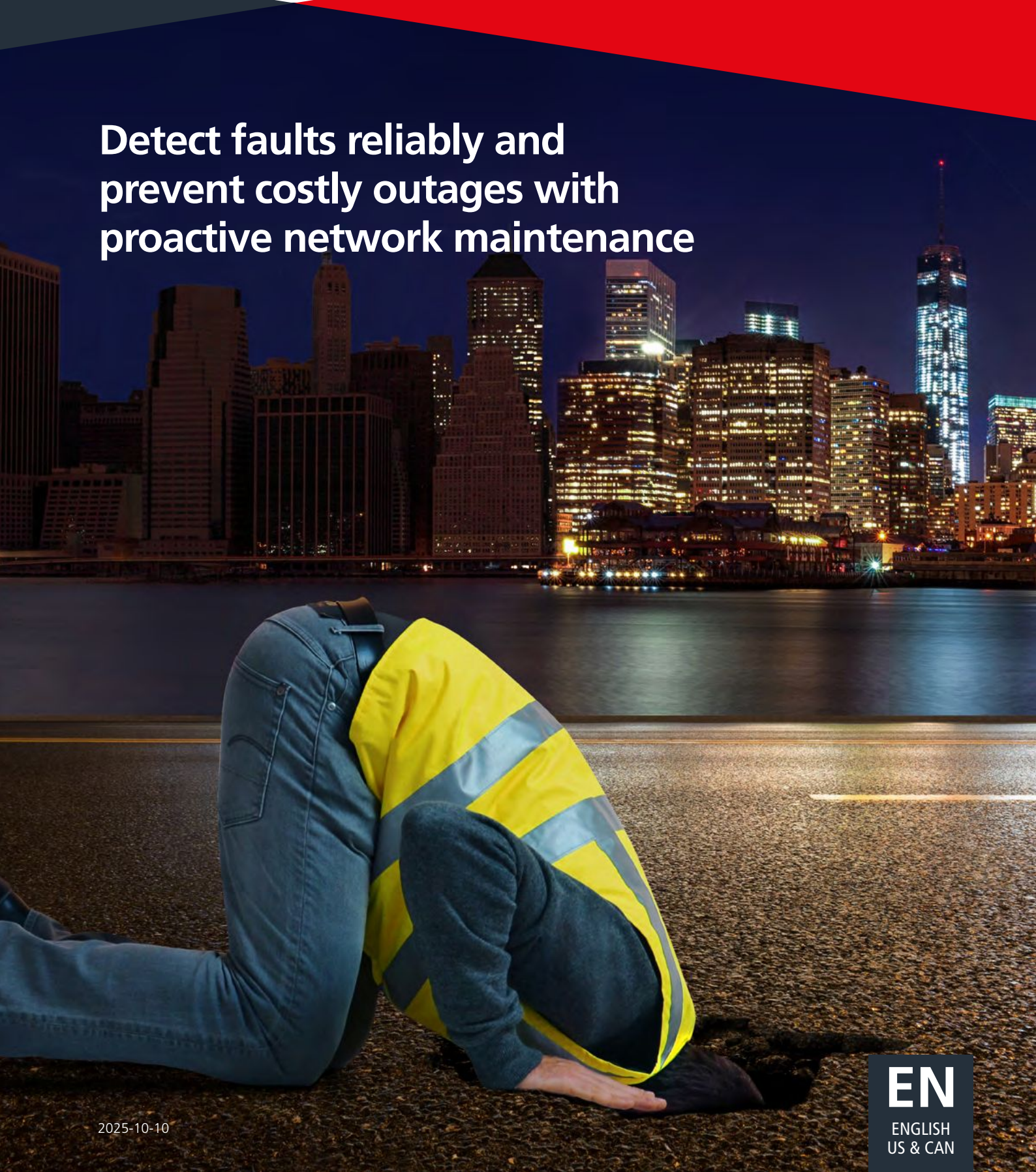
Testing, diagnostics and fault location on power cables

Megger

Detect faults reliably and prevent costly outages with proactive network maintenance



2025-10-10

EN
ENGLISH
US & CAN

We are setting the standards

We are the world's leading provider of measurement technology for cable fault location, testing, and diagnostics. Our solutions combine maximum safety, accuracy, innovative technology, and outstanding user-friendliness to ensure the highest reliability of your cable networks and systems. They detect faults that other devices cannot, helping you increase supply security and reduce costs.

Commissioning testing and condition assessment of MV cables

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CABLE TESTING

Cable testing today means VLF testing. As the inventor of VLF technology in 1986, Megger has over four decades of experience – more than anyone in the industry. Unlike the now obsolete DC testing, which is no longer recognised for extruded cables anywhere, VLF testing at 0.1 Hz is fully established in international standards such as VDE, CENELEC, IEC and IEEE.

Megger's solutions support all available VLF waveforms, for example sinewave as an entry-level solution and also the very powerful cosine-rectangular waveform that enables standard-compliant testing of long cables or three paralleled cables at 0.1 Hz. Our test units are designed for safety, performance, and ease of use, featuring ISO9241-optimised graphical interfaces that keep operation straightforward and focused on what really matters in the field.

With proven technology, multiple waveform options, and user-friendly design, Megger provides future-proof solutions for today's cable testing challenges.

12

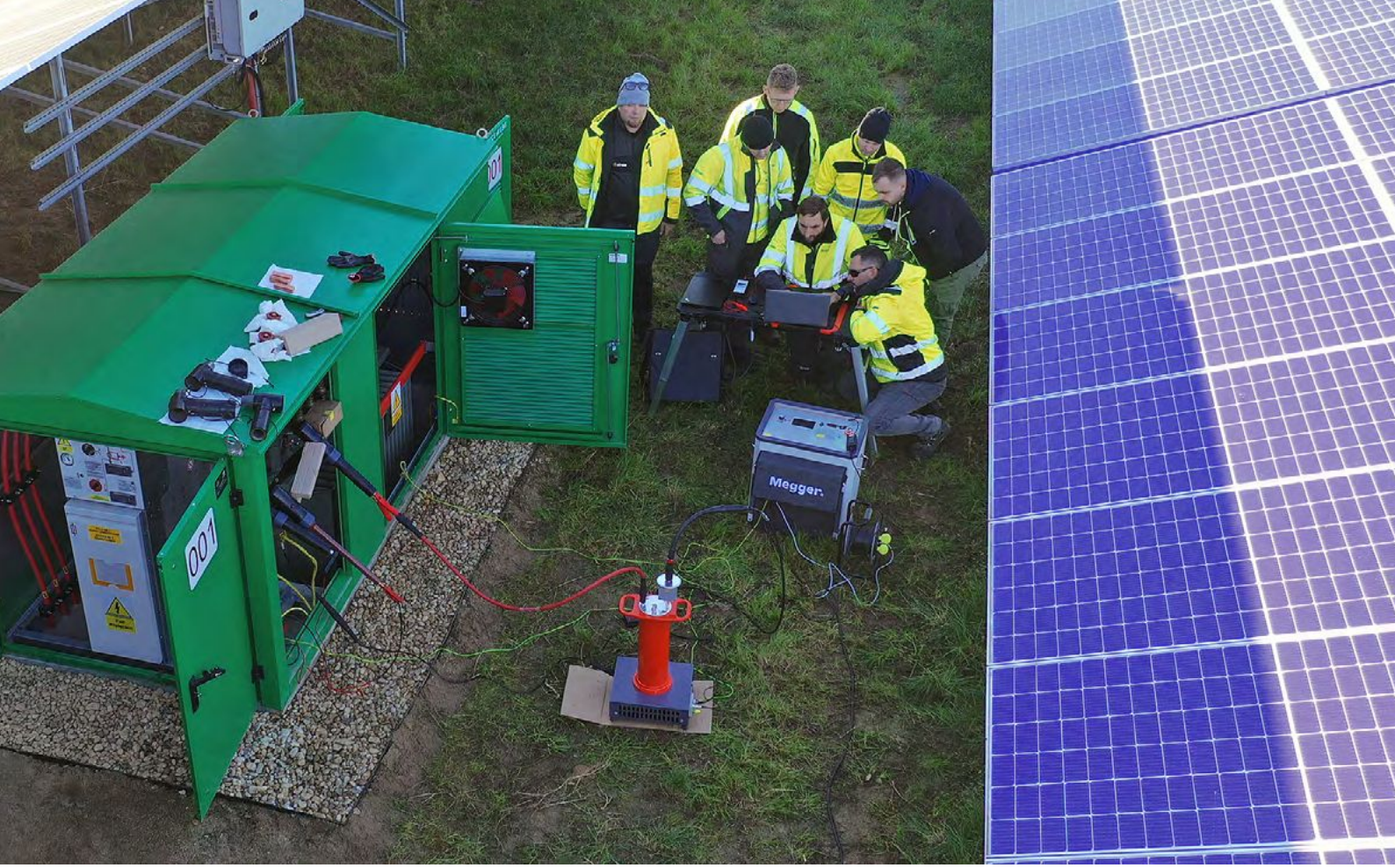
VLF SINE 37 kV / 45 kV / 62 kV

Commissioning testing and condition analysis of medium voltage cables

FEATURES

- **Cable withstand testing, cable diagnostics, sheath testing and fault pinpointing in one device**
- **Smallest, lightest and most powerful unit in its class**
- **Unmatched user-experience thanks to large colour-touch display and advanced user interface**
- **Precise automatic result interpretation as per latest IEEE 400.2 standard**

Very Low Frequency test sets are used to verify the dielectric integrity of the cable under test, be it for commissioning/ acceptance testing or for maintenance testing. VLF Sineoidal and VLF Cosine Rectangular (CR) are the two most common and standardized wave shapes used for VLF testing. Whereas VLF Sineoidal test sets can be used for testing of short cable lengths, the VLF CR units can test long cables or multiple phases in parallel, and this with almost same dimensions and weight. Megger is the only provider which can supply both technologies and even a combination of both technologies (TDM series). Additional testing capabilities such as Tan Delta (internal or external) and PD measurement can also be added to gain more information about the insulation condition of medium voltage cables. All VLF test units from Megger can also be used for sheath testing and sheath fault pin-pointing.



TECHNICAL DATA	VLF SINE 37 kV	VLF SINE 45 kV	VLF SINE 62 kV
VLF test voltage	0 to 37 kV_{peak}	0 to 45 kV_{peak}	0 to 62 kV_{peak}
Frequency	0.01 to 0.1 Hz	0.01 to 0.1 Hz	0.01 to 0.1 Hz
Wave form	Sine	Sine	Sine
Testing cable capacitance @U_{max}	1.6 µF @ 0.1 Hz 10 µF max*	0.6 µF @ 0.1 Hz 10 µF max*	1 µF @ 0.1 Hz 10 µF max*
Optional TD measurement	internal	internal	internal
DC test voltage	0 to ± 37 kV	0 to ± 45 kV	0 to ± 62 kV
Sheath testing	0 to 5 / 10 / 20 kV	0 to 5 / 10 / 20 kV	0 to 5 / 10 / 20 kV
Sheath pinpointing test voltage	0 to 5 / 10 / 20 kV	0 to 5 / 10 / 20 kV	0 to 5 / 10 / 20 kV
Pulse rate	0.5:1, 1:2, 1:3, 1:4, 1.5:0.5	0.5:1, 1:2, 1:3, 1:4, 1.5:0.5	0.5:1, 1:2, 1:3, 1:4, 1.5:0.5
Output current	0 to 37 mA	0 to 20 mA	0 to 40 mA
Dimension (W x D x H)	529 x 478 x 380 mm	544 x 520 x 416 mm	544 x 520 x 416 mm
Weight	29 kg	50 kg	60 kg

*at reduced voltage and/or frequency

VLF SINE SERIES Datasheets

PDS 62-SIN Datasheet

RECOMMENDED ACCESSORIES
tan delta diagnostics (internal or external)
Partial discharge diagnostics with PDS 62-SIN
Transport cases (offshore/ onshore)
ESG NT2 for sheath fault pinpointing

TDS 40/60-Plus

High power test systems for medium voltage cables

FEATURES

- **VLF test, DC test and sheath test in one device**
- **High test capacity for standard-compliant testing of all three phases at the same time**
- **Integrated discharge system and breakdown detection**
- **Leakage current measurements for evaluation of the cable insulation quality**
- **Expendable to a full PD diagnostic system via the PDS 60 PD coupler (TDS 40/60)**
- **Optional: Transport case available for offshore use**

VLF CR (cosine-rectangular) is a Megger patented waveform approved by IEC & IEEE. Portable VLF CR models can test high capacitances up to 5 µF @ 0.1 Hz, and are suitable for testing longer cables at standardized frequency or simultaneous testing of all three phases. Solutions are available from portable units to powerful systems with 25 µF testing capacity at maximum test voltage.

TECHNICAL DATA	TDS 40-P	TDS 60-P
VLF test voltage	0 to 40 kV_{RMS}	0 to 60 kV_{RMS}
Frequency	0.1 Hz	0.1 Hz
Wave form	CR	CR
Testing cable capacitance @U_{max}	4.8 µF	2 µF (TDS 60-P) 6.5 µF (HP model)
DC test voltage	0 to 40 kV	0 to 60 kV
Sheath testing	2 to 10 kV	2 to 10 kV
Sheath pinpointing Test voltage	2 to 10 kV	2 to 10 kV
Pulse rate	1:3 / 1:4 / 1:9	1:3 / 1:4 / 1:9
Output current measurement	0 to 7 mA	0 to 5 mA / 0 to 16.7 mA (HP)
Dimension (W x D x H)	550 x 1100 x 420 mm (TDS 40/60-P) 1350 x 1250 x 1100 mm (HP model)	
Weight	55 kg + 48 kg	85 kg + 48 kg (TDS 60-P) 380 kg (HP model)
Portable	Yes	Yes (TDS 60-P) Van mounted (HP model)

RECOMMENDED ACCESSORIES
Partial discharge diagnostics with PDS 60
Transport cases (offshore/ onshore)
ESG NT2 for sheath fault pinpointing

TDS 40/60-Plus

The portable VLF CR system TDS 40/60 is a high power test set that allows standard compliant testing at 0.1Hz. Aside from cable and sheath testing, the test systems can also be used for precise pinpointing of sheath faults.

VLF CR SERIES
Datasheet

FEATURES

- **High test capacity at standardized frequency of 0.1 Hz**
- **Portable thanks to two part design**
- **Can be expanded to a PD diagnostic system with the PD coupler PDS 60 (TDS 40/60)**
- **Integrated discharge system**

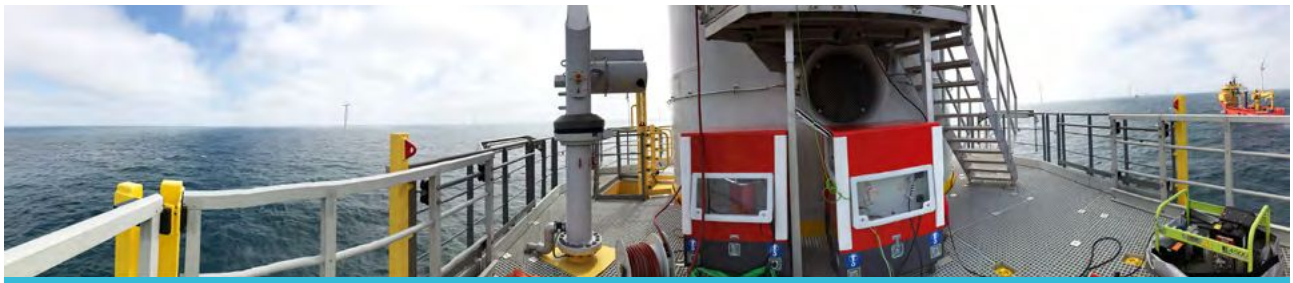
VLF CR 60-HP

The VLF CR system VLF CR 60-HP is a high power test set that allows standard compliant testing at 0.1 Hz of very long cables (up to 33 km at maximum test voltage). This unit is ideally suited, if installed in a container, for offshore wind farm testing (36 kV class up to 3 U_0).

VLF CR 60-HP
Datasheet

FEATURES

- **High test capacity at standardized frequency of 0.1 Hz**
- **Can test up to 33 km cable at maximum output voltage**
- **Van or container mounted**
- **Integrated discharge system**



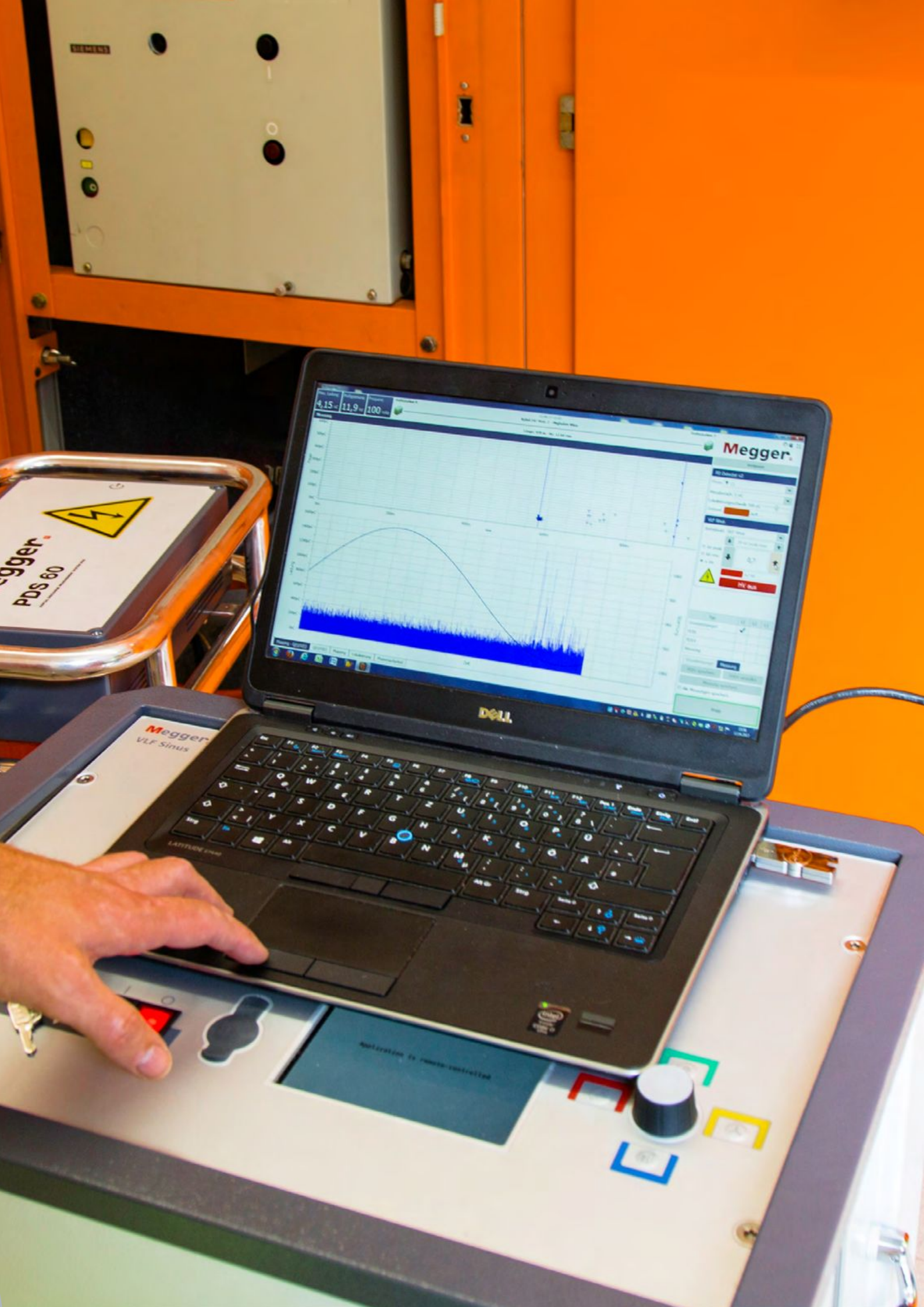
For customised solutions like VLF test sets with 25 µF @ 60 kV_{RMS} please go to page 66/67

CABLE DIAGNOSTICS

The main goal of Megger diagnostic technologies is to avoid service interruptions during network operation in medium voltage, high voltage and extra high voltage cable systems. Service interruptions are primarily caused by damage to the cable resulting from poor cable laying, workmanship failures on accessories and age-related deterioration in joints, terminations and cable insulation.

With Megger diagnostic systems, it is possible to verify the quality of a new cable system and assess its condition before a cable is put into operation. Potential issues and damage caused by poor installation can be detected and corrected at the commissioning stage, while all components are still accessible. This avoids future network failures and the subsequent costs that would otherwise be incurred.

Another way to save costs is to efficiently replace cables based on their condition. For critical cables that are already in operation, permanent or periodic condition analysis can identify potential faults, so that planned, condition-based maintenance work can be carried out. This avoids unplanned outages and again, the associated costs that would otherwise be incurred by network failure.


SIEMENS
Megger
PDS 60
Megger
VLF Sinus
DELL

MV DAC-30

PD diagnostics system for medium voltage cables

MV DAC-30
Datasheet

FEATURES

- **Safest operation thanks to fully isolated design**
- **Uses well proven DAC excitation voltage for PD measurements**
- **Real-time data evaluation and display of results**
- **Two part design for easy transportation**
- **Ideally suited for cables rated up to 23 kV**

Partial discharge (PD) activity is an indication of an incipient fault in the insulation and is one of the best "early warning" indicators of deterioration in medium and high voltage cables. The MV DAC-30 unit can identify, evaluate and locate partial discharge in both cable insulation and accessories according to IEC 60270 and IEEE 400.3/4. One of the major benefits of the DAC waveform is the similarity with the 50/60 Hz power frequency. Data can directly be correlated and decisions can be made, this in contrary to VLF Sine 0.1 Hz, over here it is not possible.

One of the unique features of the MV DAC-30 is that the HV unit consists of a voltage source with an internal PD detector. Unlike with other PD measurement systems, the cable under test is the only accessible live component when testing with the MV DAC30, making it the safest unit on the market.

RECOMMENDED ACCESSORIES
Diagnostic connection set and test bushings
Transport cases
PD-free connection cable

TECHNICAL DATA	MV DAC-30
Voltage range	3 … 30 kV_{peak}
DAC frequency	20 Hz … 500 Hz
Testable load capacitance	10 µF
PD measuring range	2 pC …. 100 nC
System noise level	< 2 pC
Charge evaluation	According to IEC60270
PD Localization	
Range	0 … 16 km / V/2 = 80 m/µs
Accuracy	1% of cable length
Resolution	±1 pC / ±1 m
Weight	
HV module	45 kg
Control module	30 kg
Dimension (W x D x H)	56 x 42 x 100 cm

Megger.

TDS SERIES

High power test & diagnostics combination for MV cables

FEATURES

- **Two proven voltage wave shapes, VLF CR and DAC, in one device**
- **High test capacitance enables standard compliant VLF 0.1 Hz cable testing and diagnostics on long cables or multiple phases in parallel**
- **Non-destructive PD diagnostics by means of proven DAC voltage (acc. IEEE 400.4)**
- **50/60 Hz slope technology for a direct comparison with the power frequency**
- **Two-piece design allows for portable and easy transport**
- **Leakage measurement**
- **Real-time data evaluation and display of results**

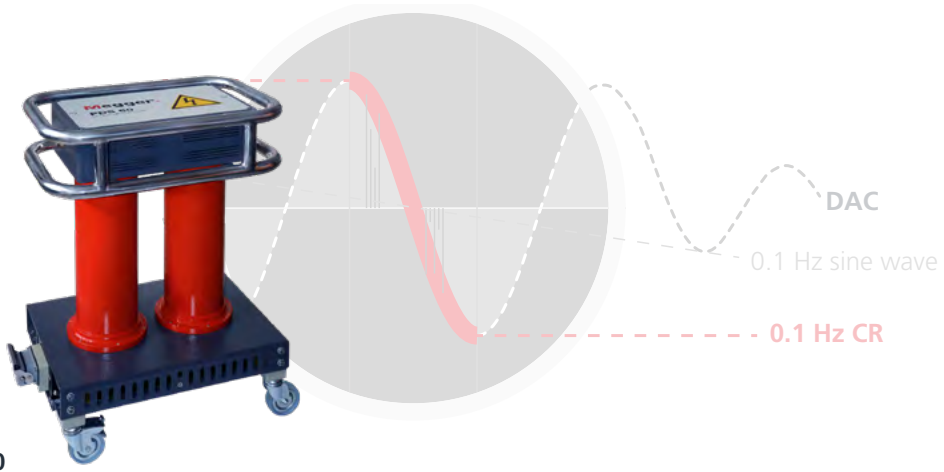
Network operators can now get faster and significantly more reliable information about the quality and the condition of their cables. For the first time, it has become possible to immediately locate faults in underground cables during the actual PD measurement. With the 50/60 Hz Slope Technology a withstand test with VLF cosine-rectangular voltage (VLF CR) and PD diagnosis with damped alternating voltage (DAC) is combined in one unit, the TDS NT series. This allows an efficient and integrated solution for precise inventory of the network infrastructure. Important to mention 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.

Apart from PD diagnostics the TDS NT series can also be used for simple VLF withstand testing, DC testing, sheath testing and sheath fault pinpointing. Making it a universal system for both cable testing and diagnostics.

The TDS series are available in two versions,
40 and 60 kV.

RECOMMENDED ACCESSORIES
Diagnostic connection set and test bushings
Transport cases
PD-free connection cable

TDS NT 40/60



TECHNICAL DATA	TDS 40-P	TDS 60-P
Output voltage		
VLF	3 ... 40 kV_{RMS}	3 ... 60 kV_{RMS}
DAC	3 ... 40 kV_{peak}	3 ... 60 kV_{peak}
DC	3 ... ±40 kV	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	0.1 Hz cosine-rectangular	
DAC	20 ... 500 Hz	
Testable cable capacitance VLF		
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	
Weight (depending on options fitted)	approx. 55 + 48 kg	approx. 85 + 48 kg
Dimension (W x D x H), **divided in two devices**	550 x 1100 x 420 mm	550 x 1100 x 420 mm

TDS NT
Datasheet

TECHNICAL DATA	PD DETECTOR PDS 60
Voltage	
Operation	max. 60 kV_{RMS}
Type	VLF Sine, VLF CR or DAC
Sensitivity range	2 pC … 100 nC
PD self-noise level	< 2 pC
PD localization	
Measuring range	0 ... 16000 m / v/2= 80 m/µs
Precision	1% of the cable length
Resolution	±1 pC / ±1 m
Weight	30 kg
Dimension (W x D x H)	39 x 54 x 76 cm
PD calibrator (IEC 60270 compliant)	
Measuring range	100 pC ... 100 nC
Power supply	9 V block battey
Software	easyGO principle, integrated cable database, fully automatic evaluation

PDS 60
Datasheet

TDM SERIES

High power test & diagnostics combination for MV cables

FEATURES

- **Cable testing, cable diagnostics and sheath testing in one device**
- **Available in two voltage levels and different application packages**
- **Portable as well as van-mount version**
- **Enables standard compliant high power VLF testing at 0.1 Hz (up to 7.8 µF @ 36 kV_{RMS} and 5 µF @ 54 kV_{RMS})**
- **Internal tan delta measurement with automatic result interpretation according IEEE 400.2**
- **PD diagnostics using VLF sine wave, Damped AC or 50/60 Hz Slope technology voltages**
- **Real-time data evaluation and display of results**
- **PD and TD monitored withstand testing**

TDM series is a revolutionary breakthrough in testing and diagnostics of MV cables. The patented concept addresses the utilities increasing need for flexibility in use of test and measuring equipment based on the type of application. Market trends such as increasing length of MV cable systems are fully addressed.

The TDM series is available in two voltage levels, one optimized for 20 kV networks (TDM 4540) and one for 30 kV networks (TDM 6260). Different application packages are available for both voltage levels. Most upgrades are possible at any time without checking or returning the equipment back to the factory. Most combinations are available both as a stand-alone device and as van-mount version.

TECHNICAL DATA (maximum configuration)	25 kV networks (TDM 4540)	35 kV networks (TDM 6260)
Output voltage		
VLF Sine VLF CR DC DAC	0 ... 45 kV_{peak} 0 ... 45 kV_{RMS} 0 ... ± 45 kV 0 ... 40 kV_{peak}	0 ... 62 kV_{peak} 0 ... 60 kV_{RMS} 0 ... ± 62 kV 0 ... ± 60 kV_{peak}
Output current	12 mA	23 mA
Leakage current measurement	0 … 20 mA, resolution 10 µA	0 … 20 mA, resolution 10 µA
Testable capacity (@ U_{max})		
VLF Sine	0.6 µF @ 0.1 Hz 10 µF max	1 µF @ 0.1 Hz 10 µF max
VLF CR	5 µF @ 0.1 Hz (40 kV_{RMS})	4.4 µF @ 0.1 Hz (60 kV_{RMS}) 7.8 µF @ 0.1 Hz (36 kV_{RMS})
DAC	5 µF @ 0.1 Hz (40 kV_{peak})	4.6 µF @ 0.1 Hz (60 kV_{peak})
Sheath testing / pinpointing	0 to 5 / 10 / 20 kV	0 to 5 / 10 / 20 kV
Internal tan delta diagnostics	option	
Partial discharge measurement	option	

APPLICATION	TDM 45	TDM 4540	TDM 62	TDM 6260
VLF testing short cables	■	■	■	■
VLF testing long cables		■		■
Tan Delta (TD) diagnostics	with TD option	with TD option	with TD option	with TD option
Partial discharge (PD) diagnostics with VLF Sinusoidal	with PD option	with PD option	with PD option	with PD option
Partial discharge diagnostics with DAC and 50 Hz Slope technology		with PD option		with PD option

PDS 62-SIN

Partial Discharge detection and localisation system

FEATURES

- **Partial discharge diagnostics with VLF Sineoidal voltage up to 62kV$_{peak}$**
- **With 14.5 kg – the lightest PD measuring unit on the market**
- **Real-time data evaluation and display of results, no post processing needed**
- **General and localized Phase Resolved PD (PRPD) pattern display for defect type recognition**

Apart from PD couplers which are suited for all types of excitation voltages Megger also offers PD couplers which are suited for VLF Sinusoidal only. The PDS 62-SIN has been designed for all Megger VLF Sinusoidal testers up to 62 kV$_{peak}$. With its weight of 14.5 kg the PDS 62-SIN is the lightest PD measuring unit on the market.

PDS 62-SIN Datasheet

TECHNICAL DATA	PDS 62-SIN
Voltage	
Operation	max. 62 kV$_{peak}$
Type	VLF sine 0.01 to 0.1 Hz
Sensitivity range	2 pC … 100 nC
PD self-noise level	< 2 pC
PD localization	
Measuring range	0 … 16000 m / v/2= 80 m/µs
Precision	1% of the cable length
Resolution	±1 pC / ±1 m
Weight	14.5 kg
Dimension (W x D x H)	36 x 33 x 64 cm
PD calibrator (IEC 60270 compliant)	
Measuring range	100 pC … 100 nC
Power supply	9 V block battey
Software	easyGo principle, integrated cable database, fully automatic evaluation

RECOMMENDED ACCESSORIES
Diagnostic connection set and test bushings
Transport cases
PD-free connection cable

TAN DELTA DIAGNOSTICS

Dielectric loss measurement on medium voltage cables

FEATURES

- **Internal tan delta in complete VLF SINE series**
- **Automatic result interpretation acc. to IEEE 400.2**
- **Optional leakage current correction**

Tan delta measurements allows the operator to precisely determine a cable's condition. Integral aging effects, such as the degree of humidity and "water treeing" can be simply recognised and quantified, making the tan delta diagnostics the ideal instrument for monitoring cable conditions.

Megger provides three VLF solutions for tan delta diagnostics, the VLF Sine 37-TD, the VLF Sine 45-TD and the VLF Sine 62-TD.

VLF SINE SERIES
Datasheets

TECHNICAL DATA	VLF SINE 37-TD	VLF SINE 45-TD	VLF SINE 62-TD
Internal/ external	internal	internal	internal
Voltage range	up to 37 kV_{peak}	up to 45 kV_{peak}	up to 62 kV_{peak}
Operating frequency	0.01 to 0.1Hz	0.01 to 0.1Hz	0.01 to 0.1Hz
tan delta accuracy	10^{-4}	10^{-3}	10^{-4}
tan delta resolution	10^{-5} or 10^{-6}	10^{-4}	10^{-5} or 10^{-6}
Power supply	via VLF unit	via VLF unit	via VLF unit
Data communication	via VLF unit	via VLF unit	via VLF unit
Weight	29 kg (incl. VLF)	50 kg (incl. VLF)	60 kg (incl. VLF)

HV DAC SERIES

Test and diagnostic system for high voltage cables

FEATURES

- **Cable withstand test and PD diagnostic in one single system**
- **Acceptance testing of newly installed cable**
- **Condition monitoring of in-service cables to check the aging of the cable**
- **Automatic display and evaluation of results during the test**
- **Transportable and compact**
- **Short set-up times allowing to response quickly on changing weather conditions**

Having accurate data is essential for reliable asset management to extend the life of assets and minimise operational costs. PD in High voltage cables indicates a progressive breakdown in insulation that may at some point become critical resulting in an unplanned outage. The costs of unplanned outages in the transmission network are extremely high so asset managers need to optimise their condition assessment and predictive maintenance regimes.

The HV DAC-200 and HV DAC-300 apply damped AC voltage techniques to the cable installation, as part of a maintenance regime or the commissioning of new high voltage cables up to 230 kV. HV DAC systems can easily identify, evaluate and locate partial discharges faults in cable insulation and cable accessories of all types in both new and aged high voltage power cables. The DAC frequency of the test voltage is close to nominal AC voltage service condition, therefore all PD measurements are evaluated and comparable to the power frequency. PD inception voltage (PDIV) and PD extinction voltage (PDEV) also can be easily determined.

TECHNICAL DATA	HV DAC-200
Output Voltage DAC	18-141 kV_{RMS} / 25-200 kV_{peak}
Commissioning cable	up to132 kV
Commissioning standard	IEC 60840 / IEEE 400.4
PD testing standard	acc. to IEC 60270
Software	For operation, evaluation & reports
Frequency range	20Hz – 300Hz
Capacity range	0.035µF - 8µF 200m – 40 km @ 0.2 µF/km
Charging current	20 mA
PD range and resolution	2 pC – 100 nC & ± 1pC
Weight	950 kg (incl. flight cases)

RECOMMENDED ACCESSORIES
Support capacitor for testing short cables
PD-free connection tubes in different lengths and diameter

Watch the product video of HV DAC 300
(3:04 min)

Watch the customer video of HV DAC 300
(3:25 min)

Watch the explanatory video of HV DAC 300
(4:00 min)

HV source HV switch

HV DAC 200
Datasheet

HV DAC 300
Datasheet

HV DAC-300
18-212 kV_{RMS} / 25-300 kV_{peak}
up to 230 kV
IEC 62067 / IEEE 400.4
acc. to IEC 60270
For operation, evaluation & reports
20Hz – 300Hz
0.035µF - 8µF 200m – 40 km @ 0.2 µF/km
12.5 mA
2 pC – 100 nC & ± 1pC
1100 kg (incl. flight cases)

Inductance

Coupling capacitor

PD SCAN

Medium voltage switchgear substation surveying system

FEATURES

- **Universal application range thanks to wide variety of sensors (internal/ external)**
- **Automatic evaluation and interpretation of the data**
- **Easy to use via touch screen and key pad**
- **Integrated camera/ QR code scanner**
- **PD localization via external TEV Sensor**

The PD Scan is a handheld, pre-screening tool suitable for on-line detection of PD activity in MV cables and plant. PD activity is widely regarded as an indication of incipient faults in the insulation and seen as one of the best 'early warning' indicators of the deterioration of medium and high voltage insulation. Faults in MV plant are in most cases cost expensive. A breakdown in e.g. a termination can lead to damage of the entire cubicle. In addition faults in MV plant can lead to long outage times. With help from the PD scan such faults can be prevented.

As of its large color touchscreen and simple guidance the PD Scan belongs to the easiest to use handheld online PD units on the market. Furthermore features like QR code scanner, TEV PD localisation mode, its wide variety of sensors with auto recognition function and some unique software features make the unit a versatile tool. Therefore it should be part of the toolbox for all maintenance and service teams doing work in MV substations.

TECHNICAL DATA	PD SCAN
Type of sensor	TEV (internal/ external) AA (internal/ external) HFCT (external) Temp/ Hum (external)
Display	3.5" color touchscreen
Interfaces	USB Type-C, Lemo, Bluetooth
Memory	internal
Power supply USB charger Internal battery Battery life	 Input voltage 100 … 240 V, 50/60 Hz, Output voltage 5 V / 2.2 A Li-Ion 3.6 V DC / 3.35 Ah > 8 hours
Dimensions	220 x 91 x 35 mm
Weight	410 g

PD SCAN
Datasheet

Please watch the video
PD SCAN (1:16)
uk.megger.com/pdscan

Megg

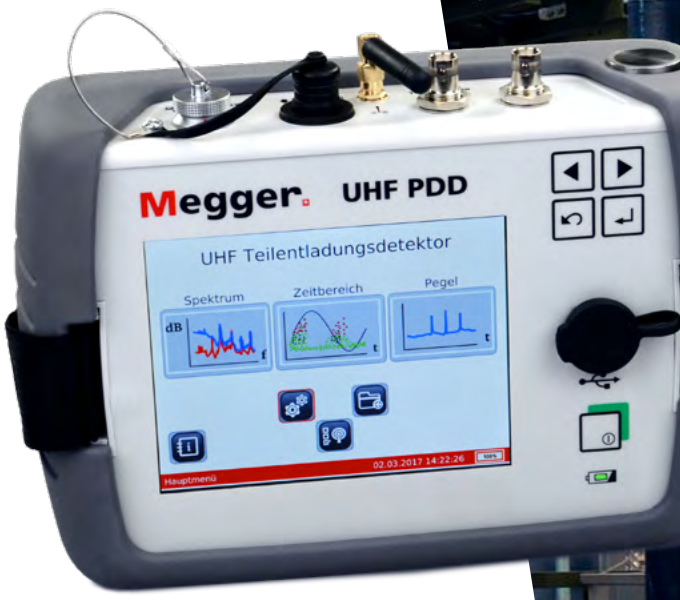
UHF PD DETECTOR

Handheld online PD substation surveying system

FEATURES

- **Quick online surveying of PD activity in medium and high voltage network**
- **Prevent costly outages and long maintenance times**
- **Ideal tool for quick non-invasive surveys**
- **Large color touch-screen for easy operation**
- **Dual channel system for direct comparison between two sensors**
- **Synchronization with power frequency**

The UHF PD Detector is the ideal tool for periodic non-invasive surveys in MV and HV substations and can identify defects in an early stage. It should therefore be part of the toolbox for all maintenance and service teams. Thanks to the high measuring bandwidth, UHF measurements can accurately measure local online PD activity in frequencies above those of common disturbances. The UHF PD Detector can be used to identify partial discharge emanating from various HV assets including cable terminations, voltage transformers, surge arresters and transformer bushings.



TECHNICAL DATA	UHF PDD
Frequency range	
UHF	150 ... 1000 MHz
RF	100 kHz … 70 MHz
Sensitivity	-90 dBm
Display	6'' color touchscreen
Internal memory	10 GB
Power supply	
Charger	Input voltage 100 … 240 V, 50/60 Hz, output voltage 12 VDC
Internal battery	Li-Ion 7.4 V/ 12.25 Ah
Battery life	>10 hours
Dimensions	25 x 19 x 10 cm
Weight	1.9 kg

UHF C1 termination sensor (optional)

Please watch the video
UHF PD DETECTOR (1:44)
uk.megger.com/uhf

UHF PDD
Datasheet

Megger.

MPAC128

Acoustic imaging camera

MPAC128
Datasheet

FEATURES

- **128 microphone array**
- **Detection frequency up to 48 kHz**
- **Detection range up to 120 m**
- **8 MP optical camera resolution**
- **7" screen**
- **Intelligent analytics**
- **Ultrasonic monitoring**

Many types of fault conditions, in particular, gas leaks and partial discharges, produce sounds. Sometimes, the sounds are audible, but more often, they are ultrasonic; that is, they are at frequencies above the limit of human hearing. By 'listening' for these sounds, it is possible, in principle, to discover that a fault is present and, by tracing the source of the sound, to find the location of the fault. This is the principle on which acoustic imagers work. Prevent critical asset failures, safety hazards, and costly disruptions by detecting partial discharge and gas leaks early.

With Megger's acoustic imager, you can visualise gas leaks and dielectric breakdown risks that are otherwise invisible in finished products, process plants and electrical installation environments. This enables you to respond rapidly, preventing safety incidents, compliance violations, equipment damage, resource wastage, and costly unplanned downtime.

Safely detect issues in hard to access areas

Partial discharge and gas leaks can often be found in hard to access areas, such as PD in overhead lines. The 120m detection range enables technicians to safely access any hazardous or hard to access environments - so, for example, there is no requirement for working at height and no need to approach energised conductors - without compromising the level of accuracy. In addition to safety considerations, this can also save you time, when large sections of plants can be surveyed for leaks in just a few minutes, whereas manual inspection to find leaks could take hours.

Work in extreme conditions

The MPAC128 IP54 rating wide operating temperature range from -20 to 50 degrees Celsius makes it well-suited for extreme environments. In addition the MPAC-ATEX can be used in Zone 2 hazardous areas. Whether in industrial settings with explosive atmospheres, outdoor conditions with varying temperatures, or dusty and wet environments, its robust design ensures reliable performance. With these features, the acoustic imager can withstand harsh conditions while providing accurate and safe acoustic imaging for critical applications.

Please watch the video
MPAC128 (0:45)

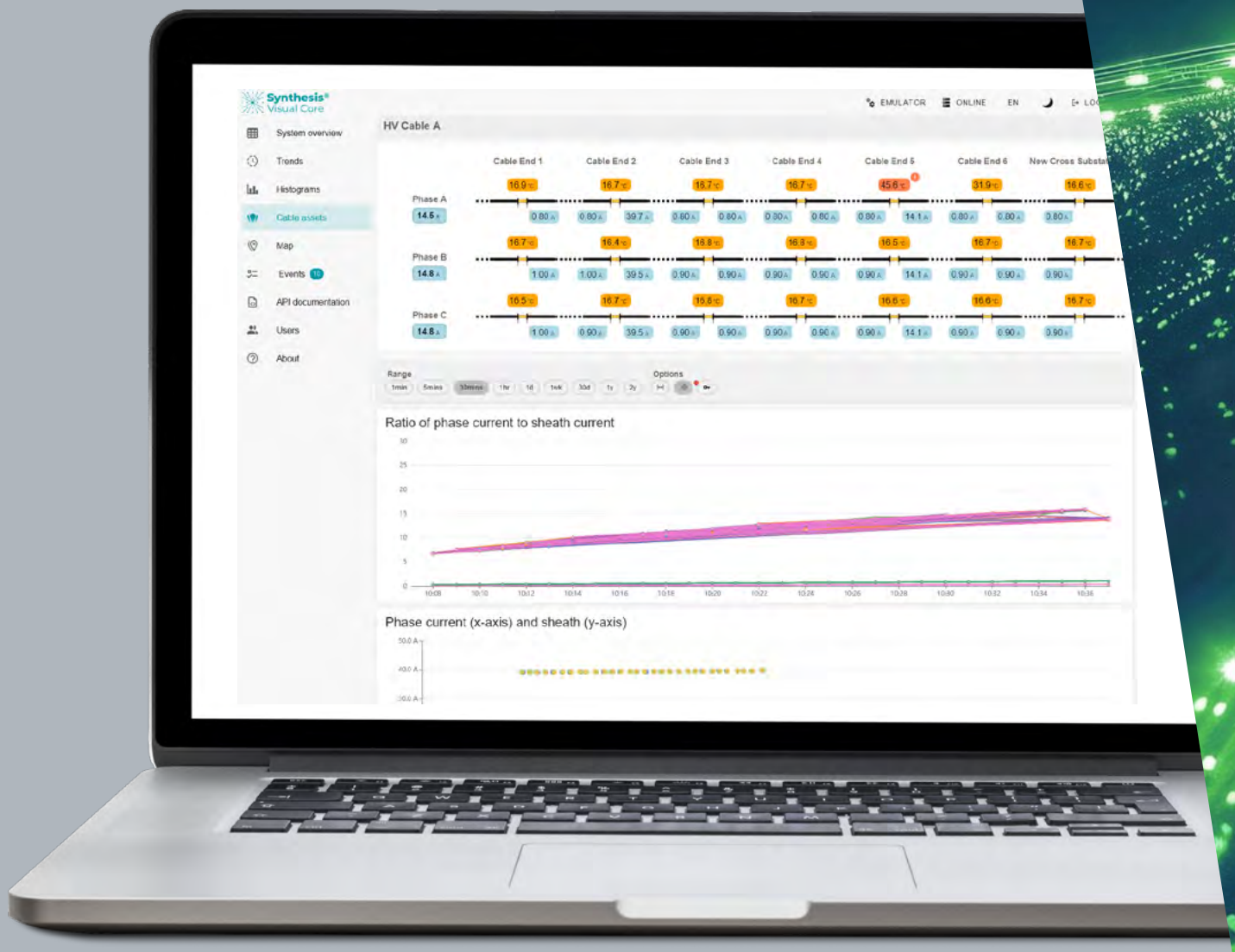
Megger.
Surface Discharge 100%
MPAC128-ATEX
Megger Professional Acoustic Imaging Camera

CABLE MONITORING

Greenlight™ is Synaptec's unique HV cable resilience solution, enabling the highest levels of cable network availability and health.

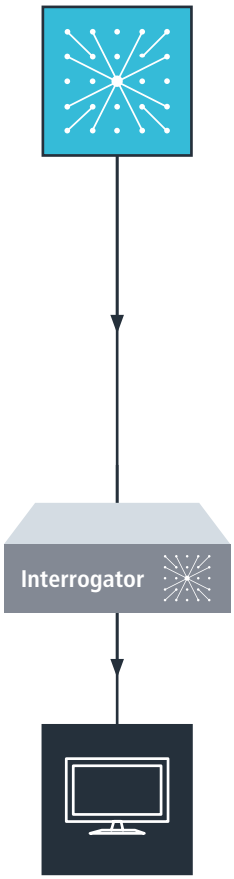
Early warning of failures

Greenlight™ leverages passive and permanent sensing to provide early warnings of damage and failure in cable assets, reducing the need for costly and high-risk manual inspection and scheduled maintenance, and avoiding unnecessary outages. The Greenlight™ solution delivers high-fidelity measurements from every cable joint and termination to a real-time analysis platform, where operators can observe and react to abnormal activity on their network in advance of critical failures.

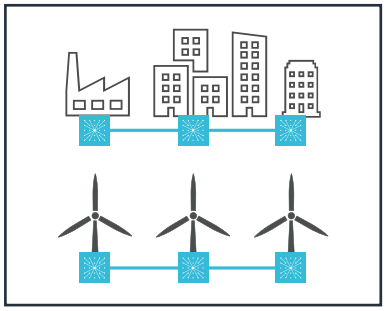


DES – Distributed Electrical Sensing

How it works



1 – Passive sensors
Deployed at all joints and terminations



- Distributed phase current, screen current, spot temperature monitoring
- Incorporates DTS, DAS, and offline PD / tan delta

Illumination of optical sensor network

Signals reflected from sensors

2 – Interrogator
Centrally integrating, time-stamping, and publishing synchronous data, installed in substation

3 – Synthesis® server
Real-time data-processing, visualisation, and analytics platform

BROCHURE Greenlight

synaptec
powered by Megger

CABLE FAULT LOCATION

A cable fault, resulting from the failure of the cable's main insulation, leads to immediate and costly system outages. This significantly impacts supply reliability metrics such as SAIDI and SAIFI, and places considerable pressure on field crews to quickly locate the fault. Due to the variety of different cable faults, fault location requires a diverse array of methods and technologies. It is crucial to have solutions that offer a broad spectrum of techniques, similar to a big toolbox, to be able to adapt flexibly to different fault scenarios.

The modern approach to fault location is a fully automated sequence in multiple steps. The first step tries to identify the type of fault through insulation testing and breakdown testing with a ramped DC voltage. This is followed by the second step, the application of prelocation methods, such cable radar/TDR or the inductive arc reflection method (ARM), to find the distance to the fault. The final step is the precise pinpointing of the fault position using advanced devices like the magnetic-acoustic surge wave receiver digiPHONE+2.

Megger, building on the legacy of HDW Elektronik and SebaKMT, is the industry's forerunner and global leader in the manufacturing of cable fault location solutions. Our portfolio includes both portable devices and fault locating systems on skids, in vans, in trailers, and in containers. Megger's products empower field crews around the world to locate faults quickly and safely, without further compromising the integrity of the healthy parts of the cable. Designed to the highest safety standards, Megger devices minimise hazards and risks to users.

STX40, page 34

SWG32

Conventional surge generator (thumper)

FEATURES

- **Three surge voltage levels: 8 kV, 16 kV, and 32 kV**
- **Surge energy in two versions: Either 1750 J or 3500 J, in each of the three stages**
- **Robust and fast-switching discharge unit**
- **For expansion with prelocation using cable radar/TDR and Arc Reflection please contact the factory**

SWG Datasheet

SPG5-1000-1 AND SFX32

Portable cable fault location systems

The SPG5-1000-1 is an automated, portable fault location device for low voltage cables. It comes with a 5 kV DC source (DC hi-pot), two stages for surging (thumping) and can be used for fault conversion, prelocation and pinpointing. Instead of using a cable radar/TDR, the distance to the fault is determined with the ICEplus method. The user-friendly single rotary knob operation and the use of motorised switches make the SPG5 a convenient tool in the day to day work of cable technicians. The device is also suitable for branched low voltage networks with T- and Y-joints (splices).

The well-established SFX32 is distinguished by its high reliability in the field and its steady success over the years has made it the most commercially successful portable device for cable fault location worldwide. It is a semi-automatic solution for medium and low voltage cables, featuring three surge voltage levels of 8 kV, 16 kV and 32 kV, and an adequate surge energy of 1750 J. The premier Teleflex SX-1 is used as its sit-on-top cable radar/TDR. Note: The legacy SebaKMT products SFX8, SFX12, and SFX16 have been discontinued.

SPG5-1000-1
Datasheet

SFX32
Datasheet

Hochspannung
Lebensgefahr

E-TRAY: CONTROLLER + SOFTWARE

The E-TRAY family currently consists of the following products:

- M-THUMP5-1000
- EZ-Thump 3 Dual, EZ-Thump 4, EZ-Thump 12
- Smart Thump 16-20, Smart Thump 25-30

Innovative UX concept

The E-TRAY was originally introduced by HDW Electronics in 2010 as a digital hardware and software solution for the purpose of radically streamlining cable fault location. Its operation concept was unique in the market upon its release, and over a decade later no competitor has caught up to it yet.

All E-TRAY products have an identical graphic user interface, and software version regardless of the product or language.

User-friendly and automated

The E-TRAY's main focus is the by far biggest group amongst field crews: less experienced users and outright laymen. Instead of overwhelming users with methods and parameters, the E-TRAY reduces complexity by showing only relevant information, and by following only a narrowed-down and pre-defined decision tree.

The E-TRAY software guides users through the entire fault location process using a pull-through sequence. This allows users to direct most of their attention on finding the fault without needing in-depth knowledge about individual fault location methods and without having to remember the cumbersome operation as known from outdated manual analogue units.

Fault identification // Insulation resistance, DC breaktown test

↓

Fault prelocation // Cable radar/TDR, Arc Reflection ARM

↓

Fault conversion (if needed) // Burning

↓

Advanced prelocation // Burn Arc Reflection, current decoupling ICE

↓

Fault pinpointing // Magnetic-acoustic coincidence method, voltage gradient method

User guidance and assistance

The E-TRAY software pulls users through a standardised decision tree which consists of the classic fault location sequence in three major steps: fault identification, fault prelocation, fault pinpointing.

The software always proposes the next logical action. The user need not to select but just to confirm the next step. No further adjustments are needed. To address experienced users, there is an expert mode giving full access to all parameters and settings.

Fault identification

Tell apart and identify different types of faults

Fault prelocation

Get a distance to the fault and learn where best to start pinpointing

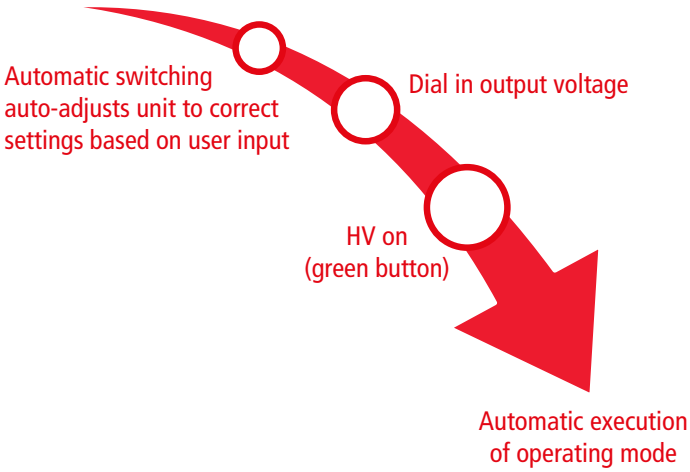
Fault pinpointing

Discover the exact position of the fault down to 0.1-0.2 m^2

Uniform operation

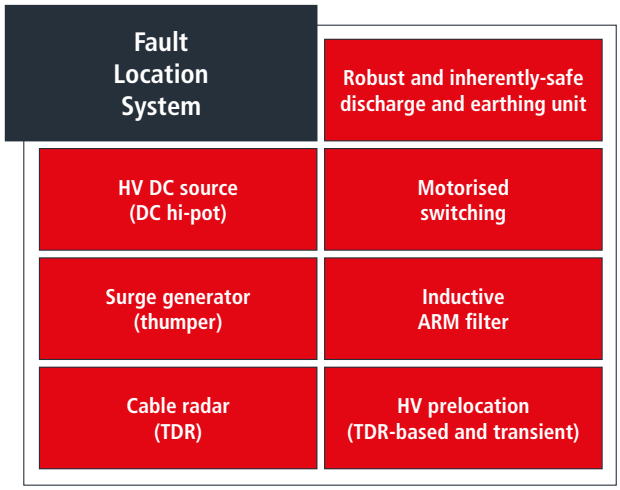
Know one, know them all. All E-TRAY products operate identically, offering a standardised high voltage turn-on sequence across the board. Once a user becomes familiar with one E-TRAY product, they can easily use any other product from the E-TRAY family.

The training burden on personnel is significantly reduced, and onboarding new people to a crew is quick and effortless.



Physical and functional integration

The E-TRAY is based on the integration of all essential components that a modern cable fault location system must have. This includes DC source, discharge and earthing device, surge generator, TDR/ cable radar, inductive arc reflection filter, sensor for current decoupling etc. Physical integration means that all of those components are mounted and wired inside of the one and the same enclosure. Functional integration means that all of those components are operated in an automated fashion by the common controller.



M-THUMP5-1000

Innovative portable fault location unit for LV and MV cables

The M-THUMP5 portable cable fault locating system provides safe, efficient, and extremely easy-to-use solutions for quickly identifying, prelocating, and pinpointing various types of cable faults in low and some medium voltage power cables. The M-THUMP5 was developed to meet the requirements for typical low and lower medium voltage distribution cable fault location markets. The unit features a light weight aluminium enclosure, equipped with handles as a portable unit, or as a permanently installed vehicle mount unit.

FEATURES

- **9 fault locating technologies in one box**
- **3 fault location technologies for branched LV cables**
- **E-TRAY software with automated pull-through guidance**
- **System voltage up to 6.6 kV**

Check out all the features

M-Thump5 Datasheet

TECHNICAL DATA	M-THUMP5-1000	EZ-THUMP series	SMART THUMP series
Outdoor capable	IP53	IP53	IP53
Max. DC voltage	5 kV	3 kV / 4kV /12 kV	20 kV / 30 kV
Max. current	500 mA	94 mA / 47mA / 12 mA	60 mA / 40 mA
Insulation resitance	Yes	Yes	Yes
Max. surge voltage	5 kV	3 kV / 4kV /12 kV	16 kV / 25 kV
Max. surge energy	1000 J	500 J	1500 J / 1600 J
HV prelocation	ARM, ICE, ARM Live Burning	ARM	ARM, ICE
F-Ohm safety interlock	Yes	Yes	Yes
F-U safety interlock	Yes (optional)	-	-

EZ-THUMP SERIES, SMART THUMP SERIES

Small and intermediate size fault location units for outdoor use

The EZ-Thump and Smart Thump series are fault location systems in the compact and intermediate power class. They embody Megger's modern, digital solution for identifying, prelocating and pinpointing faults on different cable types. The units have been tailored to outdoor use in harsh conditions at the best possible power-to-weight ratio. Main applications are low voltage and medium voltage cables.

EZ-Thump
3 kV / 4 kV
Datasheet

EZ-Thump 12 kV
Datasheet

Smart Thump 16-20
Datasheet

Smart Thump 25-30
Datasheet

STX40

Most powerful and most modern mobile cable fault location system

The STX40 is the most advanced solution of portable cable fault location technology available in the market. It is expertly designed to address the complexities of faults in XLPE- and EPR-insulated power cables. Featuring a 40 kV high-voltage DC source and a highly effective high-frequency burner, this unit is also uniquely equipped to meet the challenges associated with PILC and MIND cables.

Emphasising a digital, software-based and automated design with motorised switching, the STX40 leaves behind the outdated analogue and manual instruments from the past. The graphical user interface of the STX40 is designed for simplicity and efficiency, incorporating a single rotary knob and an industrial-grade display, which significantly boosts the efficiency and performance of field crews.

Datasheet STX40

FEATURES

- **Toolbox philosophy and full integration:**
  Identification, prelocation, pinpointing and conversion of faults all in one unit
- **Offers 7 different built-in fault locating techniques:**
  1. Insulation test, 2. DC test (DC hi-pot), 3. Cable radar/TDR, 4. HF burning,
  5. TDR-based and transient HV prelocation, 6. Surging (Thumping) in multiple voltage ranges,
  7. Sheath test and sheath fault pinpointing
- **Unsurpassed outdoor-ready design with exceptional all-terrain mobility:**
  IP43 rainproof and weather-resistant, extreme temperature resilience,
  bright sunlight-readable display, lightweight yet robust, optimally balanced
  center of gravity, large pneumatic tyres, adjustable handlebar
- **Impressive usability: Easy to navigate software-based graphical user interface**
  with single rotary knob control
- **Automation like a cable test van: Fully automated operation via motorised switching**
  of all HV modes and all voltage ranges
- **Highest safety in the industry: Safety interlocks for monitoring of station earth and**
  touch potentials (F-U), as well as earth connections (F-Ohm)
- **DC test (DC hi-pot) up to 40 kV, surging (thumping) up to 32 kV,**
  high-frequency burning up to 850 mA, and considerable surge energy of 2000 J
- **Built-in HV prelocation: ARM, ICE, Decay**
- **Functionally fully integrated and latest cable radar/TDR technology:**
  Teleflex® RDR with bipolar impulse generation
- **ARM Multishot feature with 32 fault traces and best-of-32 BestPicture feature**
- **Inductive ARM filter for superior fault finding performance**
- **Sheath fault pinpointing utilising the step voltage method (voltage gradient method)**
  with a pulsed DC output for the ESG earth fault locator

Addressing the challenges of paper cables

Paper-impregnated lead-covered (PILC) and mass-impregnated non-draining (MIND) cables, with their many layers of lapped paper and oil/mass insulation, present substantial challenges in fault locating compared to modern solid dielectric cables. Breaking down liquid insulation, igniting and stabilising arcs in fluid, and capturing good fault traces with cable radar/TDR is significantly more complex in paper cables than in XLPE- and EPR-insulated solid dielectric cables. In PILC and MIND cables, high resistance faults typically show higher breakdown voltages, while low resistance faults occur more frequently. Designed to meet these specific challenges, the STX features a 40 kV high-voltage DC output and an 850 mA high-frequency burner, along with 2000 Joules of energy at 32 kV. Its state-of-the-art built-in cable radar/TDR, equipped with bipolar impulse generation, BestPicture Multishot, and ProRange de-attenuation, ideally supplements the high voltage capabilities for successfully finding faults in paper cables.

Unbeatable combination:
With the STX40 and the digiPHONE+2 NT or NTRX set you have the best option for pinpointing cables faults and sheath faults (see the next page).

DIGIPHONE+2

Pinpointing with magnetic-acoustic surge wave receiver

FEATURES

- **Acoustic-magnetic pinpointing**
- **Highest acoustic noise immunity**
- **Automatic filtering of interference signals**
- **Automatic adjustment of all parameters, no adjustment required**
- **Cable compass: shows the actual cable route position and always helps you to stay on track**
- **Optional: Bluetooth® headphones**

The digiPHONE+2 marks the next step in pinpointing of cable faults with the coincidence method. It is the refined successor of the orange digiPHONE+, the world's best-selling surge wave receiver.

Thanks to the optimised acoustic sensors, noise is reduced, and the bang of the cable fault is amplified and can be heard even clearer. In combination with the high-quality wireless headphones, the advanced Active Noise Cancelling function, which filters additional noise from the outside, is optionally available.

Datasheet
digiPHONE+ 2 Series

You can connect wired and wireless headphones to digiPHONE+2 at the same time. This makes it easier to train new staff.

DIGIPHONE+2 NT SET

Sheath fault location

In addition to acoustic-magnetic pinpointing of insulation faults, this set can also be used to pinpoint cable sheath faults using the gradient voltage method. With the new 50/60 Hz mode it is now possible to detect cable faults while the power is still on and households are still connected.

FEATURES

- **Automatic suppression of external potentials**
- **Automatic adaption to the voltage level**
- **Automatic detection of the pulse rate**
- **Automatic zero adjustment**
- **Very high measuring sensitivity in the µV range**

The digiPHONE+2 NT and NTRX sets already have wireless ANC headphones included.

DIGIPHONE+2 NTRX SET

Cable tracing with detection of current direction

In addition to the functions of the NT set, this set offers the possibility of routing and line location.

FEATURES

- **Cable compass for determining the cable position**
- **Continuous display of laying depth and current intensity**
- **Current direction detection**
- **Frequency scan**
- **Special probe location mode**
- **Don't forget about the transmitter! Available audio frequency generators: 12 W, 50 W, or 200 W (van-only)**

TELEFLEX

Time domain reflectometers (TDRs), portable cable radars

Cable radars / Time domain reflectometers can determine the distance to the fault by measuring runtimes and impedance changes in the cable. In conjunction with a surge wave generator, cable radars/TDRs may also be used for various high voltage prelocation methods. The Teleflex® series has been designed to be the best performing instruments in the market and can be used either as standalone portable unit or as vehicle-mounted unit as part of certain cable test van products.

TECHNICAL DATA	Teleflex SX-1	Teleflex VX-PT V2
Operation mode	Single rotary knob, touchscreen, AC or internal battery	Single rotary knob, touchscreen, only AC
Measuring range @ 80m/µs	160 km	1280 km
Measurement modes	TDR, IFL	TDR, IFL
Supported HV methods	ARM, ICE, Decay, ARM Live Burning	ARM, ICE, Decay, ARM Live Burning
Pulse amplitude	50 V, fixed	150 V, adjustable
Resolution	0.1m @ 80 m/µs	0.1m @ 80 m/µs
ARM trigger	Automatic	Automatic
ARM Multishot	15 traces per shot	15 traces per shot
Memory	2 GB	16 GB
User interface	easyGO	easyGO
Communication	USB	USB, Ethernet
Display	10.1 inch	15.6 inch
Data rate	533 MHz	533 MHz
Mounting	Standalone or with surge generator	Standalone or with surge generator
Channels	2-phase	3-phase
Protection class	IP65 closed, IP54 open	IP65 closed, IP54 open
Weight	7.8 kg	18 kg
Dimension (W x D x H)	362 x 305 x 195 mm	483 x 295 x 200 mm

Teleflex SX-1
Datasheet

Teleflex VX-PT V2
Datasheet

BESØKENDE
BESØKENDE

TDR2050

Dual channel handheld TDR

TDR2050
Datasheet

FEATURES

- **CAT IV 600 V input protection**
- **IP 54 rating offers real life working**
- **Auto set up mode for instant, easy use**
- **AutoFind and FindEnd functions helps find the fault fast**
- **Trace tagging facility that allows a name to be saved with the trace**
- **Distance dependent gain to counteract signal attenuation**
- **Step function to improve detection of near end faults and illegal taps**

Designed for the location of faults in low voltage electrical power supply cables, the TDR2050 is tough. Its rugged and advanced design is dust and weatherproof to IP 54, so it is ready to work in the real world. Safety is paramount in LV networks so the unit is rated to CAT IV 600V and supplied with fused test leads as standard. Ease-of-use features such as auto-setup help new users start fault locating quickly and safely, and the auto-find function assists in interpreting the traces to find the distance to fault.

Expert users can override the auto function, permitting manual fine-tuning for more difficult faults.Megger's new screen layout allows the operator to overlay traces, providing further assistance in the location of faults such as comparing good and bad cores.

TECHNICAL DATA	TDR2050
Range	10 … 20.000 m
Operation modes	Step and Pulse TDR selections Dual channel
Accuracy	±1% of range ±1 pixel at 0.67 VF
Resolution	1% of range
Velocity factor Propagation velocity V/2	Variable from 0.2 to 0.99 in steps of 0.01 30 ... 148 m/µs
Pulse widths	2; 6; 20; 40; 60; 100; 200; 400; 600; 800; 1000; 2000; 4000; 5000; 6000 ns
Pulse amplitude	up to 20 V
Cable Impedance	25, 50, 75, 100, 125, 140 ohm + AUTO
Dimension (W x D x H)	290 mm x 190 mm x 55 mm
Weight	1.7 kg
Display	800 x 480 px, colour graphics LCD, sunlight readable
Battery	Li-ion rechargeable battery, 12 hours typical battery life
Operating temperature	-15 °C to +50 °C
Storage temperature	-20 °C to +70 °C

OVERHEAD LINE TESTING SYSTEM

System for safely operating Teleflex VX-PT V2 on high voltage overhead transmission lines

FEATURES

- **Easy to set up**
- **Great resolution at close and long ranges**
- **Line-up of filters to protect personnel and hardware from dangerous induced currents**
- **Very high energy TDR pulses for extremely long distance measurements up to 2000 km**

This system, consisting of a Teleflex VX-PT V2 and a filter device, is able to measure impedance irregularities on de-energized high voltage transmission lines with at least one earth wire (shield wire). Indentifyable irregularities include shorts and opens as well as breaks and certain in-between conditions. The system is the only available option to safely connect a TDR to an overhead power line, and it is used for a broad range of applications, e.g. accurate fault location, preventive inspection during commissioning or after repair before re-energizing circuits, phase identification, periodic checks to see changes against a fingerprint trace. The special design of the system using a filter device and a fuse link avoids damage to the equipment and eliminates risks for the user caused by hazardous induced currents and voltages.

Overhead line teting system
Datasheet

TECHNICAL DATA	OVERHEAD LINE TESTING SYSTEM
Purpose	TDR on HV/EHV transmission lines with dedicated exposed guard wire
Connection type	Single phase
Mains input	230 V +/- 10 % single phase AC, 50/60 Hz
Versions	passive (standard, no additional impulse generator) active (with additional impulse generator)
Output impedance	300 Ω
Triggering	≤ 3 dB
Filtering	10...100/300/1000/2000 kHz
Filter ranges	10 ... 100 kHz, 10 ... 300 kHz 10 ... 1,000 kHz, 10 ... 2,000 kHz
Operating conditions	+55 °C, 93 % relative humidity, non-condensing at 30 °C
Dimensions	600 x 400 x 260 mm
Weight	48 kg
Protection class	IP54

OVERVIEW LINE LOCATION SYSTEMS

Tracing and Pinpointing

Megger line location and route tracing systems allow you to quickly and reliably trace cables, identify the exact route, and obtain a comprehensive view of the cable installation.

TECHNICAL DATA	EASYLOC	FERROLUX FLG12	FERROLUX FLG50
Application	Power and Telecomm cable and pipe location	Power and Telecomm cable and pipe location	Power and Telecomm cable and pipe location
Output power	0,1 W; 0,5 W and 2 W	0 ... 12 W	0 ... 50 W
Active frequencies	100 / 120 Hz 8 / 33 kHz	491 / 512 / 640 / 982 Hz 8,44 / 9,82 / 33 kHz	491 / 512 / 640 / 982 Hz 8,44 kHz
Passive frequencies	Radio: 15 kHz ... 23 kHz 50 Hz ... 250 Hz Easyloc TX / Sonde: 33 kHz	Radio: 15 kHz ... 23 kHz 50 Hz / 60 Hz / 100 Hz / 120 Hz	Radio: 15 kHz ... 23 kHz 50 Hz / 60 Hz / 100 Hz / 120 Hz
Receiver techniques	Maximum	Minimum Maximum Super-Maximum	Minimum Maximum Super-Maximum
Measured parameters	-	Loop impedance, current, voltage	Loop impedance, current, voltage
Depth measurements	Cable: 0.3 m ... 5 m Probe: 0.3 m ... 7 m	0,1 m ... 5 m	0,1 m ... 5 m
Current measurements	-	1 mA ... 400 A / 180 A / 20 A	1 mA ... 400 A / 180 A / 20 A
Cable selection/identification	-	optional	optional
Internal memory	-	Data recording with graphic display	Data recording with graphic display
Protection class	Receiver: IP 56 IP 67 (below the battery case) Transmitter: IP54	IP 54	IP 54
Operating time	Receiver: > 40 h Transmitter: > 40 h	Receiver: >13 h Transmitter: 2.5 h bei 10 W	Receiver: >13 h Transmitter: >1 h @ 50 W or >5 h @ 10 W
Dimensions receiver	100 x 670 x 260 mm	230 x 70 x 100 mm	230 x 70 x 100 mm
Dimensions transmitter	260 x 255 x 140 mm	250 x 120 x 170 mm	410 x 335 x 175 mm
Weight receiver	2.5 kg	1.9 kg	1.9 kg
Weight transmitter	2.6 kg	2.9 kg	14 kg

FERROLUX® SYSTEM

Location of cables and pipes

Please watch the video
FERROLUX (1:51)

The FERROLUX® cable locating system is the perfect solution for your daily routine tasks. Locate and route cables and pipes. Determine their depth and store the information directly in the device. By the use of an external GPS receiver, the location data can also be stored.

The FERROLUX® combines the location techniques (identification of the direction of the signal flow) and audio-frequency methods in one instrument.

FEATURES

- **Perfect ergonomics and light weight for comfortable operation**
- **Live measurement of cable depth and signal current strength**
- **Signal select feature for unambiguous identification of targeted cable**
- **Cable locating with left-right arrows and guidance line**
- **Automatic or manual frequency selection**
- **Multi-frequency operation – three frequencies at the same time**
- **Powerful transmitter with integrated rechargeable battery**

RECOMMENDED ACCESSORIES
Mini antenna IFA (for cable selection)
Transmitter clamp UZ 50, UZ 100
Transmitter Ferrolux FLG12

"Earth fault" sensor set
Optional expansion set for sheath fault location via voltage gradient method

Ferrolux Datasheet

FLG12 Datasheet

EASYLOC

Tracing of cables and pipes

Easyloc Datasheet

FEATURES

- **Safe and fast preparation of construction sites**
- **Avoid cable damage and inconvenient delays**
- **Depth measurement at the push of a button, even without a transmitter**
- **33 kHz – compatible with other location systems**
- **Large display with simple menu guidance and automatic backlight**

Speed up civil engineering work and minimise the risk of accidents – thanks to the Megger Easyloc you know the location of the underground pipes and cables! The Easyloc locating system has been specially developed for quick and easy checking of of underground utility plans. Thanks to the considerably simplified locating process, line damage can be avoided and the use of earthmoving equipment can be optimized. It is therefore the ideal locating system for civil engineering and road construction companies, municipalities (building yard, road maintenance department) as well as gardening and landscaping companies.

TECHNICAL DATA	Easyloc Basic	Easyloc Standard	Easyloc Plus	Easyloc Cam
Passive Frequencies	Radio: 15 kHz ... 23 kHz, Power: 50 Hz ... 250 Hz, Easyloc Tx / Sonde: 33 kHz			Power: 50 Hz / 60 Hz
Active Frequencies	33 kHz	33 kHz	100 Hz /120 Hz 8 kHz 33 kHz	512 Hz 640 Hz 33 kHz (only sondes)
Depth measurement	⊘	Cables: 0.3 m … 5 m Sondes: 0.3 m … 7 m	Cables: 0.3 m … 5 m Sondes: 0.3 m … 7 m	Sondes: 0.3 m … 7 m
Output power	0.1 W 0.5 W Continuous and pulsed signal (switchable)	0.1 W 0.5 W Continuous and pulsed signal (switchable)	0.1 W 0.5 W 2 W Continuous and pulsed signal (switchable)	⊘
Application	Cable location	Cable location	Cable and pipe location	Sonde and camerahead location

DCI3

Cable and phase identification system

DCI3
Datasheet

The DCI3 is a compact cable and phase identification system designed for safe, accurate identification of both de-energised and energised (live) cables in utility networks.

It enables operators to reliably identify specific cables within bundles prior to cutting or spiking, thereby significantly reducing the risk of personal injury, equipment damage, and costly service interruptions.

FEATURES

- **Cable and phase identification in one unit**
- **Reliable cable selection for de-energised and energised (live) cables**
- **Phase identification on grounded systems**
- **Ensure highest safety of personnel**
- **Robust, compact, and field-ready design (IP54)**

DCI3 – one transmitter for Cable Identification (CI) and Phase Identification (PI)

CI readout sensors for RX3 receiver

(sensor depending on cable type or user application)

Flexible clamps
Sensor for the DC pulse method (determining current flow direction) – the preferred option for cable identification.

Twisted-field sensor
Should be used when there are two magnetic fields around the cable or if cables are inaccessible for the flexible clamps.

Phase identification sensor
This sensor is used to identify a single phase of a cable, typically at the cable's end, such as in a transformer sub-station or distribution cabinet.

PI sensors

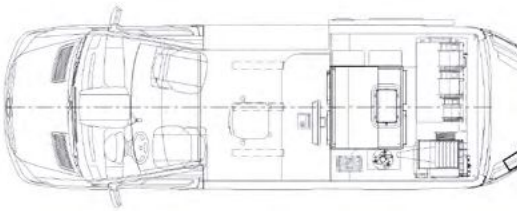
Passive clamps (standard accessories)
Without internal battery. No power supply needed.

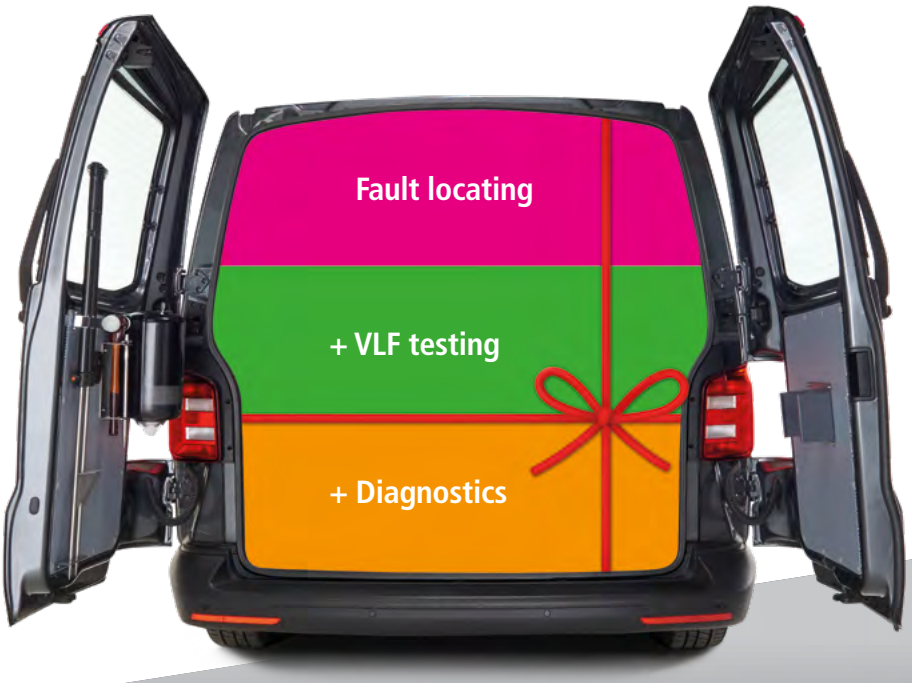
Active clamps (optional)
Flexible clamps for larger cross-sections.
Power supply e.g. via power bank (USB-C).

CABLE TEST VANS

Megger's cable test vans offer great user convenience, reliability and efficiency. Customers may choose between various standardised solutions, however, tailoring a system to highly individual demands is always possible and one of Megger Germany's core competencies.

The development of our systems is based on unique, innovative technologies as well as rich feedback from customers in the field. The result is always a product which sets new benchmarks in cable fault location and cable diagnostics performance, allowing you to keep the power on.





STX40 INSIDE

CENTRIX Evolution

The number 1 of cable test vans. Worldwide.

CENTRIX Evolution
Datasheet

FEATURES

- Made in Germany
- Most successful centrally controlled system in the market
- By now more than 1100 vans in the field since the global market release of Centrix in 2006
- High quality furniture with durable materials
- Enormous degree of customization: Upon customer request systems may be extensively project-engineered and can be tailored to highly individual needs
- Proven fault location technology: 80 kV DC, Teleflex® RDR cable radar/TDR, prelocation, surging (thumping) and pinpointing, fault conversion (burning) and sheath testing
- Surging (thumping) up to 4000 J
- Large 21.5 inch industrial-grade control unit
- Linux-based software for best stability, robustness, data security and cybersecurity, superior to Windows-based solutions
- Comes with the most sophisticated commercially available safety system incl. F-Ohm, F-U and a powerful discharge unit (SafeDischarge)
- VLF testing with high test capacitance at 0.1 Hz, neccessary for working on long cables and for testing all three phases in parallel
- Testing and Diagnostics based on sinewave technology as an entry-level solution
- Testing and Diagnostics based on advanced near-power-frequency waveshapes (Cosine Rectangular, Damped AC) for best results when doing PD testing as well as monitored withstand testing with accompanying PD trending
- Connectivity package: system remote control, remote access via TeamViewer, smartphone app

Even after more than 15 years in the market Centrix is still the leading centrally controlled cable test van system. Centrix combines cable fault location with options for cable testing and diagnostics. The either single phase or three phase system is operated via a smartphone-inspired multi-touch graphic user interface. For fault location purposes all existing prelocation methods are available, for example inductive ARM Multishot, ARM Conditioning, ICE, Decay, Decay Plus, ARM Live Burning (Burn Arc Reflection), Loop On Loop Off, ARM Charging, etc.

The current Centrix version, CENTRIX Evolution, may be configured as a complete testing and diagnostics solution with VLF, tan-Delta and PD measurement, complemented by its 80 kV DC testing function. For more than 20 years now, monitored VLF withstand testing with accompanying PD trending and IEC60270-compliant PD diagnostics was recommended to be carried out with near line frequency waveshapes, namely Cosine Rectangular and damped oscillating voltage (DAC). PD testing with sinewave voltage is possible but generally discouraged due to performance and validity issues.

Any additional equipment to do line location, route tracing, pinpointing and cable selection can be installed inside of the cable test van and will be tucked away safely in their corresponding mounts.

Overall, CENTRIX Evolution is the holistic, safe and reliable solution for commissioning and proactive, preventive and condition-based maintenance. The connectivity package and the MeggerBook software allow for sophisticated remote control features, remote access via TeamViewer, GPS mapping, GIS data import/export and therefore for location-based data storage, protocolling and most efficient cable fault location.

Upon customer request: Sinewave-based testing and diagnostics available as entry-level solution

Note: 0.1 Hz sine VLF can suffer from performance and validity issues, and, on average, does not provide results comparable to 50/60 Hz or near-line-frequency waveshapes. This has been observed in numerous field measurements since 2004 and has been published in papers and case studies many times. Therefore, we offer sinewave solutions as they are good solutions, but we recommend better solutions with 0.1 Hz Cosine Rectangular and Damped AC for obtaining results fully comparable with 50/60 Hz.

PRIMEON

Centrally controlled and automated cable fault location and cable testing system for small and very small vehicles

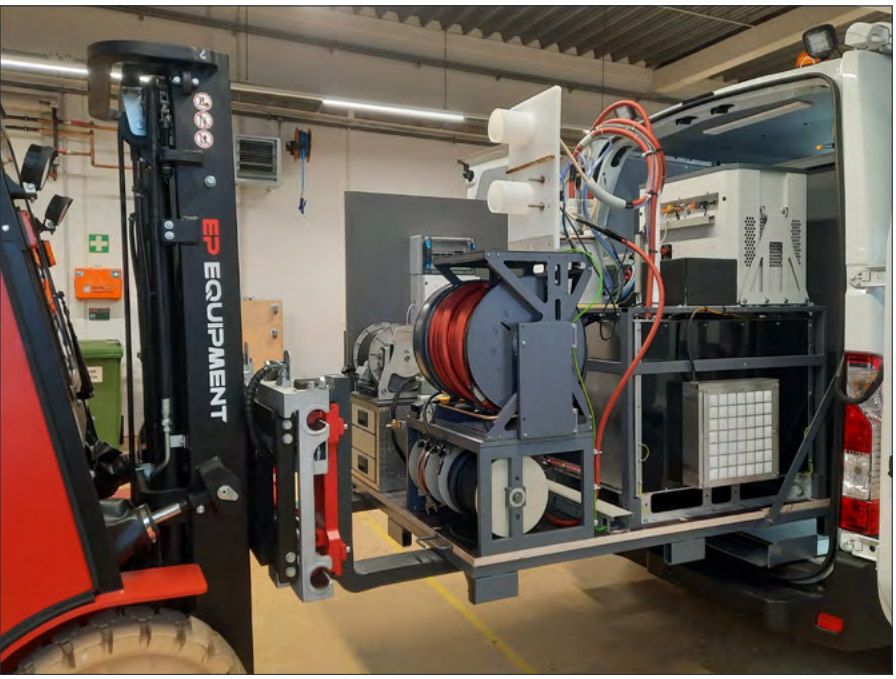
FEATURES

- **State-of-the-art system for small vehicles with very limited payload and space**
- **Clear and straightforward software-based graphic user interface (GUI)**
- **Toolbox philosophy: 7 fault location methods built-in to be flexible in the field**
- **Suitable for low voltage cables, medium voltage cables and paper-lead cables**
- **40 kV DC, surging (thumping) in multiple stages up to 32 kV**
- **High frequency burner up to 40 kV**
- **Teleflex® RDR, latest cable radar/TDR technology integrated**
- **Integrated prelocation: ARM, ICE, Decay, IFL mode, LV TDR mode**
- **BestPicture Multishot with 32 fault traces and best-of-32 analysis**
- **Inductive ARM filter for superior fault finding performance**
- **Available with additional fault locating packages, e.g., fault conversion, utility location, sheath test**
- **Available with sinewave-based entry-level solutions for testing and diagnostics**
- **Available with powerful testing and diagnostics solutions based on advanced waveshapes like Cosine Rectangular and Damped AC for near line frequency results and non-destructive condition assessment**

The PRIMEON system does fit into many different types of vehicles

PRIMEON
Datasheet

Vans, Pickup trucks, Trailers, Electric cars



R30 2.0

The gold standard for high voltage transmission-type cables

R30 2.0
Datasheet

FEATURES

- **Most functions centrally controlled**
- **Sophisticated safety system incl. amongst other things F-Ohm, F-U and the most capable discharge unit of all cable test vans in the market**
- **HV DC: Either 110 kV or 150 kV**
- **50 kV inductive-active double-surge ARM incl. Multishot feature**
- **Surging (thumping) up to 100 kV with 4000 J and transient prelocation with ICE up to 100 kV**
- **Resonance burner, tone frequency generator and sheath fault testing optionally available**

R30 is the most successful high voltage cable fault location and cable testing system in the market, and in its newest iteration, R30 2.0, it has been upgraded from a modular system to a nearly fully centrally controlled system. It was originally designed for the high demands associated with fault location on 66 kV and 110 kV high voltage cables as well as extra high voltage cables rated up to 550 kV. Nevertheless, it is perfectly fine to use R30 on medium voltage cables, paper-lead cables and low voltage cables, too.

A motorised, gas-insulated high voltage switch was a novelty and considerable innovation when R30 was initially released, and is still state-of-the-art. The concept was received so well by technicians and engineers, that software-controlled, automated switching directly spawned the development of the first fully centrally controlled cable test van a few years later. R30 anticipated this development and is still the go-to product for working on HV transmission cables.

R30 2.0 embodies Megger's toolbox philosophy and provides various different methods and technologies to treat high resistance faults, low resistance faults and intermittent faults with a high degree of flexibility. On top of that, the system comes with a number of unique features not available in other cable test vans. Aside from its HV DC capability of either 110 or 150 kV, R30 is equipped with the best performing cable radar/TDR-based prelocation: The Arc Reflection Method, today the industry's standard method, has been implemented in an inductive-active setup, thus able to find even most difficult faults which other methods or other implementations of ARM will not be able to find. While commonly available surge generators typically top out at 32 kV, R30 provides surging (thumping) and prelocation up to 50 kV.

A well-composed number of options allow customers to tailor R30 2.0 even more to HV applications, for example:

- 100 kV surging (thumpig) with 4000 J
- 100 kV prelocation with ICE
- 15 kV resonance burner with burn arc reflection
- Tone frequency generator for line location and route tracing
- Unit for sheath fault testing and sheath fault pinpointing

Moreover, R30 2.0 is the only system in the market which takes major safety aspects into account associated with fault location on very long offshore and onshore DC and AC cables: For very demanding applications such as cable lengths of 100 to 900 km (60 to 560 mi) R30 may be equipped with one of a series of high power discharge units. These discharge units have been certified by a third-party test lab and combine a short discharge time constant with a superior duty cycle for extensive prolonged testing.

SPECIAL EQUIPMENT

- SHEATH FAULT LOCATION SYSTEM
- HIGH VOLTAGE BRIDGE
- GROUND FAULT LOCATOR
- IMPEDANCE METER
- LOW VOLTAGE INSTRUMENTS

FAULT SNIFFER, page 65

MFM10

Battery operated sheath fault location system

FEATURES

- **Testing, prelocation and pinpointing of cable sheath faults**
- **Test voltage up to ±10 kV DC**
- **High adjustable current up to 750 mA, also suitable for burning**
- **Improved prelocation with voltage drop method**
- **Highest accuracy by bi-polar measurement**
- **Fault locating of main insulation faults**
- **Detection of multiple faults**
- **Detection, storage and indication of last events**
- **easyGO operation via rotary knob and touch screen**
- **Rugged IP53 PELI trolley case**
- **Only one single removable HV connection cable**
- **Max. test capacity 10 µF**

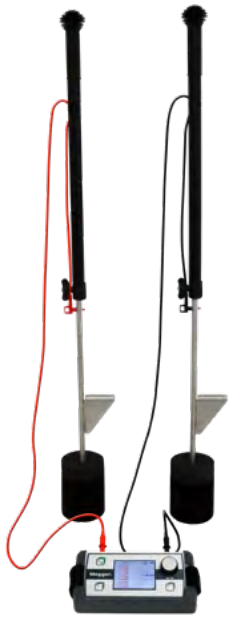
MFM10
Datasheet

Sheath faults can occur due to poor cable laying or damage during installation. A sheath fault may not be detected until the cable is already in operation, and at this point they can become real cable faults later down the cable's lifecycle. It is therefore important to identify and address these faults as quickly as possible before they can become real faults.

The fully automatic MFM10 is a testing device for the prelocation and pinpointing of cable sheath faults. The unit works with the easyGO principle, which gives the operator a fast, easy and reliable tool to evaluate this kind of fault. The unit includes evaluation of measured data to interpret the fault location.

It also has voltage drop and bipolar prelocation methods to ensure that external galvanic and thermoelectric influences are eliminated, which increases the accuracy and quality of the measurement.

RECOMMENDED ACCESSORIES
19" version for vehicle installation
ESG NT2 earth fault probe for DC voltage gradient method
HV connection cable 10 m / 15 m / 20 m
Audio frequency option with 8.44 kHz



ESG NT2
Datasheet

ESG NT2 set for voltage gradient method (step voltage method)

HVB10

High voltage bridge for long cables up to 200 km

FEATURES

- **Localisation of main insulation faults and sheath faults**
- **Voltage drop method**
- **Advantages over current balancing bridges**
- **Completely independent of the parameters of the auxiliary conductors and the jumpers at the far end**
- **Automatic measurement sequence**
- **Bipolar measurement to eliminate external influences**
- **Detection and display of incorrect connections**
- **Pluggable HV connection cable**
- **easyGO operation via rotary knob**
- **Internal discharge capability of 25 µF**
- **Testing on cables up to 200 km**

HVB10
Datasheet

HVB10 is a highly accurate HV bridge designed to prelocate main insulation faults and sheath faults, perform sheath testing and pinpoint sheath faults, especially on long high voltage cables.

With its high resolution, intermittent fault detection function, and load adaptation for faster cable charging, the HVB10 is the ideal tool for finding sheath faults early and accurately by identifying poor cable laying practices and checking contractor work before connecting to the utility's network.

The HVB10 prelocates core-to-core and core-to-screen faults, but it also provides the sheath fault location functions from the MFM10, sheath testing, prelocation and pinpointing with pulsed DC.

RECOMMENDED ACCESSORIES
ESG NT2 earth fault probe for DC voltage gradient method
HV connecting clamp set for large dimensions

Did you know?

MFM10 and HVB10 are based on the principle of the voltage drop method. Compared to the traditional current balancing bridge methods (Murray loop etc.) the voltage drop method offers enormous advantages:
- more accurate prelocation results
- lower error sensitivity
- faster measurement, without additional inputs
- deviations of shield and conductor impedances do not influence the measurement result

MGFL100

Ground fault locator

FEATURES

- **Alarms when the real fault is identified**
- **Direct measurement of resistance and stray capacitance**
- **Direct measurement of fault current and leakage current**
- **Adjustable current and voltage limits**
- **Powered off AC or internal battery**
- **Locates faults up to 400 kΩ**
- **Locate faults on AC or DC systems**
- **Operates on systems up to 600 V**

The MGFL100 locates ground faults on ungrounded DC and AC systems, DC battery systems, as well as protected IT networks.

MGFL100
Datasheet

NIM 1000

Impedance meter

NIM 1000
Datasheet

FEATURES

- **Compact and portable instrument for field use**
- **Easy operation with direct display of all measurement parameters**
- **Highest test current up to 1000 A**
- **Single and three-phase application**
- **Measures the grid impedance up to the 10th harmonic**
- **Automatic long-term measurement**
- **USB for test report and screenshot generation**

The NIM 1000 mains impedance meter is used to measure the mains impedance in low voltage networks. The network is tested at the connection point under near-operational conditions with up to 1000 A for current carrying capacity. Potential weak points are made visible.

The NIM 1000 can be used both event-oriented to determine the cause of unstable network voltage and preventively for control measurements (e.g. before and after a network conversion). In this way, a consistently good supply quality can be ensured and downtimes can be minimized. Typical preventive tasks are in particular the measurement of the network impedance at the connection point, tests for decentralized power generation, preliminary clarification for industrial customers or verification during acceptance.

FAULT SNIFFER 2

Cable fault pinpointing in low voltage networks

FEATURES

- **Can be used on straight or branched networks**
- **Reliable avoidance of unnecessary excavations**
- **Fast and easy location of the fault spot**
- **Handy size, easy to transport**
- **Accurate to approximately a decimeter**
- **Detection of fault gases from a large distance**
- **Sensitive to several gases, suitable for any insulation material**

Fault Sniffer 2
Datasheet

Surface fault detection without drilling

Save time and money. With the FAULT SNIFFER 2 you can go on cable fault location yourself. Find cable faults quickly and safely, without using service providers or a cable test van. Consumers can stay on the grid! Most cable faults result in burns of the cable sheath. The resulting gases are sucked in and detected by the vacuum technology of the FAULT SNIFFER 2.

The evaluation of the data is done in real time and gives you a graphical representation of the burning gas concentration. The cable fault is located at the point of highest measured gas concentration. In most cases, this will be at a joint. NOTE: Sniff the known joint locations first.

Please watch the video
FAULT SNIFFER 2 (2:02)

CABLE FAULT LOCATION ON HVAC AND HVDC CABLES

R550 CONTAINER
Centrally controlled automated system for EHV and HVDC cables

The R550 is a high-end cable fault location system tailored to the needs of finding faults on subsea cables, long EHV cables and HVDC interconnectors, incorporating all available fault locating methods.
Because the system is digital, automated and centrally controlled, instead of analogue, manual and electro-mechanical, it provides the highest degree of usability for any user level, especially for infrequent users. Its most important safety feature is the fast-switching discharge device, while the high voltage unit comes with an output of up to 150 kV and the high performance unit up to 20 kW. The R550 is capable of identifying, prelocating, pinpointing and, if necessary, converting all kinds of high resistance and low resistance faults.

1. High-voltage unit
2. High-performance unit
3. High-energy discharge unit
4. High-voltage surge unit
5. Connection compartment
6. Control room incl. air conditioning
7. Access points, hatches, and doors

R550
Datasheet

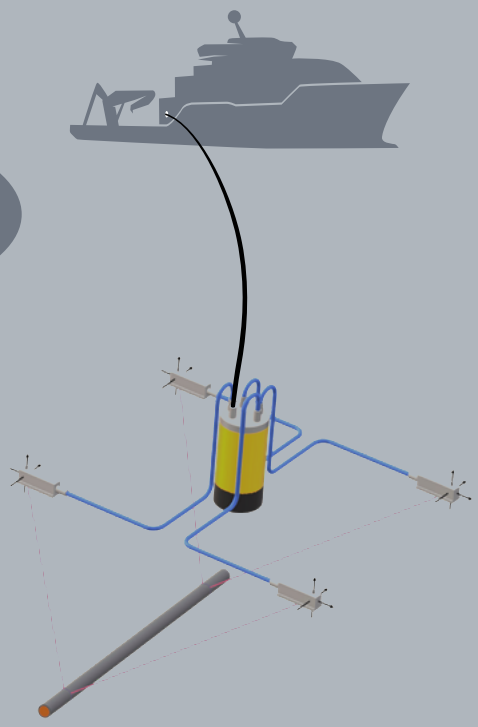
CASE STUDY
Viking Link

BIFRÖST
High-performance HV bridge

The Bifröst is a 20 kV DC high voltage bridge with an internal discharge capability of up to 750 µF for professional use in challenging very long cable systems such as HVDC interconnectors. It utilises the principle of the voltage drop method via the classical four-wire connection with either 1 or 2 auxiliary wires.

HUMMINGBIRD
High-performance heavy-duty audio frequency generator

The Hummingbird audio frequency transmitter provides an the signal for the Magtrack receiver unit to be able to track cable paths and to accurately pinpoint low resistance faults, making it ideal for demaning assets such as long subsea cables and HVDC interconnectors.



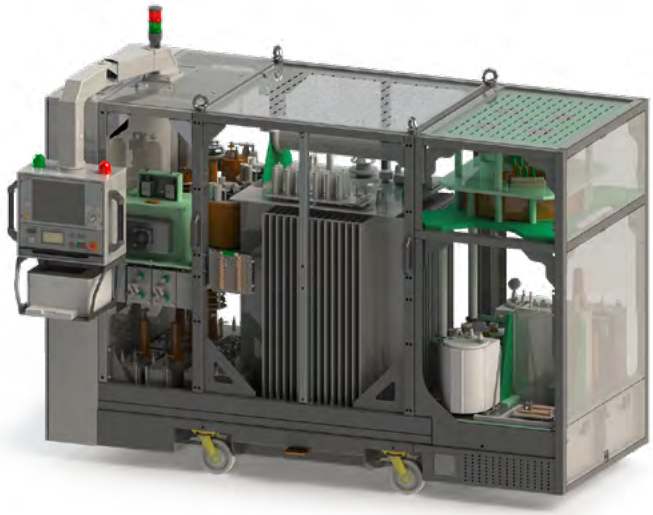
MAGTRACK
Tracking and pinpointing system for subsea cables

The Magtrack is an outstanding cable tracking and fault locating system that can most accurately detect the cable's position and inclination in 3D, show burial depth and, in conjunction with the Hummingbird, pinpoint low resistance faults.

SPECIAL & CUSTOMISED SYSTEMS

Special applications need individual solutions. Worldwide.

Working in partnership with our customers, Megger has provided many customised solutions for special applications over the years. As experts and designers of the most comprehensive range of test equipment in this field, Megger is best placed to offer a tailor-made package solution for any cable test and fault location application.



High power VLF test sets for cables of up to 100 km at 60 kV_{RMS} @ 0.1 Hz

Fault conditioning and fault conversion on long DC and AC cables with 20 kW high power burner

Third-party lab certified high power discharge units for long subsea cables of up to 1,000 km length (more than 320 µF, very short discharge time constant)

High power surge generators with more than 6000 J and no duty cycle restrictions (please contact us for higher surge energy)

High power audio frequency generators and submarine solutions for route tracing and pinpointing on long HVAC and HVDC cables upon request

Tailored high performance solutions for offshore and onshore cable fault location and cable testing by combining, integrating and automating the above mentioned unique capabilities

Our research and development team with their deep pool of experience and background knowledge are always willing to discuss different solutions for high-end applications.
Write to baunach@megger.com

SEACAT
SERVICES
OFFSHORE WINDFARM SUPPORT
SEACAT ENDEAVOUR
RESCUE ZONE

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In addition to the major manufacturing sites for the cable infrastructure,
Megger has 25 sales offices and distributors in over 100 countries around the world.
Please visit our website **www.megger.com** to get in touch with us.

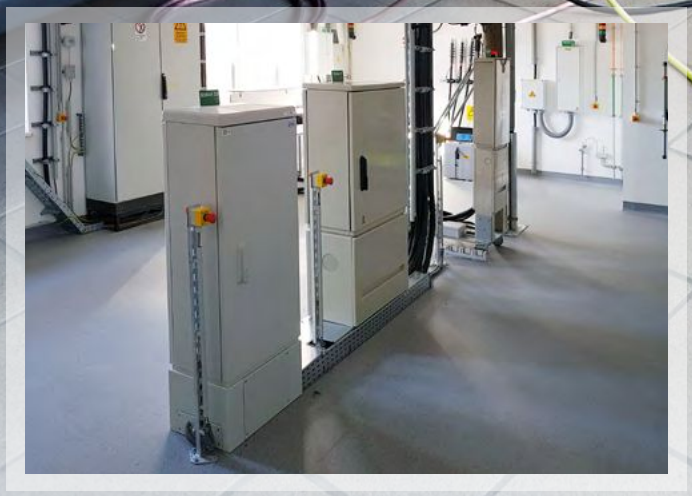
TRAINING & SUPPORT

A tremendous benefit to purchasing any test instrument from Megger is that we won't disappear after your purchase! We do have broad and in-depth technical expertise, application knowledge and experience in the field which we can all share with you.

We have invested heavily in creating a local support network of engineers to provide a rapid response by people who understand your challenges and needs.

Product and application training can also be offered at your premises or in specialist training facilities around the world. More information on course availbility and other technical resources can be found on our website **www.megger.com**.

Trainings with high practical value!



USEFUL CABLE TESTING AND DIAGNOSTICS INFORMATION

Testing & diagnostics on long cables – In acc. with CENELEC HD 620/261,IEEE 400 and IEC 60502-2

Megger

V.03

Typical voltage classes and cross sections

testable length in miles	CABLE SYSTEM / PRODUCT	VLF SINE 62 [1]		TDM 6260		TDS 60		VLF CR-60-HP		VLF CR-60-25µF		VLF CR-80		DAC 200		DAC 300	
		TESTING [2]	DIAGNOSTICS [3]	TESTING [2]	DIAGNOSTICS [3]	TESTING [2]	DIAGNOSTICS [3]	TESTING [2]	DIAGNOSTICS	TESTING [2]	DIAGNOSTICS	TESTING [2]	DIAGNOSTICS [3]	TESTING [2]	DIAGNOSTICS [3]	TESTING [2]	DIAGNOSTICS [3]
IEEE 400.2 (Table 3)	**25 kV cable with U_{Test} = 45 kV_{peak}**																
	350 MCM / 177 mm² (0.29 µF/mi)	4.8	6.2	20.5	34.7	3.8	25.0	30.2		86.8		21.2					
	500 MCM / 253 mm² (0.33 µF/mi)	4.2	5.5	18.1	30.7	3.4	22.1	26.7		76.7		18.7					
	750 MCM / 380 mm² (0.38 µF/mi)	3.7	4.8	15.7	26.5	2.9	19.1	23.1		66.3		16.2					
	1,000 MCM / 507 mm² (0.42 µF/mi)	3.3	4.3	14.0	23.8	2.6	17.2	20.7		59.5		14.5					
	2,000 MCM / 1,013 mm² (0.56 µF/mi)	2.5	3.2	10.6	18.0	2.0	13.0	15.7		45.0		11.0					
	35 kV cable with U_{Test} = 62 kV_{peak}																
	350 MCM / 177 mm² (0.24 µF/mi)	4.2	5.3	18.3	29.7	6.6	15.0	27.0		103.8		18.7					
	500 MCM / 253 mm² (0.27 µF/mi)	3.7	4.7	16.3	26.4	5.9	13.4	24.0		92.4		16.6					
	750 MCM / 380 mm² (0.31 µF/mi)	3.2	4.1	14.1	23.0	5.1	11.6	20.9		80.3		14.5					
	1,000 MCM / 507 mm² (0.35 µF/mi)	2.9	3.7	12.7	20.7	4.6	10.5	18.8		72.4		13.0					
	2,000 MCM / 1,013 mm² (0.45 µF/mi)	2.2	2.8	9.8	15.9	3.6	8.0	14.4		55.5		10.0					
IEEE 400.4 (Table A.1 or A.2)	**110-115 kV cable with U_{Test} = 181 kV_{peak}**																
	~ 2,400 MCM / 1,200 mm² (0.43 µF/mi)													18.6	18.6	18.6	18.6
	~ 3,200 MCM / 1,600 mm² (0.48 µF/mi)													16.8	16.8	16.8	16.8
	~ 4,000 MCM / 2,000 mm² (0.55 µF/mi)													14.6	14.6	14.6	14.6
	~ 5,000 MCM / 2,500 mm² (0.60 µF/mi)													13.3	13.3	13.3	13.3
	132-138 kV cable with U_{Test} = 187 kV_{peak}																
	~ 1,600 MCM / 800 mm² (0.40 µF/mi)													19.9	19.9	19.9	19.9
	~ 2,400 MCM / 1,200 mm² (0.48 µF/mi)													16.6	16.6	16.6	16.6
	~ 3,200 MCM / 1,600 mm² (0.48 µF/mi)													16.6	16.6	16.6	16.6
	~ 4,000 MCM / 2,000 mm² (0.56 µF/mi)													14.2	14.2	14.2	14.2
	220-230 kV cable with U_{Test} = 254 kV_{peak}																
	~ 2,000 MCM / 1,000 mm² (0.32 µF/mi)															24.8	24.8
	~ 2,800 MCM / 1,400 mm² (0.40 µF/mi)															20.1	20.1
	~ 3,600 MCM / 1,800 mm² (0.42 µF/mi)															19.2	19.2
	~ 5,000 MCM / 2,500 mm² (0.47 µF/mi)															17.0	17.0

IN PROGRESS

for DAC: IEEE 400.4 (Table A.1 or A.2)

[1] VLF sinusoidal test systems have an increased test capacitance at lower frequencies less than 0.1 Hz. However, this is not permitted as per VDE 0276-620/621, CENELEC HD 620/621, and IEC 60502-2 standards.
IEEE 400.2 allows for lower frequencies, however IEEE does not recommend them because the test results are not equivalent to the preferred frequency of 0.1 Hz.

[2] 0.1 Hz VLF sinusoidal
[3] 0.1 Hz VLF CR
[4] DAC 20-300 Hz (IEC)
DAC 20-500 Hz (IEEE)

Important general notes:

„Testing" means withstand testing using very low frequency AC. „Diagnostics" means condition assessment using methods such as partial discharge analysis or tan delta measurement at prescribed test levels.
The given testable lengths are based on single phase testing as per the respective standards. For diagnostics with Slope and DAC the prescribed test level is 1.7 U_0.
The actual test voltage for testing with 0.1 Hz VLF CR equals $U_{test} = U_{peak}$, for PD-monitored withstand testing with Slope it is $U_{test} = \sqrt{2}$ 1.7 U_0, and for diagnostics with DAC it is $U_{test} = \sqrt{2}$ 1.7 U_0.

Excitation voltages for partial discharge diagnostics on MV distribution cables

Megger

V.01

Typical voltage classes and cross sections

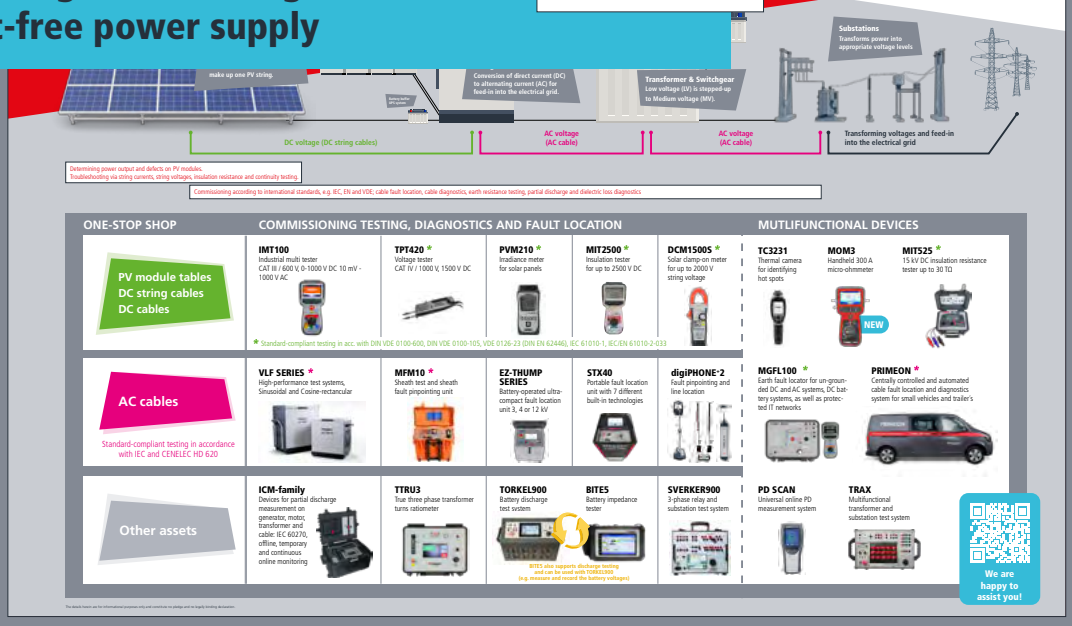
testable length in miles	CABLE SYSTEM / PRODUCT	VLF SINE 37		VLF SINE 45		VLF SINE 62		TDM 4540			TDM 6260			TDS 40-P		TDS 60-P		VLF-CR 54
		TESTING	DIAGNOSTICS PD TD	TESTING	DIAGNOSTICS PD TD	TESTING	DIAGNOSTICS PD TD	TESTING	DIAGNOSTICS TD	DIAGNOSTICS PD	TESTING	DIAGNOSTICS TD	DIAGNOSTICS PD	TESTING	DIAGNOSTICS PD	TESTING	DIAGNOSTICS PD	TESTING
	5 kV XLPE cable with U_{Test} = 3 U_0 = 14 kV_{peak}																	
	250 MCM / 120 mm² (0.50 µF/mi)	5.8	18.9	3.9	8.9	8.8	19.9	19.9	8.9	19.9	19.9	19.9	19.9	26.5	19.9	14.3	19.9	47.8
	350 MCM / 185 mm² (0.57 µF/mi)	5.1	16.6	3.4	7.8	7.7	17.4	17.4	7.8	17.4	17.4	17.4	17.4	23.2	17.4	12.5	17.4	41.9
	750 MCM / 400 mm² (0.77 µF/mi)	3.8	12.4	2.5	5.8	5.8	13.0	13.0	5.8	13.0	13.0	13.0	13.0	17.3	13.0	9.3	13.0	31.2
	1,000 MCM / 500 mm² (0.87 µF/mi)	3.4	10.9	2.2	5.1	5.1	11.5	11.5	5.1	11.5	11.5	11.5	11.5	15.3	11.5	8.2	11.5	27.6
	15 kV XLPE cable with U_{Test} = 3 U_0 = 30 kV_{peak}																	
	250 MCM / 120 mm² (0.33 µF/mi)	4.8	9.6	2.8	4.5	6.3	10.3	20.3	4.5	30.4	27.3	10.3	30.4	18.2	30.4	9.4	30.4	42.2
	350 MCM / 185 mm² (0.37 µF/mi)	4.2	8.5	2.4	4.0	5.6	9.1	18.0	4.0	26.9	24.2	9.1	26.9	16.1	26.9	8.3	26.9	37.4
	750 MCM / 400 mm² (0.49 µF/mi)	3.2	6.4	1.8	3.0	4.2	6.8	13.6	3.0	20.3	18.3	6.8	20.3	12.2	20.3	6.3	20.3	28.2
	1,000 MCM / 500 mm² (0.55 µF/mi)	2.8	5.7	1.6	2.7	3.7	6.1	12.1	2.7	18.1	16.3	6.1	18.1	10.9	18.1	5.6	18.1	25.1
	25 kV XLPE cable with U_{Test} = 3 U_0 = 45 kV_{peak}																	
	250 MCM / 120 mm² (0.26 µF/mi)		7.3	2.3	3.4	5.3	7.8	19.4	3.4	35.8	22.9	7.8	38.7		35.8	8.1	35.8	28.6
	350 MCM / 185 mm² (0.29 µF/mi)		6.5	2.1	3.1	4.8	7.0	17.3	3.1	32.0	20.4	7.0	34.6		32.0	7.3	32.0	25.6
	750 MCM / 400 mm² (0.38 µF/mi)		5.0	1.6	2.3	3.7	5.4	13.2	2.3	24.4	15.6	5.4	26.5		24.4	5.6	24.4	19.6
	1,000 MCM / 500 mm² (0.42 µF/mi)		4.5	1.4	2.1	3.3	4.8	11.9	2.1	21.9	14.0	4.8	23.7		21.9	5.0	21.9	17.5
	35 kV XLPE cable with U_{Test} = 3 U_0 = 62 kV_{peak}																	
	250 MCM / 120 mm² (0.22 µF/mi)				2.9	6.3	6.7		2.9	24.4	20.2	6.7	43.7			7.4	21.4	
	350 MCM / 185 mm² (0.24 µF/mi)				2.6	5.7	6.0		2.6	21.9	18.2	6.0	39.3			6.6	19.3	
	750 MCM / 400 mm² (0.31 µF/mi)				2.0	4.4	4.6		2.0	17.0	14.1	4.6	30.4			5.1	14.9	
	1,000 MCM / 500 mm² (0.35 µF/mi)				1.8	4.0	4.2		1.8	15.3	12.7	4.2	27.4			4.6	13.5	

[1] VLF sinusoidal test systems have an increased test capacitance at lower frequencies less than 0.1 Hz. However, this is not permitted as per VDE 0276-620/621, CENELEC HD 620/621, and IEC 60502-2 standards.
IEEE 400.2 allows for lower frequencies, however IEEE does not recommend them because the test results are not equivalent to the preferred frequency of 0.1 Hz.

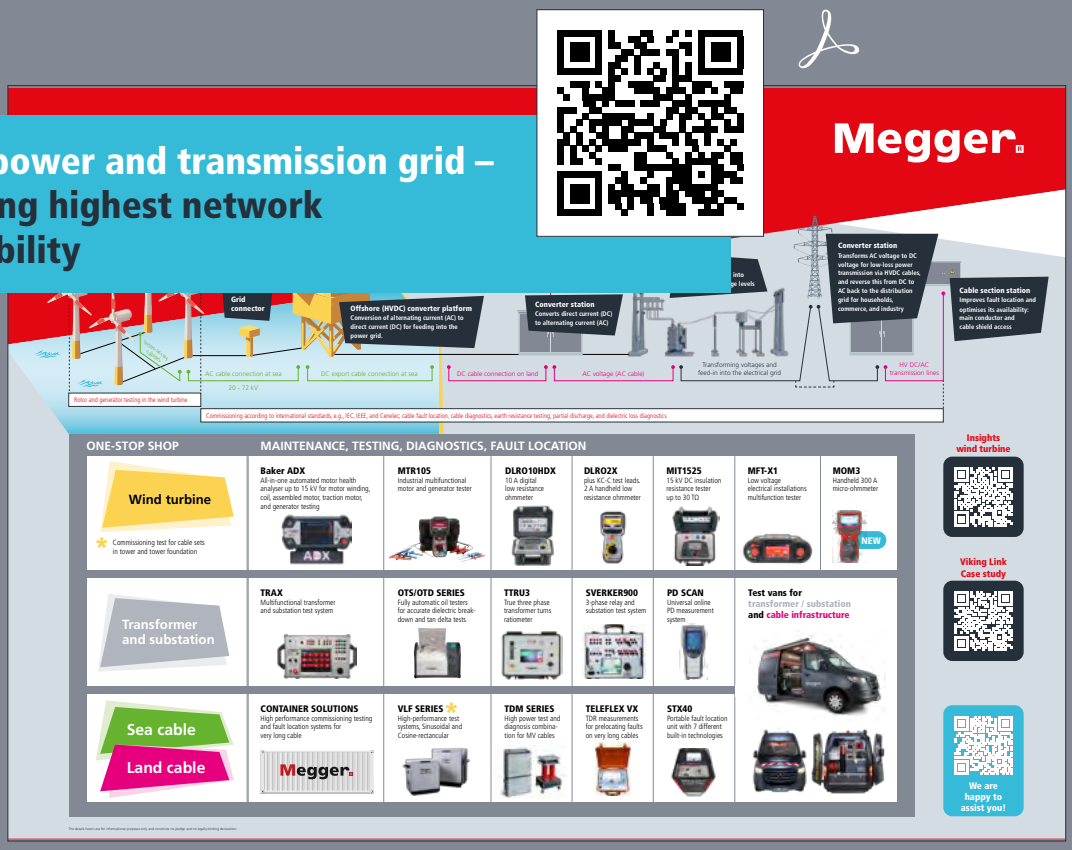
Please note:
The given testable lengths are based on single phase testing as per IEEE 400.2 recommended values and 0.1 Hz.
For diagnostics 1.5 U_0 (0.1 Hz or DAC 20 - 300 Hz)

ONE-STOP-SHOP OVERVIEWS OF DIFFERENT APPLICATIONS

Photovoltaic power – generating and ensuring a fault-free power supply



Wind power and transmission grid – ensuring highest network availability



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