

Megger[®]



DLRO10HD and DLRO10HDX **10 A Digital Low Resistance Ohmmeter**

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Instrument Safety

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired

- The instrument must be operated only by suitably trained and competent persons
- Users of this equipment and their employers are required by National Health and Safety Legislation to carry out valid risk assessments of all electrical work so as to identify potential sources of electrical danger and risk of electrical injury
- The instrument must NOT be used if any part of it is damaged
- Damaged test leads must NOT be used. Test leads, connectors and mechanical guards must be in good order, clean and have no broken or cracked insulation
- If the test subject to which the instrument is connected is energised while the instrument is turned off, protection devices may not prevent the instrument from overheating. In which case, parts of the case may become very hot and damage may occur
 - Set the instrument to ON before connecting to the test subject
 - The test subject must be set to OFF, de-energised and checked before test connections are made. Make sure that the test subject cannot be re-energised whilst the instrument is connected
 - Do not leave the equipment unattended when connected to the test subject
 - Do not leave the equipment connected to the test subject after the test is completed
- The user must exercise caution when connecting to and disconnecting from the test subject
 - Always connect test leads to the instrument before attaching to test subject
 - Keep hands behind any tactile barriers on probe clips and clamps when making or breaking connections.
 - High current connections between the instrument and test subject must be secured against accidental detachment and must not be disengaged whilst test current is flowing
 - Circuit terminals must not be touched during test
 - Do not disconnect the instrument from the test subject until the test current has stopped and the TEST warning indicator is extinguished
 - Test leads and connections may become hot during use. Exercise caution when handling
 - Disconnect from the test subject before switching the instrument OFF
- There are no user-serviceable parts inside the instrument; all servicing, including battery and fuse replacement, must be referred a Megger approved service centre
- When used on hazardous voltages the Megger terminal cover (part number 1002-390) must be used

Instrument Safety

- This product is not intrinsically safe. Do not use in an explosive atmosphere

Measurement Connection

Only Megger supplied test leads designed for this instrument provide the full safety rating.

Voltage

The rated measurement connection voltage is the maximum line to earth voltage at which it is safe to connect.

CAT IV

Measurement category IV: Equipment connected between the origin of the low-voltage Mains Power supply and the distribution panel.

CAT III

Measurement category III: Equipment connected between the distribution panel and the electrical outlets.








CAT II

Measurement category II: Equipment connected between the electrical outlets and the User's equipment.

Measurement equipment may be safely connected to circuits at the marked rating or lower. The connection rating is that of the lowest rated component in the measurement circuit.



Safety and Hazard Icons

This section details the various safety and hazard icons on the instruments outer case.

Icon	Description
	Warning: High Voltage, risk of electric shock
	Caution: refer to User Guide
	Equipment protected throughout by Double Insulation.
	Equipment complies with current EU directives.
	Equipment complies with current "C tick" requirements.
	Do not dispose of in the normal Waste stream.
	Fuse

Warning Icons

This section details the warning icons that can show on the display.

Icon	Warning	Description
	External Voltage Warning	<p>If an external voltage is applied between the terminals and the instrument is set to On, the High Voltage warning will flash on the display. This is a warning that the item under test is live and might be dangerous and testing is disabled. The High Voltage warning message will flash if more than 50 V potential difference is applied between the Voltage terminals and the Current terminals. This warning will not show if all terminals are at the same high voltage.</p> <p>Note: The warning will not operate if the instrument is set to Off.</p>
	Discharge Voltage/Current Warning	<p>The High Voltage warning and the red High Voltage LED on the panel will flash if a current greater than 1 mA is still flowing after an inductive test is completed. This suggests that the inductive load has been tested and is discharging. Do not disconnect the current loop while the discharge warning is showing.</p>

Description

This User Guide details the DLRO10HD and the DLRO10HDX.

Both the DLRO10HD and the DLRO10HDX measure the same tests and parameters, in addition the DLRO10HDX can save, recall and download test results to PowerDB.

The DLRO10 range of digital low resistance ohm meters measure resistance in a range of 0.1 $\mu\Omega$ to 2 k. These instruments provide a maximum test current of 10 Amps. The DLRO10 range consist of four versions:

- DLRO10
- DLRO10X
- DLRO10HD
- DLRO10HDX

Key Features

- Simple operation
- High power ranges
- Simultaneous testing and battery charging
- Rugged case construction designed for use in demanding environments or the lab
- IP65 with the lid closed and IP54 with the lid open for protection against ingress during operation (IP65 lid closed)
- Multiple lead set options (Megger connect leads - see the lead set data-sheet)
- 10 A while measuring up to 250 m Ω and 1 A while measuring up to 2.5 Ω
- Monitors test lead contact - reduces the chance of erroneous readings
- Rechargeable battery: Capacity <1000 10A test
- Auto power off
- Large, clear LCD for all light conditions
- Time and Date stamped memory for recording of results (DLRO10HDX only)
- Memory storage and USB download capability (DLRO10HDX only)
- CAT III 300 V: Protected against accidental connection to external voltages up to 600 V DC applied between any pair of the four terminals for up to 10 seconds

Applications

The DLRO10HD and DLRO10HDX measure low resistance values in applications ranging from railways and aircraft to resistance of components in industry.

Any metallic joint can be measured but users must be aware of measurement limitations depending on application. For example, if a cable manufacturer plans to make resistive measurements on a thin wire, a low test current should be selected to prevent heating the wire thereby changing its resistance.

The DLRO10HD is well suited to measuring thick conductors, bonds and quality of welding because of its 10 A range for resistance values up to 250 mΩ. Measurements on electric motors and generators will be inductive and require the User to understand the inductive mode and charging process before a correct result is achieved.

Electromagnetic noise induced into the leads can interfere with a reading. A noise icon alerts the User, but does not prevent a measurement.

When dissimilar metals are joined a thermocouple effect is created. Users should select a bidirectional mode to ensure cancellation of this effect. The instrument measures with current flowing in both directions and averages the result. Typical applications of the DLRO10HD include DC resistance measurements of:

When dissimilar metals are joined a thermocouple effect is created. Users should select a Bi-directional mode to make sure this effect is cancelled. The instrument measures with current flowing in both directions and averages the result.

Typical applications include DC resistance measurements of:

- Switch and contact breaker resistance
- Transformer and motor winding resistance
- Busbar and cable joints
- Rail and pipe bonds
- Aircraft frame bonds and static control circuits
- Metal alloys, welds and fuse resistance
- Integrity of welded joints
- Graphite electrodes and other composites
- Inter-cell connections on battery systems up to 100 V
- Wire and cable resistance
- 300 V peak
- Transmitter aerial and lightning conductor bonding
- Quality control of resistive components

Overview

This section details an over view of the instrument:

Display

DLRO10HDX



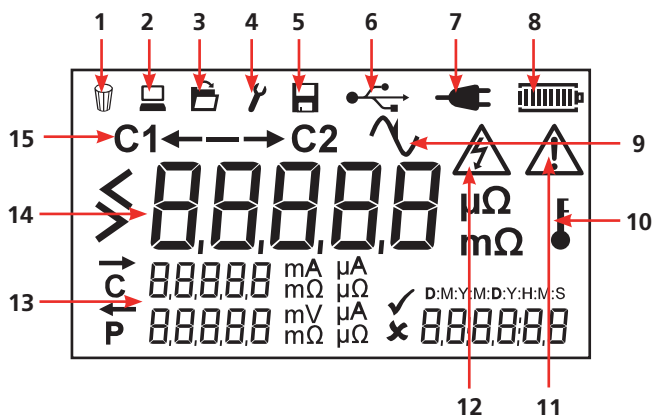
DLRO10HD



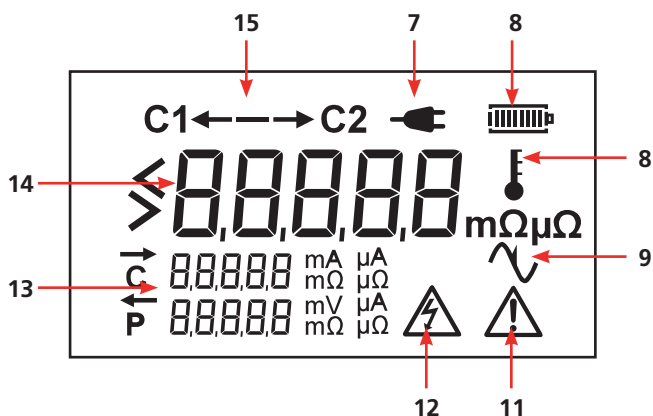
Item	Description	Item	Description
1	Current Terminals	9	Test button (Start and stop tests)
2	Potential Terminals	10	Navigation keypad (setup and stored results)
3	Test Lead LED Cable	11	Test modes and Off rotary switch
4	Display	12	Mains Power On LED
5	Save Button	13	Fuse
6	USB socket (download records)	14	Contrast button
7	Hazard warning LED during test	15	Mains Power Socket
8	Range Rotary Switch	16	Back-light

Display Icons

DLRO10HDX



DLRO10HD



Item	Description	Item	Description
1	Delete	9	Noise (over 100 mV 50/60 Hz)
2	Test Result Download mode	10	Over Temperature
3	Recall Test Result Mode	11	Refer to User Guide
4	Date and Time mode	12	High Voltage Warning
5	Save mode	13	Secondary Displays
6	USB connected	14	Primary Display
7	Mains Power connected	15	Direction of Current flow in a test
8	Battery Status		

Secondary Display

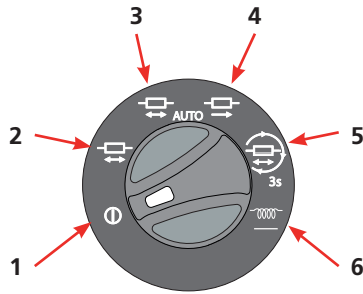


Directional arrow to show current flow above C indicator

Directional arrow to show current flow above P indicator

Test Mode Rotary Switch

Test modes and instrument Off are selected with the Test Mode rotary switch.



Available test modes are:

Item	Mode	Description
1	Off	Instrument is Off. Rotate the switch to any mode to start the instrument
2	Manual Bi-directional	Test current applied in both directions current flow. Continuity of all four connections is checked. Current is applied in both forward and reverse direction. See "Manual Bi-directional Test" on page 15
3	Automatic Bi-directional	Test current applied in both directions current flow. See "Automatic Bi-directional Test (Automatic Save)" on page 16 See "Automatic Bi-directional Test (Manual Save)" on page 17
4	Automatic Uni-directional	Current is applied in one direction only, to speed up the measurement process. Standing EMF's setup during the test are ignored so lower accuracy can result. See "Automatic Uni-directional Test (Automatic Save)" on page 18 See "Automatic Uni-directional Test (Manual Save)" on page 19
5	Continuous	Test current is applied in both directions. The test repeats at three seconds intervals. See "Continuous Test (Automatic Save)" on page 20 See "Continuous Test (Manual Save During Test)" on page 21 See "Continuous Test (Manual Save After Test)" on page 22
6	Inductive	Test current applied in only one direction. See "Inductive Test" on page 23

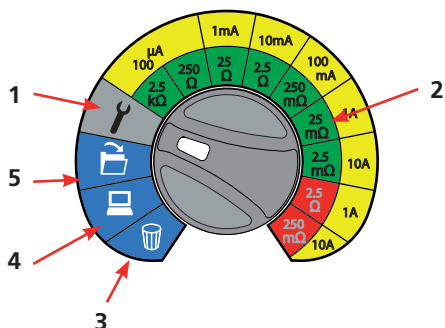
⚠ Warning: When inductive loads are measured it is essential that the current carrying leads are securely clamped to the item being tested, and that they are not removed before any stored charge has been discharged at the end of the test. Failure to comply with these instructions might result in an arc being produced, which might be dangerous for the instrument and the operator.

Note: When inductive loads are measured it is necessary to wait for the voltage to stabilise, so the measurement process can take a few seconds or several minutes.

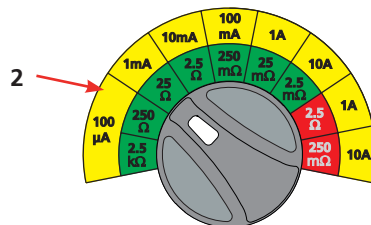
Range Rotary Switch

The instruments test range of resistance and current is selected with the Range rotary switch.

DLRO10HDX



DLRO10HD



- Green resistance ranges: Low output power (<0.25 W) outputs.
- Red resistance ranges: Higher 2.5 W (1 A) and 25 W (10 A) power outputs (Warning icon shows).

Item	Mode	Description
1	Date and Time	Set the date and time (see "Date and Time Setup" on page 13)
2	Resistance and Current Range	Set the test range and current (see "Resolution and Accuracy" on page 10)
3	Delete Records	Delete a single or all test result records (DLRO10HDX only (see "Memory Features" on page 24))
4	Download Records	Download test result records to PowerDB (DLRO10HDX only (see "Memory Features" on page 24))
5	Recall Records	Recall and view previous test result records (DLRO10HDX only (see "Memory Features" on page 24))

Overview

Resolution and Accuracy

- Test current accuracy $\pm 10\%$
- Voltmeter input impedance $>200\text{ k}\Omega$
- Maximum lead resistance at 10 A $<100\text{ m}\Omega$

Test Current	Resistance Range	Resolution (as shown)	Basic Accuracy*	Full Scale Voltage	Max. Power Output
100 μA	0 to 2.5 $\text{k}\Omega$	0.1 Ω	$\pm 0.2\%$ $\pm 200\text{ m}\Omega$	25 mV	25 μW
100 μA	0 to 250 Ω	0.01 Ω	$\pm 0.2\%$ $\pm 20\text{ m}\Omega$	25 mV	2.5 μW
1 mA	0 to 25 Ω	1 m Ω	$\pm 0.2\%$ $\pm 2\text{ m}\Omega$	25 mV	25 μW
10 mA	0 to 2.5 Ω	0.1 m Ω	$\pm 0.2\%$ $\pm 200\text{ }\mu\Omega$	25mV	250 μW
100 mA	0 to 250 m Ω	0.01 m Ω	$\pm 0.2\%$ $\pm 20\text{ }\mu\Omega$	25 mV	2.5 mW
1 A	0 to 25 m Ω	1 $\mu\Omega$	$\pm 0.2\%$ $\pm 2\text{ }\mu\Omega$	25 mV	25 mW
10 A	0 to 2.5 m Ω	0.1 $\mu\Omega$	$\pm 0.2\%$ $\pm 0.2\text{ }\mu\Omega$	25 mV	0.25 W
1 A**	0 to 2.5 Ω	0.1 m Ω	$\pm 0.2\%$ $\pm 200\text{ }\mu\Omega$	2.5 V	2.5 W
10 A**	0 to 250 m Ω	0.01 m Ω	$\pm 0.2\%$ $\pm 50\text{ }\mu\Omega$	2.5 V	25 W

* Basic accuracy stated assumes forward and reverse measurements.

** Warning icon shows

Inductive or Uni-directional mode can introduce an undefined error if an external EMF is present.

Basic accuracy at reference conditions.

Test Leads

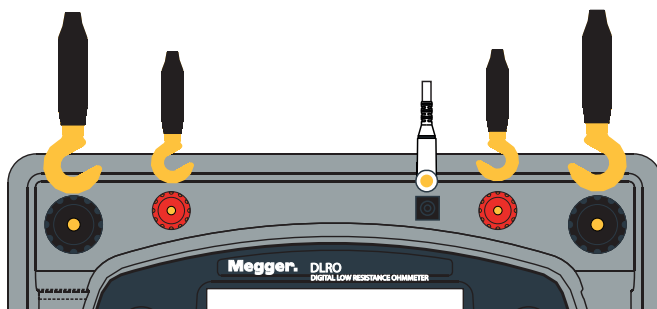
The test leads can be used with either:

- Hand-spikes (supplied), or
- Clamps (optional accessory)

See “Accessories” on page 30

Connection to the Instrument

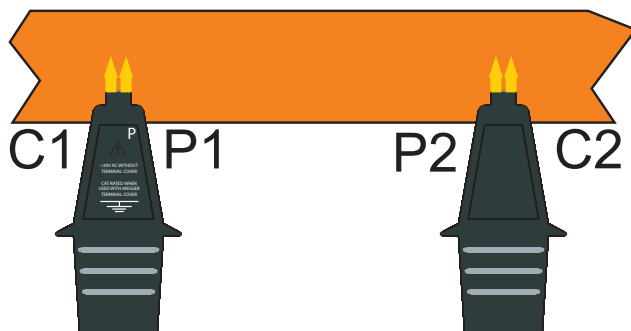
Connect the supplied test leads to the instrument as show below:



Tip: To help connect the test leads remove the instrument lid. Open the lid to approximately 45° and slide it to the right.

Connection to a Test Piece

Connect the test leads to the test piece in the Kelvin arrangement as shown:



The image shows the correct test lead connection of the current (C1, C2) and potential probes (P1, P2) to a test piece. To make sure test readings are accurate, the current terminals (C1 and C2) must be connected outside of the potential terminals (P1 and P2).

The earth terminal is used to detect floating voltage on the test subject relative to the Instrument's 0 V. High floating voltage on the test subject could be a hazard to the User and the Instrument.

If the test subject is ± 200 mV from the Instrument 0 V, the test will be inhibited.

DH4-C Duplex Hand-spikes


Each hand-spike is marked with the letter **P** (potential terminals). These should always be the **inside** contacts when a test measurement is taken.

One of the test lead connectors has two LEDs (**L1** and **L2**) and an LED driver cable. The LED driver cable plugs into the terminal next to terminal **P2** (see "Connection to the Instrument" on page 11).

LEDs **L1** and **L2**, give information to the User that would otherwise only be available on the display:

Lamp L1	Lamp L2	Description
On (red)	Off	Inadequate continuity at C or P contacts
Flashing (red)	Off	Voltage present between contacts
Off	On (green)	Current , 1mA, test complete
Off	On (red)	Measurement fail

For example, when the test leads are used in an Auto test mode:

1. Press .
2. **L1** shows a steady red to show there is a contact failure.
3. When all four contacts are connected, **L1** goes Off.
4. No LEDs show in a test, unless contact fails.
5. To signal end of test, **L2** shows a steady green when the current flow has decayed to less than 1 mA.
6. When the test leads are removed from the test piece, **L2** goes Off (end of test) and **L1** shows red (no contact).

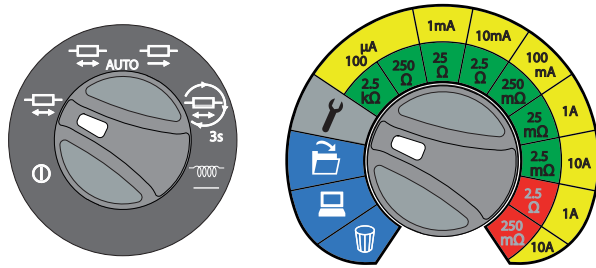
When the DH4-C Duplex Hand-spikes are used, the instrument always makes sure that there is a good contact before the full test current is applied, so there should be no erosion of the contact tips. However, if the tips become worn or blunted, they can be replaced. Pull out the worn tips and install new ones.

Tests with the DH4-C Duplex Hand-spikes or Individual Leads


Connect the four leads as shown. In all cases make sure that the potential probes (P1 and P2) are inside the current (C1 and C2) probes.


Date and Time Setup

(DLRO10HDX only)




Set Date and Time

Press  to toggle between D:M:Y or M:D:Y format (Default: DMY).

Press  to toggle between Date and Time

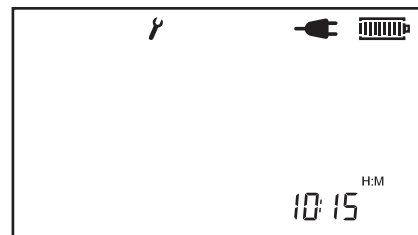
1. Press  to start adjustment.

2. Press  to toggle between D/M/Y and HM

3. Press  to adjust

4. Press  to scroll

5. Press  to set



Tests

This section details the instruments test procedures.

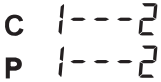
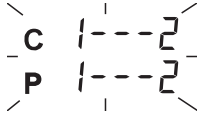
Test Lead Connection

A good test measurement requires both the Current carrying circuit and the Voltage detection circuit to be completed by the unit under test. The Instrument checks for continuity in both C and P circuits.

A test will not start until there is a good connection to the test piece by the test leads.

Confirmation of successful continuity:

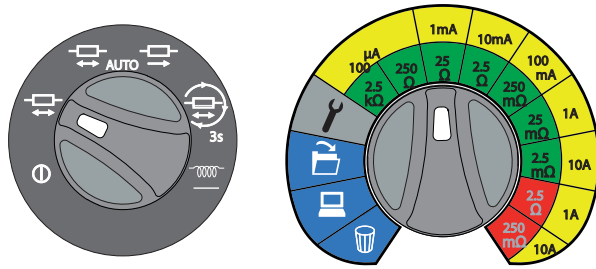
- If **C 1----2** and **P 1----2** are constant the connectivity is good.
- If either **C 1----2** and **P 1----2** flash there is no connectivity, and the test will not start.

Successful Connection	Unsuccessful connection
	

The resistance result is shown on the display in either Ω , $m\Omega$ or $\mu\Omega$ ranging from 2500.0 Ω to 0.1 $\mu\Omega$.

The result in Bi-directional modes is the average of two readings shown by the two secondary displays, with arrows to show the direction of current flow. The large arrow at the top of the display between C1 and C2 shows the measurement current flow.

Manual Bi-directional Test



Tip: Use Clamp test leads (optional accessory)

Note: In Manual test mode both the Current and Voltage test leads must be connected across the test piece before **TEST** is pressed.

1. Press **TEST** (acknowledged by a beep sound).
Test starts (LED shows red).

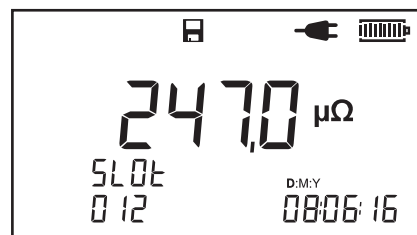
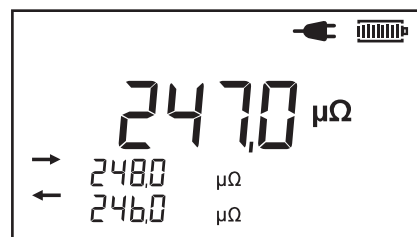
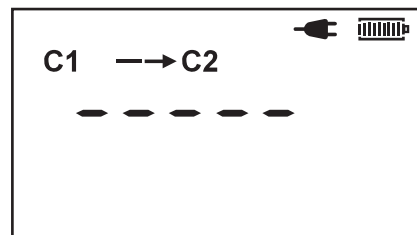
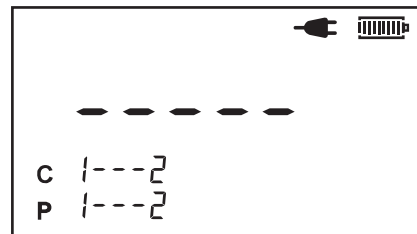
Arrow direction animated (based on current direction) and plateau.

Test result for the currently connected test piece is shown.

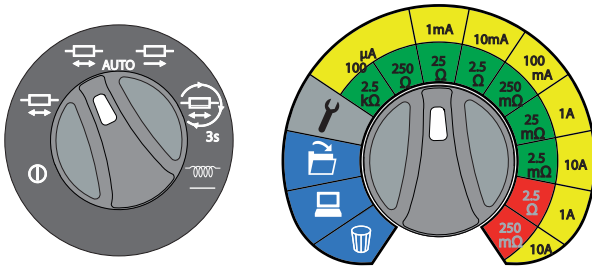
2. Save test results (if required).


Press . The test result is saved and the memory slot number is shown.
The Save screen is shown for three seconds.

3. If the test piece is still connected, press **TEST** to do another test.
4. Remove the clamps and press **TEST** to stop the test.



Automatic Bi-directional Test (Automatic Save)



1. Press  (acknowledged by a beep sound).
Save function is available until the memory has 200 test records.

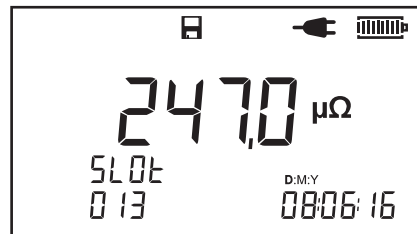
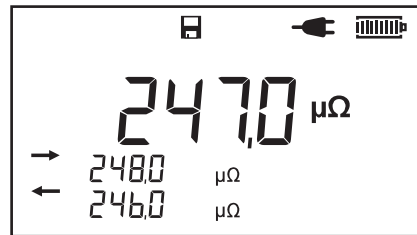
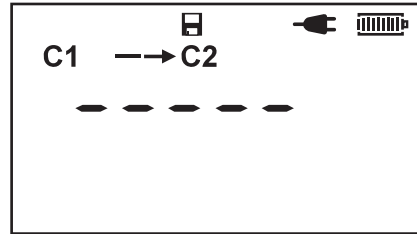
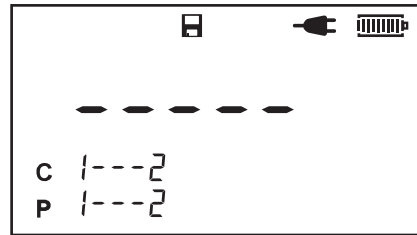
2. Connect the test leads to the test piece.
Test starts (LED shows red).
Arrow direction animated (based on current direction) and plateau.

3. Test results for the currently connected test piece are shown.

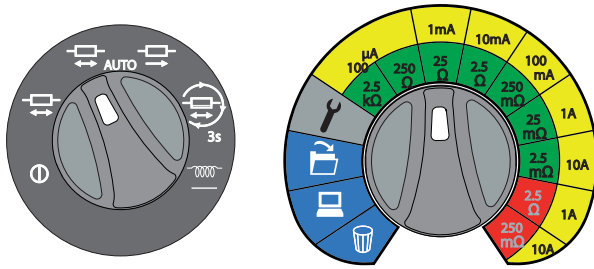
Test results are saved and their memory slot number is shown. The Save screen is shown for three seconds.

4. The test automatically continues for the next connected test piece.

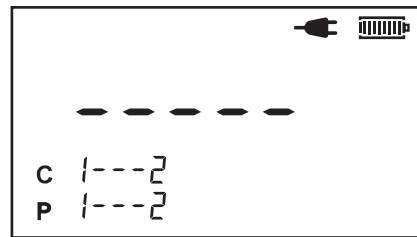
5. Press  to stop the test.



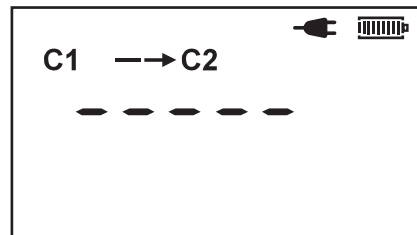
Automatic Bi-directional Test (Manual Save)



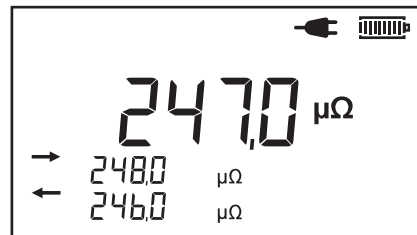
1. Connect the test leads to the test piece.
Test starts (LED shows red).




Arrow direction animated (based on current direction) and plateau.

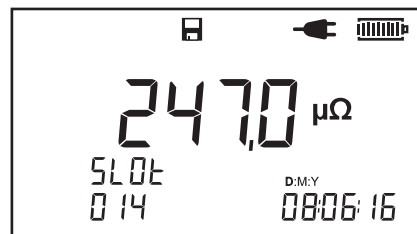


2. Test results for the currently connected test piece are shown.



3. Save test results (if required).

Press . The test result is saved and its memory slot number is shown. The Save screen is shown for three seconds.

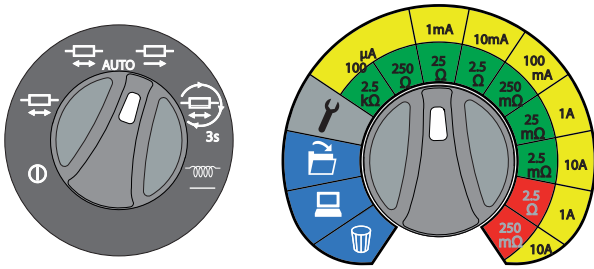




4. The test automatically continues for subsequent connected test piece.

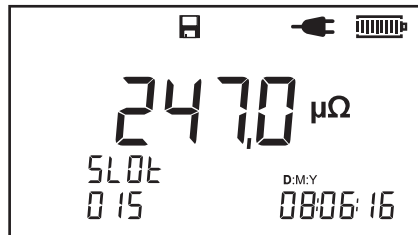
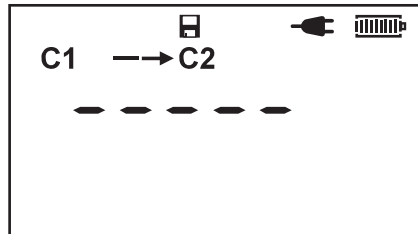
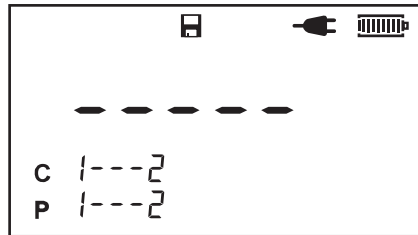
5. Press  as required.

6. Press  to stop the test.

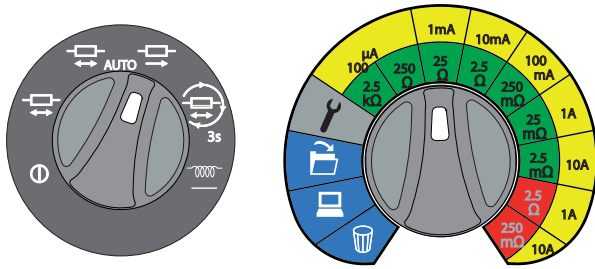
Automatic Uni-directional Test (Automatic Save)



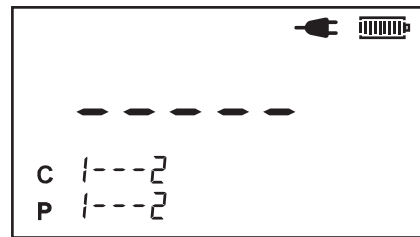
1. Press  (acknowledged by a beep sound).
Save is available until the memory has 200 test records.
2. Connect the test leads to the test piece.
Test starts (LED shows red).
Arrow direction animated (based on current direction) and plateau.
3. Test results for the currently connected test piece are shown.
4. Test results are saved and their memory slot number is shown. The Save screen is shown for three seconds.
5. The test automatically continues for the next connected test piece.
6. Press  to stop the test.



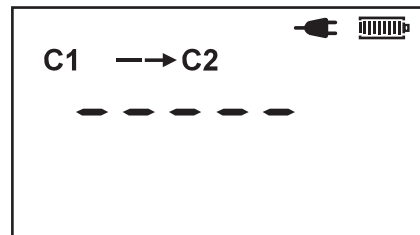
Automatic Uni-directional Test (Manual Save)



1. Connect the test leads to the test piece.
Test starts (LED shows red).




Arrow direction animated (based on current direction) and plateau.



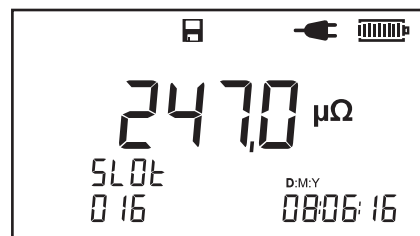
2. Test results for the currently connected test piece are shown.



3. Save test results (if required).

Press . The test result is saved and its memory slot number is shown.

The Save screen is shown for three seconds.

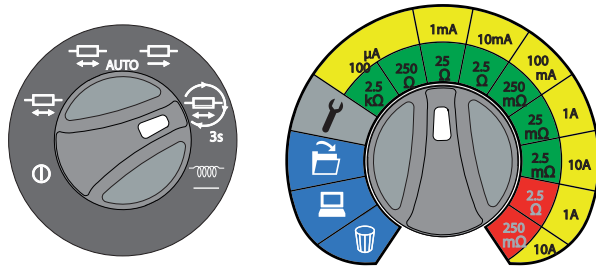


4. The test automatically continues for subsequent connected test piece.


5. Press  as required.


6. Press  to stop the test.


Continuous Test (Manual Save During Test)

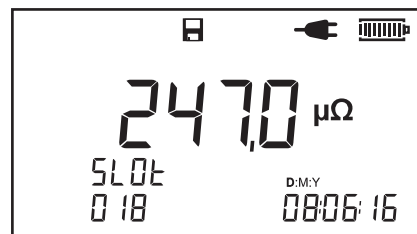
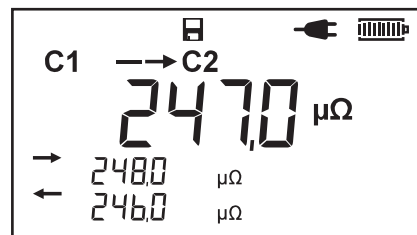
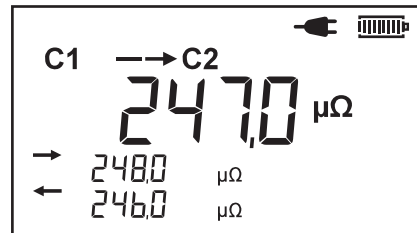


Tip: Use Clamp test leads (optional accessory)

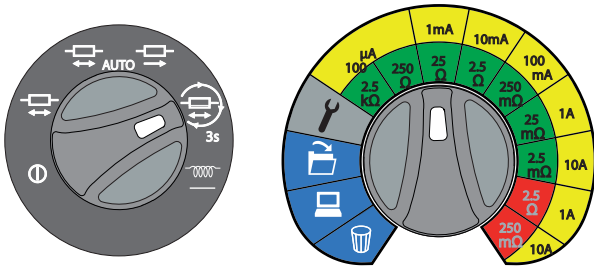
1. Press  .
Test starts (LED shows red).
2. Arrow direction animated (based on current direction) and plateau.
3. Continuous measurements are taken on the connected test piece.
Tests are made every three seconds.
Last test record is shown while the next test is in progress.
4. Save test results (if required).

At any point press  (acknowledged by a beep sound).
Test results are saved until the test is stopped or the memory is full (2000 records).




5. Press  to stop the test.
6. Test results are saved and the memory slot number is shown. The Save screen is shown for three seconds.

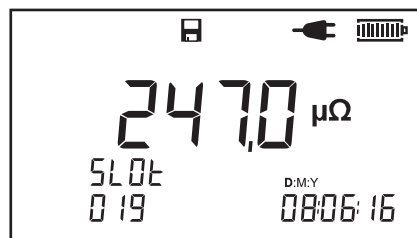
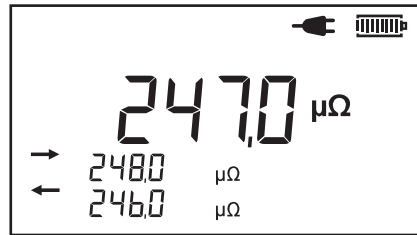
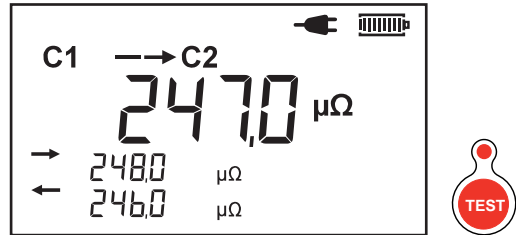


Continuous Test (Manual Save After Test)

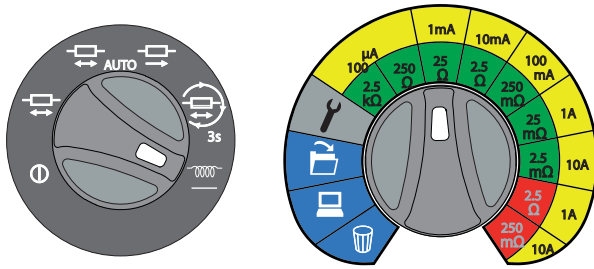


Tip: Use Clamp test leads (optional accessory)




1. Press  .
 Test starts (LED shows red).
 Arrow direction animated (based on current direction) and plateau.
2. Continuous measurements are taken on the connected test piece.
 Tests are made every three seconds.
 Last test record is shown while the next test is in progress.
3. Press  to stop the test.
 The last complete test result is shown.
4. Save test results if required.
 Press  . The last complete test result is saved and its memory slot number is shown.
 The Save screen is shown for three seconds.

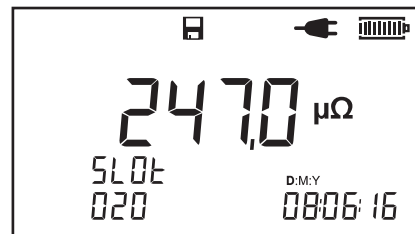
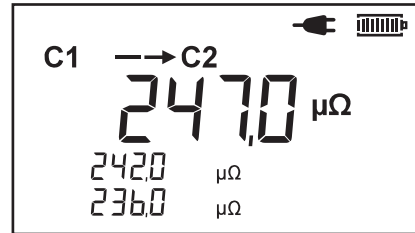


Inductive Test



Tip: Use Clamp test leads (optional accessory)

1. Press  .
 Test starts (LED shows red).
 Arrow direction animated (based on current direction) and plateau.
2. Continuous measurements are taken on the connected test piece.
 The last three test records show (new test result shows on the Primary display (rolling display)).
 Last test record is shown while the next test is in progress.
3. Press  to stop the test.
 The last complete three test results are shown.
4. Save test results if required.
 Press  . The last complete test result is saved and its memory slot number is shown.
 The Save screen is shown for three seconds.



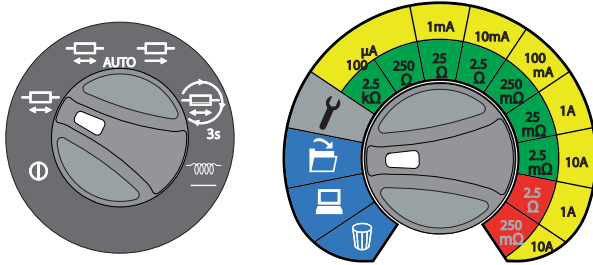
Memory Features

(DLRO10HDX only)


The DLRO10HDX can record, save and download test results.

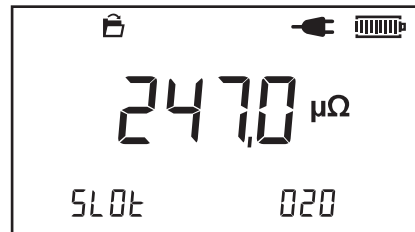
Up to 200 memory slots are available.


Recall Test Result Records



1. Last saved test result shows.

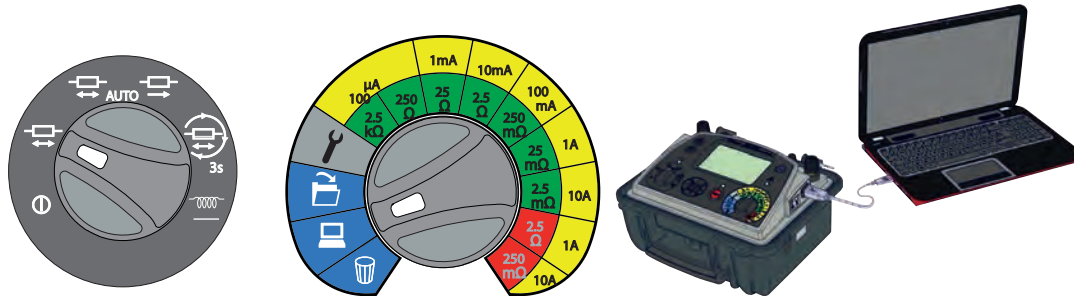
2. Press  to scroll through the test results records.



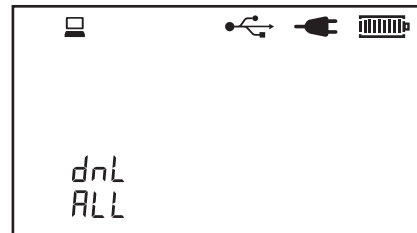
3. Press  to show a record for the selected slot.
Screen toggles between date and time when record was saved.

Note: While in Memory Recall mode, if no records are found, the warning icon shows on the display.

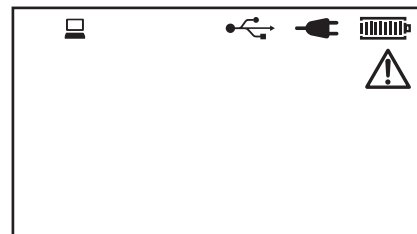
Download Test Result Records



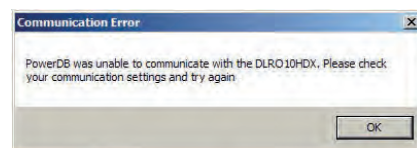
1. Open PowerDB.
2. Click on the required Instrument.
3. In the **Instrument configuration** window, make sure the comms parameters are correct.
4. Click **OK**. The Microhmmeter Measurements form opens.



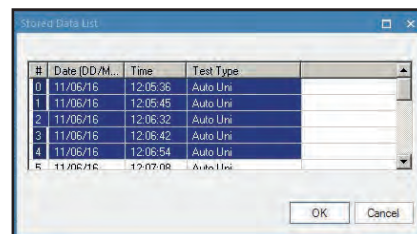
5. Click **Download DLRO10HDX Data**.
The USB icon (on the Instrument) shows only while the data download in progress. If communication to the host PC fails a Communication Error window shows in PowerDB



Tip: If download does not start: Click **Initialise**, wait for **OK** to show, then click **Download DLRO10HDX Data** again.



6. In PowerDB select the required test results (Shift+Click).
7. Click **OK** to import the selected test results into the Microhmmeter Measurements form.

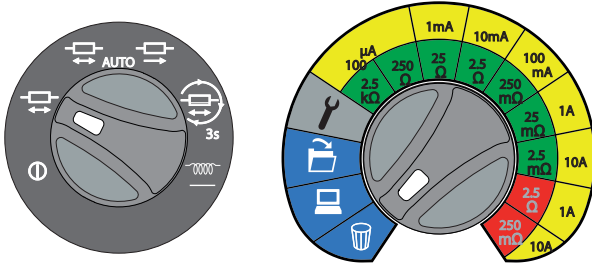


8. In PowerDB amend the Microhmmeter Measurements form as required (see PowerDB help)

Delete Test Result Records

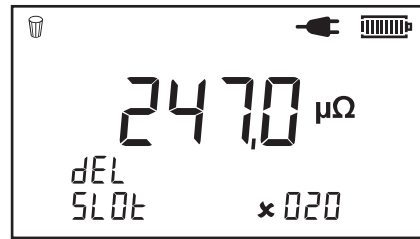
All test result records or a single test result record (last recorded test result) can be deleted.


Delete icon flashes to show Memory Delete mode.

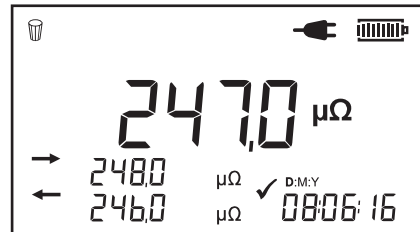


1. Press  to toggle **SLOt** (Single delete) or **ALL** (Delete All).

Single Delete: Only the last test record in the list can be deleted, at a time.



2. Press  to confirm deletion (Delete icon shows constant to confirm delete mode).



3. Press  to delete.

Note: While in Delete Memory mode, if no records are found, the warning icon shows on the display.

Maintenance

Routine Inspection

Look for any cracks or other damage to the enclosure, missing ports, etc.

Cleaning

Disconnect the instrument from the Mains Power. Wipe it with a clean cloth slightly dampened with water or Isopropyl alcohol (IPA). Care should be taken near the terminals, the IEC Mains Power and USB sockets.

Care of the Instrument

The instrument should always be handled with care and not dropped. Always make sure that the instrument is secured when being transported to prevent mechanical shock.

Test Leads

Leads are silicone insulated and work well in all weather conditions. Always keep the leads in a suitable lead bag when in storage or transportation.

Regular inspection of leads is recommended to make sure that they are not damaged in any way. Damaged leads could affect resistance readings and are a safety hazard.

Mains Power Fuse

Always use the correct rated fuse (see "Specifications" on page 28)

Battery Care

Caution: Batteries are only to be installed or removed by an Authorised Service Centre. Do not attempt to remove the batteries from this instrument.

- To prevent deep battery discharge, the battery should be charged at a minimum of three month intervals.
- Never attempt to charge the battery below 0 °C or above +40 °C ambient.
- The battery is charged when Mains Power is connected (unless a test is in progress).
- To improve battery life, store the instrument in a cool, dry location. Storage temperatures below freezing should be avoided.

Specifications

Item	Description
Temperature Coefficient	< 0.01% per °C, from 5 °C to 40 °C
Maximum Altitude	2000 m (6562 ft) to full safety specifications
Display Size and Type	Primary five digit and two five digit secondary displays
Voltage Input Range	100 - 240 V 50 / 60 Hz 90 VA
Mains Power Input Fuse	T 1.25 A, 250 V, HBC ceramic 20 mm x 5 mm
Battery Type	6 V, 7 Ah sealed lead acid (return instrument to a Megger authorised repair agent for replacement)
Battery Charge Time	Eight hours
Battery Life	>1000 Automatic (three seconds) tests
Back-light	LED
Auto Power Down	300 seconds after inactivity
Mode Selection	Rotary switch
Range Selection	Rotary switch
Memory Features	Rotary switch (DLRO10HDX only)
Memory Storage	200 test result records (DLRO10HDX only)
USB Connection	Download to PowerDB
Weight	6.7 kg
Case Dimensions	315mm (L) x 285mm (W) x 181mm (H)
Pouch for Test Leads	Yes (lid mounted)
Test Leads	Dependant on order code selected
IP Rating	IP65 case closed, IP54 battery operation
Safety Rating	In accordance with IEC61010-1, CATIII 300 V when used with optional terminal cover ("Accessories (Extra Cost)" on page 30)
Application	IEC 61010 defines measurement categories from I to IV relating transient over voltages and the location within electrical installations. This instrument is designed for use at Category III (Building installation level) on 300 V phase to earth systems, 520 V phase to phase.
Operating Temperature and Humidity	-10 °C to +50 °C (14 °F to 122 °F) <90% RH
Storage Temperature and Humidity	-25 °C to +60 °C, <90%RH
Reference Conditions	20 °C (±3 °C)
EMC	In accordance with IEC61326-1 (Heavy industrial)
Noise Rejection	Less than 1% (±20) digits additional error with 100 mV peak 50/60 Hz. on the potential leads. Warning will show if hum or noise exceeds this level.
Maximum lead resistance	100 mΩ total for 10 A operation irrespective of battery condition.

Power Lead

If the power lead supplied is not suitable for your Mains Power connection, do not use an adaptor. Always use a power lead installed with the correct plug. The instrument has a two-pin IEC60320 Mains Power socket.

Most power leads are made with three-core cable, so the ground connection will not be used.

Power Lead Connection Table

Connection	K/International	USA
Earth / Ground	Yellow / Green	Green
Neutral	Blue	White
Live (Line)	Brown	Black

If a fused plug is used, make sure that it is installed with a 3 A fuse (see “Specifications” on page 28).




The instrument can be powered from 100 - 240 V 50 / 60 Hz 90 VA.

Battery Charge

The battery charges when a Mains Power supply is connected.

For optimum battery life, charge the battery after each use. A fully discharged battery takes eight hours to recharge.

The charge level will go from low to full charge in incremental steps and continue as long as Mains Power is connected (unless a test is in progress). When the battery is fully charged the battery icon will stay steady.

	Battery full charge
	Battery charge low
	Battery discharged: The instrument shuts down automatically.

Accessories

Accessories (Included)

Item	Order No.
Test Lead Pouch (lid mounted)	1000-036
DLRO10HD / 10HDX User Guide CD	1000-869
Warranty Book	6170-618

Accessories (Extra Cost)

Item	Order No.
Calibration Shunt, 10 Ω , current rating 1 mA	249000
Calibration Shunt, 1 Ω , current rating 10 mA	249001
Calibration Shunt, 100 m Ω current rating 1A	249002
Calibration Shunt, 10 m Ω current rating 10 A	249003
Certificate of Calibration for Shunts, NIST CERT-NIST	CERT-NIST
Replacement tips for DH4 and DH5 hand-spikes Needle point	25940-012
Replacement tips for DH4 and DH5 hand-spikes Serrated end	25940-014
Terminal Cover (use in conjunction with DH4 test leads supplied as standard, or optional DH5 test leads for CATIII 300 V compliance)	1002-390

Test Leads (Extra Cost)

Normal test leads (no in-line connector)

Item	Order No.
DH5 straight duplex handspikes (x2 (One has indicator lights)) 2.5m/8ft	6111-517
Duplex Handspikes with spring loaded helical contacts (x2) 2m/7ft	242011-7
DH1 2.5m/8ft	6111-022
DH1 5.5m/18ft	242011-18
DH2 6m/20ft (only 1 lead supplied)	6111-023
DH2 9m/30ft (only 1 lead supplied)	242011-30
DH3 9m/30ft	6111-024
Straight Duplex Handspikes Heavy Duty with fixed contacts (x2) 2m/7ft	242002-7
Straight Duplex Handspikes Heavy Duty with fixed contacts (x2) 5.5m/18ft	242002-18
Straight Duplex Handspikes (2) Heavy Duty with fixed contacts (x2) 9m/30ft	242002-30
Duplex Heavy Duty 5cm (2") C-Clamps. (x2) 2m/7ft	242004-7
Duplex Heavy Duty 5cm (2") C-Clamps. (x2) 5.5m/18ft	242004-18
Duplex Heavy Duty 5cm (2") C-Clamps. (x2) 9m/30ft	242004-30
Duplex handspikes with replaceable Needle Points 2m/7ft	242003-7
Duplex 1.27 cm (1/2 ") Kelvin Clips. (x2) gold plated 2m/7ft	241005-7
Duplex 1.27 cm (1/2 ") Kelvin Clips. (x2) silver plated 2m/7ft	242005-7
Duplex 3.8 cm (1 1/2 ") Kelvin Clips. (x2) 2m/7ft	242006-7
Duplex 3.8 cm (1 1/2 ") Kelvin Clips. (x2) 5.5m/18ft	242006-18
Duplex 3.8 cm (1 1/2 ") Kelvin Clips. (2) 9m/30ft	242006-30
Single handspike for potential measurement (x1) 2m/7ft	242021-7
Single handspike for potential measurement (x1) 5.5m/18ft	242021-18
Single handspike for potential measurement (x1) 9m/30ft	242021-30
Current clip for current connections (x1) 2m/7ft	242041-7
Current clip for current connections (x) 5.5m/18ft	242041-18
Current clip for current connections (x1) 9m/30ft	242041-30

Note: For more details of optional test lead-sets see the separate test lead data-sheet DLRO_TL_DS_en_V01.pdf

Test leads with In-line Connector

For detailed information on connecting lead accessories refer to the supplied "Accessory Important Information Sheet" (DLROTestLeads--2007-431_UG_EN-DE-FR-ES-IT_V###)

Repair and Warranty

If the protection of an instrument has been impaired it should not be used, but sent for repair by suitably trained and qualified personnel. The protection is likely to be impaired if, for example, the instrument shows visible damage, fails to perform the intended measurements, has been subjected to prolonged storage under unfavourable conditions, or has been exposed to severe transport stresses.

New instruments are covered by a two year warranty from the date of purchase by the User, the second year being conditional on the free registration of the product on www.megger.com. You will need to log in, or first register and then login to register your product. The second year warranty covers faults, but not recalibration of the instrument which is only warranted for one year. Any unauthorised prior repair or adjustment will automatically invalidate the warranty.

These products contain no User repairable parts and if defective should be returned to your supplier in original packaging or packed so that it is protected from damage during transit. Damage in transit is not covered by this warranty and replacement/repair is chargeable.

Megger warrants this instrument to be free from defects in materials and workmanship, where the equipment is used for its proper purpose. The warranty is limited to making good this instrument (which shall be returned intact, carriage paid, and on examination shall disclose to their satisfaction to have been defective as claimed). Any unauthorised prior repair or adjustment will invalidate the warranty. Misuse of the instrument, from connection to excessive voltages, fitting incorrect fuses, or by other misuse is excluded from the warranty. The instrument calibration is warranted for one year.

This Warranty does not affect your statutory rights under any applicable law in force, or your contractual rights arising from a sale and purchase contract for the product. You may assert your rights at your sole discretion

Calibration, Service and Spare Parts

For service requirements for Megger Instruments contact Megger or your local distributor or authorised repair centre.

Megger operates fully traceable calibration and repair facilities, to make sure your instrument continues to provide the high standard of performance and workmanship you expect. These facilities are complemented by a worldwide network of approved repair and calibration companies to offer excellent in-service care for your Megger products.

See the back of this User Guide for Megger contact details.

To find your local Authorised Service Centre email Megger on ukrepairs@megger.com and give details of your location.

Approved Repair Companies

A number of independent instrument repair companies have been approved to do repair work on most Megger instruments, complete with genuine Megger spare parts.

Consult the Appointed Distributor / Agent about spare parts, repair facilities and advice.

Return an Instrument for Repair

If an instrument is to be returned the manufacturer for repair, it should be sent freight pre-paid to the appropriate address. A copy of the Invoice and of the packing note should be sent simultaneously by airmail to expedite clearance through Customs. A repair estimate, which will show freight return and other charges, will be submitted to the sender, if required, before work on an instrument starts.

Note: The battery is a sealed Lead-acid type and if changed the disposal of old cells should be in accordance with local regulations.

End of Life Disposal

WEEE Directive

The crossed out wheeled bin icon placed on Megger products is a reminder that this instrument must not be disposed of in general waste at the end of its life.

Megger is registered in the UK as a Producer of Electrical and Electronic Equipment (Registration No.: WEE/HE0146QT).

For more information about the disposal of the product consult your local Megger company or distributor or visit your local Megger website.

Batteries

Battery replacement **must only be done** by a Megger authorised repair agent, who will correctly dispose of the 'end of life' battery or batteries.

The crossed out wheeled bin placed on the batteries is a reminder that the batteries must not be disposed of with general waste.

This instrument contains:

- One sealed lead acid battery 6V, 7Ah (NP7-6 type), and
- One Lithium ion coin cell battery (DLRO10HDX only)

The lead acid battery installed in this instrument is classified as a Portable Battery.

The Lithium ion coin cell battery is classified as an Industrial Battery.

Megger is registered in the UK as a producer of batteries (Registration No.: BPRN00142).

Deceleration of Conformity

Hereby, Megger Instruments Limited declares that radio equipment manufactured by Megger Instruments Limited described in this User Guide is in compliance with Directive 2014/53/EU. Other equipment manufactured by Megger Instruments Limited described in this User Guide is in compliance with Directives 2014/30/EU and 2014/35/EU where they apply.

The full text of Megger Instruments EU declarations of conformity are available at the following internet address: megger.com/eu-dofc.