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Portable test instruments for maintenance of electrical power system.



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Megger

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SMRT36

The world's lightest and most powerful 3-phase relay test set.

MOM2

The amazingly small 200 A low resistance ohm meter that will revolutionise on-site testing of assets such as circuit breakers.

MIT30

30 kV insulation resistance tester that satisfies the need for a highly accurate low current tester.

Delta4000

12 kV diagnostic insulation test system which will automatically measure $\tan \delta$.

PFL22-1500

With an emphasis on portability, featuring all of the basic fault locating tools within one tough and compact package.

INGVAR

The commissioning tool of choice, with its unique 1/30 function to allow pre-testing.

DET14C and DET24C

Mould-breaking stake-less or clamp-on earth tester.



Advanced manufacturing technology

Megger believes that the best way to secure good quality products and intellectual property is through excellence in engineering and its production facilities.

Key processes and expertise are kept in-house, and engineering teams are located on-site at all the company's factories.

Advanced manufacturing technology including automated wave-solder machinery and robotic surface mount component technology help keep costs down and quality up.

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Insulation testing

pages 4 to 9

Megger is renowned for its understanding of d.c. insulation testing. With test ranges from 10 V to 160 kV, no other company has the experience of Megger in this field, who have been producing IR testers since 1903.

Low Resistance testing

pages 10 to 11

A selection of compact light micro-ohmmeters that can be mains or battery powered. They offer a choice of 2 A and 10 A maximum test current and are used for bond testing.

Circuit breaker contact resistance testing

pages 12 to 13

A large selection of high current micro-ohmmeters are offered for testing circuit breaker contacts for compliance with IEC 62271-100, some with the Dual-Ground facility including the revolutionary MOM2 which weighs 2 kg.

Circuit breaker analysers

pages 14 to 15

As circuit breakers are electro mechanical devices, the electrical and mechanical operation should be tested. It is essential that circuit breakers operate correctly when the protection systems detect a fault to avoid catastrophic failure. Megger offers a full suite of circuit breaker analysis tools to help ensure they do.

Primary injection testing

pages 16 to 17

Primary injection testing is ideal for commissioning a system as it does test the complete system, the current transformer, conductors, connection points, relay protection and circuit breakers.

Relay or secondary testing single-phase

page 18

Products include the long-lived Sverker series of tester and the exciting new SMRT1.

Relay or secondary testing three-phase

pages 19 to 21

More complex relays require more flexible testing solutions. Megger's extensive range of test sets includes the tough and light SMRT36, the latest generation of relay test equipment.

IEC 61850 communications testing

page 22

With the introduction of IEC 61850 communication in to substation controls means that the communications networks require testing.

Current transformer testing

page 22

As sensors of what is happening on the network, the output of current transformers need to be checked to ensure they are performing in the optimal range.

Transformer testing

pages 23 to 27

With the most extensive range of transformer test instruments Megger has been a leader in the development of transformer testing. From basic turns ratio testers to through to transformer finger-printing and frequency domain spectroscopy, Megger can offer the complete range.

Earth system

pages 28 to 29

From earth system design to simple earth electrode testing Megger offer the tools for the job. Its increasing popular clamp-on earth electrode tester has re-visioned this class of tester.

Battery

pages 30 to 31

With an ever increasing dependence on battery systems it is becoming increasingly important that the systems are thoroughly tested. Megger offers solution for both generally accepted test methodologies, battery load measurement and battery impedance measurement.

Power quality recording

pages 32 to 33

With the increasing sophistication of electronic equipment, the quality of electrical supply is becoming ever more important: adding distributed generation to the mix just exacerbates the problems.

Cable fault location

pages 34 to 35

The fundamental objective of any fault location system is to find the fault quickly and safely so that the supply can be restored with the minimum delay.

General test and measurement instruments

pages 36 to 37

Multimeters and other LV testers including polarity testers for phase sequence analysis.

Test results management software

pages 38 to 39

Management of results, the trending and reporting of data are becoming an increasingly important part of managing liability in this litigious environment. Power DB downloads results from many test instruments for analysis.

Regular insulation resistance testing is one of the most cost effective methods of identifying ageing in electrical equipment, and with over 60% of equipment failures being ascribed to insulation breakdown, it is a key area to monitor.

5 kV diagnostic insulation resistance tester

MIT520/2

MIT520/2, now with CATIV safety, offers the ability to test insulation to 5 kV. It allows automatic IR, PI, DAR, SV and DD tests. Measuring up to 15 TΩ means the MIT520/2 can detect insulation deterioration earlier than other testers. Results storage and download give you full diagnostic information for later analysis. MIT520/2 can be powered using either mains or its on-board rechargeable battery, now with improved battery-life management.

High current 5 kV insulation resistance tester

S1-552/2

With a high output current 5 mA for fast charging of capacitive loads, the S1-552/2 offers variable test voltages from 50 to 5000 V. Measuring up to 15 TΩ, it allows automatic IR, PI, DAR, SV and DD tests. The S1-552/2 is safety rated at CATIV and can be powered using both mains and its on-board re-chargeable battery, now with improved battery life management.

5 kV insulation resistance tester with high noise rejection

S1-554/2

Offering 4 mA noise rejection and software filtering the S1-554/2 leads its class. It also offers variable test voltages from 50 to 5000 V. Measuring up to 15 TΩ it allows automatic IR, PI, DAR, SV and DD tests. The S1-554/2 is safety rated at CATIV and can be powered using both mains and its on-board rechargeable battery, now with improved battery-life management.

5 kV insulation resistance testers

MIT510/2

With CATIV safety, MIT510/2 is an easy to operate insulation resistance tester that is very tough. Measuring up to 15 TΩ, it allows automatic IR. The built-in timer and high test ranges allow simple and quick evaluation of the condition of the insulation under test. The MIT510/2 is mains or battery powered, now with improved battery-life management.

10 kV diagnostic insulation resistance tester

MIT1020/2

MIT1020/2 gives you the ability to test insulation to 10 kV, giving greater flexibility, and also complies with IEEE43:2000. With CATIV safety and measuring up to 35 TΩ it allows automatic IR, PI, DAR, SV and DD tests. Results storage and download give full diagnostic information for later analysis. MIT1020/2 can be powered using either mains or its on-board rechargeable battery with improved battery-life management.

10 kV insulation resistance testers with high noise rejection

S1-1054/2

With a high 5 mA output current S1-1054/2 offer variable test voltages from 50 V to 10,000 V. Safety rated at CATIV and measuring up to 35 TΩ, it allows automatic IR, PI, DAR, SV and DD tests. It can be powered using both mains and onboard re-chargeable battery with improved battery-life management. S1-1054/2 offers 4 mA noise rejection and software noise filtering, and class leading performance.

Basic 5 kV insulation resistance tester

BM15



With four test voltages and an analogue display the BM15 is a tough, easy-to-use "go/no go" tester. With a test current of 1 mA and a maximum reading of 20 GΩ it can operate on dry cells or rechargeable batteries.

BM15 is battery powered, and very easy to use

Basic 5 kV insulation resistance tester

MJ15



MJ15 offers a unique combination of hand-cranked generator and battery to give a "go/no go" tester with four test voltages and an analogue display. The MJ15 is a tough and easy to use and offers a test current of 1 mA and a maximum reading of 20 GΩ.

MJ15 has an analogue display and offers hand crank or battery power

5 kV graphical insulation resistance tester

S1-5010



The S1-5010 is a heavy duty mains/battery powered instrument. Offering 5 mA high power testing, auto test, graphical display and results storage, it is a stand-alone instrument for maximum diagnostic information and predictive maintenance.

S1-5010 is heavy duty and mains or battery powered



A choice of 5 kV or 10 kV insulation resistance testers to suit needs and budgets

High current 10 kV insulation resistance testers

S1-1052/2

With a high 5 mA output current for fast charging of capacitive loads, the S1-1052/2 offers variable test voltages from 50 V to 10,000 V. Measuring up to 35 TΩ, it allows automatic IR, PI, DAR, SV and DD tests. It can be powered using both mains and on-board re-chargeable battery with improved battery life management. S1-1050/2 has a CATIV safety rating.

5 kV and 10 kV insulation tester guide

| | | Insulation resistance testing | | | | | | | | | |
|----------------|-----------------------------|-------------------------------|--------|--------|--------|--------|--------|---------|---------|---------|---------|
| Model | | BM15 | MJ15 | MIT510 | MIT520 | S1-552 | S1-554 | MIT1020 | S1-1052 | S1-1054 | S1-5010 |
| Display | Graphical | | | | | | | | | | |
| | Analogue | ■ | ■ | | | | | | | | |
| | Analogue/Digital | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Power Supply | Mains power | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Rechargeable | □ | □ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Hand crank | | ■ | | | | | | | | |
| | Dry cell | ■ | ■ | | | | | | | | |
| Test Voltage | 10.0 kV | | | | | | | ■ | ■ | ■ | |
| | 5.0 kV | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 2.5 kV | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 1.0 kV | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 500 V | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 250 V | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 25 V steps 50 V to 5 kV | | | | | | | | | | |
| Measurements | Max reading | 20 GΩ | 20 GΩ | 15 GΩ | 15 TΩ | 15 TΩ | 15 TΩ | 35 TΩ | 35 TΩ | 35 TΩ | 5 TΩ |
| | Min reading | 100 kΩ | 100 kΩ | 10 kΩ | 10 kΩ | 10 kΩ | 10 kΩ | 10 kΩ | 10 kΩ | 10 kΩ | 10 kΩ |
| | Voltage | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Capacitance | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Test Types | Leakage current | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Polarisation Index | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Dielectric absorption ratio | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Step Voltage | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Other Features | Dielectric Discharge | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Timer control | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Timer display | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 4 mA max noise rejection | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 2 mA max noise rejection | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 5 mA test current | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 3 mA test current | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 2 mA test current | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 1 mA test current | ■ | ■ | | | | | | | | |
| | USB output | | | | | | | | | | |
| RS232 output | | | | | | | | | | | |
| RS232 control | | | | | | | | | | | |
| Software | PowerDB lite | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | PowerDB full version | | | □ | □ | □ | □ | □ | □ | □ | □ |

■ feature □ option

Why CATIV?

A small fault becomes a big problem on Category IV high energy unfused supplies!

A distant lightning strike can produce a transient of several kV on the supply. The transient may only last for a few tens of microseconds and is likely to do little damage.

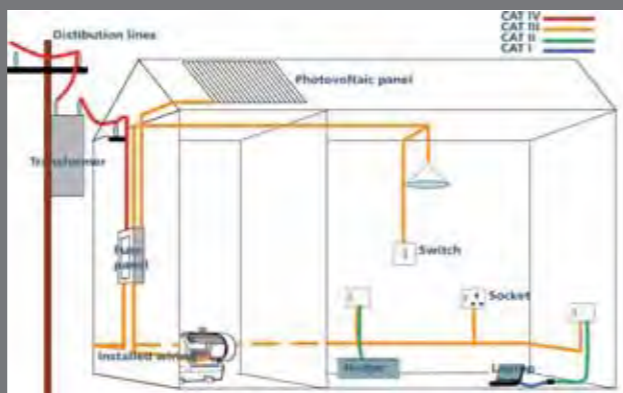
The problem is that it may initiate an arc and this arc then presents a low impedance path for current from the mains supply.

Often, that supply can deliver 1000 A or more until the breaker or other protective device operates. In that time, the amount of energy liberated is easily enough to start a fire or even cause an explosion. If the arc is within a test instrument there is a high probability that you will be injured or worse!

The solution is simple – design the instruments with protection and internal clearances that are large enough to prevent transients from establishing an arc and along with appropriate protection devices. Guidance to this is given in IEC61010 in order to comply with category ratings defined in IEC60664.

In practice, transients are damped quite quickly as they pass through a typical distribution system. As you can see from the diagram CATIV is recommended for use outside and to the consumer unit. Specify Megger CATIV testers to make sure you are safe and secure. Not only could they save your life, but they are economical too.

Using an instrument with a higher installation category rating does not alone create a safer working environment. You should always follow correct work practices to keep you and others safe.



D.C. insulation testers CAT III and CAT IV hand held Megger

Light-weight insulation and continuity tester

MIT200 series

The MIT200 series are CATIII 600 V tested offering 250, 500 and 1000 V test voltages. They will find applications in electrical contracting, both on domestic and industrial systems, as well as site maintenance and service departments. Their small size and lightness make them ideal for those engineers that need to carry them for extended periods.

Insulation resistance and continuity testers for electricians

MIT300 series

Designed to be tough enough to soak up the treatment meted out to testers on site the MIT300 series offer CATIV 300 V safety with flexibility. The MIT300 comes in five versions from a basic two-test voltages digital tester to a downloading three-test voltages tester. All the digital testers include an analogue arc display. The MIT300A is a moving coil analogue tester offering 250, 500 and 1000 V test voltages.

Insulation resistance and continuity testers for industrial maintenance

MIT400 series

MIT400 series testers offer CATIV 600 V safety in a convenient easy to hold format. MIT400 series are true diagnostic instruments measuring insulation resistance up to 200 GΩ. They measure insulation deterioration long before most testers even offer a reading. With functions such as TRMS voltage measurement, polarisation index (PI), dielectric absorption ratio (DAR), capacitance measurement and high insulation resistance ranges, makes the MIT400 suitable for the testing required in manufacturing, panel building, railways, motors, cable inspection, street lighting, avionics as well as the electrical supply industry.



Insulation resistance and continuity testers for telecommunications

MIT480 series

MIT480 series testers offer 50 and 100 V test voltages, ideal for the telecoms industry. They all provide CATIV 600 V safety. MIT480 series also offers frequency, capacitance and distance by capacitance functions and a 75 V live circuit inhibit feature to match the special needs of telecoms engineers. MIT480 series is a true diagnostic instrument measuring insulation resistance up to 200 GΩ. They measure insulation deterioration long before most testers even offer a reading.

Insulation resistance and continuity testers for special applications

MIT40X

Based on the class leading MIT400 the MIT40X allows the user to set the test voltage anywhere between 10 V and 100 V, depending on the application. It still offers CATIV 600 V safety and tests insulation resistance up to 20 GΩ.

| | Light-weight insulation and continuity testers | | | | Electrician's insulation and continuity testers | | | | | Industrial maintenance insulation and continuity testers | | | | Telecommunications insulation and continuity testers | | | |
|--------------------------------|--|--------------|--------------|--------------|---|-------------|-------------|-------------|-------------|--|-------------|-------------|-------------|--|-------------|-------------|-------------|
| | MIT200 | MIT210 | MIT220 | MIT230 | MIT300 | MIT310 | MIT310A | MIT320 | MIT330 | MIT400 | MIT410 | MIT420 | MIT430 | MIT40X | MIT480 | MIT481 | MIT485 |
| 1000 V insulation test | | | | | | | | | | | | | | | | | |
| 500 V insulation test | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 250 V insulation test | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 50 V and 100 V insulation test | | | | | | | | | | | | | | | | | |
| 10 V to 100 V in 1 V steps | | | | | | | | | | | | | | | | | |
| Resistance to | 1000 MΩ | 1000 MΩ | 1000 MΩ | 1000 MΩ | 1000 MΩ | 1000 MΩ | 1000 MΩ | 1000 MΩ | 1000 MΩ | 20 GΩ | 100 GΩ | 200 GΩ | 200 GΩ | 20GΩ | 100 GΩ | 200 GΩ | 200 GΩ |
| Continuity 0.01 to 200 Ω | | | | | | | | | | | | | | | | | |
| Continuity 0.01 to 100 Ω | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Live circuit warning | 25 V | 25 V | 25 V | 25 V | 25 V | 25 V | 25 V | 25 V | 25 V | 50 V | 50 V | 50 V | 50 V | 50 V | 75 V | 75 V | 75 V |
| Polarization Index PI | | | | | | | | | | | | | | | | | |
| Dielectric absorption rate DAR | | | | | | | | | | | | | | | | | |
| Frequency measurement | | | | | | | | | | | 40-400 Hz | 40-400 Hz | 40-400 Hz | | | | |
| Capacitance measurement | | | | | | | | | | | | | | | | | |
| Capacitance by distance | | | | | | | | | | | | | | | | | |
| Data storage | | | | | | | | | | | | | | | | | |
| USB downloading | | | | | | | | | | | | | | | | | |
| Bluetooth downloading | | | | | | | | | | | | | | | | | |
| Safety | CATIII 600 V | CATIII 600 V | CATIII 600 V | CATIII 600 V | CATIV 300 V | CATIV 300 V | CATIV 300 V | CATIV 300 V | CATIV 300 V | CATIV 600 V | CATIV 600 V | CATIV 600 V | CATIV 600 V | CATIV 600 V | CATIV 600 V | CATIV 600 V | CATIV 600 V |
| FREE calibration certificate | | | | | | | | | | | | | | | | | |

30 kV insulation resistance tester

MIT30

MIT30 satisfies the need for a variety of high voltage, high accuracy, low current applications in electrical distribution, aerospace and defence industries. With a high voltage output from 0 to 30 kV dc it offers, trip levels from 0-360 μ A and a resolution of 1 nA ($\pm 1.5\%$). MIT30 gives excellent precision for a field instrument and is extremely portable.



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Because MIT30 can perform step-voltage and proof tests which, when incorporated into a routine maintenance program, can aid in predicting potential failure before breakdown occurs.

50/100 kV a.c. dielectric test sets

681100 series

681100 series a.c. dielectric test sets are a.c. high-voltage sources for testing electrical insulation. The standard system includes a control/instrument cabinet, a high-voltage transformer assembly and all necessary cables including ground and input power.

2.5 and 12 kV semi-automatic capacitance and tan δ test bridge

670000 series

These instruments feature automatic balancing of dissipation factor and manual balancing of capacitance and interference suppression, allowing use in energised HV substations. There is direct readout of tan delta, capacitance and watts dissipated.



670000 comes complete with interference suppression circuits for testing in high-voltage switchyards, automatic balancing of dissipation factor, and direct readout of capacitance, dissipation factor and watts dissipated

70 kV, 120 kV and 160 kV d.c. dielectric test set

220000 series

220000 series provides a dependable, safe, lightweight and portable d.c. voltage source for testing the quality and integrity of electrical power cables, cable installations, motors, switchgear, insulators, transformers and capacitors.

Each test set comes in two units, the HV unit and the controller.



220000 series has advanced performance with long-term reliability provided by filtered half-wave rectification

Low voltage capacitance and tan δ test bridge

CB100

Lightweight and low-cost the CB100 is ideal for workshop use. Manually balanced it offers direct readout of tan delta and capacitance, overcoming interference by using a test frequency of 80 Hz or 100 Hz.



CB100 lets you read capacitance and dissipation factor directly from the instrument – no calculation required

Capacitance dissipation factor and tan delta

12 kV diagnostic insulation system

Delta4000 series

Featuring tough yet lightweight construction and designed to work reliably in high-interference areas like substation switchyards, Megger's new DELTA4000 series insulation diagnostic test sets offer time saving fully automatic power factor/tan delta measurement and tip-up testing. Also provided are facilities for full manual control – including the ability to vary the applied voltage up to 12 kV during testing – to cater for special testing requirements.

Accurate and dependable temperature correction, based on the actual condition of the test object, can be applied to results using a novel and patented technique, which works with data acquired from a separate dynamic frequency response (DFR) test. Automatic detection of non-linear response, which suggests the need for further (tip-up) testing and which is often a useful indicator of

incipient insulation problems, is also provided. Despite their small size and low weight, Megger's DELTA4000 series test sets offer comprehensive facilities for assessing the condition of electrical insulation in all types of high-voltage equipment, including transformers, bushings, circuit breakers, cables, lightning arrestors and rotating machinery.

They can also be used for measuring the excitation current of transformer windings.

To ensure that accurate results are obtained even when the instrument is powered from a supply with poor voltage and frequency stability, the test sets generate their own test voltage, which is independent of supply quality.

A further benefit of this approach is that it allows the test voltage to be varied in frequency from 1 Hz to 500 Hz, making the instruments even more versatile.



| Insulation testing | | | | | | |
|--|-----------------------------|-----------------------------|----------|--------|--------|-----------------------------|
| Model | Delta 3000 | Delta 2000 | CB100 | 670025 | 670065 | 670070 |
| Output voltage | 12 kV | 12 kV | 28 V | 2.5 kV | 12 kV | 12 kV |
| Capacitance measuring range in μ F | 0-0.11 or 0-1 with inductor | 0-0.11 or 0-1 with inductor | 0-1.2 | 0-0.22 | 0-0.22 | 0-0.22 or 0-1 with inductor |
| Dissipation factor | 0-90% | 0-90% | 0-30% | 0-200% | 0-200% | 0-200% |
| UST test | ■ | ■ | ■ | ■ | ■ | ■ |
| GST test | ■ | ■ | ■ | ■ | ■ | ■ |
| GST guarded test | ■ | ■ | ■ | ■ | ■ | ■ |
| Watts loss measurement | ■ | ■ | ■ | ■ | ■ | ■ |
| Current measurement | ■ | ■ | ■ | ■ | ■ | ■ |
| Range extension | ■ | ■ | ■ | ■ | ■ | ■ |
| Interference suppression | Automatic | Automatic | Inherent | Manual | Manual | Manual |
| Balancing | Automatic | Automatic | Manual | Manual | Manual | Manual |
| Data storage | ■ | ■ | ■ | ■ | ■ | ■ |
| Bar code reader | ■ | ■ | ■ | ■ | ■ | ■ |
| Comlink PC software | ■ | ■ | ■ | ■ | ■ | ■ |
| RS232 printer output | ■ | ■ | ■ | ■ | ■ | ■ |
| PowerDB Onboard | ■ | ■ | ■ | ■ | ■ | ■ |
| USB communications | ■ | ■ | ■ | ■ | ■ | ■ |

Low resistance testers have many applications as inadequate bonding can have disastrous results. There would be serious consequences for bad connections in critical electrical systems, missing broken rails and bad welds on the railways, or gaps and cracks on aircraft wings. Routine maintenance using low resistance testers, sometime known as Ducters, can highlight problems before they become catastrophic.

10 A resistance ohmmeter with test results storage and downloading

DLRO10X

The DLRO10X offers a 0.1μΩ resolution with a maximum capability of 2 kΩ. Fast testing ability means users can achieve results in less than 3 seconds. At only 2.5 kg it is the smallest, lightest and most sophisticated 10 A low resistance ohmmeter available making it convenient for general testing.

The DLRO10X has the capability of measuring inductive loads such as transformers and motor windings. The DLRO10X adds on-board memory, RS232 download capability, maximum setting and manual or automatic range control to the features of the DLRO10. Uses easily interchangeable batteries.



DLRO 10X has real-time download of results and on-board storage for later download to a PC

Dual power 10 A resistance ohmmeter with IP rating

DLRO10HD

DLRO10 HD is a tough low resistance ohmmeter which is designed to withstand the inclement conditions of real world testing. Rated at IP65 when the lid is closed and IP45 when operating under battery power, the DLRO10HD has a resolution of a 0.1μΩ. There are also 2 power output levels to assist with condition diagnosis. One is limited to avoid heating the test sample while the other maintains a set high power output.



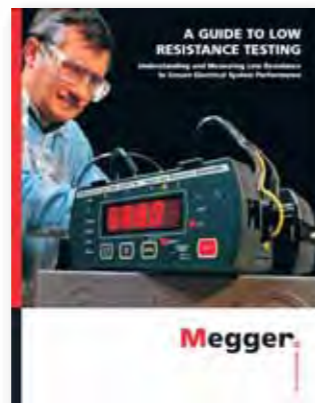
10 A low resistance ohmmeter

DLRO10

The DLRO10 offers a 0.1μΩ resolution with a maximum capability of 2 kΩ. Fast testing ability means users can achieve results in less than 3 seconds. At only 2.5 kg they are the smallest, lightest and simplest-to-use 10 A low resistance ohmmeter available. Uses easily interchangeable batteries.



DLRO10 has bright 4 1/2 digit LED display making it easy to read under all lighting conditions



Ask for the free Megger guide to low resistance testing. This 32 page comprehensive guide is written in a clear, easy to read style. The booklet comprehensively covers both theory and practise. It has chapters on how to measure low resistance, choosing a low resistance tester, and evaluation and interpretation of results

2 A low resistance ohmmeter

BT51

Low resistance ohmmeter ideally suited for bond testing applications, i.e. aircraft frames, electronic discharge and fuel tanks. Four terminal method of measurement ranges 0-20.00mΩ and 0-2000mΩ. High test current of 2A.



Wind turbine lightning protection test leads sets

KC series on cd

The KC series of test leads provide a complete and convenient solution to the problem of finding reliable test leads that are long enough for testing the continuity of lightning protection conductors in wind turbines.

KC-series wind turbine test leads are available in 100 m, 50 m and 30 m versions that are equally suitable for use on site or in the manufacturing plant. All lead set versions are 10 A rated.



Clips and leads for low resistance testing

Megger ohmmeters require test leads, two potential (voltage) and two current, to make low-resistance measurements. In addition to individual current and potential (voltage) leads sets, duplex leads that combine current and potential connections in one lead are offered. A variety of terminations, C-clamps, Kelvin clips, fixed point, and helical spring-point leads are available.

| Low resistance measurement | | | | | |
|----------------------------|-----------------|---|--------------|--------|--------------|
| For measurement of | Lead type | Termination | Test current | Length | Reference no |
| Potential | Single 2 pieces | Hand spike | | 2.0m | 242021-7 |
| | | | | 5.5m | 242021-18 |
| | | | | 9.0m | 242021-30 |
| Current | Single 2 pieces | Current clip | 10A | 2.0m | 242041-7 |
| | | | | 5.5m | 242041-18 |
| | | | | 9.0m | 242041-30 |
| | Single 1 piece | Heavy duty C-clamps | 10A | 5.0m | 242144-16 |
| | | | | 8.0m | 242144-26 |
| | | | | | |
| Current and potential | Duplex 1 piece | DH2 handspike with helical sprung contacts | 10A | 6.0m | 6111-023 |
| Current and potential | Duplex 1 piece | DH3 handspike with helical sprung contacts | 10A | 9.0m | 6111-024 |
| Current and potential | Duplex Lead set | DH1 handspikes with helical sprung contacts | 10A | 2.5m | 6111-022 |
| Current and potential | Duplex Lead set | DH4 handspikes one with indicator light | 10A | 1.2m | 6111-503 |
| Current and potential | Duplex Lead set | DH5 handspikes one with indicator light | 10A | 2.5m | 6111-517 |
| Current and potential | Duplex Lead set | DH6 handspikes one with indicator light (600V) | 10A | 1.2m | 6111-022 |
| Current and potential | Duplex Lead set | 1.3cm silver-plated Kelvin clip | 10A | 2.0m | 241005-7 |
| Current and potential | Duplex Lead set | 4.0cm silver-plated Kelvin clip | 10A | 2.0m | 242006-7 |
| | | | | 5.5m | 242006-18 |
| | | | | 9.0m | 242006-30 |
| Current and potential | Duplex Lead set | Hand spikes with helical spring-loaded contacts | 10A | 2.0m | 242011-7 |
| | | | | 5.5m | 242011-16 |
| | | | | 9.0m | 242011-30 |
| Current and potential | Duplex Lead set | Helical hand spikes with spring points and current push button switch | 10A | 5.5m | 242009-18 |
| Current and potential | Duplex Lead set | Heavy duty straight fixed contacts | 10A | 2.0m | 242002-7 |
| | | | | 5.5m | 242002-18 |
| | | | | 9.0m | 242002-30 |
| Current and potential | Duplex Lead set | Heavy duty 5cm C-clamps | 10A | 2.0m | 242004-7 |
| | | | | 5.5m | 242004-18 |
| | | | | 9.0m | 242004-30 |
| Current and potential | Duplex Lead set | Hand spikes with replaceable needle points | 10A | 2.0m | 242003-7 |
| Current and potential | Duplex Lead set | Heavy duty 10cm C-clamps | 100A | 5.0m | 242004-2-16 |
| | | | | 8.0m | 242004-2-26 |
| Current and potential | Single Lead set | Heavy duty 10cm C-clamps | 100A | 5.0m | 242004-2-16 |
| Current potential | Duplex Lead set | 2 x current leads with 7.6cm clamps | 100A | 10.0m | 830255 |
| | | 2 potential leads with 2.5cm battery clips | | 10.0m | |
| Current potential | Duplex Lead set | 2 x current leads with 4.5cm clamps | 100A | 15.0m | 830258 |
| | | 2 potential leads with 2.5cm battery clips | | 15.0m | |
| Current potential | Duplex Lead set | 2 x 25mm ² current leads with clamps | 600A | 5.0m | 6220-787 |
| | | 2 potential leads with clips | | 5.0m | |
| Current potential | Duplex Lead set | 2 x 50mm ² current leads with clamps | 600A | 5.0m | 6220-755 |
| | | 2 potential leads with clips | | 5.0m | |
| Current potential | Duplex Lead set | 2 x 70mm ² current leads with clamps | 600A | 10.0m | 6220-756 |
| | | 2 potential leads with clips | | 10.0m | |
| Current potential | Duplex Lead set | 2 x 95mm ² current leads with clamps | 600A | 15.0m | 6220-757 |
| | | 2 potential leads with clips | | | |

Circuit breaker contact resistance testing

For testing breaker contact resistance for compliance with IEC62271-100, specialist low resistance testers are used with a high output current. For this and other applications that require a higher test current, Megger offers an extensive range of testers that will fit your testing regime.

600 A low resistance ohmmeter

DLRO600

Provides the operator with high resolution, 0.1 $\mu\Omega$, lightweight and portable method of performing on-site low resistance measurements. The unit can be used to test circuit breaker contact resistance to IEC 62271-100, switch contacts, busbars, joints, splices, fuses and rail bonds. The test current is variable from 10 A to 600 A, in 1 A steps, enabling the user to perform all the required tests with a single instrument. The full keyboard makes labeling and storing of results quick and easy.



DLRO600 measures resistances between 0.1 Ω and 1 Ω , at high currents. It can provide test currents from 10 amps up to 600 amps subject to the load resistance and supply voltage. It is ideal for testing busbars

200 A low resistance ohmmeter

DLRO200

Provides the operator with high resolution, 0.1 $\mu\Omega$, lightweight and portable method of performing on-site low resistance measurements. The test current is variable from 10 A to 200 A, in 1 A steps, enabling the user to perform all the required tests with a single instrument. The unit can be used to test small circuit breaker contact resistance to IEC 62271-100, switch contacts, busbars, joints, splices, fuses and rail bonds. The full keyboard makes labeling and storing of results quick and easy.



A large liquid crystal display provides all the information needed to perform a test; all test parameters and measurement results are displayed

600 A low resistance ohmmeter

MOM690A

Offering a test current from 0 to 600 A d.c. the MOM690A has a measurement range up to 200 m Ω with a resolution of 1 $\mu\Omega$. The MOM690A can be programmed to perform an individual test or an entire series and store the results. There is an a.c. output for quick and easy demagnetization of CTs.



600 A low resistance ohmmeter

MOM600A

Offering a test current from 0 to 600 A d.c. the MOM600A has a measurement range up to 2 m Ω with a resolution of 1 $\mu\Omega$.



200 A low resistance ohmmeter

MOM200A

Weighing 14 kg the MOM200A offers a test current from 0 to 200 A d.c. It has a measurement range up to 20 m Ω with a resolution of 1 $\mu\Omega$.



200 A low resistance ohmmeter with DualGround safety

MJÖLNER200

By being able to operate with both sides of the circuit breaker earthed Mjölner adds a new level of safety to the tester of CBs.



The ripple free d.c. test current can be varied from 5 A to 200 A with a maximum continuous current of 100 A. The measuring range is up to 1 Ω with a resolution as low as 0.1 $\mu\Omega$ depending in the resistance being measured.

600 A low resistance ohmmeter with DualGround safety

MJÖLNER600

By being able to operate with both sides of the circuit breaker earthed Mjölner adds a new level of safety to the tester of CBs.



The ripple free d.c. test current can be varied from 5 A to 600 A with a maximum continuous current of 300 A. The measuring range is up to 1 Ω with a resolution as low as 0.1 $\mu\Omega$ depending in the resistance being measured.

Hand-held 200 A low resistance ohmmeter

MOM2

A revolutionary new concept in resistance measurement, the MOM 2 uses patented ultra capacitor technology to provide the high test current required to measure circuit breaker contact resistance to IEC62271-100. This allows the tester to be conveniently battery powered and so small and light it can be operated while held in your hand.



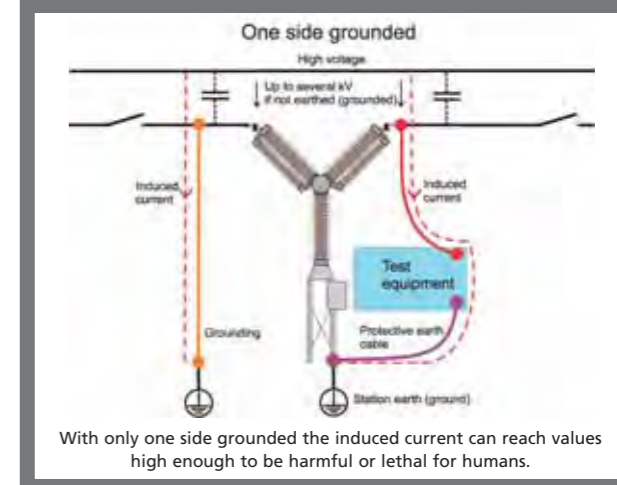
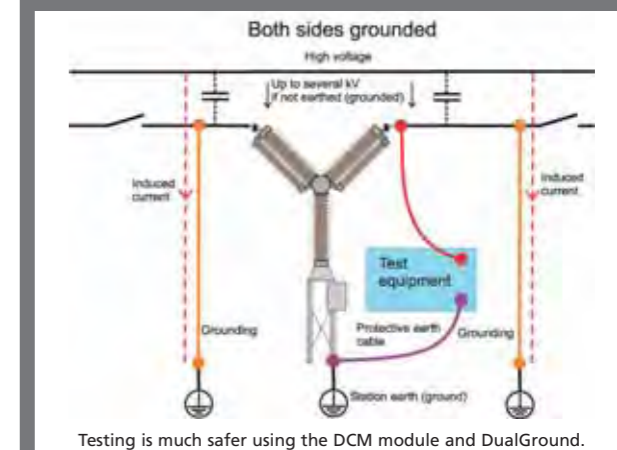
Testing with DualGround™

Deregulation changed the business environment for utilities, switchgear owners and their service companies. It has increased the emphasis on efficiency of operation, maintenance and service levels. Likewise the internationalisation of the business has brought new challenges by increasing the emphasis on health and safety and environmental compliance.

Experience has shown that the switch gear is less able to be taken out of service for testing. And when it is it is available for shorter periods.

Network operators and service companies are under continued pressure to maintain and improve their safety record. Safety organisations and labour organisations rightly increase their demands for safe working practices. Deregulation has led to the codification of safe working and the increasing tightening of regulation. Having a good safety record is a crucial asset to attract investment.

In all substations the capacitive coupling from live high voltage conductors induce dangerous currents in parallel conductors. Grounding both sides of the equipment under test will lead the induced currents to earth, providing a safe area for the test personnel.



| Low resistance measurement | | | | | |
|----------------------------|---|---|--|--|-------------------------------------|
| Model | DLRO600 | DLRO200 | DLRO10X | DLRO10 | BT51 |
| Measurement ranges | 0.1 $\mu\Omega$ to 999.9 m Ω auto ranging | 0.1 $\mu\Omega$ to 999.9 m Ω auto ranging | 1.9999 m Ω 19.999 m Ω 199.99 m Ω 1.9999 Ω | 1.9999 m Ω 19.999 m Ω 199.99 m Ω 1.9999 Ω | 20.00 m Ω 2000 m Ω |
| Resolution | 0.1 $\mu\Omega$ | 0.1 $\mu\Omega$ | 0.1 $\mu\Omega$ | 0.1 $\mu\Omega$ | 10 $\mu\Omega$ |
| Accuracy | <1% | <1% | $\pm 0.2\%$ | $\pm 0.2\%$ | $\pm 1\%$ |
| Current test range | 10 A - 600 A | 10 A - 200 A | 0.1 mA - 10 A | 0.1 mA - 10 A | 2.0 A |
| Results storage | 300 | 300 | 700 | | |
| RS232 | ■ | ■ | ■ | | |
| Power source | Mains Rechargeable battery | ■ | ■ | ■ | ■ |
| Weight excluding leads | 14.5 kg | 14.5 kg | 2.6 kg | 2.6 kg | 4.5 kg |

IEC62271-100 recommends that contact travel and speed are tested as well as closing and opening times, resistance of the main contacts and synchronisation of the contact operation.

As circuit breakers are electro mechanical devices, the electrical and mechanical operation should be tested. It is essential that circuit breakers operate correctly when the protection systems detect a fault to avoid catastrophic failure. Megger offers a full suite of circuit breaker analysis tools to help ensure they do.

Circuit breaker analyser system with Dual Ground safety



TM1800

Designed on an expandable modular concept, TM1800 is capable of taking 48 +48 timing channels and measures circuit breaker timing and motion. Other measurements it can make include coil current, dynamic resistance (DRM), vibration. The stand-alone functionality means that the test engineer has only to bring one instrument on site which is tough enough to deal with the conditions.



Circuit breaker analyser

TM1600

Offering 24 timing channels in one unit the TM1600 measures the circuit breaker's timing cycle. The timing channels record closings and openings of main contacts, resistor contacts and auxiliary contacts. The modular design allows it to be combined with MA61 motion analyser.



Circuit breaker analyser

EGIL

Designed using the experience gained from our larger instruments, the EGIL is intended for breakers with one break per phase. Its size and simplicity makes it attractive to smaller power plants and maintenance department. Now can be used with SDRM.



Circuit breaker analysis software

CABA Win

The ability to accurately compare circuit breaker tests with previous test results is essential. CABA Win helps achieve this, by ensuring the tests are conducted in exactly the same way and under the same conditions as those conducted earlier. Comparison can then provide a clear picture of any deviations and changes, thereby indicating whether or not the circuit breaker should be kept in operation or taken out of service for further investigation.

PIC TO COME?

Static dynamic resistance measurement

SDRM

Used together with TM1800, TM1600/MA61 or EGIL SDRM measures the contact resistance while the circuit breaker is in operation. It can be used to assess the condition of the contacts and the arcing contact length in SF6 Circuit Breakers. The results are recorded and can be displayed with the timing, motion and other specified test results.



Power supply unit

B10E

A useful power supply unit providing a controllable dc power source to supply the circuit breaker under test. It is also used for minimum trip coil voltage tests to make sure it will still operate if the voltage drops.



Vacuum tester

VIDAR

VIDAR enables you to check the integrity of the vacuum interrupter quickly and conveniently by means of the known relationship between the flashover voltage and the vacuum interrupter. A suitable d.c. test voltage is applied to the breaker, and the result is known immediately.



Linear Transducer

TLH225

225 mm travel including cable 500 mm.



Rotary transducer, Novotechnic

IP6501

Including 6 mm flex coupling, 1000 mm cable and wrench.



Rotary transducer mounting kit

Vibration kit

BL13090

Includes SCA606, CABA Win vibration software and one vibration channel.



Temperature sensor

The ambient temperature is automatically measured and stored with the test result.

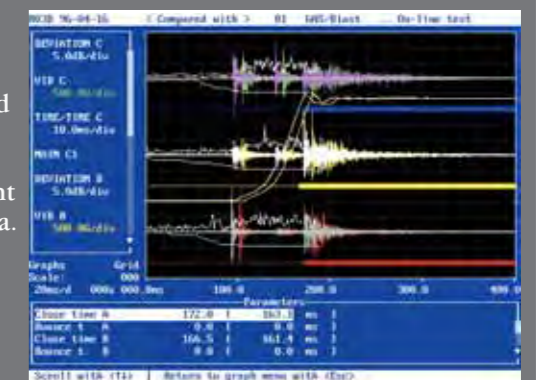


Vibration testing – direct method for mechanical function

A CIGRE study on the installed base of active circuit breakers shows that the reason for malfunction of HV CBs is mostly caused by mechanical faults. Vibration testing is a direct measurement of the mechanical behaviour of the circuit breaker. It is possible to distinguish a normal mechanical behaviour from an abnormal behaviour. If the circuit breaker behave normally the mechanical system is in good order. Abnormal behaviour indicates that something is different from the expected and the circuit breaker is in need for overhaul or further investigation.

Interpretation is easy with CABA Win Vibration software, based on voice recognition algorithms that is adopted for circuit breaker vibrations. Based on the software analysis the interpretation is green, yellow or red. Green and red is straight forward, while yellow requires further investigation of the data.

In the same way as with DRM measurement it is possible for the knowledgeable user to deduct very detailed information about the circuit breaker. The time shift and deviation curves from CABA Win Vibration are intuitive for someone with insight in the circuit breaker mechanics.



Primary injection testing requires the system to be taken out of service and consequently is usually conducted during commissioning. It does however test the complete system, the current transformer, conductors, connection points, relay protection and circuit breakers.

Primary current injection test system

INGVAR

This 5000 A 2 piece portable test system is designed for primary injection testing of protective relay equipment and circuit breakers. Unique I/30 function allows the current to be pre-set using low current to prevent test sample heating.

Ideal for commissioning protection systems, testing MCCBs and many other high current applications.



Primary current injection test system

ODEN A

A powerful test system designed for primary injection testing of protective relay equipment and circuit breakers. It is also used to test the transformation ratio of current transformers and for other applications that require high variable currents. Up to 8 kA for 1 second can be generated and 1900 A continuous.

The ODEN A system consists of a control unit together with one or two current units. All parts are portable, and ODEN A can be quickly assembled and connected. There are two versions of the current unit: S and X, S and X are identical except that X has an additional 30/60 V output.



Primary current injection test system

ODEN AT

The ODEN AT primary current injection test system consists of a control unit together with one, two or three current units offering a maximum output of 13 kA for one second and 3800 A continuous. There are three versions of the current unit: S, X and H. The S and X current units are identical except that the X unit has an additional 30/60 V output. The H unit is rated for even higher current. This makes an ODEN AT system very flexible. Each component is portable, and ODEN AT can be quickly assembled and connected.



The control unit has many advanced features – a measurement section that can display turns ratio as well as time, voltage and current. A second measurement channel can be used to test an additional current or voltage. Current transformer turns ratio, impedance, resistance, power, power factor (cos φ) and phase angle are calculated and shown in the display. Current and voltage can be presented as percentages of nominal value. The fast-acting hold function freezes short-duration readings on the digital display when the voltage or contact signal arrives at the stop input, the object under test interrupts the current or injection is stopped.

Current supply units

CSU600A and CSU600AT

These high-current supply units have two main fields of application. The first is to conduct primary tests on protective relays. The second field of application involves conducting current tests on low-voltage circuit breakers and overcurrent devices.

Both outputting 600 A the CSU60 requires the use of an external timer and ammeter, while the CSU600AT comes with built in timer and analogue ammeter that provides rough current settings quickly and easily, reducing connection time to a minimum.



Timer unit

TM200

This timer unit, designed for use with ODEN A and CSU600A, has the precision that makes it ideal for many substation uses.



High current probe

HCP2000

This allows testing of automatic circuit breakers or MCCBs without uninstalling the breaker. Found in power plants industry MCCB have a trip current between 16 A and 1500 A.



Current transformer switchbox

For use with ODEN AT the switchbox facilitates CT testing. The secondary windings of the CT are connected to the switchbox inputs and the outputs are connected to ammeter 2 of the ODEN AT. It can handle up to 5 secondary windings.



High current serial bar

For the serial connection of ODEN current units.



Circuit breaker and overcurrent relay test set

MS2A

Model MS-2A is capable of testing the time-delay characteristics of overcurrent relays, motor overload relays and molded-case circuit breakers rated up to 125 amperes, when following the recommended test procedure of testing the time delay of these devices at three times their rating.

Higher currents are available for the short durations required to test an instantaneous trip element. For example, the test set will provide a maximum short duration output of 750 amperes through a typical, 125 ampere, molded-case circuit breaker.

Primary current injection test set

PCITS2000/2

PCITS2000/2 enables you to test relay protection systems and their CTs together. Its built-in timer records protection relay operation. Tough and self contained with a hand-held controller, the operator can work close to the relay.



These tough self-contained test sets are designed for operation by one person and are comparatively light. With a separate hand-held controller connected by an expandable cable it allows the operator to work close to a protective relay while controlling a test

Multi-cable high current cable sets



| Length | Impedance (Twisted-pair cables) | |
|---|---------------------------------|----------|
| Cross section area: 240 mm² (2x120) | | |
| 2 x 0.5 m (1.6 ft) | 0.21 mΩ | GA-12205 |
| 2 x 1 m (3.3 ft) | 0.32 mΩ | GA-12210 |
| 2 x 1.5 m (4.9 ft) | 0.42 mΩ | GA-12215 |
| 2 x 2 m (6.6 ft) | 0.53 mΩ | GA-12220 |
| Cross section area: 360 mm² (3x120) | | |
| 2 x 0.5 m (1.6 ft) | 0.18 mΩ | GA-12305 |
| 2 x 1 m (3.3 ft) | 0.25 mΩ | GA-12310 |
| 2 x 1.5 m (4.9 ft) | 0.32 mΩ | GA-12315 |
| 2 x 2 m (6.6 ft) | 0.39 mΩ | GA-12320 |
| Cross section area: 480 mm² (4x120) | | |
| 2 x 0.5 m (1.6 ft) | 0.16 mΩ | GA-12405 |
| 2 x 1 m (3.3 ft) | 0.21 mΩ | GA-12410 |
| 2 x 1.5 m (4.9 ft) | 0.27 mΩ | GA-12415 |
| 2 x 2 m (6.6 ft) | 0.32 mΩ | GA-12420 |
| Cross section area: 720 mm² (6x120) | | |
| 2 x 0.5 m (1.6 ft) | 0.14 mΩ | GA-12605 |
| 2 x 1 m (3.3 ft) | 0.18 mΩ | GA-12610 |
| 2 x 1.5 m (4.9 ft) | 0.21 mΩ | GA-12615 |
| 2 x 2 m (6.56 ft) | 0.25 mΩ | GA-12620 |
| Cable set, 2 x 5 m (16 ft), 120 mm² | | |
| Cross section area: 120 mm² | | |
| Weight: 15.2 kg (33.5 lbs) | | |
| Impedance: 2.2 mΩ | | |
| GA-12052 | | |
| Cable set, 2 x 5 m (16 ft), 25 mm² | | |
| Cross section area: 25 mm² | | |
| For the 30/60 V output of current unit X. | | |
| Weight: 4 kg (8.8 lbs) | | |
| GA-02052 | | |

Distribution systems are protected by increasingly complex relays which require testing. Since the 1970s the Sverker series of relay testers has been class leaders, being small, light and simple to operate. Over the years more features have been added to enable the testing of more complex relays resulting in the variable phase shift and frequency features of the Sverker 780. Now new technology pushes the boundaries even further with the SMRT1, a revolutionary new concept in automatic relay testing, which makes high power complex testing available in a very small, extraordinarily light package.

Relay testing unit

SVERKER650

The Sverker 650 enjoys a well-earned reputation for reliability and convenience. Compact and powerful, it provides all of the functions needed for secondary testing of any types of single-phase protection now available. It features logical design, and it is extraordinarily easy to learn and use. Its compact design and low weight makes it extremely portable. Accessories for SVERKER 650 includes a test lead set and a rugged transport case and the ACA120 voltage source which makes it easier to test directional relays.



Relay testing unit

SVERKER750 and SVERKER780

The SVERKER 750 and SVERKER780 feature many functions that make relay testing more efficient. Their measurement section can display, in addition to time, voltage and current Z, R, X, S, P, Q, phase angle and $\cos \phi$. The voltmeter can also be used as a 2nd ammeter when testing differential relays. All values are presented on a single easy-to-read display. Directional protective equipment can be tested efficiently by means of the built-in variable voltage source.



SVERKER 780 this has a continuous phase shift function and adjustable frequency as well. Automatic reclosing devices can also be tested – just as easily.

Both units are available in an optional impact resistant and waterproof (IP65) high density plastic-case with wheels and retractable handle.

Timer unit

TM200

This timer unit, designed for use with SVERKER, has the precision that makes it ideal for many substation uses.



Single channel relay test set

SMRT1



Weighing in at only 3.2 kg the SMRT1 is an amazingly powerful relay test set. With a single current and voltage generators, the current channel outputs 60 A at 400 VA while the voltage channel outputs up to 300 V or can be converted to a current channel outputting 15 A constant. 150 VA

Should you want more channels the instrument can be daisy chained together to give more channels and more power.

All this power can be controlled with STVI manual controller or by use of a laptop and AVTS relay testing software using Bluetooth® or Ethernet connection.

More complex relays require a more flexible testing solution and Megger has a wide variety of units for these applications. The new 3 channel SMRT36 has a class leading constant power output in a field portable case the size of a 5 kV insulation tester! It can be manually controlled from a touch screen interface or by using PC control running AVTS software. This software is a full relay database management system allowing you to manage your assets effectively. It can be used with the MPRT and with the new single channel SMRT1 which can be connected via ethernet with the SMRT36 to make a 4 channel unit. 3 SMRT1s can also be connected together to make a 3 channel unit or more, however many channels you want. Megger also has the well established simple to operate Freja test system with the Freja306 utilising the CA30 amplifier to provide higher test currents and up to 6 current channels.

Relay testing system

Freja300

Weighing only 15 kg, the FREJA300 is tough. The rugged hardware design is built for field use over a wide temperature range, with the possibilities of intelligent software to perform rapid testing.



FREJA 300 can be operated with or without a PC. After being put into the Local Mode, FREJA 300 can be used stand-alone without a PC. Using the Local Mode is easy. The function of each key is described on the display, which also presents the settings and measured values. The very accurate low level analogue inputs (typically 0.01%) are designed for transducer measurements.

The high level inputs can be used as a normal volt- and ammeter. FREJA 300 can generate 4x150 V (82 VA) and 3x15 A (87 VA) or 1x45 A (250 VA). Each output can be varied independently. Both static and dynamic testing can be performed, such as pre-fault and fault generation, simultaneous ramping of several quantities and wave form editing.

Relay testing system

Freja306

FREJA 306 is an excellent choice when you want more current outputs, higher amps (3 x 15 A + 3 x 35 A), VA or compliance voltage. Use it to test differential relays with 6 currents, or virtually any single or 3-phase relay.



When testing 1-phase relays, you can make use of either the high current (over 100 A), or the very high compliance voltage. This now makes it possible to test high impedance relays of different kinds, like rotating disc relays, earth protection relays, etc. FREJA 306 can be also be used as a fault simulator to ensure proper relay configuration for specific applications.

Like the FREJA300, FREJA306 can be operated with or without a PC using the Local Mode.

Current amplifier

CA30

The CA30 is a 3-channel current amplifier with a switched mode power supply capable of delivering up to 3 x 35 A. The DC-coupled design makes it suitable for acyclic generation. Maximum output power is 250 VA per channel, and the maximum compliance voltage is 50 VRMS. The amplifier can generate 50 VRMS up to a current generation of 5 A per channel.



Test terminal blocks

States switches

Covers the complete area of panel connections from terminal blocks to knife switches. All products give long-term connection quality and mechanical stability.



States switches are UL listed, and CSA certified

Phase angle meter

PAM360E

PAM360E commonly used for phasing out circuits, checking poly-phase metering installations, testing and calibrating protective relays, checking differential relay schemes, and verifying the polarity of current and potential transformers.



Relay testing system

SMRT36

The SMRT36 is conceivably the smallest, lightest, highest output powered, complete three phase relay test system in the world today.

The test system may be customized by adding the number of Voltage-Current, (VIGEN), modules needed for specific test applications. For electric utility use, the SMRT36 with three VIGEN modules provides complete three-phase testing of three-phase impedance, directional power, negative sequence over-current and other devices that require a three-phase four-wire wye connected source. With three modules, output current and VA is tripled for high instantaneous or high burden over-current relays. With the voltage channels converted to currents, the same unit can provide 6-phase current. The SMRT36 VIGEN modules also provide high power in BOTH the voltage and current channels to test virtually all relays.



LIGHT AND POWERFUL

POWER BOX

The Power Box is ultra rugged, lightweight and feature packed. Some of the unique features include:

Constant Power Output (CPO) capability – The current amplifier delivers maximum compliance voltage to the load constantly through the entire power curve of a test. With a CPO rating of up to 300 VA per current channel it has the power and flexibility to test virtually any relay. Constant power output eliminates the need for complicated, time consuming, series and parallel combination connections of current channels together to test high burden relays. Constant power output in the new "PowerV" voltage channel provides a flat power curve at 150 VA from 30 to 150 Volts, which provides testing of electromechanical high impedance relays, and other high burden applications such as panel testing.

Unique VIGEN internal design – The Voltage and Current Generator (VIGEN) components have been combined into one small amplifier package. This reduces size, weight and with reduced parts count increases reliability. The SMRT36 has the flexibility to deliver up to three voltages, three currents, or using the convertible voltage channels the unit can provide combinations of voltages and currents up to six currents from the 3 channel system.

Multiple high speed communication ports: The SMRT36 is provided with three Ethernet ports (two are shared for synchronizing two or more SMRT units together) a high speed USB port and a Bluetooth® option. The Bluetooth option provides the additional capability to communicate with the SMRT36 wirelessly from your PC.

SMRT TOUCH VIEW INTERFACE (STVI)

Finally... an easier way to perform manual, semiautomatic and automatic relay testing without the need of a computer and expensive software. It's all done via a unique hand held controller called the Smart Touch View Interface. The most significant feature of the STVI is its ability to provide the user with a very simple way to manually test even the most complex relays manufactured today. Manual operation is simplified through the use of a built in computer operating system and the STVI, with a large color high resolution TFT LCD touchscreen. The STVI eliminates the need for a computer when testing virtually all types of relays. Menu screens and touch screen function buttons are provided to quickly and easily select the desired test function.

UNCOMPROMISED PERFORMANCE

Large colour TFT LCD touch-screen display – The STVI features an easy to use and read display providing manual control of the test set, and displays measured values of voltage and current. This reduces human error and time in testing relays.

Constant Power Output – The new SMRT36 employs high powered Voltage-Current amplifiers. The current amplifier delivers maximum compliance voltage to the load constantly during the test. Constant power output in most cases eliminates the need for complicated, time consuming, series and parallel combination connections of current channels together to test high burden relays. Constant power output in the new "PowerV" voltage channel between 30 to 150 Volts provides testing of electromechanical high impedance relays, and other high burden applications such as panel testing.

Modular design – Output modules plug-in for system reconfiguration and ease of maintenance. Purchase less than a 3 phase system now and upgrade later allows customers to better utilize their limited budgets.

High resolution and accuracy – The STVI has metered outputs and a timer to provide extremely high accuracy.

Internal memory – The STVI provides storage of test set-up screens, test results, which reduces testing time and paper work. Saved test results can be downloaded into the Power DB database.

Steady-state and dynamic test capability – The SMRT36 provides, either through manual control or computer control, both steady-state and dynamic testing of protective relays. This includes programmable waveforms with dc offsets and harmonics, which provide realistic transient output waveforms.

Display screen prompts operator – The STVI features a display screen that prompts the user with easy to use function buttons. Single button operation saves time in testing relays and minimizes human error.

Output current and voltage sine waves are generated digitally – SMRT outputs do not vary with sudden changes in input voltage or frequency, which increases test accuracy and reduces testing time.

Memory metering – Allows the user to set test currents and voltages faster, which reduces heating of the device under test.

Digital inputs and outputs – SMRT36 with the "N" option and at least two VIGENS has 2 programmable inputs, and 2 programmable outputs. For more binary inputs and outputs, the "P" (Plus) option adds 8 binary inputs, and 4 binary outputs (2 high speed), and the Battery Simulator. Binary Inputs can be programmed, using Boolean logic, for more complex power system simulations.

Circuit breaker simulator – The SMRT36 binary outputs provide programmable normally closed and normally open contacts to simulate circuit breaker operation for testing reclosing relays. Sequence of operation, timing, and lockout are easily tested.

Performs transient tests – Perform acceptance or troubleshooting tests by replaying digitally recorded faults or EMT/ATP simulations in the IEEE- C37.111, COMTRADE Standard format.

Perform end-to-end tests – Using AVTS software and a GPS satellite signal, the SMRT36 units can perform satellite-synchronized end-to-end dynamic or transient tests. Provides precisely synchronized testing of remotely located complex protection schemes.

Wide-ranging output frequency – The output frequency of the current and voltage channels can be set for any frequency from dc to 1 kHz.

Ethernet ports – Two Ethernet ports provide high speed computer interface. This can be used to quickly download transient waveform data, or update test set firmware. One Ethernet port is used to connect the STVI to the SMRT36. Another port is used for automated control using a PC and AVTS software. The third port may be used to either connect to a substation bus for IEC 61850 testing, or "piggy-back" multiple SMRT units together for synchronized multi-phase test systems.

Bluetooth communication – Bluetooth wireless communications provides a reliable communications medium at the same time providing isolation from the PC.

Universal input voltage – Operating from 90 to 264 VAC, 50/60 Hz, the SMRT36 can use virtually any standard source in the world.

Battery simulator – The SMRT36 with the P option provides a variable dc output voltage from 5 to 250 Volts, at 100 Watts (4 Amps Max), which eliminates needing a separate dc source for providing logic voltage for solid-state relays. The SMRT36 with the N option does not include a battery simulator.

Immediate error indication – Audible and visual alarms indicate when amplitude or waveforms of the outputs are in error.

Relay testing software System

AVTS

For full automatic testing the SMRT36 may be controlled by Megger Advanced Visual Test Software (AVTS). AVTS is a Microsoft® Windows® XP/Vista™/7 compatible software program designed to manage all aspects of protective relay testing using the new Megger SMRT. More flexibility has been added as well as some new and powerful features.

AVTS comes in three different levels:

- SE test
- Advanced test
- Professional test

Every unit comes with AVTS SE. It includes online vector control for single and multi-state timing tests including reclosing, online ramp control for automatic ramping of voltage, current, phase angles or frequency to find minimum operating/pickup and dropout tests and online Click-On-Fault for dynamic tests of impedance relays with the ability to import specific relay impedance characteristics. The user may also save, execute and print relay specific test modules and results. Test results may also be exported directly to Microsoft Word. The SE version also includes new enhanced relay test wizards for over-current, voltage, differential, impedance and frequency relays, making relay testing swift and easy.



AVTS can display the voltage and current output waveforms in time sequence with the binary inputs and outputs

The AVTS Advanced Test version includes the powerful test editor, dynamic control including dynamic end-to-end testing capability, modbus communication test capability, ASPEN OneLiner™ or Electrocon CAPE™ S51 File Converter for dynamic testing, and easy to use programming Tools for creating and editing test modules.

The AVTS Professional Test version includes all of the features of the SE and Advanced versions plus some other powerful test tools and features. It includes the DFR Waveform Viewer, One-Touch™ Test for fully automatic tests, and Waveform Digitizer to digitise scanned waveforms of electromechanical over current time curves.

GPR timing reference

MGTR

MGTR is a small, lightweight, field portable, GPS satellite receiver system specifically designed to perform end to end tests of line protection schemes, with Megger relay test systems. MGTR provides a precise Programmed Output Pulse (POP), with 100 nanoseconds of resolution. This output pulse provides a trigger synchronization of two or more MPRT test systems to less than $\pm 1 \mu\text{s}$ of the Universal Time Coordinated (UTC).



MGTR is a portable GPS system designed to enable end-to-end tests

Low Current Adapter

MPRT LCA

LCA Low Current Adapter is a lightweight, field portable unit designed to provide multiple precise very low current sources with the Megger MPRT relay test system. The combination of MPRT and LCA provides a very powerful test capability. A single LCA unit can provide a maximum of three currents 10 to 200 milliamps each phase. LCA is especially designed for testing very sensitive extremely low current relays with high accuracy amplitude and phase angle.



With MPRT and LCA, you can test relays which require three phase voltage and three phase currents, with currents as low as 7.5 mA up to 0.20 A

Protective relay tool kit

K500

A comprehensive range of relay tools containing over 40 specific items. The whole kit is supplied in either a lightweight soft case or a tough lockable vinyl case.



MPRT relay test set with touch view interface makes it easy to perform manual and semi-automatic relay testing

IEC61850 communication testing

IEC61850 is a substation communication protocol utilised in many new substations. Some Megger relay testers are already compatible with IEC61850 but for those that aren't the goose message interface can be used. IEC61850 goose messages are communicated through the substation LAN networks which can be performance tested by the SCT2000.

IEC 61850 test system

GOOSE message interface

The goose message interface allows you to interface any relay test system with IEC61850.

The GOOSE message interface provides two physically isolated Ethernet ports to safeguard your network from unwelcome erroneous messages from your PC, as the isolated ports do not allow communication from the direction of the PC to the Network.

GOOSE message interface can convert IEC61850 GOOSE messages coming from the rear Ethernet port to physical binary output and it converts a binary input physical contact (voltage or contact) into GOOSE message publication. GOOSE message interface has 10 binary inputs and 10 binary outputs.



Structured cable certifier

SCT2000

With the gradually increasing use of networks in the substation environment there is a need for a tester that can certify the network to the highest installation class. SCT2000 is a tough tester that can certify networks to IEC classes F, E, D and C and TIA Category 5e, 6 and 6a and is ready TIA Cat 7. The on-board diagnostics pin-point disturbances quickly and effectively. Essential for substation use the SCT is immune to common electrical hazards, unlike other testers in its class.



Current transformer testing

When commissioning protection systems and after a fault occurs it is necessary to check that the CTs are providing the protective relays with the correct outputs.

Automatic current transformer saturation, ratio and polarity test set

MCT1600B

A huge time saver, this robust, portable unit to automatically or manually perform saturation, ratio, polarity, demagnetising tests, CT burden and insulation tests on current transformers using the voltage comparison method. It has an integrated 1 kV insulation test system. The colour display is viewable in daylight and shows multiple instantaneous saturation curves with knee points. Data is saved to a USB stick.

Automatic multi-tap current transformer test set

MCT1605

Similar to the MCT1600B but MCT1605 can perform saturation, ratio and polarity on all taps at the push of a button and without changing leads.



Step-up transformer

MAGNUS

MAGNUS permits the preparation of excitation curves for CTs, to demagnetize their cores and turns ratio tests on voltage transformers. Despite its size 16 Kg it can deliver 1 A at 2.2 kV.



Transformer testing

Transformers are one of the most critical and expensive assets in a substation. If a large transformer fails it will be a major problem for the asset owner, it will be expensive to repair or replace and there may not be a replacement of the required type available at short notice. Extending transformer life and predicting failure is becoming increasingly important to asset owners and Managers. Luckily, Megger can help.

Megger's transformer test equipment is tough, light and with all the functionality you need for rapid testing.

Hand-held TTR

TTR25

TTR25 is an automatic hand-held transformer ratio test set used to measure the turns ratio, excitation current and polarity of windings distribution and power transformers, potential and current transformers, and tapped transformers. angle deviation, winding resistance and transformer polarity, the results can be stored on board for later downloading.



TTR25 is designed to operate in tough environments. It is extra rugged, with a high impact, shock resistant case, yet incredibly lightweight at a mere 870 g

Hand-held transformer tester

TTR100

Fully three-phase capable, TTR100 is the low cost solution for three-phase transformer testing. The lightest and most portable TTR test set available, it offers a full set of tests including; transformer turns ratio, excitation current, phase angle deviation, winding resistance and transformer polarity, the results can be stored on board for later downloading.



With a turn ratio of 20,000:1, the TTR100 offers the highest turns ratio accuracy in the industry of 0.1%. The TTR100 features special software capabilities

| Transformer turns ratio testers | | | | | | | |
|---------------------------------|----------------------|---------------|------------------|---------------------|---------------------|---------------------|---------------------|
| | TTR25 | TTR100 | TTR550005 | TTR300 | TTR310 | TTR320 | TTR330 |
| Turns ratio range | 0.8 to 20,000 | 0.8 to 20,000 | 0.001 to 129.999 | 0.8 to 45,000 | 0.8 to 45,000 | 0.8 to 45,000 | 0.8 to 45,000 |
| Excitation voltage | 0.5 V, 1.5 V and 8 V | 1.5 V and 8 V | 8 V | 8 V, 40 V, and 80 V | 8 V, 40 V, and 80 V | 8 V, 40 V, and 80 V | 8 V, 40 V, and 80 V |
| Excitation current | 0 - 100 mA | 0 - 100 mA | 0 - 1 A | 0 to 500 mA | 0 to 500 mA | 0 to 500 mA | 0 to 500 mA |
| Single phase test | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Automatic three phase test | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Display Type | 128 x 64 LCD | 128 x 64 LCD | Analogue | | 5.7" mono | 5.7" colour VGA | 8.4" colour VGA |
| On-screen view | Text | Text | | | Text | Graphical icons | Test forms |
| Remote PC control | | | | RS-232 | RS-232 | Ethernet | Ethernet |
| User defined settings | | ■ | | ■ | ■ | ■ | ■ |
| Display % error | | ■ | | ■ | ■ | ■ | ■ |
| Power DB Onboard | | | | | | | |
| Keypad | 7 key | 19 key | | | 16 key | Full QWERTY | Full QWERTY |
| Internal storage | | 200 datasets | | | 200 datasets | 10,000 datasets | 10,000 datasets |
| Printer interface | RS-232 | RS-232 | | | RS-232 | RS-232 | USB |
| Software COMLINK | ■ | ■ | ■ | | ■ | ■ | ■ |
| PowerDB LITE | | | | ■ | ■ | ■ | ■ |
| Power source | 6 x AA | NiMH | Hand -cranked | 120/230 V a.c. | 120/230 V a.c. | 120/230 V a.c. | 120/230 V a.c. |
| Weight | 1.5 kg | 1.5 kg | 7.3 kg | 9.1 kg | 10.4 kg | 11.3 kg | 11.3 kg |

1 time connection principle – Megger 3-phase Turns Ratio and winding resistance testers allow the connections to be made once and all the tests to be carried out without having to swap the leads and re-connect each time you want to test another winding. This speeds up the testing substantially, especially on large power transformers with multiple taps. The leads are compatible with both the TTR300 and MTO300 series

Basic TTR test set

TTR300

TTR300 is designed to be completely remote controlled via a PC running PowerDB LITE (included) or PowerDB (full version) PC software. TTR300 is field upgradeable to TTR310, TTR320 or TTR330 without compromise to calibration. It has built-in capability for storing test results into internal memory in an open XML data format via PowerDB LITE. You can quickly download test results via RS-232 serial port.



TTR with PowerDB lite

TTR310

TTR310 has an easy-to-read, high-contrast LCD that can be seen in bright sunlight and provides the user interface for instrument set-up and test operation. It comes complete with PowerDB LITE software. TTR310 can store test results, upload results to a PC (via RS232 serial port), and/or print them in the field via optional thermal paper printer, without the use of an external computer. TTR310 has fully automatic operation (either stand-alone or remote-control), is field upgradeable to a TTR330 or TTR320 without compromise to calibration and built-in capability for storing test results into internal memory in an open data format for direct input into Excel® or XML format via PowerDB.

Advanced TTR test set with PowerDB onboard

TTR330

TTR330 has a new user interface that lets you interact with the PowerDB ONBOARD software system through keyboard and navigation keypads as displayed on an 8.4" VGA bright colour screen. PowerDB ONBOARD displays the actual test form directly on the screen. TTR330 also lets you customize test forms via optional full-version PowerDB. TTR330 has three communications ports (two USB, one Ethernet). The USB host ports can be used for connecting directly to an optional printer (to print full size A4 or letter completed test forms) and for data storage to a USB memory device (for later printing, analysis, archiving, and/or trending). The Ethernet port allows TTR330 to interface bi-directionally to a PC. TTR330 has fully automatic operation (stand-alone or remote control) with user interface via on-screen customizable test forms and built-in capability for storing test results, in an open XML format, to either internal memory or to an external USB storage device.

TTR with PowerDB lite and colour display

TTR320

TTR320 has a high contrast bright 5.7" full VGA colour display can be seen in direct sunlight. It has a full keyboard for entering nameplate information. Communications ports include RS-232, USB and Ethernet ports for easy on-board printing, storage, and downloading of test results. PowerDB LITE software is included, so you can perform data analysis and trending of results. TTR320 has fully automatic operation (stand-alone or remote-control), is field upgradeable to TTR330 without compromise to calibration and has a graphical user interface with easy-to-read ICON based screens and automated setup and control. You can store test results in an open XML format, to either internal memory or to an external USB storage device.



TTR330 has PowerDB for rapid report generation

Transformer ohmmeter

MTO210

MTO210 is a line-operated, field-portable instrument designed specifically to measure the d.c. resistance of all types of magnetic windings safely and accurately. It is mainly used all types of transformer windings but can also test rotating machine windings and perform low-current resistance measurements on connections, contacts and control circuits.



Three features combine to make this instrument unique

- dual measurement
- load tap-changer testing
- safety shutdown

The dual set of potential inputs measure the resistance of the primary and secondary windings of a single- or three-phase transformer simultaneously speeding up the measurement.

To achieve a tenfold improvement in reading time, a balancing current is applied to the secondary to attenuate the circulating current induced when the test current is applied to the primary winding.

When testing the windings and contact resistance on tap-changers with make-before-break contacts and voltage regulators, the internal shutdown circuit of MTO210, which will be triggered by a voltage kickback of a few microseconds if the tap-changer contacts are opened, can be used to check for pitted or misaligned contacts as the instrument will shut down if either condition occurs.

Users are protected by the shutdown circuit safety feature: any inadvertent disconnection of a test lead or loss of power to the instrument will safely discharge the energy stored in the test sample.

Transformer ohmmeter with graphical interface

MTO300

MTO300 provides a fully automatic six-winding resistance measurement capability, even on 3-phase transformers with tap changers. During tap changes, the unit also continuously monitors for any break-before-make conditions.

The high contrast bright 5.7" full VGA colour display can be clearly read in direct sunlight. The graphical user interface allows automated setup and control through easy-to-read icon based screens. The full QWERTY keyboard speeds the entering of information such as nameplate-type data.

Communications is via RS-232, USB and Ethernet ports for easy on-board printing and storage, and downloading of test results.

Once testing is complete, the unit will automatically demagnetize the transformer.

Supplied with PowerDB LITE PC software application, the user can perform data analysis and trending of results.

Transformer ohmmeter with Power DB on-board

MTO330

As the MTO 320 but with power Db on board, displaying the actual test form on screen.



MTO measures dc resistance of all types of transformer windings within the defined ranges of current and resistance

Universal lead sets

For use with MTO300 and TTR300 series products (up to 10 A d.c. max) 3-phase shielded test lead set, X and H windings.

Two length options 18 m or 9 m and 10 m extension.

PowerDB OnBoard – consistent and repeatable

PowerDB OnBoard comprises the powerful PowerDB asset management software embedded within the instrument, running on a Windows operating system. Without the need for an external computer, PowerDB OnBoard brings field based users consistent, repeatable tests across instruments, unprecedented data analysis (including historical trend charting) and asset management tools, all from on-screen 'forms based' views.

Also included are a number of new communication technologies, providing a near seamless interface between the instrument and optional peripheral equipment, such as an "in-lid" USB full-sheet (A4 or letter) thermal-paper printer, USB flash drive, and external PC (via Ethernet port). For advanced users, a USB router can be connected to the instrument to provide simultaneous access to other equipment, such as a mouse or a keyboard. Storage space is provided by either the internal flash memory or external USB flash drive – sufficient to save literally tens of thousands of test data sets.

Reduced training time

A common user interface reduces the training time needed to understand the different instruments that a busy test engineer has to use. New instruments with PowerDB OnBoard such as TTR330 are truly forms-based, have a large 8.4" full-VGA bright colour display, and let you set up and control the instruments through on-screen test form views. On-screen test forms are exact replicas of the test forms which are printed as a permanent test form record once testing is complete. They are secure reports and generated directly from instrument so no human interface is needed.

For more information see page 34.

Dielectric strength testing

Oil is an efficient coolant with a high flash point and high dielectric strength when used as an insulator in transformers. The insulation properties can change due to oxidation, acids, sludge, gas and water absorption. These changes can be monitored using a dielectric Megger OTS test set.

60 kV, 80 kV and 100 kV automatic laboratory oil test sets

OTS60AF, OTS80AF and OTS100AF

Designed for Laboratory use, these instruments measure the dielectric strength of mineral, ester and silicon insulating oils. With re-thought out ergonomics, the vessels and chambers are particularly easy to drain and clean out.

The screw adjusted electrodes have a unique mechanism to lock precisely the electrode gap. The detection circuit offers direct measurement of both voltage and current and the system has an ultra fast HV switch off time of less than 10 μ s for improved operator

Each instrument has a large, bright, coloured screen to make user interface intuitive and to assist with the labelling of results files and recording of comments there is a phone-like 12 key alphanumeric pad.

The products can be configured to meet the testing requirements of the laboratory.



60 kV and 80 kV portable automatic oil test sets

OTS60PB and OTS80PB

Weighing in at only 16 kg the OTS60PB is the lightest, most portable oil test set available. Meanwhile the OTS80PB is the most flexible test set because it offers more power in a test set which weighs less than 21 kg.

Featuring the same easy empty vessel and quick drain chamber design as the laboratory models, the large, bright, colour screens are easy to read in sun light.

Features like the electrode precision lock and ultra fast HV switch off time are particularly important for instruments that may not be used in the ideal environment.

The OTSPBs can be configured to match the users needs.

60 kV manual oil test set

OTS60SX

Light semi-automatic 60 kV oil dielectric strength test set which is simple to use and can be powered from a range of mains supplies.

Digital voltage checker for oil test sets up to 80 kV and 100 kV

VCM80D and VCM100D

Designed for checking the output voltage of the OTS AF and OTS PB test sets, these checkers show the output voltage in digital read out form and this can be compared with the instrument reading.



Karl Fischer testing

Karl Fischer testing uses the titration method to measure the amount of water in fluids such as insulating oil. It has become a standard test done on transformer insulating oil.

Portable moisture in insulating oil test set

KF875

Optimised for oils with an SG of 0.857, the KF875 is easy to use, portable one button test set with integral printer. Can be powered from mains, internal rechargeable battery or car battery. Ideal for on site use.

Variable specific gravity moisture in oil test set

KF-LAB

Easy to use test set that titrates for specific gravities between 0.60 and 1.40. Designed specifically for laboratory use, the KF-LAB is mains powered only.



KF-LAB MKII analyzes materials with a specific gravity between 0.6 and 1.4, plus insulating oils

KF875 uses coulometric titrimetry technology

Frequency domain spectroscopy (FDS)

FDS, also known as dielectric frequency response (DFR) is the most powerful tool for assessing the moisture in the oil and cellulose components of power transformers. Because it scans the dielectric losses in the system across a spectrum of frequencies and then compares them to a modeled curve, results are independent of temperature. Before FDS, the only way to tell the moisture content in a transformer was to open it up and take a sample of the cellulose insulation for analysis.

Insulation diagnostic analyser

IDAX300

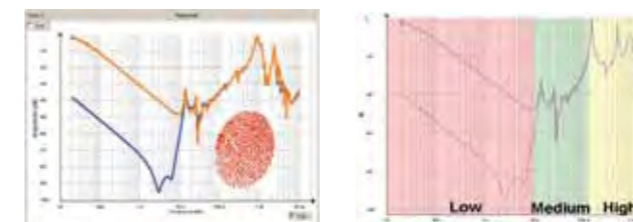
A reliable and accurate method for assessment of the condition of the insulating components of transformers and bushings, IDAX 300 exploits FDS techniques and state-of-the-art software to make a transformer moisture assessment in under 18 minutes. It measures capacitances and tan δ or power factor of the insulation between the transformer windings at multiple frequencies and plots the resultant curve. Comparing this measured curve with a modeled one allows calculate the moisture content.



Sweep frequency response analyser

FRAX101

SFRA is a method for assessing whether or not a transformer has been subject to mechanical damage, for example when moved or from a lightning strike. FRAX101 and its software allows repeatable fingerprinting of transformers so that a scan can be run whenever it experiences a traumatic event such as transportation, severe fault or overhaul, allowing to back one line faster. Ideally a transformer is fingerprinted at birth, but now is a good time so any future problems can be diagnosed. Compatible with all international standards for SFRA, FRAX101 can be battery powered and has wireless communication with a computer.



Sweep frequency response analyzer with Power DB

FRAX150

Like FRAX 101 offers all the benefits of SFRA for diagnosis of damage to transformers, but it is built into a tough carry case which includes an on-board computer making it even more transportable. There is a large bright screen to make it comfortable to use even in bright sun light. Data is stored on the hard-drive and can be downloaded using the galvanically isolated USB port.



One of the most important considerations in an electrical system is the resistance of the earth for reliable operation and safety. Whether you are doing a ground resistivity survey to plan the location of a substation or testing an earth electrode Megger has an earth tester suitable for the job. Megger has more than 50 years experience of designing and building earth resistance testers. The latest generation is CATIV rated, and have tough moulded cases. Variable test frequency keeps noise down, reliability up.

High resolution earth tester

DET2/2

Our top of the range earth tester. High resolution to 1 mΩ. This level is required to measure resistivity to adequate depth on many substation and communication sites. Measurement of the low earth values required on many installations, to meet Ground Potential Rise (GPR) requirements need this resolution to ensure valid results. Superior noise filtering greater than 40 V peak to peak to retain resolution under real test conditions.



DET2/2 has excellent noise filtering and is ideal for big earth systems

Earth leakage clamp

DCM300E

Measurement of leakage current. For stable readings down to very low current value with a 0.01 mA resolution. Current measurement ranges from 30 mA up to 300 A.



DCM300E was designed with safety in mind. It exceeds the requirements of IEC1010-2-32

| Earth resistance testing | | DET2/2 |
|--------------------------|---|---|
| Feature | Earth test technique | 2-pole resistance measurement a.c. <input type="checkbox"/> 3-pole earth measurement a.c. <input type="checkbox"/> 4-pole earth measurement a.c. <input type="checkbox"/> |
| | Warnings or indicators | Noise interference <input type="checkbox"/> P spike resistance high <input type="checkbox"/> C spike resistance high <input type="checkbox"/> |
| | Outputs | Adjustable frequency 105 -160 Hz <input type="checkbox"/> 0.5 Hz steps <input type="checkbox"/> |
| Displays | Max resolution 0.001 Ω high accuracy <input type="checkbox"/> | |
| Noise rejection | 40 V peak to peak <input type="checkbox"/> | |
| Power supply | Battery status indicator <input type="checkbox"/> | |
| | Charge from vehicle battery <input type="checkbox"/> | |
| Case | Weather and dust proof to IP54 <input type="checkbox"/> | |
| | Operation instructions on lid <input type="checkbox"/> | |

Professional earth test kit

Megger's Professional Earth Test Kit is designed to be as practical as possible. Housed in a tough polyethylene carry case, the kit is stored neatly, well-protected and easy to transport. In use the reels are fitted and retained on the spike handles, simply run out the test lead to the instrument and plug in, plug the other end directly into the spike, and test. When the test is complete, unplug the test leads and wind them in, whilst still on the spike.

- Ideal for use with whole range of Megger earth testers
- 4 wires on easy-wind reels make it quick to get testing and quick to pack away again
- 1 croc clip test wire
- Fibre-glass measuring tape to assist accuracy
- Auger style spikes make it easy to deploy and to check depth
- Tough easy store case



Everything you need for earth ground testing, including a tough moulded polyethylene case

Earth ground testers

DET3 and DET4

All models include these features

- Extra large selector switch
- Extra large, clear display for easier operation in outdoor conditions
- Simple one button operation
- Battery powered with a bar graph that updates battery strength
- Noise reduction up to 40 V peak to peak
- Safety rating of CATIV 100 V
- IP54 rated (water/dust ingress) for extra protection in harsh conditions

DET3TD offers a complete kit for customers wishing to conduct earth electrode testing using the two and three pole techniques.

DET3TC when used with the optional ICLAMP allows fall of potential testing using the ART technique without needing to disconnect the electrode under test.

DET4TD2 is a complete earth testing kit for users needing the flexibility to use either the two and three pole electrode techniques or the four pole soil resistivity test.

DET4TR2 is similar to DET4TD2, with the added advantage of using rechargeable batteries. You can also get an adaptor to charge your tester from your vehicle.

DET4TC2 is a four pole tester with extended resistance range and variable test frequency. Use it for ART testing, two or three pole testing, four pole resistivity testing and stakeless testing.



DET4TC2 comes as a bare tester or in a full kit

DET4TCR2 is similar to DET4TC2, with the added advantage of using rechargeable batteries. You can also get an adaptor to charge your tester from your vehicle.

Each instrument includes everything you need to test: Comes complete with test leads, stakes, batteries, calibration certificate and rugged polypropylene carry case.

Earth resistance clamp testers

DET14C and DET24C

Earth resistance clamp testers are suitable for measuring earth resistance of installations such as buildings, pylons and RF transmitter sites and for inspection of lightning protection systems.

- Elliptical clamp shape improves access to earth cables and straps up to 50 mm
- Low maintenance flat jaw interface
- Measures ground resistance from 0.05 Ω to 1500 Ω
- Measures true RMS ground leakage current from 0.5 mA rms to 35 A rms
- Automatically self calibrates
- Auto ranging
- High and low alarms
- Memory and downloading
- CAT IV 600 V safety rating



With the increasing dependency of back up systems on battery strings, and the escalating cost of replacing batteries instrumentation and software systems that can measure, trend and manage the life-cycle of cells is a cost effective option. There are two methodologies for testing batteries; the first, impedance testing is an on line test and can be performed frequently to identify individual weak cells before they fail. The second, battery discharge testing is an off line test and tests the actual output of the whole battery under load conditions. This will show what will actually happen if the battery is required to take the load. Most battery systems are floating and have earth leakage monitors and trips if there is an earth fault. The Battery Ground Fault Tracer allows you to trace a faulty circuit easily in a complex system.

Battery impedance test equipment

BITE3

BITE3 battery impedance test equipment determines the health of lead-acid cells up to 2000 Ah by taking measurements of the most important battery parameters, cell impedance, an internal ohmic test, cell voltage, intercell connection resistance and ripple current.

For the first time in a battery test instrument, BITE3 measures float current and the harmonic content of the ripple current. There is a built-in spectrum analyser to show the harmonic content of the ripple current. It has firmware that can be upgraded through the Internet.



BITE3 determines the health of lead-acid cells up to 2000 Ah by taking measurements of the most important battery parameters

Battery impedance tester for up to 7000 Ah cells

BITE2P

A rugged durable instrument whose enhanced capabilities make it easier to determine the true state of health of a battery system, terminal plate to terminal plate. The BITE2P is ideal battery systems up to 7000 Ah, used in substations, generating stations, telephone exchange UPS systems and cabinetised UPS batteries, railway substations, signal and communications installations.



BITE 2P Battery Impedance Test Equipment determines the condition of lead-acid and nickel-cadmium cells up to 7000 Ah

Battery ground fault tracer

BGFT

A manually balanced instrument that identifies, tracks and locates ground faults in unearthed d.c. battery systems, on-line. Effective in high electrical noise environments, as the strength of test current can be adjusted. Useful for industries where power supply for operating measurement, communication and control equipment is critical.



The Battery Ground-Fault Tracer is an economical, manually-balanced instrument that identifies, tracks and locates ground faults in ungrounded d.c. battery systems - on-line. It is particularly effective in a high electrical noise environments, as the strength of the test current can be adjusted

Battery load tester for telecom applications

TORTEL820

During a power outage, crucial telecommunication and radio equipment must be kept operating by batteries. Back up batteries ability to perform this task should be checked to prevent expensive downtime in the event of a power failure.

Combining efficiency with portability, TORTEL820 can discharge 24 and 48 V batteries at a current of 270 A and 12 V batteries at 135 A. The discharging can proceed at constant current, constant power or constant resistance, or in accordance with a pre-selected load profile to reflect a real-life incident.

For higher discharge rates two or more TORTEL820 units and/or extra load units TXL.

Battery load tester for utility applications

TORTEL840

Designed to be used for battery systems ranging from 12 to 250 V which are often encountered in switchgear and similar equipment, TORTEL840 can discharge a battery at up to 110 A, and if higher current is needed, two or more TORTEL840 units, or extra load units (TXL), can be linked together. Tests can be conducted at constant current, constant power, constant resistance or in accordance with a pre-selected load profile.

There is no need to disconnect the battery from its regular load to test it with TORTEL as the unit adjusts to include the load currents in the test parameters. There is a user adjustable alarm and shutdown to prevent deep discharge of the battery. TORTEL WIN software allows the progress of the test to be monitored in real time as well as recording the result, post test analysis and report generation.

Battery extra load

TXL

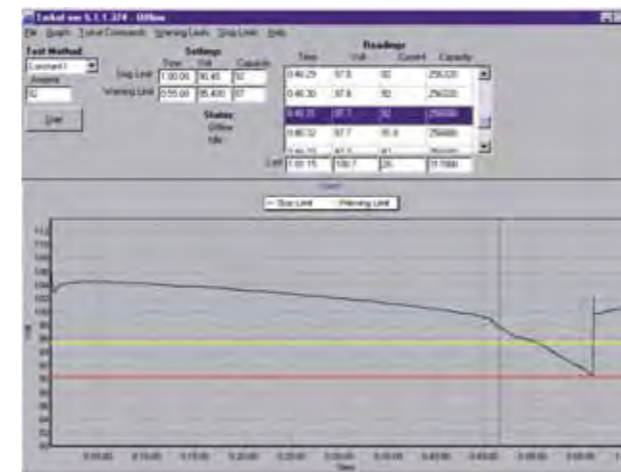
For use with the TORTEL testers which controls the test, the extra load units allow the battery to be discharged at a greater rate.



Battery testing software

TORTEL Win PC Software

TORTEL Win allows remote control of TORTEL battery load testers, recording time, voltage current and discharge capacity, and permitting the display of voltage curves and production of reports.



Battery load tester

TORTEL860

TORTEL860 is built for peripatetic battery maintenance engineers, who encounter battery systems ranging from 12 V to 480 V. It can handle a discharge rate of 110 A and offers the same benefits as the TORTEL840 including the ability to expand the system should higher discharge rate be required.



Digital hydrometer

For determining the specific gravity of flooded cells, electrolyte is simply drawn in and the specific gravity and temperature are determined in five seconds. It provides memory for both temperature and specific gravity for eight tests of 256 cells each. The stored data can be easily downloaded into any PC using ????????



Other useful instruments include:

DLRO10X – For checking of cell interconnections, see page 9.

DCM340 – Clamp-meter for measuring load currents, see page 36.

AVO410 – Multimeter for battery voltage measurement, see page 36.

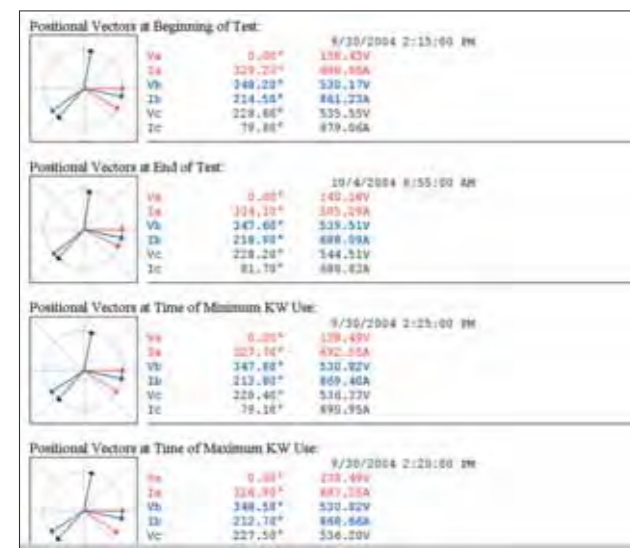
With the increased sophistication of electrical and electronic equipment, and new micro generation systems being added to the grid, there is now more than ever attention being paid to the quality of supply. Power quality surveys on electrical noise, lamp flicker, load balancing, power factor correction and motor in-rush studies can all be carried out with Megger power quality analysers.

Power quality analysis software

MetReport

MetReport is an extremely powerful, fully functional, and stand-alone report generation tool for the Megger PA-9Plus power quality analysers. Its primary purpose is to dramatically improve and extend reporting capabilities.

In today's economy, time is money. Power and power quality professionals sometimes spend countless hours every year creating customized reports supporting their analysis studies. MetReport automates this tedious task while improving the accuracy and reliability of the entire reporting process.



MetReport utilizes data files obtained from the PA-9 and PA-9Plus to rapidly produce completely customizable reports targeted to your particular applications and requirements. Some examples include: Power quality studies, harmonics analysis, power factor and energy consultation, tolerance curve studies (CBEMA/ITIC, SEMI F47, User Defined), auto data analysis pass/fail reports, EN50160 compliance, and IEEE/IEC Flicker. The key to quickly learning and using MetReport is the integrated wizard function. This wizard effortlessly takes you through the entire report creation, customization, and generation process. Several sample report templates are included for review, and may be modified to meet your specific needs.

All reports are output as standard Microsoft Word documents.

Distribution profiler

MDP series

With virtually unlimited data recording capacity, easy installation and lightweight durable construction, MDP gives power utilities a convenient and accurate way of acquiring information needed to monitor power flow on feeders and overhead lines. MDP1 records actual current RMS magnitude up to 1000 A, with an additional 200 A overrange. MDP2 adds recording of relative voltage RMS magnitude together with power and power factor. The MDP3 provides facilities for waveform capture as well as the recording harmonics and THD.



3-phase power measurement meter

PMM-1

Measures a.c./d.c. voltage, a.c. primary and secondary current, power, power factor, reactive power, phase angle and frequency of single and three phase electrical systems with extreme accuracy. Integral solid state timer for continuity and voltage sensing and harmonic measurement up to 49th harmonic. For detailed waveform analysis a high-speed capture function allow 20 measurements per second. A data port allows bi-directional communication.



Power multimeter multi-function measuring instrument with simultaneous measurement and display of all three-phase system parameters

Power quality analyser

PA9 Wireless

The new Megger PA9 Wireless is the latest innovation of the successful PA-9 Power Quality Analyser platform. It simultaneously records power quality and power flow information. PA9 Wireless incorporates newly enhanced key features including a wireless modem for remote communication, a full 12 MB of nonvolatile internal memory and standard auxiliary power input capabilities as well as an optional external flash card for added memory. The unique wireless modem allows the user to configure the unit remotely, view real-time data via the remote screen, and preview all recorded data without downloading the data. The wireless modem allows for remote analysis of data, remote data retrieval capabilities and remote unit configuration. The unit intelligently downloads, previews and retrieves only the information of interest. It trends voltage, current, imbalance power, energy, events, flicker (PST/PLT), THD, TDD, individual harmonics, and frequency. Operating in real-time, it graphically displays harmonic content, power and source direction. It has remote communications and alarm capabilities. PA9 wireless includes enhanced MEGPA9IEC software.



PA9 Wireless Starter Kit, shown here, includes 4 voltage cables and 3 raintight CTs

Power quality analyser

PA9plus

The PA9plus has enhanced standard key features including a fast digital signal processor to support future evolving features and capabilities, a full 12 MB of internal, non-volatile memory and incorporated auxiliary power input capabilities.

The product offers testing to the relevant standards (EN50160, IEC61000 series, IEEE1159, IEEE519).

Data can be downloaded from PA9 without interrupting the instrument recording events. The optional removable memory allows internally recorded data to be copied to an external compact flash card using the same technology you see with most digital cameras. Without a computer on site, data can be copied, manually or unattended, from the instrument to external memory cards, increasing the effective instrument memory storage to the size of the memory card used. You can program new configuration setups in the same, simple manner.



On-site trending, analysis and data retrieval without a computer and intelligent downloading

| Power Quality | | |
|----------------------------|---|---------------|
| Model | PA9+ | PA9+ wireless |
| Voltage range | 20 V to 600 V ac or dc | |
| | True RMS through 63rd harmonic | |
| Crest factor | 1500 V peak | |
| | Current 1.4 of full scale at peak | |
| Current | Resolution 0.1% of full scale | |
| | Accuracy ± 0.25% of reading ± 0.05% of range | |
| Voltage/Current connection | V = 4 colour coded pairs of safety banana jacks | |
| | I = 5 Amp miniature circular connector | |
| | Power provided for flexible CTs | |
| Frequency | Fundamental 20 Hz to 70 Hz autoranging | |
| Power from phase A | 90 V to 600 V ac, 100 V to 600 V dc | |
| Trigger events | RMS level current or voltage | |
| | Transient level current or voltage | |
| | Harmonic content current or voltage | |
| Communications | RS232 | |
| | Compact flash card | |
| | Wireless modem | |
| | Wired modem | |

The fundamental objective of any cable fault location system is to provide quick, effective, accurate and safe fault location, resulting in reduced system outages and "Customer Minutes Lost". Megger's PFL systems help you quickly find the location of the underground fault.

PFL Series Cable Fault Locators

The standard system comes as a mobile, compact unit to meet your local requirements. All systems offer the facility to undertake cable testing.

- Cable and fault diagnosis
- Prelocation of cable faults
- Fault conditioning
- Pinpointing locating using acoustic methods

PFL40-1500 and PFL40-2000

Features include:

DC testing to 40 kV

Each instrument uses DC testing to prove the integrity and confirm fault conditions in cable networks with a test voltage up to 40 kV and a current of 25 mA.

The variable output voltage can also be used to test sheaths requiring 5 or 10 kV test voltages. The operator selectable over-current trip levels provide protection to the system under test in the event of the cable under test breaking down.



Fault pre-location

Each system provides a variety of methods you can use to prelocate the fault position.

TDR mode – use a real time trace and a stored trace for viewing simultaneously on the colour display, allowing comparison and difference measurements to be determined. Further, the TDR features auto-ranging, auto distance to fault and operator assist functions that guide the operator through the fault locating process.

A.R.M. (Arc Reflection Method) mode – the system stabilizes a fault by creating a temporary "bridge" to earth. During this condition a standard pulse echo measurement is taken into what is basically a short circuit fault.

ICE (Impulse Current) and Voltage Decay methods – these are also available and are transient analysis methods or prelocation which utilize either a linear coupler or voltage divider.

Fault conditioning

Also use the system to stabilize flashing, unstable or high resistance faults, by employing A.R.M. and Proof/Burn technology.

Proof/Burn

Following a breakdown of the cable under test, you can employ the 40 kV dc output to apply a high current, thus

stabilizing the fault condition. This allows easier and quicker pre-location and pinpointing of the unstable faults.

A.R.M.

Although not widely thought of as a fault condition method, the A.R.M. mode can be used in pinpointing faults.

Acoustic pinpoint fault location

Accurate acoustic pinpoint location of faults is achieved with the powerful 8/16/34 kV (4 kV is optional) surge generator (thumper), which comes in either 1500 Joules or 2000 Joules configurations.

Additional accuracy can be achieved by using the Megger MPP1001 or 1002 acoustic and electromagnetic pinpointer which easily and accurately shows the direction and distance to a fault.

PFL40 features a large, colour screen and intuitive software which assists you in accurately tracing and locating cable faults.

Included accessories

Each PFL40 unit comes complete with:

- High voltage shielded output cable (15 m)
- Supply cable (7.6 m)
- Flexible ground cable (15 m)
- Ground rod
- Interlock shorting plug
- Cable bag and instruction manual

A stand-alone and rack-mounted cable reel assemblies are also available.

Power cable fault location system

PFL22M1500

The PFL20-1500 emphasises portability, featuring all of the basic fault locating tools within one tough and compact package. It is a flexible stand-alone unit with a MTDR mounted in the hinged lid.

All important tools of cable fault locating are consolidated into the package: HV insulation testing to 20 kV, a proof/burn function with output up to 20 kV, 115 mA, a generator offering 8 kV and 16 kV, 1500 Joules surge output and multiple fault pre-location methods including Arc reflection method, Arc reflection plus, Differential arc reflection, Impulse current (current impulse). There is the option for an on-board inverter.



PFL is a big system in a small package.

Van mountable cable fault locator

CFL

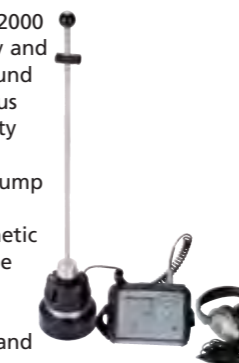
CLF40A has been designed to complement the award winning and successful PFL40A series of portable fault locators. All the control functions are installed in a newly designed remote panel, connected to the HV unit by a flexible umbilical cable. This configuration lends itself to installation into a suitable vehicle by you, your designated contractor or by Megger. Every installation is different, and we show some options to you here. Ask to see our fully equipped demonstration vehicle that shows PFL40A in action. Megger offers a full installation and fitting service throughout Europe. Email us at CFL@Megger.com for more details.



Cable fault pin-pointer

MPP2000

The Megger Pinpointer model MPP2000 is specifically designed to accurately and quickly pinpoint faults in underground cable networks. Easy-to-access menus provide advanced users the flexibility and features they desire. MPP2000 detects the acoustic discharge or thump and measures the acoustic signal strength as well as the electromagnetic signal strength, it measures the time delay between acoustic and electromagnetic signals giving an indication of the direction to fault and calculates relative distance to fault.



Portable cable locators

L1050, L1070, L1071 Accutrace, and Cable Route Tracer

These instruments are used to locate the exact route and depth of metallic cables. The instruments' capabilities are enhanced by offering both passive and active modes. For ease of use, and improved efficiency, the instruments can be either inductive or conductively coupled.

- Multiple output frequencies*
- Variable tx output power level*
- Peak and null detection*
- Push button depth measurement*

* dependent on model.



Capable of locating long or short ranges, inductive or conductive, active or passive, the L1070 delivers quick and accurate results with a user-friendly interface

Single phase time domain reflectometer

MTDR100

The MTDR100 has a range of 100 m to 55 km is designed to rapidly and accurately pre-locate faults in power cable networks. Operation is via a single job-dial and an easy-to-use menu with pull-downs. All the operator has to do is select the operation and click to confirm.



On-board memory and file manager is supported by the ability to transfer traces to or from the unit via USB. The MTDR100 is available as part of a Megger CFL or PFL system and as a stand-alone unit, housed in a rugged field proven case.

Single channel LV cable fault locator

TDR1000/2P

A state of the art TDR capable of identifying and locating faults on metallic cables. The TDR1000 is suitable for use on both dead or live cables without a blocking filter, up to CATIII 300 V phase-to-earth. It has been recently modified to improve performance still further.



It takes less time to train users on TDR1000/P, as each key has a dedicated function, such as cursor left and right, velocity factor, range etc

Dual channel LV cable fault locator

TDR2000/2P

A state of the art mono or colour display two-channel TDR. capable of identifying and locating faults on metallic cables. The TDR2000P is suitable for use on dead or live cables without a blocking filter, up to CATIII 300 V phase-to-earth with a range of up to 20 km. The TDR has an internal memory and the TraceMaster software supplied allows storage and analysis of waveforms on a PC.



TDR2000/2P can identify and locate a wide range of faults on metallic cables from a few metres to 20 km depending on cable type

Voltage detectors and phasing testers

DETEX

The Detex range of testers is ideal for determining the presence of voltage, be it phase to earth or phase to phase. A verification unit is available to ensure safe operation. Voltage detectors are suitable for voltages from 2.3 kV to 550 kV. Models are available with electronic LED and audible indication or neon indication. Phasing testers are available from 2.4 kV to 69 kV with a choice of analogue or neon voltage indication.



DETEX Voltage detectors are available in seven models that cover a range from distribution class to transmission line voltages up to 550 kV

Electrical contractors throughout the world depend on hand-held test equipment to ensure installations are safe and function correctly. Count on Megger to produce tough machines that are designed to surpass the requirements of wiring regulations.

Multimeters

AVO300 and AVO310

Tough and simple multimeters offering a large single parameter display and auto-ranging.

PICTURE TO COME

AVO410

A CAT IV 600 V multimeter that offers true rms on a.c. functions, it is auto ranging with the option of manual range selection. AVO410 has data hold and max and min measurements. It has a capacitance range to 600 μ F and frequency to 60 MHz.



Clampmeters

DCM series

A choice of 3 clamp meters and a fork multimeter for use during the installation, maintenance and checking of electrical systems and equipment.



DCM clampmeters are ideal for use in the installation, maintenance, monitoring or checking of electrical systems and equipment

MMC850

MMC850 offers a unique solution to current measurement in multi-core cables, without the need to split cores. Simply clamp the MMC850 to a multicore cable and read the current flowing.



Not shown on selection chart – please ask for datasheet.

Clampmeters and fork multimeter

| Model | | DCM310 | DCM320 | DCM330 | DCM340 |
|------------------------|---|--------|--------|--------|--------|
| Safety rating | CAT III 600V | ■ | ■ | | ■ |
| | CAT III 1000V | | | ■ | |
| | CAT IV 600V | | | ■ | |
| DC and AC volts | 0 - 200.0 V range, 200.0 - 600.0 V accuracy | ■ | ■ | | |
| Continuity | On < 20 Ω , Off > 50 Ω , response time < 50ms | ■ | ■ | | |
| Resistance | Range 200.0 Ω \pm 1%, Accuracy \pm 5% digits | ■ | ■ | ■ | |
| | Range 0 - 400.0 Ω , Accuracy \pm 1% \pm 3 digits | | | | ■ |
| | 35mm diameter | | | | ■ |
| Maximum conductor size | 27 mm diameter | ■ | ■ | | |
| | 16 mm diameter | | | ■ | |
| Power requirement | 1 x PP3 9 V alkaline battery | ■ | | | ■ |
| | 2 x AAA 1.5 A alkaline battery | | ■ | ■ | |
| AC current range | 0-19.99 A | ■ | | | |
| | 0-40.00 A | | ■ | | |
| | 0-60.0 A | | | | ■ |
| | 20.0-199.9 A | ■ | | | |
| | 40.00-200.0 A | | ■ | | |
| | 60.0 - 400.0 A | | | | ■ |
| | 0 - 200.0 A | | | ■ | |
| | 200-400 A | ■ | ■ | | |
| | 400 - 600 A | | | | ■ |
| DC current range | 0 - 60.0A | | | | ■ |
| | 60.0 - 400.0A | | | | ■ |
| | 400 - 600 A | | | | ■ |

Multifunction tester

MFT1700 series

Offering insulation resistance, continuity, earth loop impedance, RCD and earth electrode testing in one tester. Ideal for installation testing and periodic inspection, the top of the range model offers Bluetooth connectivity for paperless certification.



Earth loop impedance testers

LT300

A high current loop tester that is ideal for industrial applications with 50 V to 500 V and 16 Hz to 400 Hz operational range.



LTW300 Series

2-wire non-tripping loop testers that makes loop impedance testing simple where there is no neutral present.

LTW425

2-wire non-tripping loop tester that makes measurement close to the source of supply possible as it measure loop impedance down to 3 decimal places.



The Model 8 Mk 7 being manufactured here is a direct descendant of MacAdie's original design

Portable appliances testing

A range of testers are offered for in-service inspection and testing of electrical equipment in accordance with the IEE code of practice.

PAT400 series

Offers a sophisticated tester with on-board asset database for high speed testing, and data download for certification.



Insulation and continuity testers

MIT400 series

Megger's most sophisticated series of less than 1 kV insulation and continuity testers. Capable of performing many of the diagnostic tests found on our 5 kV insulation testers MIT400 offers CAT IV 600 V safety. See page 7.

MIT300 series

A CATIV 300 V insulation and continuity tester that comes in five version from basic tough 2 voltage digital tester to a downloading 3 voltage tester, there is also an analogue 3 voltage tester. See page 7.



MIT300 is ergonomically designed in landscape format to suit electrical contractors

MIT200 series

A light-weight, CATIII 600 V insulation and continuity tester ideal for the maintenance engineer whose on the move. See page 7.



MIT200 is an economical tester with all the essential functions you need

Test and measurement software



Acceptance and Maintenance test data management software

PowerDB

A powerful software package that offers a revolutionary approach to managing electric utility and industrial electrical testing data. The software is designed from a ground-up approach, and is easily the most advanced package on the market. It employs over 160 industry standard test forms that have been developed and used by industry specialists during the last 20 years.

The software package provides data management for electric utility companies, electrical testing services acceptance jobs, or maintenance testing jobs. Data entry, storage and creating reports are all features of the software. In a single step, PowerDB is able to quickly create entire test documentation packages that include test reports, comment and deficiency summaries, table of contents and field service reports. In addition, users are able to use this flexible software to define data forms and customize them to different device types.

PowerDB's test forms are designed to be used with each of the following Centres:

- Batteries
- Cables
- Circuit Breakers
- Coordination Data
- Disconnects
- Generators
- Ground Fault Tests
- Ground Mat/Grid Tests
- Instrument Transformers
- Power Transformers
- Insulation Fluids
- Loadbreak Switches
- Motor Control
- Power Factor Tests
- Relays
- Switchboards
- Transfer Switches
- Wattour Meters
- Transducers

Asset management system

Easier Management of Test Data

This easy-to operate software offers a straightforward approach to data management. The first basic step in creating this user-friendly package was to make test data entry screens and printed forms identical. Users will appreciate that what they see on the screen is what they will see in the printed version. PowerDB also simplifies testing and data management by allowing users to deliver reports electronically using e-mail, CD-ROM, web server and PDF files.



The software will also execute several tasks for the user, including equation calculations, temperature, correction factors and charting.

PowerDB helps predict possible equipment

failure by trending previous results, which can be stored using PowerDB or imported from other software. This makes transitions from other software to PowerDB easy, and users can be prepared for possible problems with equipment. The industry standard test form is not always what a company needs, and because of that, the PowerDB software allows the user to customize forms. With a drag and drop feature anyone, even those without database experience, can create a form simply by dragging and dropping in tables, text boxes, images, charts and more, to create a customized form. And, with VBScript, calculations can be defined, tables looked up, and it can even interact with other applications. One time definition of common items can be used to put logos, headers and footers on every page or in many multiple forms. One change will automatically update every form the common item is used in.

There are three ways to document testing using the PowerDB software.

First, the software can communicate directly with test and measurement equipment produced by Megger. This allows these products to enter the results



directly into data fields. Second, forms can be filled in using other applications, including Megger's Advanced Visual Test Software, entering data into the fields using information stored

in the other applications. Finally, data fields can be filled in using manual entry. This allows the user to enter the exact information that is desired.

Built-in Report Flexibility

PowerDB can create reports in one step, with customizable sorting of the order of test forms. Forms can be removed, and page numbering will be automatically adjusted. In a

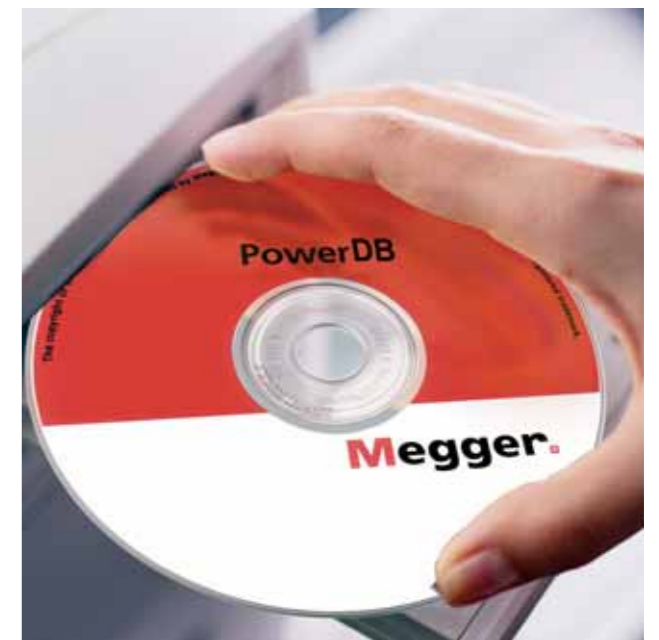


single print job, supplemental reports can also be printed at the same time as the primary report. The supplemental reports, including comment and deficiency summary reports, open up the data and information for all of the equipment tested on one job. Finally, all of the information can be generated for the on-demand world using the optional PowerDB Web server. All of the user's important information is published to the Web and can be accessed from anywhere in the world.

Simplifying the Compilation and Reporting Process

The new PowerDB software package eliminates many common paperwork and recording problems. With the software, the number of man-hours devoted to preparing reports will be minimal. The user can customize the reports to be what a job requires but will not have to write the report, which is automatically generated by the software. Included in the reports are a table of contents, data sheets, as well as comment and deficiency summaries. PowerDB even comes with a built-in spell check.

Automatically generated professional reports means that a testing company, for instance, is able to complete jobs faster and in a more efficient manner. PowerDB is



Computerized Maintenance Management System Support

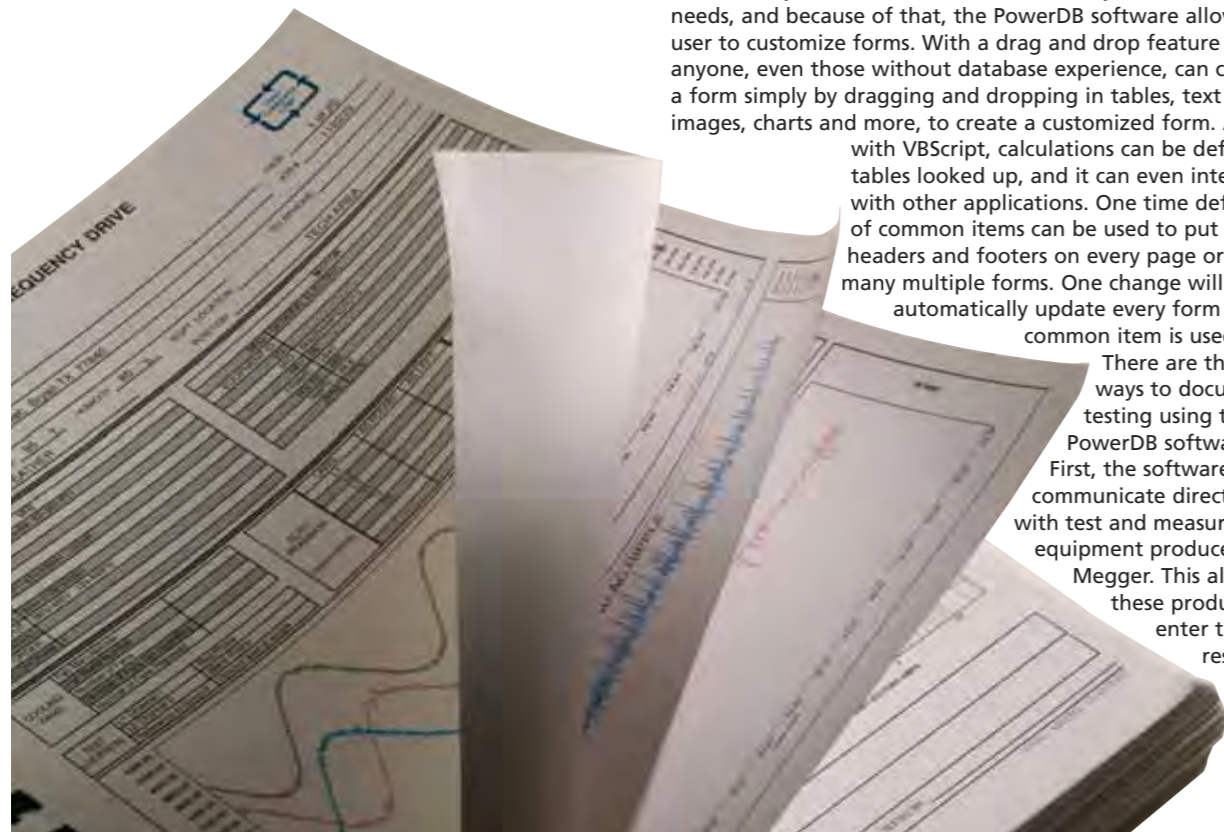
Many electrical utilities and other company operations have invested in sophisticated CMMS systems, such as Digital Inspection's Cascade and MRO Software's MAXIMO. However, due to test instrument specific software packages and handwritten test results, these firms often struggle to get test data into their systems. One electric utility even referred to getting data into the CMMS as 'feeding the monster'. PowerDB's speciality is 'feeding the monster'!

PowerDB allows you to link easily with the CMMS system so that the system can pre-populate the PowerDB equipment database, send PowerDB all work orders, add forms based on the job plans, and even return the measurement points, obtained from a multitude of test sets, back to the CMMS system.

Furthermore, Megger will work directly with your CMMS personnel to integrate your data into your internal CMMS system.

well-suited for technicians who prefer to spend a minimum amount of time writing reports and want a more concise way to process data.

Electronic records of test data can create a couple of different problems for companies and utilities. While many electronic records are hard to locate due to the vast amount of records kept on one system PowerDB makes it easier. By using its relational database it is much easier to find present and past records. And, because it has multiple safe guards, PowerDB prevents lost data. By saving documents that are in progress to multiple places, the problem of lost data is eliminated. PowerDB also synchronizes the date to several machines, meaning that a single crash does not create a costly loss of data.



| | | Asset management system | | |
|--------------|--------------------------------|-------------------------|--------------|----------------------|
| | | PowerDB OnBoard | PowerDB lite | PowerDB full version |
| Product type | Software | | ■ | ■ |
| | Firmware | ■ | | |
| Cost options | Free with selected instruments | ■ | ■ | |
| | Separate purchase | | | ■ |