

MTOU3

Switched Three-phase transformer winding ohmmeter



Three-phase switched source and measurement for:

- **Winding resistance**
Up to 10 A, $\pm 0.2\%$ accuracy
- **Adaptive demagnetization**
- **Unique transformer vector validation**
- **Accuracy guaranteed from $-20\text{ }^{\circ}\text{C}$ to $50\text{ }^{\circ}\text{C}$**
- **Save time and protect operators with efficient one-time lead connection for all tests**

DESCRIPTION

Power through transformer winding resistance tests with the new MTOU3, the switched three-phase transformer winding ohmmeter. Perform vector confirmation, winding resistance, and demagnetization tests with the same one-time lead connection. Guided by color-coded leads and extendable clamps with on-screen vectors that match the transformer nameplate, the easy to follow setup ensures the right result the first time - just click start! Auto vector confirmation before every test ensures that the proper transformer vector is selected.

STANDARD FEATURES

- Microsoft Excel export
- PowerDB import and export
- 10.1 in Hi-bright touch screen
- Find vector, polarity recognition and validation
- Winding resistance, up to 10 A DC, $\pm 0.2\%$ resistance accuracy
- Independent dual winding magnetization
- Adaptive demagnetisation
- OLTC make before break continuity testing
- OLTC control with breaker protection
- One-touch OLTC
- Built in retractable handle and wheels
- Emergency stop

- Key lock
- Safety interlock

ADDITIONAL FEATURES

- Dynamic resistance measurements
- Winding resistance dry out
- Winding resistance heat run
- USB printer
- Safety beacon
- OLTC motor current monitor
- OLTC vibration monitor
- External temperature probe

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DETAILED DESCRIPTION

The MTOU3 is designed to test all power and distribution transformers, and potential transformers. With minimal input from the user, the MTOU3 delivers the DC voltage and current to obtain fast, accurate results.

A single ladder climb and one-time lead connection reduces time spent on top of transformers. Once connected to the transformer, a key lock, safety interlock, and an emergency stop ensure testing starts and stops safely.

Confirm vector / polarity recognition

A first for winding ohmmeters, confirm vector provides confidence in transformer results by performing vector group discovery and validation before every test. The operator is required to validate the intended winding to be measured and failure to do so could have catastrophic consequences when system voltage energises the transformer.

Winding resistance

Efficiently test winding resistance with switched three-phase dual winding DC output of the MTOU3. 50 VDC open circuit voltage quickly saturates the transformer core as independent current sources for H and X channels deliver stable and accurate measurements for each winding under test. No lead changes are required to switch from phase to phase - select auto save and the MTOU3 does all the work. If one phase is out of limits, the user interface simplifies investigation by highlighting the problem phase and guiding the user through the results validation process.

Automatic adaptive demagnetization

Adaptive demagnetization removes remanence (magnetization) that remains after winding resistance tests are complete. The MTOU3 avoids costly nuisance trips of protection equipment with automatic demagnetization performed after each winding resistance test.

OLTC make before break continuity

When performing winding resistance tests across multiple OLTC taps, make before break testing automatically verifies continuity of the tap changer connections. This first level diagnostic mode is useful in determining when dynamic resistance measurements are appropriate for further investigation.

One-touch OLTC

Save time testing with One-touch OLTC. Connect to the transformer OLTC with the included cables and run through an entire OLTC with one click, providing maximum test efficiency.

PROBLEMS TYPICALLY FOUND WITH THE MTOU3

- Loose connections
- Tap changer contact problems

SOFTWARE, SAVING, AND PRINTING RESULTS

Minimise training time with the intuitive 10.1 in user interface of the MTOU3. Large, self-explanatory buttons guide operation, while on-screen vectors provide reassurance that the transformer nameplate matches the test setup. When exported, results are grouped by file name, producing an XLSX/PDF report that is easy to read, email, or import into PowerDB. When needed, the optional USB printer can print results on demand.

When you connect the MTOU3 to your PC, not only can you control the device, but a USB drive will appear. The user manual, data sheet, and MTOU3 PC application installer can be found on this drive so you always have the necessary documentation and applications on hand.

PowerDB control

If you're looking to step up your reporting, use PowerDB to configure and execute your tests. With PowerDB you can produce consistent test reports from all of your Megger instruments.

Custom application control

With custom app control, any program can control the MTOU3 through the API. Great for organisations looking to push their test program to the limit! Non-disclosure agreement required for access to the API.

Dynamic resistance measurements (DRM)

Dynamic resistance measurements are an advanced diagnostic test for on-load tap changers. Pinpoint issues in on-load tap changers with individual resistor values and vibration and motor current profiles.

Heat run – internal temperature

Winding resistance cool down is an advanced diagnostic tool to determine the maximum temperature of a winding immediately after removal from full power.

Dry out – internal temperature

A transformer may need to go through a dry out process before going into service. This dry out process requires the internal temperature to remain steady for a set amount of time. Provide a reference temperature and resistance, and the MTOU3 will report the temperature of the winding.

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UNIVERSAL LEAD SET

The three-phase universal lead set simplifies connecting to any transformer. The durable kelvin clamps extend up to 7.6 cm (3 in) for connecting to any bushing size. Lead spans range from 5 m (15 ft) to 30 m (100 ft), ensuring secure connection and test capabilities for all transformer shapes and sizes. Connecting all leads in one ladder climb greatly reduces the risk of fall injuries and test time. Existing customers are able to use legacy lead sets with the MTOU3. See the tables to the right for details.

COLOR CODED LEADS FOR QUICK SETUP AND VERIFICATION

Jackets Connectors Clamps



16 A H leads - MTOU3 BASIC



16 A X leads - MTOU3 BASIC

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SPECIFICATIONS - Valid from -20 ° to +50 °C

Input power

100-240 V AC, 47-63 Hz, 1200 W±10 %
Mains supply voltage fluctuations overvoltage category II

Output power

Voltage: 3-phase switched, 1-50 V
Frequency: DC, 80 Hz
Current: 0.1 mA – 1 A at 50 V
Current: 0.1 mA – 10 A at 24 V

Regulatory

Safety IEC 61010-1:2010 + AMD1:2016
EMI/EMC IEC 61326-1:2012
RoHS2 EN50581
Vibe/Shock MIL-STD-810G
Ingress protection IP67 (in transit case)

Transformer testing standards

IEEE C57.152-2013
IEC 60076-1:2011
AS/NZS 6076 1:2014
CIGRE 445 2 011
GOST 3484.1-88

Dimensions

55.8 x 28.7 x 19 cm
22 x 11.3 x 7.5 in

Weight

17 kg 38 lbs

Case

Rugged case with built in wheels and handle
Backpack lead bag for leads and accessories

Internal/external data storage

Up to 10 000 sets of three-phase results internal storage
Transferable via USB 2.0 drive

Communication/control software

USB interface for PC control with custom GUI

Touch screen

25.6 cm 10.1 in
1024 x 600 resolution
1000 NITS

Printer (optional)

51 mm (2 in) thermal printer
Prints all measurement data displayed on GUI

Environmental

Operating -20 ° to 50 °C (-4 ° to 122 °F)
Storage -30 ° to 70 °C (-22 ° to 158 °F)
Relative humidity 0-90 %, non-condensing
Indoor and outdoor use in dry locations
Elevation 2000 m MAX
Pollution degree 2

WR

Resistance measurement methods

1-phase wye, delta, zigzag
Dual winding excitation

DC open circuit

voltage Up to 50 V

DC measurement

voltage Up to 50 V

Resistance accuracy

1.0 μΩ to 30 kΩ
±0.2 % reading, ± 1μΩ
30+ kΩ
±0.5 % reading

Resistance resolution

5 digits

DC voltage accuracy

Typical: ±0.05 % reading, ±0.1 mV
Guaranteed: ±0.5 % reading, ±0.1 mV

DC current accuracy

Typical: ±0.05 % reading, ±0.1 mA
Guaranteed: ±0.5 % reading, ±0.1 mA

Specified accuracy for external verification only and does not impact DC tests accuracy (Winding resistance).

Current and resistance ranges

Typical with 9 m (30 ft) leads

| Current | Min Ω | Max Ω |
|---------|--------|--------|
| 10 A | 1.0 μΩ | 1.0 Ω |
| 8 A | 1.0 Ω | 2.0 Ω |
| 1 A | 2.0 Ω | 20 Ω |
| 100 mA | 1.0 Ω | 100 kΩ |

Dynamic resistance measurement method

Dynamic voltage
Dynamic current
Dynamic resistance

Dynamic Resistance Speed

Speed 20 kHz

Motor current measurement (optional)

9 V battery power

Measuring range: 3.0 A/30 A
Frequency range: DC to 60 Hz
Resolution: ± 50 mA / ± 100 mA
Accuracy: ±1 % reading

Temperature probe measurement (optional)

Range: -20 °C to + 110 °C
Accuracy: ±1 % reading, ± 1.0 C

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ORDERING INFORMATION

| Item (Qty) | Cat. No. | Item (Qty) for price list | Cat. No. |
|---|--------------|--------------------------------------|----------------|
| Three-phase transformer winding analyser | MTOU3 BASIC | | |
| Included Accessories | | Optional hardware accessories | |
| AC Power Cords (US, EU, UK) | 1014-927 | Calibration Certification | MTOU3-CAL-CERT |
| USB 2.0 Cable | CA-USB | Safety Beacon – 18 m (60 ft) | 1004-639 |
| OLTC Tap Changer Cable | 1011-622 | Transit case (for instrument) | 1014-928 |
| Cable Bag – Backpack | 2012-180 | USB Printer | 90029-573 |
| Ground Lead 4.5 m (15 ft) | 4702-7 | USB Printer Paper (x48 rolls) | 90029-573-P |
| USB Drive | 90012-878 | OLTC tap changer cable adapters | 1011-622-A |
| Accessories required for operation | | Motor current monitor | 1014-929 |
| Choose one lead kit | | Temperature probe kit | 1014-931 |
| MTOU3 BASIC Lead kits | | TOS1 calibration standard | TOS1 |
| 16 Amp H leads with red jacket and red, yellow, blue, and white clamps (4 total) | | Optional software accessories | |
| 16 Amp X leads with black jacket and red, yellow, blue, and white clamps (4 total) | | PowerDB control | SW-POWERDB |
| 5 m (15 ft) H and X leads | 2008-15KIT2 | Custom application control | SW-CUSTOMAPP |
| 9 m (30 ft) H and X leads | 2008-30KIT2 | Dynamic resistance measurements | SW-DRM |
| 18 m (60 ft) H and X leads | 2008-60KIT2 | Transformer heat run measurements | SW-HEATRUN |
| 30 m (100 ft) H and 18 m (60 ft) X leads | 2008-100KIT2 | | |
| Optional lead accessories | | | |
| MTOU3-BASIC 16 A H and 16 A X lead extensions | | | |
| 9 m (30 ft) H and X extensions | 2008-30XKIT2 | | |

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