

Service Solutions

**Megger**<sup>®</sup>



# Service Solutions

## ABOUT US

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Megger designs and manufactures portable electrical test equipment. Megger products help you install, improve efficiency, reduce cost and extend the life of your or your customers' electrical assets.

Established in the late 1800s, the company has been designing and making test and measurement instruments that perform electrical measurements for preventative maintenance, troubleshooting and commissioning for decades. Megger products have supported customers all over the world to improve their facilities' efficiency, reduce costs, extend the life of apparatus and trending and analysis, anticipate equipment failure and future performance. It now has local offices in many locations with technical support teams and distributors all over the world. Manufacturing plants are located in Germany, Sweden, the UK, and USA.

## MEGGER BRAND

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At Megger, we understand that keeping the power on is essential for the success of your business. That is why we are dedicated to creating, designing and manufacturing safe, reliable, easy-to-use portable test equipment and professional technical services backed by world-leading support and expertise.

We can assist your acceptance, commissioning and maintenance testing for predictive, diagnostic or routine purposes. By working closely with electrical utilities, standards bodies and technical institutions, we contribute to the dependability and advancement of the electrical supply industry ... keeping the Power on.

Our engineers actively participate in regulars' committees, meetings with all the big trade associations around the world, training organisations and government organisations, to understand the needs of electrical contractors. So, when new legislation or rules are introduced, you can count on Megger to put your interests first, because Megger products and services help customers all over the world, improving their efficiency, reducing costs, and meeting standards. It operates globally, with dedicated field sales teams and distributors located all over the world and manufacturing plants in Germany, United States, Sweden and the United Kingdom. The commitment of Megger to industry is reflected in its technical leadership and in being the first to design and introduce many key innovative solutions to the markets.

**Megger offers a full service, repair and calibration service accredited to ISO9001:2015 and ISO14001:2015.**

## WHAT OUR SERVICES MEAN FOR YOU

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Megger is the global leader in electrical power test and measurement. When using Megger test equipment, you can be reassured that you're getting the best safety, accuracy, and reliability the industry has to offer. But it's not just about getting the best test equipment. Quality of service and aftercare are paramount to ensure the life of the equipment. With that in mind, Megger offers a range of comprehensive after-sales services so you can have confidence that your test sets will live to their full potential.

We at Megger are extending our services globally, offering you our support wherever you are in the world. We are also extending the scope of our support, so we're not just providing spares and repairs but technical support, testing services, and training.

To optimise performance, it is important to train technical personnel in the use of our equipment. To that end, Megger have developed quality, hands-on technical training so you and your team can use Megger's electrical test equipment with confidence.

In addition to offering test equipment training and maintenance, Megger will also provide you with access to our deep heritage of technical expertise and support so we can assist you in electrical test analysis and diagnosis. Some testing procedures are particularly complex, so our consultancy services extend not just to product use, but also to application.

## OUR PROMISE

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"Enabling everyone to live confidently and work safely, with the energies which power our world."

At Megger, we have a values-driven culture where every employee aims to serve our customers to the best of their ability. You can rely on Megger service centres to ensure your equipment continues to operate safely and reliably during its entire lifecycle.

Our testing equipment, combined with top level after-sales services, enable Megger to help you keep the power on.

## Service solutions

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## MAINTENANCE SERVICES

Megger's maintenance services provide comprehensive maintenance solutions. Our predictive and preventative care enhances the lifespan of your testing equipment, reducing network downtime. There are a number of different options available to support you during the lifetime of your test kit and these can be customised to fit your requirements.

We as an OEM are not only experts of our equipment, but we are also experts of the applications they are used in. As such, you can expect full support from our technical specialists as part of our maintenance service.



# Our service solutions

The benefits of our maintenance services include:

- **Extended equipment lifespan, giving you better value for your investment**
- **Quick turnaround, reducing network downtime**
- **Peace of mind, reassuring you that your equipment will get quality care from reliable services provided by industry experts**
- **We provide a wide range of services which includes most of the required tests**
- **Independent solutions**
- **Direct contact with OEM for qualified services lead to reliability**

# Service solutions

## TESTING SERVICES

Testing your electrical power assets comes with its own challenges and requires significant investment in time and money.

Megger offer services that can carry out those tests for you. This way, you can be sure that you are not only getting market-leading test equipment, but you're also getting our technical expertise and exceptional industry knowledge. Indeed, Megger aren't only designers and manufacturers of test equipment, we're also influencers of the industry standards, sitting in on committees such as Cigré and IEEE.

Below details the testing services that are available. However, this is not exhaustive, so if there is a specific test you require that is not listed, please contact your local Megger Service Centre who will work with you to provide the help you need.



### OUR LIST OF SERVICES



**1. Transformer life cycle assessment services**



**2. Partial discharge services**



**3. Motor and generator services**



**4. Cable testing and diagnostics services**



**5. Circuit breaker services**



**6. Battery testing services**



**7. Relay testing services**



**8. Customised training services**

# Service solutions

## TRANSFORMERS LIFE CYCLE ASSESSMENT SERVICES

### Industry challenges

- Understanding and assessing operational conditions of transformers being the most costly assets of substations
- Identifying faults when they occur and maximising lifespans of transformers
- Making the most cost effective maintenance and operational decisions
- Full assessment of transformer's overall health

### Megger solutions

- Megger offers the broadest range of transformer testing solutions capable of delivering the most comprehensive picture of a transformer's health
- Support from a technically competent team who has exceptional industry knowledge including expertise in commissioning, testing, diagnostics and failure modes
- State-of-the-art measurement of moisture content, tan delta/power factor and oil conductivity using DFR (Dielectric Frequency Response)
- Dedicated test procedures for power transformers, bushings and current transformers with automated individual temperature correction (ITC)
- Testing through high voltage amplifier (VAX) enabling capacitance and dissipation factor measurements at 2 kV test voltage
- Testing through sweep frequency response analyser (FRAX) with highest dynamic range and accuracy in the industry
- Testing through high precision capacitance and dissipation factor test set (CDAX) for measuring capacitive, resistive or inductive test objects



### Key features

- Ability to measure dynamic resistance for on-load tap changer using a unique method
- Unique step-up TTR measurements (best in class accuracy)
- Individual temperature correction for Dielectric Frequency Response Analysis DFR
- Adaptive demagnetisation





# Service solutions

## PARTIAL DISCHARGE SERVICES

### Industry challenges:

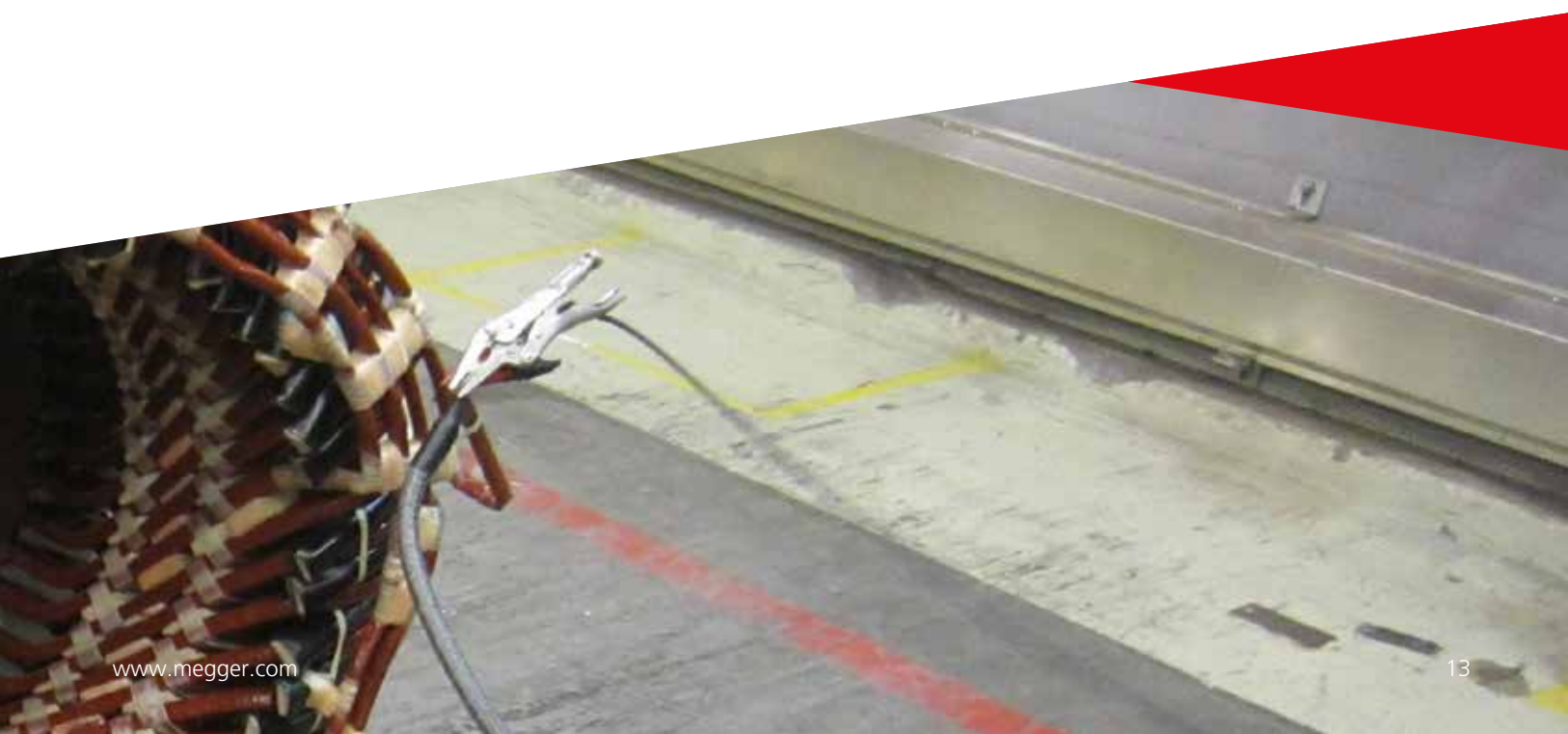
- In the early stage of ageing of insulated materials, detection of deteriorating performance may be difficult to detect by traditional test methods. However partial discharge still occurs and can be monitored its source identified.
- The unplanned failure of critical power systems in a manufacturing process can have severe economic and safety consequences. Partial discharge testing allows for early warning of potential failure, allowing time to plan maintenance
- As polyethylene is a 'non-forgiving' form of insulation, close attention needs to be paid to any partial discharge activity during factory testing, commissioning and online servicing.





### Megger Solution:

- **Megger Services can conduct on-line partial discharge measurements, on a continuous basis or off-line during maintenance to provide all round condition monitoring of the asset.**
  - **We offers a wide range of test equipment for onsite on- and off-line tests and PD monitoring, as well as PD acceptance testers for factory testing laboratories.**
  - **Not only we do offer services for the standard range of applications, we also offer customised solutions for a range of other applications that haven't been listed.**
  - **We do have special technical skills and practical experiences in the field that is for installation of partial discharge couplers, sensors, and instruments.**
- 
- We are capable of providing the following on-ste services:
    - Partial discharge (PD) measurements
    - PD fault analysis by PD pattern recognition and interpretation
    - Loss factor (TD) measurements
    - Spectrum analysis
    - Time domain analysis
    - Acoustic PD location
    - Dielectric tests
    - Three-phase induced tests up to 90 kV AC
    - Applied voltage tests up to 500 kV AC



# Service solutions

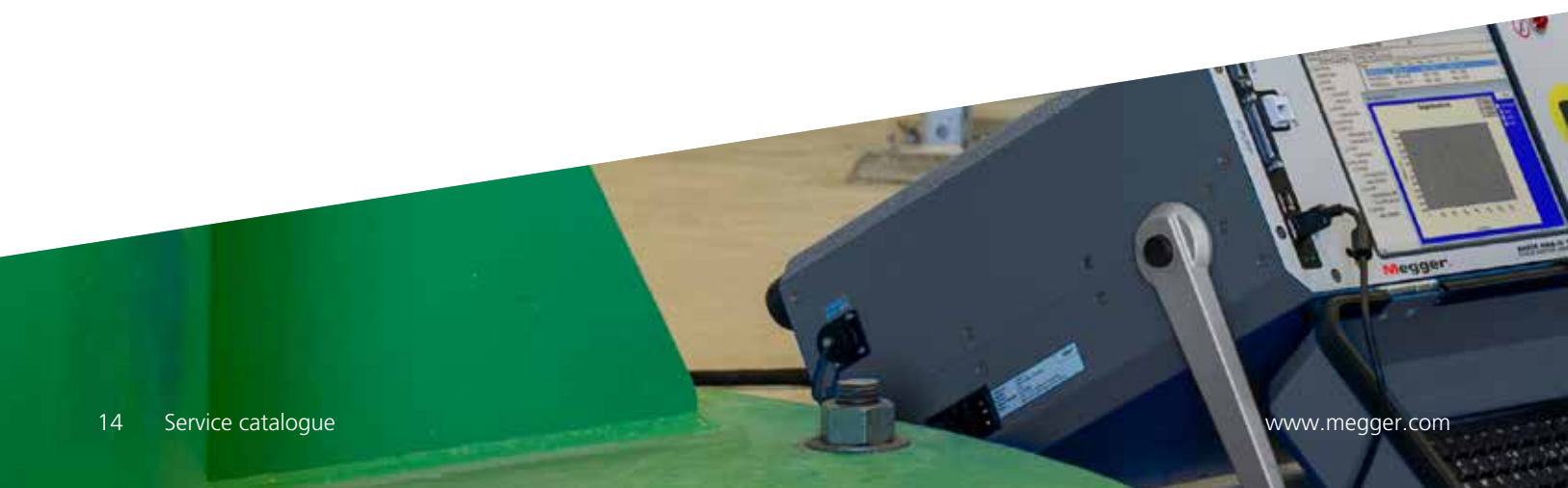
## MOTOR AND GENERATOR SERVICES

### Industry challenges

- **Assessment of electrical condition monitoring of motors, generators and coils**
- **Avoid unplanned motor and rotating machine downtime**

### Megger solutions

- **Motor testing with Megger Baker instruments allows you to fully understand the condition of the motor, the power supply and the load**
- **Predictive maintenance of your motor (rotating machine) through life cycle assessment with Static Motor Analyser**
  - Testing over 4 kV to 12 kV for wide spectrum of motors and coils
  - Testing compatible with the Baker PPX Power Packs for testing up to 40 kV
  - High and low voltage tests to characterise circuits and insulation
  - Testing capabilities which include: surge, winding resistance, Megohm, PI, DA, continuous ramp DC step voltage, and DC hipot tests
  - Testing with 12 kV HO (high-output) version for performing surge tests on large motors and generators



### Key features

- Evaluating the quality of incoming power fed to motor
- Monitoring and assessing the conditions across a running “machine system” that impact the health and performance of the motor within the system
- Tacking the amount and condition of load placed on the motor
- Assessing motor performance indicators



# Service solutions

## CABLE TESTING AND DIAGNOSTIC SERVICES

### Industry challenges

- Minimise/avoid service interruptions during network operation in MV, HV and EHV cable systems
- Monitor health of cable on proactive basis

### Megger solutions

- Megger is your partner for accepting challenges on cable health monitoring on a proactive basis through Megger “Cable Testing and Diagnostic” services
- MV, HV and EHV cable testing and diagnosis has never been so result oriented and effective with non-destructive Damped Alternating Current (DAC) method
- LV and MV cable commissioning with new state of the art AC hi-pot testing (Very low frequency Testing 0.1Hz) to verify the cable healthiness
- Testing through combination system for cable test diagnostics (two proven voltage wave shapes)





### Key features

- Standard compliant VLF cable testing with accompanying PD diagnosis
- Non-destructive PD diagnosis by means of proven DAC voltage
- Partial discharge diagnosis using VLF Sine wave, Damped AC or 50/60 Hz Slope technology voltages
- Internal tan delta measurement with automatic result interpretation



# Service solutions

## CIRCUIT BREAKERS SERVICES

### Industry challenges

- The proper functioning of a circuit breaker is reliant on a number of individual components, including the interrupter, the operating mechanism, and the auxiliary contacts and coils, which have to be tested at regular intervals.
- Mechanical wear and lubrication often affect the performance of breakers, so being able to trend mission critical parameters and compare these with factory thresholds helps to verify proper breaker function.
- Testing provides assurances that a circuit breaker will operate and, moreover, will act within expected tolerances. Testing also informs circuit breaker maintenance decisions so that maintenance dollars are spent most wisely and stretch further. Maintenance, of course, is essential to maintain maximum reliability of a circuit breaker.

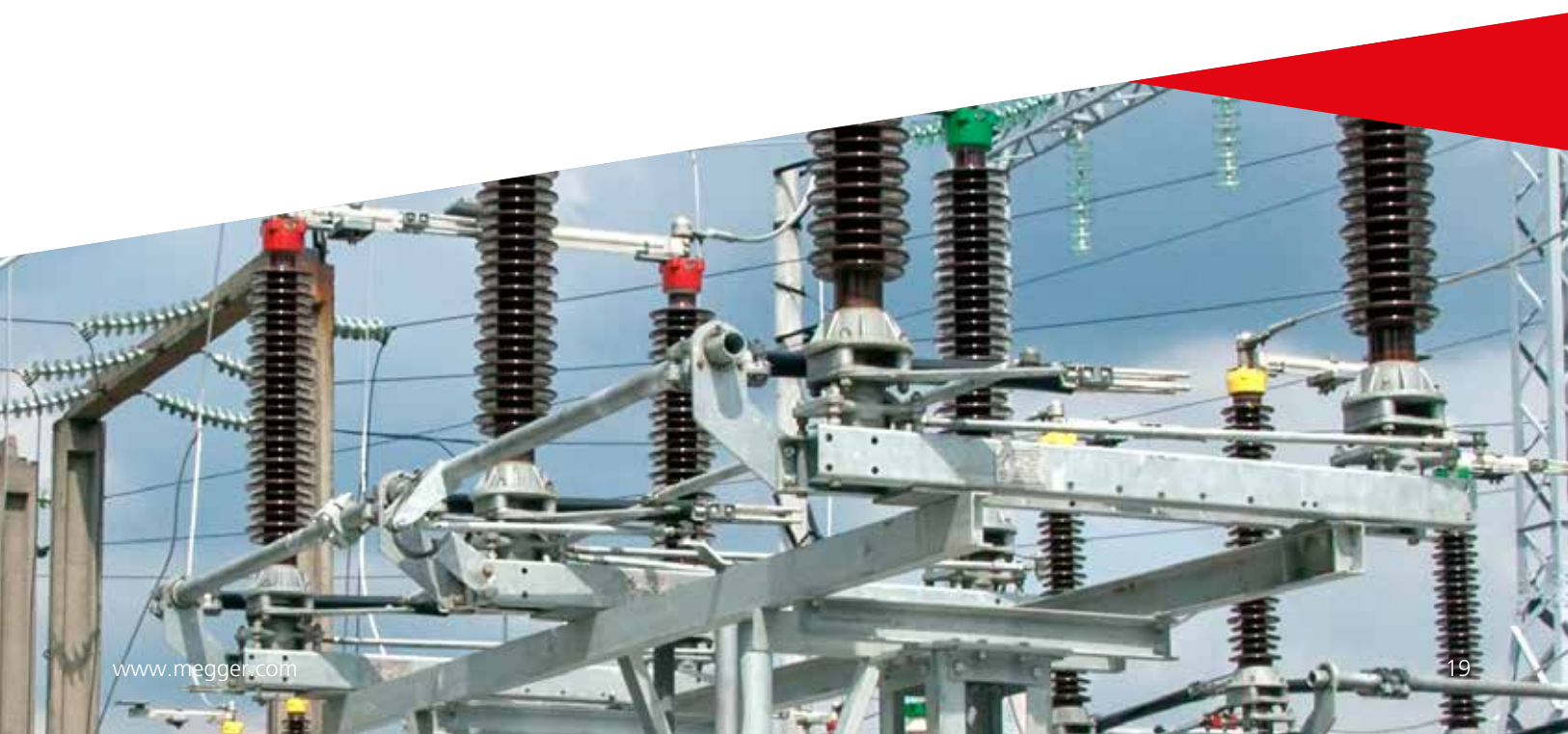


## Megger solutions

- From online testing (first trip and vibration) to basic testing (time and travel) to advanced applications that are delivered with a very basic feel (DCM and DRM, vibration), Megger has the circuit breaker testing solution so that you can supply power with confidence.
- Megger's circuit breaker test solutions highlight our legacy of innovation and reveal our focus on safety, reliability and testing efficiency. For example, our record of "firsts" includes DCM, DRM, and vibration.
- Megger's patented DualGround™ timing technology, which gives repeatable and reliable timing results with both sides grounded on any type of breaker, including specific gas-insulated switchgear (GIS). Testing between grounds is the safest way to perform circuit breaker testing. With our very simple DCM testing hookup, accurate test results are obtained quickly and safely.
- Performing DRM measurements are made to evaluate the arcing contacts on SF6 circuit breakers. This test adds little time to already planned circuit breaker tests and provides a picture of the arcing contacts inside your breaker without having to pull the gas out and tear the interrupter apart in order to inspect them visually.

## Key features

- Record of "first trip" DCM, DRM and vibration
- Dynamic capacitance measurements, (DCM)
- Dynamic Resistance Measurements (DRM)
- Comprehensive test solution from online to basic to advance application
- Proven reliability





# Service solutions

## BATTERY TESTING SERVICES

### Industry challenges

- In the event of power failure in a power plant or transformer substation, batteries are there to provide backup power. However, the battery capacity can drop significantly long before its calculated life expectancy is reached, and the battery can have weak cells that can cause costly service interruptions. Regular capacity and impedance testing is essential for predictive maintenance and protection of assets, and it need not be time-consuming or expensive.
- Selecting right test equipment for the specific application to reduce your battery maintenance and testing costs. With both capacity and impedance testers available, Megger services can provide a battery tester tuned to your specific need.

### Megger Solutions

- **Capacity test:** the only reliable way of measuring battery capacity is to conduct a discharge test using our Megger TORCEL series of test instruments enables you to perform discharge tests at constant current, constant power or constant resistance. You can even test the batteries on-line and get extra load units if you need a higher load current. Moreover; Megger's BVM is a unique battery voltage measurement device that's used for the capacity testing of large battery banks. It can also be used in conjunction with the TORCEL to perform a completely automated battery bank capacity test.
- **Impedance test:** The battery impedance test helps to identify weak cells before they cause problems, however taking the battery off-line for testing is time-consuming and risky. You don't need to do this with the on-line testing capabilities of Megger's battery test equipment.
- **Ground fault tracing:** An earth fault can cause the earth monitor on the battery to trip out, resulting in the loss of battery supply. Ground fault tracing is therefore essential to prevent this from occurring.



### Key features

- Ability to perform Capacity test without disconnecting batteries from the system
- Complete stand-alone discharge test with high discharge capacity
- Ability for automated battery voltage measurements during capacity test
- Determines condition of cells up to 7000 Ah with up to 10 A test current.
- Locates ground faults upto 399 K-ohm in DC system.



# Service solutions

## RELAY TESTING SERVICES

### Industry challenges

- Validating and testing the protection relay schemes operation for ensuring network reliability and safety

### Megger solutions

- Simplified and flexible solutions to speed up the testing process and reduce customer's downtime and costs
- Suitable for any time of power grid protection scheme
- Cost effective solution
- Huge reduction in testing time using automated test kit
  - 15 minutes for 100% testing of differential relays
  - 30 minutes for 100% testing of distance
  - Relays using XIRO, CSV, RIO, TXT or any format of relay file
- Testing engineer / back up team with power system protection expertise for expert guidance
- Critical testing activities
  - End-to-end testing using GPS
  - CGF playback/Power swing / poleslip
  - Busbar/generator commissioning



### Key features

- **Advanced database management with cloud and dashboard with the ability to customise test reports using PowerDB Pro.**
- **Combining high burden and high accuracy to cover both modern microprocessor relays and electromechanical relays.**



# Service solutions

## CUSTOMISED TRAINING SERVICES

An additional benefit to purchasing any test equipment from Megger; training and developments play an important role in the effectiveness of industrial sector and utilities to the experiences of people in the work. Training has an implication for productivity at work.

In Megger, we have invested heavily in creating an expert and knowledgeable network of engineers who understand your applications and needs to provide the best solution.

Megger's Services help you create an efficient maintenance service so you can sustain a reliable electrical grid, the training courses offered by Megger Services focus on assets as well as their application fields. They also demonstrate efficient test procedures, so you can interpret test and measurement results effectively.

In training, we share our experiences of testing in order to give you a broader understanding of how and why it is so important, we also provide hands-on experience on performing best testing experience efficiently.



Advanced offered courses:

- Power system protection training
- Life cycle management for power transformers trainings
- Cable health monitoring through cable testing and diagnostics training
- Insulation testing
- Predictive maintenance of rotating machines
- Advanced transformer maintenance
- Substation maintenance
- Advanced transformer maintenance Testing
- Battery maintenance testing courses
- Electrical safety for utilities
- Cable fault location and tracing, medium voltage
- Online partial discharge

We also offer customised tailor training sessions specific to the customers' needs based on your request.

You can contact Megger Services on [meservices@megger.com](mailto:meservices@megger.com) for more information.



## 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).





## **DLRO100 series** **Highly portable micro-ohmmeters**

Weighing as little as 7 kg, this micro-ohmmeter, which outputs 100 A, offers CAT IV safety and can be operated using mains and/or battery.



## **SVERKER900** **Relay and substation test system**

The ultimate test box for engineers that addresses the increasing need for three-phase testing capability in substations and industrial applications.



## **TRAX series** **Multifunctional transformer and substation test systems**

This exciting new test system that offers a plethora of automated standard transformer tests all in one box.



## **TDS NT series** **Combined cable test and diagnosis systems**

By combining VLF testing and damped AC, this system can more reliably diagnose the condition of the insulation of a cable.

**[www.megger.com](http://www.megger.com)**

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