NEW DLRO10HD GIVES YOU THE POWER

- **What Power can the DLRO10HD provide?**
- **Why does the DLRO10HD let you choose the power output?**
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- **What are the applications for the DLRO10HD?**
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INTRODUCTION

Megger has been manufacturing low resistance ohm meters for many years. In fact the first Low resistance ohmmeter was launched in 1908. The first low resistance ohm meter, launched under the DUCTER trade mark was developed by Evershed and Vignoles (one of the companies that evolved into Megger) and used a cross-coils meter movement. Today, Megger has a comprehensive range of Digital Low Resistance Ohmmeters, under the DLRO trade mark, providing accurate and reliable measurements with test currents ranging from a few μA to 600 A suitable for many applications.

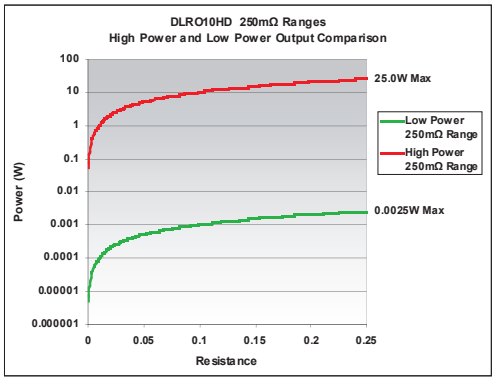
The DLRO10HD is the latest addition to the Megger range fulfilling the requirement for a heavy duty instrument in both test specification and physical toughness.

What Power can the DLRO10HD provide?

When discussing "power" with regard to a DLRO we could be talking about one of two things. The DLRO10HD has special features in both of these departments, each proving real benefits to the user.

- **Power supply** – the DLRO10HD like many low resistance ohmmeters is powered by rechargeable batteries. However, what happens when the battery is flat? The result is a few hours waiting for the battery to charge! The DLRO10HD can be operated from a mains or line supply and charge its battery at the same time. No more waiting for a battery to charge. This is particularly useful in manufacturing environments.
- **Power output** – applying too much current during a test will result in power dissipation in the test piece, in turn resulting in heating. The heating alters the resistance of the test piece. This is the very reason why the established DLRO10 limits power output to 0.2 W. However there are some applications where having higher power output is useful. The new DLRO10HD is unique in that it gives you the best of both worlds. The user can select measurement ranges of either low or high power.

The DLRO10HD features two ranges with extended compliance. Effectively there are two 2.5 Ω and two 250 mΩ ranges one low power, and one high power. The chart below shows the power output curves for the two 250 mΩ ranges. Each range provided 10 $\mu\Omega$ resolution allowing the user to make comparative measurements at either 0.25 Ω or 25 Ω maximum outputs.



Why does the DLRO10HD let you choose the power output?

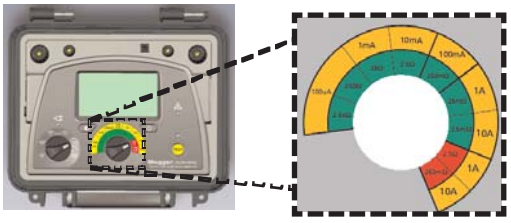
Here are three examples that will help to explain:

- **Contamination** – The application of high power will result in test piece heating. However there is another aspect to this. Many tests are performed on bonds, connections, contacts etc. used in low current applications. If you have contamination between surfaces, higher test current and power will just "blast" through the contamination. This results in a good test result, even though in use the connection will prove to be unreliable. Testing at a low current and power will show up the problem much more readily.

- **Rough surfaces** – An example where high power is an advantage is testing connections, or bonds with rough surfaces. In some cases a good test result will be obtained with a low test current and power, the contact points between contact surfaces being of low enough resistance. However applying a higher test current and power will heat these small points of contact. The result is a test result changing as the heating takes place, high lighting the problem.

- **Frayed wires** – On lower current carrying systems (typically less than 10 A) testing with higher power will cause heating on weaknesses such as frayed wired. The remaining wires presenting a higher resistance.

DLRO10HD Range selection



The selection of the ranges on the DLRO10HD couldn't be simpler. The colour coded rotary range switch gives simple indication of resistance measurement range and test current selected. The yellow band contains the test current. The green ranges indicate ranges where the output power is limited to 0.25 W, and the red ranges indicate the high power ranges that will dissipate up to 25 W into the test piece.

The 25 W power output can be supplied continuously for at least 60 seconds. This means resistance with inductance can be measured. However it must be stressed that the DLRO10HD is not suitable for testing large inductive circuits, such as power transformers.

In addition in normal (non inductive) applications this affords the instrument an excellent duty cycle so the user will not spend excessive amounts of time waiting for the instrument to cool between tests.

What are the applications for the DLRO10HD?

As with many low resistance ohm meters the applications are far and wide. Here are a few applications suited to a DLRO10HD.

- **During electrical manufacturing processes**
  - **Testing switches, connectors and relays** – To ensure contact resistance is within specified values.
  - **Cable resistance** – too low means too much copper in cable (higher costs), too high means not enough copper (cables' current carrying capacity compromised)
  - **Motors** – To determine heat rise under load, measure winding resistance, check for short circuits or open circuits.
  - **Generators** - To determine heat rise under load, measure winding resistance, check for short circuits or open circuits.
  - **Fuses** - To ensure resistance is within specified values.
  - **Cable looms** – Checking bonding and interconnections when installing in equipment, racks etc.
  - **UPS / Car batteries** - Carrier to plate weld resistance, high resistance indicates poor weld quality that will restrict battery's ability to carry current.

- **Aircraft assembly and maintenance**
  - **Main frame electrical and mechanical bonds** – to ensure a stable "ground plan" to protect aircraft from static electricity and lightning strikes.
  - Static wick bonding
  - Antenna bonds
  - Control linkage bonding
  - Battery connection and interconnection
  - Integrity of structure and exhaust system
  - Metallic coating resistance

- **Railway / Railroad Industry**
  - **Strap and wire bond between rail segments** – maintaining performance of control and telephone system. Minimising power loss on three rail systems. However sometime higher test currents are specified.
  - **Cable joints** – power system efficiency.
  - **Earth / ground bonds** – e.g. lightning protection on structures. Ground mats, ground conductor rings, metal cladding, metal ceilings, metal floors, hand rails, seats etc. to limit step and touch potential.
  - **Platform edge doors** – Earth / ground bonding (mainly underground systems)

- **Aluminium refineries**
  - **Graphite electrodes** – to verify density

- **Ship building or any metal structures**
  - **Weld quality** – measure at regular intervals along weld length looking for uniformity.
  - **Installed equipment bonds** – to steel structure / hull.
  - **Raw material processing**, e.g. cement plants
  - **Power carrying elements** – installation and maintenance
  - **Ground bonds** - cement is corrosive

- **Automotive industry**
  - **Cable leads in robot spot welders** work-harden through flexing causing strands to break. Results in poor weld quality.

- **Power Generation and Distribution**
  - **Bus bars** – lap joint tests to maintain low resistance, and hence maintaining efficiency and reducing likely hood of fire.
  - **Cable joints** – including overhead lines. High imped ance joint can explode.
  - **Fuses** – connections

- **Uninterruptible Power Supply (UPS)**
  - **Battery straps** – quality of connections. Preventing potential of fire and failure to operate
  - **Carrier to plate weld resistance** – High resistance indi cates poor weld quality that will restrict battery's ability to carry current.

- **Military vehicles – Trucks, tanks etc.**
  - **Installed equipment such as radio equipment** - ground bonding to vehicle chassis.

- **Buildings – wiring, lightning protection bonds**
  - **Various bond, both for power distribution and earth grounding** – check for step and touch voltage safety in fault condition.
  - **Conduit continuity** – metal conduit, detect corroded or loose threads etc.

- **Pipe lines**
  - **Cathodic protection** – check connection etc. Tough environment ideal for the DLRO10HD

- **Wind turbines**
  - **Lightning protection** – wing tip to base, or component parts in manufacture. Long test leads available for this application.
  - **Earth ground bonds** – various

What other advantages does the DLRO10HD offer?

The DLRO10HD is a heavy duty instrument designed to operate in the toughest of conditions. Below is a complete list of the key **features and benefits**:

- **Both high and low power outputs**
  - **Diagnostic tool**. Low power to identify problems such as bond contamination and corrosion. High power to show up weaknesses due to heating.

- **High power (10 A into 250 mΩ, or 1 A into 2.5 Ω measurements) with inductive mode**
  - Will pass 10 A continuously for at least 60 seconds
  - Less time waiting for unit to cool

- **Operates from mains as well as high capacity lead acid battery**
  - **Always ready to test**, even with a flat battery

- **High level of input protection, 600 V without damage (CAT III 300V rated with DH7 insulated terminal covering leads)**
  - Inadvertent connection to mains / line supply will not damage instrument or blow fuse. Instrument will continue to operate as normal. Particularly useful when testing UPS battery straps.

- **Automatic testing**
  - Initiates test on contact, passes current in each direction in 3 seconds to cancel out the effect of thermal E.M.F. caused by contact between dissimilar metals.

- **Simple operation and fast testing**
  - Time is money, no time wasted reading complicated user guides and short test time saves time.

- **Tough housing IP65 lid closed, IP54 in operation**
  - Ideal for very tough conditions both indoor and out side

Megger.

DLRO10HD
10 A Digital Low Resistance Ohmmeter

What other <10A instruments are in the range?

Megger also manufacture two other DLRO instruments, the DLRO10 and DLRO10X. Both these instruments offer light weight, hang around the neck operation with 0.2 W limited power output.
Full information on these and any other Megger products can be found on www.megger.com

Feature	DLRO10	DLRO10HD	DLR010X	Benefit/s
Power limied ouput test ranges (<0.25 W)	■	■	■	Negligible heating, little need for contact temperature compensation Can help to highlight contamination Extends battery life
High power output test ranges (25 W)		■		Can help to highlight weakness with heating, such as poor connection due to rough surfaces or broken strands on cables Improved inductive load performance
Auto current reversal	■	■	■	Cancels out thermal EMFs
Auto start (continuity detection)	■	■	■	Fast operation without pressing test button
High input protection <600 V	■	■	■	Inadvertent connection to live line supply or UPS voltage will not even blow a fuse Testing just continues as normal
Noise immunity specified at 100 mV	■	■	■	Make measurement in harsh environments
Noise limit exceeded indicator		■		Confidence that measurements are not effected
User interchangeable detachable battery pack	■		■	Continuous testing with optional second battery. Use one battery while second charges
Hang from neck operation	■		■	Ideal for use up ladders and platforms improved manoeuvrability
Operate from mains/line supply		■		Continuous testing from mains ideal for manufacturing applications Always ready to test no waiting for battery to charge
IP65 lid closed		■		Can be transported in any wet conditions
IP54 in use		■		Can be operated in the rain
Ultra tough case		■		Built to take the knocks in the most arduous of conditions
Test result storage with memos			■	Ideal for predictive maintenance systems Less errors in writing down test results
Printer and PC output			■	Save results to your PC or send to a printer
User selectable test limits			■	Aids rapid testing to specified limits

DLRO10

DLRO10HD

DLRO10X

More comprehensive information on understanding and measuring low resistance can be found in the Megger publication "A Guide to Low Resistance Testing".

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