

MTO210

Transformer Ohmmeter



- **Direct 2-channel digital reading (10 $\mu\Omega$ to 2000 Ω)**
- **DC test current up to 10 A maximum**
- **0.25% measurement accuracy**
- **Integrated demagnetization feature**
- **Tests operation of on-load tap-changers**
- **Fast auto safety discharge circuit**

DESCRIPTION

The MTO210 Transformer Ohmmeter is a line-operated, field-portable instrument designed specifically to measure the dc resistance of all types of magnetic windings safely and accurately. It can test transformers and rotating machine windings and perform low-current resistance measurements on connections, contacts and control circuits.

The dual set of potential inputs measures the resistance of the primary and secondary windings of a single- or three-phase transformer simultaneously. This dual reading, dual injection characteristic, also helps to speed up the measurements when used to test LV windings on large three-phase power transformers.

The Transformer Ohmmeter is useful when testing the windings and contact resistance of tap-changers with "make-before-break" contacts and voltage regulators. This action will check for pitted or misaligned contacts as the instrument will give an indication if either condition occurs.

Users are also protected by the auto-shutdown safety feature. Any inadvertent disconnection of a test lead or loss of power to the instrument will safely discharge the energy stored in the unit under test (UUT).

APPLICATIONS

The MTO210 Transformer Ohmmeter is used:

- To verify factory test readings.
- As part of a regular maintenance program.
- To help locate the presence of defects in transformers, such as loose connections.
- To check the "make-before-break" operation of on-load tap-changers.

A regular maintenance program that includes winding resistance measurements is the most effective way to use this instrument. Once a benchmark is established, subsequent test results can be compared to determine if changes are occurring in the transformers and associated control wiring, voltage regulators, motors, generators, breaker contacts, and all types of connections (bolted,

soldered, crimped, etc.).

Tap-changers are mechanical devices and the most vulnerable part of a transformer. Tap-changers result in more failures and outages than any other component and so require frequent testing and attention to ensure reliable and safe operation.

FEATURES AND BENEFITS

- Direct 2-channel digital reading allows for testing two windings at a time.
- Very fast discharge time.
- High-contrast, large alphanumeric displays can be seen in bright sunlight.
- User-selectable maximum current range ensures protection of small transformers.
- Beacon drive circuit is provided for use with optional HV strobe light.
- Built-in demagnetization circuitry allows the operator to de-magnetize the transformer core upon completion of resistance testing, or as a stand-alone feature before SFRA testing or when the transformer is put back in service.
- The MTO210 allows for test of transformers with on-load tap-changers and provides a "break-before-make" indicator, in the event of any discontinuity.
- For those users who choose to create an external interlock safety perimeter, a safety interlock circuit is provided.
- Remote trigger switch is also provided for testing transformers with tap-changers.
- Internal flash memory allows for mass storage of dataset records, for later recall, printing, and analysis.
- Ruggedized clamps, with 4 inch (100 mm) jaws, are provided eliminating the need for bushing adapters.
- Kelvin clamps/cables (optional) for easy connection to the transformer
- Compatible with PowerDB software package.
- Built-in discharge circuit safely discharges the specimen when test is completed, if lead accidentally disconnects, or if power is lost.

- Output RS232 serial port is provided for optional printing of results and/or data output to a PC.
- Detachable lid for ease of use.

SPECIFICATIONS

Input

85-264 V, 47-63 Hz, 720 VA

DC Output

User Selectable Current Ranges: up to 10 mA
 up to 100 mA
 up to 1 A
 up to 10 A

Open-Circuit Test Voltage: 40 V dc

Measurement Voltage: up to 20 V dc

Max Power: 200 VA continuous

Resistance Measurement/Display

Resistance:

10 A	10 $\mu\Omega$ to 0.2 Ω	0.000001
10 A	0.2 Ω to 2 Ω	0.0001
1 A	100 $\mu\Omega$ to 2 Ω	0.00001
1 A	2 Ω to 20 Ω	0.001
100mA	1 m Ω to 20 Ω	0.0001
100mA	20 Ω to 200 Ω	0.01
10 mA	10 m Ω to 200 Ω	0.001
10 mA	200 Ω to 2000 Ω	0.1

Accuracy: $\pm 0.25\%$ Range $\pm 0.25\%$ Rdg

Resolution: Up to 4 digits

Make Before Break Settings

L0 - OFF

L1 - 2 ms

L2 - 20 ms

L3 - 40 ms

L4 - 80 ms

Displays

Two 1" high, 6 character, 7-segment, LCDs

One 0.71" high, 6 character, 7-segment, LCD

Printer

Via RS-232 port

User Interface

B&W alphanumeric displays, keypad

Computer Interface (for downloading results)

Via RS-232 port

Internal Data Storage

Up to 10,000 data sets

Environmental

Operating: 14° F to 122° F (-10° C to 50° C)

Storage: -40° F to 158° F (-40° C to +70° C)

Relative Humidity: 0-90% non-condensing

Ingress Protection (lid closed): IP 52

Safety

Meets the requirements of EN61010-1:2001

EMC: Meets the requirements of EN61326-1:1998 for use in heavy industrial areas.

Dimensions

8.5 H x 21.5 W x 13 D in (216 H x 546 W x 330 D mm)

Weight

Net 29 lb (13.1 kg)

ORDERING INFORMATION

Item (Qty)	Cat. No.	Item (Qty)	Cat. No.
Transformer Ohmmeter 120/240 volt, 50/60 Hz input	MTO210	Optional Accessories	
Included Accessories		V1 Potential Lead Set, 100 ft (30 m)	2000-700-100
V1 Potential Lead Set, 60 ft (18 m)	2000-700-60	V2 Potential Lead Set, 100 ft (30 m)	2000-701-100
V2 Potential Lead Set, 60 ft (18 m)	2000-701-60	Jumper Lead, 50 ft (15 m)	2000-703-50
Current Lead Set, 60 ft (18 m)	2000-702-60	Current Lead Set, 100 ft (30 m)	2000-702-100
Jumper Lead, 30 ft (9 m)	2000-703-30	Kelvin Lead Set, 60 ft (18 m)	2000-706-60
Ground Lead, 15 ft (4.5 m)	4702-7	Kelvin Lead Set, 100 ft (30 m)	2000-706-100
RS232 Cable for connecting to a PC and Printer	CA-RS232	Test Lead Set, 60 ft (18 m) including V1, V2, Current and 30 ft (9 m) Jumper Lead	1001-425
Remote Hand Switch	30915-220	Test Lead Set, 100 ft (30 m) including V1, V2, Current and 50 ft Jumper Lead	1001-451
AC Power Cord (IEC60320-C13 to US standard)	17032	HV Strobe including (18m) 6 ft Lead	1004-639
AC Power Cord (IEC60320-C13 to Schuko CEE 7/7)	17032-13	Printer (includes battery/line powered serial thermal printer)	
Quick Start Guide	Y37178	120 V, 60 Hz	1001-390
Canvas Carrying Bag (for leadset)	2005-265	230 V, 50 Hz	1001-401
Ethernet Cable	36798	Foam-lined Transit Case	2005-340
Instruction Manual	ATVMMTO210	USB to Ethernet Adapter	90001-541
PowerDB LITE, Computer Software			

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