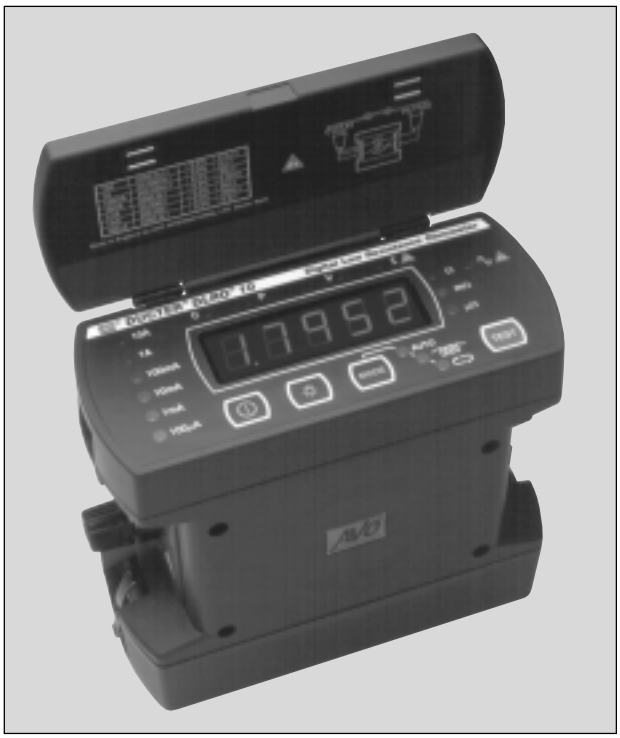


MEGGER® DUCTER® DLRO® 10

- **Accurate results in under 3 seconds**
- **Designed for the rigors of on-site testing and laboratory use**
- **Four-wire measurement technique cancels out lead resistance**
- **Auto current reversal cancels standing emfs**
- **Continuous not pulsed current**
- **Fuse protected to 600 V**
- **NiMH battery reduces weight**
- **250 mW power limit (with optional override) to avoid heating the test sample**
- **Automatically detects continuity in potential and current connections**
- **Visible warning of high voltages present at the terminals**
- **Visible warning of current flowing in the test sample**
- **5 operating modes including fully automatic**

Digital Low Resistance Ohmmeter

DESCRIPTION

The MEGGER DUCTER DLRO 10 Digital Low Resistance Ohmmeter brings a new standard to the measurement of low values of resistance. The DLRO 10 is built into a strong, lightweight case which is equally durable while working on the bench, in the field, or in the laboratory. The DLRO 10 is light enough to be worn around the neck and small enough to be taken into areas which were previously too small to accommodate low resistance meters. Its bright 4-1/2 digit LED display will ensure complete readability even in the darkest corners.

The DLRO 10 automatically selects the highest current, up to 10 A dc, to measure resistance from 0.1 μΩ to 2000 Ω, on one of seven ranges. Measurements are taken with forward and reverse currents to cancel the effects of any standing voltages across the test sample and the average value is displayed within three seconds, to a basic accuracy of 0.2%.

When making a measurement, the instrument checks to see if good continuity is present in the C and P circuits. If continuity is correct, the test current autoranges to the highest possible current and is applied in the forward direction and then in the reverse direction. At the end of approximately two seconds, the average of the two directions is display. Normally, the power used is limited to 250 mW to avoid heating the sample under test.

The DLRO 10 also checks to see if there is noise present when making measurements. If noise is present, the instrument will warn the user and perhaps limit the resolution of the reading to a level which can be trusted. Ambiguous digits will flash to show their unreliability.

To enhance operation, five measurement modes are available:

Normal mode initiates a test by pressing the test button on the front panel after connecting the test leads. Continuity of all four connections is checked, forward and reverse currents are applied, and the average resistance is displayed for 10 seconds or until the test button is again pressed.

Auto mode allows forward and reverse current measurements to be made and the average displayed by making contact with all four probes. Each time the probes are removed and reconnected to the load, another test will be performed without the need to press the test button on the instrument.

Continuous mode allows repeated measurements to be made on the same sample. Simply connect the test leads and press the test button. The instrument repeats the measurement, updating the display approximately every three seconds until the circuit is broken.

High Power mode is intended for use when making measurements on inductive loads. This mode overrides the 250 mW power limit thereby allowing higher voltages to be applied to the load, thus speeding the charging of inductive loads. The result will be displayed when the current stabilizes which should take less than two seconds for loads with an inductance less than 10 H.

To assist operator safety and ease of use, the DLRO 10 is supplied with a pair of duplex handspikes with leads. One of the probes is fitted with two LEDs which duplicate indicators on the instrument display indicating that all four contacts have been made, the presence of high voltage across the load, and the presence of current flow while an inductive load is discharging. A full range of test leads is available with probes, clamps and Kelvin clips.

A Nickel Metal Hydride (NiMH) battery provides the DLRO 10's power. These packs are interchangeable so that an exhausted battery may be recharged using the external charger supplied while testing continues using a spare pack. Although full charging will take 14 hours, a fast charge mode allows the battery to be 90 percent charged within four hours from a 12 V battery or from a standard 120/230 V ac outlet via the supplied charger. The battery pack contains its own battery state indicator which allows the charge state to be monitored, without being connected to the instrument.

APPLICATIONS

The needs for accurate low resistance measurement are well known and very diverse. They range through receiving, inspection of components to ground bonding and welded joints. Typical end users include utilities, telecom, railroads, aviation, manufacturing facilities, and process control plants. Applications include, but are not limited to, making dc resistance measurements for:

- Switch and contact breaker resistance
- Busbar and cable joints
- Aircraft frame bonds and static control circuits
- Integrity of welded joints
- Intercell strap connections on battery systems up to 600 V peak
- Quality control of resistive components
- Small transformer and motor winding resistance
- Rail and pipe bonds
- Metal alloys welds and fuse resistance
- Graphite electrodes and other composites
- Wire and cable resistance
- Transmitter aerial and lightning conductor bonding

FEATURES AND BENEFITS

- Small, lightweight and portable — can be used in tight places, reduces the need for extra long leads and two-person operation.
- Four-terminal resistance method shows the true resistance of the item under test.
- Bright LED displays are easily visible under all lighting conditions and reduces human error.
- Automatically applies forward and reverse currents which cancels out any standing voltages across the sample under test.
- Checks for undue noise during measurement reducing the possibility of recording the incorrect result.
- Automatically detects continuity in P and C circuits, preventing erroneously high readings to be taken due to high resistance contact.
- Battery module features smart charging circuit, reducing accidental damage and cost.
- Battery module has a battery condition indicator allowing the user to check the state of spare batteries without connecting to the instrument.

SPECIFICATIONS

Test Current Accuracy: ±10%

Output Current Stability

Better than 10 ppm per second on at test currents of 10 mA or less

Better than 100 ppm per second at currents above 10 mA

Voltmeter Input Impedance: greater than 200 kΩ

Hum rejection: less than 1% + 20 digits additional error with 100 mV rms 50/60 Hz on potential leads. If this level is exceeded, a warning will illuminate on the front panel.

Measurement speed: less than 3s for forward, reverse measurement and to display average

Display

Measurement: 4-1/2 digit seven segment LED

Range and Safety: LED indication

Battery

Standard capacity: 7 Ah NiMH rechargeable battery supplied with instrument

Recharge: via external charger supplied from 115/230 V 50/60 Hz or from 12 V car battery

Life: typically 1000 x 10 A tests

Battery charging

Standard Charge: 14 hrs

Fast Charge: 4 hrs to 90 % capacity at 68° F (20° C)

Charging temperature

Standard charge: 32° F to 113° F (0° C to +45°C)

Fast charge: 50° to 113° F (+10° to +45° C)

Temperature Range

Operation

41° to 113° F (+5° to +45° C) at full specification

14° to 122° F (-10° to +50° C) at reduced accuracy

Calibration temperature

68° F (20 ° C)

Temperature Coefficient

<0.006% per °F over range 41° to 104° F

<0.01% per °C over range 5° to 40 °C

Storage

-4° to 158° F (-20° to +70° C)

Humidity (max): 90% RH @ 104°F (40°C) non-condensing

Altitude (max): 6562 ft (2000 m) to full safety specifications

Safety: in accordance with EN61010-1 600 V Category III

EMC: meets EN50081-1 and EN50082-1 (1992)

Dimensions: 8.6 x 4 x 9.5 in. (220 x 100 x 237 mm)

Weight: 5.6 lb (2.5 kg) including battery module

Full Scale	Resolution	Accuracy	Volts (full scale)	Test Current
1.9999 mΩ	0.1 µΩ	± 0.2% ± 0.2 µΩ	20 mV	10 A
19.999 mΩ	1 µΩ	± 0.2% ± 2 µΩ	20 mV	1 A
199.99 mΩ	10 µΩ	± 0.2% 20 µΩ	20 mV	100 mA
1.9999 Ω	100 µΩ	± 0.2% 0.2 mΩ	20 mV	10 mA
19.999 Ω	1 mΩ	± 0.2% ± 2 mΩ	20 mV	1 mA
199.99 Ω	10 mΩ	± 0.2% 20 mΩ	20 mV	100 µA
1999.9 Ω	100 mΩ	± 0.2% ± 0.2 Ω	200 mV	100 µA

OPTIONAL TEST LEADS

MEGGER DUCTER DLROs require test leads, two potential and two current, to make low-resistance measurements. In addition to individual current and potential lead sets, duplex leads that combine current and potential connections in one set are offered. A variety of C-clamps, Kelvin clips, fixed point, and helical spring-point leads are available in various lengths.

Individual Test Leads

Type	Termination	Maximum Test Current	Length	Cat. No.
Potential	Hand Spikes	N/A	7 ft (2 m)	242021-7
			18 ft (5.5 m)	242021-18
			30 ft (9 m)	242021-30
Current	Terminal Clips	10 A	7 ft (2 m)	242041-7
			18 ft (5.5 m)	242041-18
			30 ft (9 m)	242041-30

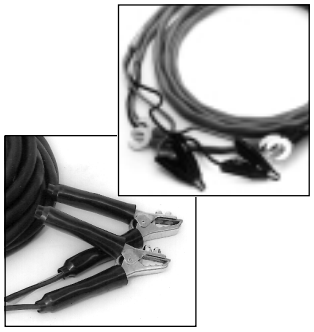
Duplex Test Leads

Helical Spring Points — Tips rotate and compress into the body of the probe to ensure accurate measurement.

Heavy-Duty Fixed Points — Economical, lightweight and built for durability.

Heavy-Duty C-Clamps — Current passes through the C-clamp and screw thread; the potential passes through a four-point anvil insulated from the clamp metal. This set of leads is available in two widths and a variety of lengths.

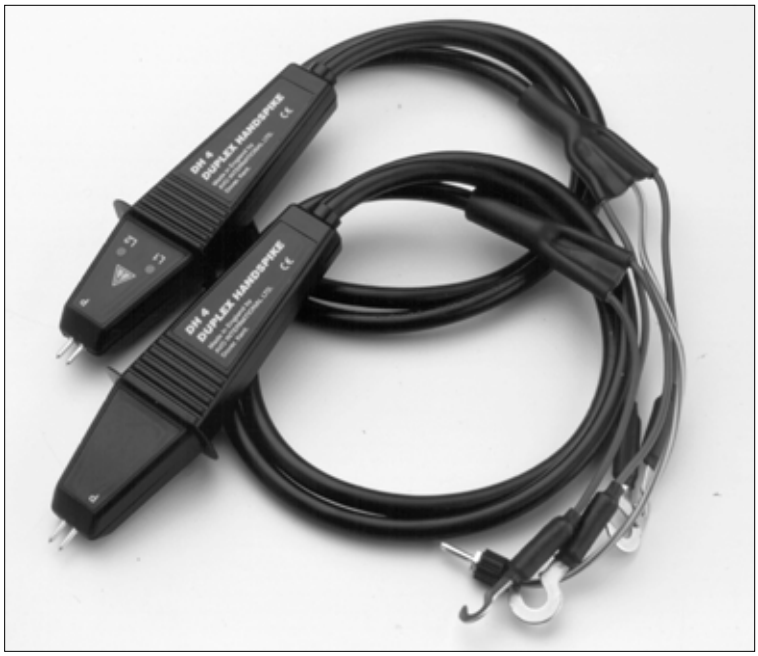
Kelvin Clips — Feature spade lugs on outboard end and alligator clips with insulated, silver- or gold-plated jaws.



Termination	Maximum Test Current	Length	Cat. No.
Helical Hand Spikes with Spring Points	10 A	7 ft (2 m)	242011-7
		8 ft (2.5 m)	EV6111-022
		18 ft (5.5 m)	242011-18
		20 ft (6 m)	EV6111-023
		30 ft (9 m)	242011-30
DH5 Fixed-point Hand Spikes	10 A	8 ft (2.5 m)	EV6111-517
DH6 Hand Spikes (suitable for 600 V systems)	10 A	8 ft (2.5 m)	EV6111-518
Heavy-duty Fixed-point Hand Spikes	10 A	7 ft (2 m)	242002-7
		18 ft (5.5 m)	242002-18
		30 ft (9 m)	242002-30
Replaceable Needle Points	10 A	30 ft (9 m)	242003-30
2-in. (5-cm) Heavy-duty C-Clamps	10 A	7 ft (2 m)	242004-7
		18 ft (5.5 m)	242004-18
		30 ft (9 m)	242004-30
1.5-in. (4-cm) Kelvin Clips	10 A	7 ft (2 m)	242006-7
		18 ft (5.5 m)	242006-18
		30 ft (9 m)	242006-30
0-5-in. (1.3-cm) Kelvin Clips	10 A	7 ft (2 m)	241005-7*
		7 ft (2 m)	242005-7**

**Gold-plated* ***Silver-plated*

The DLRO 10 is light enough to be worn around the neck. It is also small enough to be taken into areas which were previously too cramped for easy testing.



To assist operator safety and ease of use, the DLRO 10 is automatically supplied with a pair of special duplex handspikes. One of the probes features two LEDs that light up. These LEDs duplicate indicators on the instrument display that all four contacts have been made, the presence of high voltage across the load, and the presence of current flow while an inductive load is discharging.

ORDERING INFORMATION

Item	Cat. No.
MEGGER® DUCTER® DLRO® 10	DLRO-10
Included Accessories:	
7 Ah NiMH battery module	EV6340-101
DH4 Duplex handspikes, 4 ft (1.2 m) [2], one with indicator lights	EV6111-503
Battery charger for operation from 115/230 V 50/60 Hz supply	EV6280-333
Cigar lighter adapter for battery charging	EV6280-332
User guide	EV6172-473
Warranty book	EV6170-618

Item	Cat. No.
Optional Accessories:	
Test leads	see chart
Carrying case for DLRO 10 and all standard accessories	EV6380-138
Carrying case for optional lead sets.	18313
Calibration Shunt, 10 Ω, current rating 1 mA.	249000
Calibration Shunt, 1 Ω, current rating 10 mA.	249001
Calibration Shunt, 100 mΩ, current rating 1A.	249002
Calibration Shunt, 10 mΩ, current rating 10 A.	249003
Certificate of Calibration for Shunts, NIST	CERT-NIST
Replacement tips for DH4, DH5 and DH6 handspikes	
Needle point	EV25940-012
Serrated end	EV25940-014

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MIL/5M/1000 BULLETIN-1 DLRO 10