

MTO210

Transformer Ohmmeter



- **Direct 2-channel digital reading**
(1 $\mu\Omega$ 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**
- **Very 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 extremely 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 beacon 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 analysis on a PC.
- Detachable lid for ease of use.
- Unit can be operated while in transit case.
- Leads can stay connected while in transit case.

SPECIFICATIONS

Input

120/240 V, 50/60 Hz, 720 VA

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: up to 50 V dc

Resistance Measurement/Display

Resistance: 1 $\mu\Omega$ to 2000 Ω

Accuracy: $\pm 0.25\%$ reading, $\pm 0.25\%$ full scale (when current has stabilized)

Resolution: Up to 6 digits

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: 5° F to 158° F (-15° C to +70° C)

Relative Humidity: 0-90% non-condensing

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 | | |
| Included Accessories | | Optional Accessories | |
| V1 Potential Lead Set, 60 ft (18 m) | 2000-700 | V1 Potential Lead Set, 100 ft (30 m) | 2001-403 |
| V2 Potential Lead Set, 60 ft (18 m) | 2000-701 | V2 Potential Lead Set, 100 ft (30 m) | 2001-404 |
| Current Lead Set, 60 ft (18 m) | 2000-702 | Jumper Lead, 50 ft (15 m) | 2001-405 |
| Jumper Lead, 30 ft (9 m) | 2000-703 | Current Lead Set, 100 ft (30 m) | 2001-406 |
| Ground Lead, 15 ft (4.5 m) | 4702-7 | Kelvin Lead Set, 60 ft (18 m) | 2001-407 |
| RS232 Cable for connecting to a PC and Printer | CA-RS232 | Kelvin Lead Set, 100 ft (30 m) | 2001-408 |
| Remote Hand Switch | 30915-220 | Test Lead Set, 60 ft (18 m) including V1, V2, Current and 30 ft (9 m) Jumper Lead | 1001-425 |
| AC Power Cord (IEC60320-C13 to US standard) | 17032 | Test Lead Set, 100 ft (30 m) including V1, V2, Current and 50 ft Jumper Lead | 1001-451 |
| AC Power Cord (IEC60320-C13 to Schuko CEE 7/7) | 17032-13 | Beacon Strobe Light | 37181 |
| Quick Start Guide | 37178 | Printer (includes battery/line powered serial thermal printer) 120 V, 60 Hz | 1001-390 |
| Canvas Carrying Bag (for leadset) | 30915-211 | 230 V, 50 Hz | 1001-401 |
| CAT5e Patch Cable | 36798 | Foam-lined Transit Case | 37009 |
| Instruction Manual | ATVMMTO210 | USB to Ethernet Adapter | 90001-541 |
| PowerDB LITE | | PowerDB (full version) Software, 1st machine license, soft key | DB1001 |
| | | PowerDB (full version) Software, 1st machine license, USB dongle | DB1001S |