

TDSNT

Cable test and diagnosis system in one



- **Two proven voltage wave shapes in one device**
- **Standard compliant VLF cable testing with accompanying PD diagnosis**
- **Non-destructive PD diagnosis by means of proven DAC voltage**
- **50 Hz Slope Technology for a direct comparison with the power frequency**

DESCRIPTION

THE NEXT GENERATION IN CABLE DIAGNOSIS

Network operators can now get faster and significantly more reliable information about the quality and the condition of their cables. This is made possible thanks to the brand-new 50 Hz Slope Technology. For the first time, it has become possible to immediately locate faults in underground cables during the actual PD measurement.

With the 50 Hz Slope Technology for the first time worldwide a withstand test with VLF cosine-rectangular voltage (VLF CR) and PD diagnosis with damped alternating voltage (DAC) is combined in one unit. This allows an efficient and integrated solution for precise inventory of the network infrastructure. The important fact here is that the PD measurement data, gained with the VLF CR or with the DAC test voltage, can be compared directly with the 50 / 60 Hz network voltage. This facilitates reliable decision making.

TDS NT consists of a multifunctional, compact voltage source and a PD detector. It can be used to test cables according to the international standards (e.g. IEC 60502-2 and IEEE 400.2) with VLF-CR. In addition, a PD diagnosis using the new 50 Hz Slope Technology, can be performed simultaneously with the help of the PD detector. Alternatively, the TDS NT can also be used for PD diagnosis with the proven damped AC voltage (DAC).

In practice, the PD diagnosis has been established nationally and internationally as an effective method of measurement. It is especially useful for commissioning testing, as it is the only way to check reliably the quality of workmanship of the accessories.



TDS 40 together with the PD detector PDS 60 in operation to test the quality of workmanship on a newly installed cable.

Two proven methods in one device

SebaKMT is widely known for its powerful VLF test systems. The high testing capability is achieved through the patented energy recovery principle. Now, in addition to the VLF waveform, which is ideal for commissioning tests, there is also the option of generating a DAC voltage. The DAC voltage has proven to be the ideal voltage waveform for a non-destructive PD diagnosis.

THE PRINCIPLE

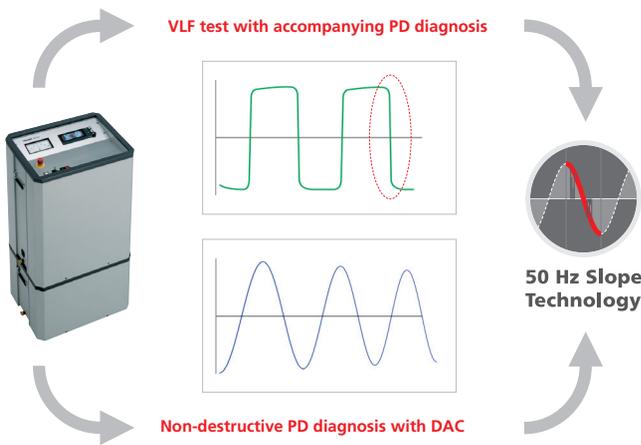
For both voltage waveforms, these two fundamental conditions are present: the **charging phase** and the **resonance phase**. During the charging phase the test object is charged to the desired

voltage, or the voltage losses of the cable during measurement are recharged. During the resonance phase the TDS and the cable form a resonant circuit whose natural resonance frequency is determined by the fixed inductance and the support capacitor of the power source, and the capacitance of the test object. The support capacitor has been designed in such a way that the resonance frequency will always fall in a specific frequency window comparable to that of the network frequency - thus a 50 Hz Slope is attained for every test object.

THE UNIQUE "ALL-IN-ONE" SOLUTION

The new TDS NT series offers the highest degree of flexibility in the area of cable testing and diagnosis.

The TDS NT consists of a multifunctional, compact voltage source and a modern PD detector. The TDS test voltage source can be used for both simple VLF tests or for meaningful commissioning tests with accompanying PD diagnosis in connection with the PD



detector.

In addition to the proven **VLF and DAC test voltage** the TDS can also be used for **DC tests** and **sheath tests** in compliance with IEC 60229. Furthermore, in combination with the step voltage sensor ESG NT, it can also be used for precise pinpointing of sheath faults.

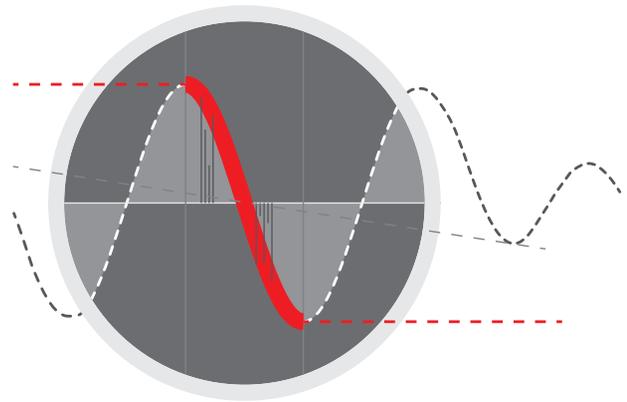
BY USERS FOR USERS

Your partner with long-lasting experience in PD diagnosis

The new PD detector PDS 60 combines many years of field experience, customer demands and innovations in one device. That makes it possible to carry out a VLF test along with a PD diagnosis. This not only increases the reliability of the withstand-test, since partial discharges are simultaneously recorded, but is also cost-effective. If a PD-free cable is detected during the withstand-test, a PD diagnosis for quality control is no longer required.

THE 50 HZ SLOPE TECHNOLOGY

Both the VLF voltage and the DAC voltage work according to the principle of 50 Hz Slope Technology. This is particularly important for PD diagnosis, since reliable evaluation of the measured results requires a direct comparability with the power frequency. It is widely known that PD characteristics change in case of large frequency differences, making reliable evaluation impossible. Our 50 Hz Slope Technology ensures comparability for both voltage wave shapes.



The above diagram shows a typical example of how PD measurement is carried out during the slope of the applied voltage. The steepness of the VLF CR and DAC slopes in comparison to the 0.1 Hz sine wave can be clearly seen.

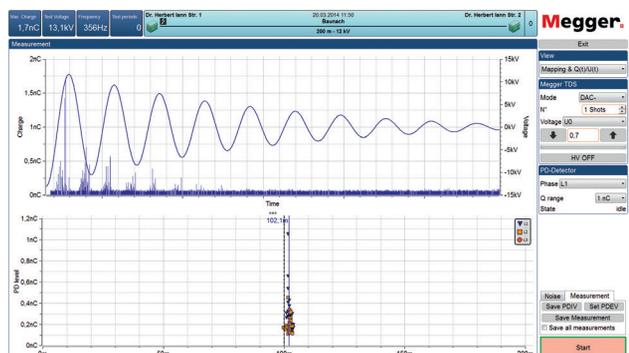
It is precisely this rise in voltage which is so important for the PD inception voltage. Therefore, the 0.1 Hz sine wave test voltage cannot be directly compared to the 50 / 60 Hz power frequency and critical partial discharge defects are therefore not always reliably detected.

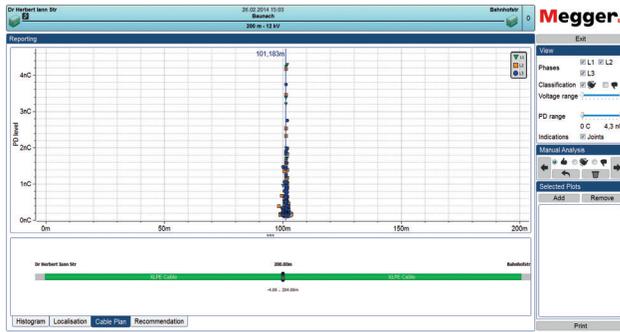
USER-FRIENDLY SOFTWARE

The focus of the new technology is on the user

The operating software is designed so that any user will come to grips with it immediately.

- Integrated database, simplified searching, browsing and administration of measurement and cable data.
- Improved fully automatic calibration with display of signal to noise ratio.
- "Live" PD mapping: The PD evaluation algorithm enables a reliable automatic detection and precise location of partial discharges (PD mapping) whilst the measurement is taking place. Time-consuming post-processing of the measurement data is no longer needed, maintenance resources can be directly scheduled.





(See figure 1)

- Reporting by mouse click: immediately after the measurement has been completed, the operator can create a report with a clearly structured summary of the most important measurement data with a simple mouse click. (See figure 2)

TECHNICAL DATA TDS 40 / 60

Special features:

- Thanks to the high test capacitance, standard compliant 0.1 Hz VLF tests on long cables or multiple phases in parallel are guaranteed.
- This allows considerable time savings.
- Portable and easy to transport thanks to two-piece design.
- The integrated leakage measurement gives a first indication about the condition of the cable.
- Highest safety through integrated discharge unit, earth-loop-monitoring and breakdown detection.

| Variant | TDS 40 | TDS 60 | |
|--|---|---|---|
| Output voltage | VLF DAC DC | 3 ... 40 kV _{RMS} 3 ... 40 kV _{peak} 3 ... ±40 kV | 3 ... 60 kV _{RMS} 3 ... 60 kV _{peak} 3 ... ±60 kV |
| Output current | 7 mA | 5 mA | |
| Leakage current measurement | 0 ... 7 mA, resolution 10 µA | 0 ... 5 mA, resolution 10 µA | |
| Frequency | VLF DAC | 0.1 Hz 50 to 500 Hz | |
| Testable cable capacitance VLF | | | |
| Basic version | 2.4 µF / 40 kV _{RMS} @ 0.1 Hz | 1 µF / 60 kV _{RMS} @ 0.1 Hz | |
| Plus version | 4.8 µF / 40 kV _{RMS} @ 0.1 Hz | 2 µF / 60 kV _{RMS} @ 0.1 Hz | |
| Testable cable capacitance DAC | 5 µF / 40 kV _{peak} 10 µF max. | 2 µF / 60 kV _{peak} 10 µF max. | |
| Sheath test / fault pinpointing | Testing: 3 ... 10 kV Pinpointing: 3 ... 10 kV, pulse 1:3 / 1:5 / 1:9 | | |
| Safety devices | Breakdown detection, integrated discharge unit, earth loop monitoring | | |
| Power supply | 230 V, 50/60 Hz, 500 VA 120 V, 60 Hz, 500 VA | | |
| Logging | Yes | | |
| Temperature | Operation Storage | -25 °C ... +55 °C -40 °C ... +70 °C | |
| Relative humidity | 93% / 30 °C (non-condensing) | 93% / 30 °C to 50 kV (non-condensing) 70% / 30 °C from 50 kV to 60 kV (non-condensing) | |
| Protection class | IP 20 | | |
| Weight (depends on options fitted) | Approx. 55 kg + 48 kg | Approx. 85 kg + 48 kg | |
| Dimensions W x H x D, divided in two devices | 550 x 1100 x 420 mm | | 550 x 1100 x 420 mm |

TECHNICAL DATA PD DETECTOR PDS 60

Special features of the evaluation software:

- Powerful database. Simplified searching, browsing and administration of measurement and cable data.
- Fully automatic calibration with the option of calibrating according to cable length
- or propagation velocity.
- Clear display of measurement results and live PD localization.
A time-consuming post-processing of the measured data is no longer necessary.
- Report generation by mouse click.

| PD detector PDS 60 | | |
|-------------------------------------|--|--|
| Voltage | Operation Type | max. 60 kV _{RMS} VLF CR or DAC |
| Capacity of HV coupling capacitor | | 25 nF |
| Sensitivity range | | 2 pC ... 100 nC |
| Resolution | | ± 0.1 pC |
| PD self-noise level | | < 2 pC |
| PD impulse repetition rate | | 100 kHz |
| PD localization | Measuring range Propagation velocity v/2 Sampling rate Bandwidth Precision Resolution | 0 ... 16.000 m / v/2= 80 m/μs 5 ... 120 m/μs 125 MHz (8 ns) 3 / 25 MHz (switchable) 1% of the cable length ±0.1 pC / ±0.1 m |
| Filter | | Analog and digital |
| Power supply | | 24 V via TDS test system |
| Temperature | Operation Storage | -20 °C ... +55 °C -40 °C ... +70 °C |
| Relative humidity | | 93 % / 30 °C (non-condensing) |
| Weight | HV filter/ coupler PD detector | 25 kg 6 kg |
| Dimensions (W x D x H) | | 40 x 78 x 54 cm |
| PD calibrator (IEC 60270-compliant) | Measuring range Power supply | 200 pC ... 20 nC 9 V block battery |
| Software | | EasyGo principle, integrated cable database, fully automatic evaluation |

| Product | Order no. |
|---|-----------|
| TDS NT 40-B Set Consists of TDS 40 Basic, PDS 60, PD calibrator, laptop and SW licence with 3 dongles | 1004526 |
| TDS NT 40-P Set Consists of TDS 40 Plus, PDS 60, PD calibrator, laptop and SW licence with 3 dongles | 1004527 |
| TDS NT 60-B Set Consists of TDS 60 Basic, PDS 60, PD calibrator, laptop and SW licence with 3 dongles | 1004528 |
| TDS NT 60-P Set Consists of TDS 60 Plus, PDS 60, PD calibrator, laptop and SW licence with 3 dongles | 1004529 |
| TDS 40 Basic | 138315765 |
| TDS 40 Plus | 138315795 |
| TDS 60 Basic | 138315405 |
| TDS 60 Plus | 138315410 |
| PDS 60 | 1003380 |
| PD calibrator | 90007366 |
| SW licence with 3 dongles | 90011937 |
| Optional accessories | |
| Additional SW licence (1 dongle) | 90011938 |
| Mounting bracket PDS 60 | 2003886 |
| Diagnostic connection set | 890017909 |
| PD-free test adapter PD PA-MC-12 | 820016301 |
| PD-free test adapter PD PA-MC-16 | 820016302 |
| External safety device | 128309600 |
| Laptop platform | 2005346 |
| PDS 60 HV connection cable 1.5 m | 138316094 |
| PDS 60 HV connection cable 3 m | 2005655 |
| PDS 60 HV connection cable 5 m | 890010915 |
| PDS 60 HV connection cable 10 m | 890023555 |
| TDS 40/60 HV connection cable 10 m | 2005656 |
| Upgrade VLF CR-40B/P to TDS 40-B/P | 1005138 |
| Upgrade VLF CR-60B/P to TDS 40-B/P | 1005140 |

UK
Archcliffe Road Dover
CT17 9EN England
T +44 (0) 1304 502101
F +44 (0) 1304 207342
UKsales@megger.com

UNITED STATES
4271 Bronze Way
Dallas TX 75237-1019 USA
T 800 723 2861 (USA only)
T +1 214 333 3201
F +1 214 331 7399
USsales@megger.com

OTHER TECHNICAL SALES OFFICES
Valley Forge USA, College Station USA,
Sydney AUSTRALIA, Danderyd SWEDEN,
Ontario CANADA, Trappes FRANCE,
Oberursel GERMANY, Aargau SWITZERLAND,
Kingdom of BAHRAIN, Mumbai INDIA,
Johannesburg SOUTH AFRICA, Chonburi THAILAND

CERTIFICATION ISO
Registered to ISO 9001:2008 Cert. no. Q 09290
Registered to ISO 14001:2004 Cert. no. EMS 61597
TDSNT_DS_en_V01
www.megger.com
Megger is a registered trademark