DLRO 10 and DLRO 10X
Digital Microhmmeter

DESCRIPTION

DLRO 10 and DLRO 10X set the standards for low resistance measurement. DLRO 10 and DLRO 10X are fully automatic instruments, selecting the most suitable test current up to 10A d.c. to measure resistance from 0.1 µΩ to 2000 Ω, on one of seven ranges.

For users who desire more control over the measurement process, DLRO 10X uses a menu system controlled by a two-axis paddle to allow the user to manually select the maximum test current.

DLRO 10X also adds real time download of results and on board storage for later download to a PC.

Both instruments are built into a strong, lightweight case that is equally at home in the field or in the laboratory. Light enough to be worn around the neck, they are small enough to be taken into areas that were previously too small to access.

DLRO 10 uses a large, bright 4 1/2 -digit LED display while DLRO 10X has a large, backlit LCD display. Normally, measurements are made with forward and reverse currents to cancel the effects of any standing voltages across the test sample.

The average value is then displayed within 3 seconds, to a basic accuracy of 0.2%. DLRO 10X displays both forward and reverse measurements as well as the average of the two.

DLRO 10X allows the user to set high and low pass limits, thereby enabling simple go-no-go testing.

At the end of a test DLRO10X will store the test results, as well as any notes relevant to the test.

To assist operator safety and ease of use, both instruments are supplied complete with a pair of duplex handspikes with 1.2 m (4 ft) leads. One of the probes is fitted with LED’s, which duplicate indicators on the instrument display indicating that all four contacts have been made, the presence of a high voltage across the load, and the presence of current flow while a load is discharging. A full range of test leads is available with probes, clamps and Kelvin clips.

Nickel Metal Hydride (NiMH) batteries power the instruments. The battery 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 4 hours, a fast charge mode allows the battery to be 90% charged within 2 1/2 hours from a 12 volt battery or from a standard 120/230 V AC supply via the supplied charger. The battery pack contains its own battery state indicator, which allows the charge-state to be monitored, even without being connected to the instrument.

DLRO 10X is fitted with RS232 communications that will allow results to be downloaded in real time or stored for later retrieval.

Up to 700 sets of results may be stored within DLRO 10X complete with notes containing up to 200 characters which may be added using the on board keypad. These results can also be downloaded to a PC.

MEASUREMENT MODES:

A variety of measurement modes are available. Since the introduction of V2.0 firmware, Normal, Auto, Continuous and Inductive mode are available on both the DLRO 10 and the DLRO 10X.

- Auto current reversal cancels standing emfs
- Protected to 600 V
- Automatically detects continuity in potential and current connections
- Multiple operating modes including fully automatic
- Alpha-numeric keypad for entering test notes (DLRO 10X)
- User selectable high and low limits (DLRO 10X)
- Printer output and memory (DLRO 10X)
DLRO 10 will display the average of the measurements achieved using forward and reverse current, while DLRO 10X displays both individual measurements and the average.

**Normal mode** initiates a test by pressing the Test button on the instrument front panel after connecting the test leads. Continuity of all four connections is checked, forward and reverse currents are applied.

**Auto mode** allows forward and reverse current measurements to be made and the average displayed simply by making contact with all four probes. This mode is ideal when working with the supplied handspikes. 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 measurement is updated every 3 seconds until the circuit is broken.

**Inductive mode** is intended for use when measuring inductive loads. When measuring inductive loads it is necessary to wait for the voltage to stabilise. This means that the measurement could take a few seconds or several minutes. The test leads are firmly connected to the item to be measured and the Test button is pressed. The instrument will pass a current through the sample and wait for the voltage to stabilise. If possible the current will be increased. This procedure will be repeated until the voltage detected falls into the range 15 mV to 200 mV. The instrument will then continue to take readings, which will gradually decrease to the true value as the voltage stabilises further. The operator decides when the result is stable and presses the Test button to terminate the test. Measurement is made with forward current only.

**Unidirectional mode**, on DLRO 10X only, applies a current in one direction only. This does not enable any standing emfs to be negated but speeds up the measurement process. Test starts automatically when probes are connected.

**APPLICATIONS**

The needs for accurate low resistance measurement are well known and very diverse. They range through Goods Receiving inspection of components to ground bonding and welded joints. Typical applications include, but are not limited to, making d.c. resistance measurements of:

- Switch and contact breaker resistance
- Busbar and cable joints
- Aircraft frame bonds and static control circuits
- Integrity of welded joints
- Inter-cell connections on battery systems up to 600 V peak
- Quality control of resistive components
- 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

The DLROs are light enough to be worn around the neck. They are also small enough to be taken into areas which were previously too cramped for easy testing.
## DLRO 10 AND DLRO 10X

**Digital Microhmmeter**

<table>
<thead>
<tr>
<th>Full Scale</th>
<th>Resolution</th>
<th>Accuracy*</th>
<th>Resistive</th>
<th>Inductive</th>
<th>Resistive</th>
<th>Inductive</th>
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<tbody>
<tr>
<td>1.9999 mΩ</td>
<td>0.1 µΩ</td>
<td>±0.2% ±0.2 µΩ</td>
<td>20 mV</td>
<td>n/a</td>
<td>10 A</td>
<td>n/a</td>
</tr>
<tr>
<td>19.999 mΩ</td>
<td>1 µΩ</td>
<td>±0.2% ±2 µΩ</td>
<td>20 mV</td>
<td>20 mV</td>
<td>1 A</td>
<td>1 A</td>
</tr>
<tr>
<td>199.99 mΩ</td>
<td>10 µΩ</td>
<td>±0.2% ±20 µΩ</td>
<td>20 mV</td>
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*The accuracy stated assumes forward and reverse measurements. Inductive mode or unidirectional mode will introduce an undefined error if an external EMF is present.*
## ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Item (Qty)</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLRO 10 Digital Low Resistance Ohmmeter</td>
<td>6111-428</td>
</tr>
<tr>
<td>DLRO10X Digital Low Resistance Ohmmeter</td>
<td>6111-429</td>
</tr>
<tr>
<td>Complete with 7 Ah NiMAB battery module.</td>
<td>6340-101</td>
</tr>
<tr>
<td>DH4 Duplex handspikes (2), one with indicator lights. 1.2m / 4 ft</td>
<td>6111-503</td>
</tr>
<tr>
<td>Battery charger for operation from 115/230 V, 50/60Hz supply.</td>
<td>6280-333</td>
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<tr>
<td>Cigar lighter adapter for battery charging.</td>
<td>6280-332</td>
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<td>User guide.</td>
<td>6172-473</td>
</tr>
<tr>
<td>Warranty book.</td>
<td>6170-618</td>
</tr>
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</table>

### Optional Accessories at extra cost

- Carrying case for DLRO10/10X and all standard accessories. | 6380-138 |
- 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 | 25940-012 |
- Serrated end | 25940-014 |

### Optional Test Leads at extra cost

#### Duplex Leads

- DH5 straight duplex handspikes (2). One has indicator lights. 2.5m/8ft | 6111-517 |
- DH6 Duplex handspikes (2) suitable for working on 600 V systems. 2.5m/8ft | 6111-518 |
- Duplex Handspikes (2) with spring loaded helical contacts. 2m/7ft | 242011-7 |
- 2.5m/8ft | 6111-022 |
- 5.5m/18ft | 242011-18 |
- only 1 lead supplied 6m/20ft | 6111-023 |
- 9m/30ft | 242011-30 |

#### Single Leads

- Single handspike (1) for potential measurement. 2m/7ft | 242021-7 |
- 5.5m/18ft | 242021-18 |
- 9m/30ft | 242021-30 |
- Current clip (1) for current connections. 2m/7ft | 242041-7 |
- 5.5m/18ft | 242041-18 |
- 9m/30ft | 242041-30 |