

MTO3XX Series

Automated Six-Winding Transformer Ohmmeter



- **One-time connection principle results in a 4x faster setup time eliminating over 70% of safety risk***
- **Automated eight-terminal/six-winding measurement capability**
- **Interchangeable lead set with the Megger 3-phase series of TTRs**
- **Simultaneous winding magnetization for fast and accurate dc winding resistance measurements of high inductive loads**
- **Built-in auto-demagnetization**
- **On-load tap changer operation testing**

DESCRIPTION

The MTO3XX series delivers full eight-terminal/six-winding resistance measurement capability. It is designed to save time by testing all six windings without having to disconnect and reconnect leads. Also, the simultaneous winding magnetization (SWM) method gives fast and reliable measurements even on large transformers with delta configuration on the low voltage side. Additionally, the MTO3XX series leads are interchangeable with the Megger TTR300 series of three-phase turns ratio instruments which eliminates additional connecting time for turns ratio measurements.

The MTO3XX series consists of two models:

- The base model, MTO300, is designed to be remote controlled via PowerDB software on an external PC or a Megger transformer test product with on-board computer.
- The MTO330A offers the same functionality as the MTO300. The MTO330A is equipped with an industrial grade, 12-in. touch controller. The display is designed to operate in direct sunlight (1600 nits brightness), and all the components are rated to operate from -20°C to +50°C. An additional feature that has been added to the MTO330A is the "safety shutdown" which automatically saves results and properly shuts controller down in the event of an abrupt power disruption, whether accidentally or on purpose.

Modular Testing

The MTO3XX series is the latest addition to Megger's extensive line of products with a common digital platform, allowing users the ability to link with other compatible Megger transformer test instruments.

- The MTO300 can be controlled by an external PC or other Megger products with on-board computer such as the DELTA4310A and TTR330A.
- MTO330A has an internal computer and can be used to control other Megger products such as the TTR300, TTR310, DELTA4110, and MLR10.

APPLICATIONS

MTO3XX Transformer Ohmmeters are used to:

- Verify factory test readings.
- Help locate the presence of defects in transformers such as increased contact resistance in terminal connections and tap-changers.
- Check the operation of on-load tap changers.

* Historically, a common accident when working in a substation happens while the technician is going up and down a ladder.

The design of the MTO3xx series of products allows testing of all six windings, on a 3-phase transformer, with one lead set connection. Traditional "one-at-a-time" six-winding testing required 7 to 8 separate trips up/down the ladder as compared to only one trip to connect and one trip to disconnect with the MTO3xx series.

FEATURES AND BENEFITS

- Faster testing with one-time connection principle, measures all phases and windings without disconnecting or reconnecting leads.
- “One clamp per designated bushing” concept significantly reduces chance of operator error in making lead set connections.
- Automated eight-terminal/six-winding measurement capability saves time and eliminates the need for external jumper cables.
- Interchangeable lead set with the Megger TTR300 series of 3-phase turns ratio instruments saves time and money.
- DC test current up to 10 A.
- Built-in discharge circuit safely discharges the specimen when test is completed, if lead accidentally disconnects, or if power is lost.
- Built-in demagnetization circuitry allows the operator to demagnetize 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.
- Custom PowerDB form for production heat-run (interval) testing.
- PowerDB software allows for data analysis and trending while in the field without the use of an external computer.
- The user can easily recall transformer set ups from a custom-settings menu with PowerDB.
- PC interface via USB for remote control operation and downloading of test results for ease of use.

Easy, Automatic Testing of All Six Windings

Once connected, the MTO3XX performs resistance measurements on all windings without any reconnection. The test procedure is simple and efficient. One end of the measurement cable set is connected to each bushing/terminal of the transformer using the special Kelvin clamp. The other end of the cable is connected to the MTO3XX. The instrument will automatically measure selected resistances of both HV and LV windings. The test sequence can be selected as 6-winding with simultaneous winding magnetization, 3-winding measurement of HV and LV separately, or single-winding test.

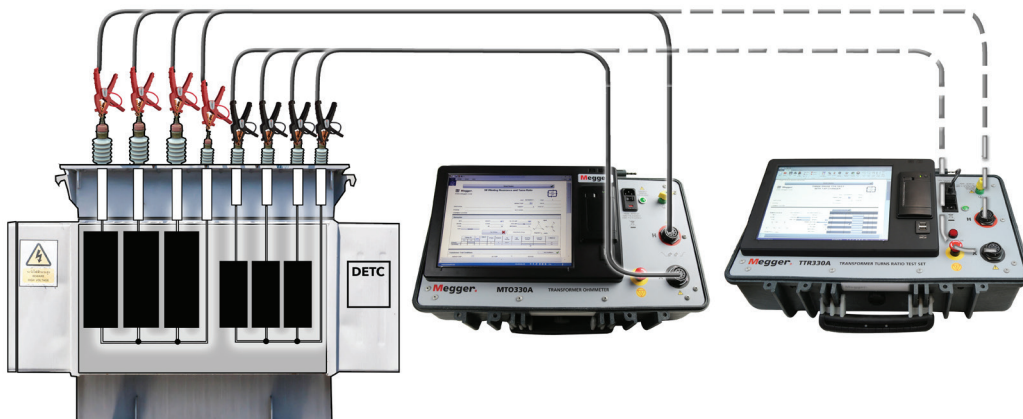
PowerDB™ ONBOARD Software (Model MTO330A only)

The “PowerDB ONBOARD” logo means PowerDB software is running on a computer embedded within the MTO330A. This software provides the MTO330A with a common “user interface” to minimize operator training and provides a seamless interface to the full PowerDB (PC version) application.

Easy-to-read on-screen test forms provide the user interface for instrument set-up and test operation. Results are displayed against pass/fail nameplate limits and can be stored (either internally or to a USB storage device) in an open XML data format.

The ONBOARD software also maintains a historical data file so that, while in the field, current and past results can be analyzed, compared, and displayed in trend charts without the need of an external computer. The built-in industrial controller also comes with a built-in 2 inch printer (uses universally available thermal paper). This printer is useful for printout of any critical results, and for those who want a backup of results with them.

Two Instruments, One Set of Leads



The diagram shows the MTO3xx series and TTR300 series easily and conveniently using the same set of test leads. For example, the user can leave the leads connected to the transformer and use the same lead set to run turns-ratio testing with the Megger TTR3xx series, eliminating several up-and-down-the-ladder trips.

SPECIFICATIONS**Input Power**

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

Output**User Selectable Current Ranges:**

up to 10 mA
up to 100 mA
up to 1 A
up to 2.5 A
up to 5.0 A
up to 7.5 A
up to 10 A

Open Circuit Test Voltage: up to 40 V dc

Measurement Voltage: up to 20 V dc

Max Power: 200 VA continuous

Resistance Measurement/Display

Resistance ranges:

Current Range (A)	Resistance Range (Ω)	Resolution (Ω)
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: +/-0.25% Range +/-0.25% Rdg

Resolution: Up to 4 digits

Printer Interface

MTO300: Via external PC

MTO330A: USB

PC Interface

MTO300: Ethernet

MTO330A: Ethernet for remote control; USB flash drive for storage and transfer of test results

User Interface

MTO300: PowerDB on external PC

MTO330A: Provided hardware

Touchscreen Display (ruggedized for field use)

Size: 300 mm (12 in.)

Resolution: 1024 x 768 (XGA)

Luminance: 1600 nits

Coating: anti-glare

Backlight: LED

Technology: 4-wire resistive touchscreen

Memory: 32 GB

Controls and Communication

Built-in touchscreen, 2 USB 2.0 ports and 1 Ethernet interface (10/100 Mbps) provided for data export, built-in printer as well as OnBoard computer remote control of the Megger TTR3XX, DELTA4110, MLR10, MWA3xx and select S1/MIT series insulation testers.

Internal Data Storage

MTO330A: 10,000 data points

Environmental

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

Storage: -58° F to +158° F (-50° 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

Instrument only, not including leads

MTO300: 29 lbs (13.1 kg)

MTO330A: 33 lbs (14.9 kg)

Case

Ruggedized plastic case with removable lid and carrying strap

Communication/Control Software

MTO300: PowerDB Lite (PowerDB Pro, optional)

MTO330A: PowerDB ONBOARD

Safety/EMC/Vibration

Meets the requirements of IEC-1010-1, CE and ASTM D999.75

OPTIONAL ACCESSORIES

Test Leads

Newly designed test leads, shown in image below, are universal and can be used for winding resistance (MTO3XX) or turns ratio (TTR3XX) instruments. Expandable jaws, shown in inset, allow for testing any size transformer.



Remote Tap Controller

The RTC-1 is a manually operated remote tap controller designed to provide a more efficient method of controlling (on)load tap changer (LTC) while performing routine tests on power transformers. It removes the need to be physically close to the LTC while testing or to have a second person controlling the LTC while operating the testing instrument. A 30 ft (9 m) three-conductor cable is provided to allow proximity to the test instrument while performing testing and advancing tap positions as required throughout the test.



ORDERING INFORMATION

Item	Cat. No.	Item	Cat. No.
Transformer Ohmmeter 120V $\pm 10\%$ 230V $\pm 10\%$, 47-63 Hz input	MTO300	Optional Accessories	
Transformer Ohmmeter, with onboard computer, 120V $\pm 10\%$ 230V $\pm 10\%$, 47-63 Hz input	MTO330A	3-phase universal shielded test lead sets compatible with MTO3XX, MWA3XX & TTR3XX series instruments (up to 10A max), complete with color-coded Kelvin clamps:	
Included Accessories		3-phase universal, 9 m (30 ft) H & X	2008-30-KIT
Universal AC power cord set, 2.5m (8 ft), IEC, includes US standard, Schuko CEE 7/7, BS1363, AS/NZ S3112:2004	2009-874	3-phase universal, 18 m (60 ft) H & X	2008-60-KIT
Ethernet communication cable	36798	3-phase universal, 30 m (100 ft) H & X	2008-100-KIT
USB to ethernet adapter (provided with MTO300 only)	90001-541	3-phase universal, 9 m (30 ft) H	2008-113-30
PowerDB Lite		3-phase universal, 9 m (30 ft) X	2008-114-30
Ground lead, 15 ft (4.5 m)	4702-7	3-phase universal, 18 m (60 ft) H	2008-113-60
Canvas carrying bag	2005-265	3-phase universal, 18 m (60 ft) X	2008-114-60
MTO3XX User guide on USB	1010-941	3-phase universal, 30 m (100 ft) H	2008-113-100
		3-phase universal, 30 m (100 ft) X	2008-114-100
		3-phase universal, 10 m (33 ft) X, extension	36486-7
		3-phase universal, 10 m (33 ft) H, extension	36486-8
		3-phase universal, 10 m (33 ft) H & X, extension	36486-9

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