AWG) with TTA clamps*	CX-12-062XWC
Current connection cable 1 x 12 m 10 mm <sup>2</sup> (65.6 ft, 7 AWG) with TTA clamps**	CX-12-102XWC
Current connection cable 1 x 12 m 16 mm <sup>2</sup> (65.6 ft, 5 AWG) with TTA clamps**	CX-12-162XWC
Temperature sensor 1 x 50 mm (1,97 in) + 5 m (16,4 ft) cable	TEMP1-050-05
Temperature sensor 1 x 50 mm (1,97 in) + 10 m (32,8 ft) cable	TEMP1-050-10
Temperature sensor 1 x 50 mm (1,97 in) + 15 m (49,2 ft) cable	TEMP1-050-15
Temperature sensor 1 x 50 mm (1,97 in) + 20 m (65,6 ft) cable	TEMP1-050-20
Test Shunt 150 A / 150 mV	SHUNT-150-MK
Transport bag for instruments in Metal housing	TRBAG-M00-01
Cable bag	CABLE-BAG-00
Cable plastic case - small size	CABLE-CAS-01
Cable plastic case - medium size	CABLE-CAS-02
Cable plastic case with wheels - medium size	CABLE-CAS-W2
Cable plastic case - large size	CABLE-CAS-03
Cable plastic case with wheels - large size	CABLE-CAS-W3
Built in thermal printer 58 mm (2.28 in)	PRINT-058-01
Thermal paper roll 58 mm (2.28 in)	PRINT-058-RO
Bluetooth communication module	BLUET-MOD-01
Tap Changer Simulator with cable set	TAPC-SIM-000

\* For the RMO10TW and RMO20TW models

\*\* For the RMO30TW and RMO50TW models

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