

## TRAX - Multi-function transformer and substation test system

TRAX is a high performance multi-function transformer test set that offers a time saving and cost effective alternative to conventional measurements using separate instruments.



## MTO250 - Winding resistance testing to 50 A DC

Packed with safety features to enable safe testing of highly inductive objects.



## TRANSFORMER TEST VAN - Maintenance and diagnostics of power transformers

Integrated instruments, accessories and test leads makes commissioning and maintenance easier and more efficient.



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# Transformer testing equipment

**Megger**<sup>®</sup>  
Power on

## Megger - leaders in transformer testing

The first insulation test set “Megaohm meter” was invented by Sydney Evershed (Evershed & Vignoles Limited). The MEGaohm metER was branded as “Megger” in 1903. Since branding, Megger has grown and evolved to become the leading manufacturer of portable substation testing equipment. Insulation testing and the word ‘Megger’ are synonymous in the electrical test industry, a position only maintained by continually designing world class products.

### Asset management plan

Transformers have the single highest value of the equipment installed in substations reaching 60% of the total investment. Asset managers are constantly under pressure to improve the financial and technical performance of transformers, which has pushed utilities to assess the actual condition of their transformers. Condition assessment contributes to achieving the optimal balance between maintenance costs and operating performance and provides asset managers the economic and technical justifications for engineering decisions and capital replacement plans.

Maintenance strategy and condition assessment actions differ from utility to utility but the well-accepted tests that are useful as diagnostic methods are listed in the table (overleaf).

### Complete transformer testing toolbox

There are several facets to a transformer’s overall health, so a full assessment requires a number of tests. Megger offers the broadest range of transformer test equipment in the industry, capable of delivering the most comprehensive picture of transformer health. Our instruments enable routine and advanced electrical testing techniques described and recommended in international standards such as IEEE, IEC and CIGRE. Moreover, our instruments and software tools are user-friendly, highly accurate and reliable to facilitate the management of your entire electrical testing program for power, distribution and instrument transformers.



Sydney Evershed's Megaohm meter (1895).

■ **1895** - First insulation test set invented by Sydney Evershed

■ **1903** - Megger trademark registered

■ **1923** - First multimeter with Amps, Volts and Ohms (AVO)

■ **1965** - First low-weight tan delta/power factor insulation test set

■ **1980** - First transformer ohmmeter with tap-changer discontinuity detection

■ **1991** - Merger of the Megger Group (Megger, Biddle, Multi-Amp)

■ **1995** - First dynamic resistance measurements for on-load tap-changers

■ **1997** - First dielectric frequency response analyzer for insulation diagnostics in the field

□ **2009** - First portable 30 kV insulation test set

■ **2010** - Megger patent on individual temperature correction of measured tan delta/power factor values

■ **2010** - Megger patent on automatic detection of tan delta/power factor voltage dependence

■ **2013** - First 5 kV and 10 kV insulation resistance tester with 4 mA noise rejection and firmware filtering

■ **2014** - First 15 kV insulation resistance tester with 8 mA noise rejection and 5% accuracy up to 3 T $\Omega$

■ **2015** - First multi-function transformer and substation test system with apps-based user interface



## Megger - leaders in transformer testing

TEST TYPES		MEGGER TEST SETS									
COMPONENT	TEST	TRAX	Delta	IDAX	CDAX	S1/MIT	FRAX	MWA	TTR	MTO	
Windings	Resistance	■						■		■	
	Ratio / polarity	■	■		■			■	■		
	Excitation current	■	■	■				■	■		
	Short-circuit impedance	■									
	Frequency response analysis						■				
	FRSL	■									
	Insulation resistance			■		■					
	Capacitance	■	■	■	■						
	Power factor / tan delta	■	■	■	■						
	Dielectric frequency response	■	■	■							
	Magnetic balance	■									
Bushings	Capacitance	■	■	■	■						
	Power factor / tan delta	■	■	■	■						
	Dielectric frequency response	■	■	■							
	Bushing CT's	■									
Insulating oil	Dielectric strength										
	Power factor / tan delta	■	■	■							
Cellulose insulation	Moisture content			■							
Tap changers	Load/OLTC	Resistance	■					■		■	
		Dynamic resistance	■								
		Excitation current	■	■	■				■		
		Ratio	■	■					■		
		Continuity (make before break)	■					■		■	
		Contact timing (DRM)	■								
	No-load/DETC	Resistance	■								■
		Excitation current	■	■	■				■		
		Ratio	■	■					■		
Core / Tank	Core insulation			■		■					
	Excitation current	■	■	■				■	■		
	Magnetic balance	■							■		
	Frequency response analysis						■				
	Ground connection	■									
Connections	Contact resistance	■								■	
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TRAX Apps for various measurements/applications

# TRAX

## Transformer and substation test system

The TRAX transformer and substation test system is designed to be a complete solution in transformer testing. TRAX is a multi-functional test system that replaces numerous individual testing instruments for testing of transformers and other system components addressing the need for a single test system capable of performing multiple tests. Testing with TRAX is a time saving and cost effective alternative to using separate instruments.

TRAX provides up to 800 A and 2200 V test signals (2000 A and 12 kV with accessories) with a frequency range adjustable from 5 to 500 Hz (1 - 500 Hz for insulation testing). These variable levels of voltage and current can be generated and measured with

- ▣ Power transformers
- ▣ Load tap-changers
- ▣ Reactors
- ▣ Instrument transformers
- ▣ Bushings
- ▣ Circuit-breakers
- ▣ Protection relays
- ▣ Grounding systems

high precision, allowing TRAX to be used for testing of turns ratio, excitation current, winding and contact resistance, impedance, tan delta/power factor and various primary tests for LV, MV and HV electrical apparatus.

The user interface allows full manual control where the user defines a specific test setup. Alternatively, a variety of individual instruments/apps are available to perform different tests like winding resistance, turns ratio, impedance measurements, relay testing, circuit breaker analysis and more. The tests measurements can be organized and reported as separate tests or as a combined full set of test results for the same asset. TRAX can be used with an integrated touch screen or external computer device with a Chrome web browser.



# TRAX

## Transformer and substation test system

- Winding resistance
- Demagnetization
- Load tap-changer (OLTC) continuity and dynamic resistance
- Turns ratio
- Excitation current
- Short-circuit impedance (Leakage Reactance)
- FRSL (frequency response of stray losses)
- Optional switchbox for one-time 3-phase connection
- Magnetic balance
- CT testing
- VT testing
- Voltage withstand
- Circuit breaker
- Single-phase relay
- Ground/ earth/ impedance
- Tan delta/ power factor and capacitance



TDX120 accessory for tan delta/power factor and capacitance measurements

### TRAX SPECIFICATIONS

<b>Input Power</b>	100-240 V $\pm$ 10 %, 50/60 Hz
<b>Output Voltage</b>	0 to 250 V AC 0 to 2200 V AC 0 to 12 kV AC (with TDX option) 0 to 300 V DC
<b>Output Current</b>	0 to 10 A AC 0 to 200 A AC (TRAX 220) 0 to 800 A AC (TRAX 280) 0 to 2000 A AC (with TCX option) 0 to 100 A DC
<b>Frequency Range</b>	5-500 Hz (1-500 Hz for insulation testing)
<b>Output contacts</b>	2, for tap-changer and circuit breaker operation
<b>Measurement channels</b>	Internal measurements on output generators and output contacts 4 x multi-purpose voltage/current measurement 2 x DC voltage for resistance measurements 1 x transducer input 3 x timing 1 x trig input
<b>3-phase one-time connection</b>	With TSX option
<b>Tan delta and capacitance measurements</b>	
	With TDX option
<b>Weight</b>	26 kg (TRAX 220) 29 kg (TRAX280)



# DELTA Series

## Tan delta / power factor test set

- Accurate measurements in high noise and HV environments
- Lightweight two-piece design, 14 kg and 22 kg
- Automatic voltage dependency detection
- Individual Temperature Correction (ITC)
- Dielectric frequency response (1 - 500 Hz)

The DELTA 4000 Series is a fully automatic 12 kV insulation power factor/dissipation factor (tan delta) test set designed for condition assessment of electrical insulation in high voltage transformers, bushings, and surge arresters.



The DELTA 4000 Series can be used to measure the excitation current of transformer windings as well as to perform automatic tip-up tests for dry type transformers and HV turns-ratio testing (using an optional TTR capacitor) .

This state of the art instrument utilizes a patented method for temperature correction (ITC) versus now invalidated temperature correction tables. Additionally, the measurement is monitored and when possible voltage dependence is detected, the user is prompted to perform tan delta/power factor tip-up measurements.

The Delta 4110 requires an external computer to control it. The Delta 4310 has an onboard computer but can also be controlled externally.

### DELTA SPECIFICATIONS

<b>Input Power</b>	100-240 V $\pm$ 10 %, 50/60 Hz, 16 A max
<b>Output Voltage</b>	0 to 12 kV
<b>Test Frequency Range</b>	1 to 500 Hz
<b>Output Power</b>	3.6 kVA
<b>Output Current</b>	300 mA
<b>MEASURING RANGES</b>	
<b>Capacitance:</b>	0 to 100 $\mu$ F
<b>Inductance:</b>	6H to 10 MH
<b>Watts:</b>	0 to 2000 W
<b>ACCURACY</b>	
<b>Capacitance:</b>	+/-0.5 % Rdg +/-1pF
<b>PF &amp; DF:</b>	+/-0.5 % Rdg +/-0.02 %
<b>PHYSICAL</b>	
<b>Weight</b>	14 kg + 22 kg = 36 kg

# CDAX

## High precision capacitance and dissipation factor test set



CDAX is a precision instrument that combines a bridge and direct (vector) capacitance and dissipation factor test set to be used with an external AC power source and a standard capacitor to form a complete measurement setup for capacitive, resistive and inductive loads.

CDAX 605 is designed for laboratory and production line testing of electrical equipment insulation and insulating materials as well as calibration of CCVTs and other precision ratio devices. Testing can be performed at almost any voltage level depending on the rating of the equipment, the power source and the capacitor.

The unit will accept a test current up to 5 A from the specimen under test which can be increased by using an external current transformer.

### CDAX SPECIFICATIONS

<b>Test voltage</b>	Pending generator, standard capacitor and test object
<b>Test frequency range</b>	5 to 400 Hz
<b>Reference and test current</b>	15 $\mu$ A to 5 A
<b>MEASUREMENT RANGE</b>	
Range limit is given by test current and voltage of used power source	
<b>Capacitance accuracy</b>	0.02 %
<b>Dissipation factor accuracy</b>	0.05 % of reading + 0.002 %
<b>Phase accuracy</b>	0.02 mrad
<b>Recorded values</b>	Current, voltage, capacitance, inductance, resistance, tan delta, phase, ratio

### PHYSICAL

<b>Weight</b>	4.4 kg
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- Very high accuracy and wide measurement range
- Fast and automated measurement process with direct readings of results
- Measures capacitance, resistance and inductance in combination
- High accuracy ratio measurements with direct reading of measured ratio and phase deviation
- Optional LabView and C# interface

The input voltage to the device can be measured with a traditional reference capacitor while the secondary low voltage can be measured with a calibrated resistive divider such as the CRD 605 accessory.

A CDAX test instrument replaces traditional bridges and has a unique fully automated test process eliminating time consuming manual balancing.

The unit is ideal for use in a manufacturing environment where results are stored such as in Labview or C#.

# IDAX300/350

## Dielectric response and moisture analysis

- ▣ Automated measurement and analysis of moisture content, oil conductivity and tan delta/power factor
- ▣ Individual temperature correction (ITC) of tan delta/power factor and oil conductivity
- ▣ DFR measurements with AC test signals for reliable measurements in high - interference environments
- ▣ New multi-frequency technique performs a complete insulation assessment in 22 minutes

IDAX provides fast and accurate dielectric frequency response measurements for insulation assessment including moisture content in the solid insulation, conductivity of the oil, power frequency tan delta and capacitance. Using true AC dielectric frequency response, IDAX gives reliable results even under high interference conditions and with the new multi-frequency technique, it is also the fastest instrument on the market.

IDAX provides other test functions including excitation current, hot collar testing and DC insulation. The unique dielectric response of the insulation system can be converted into the thermal response of that specific component. In addition to power transformers, it is



also suitable for use for bushings, current transformers, voltage transformers and virtually any other electrical component where tan delta and capacitance measurements are needed.

All IDAX models have three measurement input channels and can be equipped with two separate ammeters enabling two completely independent measurements at the same time, thus minimizing test time.

### IDAX SPECIFICATIONS

<b>Output voltage (V peak)</b>	0 to 10 V, 0 to 200 V, 0 to 2000 V (with VAX 020)
<b>Output current</b>	0 to 50 mA
<b>Frequency range</b>	DC to 10 kHz
<b>Measurement channels</b>	3, Red, Blue and Ground
<b>Ammeters</b>	1 (IDAX 300) or 2 (IDAX 300S and 350)
<b>Max AC interference (50/60Hz)</b>	1 mA @ 1:10 SNR,

### Individual temperature correction

Tan delta/power factor to 20 C  
(0.1, 1, 10 Hz or line frequency)  
Oil conductivity to 25°C reference

### Test time for moisture analysis

12 min, 2 mHz to 1 kHz, 30°  
to 45°C insulation temp  
22 min, 1 mHz to 1 kHz, 20° to  
30°C insulation temp  
43 min, 0.5 mHz to 1 kHz, 10° to  
20°C insulation temp

### Instrument control

Internal or external PC

External PC (IDAX 300 and IDAX 300S)  
IDAX 350

### PHYSICAL

IDAX 300

IDAX 350

Accessories

### Weight

4.9 kg (11 lbs), 9.9 kg (22 lbs) incl. flight case

13.5 kg (29.8 lbs)

8.5 kg (18 lbs) soft bag



# VAX020

## High voltage amplifier

- High voltage amplifier enables IDAX measurements at 2 kV test voltage
- Large frequency range, DC to 1 kHz
- Compact design, weight only 4.4 kg

The testing capabilities of IDAX are extended with the addition of the high voltage amplifier VAX020. The voltage output increment from 200 V up to 2 kV (peak) is the most assertive solution to challenging DFR measurements in high interference environments (e. g. HVDC substations) or while measuring at very low frequencies on low capacitance objects (e.g. bushings and instrument transformers).

VAX020 allows not only HV DFR measurements but also measurement of excitation current, capacitances up to 80 nF at 50 Hz (67 nF @ 60 Hz) and hot collar testing at 1.4 kV (RMS). IDAX together with VAX can also be used for DC insulation resistance measurement (including polarization index and dielectric absorption ratio) at 2 kV.



### VAX020 SPECIFICATIONS

Output voltage (V peak)	0 to 2000 V
Output current	0 to 50 mA
Frequency range	DC to 1 kHz
Max AC interference (50/60Hz)	10 mA @ 1:10
SNR	
Max DC interference	20 $\mu$ A
<b>PHYSICAL</b>	
Weight	4.4 kg



# S1 and MIT Series

## High current insulation resistance tester

- ▣ Insulation testing up to 15 kV
- ▣ Resistance range up to 30 TΩ
- ▣ Operate from rapid charge Li-ion battery or AC source
- ▣ Advanced memory with time/date stamp
- ▣ Unique tough dual-case design providing additional user protection
- ▣ Safety rated up to CAT IV - 1000 V up to 4000 m altitude
- ▣ Stable readings in noisy environments



S1 and MIT Series high current insulation testers are ideal for transformer testing, cable, generator/motor, circuit breaker and general purpose testing. The products, depending on model, are packed with features such as IR, timed IR, polarisation index, dielectric absorption ratio and more. The models include rapid charge batteries and operation from an AC source when the battery is dead.

The S1 Series offers class leading charge current, noise rejection and software filters, making them Megger's most advanced DC insulation resistance testers to date.

Test reports can be created using test data by downloading information from the instrument memory or charts from real-time data.

A range of high voltage test lead options are available with large or medium clips and in lengths 3 to 15 m depending on model.

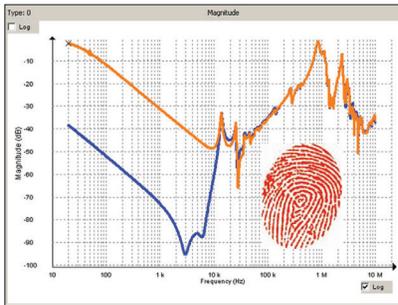


### S1 AND MIT SPECIFICATIONS

	MIT515	MIT525	MIT1025	MIT1525	S1-568	S1-1068	S1-1568
Maximum test voltage	5000 V	5000 V	10000 V	15000 V	5000 V	10000 V	15000 V
Maximum test current	3 mA	3 mA	3 mA	4 mA	6 mA	6 mA	6 mA
Noise rejection	3 mA	3 mA	3 mA	4 mA	8 mA	8 mA	8 mA
PC Remote control & Bluetooth®					■	■	■
Step voltage, ramp & DD tests		■	■	■	■	■	■

# FRAX

## Sweep frequency response analyzer



Collecting fingerprint data using Frequency response analysis (FRA) is an easy way to detect electro-mechanical problems in power transformers and an investment that will save time and money

- Highest accuracy and dynamic range in the industry
- Complies with and exceeds international standards for sweep frequency measurements
- Smallest and most rugged sweep frequency analyzer on the market
- Advanced analysis and decision support built-in to the software.
- Extensive file import-export capabilities including CIGRE and xml formats

### FRAX SPECIFICATIONS

<b>Output voltage</b>	20 V (FRAX 99) 0.2-24 V (FRAX 101 and 150)
<b>Measurement voltage</b>	10 V @ 50 Ω (FRAX 99) 0.1-12 V @ 50 Ω (FRAX 101 and 150)
<b>Frequency range</b>	0.1 Hz – 25 MHz
<b>Frequency sweep settings</b>	Low to high or high to low, logarithmic or linear
<b>Number of points</b>	Default 1046, user selectable up to 32000
<b>Dynamic range (IEC60076-18) (+ 10 dB to internal noise level)</b>	> 150 dB (FRAX 101 and 150) > 130 dB (FRAX 99)
<b>Accuracy</b>	± 0.1 dB from +10 dB to -50 dB ± 0.5 dB from +10 dB to -100 dB (FRAX 101 and 150) ± 1 dB from +10 dB to -100 dB (FRAX 99)
<b>Analysis</b>	Magnitude Phase Impedance Admittance Inductance Resistance
<b>User defined formulas to the list of analysis tools</b>	Cross-correlation (CCF), as in DL/T911-2004 or customer defined



The FRAX series of sweep frequency response analyzers is based on comparative analysis where a measurement is compared to a reference fingerprint.

The superposition of curves is a direct indication whether geometrical and/or electrical changes have taken place within the transformer.

The measurement is easy to perform capturing a unique fingerprint of the transformer. All FRAX models fulfill and exceed sweep frequency response specifications in international standards including IEC 60076-18, IEEE C57.149, CIGRE 342 and DL/T-911.

FRAX 99 is the base model; FRAX 101 allows for larger dynamic range measurements and wireless communication; and both units are operated from a PC. FRAX 150 has the same specifications as FRAX 101 but has an internal computer.

A powerful software interface will guide the users step by step in the measurement process, minimizing testing time and ensuring accurate and repeatable measurements.



# MTO

## Winding Resistance Testing

- Simultaneous 4 winding measurements
- OLTC make before break detection
- Computer or manual control with internal memory
- Reading stability indicator– detects when readings have stabilized

MTO series of instruments offer accurate and fast winding resistance test times using a single current source for four simultaneous measurements minimizing testing time.

For testing LV delta windings (>1000 A) where test times for each tap reach up to 15 minutes each, MTO250 offers a 50 A test current reducing testing time down to seconds.



The 3 phase leads set of our MTO 300 is fully interchangeable with TTR series Instruments, thereby minimizing testing times when both measurements are used together.

- MTO210 – 10 A, Single-phase, 2 ch, manual
- MTO250 – 50 A, Single-phase, 2 ch, manual or PC control
- MTO300/330 – 3-Phase/6-winding measurements, 10 A, stand-alone or remote control

### MTO SPECIFICATIONS

Output current	Up to 10 A DC (MTO210 and 300) 50 A DC (MTO250)
Open-circuit voltage	MTO210: 40 V DC MTO250: 50 V DC MTO300: 40 V DC
Resistance:	10 $\mu\Omega$ to 2000 $\Omega$ (MTO210 and 300)
Accuracy:	$\pm 0.25$ % reading, $\pm 0.25$ % full range scale when current has stabilized
Resolution:	Readings: 4 digits Current: 6 digits

# TTR

## 3-Phase transformer turns ratio test sets



TTR series of instruments are designed for accurately measuring the turns ratio of single and three phase, two and three winding power CTs, VTs, PTs and phase shifting transformers.

TTR instruments make testing easy with “quick test mode” (where little nameplate information is required) or “automatic mode” where a transformer nameplate information is entered and all taps and windings can be tested sequentially tap by tap and phase by phase. Results are stored and/or downloaded to a test report format or CSV file for easy printing.

For optimum efficiency and safety, the leads used in the TTR 3XX series can be used with the Megger winding resistance units (MTO 3XX) where climbing up and down ladders to reach bushings is done only once.

- ▣ **Accurately measures ratio, excitation current, phase deviation as well as phase shift of phase shifting transformers.**
- ▣ **Built in storage and downloading test results in CSV format or to PowerDB software.**
- ▣ **Works manually or automatically with and without PC**
- ▣ **Test leads can be used with Megger MTO 3XX winding resistance ohmmeters for more efficient and safer test practices – only one ladder climb for 2 different tests.**



### TTR SPECIFICATIONS

MODEL	FEATURES	DISPLAY	KEYBOARD	INTERNAL PRINTER	RATIO
TTR25	Single phase, handheld, battery	B/W LCD	Alpha-numeric	No – RS232	20,000:1
TTR100	Single phase, handheld, rechargeable battery, automatic phase comparison	B/W LCD	Alpha-numeric	No – RS232	20,000:1
TTR300	3 phase, portable, remote PC operated	None, external computer control	None, external computer control	No	45,000:1
TTR310	3 phase, portable, screen operated	5" B/W alpha-numeric	Alpha-numeric	Yes	45,000:1
TTR330	3 phase, portable, QWERTY keyboard and coloured screen	8.4" color VGA	Qwerty	Yes	45,000:1

# MWA

## 3-Phase Ratio and Winding Resistance Analyzer

- **All transformer types and sizes – with and without OLTC tap changers**
- **All generators & motors**
- **Bus bar connections, circuit breakers contacts**
- **Testing includes:**
  - Ratio**
  - Winding resistance,**
  - Demagnetization,**
  - Polarity,**
  - Excitation current,**
  - Make/break transition & phase.**

The MWA3xx is designed to test power, instrument, and distribution transformers in high noise, harsh outdoor environments or in an indoor manufacturing process. It is ideal for testing complex 3-phase transformers (with tap changers, bushing CTs, and tertiaries) in a fraction of the time taken with traditional test equipment.



The Megger MWA3xx Transformer Winding Analyzer is an advanced 3-phase transformer test system delivering portability, reduced set-up time, increased job-site safety, and effortless productivity. The MWA3xx provides complete ratio, phase and winding resistance measurements for a 3-phase transformer. All ratio and winding resistance tests are performed in one instrument, with only one 3-phase lead-set connection. The MWA3xx utilizes PowerDB as a single software platform saving the user additional time with only one set-up and one easy-to-read data report.

- **The solution for measuring ratio + winding resistance safer and quicker than traditional methods**
- **One control interface for both functions**
- **Combined Test Form**
  - One can test either ratio or winding resistance, all controlled and viewed from a single form.
- **One lead set**
  - One connection to the transformer
  - Twice as safe, 50% lighter, easier transformer hook up and take down



Custom lead sets



# Transformer test van

## Test van for maintenance and diagnostic testing of power transformers

- ❑ Software control and reporting
- ❑ High voltage and low voltage leads are shared among different instruments
- ❑ DC Winding resistance / Tap Changer Test
- ❑ Turns ratio and vector group verification
- ❑ Capacitance and dissipation factor / power factor
- ❑ Excitation current
- ❑ Insulation Resistance
- ❑ Power losses for no-load and short circuit conditions (optional)
- ❑ Moisture-in-cellulose assessment with DFR technique (optional)
- ❑ Withstand tests at elevated voltage up to 100 kV AC 50 / 60 Hz and 70 kV DC (optional)
- ❑ Oil breakdown test (optional)

A dedicated and fully integrated test van, complete with all relevant instruments, accessories, and test leads, for commissioning and periodic maintenance tests.

The heart of the system is a switch box that enables automated software-driven selection of HV and LV methods and test schemes. This allows most instruments to share common test lead connections saving time and making operation safer. Physical interface with the instruments themselves is no longer required. Upon completion of each measurement, results are automatically transferred into a protocol.

The software allows comparative measurements with nameplate and previous measurements for trending.

Routine and advanced diagnostic techniques in accordance with the IEC 60060-3, IEC 60076, IEEE Std. C57.12.00, GOST 11677-85 and CIGRE 445 standards can be performed.



OIL TEMP: 30 °C  
IMPEDANCE: 4.2 Ω  
WEATHER: Indoor  
TANK TYPE: SEALED

(Press enter to change)

VOLTAGE	kVA	RATED	Tap	NOMINAL	CHANGER	TAP SETTING
PRIMARY: 50	300	2.82	5	3	DTIC	
SECONDARY: 33 / 15.00	300	0.25	1			

TEST FREQUENCY: 50 COMMENTS:

Overall Test     Bushing CT     Bushing CT     Surge Arresters  
 Hot Collar     TTR     Exciting Current

TRANSFORMER OVERALL TEST SET UP						TRANSFORMER OVERALL TEST RESULTS					
Multiple Test	Insulation Tested	Test Mode	Test Lead Connections	Test KV	Capacitance C (pF)	Measured @ 20°C	Disp Factor	mA	Watts	IR	
1	CHG + CHL	OST-GRD	H L G	5.00	8.138 20	0.28	0.22	0.800	28.7130	0.8046	
2	CHG	OST-RIB	H L G	5.00	2.287 13	0.24	0.19	0.800	7.1863	0.1723	
3	CHL	UST-R	H L G	5.00	6.851 05	0.28	0.24	0.800	21.5239	0.8326	
4	CHL	Test 1 Minus Test 2			6.852 07				21.5276	0.8325	
5	CLG + CHL	OST-GRD	L H G	5.00	14.037 27	0.31	0.25	0.800	44.0979	1.3816	
6	CLG	OST-RIB	L H G	5.00	7.184 04	0.32	0.26	0.800	22.5662	0.7310	
7	CHL	UST-R	L H G	5.00	6.852 59	0.29	0.23	0.800	21.5274	0.8312	
8	CHL	Test 5 Minus Test 8			6.853 23				21.5297	0.8308	
9	CHG	CLG Minus H Bushings									
10	CLG	CLG Minus L Bushings									

NOTE: SHORT EACH WINDING ON ITSELF

INSULATION RATING KEY: H = HIGH VOLTAGE WINDING, L = LOW VOLTAGE WINDING, G = GOOD, D = DETERIORATED, I = INVESTIGATE, B = BAD  
 H = HIGH VOLTAGE WINDING, L = LOW VOLTAGE WINDING, G = GROUND, N = NEUTRAL BUSHING



- Short circuit impedance (optional)
- Frequency Response Analysis (optional)



PowerDB integrated reporting

# MRCT

## Current (CT) Transformer Testing

- Multi-tap simultaneous testing reduces test time by 5
- Smallest and lightest 2 kV secondary voltage injection unit on the market
- Integrated insulation resistance, winding resistance and demagnetization testing
- Completely automated testing and test report with one touch operation
- Optional integrated single phase relay test set, 60 A and 300 V AC/DC

The MRCT is the evolution of testing for current transformers (CT). This instrument provides the ability to perform the testing up to 5 times faster than with traditional instruments, and while testing, results are plotted, displayed and presented in a complete test report format.



The MRCT has also added insulation resistance test as well as demagnetization to its capability. This helps complete all the required testing as per IEC and ANSI standards without the need for additional test equipment or leads.

### Configuration options

- CT with option to add relay test
- IEC 61850 GOOSE
- Bluetooth®
- Remote operation or on-board display

The MRCT's unparalleled noise immunity makes it capable of delivering dependable and accurate results even in extra high voltage substations.

### MRCT SPECIFICATIONS

Saturation test	0 to 2000 V, 1 A maximum
Ratio measurement	0 to 20000
Winding resistance test	0 to 30 $\Omega$
Insulation test	10 G $\Omega$ to 20 G $\Omega$
Weight	16.7 kg (36.7 lb)



# OTS Series

## Oil testing dielectric breakdown

OTS range of oil test sets are fully configurable to comply with International standards including ASTM D877, ASTM D1816 and IEC 60156. The test sets perform accurate breakdown voltage tests on mineral, ester and silicone insulating liquids. Moulded test vessels give repeatable results in the field and laboratory, with lock-in precision electrode gap setting adjustments. The transparent, shielded lid is a key feature enabling users to observe the test chamber.

The OTS AF units are available in 0 to 60, 80 and 100 kV. These units are line powered and provide unique facilities for quick and easy replacement of test vessels. VCM 80 and 100 voltage meter accessories can be used for monitoring the output voltage.

The OTS PB units are small and lightweight to enable field testing. Available in 60 and 80 kV models, the units can be both line and battery powered.

- **Lightest portable unit, starts at 16 kg**
- **9 cm colour display for outdoor on site use**
- **Battery or line powered**
- **Precision lockable electrode gap adjustment**
- **Automatic oil temperature measurement**
- **Direct output voltage or current breakdown detection**



Look on the Megger  
web site for our book

“A guide to insulating  
oil dielectric breakdown  
testing”.

# DLRO10HD

## Low resistance measurements

- Heavy duty micro ohmmeter
- High or low output power selection for condition diagnosis
- 10 A for 60 seconds, less time waiting to cool, great for charging inductance
- High input protection to 600 V for protection of inadvertent connection to line or UPS voltage

The DLRO 10HD measures resistance values up to 250 mΩ making it ideal for measuring connections, bonds and welds.



### SPECIFICATIONS

Maximum test current

Test modes

Measurement range

Power source

Battery life

Weight

Test leads

### DLRO10HD

10 A

Automatic  
Bidirectional  
Unidirectional  
Inductive

0.1 uΩ to 2500 Ω

Mains/rechargeable battery

> 1000 Auto (3 sec) tests

6.7 kg

Duplex hand-spikes with indicators

# MOM2

## Handheld battery operated micro ohmmeter

- Hand held battery operated micro ohmmeter
- Up to 220 A
- 1 kg weight
- 1 μΩ to 1 Ω autoranging

The MOM2 is designed to measure the resistance of circuit breaker contacts, bus-bar joints and other high-current links. This product is designed with safety, ease of use and versatility in mind.

The micro-ohmmeter can be used anywhere to measure a low resistance value with high accuracy. MOM2 uses an ultra capacitor to generate the high output current needed for low resistance measurements.



### MOM2

220 A

I > Imin 0.1, 0.6, 3.0 s  
I = Imin 0.1, 0.6, 3.0 s

1 uΩ to 1000 mΩ

Rechargeable battery

> 2000 measurements per charge

1 kg

Kelvin probes with trigger or Kelvin clamps

## Training and support

An additional benefit to purchasing any test instrument from Megger is the breadth and depth of the technical knowledge and experience that we can share with you. We have invested heavily in creating a local support network of engineers to provide a rapid response and who understand your application and needs.

Product and application training can also be offered at your premises or in specialist training facilities around the world. More information on course availability, upcoming webinars and other technical resources can be found on our website. Courses are offered at various levels and typical content may include:

- ▣ **Applications and methods**
  - Turns ratio
  - Winding resistance measurement
  - AC and DC Insulation testing
  - Dielectric response and moisture assessment
  - Frequency response analysis
  - Oil testing
- ▣ **Practical exercises**
- ▣ **Transformer testing standards and guides**
- ▣ **Transformer theory**

## Transformer life management (TLM) bulletins

Bulletins with must have information for each of a wide range of topics concerning the care and well being of transformers.

## Data management PowerDB

Power DB is a powerful data management software for acceptance and maintenance testing.

No database knowledge is needed with the integration of a powerful forms editor used to create or customize forms. Includes equation calculations, temperature correction calculations, charting and much more.

TEST	MEASUREMENT	RESULT	UNIT	STATUS
1	1000V	1000	V	OK
2	500V	500	V	OK
3	250V	250	V	OK
4	125V	125	V	OK
5	62.5V	62.5	V	OK
6	31.25V	31.25	V	OK
7	15.625V	15.625	V	OK
8	7.8125V	7.8125	V	OK
9	3.90625V	3.90625	V	OK
10	1.953125V	1.953125	V	OK