Megger

Megger DLRO10HD and DLRO10HDX CATIII industrial application kit

User Guide

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Declaration 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.

Contents

1. Safety Warnings

WARNING, POSSIBILITY OF ELECTRIC SHOCK

CAUTION (USER GUIDE MUST BE CONSULTED)

These warnings must be read and understood before Use:

- Do not connect any test leads before the adapter is correctly fastened to a DLRO10HD(X).
- Before removing the adapter from a DLRO10HD(X), ensure all test leads are disconnected.
- Inspect the adapter before fitting. Do not use the adapter if it shows any signs of damage.
- Always ensure the adapter is kept clean and dry inside and out before every use.
- When closing the DLRO10HD(X) top lid, ensure that all test leads are removed.
- Use only suitably rated test leads supplied by Megger Instruments Limited.
- Check test leads are in good condition before use.
- Read the safety warnings provided with the DLRO10HD(X) and with the leadset before use.

1. 1 Product Safety Category - Measurement Connection

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

1. 1. 1 Voltage

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

1. 1. 2 CAT IV

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

1. 1. 3 CAT III

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

1. 1. 4 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.

1. 2 Safety, Hazard and Warning Symbols on the Instrument

This table 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 complies with current EU directives
	Equipment complies with current 'C tick' requirements
	Do not dispose of in the normal waste stream

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

Icon	Warning	Description
	External Voltage Warning	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. **Note:** The warning will not operate if the instrument is set to Off.

2. Introduction

This user guide describes use of the Megger DLRO10HD and CATIII Industrial Application Kit.

This kit is designed to allow users to get maximum usage from their DLRO10HD and DLRO10HDX, digital low resistance ohmmeters (Ducter) in industrial LV environments. In these environments commissioning testing and scheduled maintenance testing of individual connections can provide real benefits for added safety, energy efficiency and future reliability, including fire prevention.

Many applications require making test lead connections to small contacts, which can also be in difficult locations to access. This Industrial application kit allows the connection of 4 mm shrouded plugs of suitably rated building wiring style test leads, maintaining the all-important CATIII rating of the DLRO10HD and DLRO10HDX instruments.

A selection of lead sets fulfil the requirements for the vast range of applications in this environment.

This kit enables safe, convenient testing of applications such as measuring power cable core resistance from one end, measuring crimp, cable lug, bus bar connections and circuit breaker / switch contacts plus many more common industrial applications.

Ensure that all users fully understand the safety section of this document.

2. 1 What comes in the kit

1. Kelvin clip lead set

2. Kelvin probe lead set

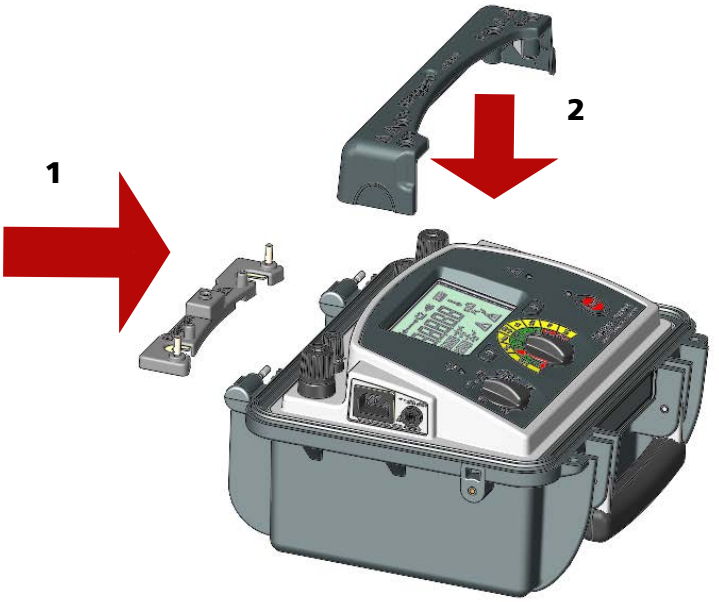
3. Bridging leadset, with clips (red and black)

4. Current and potential (four wire) lead set, with clips and probes

5. Terminal adaptor, two part, P terminal bridge and top cover

6. Carry bag

2. 2 Fitting the terminal adaptor



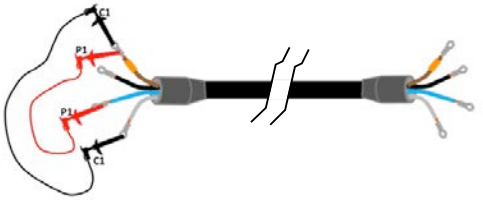
Note: Ensure that the P terminal bridge is fully home before tightening the P terminals

Note: Ensure the C terminals are screwed down fully before fitting the adaptor cover

3. Using the Kit

3. 1 Measuring a cable core resistance from one end

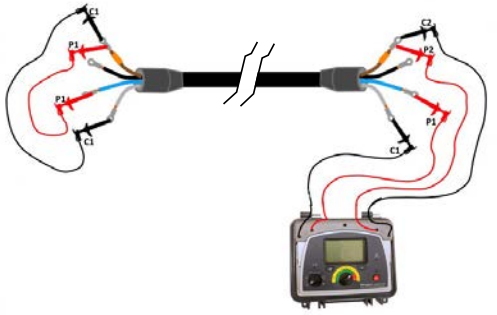
A single cable core can be tested from one end using the following procedure:



3. 1. 1 Step 1, attach the bridging lead set

At the far end of the cable, select which core is to be measured. Select two other cores to use as P1 and C1 extension leads. Link together using the bridging leadset as shown above.

3. 1. 2 Step 2, attach the current and potential (four wire) lead set



Take the instrument to the working end of the long cable and connect to the two cores selected to be the P1 and C1 connections. Connect the P2 and C2 test leads to the core to be measured as shown.

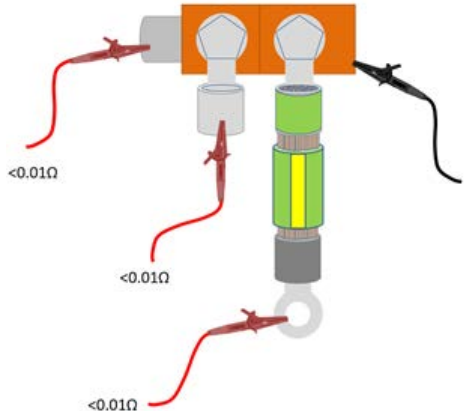
The measurement taken will be the resistance of only that individual core. The test leads can be then repositioned to measure each core in turn.

Since this is a four wire measurement any additional resistance on the cores used to make P1 and C1 connections will not affect the accuracy of the measurement, provided they do not exceed the overall C1 to C2 loop resistance limit of the DLRO instrument, which for the DLRO10HD and DLRO10HDX is 100 mΩ.

Length of cable is only limited by the C1 / C2 resistance outlined in above.

3. 2 Measuring connections within an industrial power or ground system

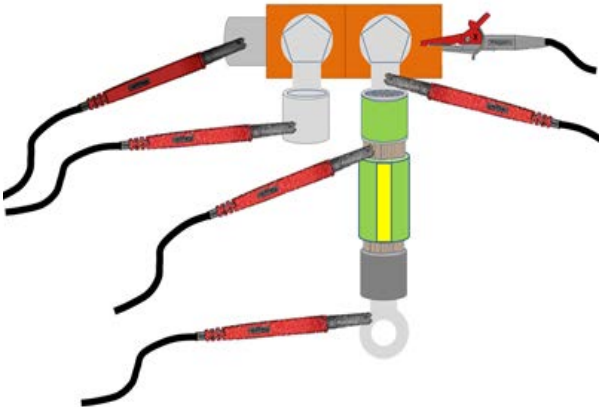
3. 2. 1 Testing with a two wire 200 mA continuity tester



Due to the convenience, a multimeter or continuity tester will often be used to verify connections on industrial ground or power systems. These instruments are not designed for such applications and cannot measure extremely low resistance to highlight the small increases that will waste energy or even render ground systems much less effective.

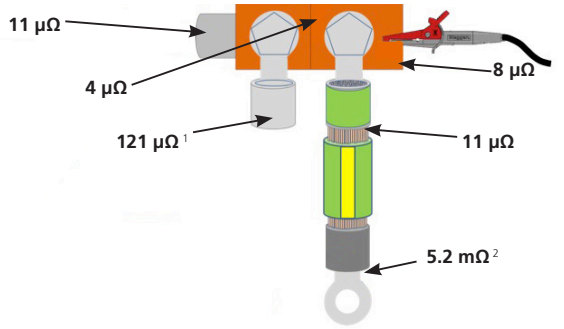
Measurements will often look good reading <0.01Ω, but using an accurate DLRO / Ducter reveals the true condition of connections.

3. 2. 2 Using Kelvin test leads (probes or clips)



This is an example of how the Kelvin probes or Kelvin clips can be used. In this case a clip is attached to the bus bar and a probe is used to quickly and accurately measure each point of connection.

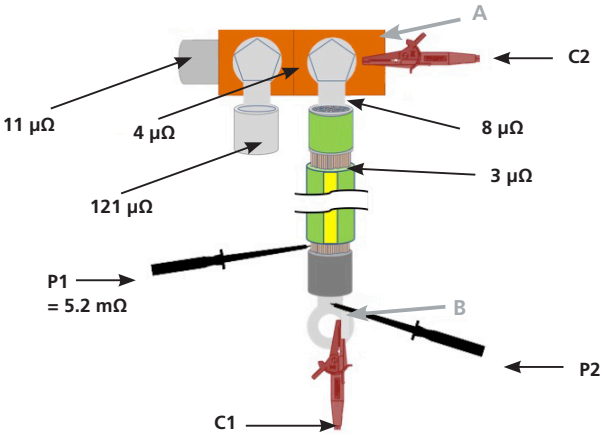
3. 2. 3 Testing with a DLRO low resistance tester.



As seen in this example, a DLRO or Ducter provides accurate results. By comparing similar connections a number of potential hazards can be easily revealed:

1. Why is this lug 10 times higher than the other one on the same bolt?
2. This excessive resistance will cause heating which will waste energy and quickly develop into a fire risk.

3. 2. 4 Using current and potential (four wire) lead sets.



Note: Cable length A to B >5 m, resistance >2.5 mΩ (approx)

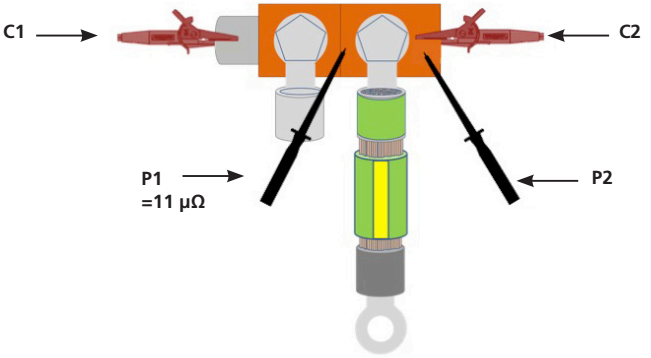
The four wire method can be used in a similar way. However in this example the cable is quite long meaning the overall resistance (A to B) would mean the instrument would use a higher resistance range if Kelvin connections had been used, losing the ability to make accurate µΩ measurements.

The resistance measured on the four wire method will be between the P1 and P2 points only, providing the instrument test current (C1 - C2) flows 100% through that connection (i e, there are no parallel paths).

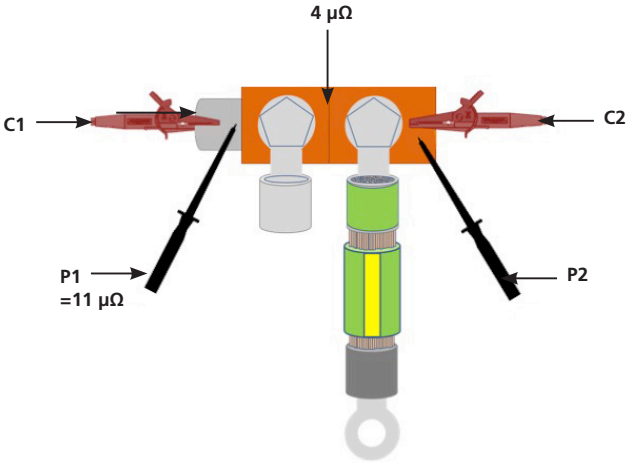
The measurement of each connection (Kelvin or four wire) will provide the same results as desired.

3. 3 These results would be obtained in the following sequence of connections:

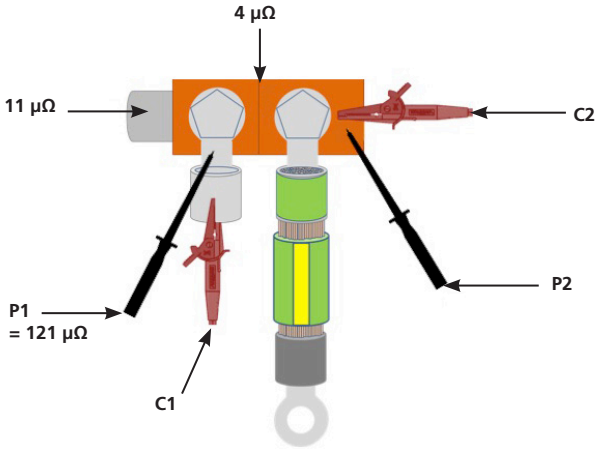
3. 3. 1 Test 1



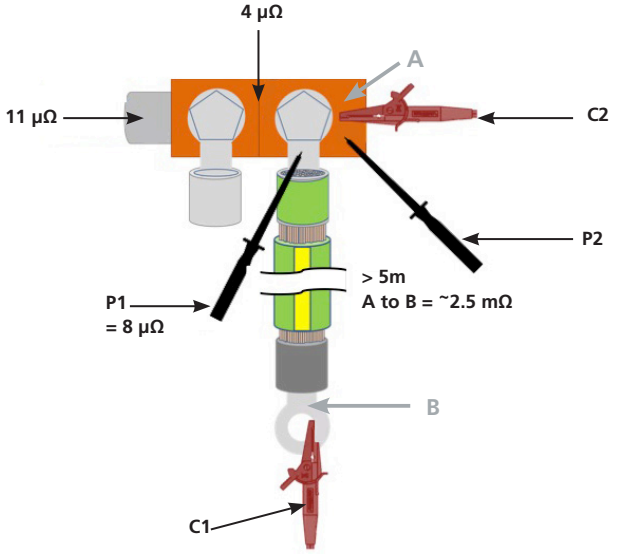
3. 3. 2 Test 2



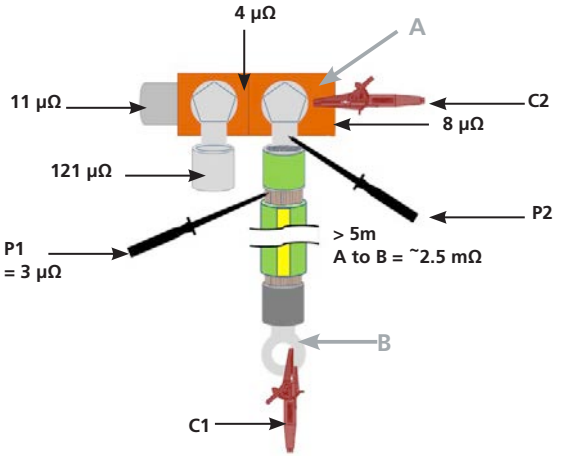
3. 3. 3 Test 3



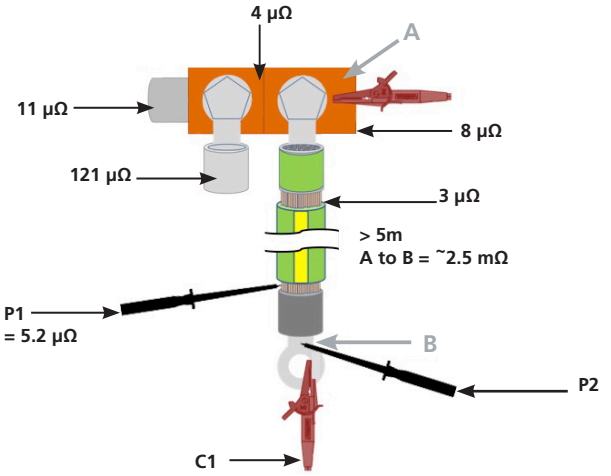
3. 3. 4 Test 4



3. 3. 5 Test 5



3. 3. 6 Test 6



3. 3. 7 In Conclusion

These are examples of how the industrial application kit can be used. The size of clips and probes are invaluable for testing many industrial applications. Small circuit breakers and switches can be tested to ensure reliable and repeatable contact resistance is achieved. Motor windings, small transformers and generator windings can be assessed to ensure efficient use of energy, future failures can be avoided and prevent potential fire risks being left undetected.

4. Calibration and Repair

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

5. Decommissioning

5. 1 WEEE directive

The crossed out wheeled bin symbol placed on Megger products is a reminder not to dispose of the product in the general waste system.

Megger is registered in the UK as a producer of electrical and electronic equipment (registration No.: WEE/HE0146QT).

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

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