



## **MULTI-AMP® Transformer Ohmmeter**

- Direct digital reading
- Built-in discharge circuitry
- Two independent measuring channels
- Tests operation of on-load tap-changers

# Transformer Winding Resistance and Tap-Changer Test Set

## DESCRIPTION

The Multi-Amp® 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.

Its predominant use is the measurement of the dc resistance of all types of transformer windings within the defined ranges of current and resistance.

It can also test rotating machine windings and perform low-current resistance measurements on connections, contacts and control circuits.

Three features combine to make this instrument unique: dual measurement, load tap-changer testing and safety shutdown.

The dual set of potential inputs measure the resistance of the primary and secondary windings of a single- or three-phase transformer simultaneously. The dual reading characteristic will speed up the measurement when it is used to test windings on delta-delta connected windings on three-phase transformers.

Due to circulating currents induced when the test current is applied to the primary winding, this type of measurement is countered by the same current on the secondary winding. This action attenuates the circulating current and the reading time is improved tenfold.

The Transformer Ohmmeter is extremely useful when testing the windings and contact resistance on

tap-changers with make-before-break contacts and voltage regulators.

The internal shutdown circuit will be triggered by a voltage kickback of a few microseconds if the tap-changer contacts are opened when the tap-changer circuit is operated through all of the tap positions.

This action will check for pitted or misaligned contacts as the instrument will shut down if either condition occurs.

Users are protected by the shutdown circuit safety feature: any inadvertent disconnection of a test lead or loss of power to the instrument will safely discharge the energy stored in the test sample.

## APPLICATIONS

The 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, instrument transformers and

associated control wiring, voltage regulators, motors, generators, breaker contacts, 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 proper, reliable operation.

The Transformer Ohmmeter can be used to check the make-before-break operation of on-load tap-changers and also to measure the contact resistance of each tap position.

## FEATURES AND BENEFITS

- Direct digital reading saves time, no balancing is required.
- Built-in discharge circuit safely discharges the specimen when test is completed, if lead accidentally disconnects or if power is lost.
- Electromechanical safety indicator gives a visual indication of a charged or discharged specimen, even if power to the instrument is lost.
- Two independent measuring channels allow simultaneous testing of primary and secondary windings or measurement of two phases at a time.
- The sensitive surge detection circuitry monitors the contact operation of on-load tap-changers for the proper make-before-break sequence. If an open circuit condition exists, the instrument shuts down immediately.

- High-accuracy, four-terminal bridge: no lead compensation required.
- Electronically generated and regulated current supply overcomes high-inductance transformers quickly, allowing fast measurements to be taken. Display of measurement occurs only after test current stabilizes.
- Wide resistance range allows heat-run testing of many transformer types.
- Lightweight and portable, the Transformer Ohmmeter is ideal for use in shop or substation environments.
- Overtemperature protection provides automatic current shutdown and LED indication to prevent instrument damage.
- Instrument and accessories come in a foam-lined transport case.

## SPECIFICATIONS

### Measuring Principle

Electronic Thompson-type circuit

### Input

120/240 V, 50/60 Hz, 350 VA

### Output

**Current Ranges:** 5 mA, 50 mA, 500 mA, 5 A (dc)

**Open-Circuit Test Voltage:** 30 Vdc

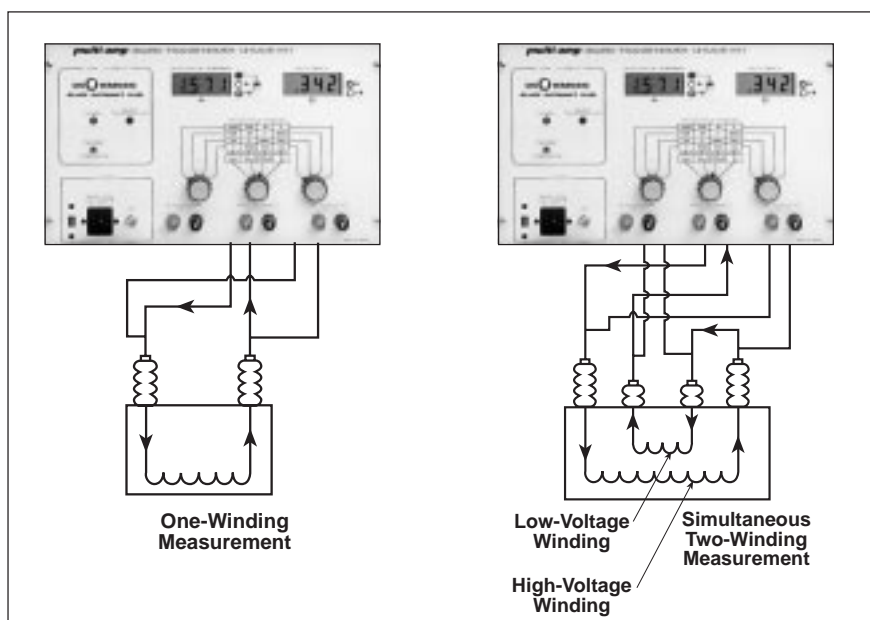
**Rating:** Continuous use on all ranges

**Resistance Measurement Inputs:** Two isolated high-impedance inputs, each with separate range control and protection provided for flash-over caused by inductive kickback

### Ranges

Nominal (ohms)	Resolution (ohms)	Maximum Display (ohms)
2 m	0.001 m	1.999 m
20 m	0.01 m	19.99 m
200 m	0.1 m	199.9 m
2	0.001	1.999
20	0.01	19.99
200	0.1	199.9
2000	1.0	1999

**Accuracy:**  $\pm 0.5\%$  reading,  $\pm 0.5\%$  full scale (when current has stabilized)



Schematic comparison of one- and two-winding measurements

**Overrange:** Lead number one displayed with all other digits blanked

### Environmental

**Operating:** 32 to 104° F (0 to 40° C), relative humidity to 80%

**Storage:** -40 to +150° F (-40 to +65° C)

**Temperature Coefficients:**  $\pm 0.05\%$  of applicable accuracy specifications per degree Celsius of resistance range

**Displays:** Two high-temperature, 0.7 in. (18 mm), liquid-crystal,  $3\frac{1}{2}$ -digit displays showing 1999 at full scale. Update rate is approximately three times per second.

### Dimensions

#### Instrument

11 H x 16 W x 10.5 D in.  
280 H x 406 W x 267 D mm

#### Transport Case

13 H x 20 W x 21 D in.  
330 H x 508 W x 533 D mm

### Weight

**Instrument:** Net 40 lb (18 kg)

**Shipping:** 66 lb (30 kg)



Power utilities can reduce expensive downtime by early detection of tap-changer problems using the Multi-Amp Transformer Ohmmeter.

## ORDERING INFORMATION

Item (Qty)	Cat. No.
Transformer Ohmmeter with	
120 volt, 60 Hz input .....	830280
240 volt, 50 Hz input .....	830280-47

### Included Accessories

Lead set, including .....	830282
Potential leads, 33 ft (10 m) [2 pr]	
Current leads, 33 ft (10 m) [1 pr]	
Shorting lead, 9.9 ft (3 m) [1]	

Item (Qty)	Cat. No.
Universal bushing adapters [set of 4] .....	830285
AC power cord .....	17032
Transport case .....	MC996
Instruction manual .....	AVTM830280

### Optional Accessories

Lead set, including .....	830282-66
Potential leads, 66 ft (20m) [2pr]	
Current leads, 66 ft (20 m) [2 pr]	
Shorting lead, 9.9 ft (3 m) [1]	