Megger
Power on

Smart Thump

The Smart Thump is the only fault locator with built-in intelligence to interpret the results of the initial test sequence.

The “Turn & Click” rotary button operation allows the user automatically proof test, prelocate, and pinpoint the fault from one convenient control console. No adjustments are required.

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cable-segment-catalogue_EN_V02

Equipment for cable fault location, testing and diagnostics

Megger
Power on

The world leader

We are the world leader in cable test, diagnostic and fault location solutions. Featuring groundbreaking performance, robustness and ease of use, our cable test products are designed to give you faster, more accurate results. They find cable faults that other instruments cannot, maximising uptime and driving your costs down.

Cable test van systems – designed for your needs.

System descriptions at page 50

Megger
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CABLE TESTING

Megger's cable test solutions are comprehensive, with a focus on portability, usability and reliability. Cables can be highly capacitive, so testing the insulation often requires a significant power output from the test equipment. Many cable test systems are therefore quite large as a result.

Our experience in testing, knowledge of cables and cable test methods fuel our designs to address this, resulting in the most efficient solutions and best-in-class performance.

Overview Typical Defects vs. Cable Type

DAMAGE TYPE	XLPE	EPR	PILC	Hybrid System of Cable Types
Assessing failure risk due to local condition				
Local water tree	■	■		■
Local electrical tree	■ ■	■ ■		■ ■
All splices	■ ■	■ ■	■ ■	■ ■
Moisture			■	■
Dried out			■ ■	■ ■
Assesing General Integrity				
Water trees throughout	■ ■	■		
Electrical trees throughout	■ ■ □	■ □		
Global moisture			■ ■ □	■ □
Dried out			■ □	

Recommended Method	Megger Instrument	
Iso-Thermal Relaxation Current (IRC)	CDS	■
0.1 Hz TanDelta	VLF SINE TAN DELTA	■
True Leakage Current	VLF CR	□
0.1 Hz AC	VLF SINE & VLF CR	■
Partial Discharge (PD)	TDS NT & DAC	■
Return Voltage Method (RVM)	CDS	■

VLF SINE 34 KV / 45 KV / 54 KV

Test systems for medium voltage cables

FEATURES

- **High test capacity**
- **Continuous duty cycle (testing without operational interruptions)**
- **AC/DC testing in compliance with DIN VDE, EN, IEEE**
- **Intuitive user software with large internal memory**
- **Expendable to a full PD diagnostic system via the PDS 60 PD coupler**
- **Sheath testing and fault pinpointing according to IEC 60229**
- **Optional TanDelta with automatic evaluation according to IEC 400.2 - 2013**
- **Maximum user safety through automatic discharge of the test object and earth loop ground monitoring**
- **Breakdown detection and load recognition (R, C)**
- **Quick, easy logging and updates via USB port**

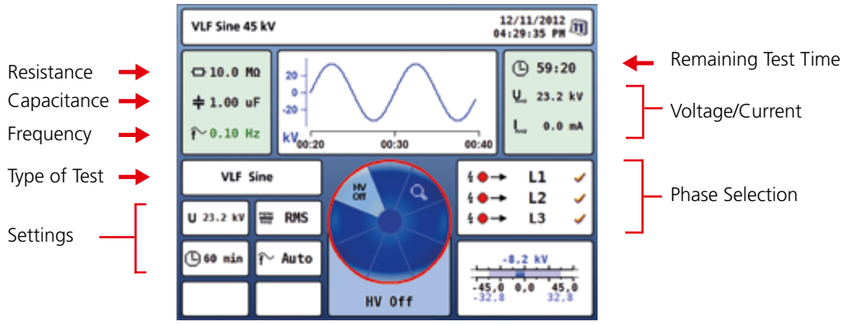
A Very Low Frequency withstand test is used to verify the dielectric integrity of the cable under test in modern polymeric cables. VLF sinusoidal and VLF cosine-rectangular are the two most common wave shapes used for VLF testing. Sine wave VLF carries out the withstand test by applying positive and negative voltage to the insulation, using charge and discharge cycles over 0.1 Hz (10 seconds) in the form of a sine wave. This provides an AC test while still allowing enough time to charge and discharge the cable capacitance of short to medium length cables. Additional testing capabilities such as Tan Delta and PD can also be added to gain more information about the insulation condition of medium voltage cables.

VLF Sine 54 kV (van mounted)

VLF Sine 34 kV

VLF Sine 45 kV

TECHNICAL DATA	VLF Sine 34 kV	VLF Sine 45 kV	VLF Sine 54 kV
VLF test voltage	0 to 34 kV_{peak}	0 to 45 kV_{peak}	0 to 54 kV_{peak}
Frequency	0.01 to 0.1Hz	0.01 to 0.1Hz	0.01 to 0.1Hz
Wave form	Sine	Sine	Sine
Testing cable capacitance	0.6 µF @ 0.1Hz 5.0 µF @ 0.01Hz	0.6 µF @ 0.1Hz 10 µF @ 0.01Hz	1 µF @ 0.1Hz 5 µF @ 0.01Hz
Optional TanDelta measurements	external	internal / external	external
DC test voltage	0 to ± 34 kV	0 to ± 45 kV	0 to ± 54 kV
Sheath testing	0 to 5kV or 0 to 10kV	0 to 5kV or 0 to 10kV	0 to 5kV or 0 to 10kV
Sheath pinpointing test voltage	0 to 5kV or 0 to 10kV	0 to 5kV or 0 to 10kV	0 to 5kV or 0 to 10kV
Pulse rate	1:3 or 1:4	1:3 or 1:4	1:3 or 1:4
Output current measurement	0 to14 mA	0 to 20 mA	0 to 35mA
Protection class	IP54	IP21	IP20
Dimension (W x D x H)	520 x 450 x 300 mm	544 x 520 x 416 mm	1000 x 600 x 500 mm
Weight	25 kg	50 kg	110 kg
Portable	Yes	Yes	Mounted inside van



VLF Sine 45 kV Operation Software

VLF Sine model	CABLE NOMINAL VOLTAGE				
	15 kV	25 kV	30 kV	35 kV	VLF Withstand
VLF Sine 34 kV	■				Installation
	■				Acceptance
	■	■			Maintenance
VLF Sine 45 kV	■	■			Installation
	■	■			Acceptance
	■	■	■	■	Maintenance
VLF Sine 54 kV	■	■	■	■	Installation
	■	■	■		Acceptance
	■	■	■	■	Maintenance

RECOMMENDED ACCESSORIES
TanDelta Diagnostics (internal or external)
ESG NT for sheath fault pinpointing
Partial Discharge Diagnostics

VLF CR 28 KV / 60 KV / 80 KV

High power test systems for medium voltage cables

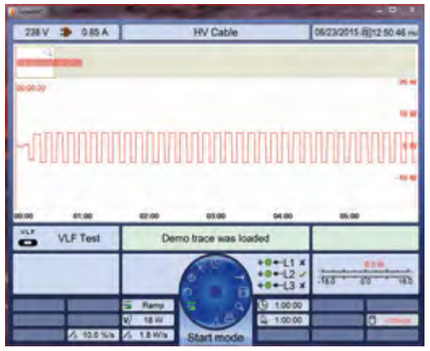
FEATURES

- **VLF Test, DC Test and Sheath Test in one device**
- **High test capacitance for testing all three phases simultaneously**
- **Integrated discharge system and breakdown detection**
- **Leakage current measurements for evaluation of the cable insulation quality**
- **Automatic reporting**

VLF CR (cosine-rectangular) is a Megger patented wave-form approved by IEC & IEEE. Portable VLF CR models can test high capacitances up to 5 µF @ 0.1 Hz, so are suitable for testing longer cables.

The high-performance and energy-efficient VLF CR test systems are used for testing cables according to the IEC/IEEE/CENELEC standards. Solutions are available from portable units to powerful systems with 25 µF testing capacity.

The Winkis VLF Software allows you to display and transfer stored data for evaluation and reporting.



TECHNICAL DATA	VLF CR 28 kV	VLF CR 40 kV	VLF CR 60 kV	VLF CR 80 kV
VLF test voltage	0 to 28 kV_{rms}	0 to 40 kV_{rms}	0 to 60 kV_{rms}	0 to 80 kV_{rms}
Frequency	0.1 Hz	0.1 Hz	0.1 Hz	0.1 Hz
Wave form	CR	CR	CR	CR
Testing cable capacitance	5 µF	2.4 µF (basic model) 4.8 µF (plus model)	1 µF (basic model) 2 µF (plus model) 6.5 µF (HP model)	2 µF (basic model) 2.5 µF (plus model)
DC test voltage	0 to 28 kV	0 to 40 kV	0 to 60 kV	0 to 80 kV
Sheath testing	2 to 10 kV	2 to 10 kV	2 to 10 kV	0 to 10 kV
Sheath pinpointing Test voltage	2 to 10 kV	2 to 10 kV	2 to 10 kV	0 to 10 kV
Pulse rate	1:3,1:4 or 1:9	1:3,1:4 or 1:9	1:3,1:4 or 1:9	1:3,1:5 or 1:9
Output current Measurement	0 to 12 mA	0 to 7 mA	0 to 5 mA	0 to 10.5 mA
Dimension (W x D x H)	550 x 700 x 420 mm	550 x 1100 x 420 mm (basic & plus model) 1350 x 1250 x 1100 mm (HP model)		1350 x 1250 x 1100 mm
Weight	25 + 25 kg	55 kg + 48 kg	85 kg + 48 kg (basic & plus model) 380 kg (HP model)	380 kg
Portable	Yes	Yes	Yes (basic & plus model) Van mounted (HP model)	Van mounted

VLF CR MODEL	CABLE NOMINAL VOLTAGE				
	15 kV	25 kV	30 kV	35 kV	VLF Withstand
VLF CR 28 kV	■				Installation
	■				Acceptance
	■				Maintenance
VLF CR 40 kV	■	■			Installation
	■	■			Acceptance
	■	■	■		Maintenance
VLF CR 60 kV	■	■	■	■	Installation
	■	■	■	■	Acceptance
	■	■	■	■	Maintenance
VLF CR 80 kV	■	■	■	■	Installation
	■	■	■	■	Acceptance
	■	■	■	■	Maintenance

RECOMMENDED ACCESSORIES

ESG NT for sheath fault pinpointing

ESG NT

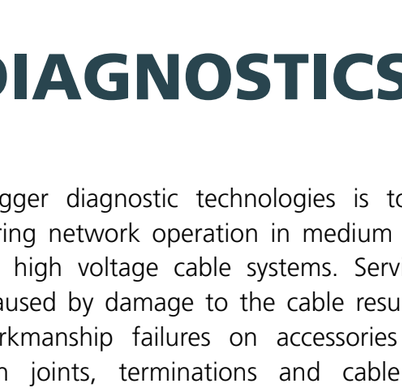
For customised solutions like VLF Test sets with 25 µF @ 60 kV please go to page 66

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.



50 Hz Slope Technology

MV DAC-30

Test & diagnostic system for medium voltage cables

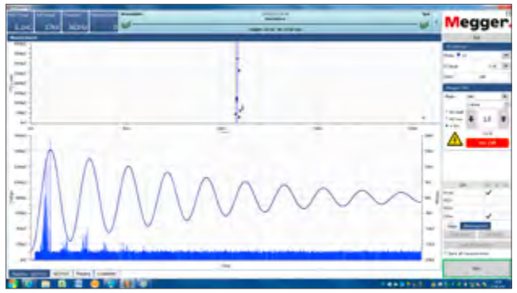
FEATURES

- **Safe operation thanks to enclosed metallic casing, integrated voltage source and PD detector**
- **Uses well proven DAC excitation voltage for PD measurements (acc. IEEE 400.0)**
- **Two part design for easy transportation**
- **Intuitive control and analysis software, suitable for the universal use with different systems**
- **PD mapping and statistical evaluation in real time**
- **Fully automatic report generation directly after a measurement**

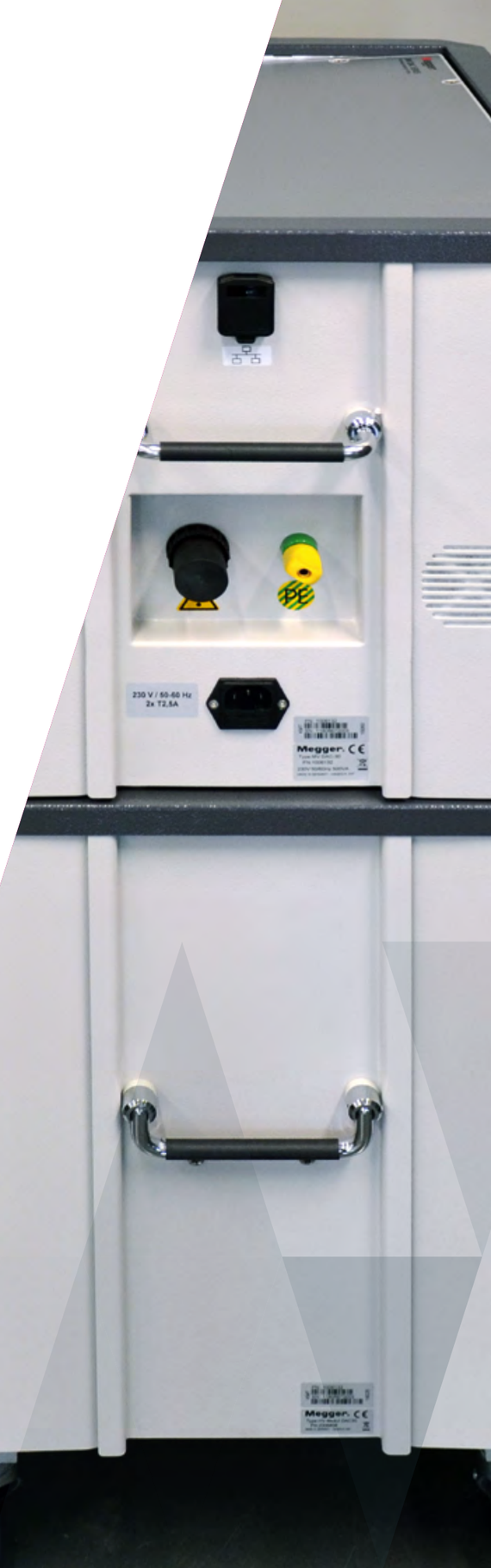
TECHNICAL DATA	MV DAC-30
Voltage range	3 … 30 kV_{peak}
DAC frequency	20 Hz … 500 Hz
Testable load capacitance	10 µF
Power supply	110/230 V, 50/60 Hz
Power consumption	500 VA at maximum
PD measuring range	2 pC …. 100 nC
System noise level	<2 pC
PD pulse repetition rate for charge evaluation	100 kHz
Charge evaluation	According to IEC60270
PD Localization	
Range	0 … 16 km / V/2 = 80 m/µs
Propagation velocity V/2	50 … 120 m/µs
Sample rate	125 MHz (8 ns)
Bandwith	3 / 20 MHz (switchable)
Accuracy	1% of cable length
Resolution	±1 pC / ±0,1 m
Filtering	Analogue and digital
Interfaces	Ethernet, external safety device
Weight	
HV module	45 kg
Control module	30 kg
Dimension (W x D x H)	56 x 42 x 100 cm
Protection class	IP20

PD - Partial Discharge 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 Damped AC (DAC) Voltage 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 between DAC slope and the 50/60 Hz power frequency, as it partially replicates operational conditions.

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, making it the safest unit on the market.



Partial Discharge Mapping



TDS NT SERIES

Combination system for cable test and diagnostics

FEATURES

- **Two proven voltage wave shapes in one device**
- **Standard compliant VLF 0.1 Hz cable testing with accompanying PD diagnostics**
- **Non-destructive PD diagnostics by means of proven DAC voltage (acc. IEEE 400.0)**
- **50/60 Hz slope technology for a direct comparison with the power frequency**
- **High test capacitance enables 0.1 Hz VLF tests on long cables or multiple phases in parallel**
- **Two-piece design allows for portable and easy transport**
- **Integrated leakage measurement**
- **Integrated discharge unit, earth-loop-monitoring and breakdown detection**
- **Fully automatic calibration**
- **Clear display of measurement results and realtime evaluation and display of results**
- **Report generation by mouse click**

The Megger TDS NT System combines VLF cosine rectangular and partial discharge with damped AC voltages to become one of the most powerful tools for cable insulation and accessory diagnostics. TDS NT consists of a multifunctional, compact voltage source and a PD detector. It can be used to test cables with a powerful VLF-CR, which complies with international standards (e.g. IEC 60502-2 and IEEE 400.2).

The TDS NT Series for PD diagnostics uses the new 50/60 Hz Slope Technology and can perform tests simultaneously with the help of the PD detector PDS 60. Alternatively, the TDS NT can also conduct a PD diagnostics with the proven damped AC voltage (DAC). It is important to note 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. As it is partially replicating the operational conditions, the 50/60Hz slope technology is able to give significantly more reliable information about the quality and condition of cables.

TDS NT 40 / 60

TECHNICAL DATA	TDS 40	TDS 60
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, resolutio 10 µA
Frequency		
VLF	0.1 Hz cosine-rectangular	
DAC	50 ... 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	
Protection class	IP 20	
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

TECHNICAL DATA	PD DETECTOR PDS 60
Voltage	
Operation	max. 60 kV_{rms}
Type	VLF Sine, VLF CR or DAC
Capacity of HV coupling capacitor	25 nF
Sensitivity range	2 pC ... 100 nC
PD self-noise level	< 2 pC
PD localization	
Measuring range	0 ... 16000 m / v/2= 80 m/µs
Propagation velocity v/2	50 ... 120 m/µs
Sampling rate	125 MHz (8 ns)
Bandwidth	3 / 20 MHz (switchable)
Precision	1% of the cable length
Resolution	±1 pC / ±0.1 m
Weight	
HV filter/ coupler	25 kg
PD detector	5 kg
Dimension (W x D x H)	39 x 54 x 76 cm
PD calibrator (IEC 60270 compliant)	
Measuring range	200 pC ... 20 nC
Power supply	9 V block battey
Software	easyGo principle, integrated cable database, fully automatic evaluation

TDM 45 SERIES

High power test & diagnostics combination for MV cables

FEATURES

- **Cable testing, cable diagnostics and sheath testing in one device**
- **Enables standard compliant high power VLF testing at 0.1 Hz (5 µF @ 40 kV_{RMS})**
- **Internal TanDelta measurement with automatic result interpretation according IEEE 400.2**
- **PD diagnostics using VLF Sine wave, Damped AC or 50/60 Hz Slope technology voltages**
- **Realtime evaluation of the data and display of results**
- **Automatic discharge of the test object and earth loop ground monitoring**
- **PD monitored withstand testing**
- **Report generation by mouse click**

The new TDM 45 series is a revolutionary breakthrough in testing and diagnostics of MV cables. The patented concept addresses the utilities' increasing need for test and measuring equipment that can adapt to different types of application. The system includes VLF Sine, VLF CR and HV DAC testing methods up to 60kV, providing the ultimate flexible solution for cable testing.

The modular concept allows the engineer to individually set-up the unit based on the type of job that needs to be executed. For example; if withstand testing on short cable lengths needs to be performed then only one module is needed. When part of the task requires a partial discharge diagnostics, then an additional module is needed.

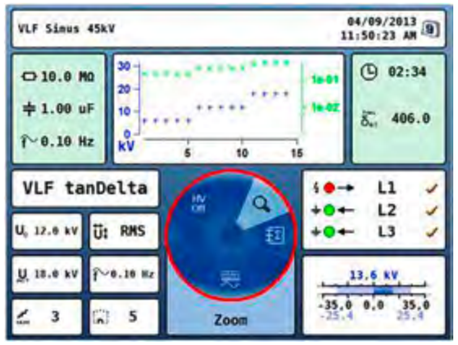
TDM 45-P (internal TD option available)

TDM 4540-P (internal TD option available)

PD Detector option

TECHNICAL DATA	TDM 45-P	TDM 4540-P
Output Voltage		
VLF Sine	0 to 45 kV_{peak}	0 to 45 kV_{peak}
VLF CR	-	0 to 40 kV_{RMS}
DC	0 to ± 45 kV	0 to ± 45 kV
DAC	-	0 to ± 40 kV_{peak}
Testable capacity (@ max voltage)		
VLF Sine	0.6 µF @ 0.1 Hz 10 µF @ 0.01 Hz	0.6 µF @ 0.1 Hz 10 µF @ 0.01 Hz
VLF CR	-	5 µF @ 0.1 Hz
DAC	-	5 µF
Sheath testing / pinpointing	0 to 5kV or 0 to 10kV	0 to 5kV or 0 to 10kV
Internal TanDelta	option	
Partial discharge	option PDS 60 (techn. data at page 15)	
Protection class	IP 21	
Dimension (W x D x H)	544 x 416 x 520 mm	544 x 416 x 520 mm + 544 x 416 x 424 mm
Weight	50 kg	50 + 42 kg

APPLICATION	TDM 45-P	TDM 4540-P
VLF testing short cables	■	■
VLF testing long cables		■
TanDelta diagnostics	With TD option	With TD option
Partial discharge diagnostics with VLF Sine wave	With PD option	With PD option
Partial discharge diagnostics with DAC and 50Hz Slope technology		With PD option



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 fault resulting in an unplanned outage. The costs of unplanned outages in the transmission network are extremely high so policy engineers need to optimise their condition assessment and predictive maintenance regimes.

The HV DAC-300 and HV DAC-200 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	HV DAC-300
Output Voltage DAC	18-141 kV_{RMS} / 25-200 kV_{peak}	18-212 kV_{RMS} / 25-300 kV_{peak}
Commissioning cable	up to132 kV	up to 230 kV
Commissioning standard	IEC 60840 / IEEE 400.4	IEC 62067 / IEEE 400.4
PD testing standard	acc. to IEC 60270	acc. to IEC 60270
Software	For operation, evaluation & reports	For operation, evaluation & reports
Frequency range	20Hz – 300Hz	20Hz – 300Hz
Capacity range	0.035µF - 8µF 200m – 40 km @ 0.2 µF/km	0.035µF - 8µF 200m – 40 km @ 0.2 µF/km
Charging current	20 mA	12.5 mA
PD range and resolution	2 pC – 100 nC & ± 1pC	2 pC – 100 nC & ± 1pC
Weight	950 kg (incl. flight cases)	1100 kg (incl. flight cases)

UHF PD DETECTOR

Handheld online PD substation surveying system

FEATURES

- **Non-invasive tool for online PD measurements in MV and HV substations**
- **Large color touch-screen for easy operation**
- **Dual channel system for direct comparison between two sensors**
- **Synchronization with power frequency via internal, mains or external sensor for PRPD pattern recognition**

The UHF PD Detector is the ideal tool for quick, non-invasive surveys in MV and HV substations and should be part of the toolkit for all maintenance and service teams. Due to its high measurement bandwidth, the UHF method provides accurate local online partial discharge (PD) measurements on HV components such as cable end-terminations, surge arrestors, voltage transformers and isolators.

MV switchgear surveys can also be carried out using radio frequencies in combination with TEV and HFCT sensors. The phase resolved PD pattern (PRPD) display helps to identify type of defect and, importantly, differentiate the noise from the PD signal. Noise can affect PD readings, leading to a false interpretation of the results and unnecessary component replacement. The noise handling capability of the Megger UHF PDD ensures a true reading of PD, eliminating false positives, so that only failing components are identified for replacement.

The handheld unit can either be operated using a keypad or using the large 6" colour touchscreen. It has a battery life of over 10 hours. Its features and performance make the UHF detector the most unique and cost-effective unit of its kind.

TECHNICAL DATA	UHF PDD
Frequency range	
UHF RF	150 ... 1000 MHz 100 kHz … 70 MHz
Sensitivity	-90 dBm
Display	color touchscreen, 640 x 480 px
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
Charging time	± 6 hours
IP rating	IP 65; IP 67 (in transport case)

RECOMMENDED ACCESSORIES
UHF Sensor for permanent installation

CDS

Cable diagnostic system

The portable CDS is used as universal dielectric diagnostic system on PE / XLPE insulated cables as well as paper insulated cables. It combines the known methods of Isothermal Relaxation Current measurement (IRC-Analysis) and Return Voltage Method (RVM-Analysis) for aging and deterioration diagnostics.

The results of this measurement give the cable operator essential information about the service reliability of the section under test. This information is very useful in the final decision making; whether or not to repair or replace the cable section in question.

FEATURES

- **Absolutely non-destructive condition evaluation of PE / XLPE / paper-oil insulated cable systems**
- **Three-phase parallel measurement for current and voltage – duration of a complete measurement is 1 hour**
- **Extended dynamic range for IRC measurement for long cable segments**
- **Measurement of charging current during formation**
- **Extended capacity of internal rechargeable battery for serial measurements**
- **Extended formation voltage up to 5 kV – suitable for diagnostics on HV cables**

TAN DELTA TEST ATTACHEMENT

Integral cable diagnostic system

The tan delta test attachment 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 test attachment the ideal instrument for monitoring cable conditions.

The tan delta test attachment can be used as a standalone system with portable VLF sine systems or in combination with the integrated VLF sine test systems in test vehicles.

FEATURES

- **Automatic result interpretation acc. to IEEE 400.2**
- **Leakage current correction for precise measurements**
- **Unaffected by multiple earthings**
- **Easy to operate**

TECHNICAL DATA	TD TEST ATTACHMENT
TanDelta measuring range	
Measuring range	1×10^{-4} … 1×10^{0}
Measuring accuracy	1×10^{-4}
Resolution	1×10^{-5}
Frequency	0.01 Hz … 10 Hz
Testable cable capacitance	2 nF … 3 µF
Measuring range current	
Test unit (MDU)	1 µA … 25 mA
Diverter box (TCU)	1 µA … 1 mA
Measuring range insulation resistance	
Measuring range	1 MΩ … 10 TΩ
Power supply	
Test unit / diverter box	battery operated
Charger	90 V … 240 V, 50/60 Hz AC (via power cable) or 12 V DC
Operating time	
Test unit (MDU)	16 hours (with TCU) 32 hours (without TCU)
Diverter box (TCU)	24 hours
Charging time	3.5 hours
Operating temperature	-25 °C … +55 °C
Storage temperature	-40 °C … +70 °C
Dimensions	
System case	400 x 170 x 330 mm

CABLE FAULT LOCATION

Faults are the "natural enemy" of reliability. A cable fault can cause an expensive unplanned outage or delay the commissioning of a new part of the network, so they need to be found and rectified quickly to enable new connections or restore the consumers' supply.

Engineers can find underground cable faults by accurately determining the distance to the fault (prelocation) and subsequently determining the exact location of the fault (pinpointing).

Cable fault location on power and communication cables is a specialised area of expertise, but Megger fault locators make it simple: each instrument's intuitive operation guides you through the fault finding process. Innovative Megger products make it possible for the user to quickly find and localise cable faults without causing damage to fault-free parts of the cable, using well-defined fault finding techniques and the appropriate test equipment.

TELEFLEX T3090, SX, VX

Time domain reflectometers (TDRs)

Time domain reflectometers (TDRs) are used for finding the distance to a fault. Designed for fast processing during fault location on a power cable, the range of Telflex TDRs can work alone or in combination with either portable or van mounted cable fault location systems.

The Teleflex series are very powerful, efficient and easy-to-use systems ranging from the three-channel Teleflex VX, the two-channel Teleflex SX and the single-channel T3090. The easyGO and easyMODE interfaces guide the user through each step in the fault location process. The Teleflex and T3090 are operated from a single jogdial, and the Teleflex VX* and Teleflex SX can be also operated through the touchscreen.

TECHNICAL DATA	T3090	SX	VX
Operation mode	Single button AC and battery	Single button AC & battery touchscreen	Single button AC & battery touchscreen
Measuring range @ 80m/µs	8 km	160 km	1280 km
Supported HV methods	ARM ** Surge Pulse, ICE, sectionalizing	ARM, ICE, Decay, ARM burning, IFL	ARM, ICE, Decay, ARM burning, IFL
Pulse amplitude	35 V	Adjustable: 10-50 V	Adjustable: 30-160 V
Resolution	0.8m @ 80 m/µs	0.1m @ 80 m/µs	0.1m @ 80 m/µs
ARM trigger	Automatic	Automatic	Automatic
ARM slide	1	15 traces per shot	15 traces per shot
Memory	External USB stick	2 GB	4 GB
Working interface	EasyMode	EasyGo	EasyGo
Interface	USB	USB, Ethernet	USB, Ethernet
Display color	5.7" (10.4")	10.4"	15" Van mounted: 17" or 21.5"
Sample rate	100 MHz	400 MHz	400 MHz
Mounting	Portable	van or portable	van or portable
Channels	1 channel	2 channels	3 channels
Protection class	IP54	IP65 closed, IP54 open	IP65 closed, IP54 open
Weight	7.8 kg	10 kg	20 kg
Dimension (W x D x H)	270 x 245 x 125 mm 279 x 381 x 152 mm	362 x 306 x 195 mm	483 x 295 x 200 mm

* For van mounted system
** Optional techniques per customer request

TDR2050

Advanced Dual Channel TDR

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.

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**

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

Adapter for the safe operation of Teleflex reflectometers on overhead line systems

Used together with a reflectometer, the overhead line testing system can show impedance irregularities in disconnected overhead lines of all voltage levels. These irregularities include short circuits, breaks and intermediate conditions. The system is mainly used for checking the overhead lines before they are switched back on, avoiding damage from travelling waves and potentially fatal problems. Regular checks should be performed, particularly to detect any changes in the line. The special design and switch-on system eliminate risks to the operator and damage to the equipment from induced voltages and currents.

FEATURES

- **Easy to operate**
- **Very good resolution at close and long range**
- **Dangerous induction voltages reliably discharged**
- **Test pulse up to 1,500 V for long distances**
- **For distances over 2,000 km**

TECHNICAL DATA

Mains voltage	230 V ± 10% 49...61 Hz ≤ 70 VA
Transmission pulse power	Nominal value ≥ 300 / 7500 W
Peak pulse voltage	at Z = 300 Ohm ≥ 300 / 1500 V
Pulse width	10 µs und 20 µS, switchable
Output impedance	300 Ohm
Triggering	Internal (pulses triggered every 0.5 s)
Filter transmission range	≤ 3 dB
Filter ranges	10 ... 2000 kHz 1 MHz 10 ... 1000 kHz 300 kHz 10 ... 300 kHz 100 kHz 10 ... 100 kHz
Temperature	max. 90 °C
Inductivity	20 mH ± 20 % ≤ 0,5 Ohm
Overcurrent protection	40 A fuse wire in the feed cable
Connection type	Single phase
Dimensions	600 x 400 x 260 mm
Weight	48 kg
Operating temperature	- 25 °C … + 50 °C (without Teleflex)
Storage temperature	- 40 °C … + 70 °C (without Teleflex)
Relative humidity	≤ 93 % at 30 °C
Degree of protection	IP 54

SWG SERIES

Surge wave generators

Surge wave generators are the central component of cable fault location. They are used for both pinpointing and prelocation in combination with an ARM filter and reflectometer.

SWG 1750

FEATURES

- **Surge generators for most voltages and output up to 3500 J**
- **Optimized surge energy for switchable capacitors**

TECHNICAL DATA	SWG 500	SWG 505	SWG 1750 C optional: leakage current measurement	SWG 1750 C-4	SWG 3500
Surge voltage	0 ... 2.5/5/10 kV 0 ... 4/8/16 kV	3 kV 4 kV 5 kV	0 ... 8 kV 0 ... 16 kV 0 ... 32 kV	0 ... 2 kV 0 ... 4 kV 0 ... 8 kV 0 ... 16 kV 0 ... 32 kV	0 ... 8 kV 0 ... 16 kV 0 ... 32 kV
Energy	195 J 500 J	180 J 320 J 500 J	1750 J 1750 J 1750 J	1130 J 1130 J 1750 J 1750 J 1750 J	3500 J 3500 J 3500 J
Surge sequence	1.5 ... 6 sec. Single Shot	1.5 ... 6 sec. Single Shot	2.5 ... 10 sec. Single Shot	2.5 ... 10 sec. Single Shot	2.5 ... 10 sec. Single Shot
DC testing I_{max}	185 mA 300 mA	129 mA 172 mA 213 mA	210 mA 105 mA 53 mA	3650 mA 1850 mA 210 mA 105 mA 53 mA	210 mA 105 mA 53 mA
Dimension (W x D x H)	520 x 280 x 530	520 x 255 x 530	520 x 430 x 630	520 x 430 x 630 520 x 430 x 460	520 x 430 x 630 520 x 270 x 410
Weight	47 kg	43 kg	97 kg	173 kg	129 kg

SWG 500

SWG 505

ARM filter

EZ-THUMP, SMART THUMP, PFL22M1500

Portable cable fault locator systems

The portable cable fault locator series of Megger provide a versatile solution for advanced identification, prelocation and pinpointing of cable faults on a wide variety of cable types.

TECHNICAL DATA	EZ-Thump	Smart Thump	PFL22M1500
Display	Transflective 5.7 in (14.5 cm) LCD color	Transflective, 5.7 in (14.5 cm) TFT	Color 10.4 in (26.4 cm) Full XGA
Insulation resistance test	–	Included	–
DC Testing	0 ... 12 kV or 0 ... 4 kV	0 ... 16 kV	0 ... 20 kV
Breakdown detection	Automatic	Automatic	Manual
Burning	14 mA or 45 mA	60 mA max.	0 - 20 kV 58 mA 0 - 10 kV 115 mA
Surge voltage	0 ... 12 kV or 0 ... 4 kV	0-8 and 0-16 kV	0-8 and 0-16 kV
Surge sequence	4 - 12 sec	4 - 12 sec.	Adjustable 5 - 30 sec Single Shot
Surge energy	500 J @ max. voltage	1500 J @ max. voltage	1500 J @ max. voltage
Sheath fault location	up to 5 or 4 kV	Up to 5 kV	-
HV prelocation methods	ARM	ARM ICE (surge pulse)	Arc Reflection Arc Reflection Plus Differential Arc Reflection Impulse Current
Protection class	IP534 (open lid)	IP534 (open lid)	IP534
Supply	110 ... 230 V and battery 24 V / 5 AH	120/230 V, 50/60 Hz 12 V deep cycle marine battery	108-132/208-265V, 47/63 Hz Ext. 12 V battery (optional)
Dimension (W x D x H)	355 x 280 x 533 mm	500 x 750 x 350 mm	965 x 536 x 503 mm
Weight	32 kg	134 kg	131 kg
Typical conductor isolation & size	PE/XLPE/EPR #4 – 500 MCM	PE/XLPE/EPR #2 – 500 MCM	PE/XLPE/EPR #2 – 500 MCM
Typical conductor length	500 m	5000 m	5000 m with 2000 J option

EZ-Thump

The practical and efficient solution for fast on-site fault location. Quick-step and expert modes, especially convenient where operator may not be called upon to use the equipment on a regular basis.

FEATURES

- **Compact, lightweight and rugged field instrument**
- **Battery and AC line operation**
- **Automatic end-of-cable and fault locating**
- **4 kV or 12 kV output versions available**
- **ARM® Prelocation**
- **500 Joules for pinpointing fault location**
- **Sheath testing and sheath fault locating (opt .ESG-NT required)**
- **F-OHM**

Smart Thump

The Smart Thump is the only fault locator with built-in intelligence to interpret the results of the initial test sequence. The "Turn & Click" rotary button operation allows the user automatically proof test, prelocate, and pinpoint the fault from one convenient control console. No adjustments are required.

FEATURES

- **Delivers 1500 J at 8/16 kV**
- **16 kV DC high voltage proof test and insulation resistance test**
- **Battery and AC line operation**
- **ARM & ICE Fault Prelocation**
- **easyGO - automatic sequence to proof test, prelocate and pinpoint**
- **Interpretation of test results**
- **Safety / grounding check**
- **Sheath testing and sheath fault locating (opt .ESG-NT required)**

PFL22M1500

The PFL22M1500 power cable fault locator is designed to provide quick, effective, accurate and safe fault location, thereby reducing system outages and minutes lost. This instrument comes in a rugged yet portable enclosure. Its IP64 rating makes it suitable for use in even environmentally hostile conditions.

FEATURES

- **HV insulation testing to 20 kV**
- **Burn up to 115 mA**
- **8/16 kV, 1500 Joules surge output**
- **ARM, ARM Plus & ICE (current impulse)**
- **Integrated large screen color TDR**
- **Optional onboard inverter available**

Surgeflex series

Portable cable fault locator systems

TECHNICAL DATA	SFX 5-1000	SFX 8	SFX 16
Display or TDR	¼ VGA display	Teleflex SX	Teleflex SX
Insulation test	1 kΩ ... 250 MΩ	–	–
DC testing	0 ... 5 kV DC	0 ... 8 kV DC	0 ... 24 kV DC
Leakage current	0 ... 1 / 10 / 100 mA automatic range setting	–	–
Breakdown detection	0 ... 5 kV Automatic	0 ... 8 kV Manual	0 ... 16 kV Manual
Burning	0 … 500 V; 1.0 A 0 … 2000 V; 0.25 A 0 … 5000 V; 0.1 A	0 ... 2 kV ; 1400 mA 0 ... 4 kV; 700 mA 0 ... 8 kV; 350 mA	0 ... 4 kV; 200 mA 0 ... 8 kV; 100 mA 0 ... 16 kV; 50 mA
Surge voltages	0 ... 2 kV; 0 ... 4 kV	0 ... 2 kV; 0 ... 4 kV 0 ... 8 kV	0 ... 4 kV; 0 ... 8 kV 0 ... 16 kV
Surge energy	1000 J	1000 J	2.000 J
Surge rate	Single pulse; 3 … 10 sec.	2 ... 6 sec. and single shot	3 ... 10 sec. and single shot
Sheath fault location	0 … 500 V/2000 V/5000 V	–	0 ... 5 kV
Cycle intervals	DC; 1:3; 1:4; 1:6	–	1:3 ... 1:10
HV prelocation methods	ICEplus	ARM, ICE current decoupling, decay voltage coupling	ARM, ICE current decoupling, decay voltage coupling
Protection class	IP20	IP54	IP20
Supply	230 V; 50/60 Hz (110 V optional)	120/230 V, 50/60 Hz	120/230 V, 50/60 Hz
Dimension (W x D x H)	520 x 560 x 430 mm	790 x 770 x 1185 mm	790 x 715 x 1160 mm
Weight	approx. 45 kg	164 kg	203 kg

RECOMMENDED ACCESSORIES
Surge wave receiver digiPHONE+
Earth fault locator ESG NT
Audio frequency cable tracer and fault locator Ferrolux
Main and ground cables
External safety unit with emergency OFF, signalling lights according to VDE 0104 / DIN EN 50191 for portable and vehicle installed versions

digiPHONE+
(page 44)

TECHNICAL DATA	SFX 25	SFX 32	SFX 40
Display or TDR	Teleflex SX	Teleflex SX	Teleflex SX
Insulation test	–	–	Voltages 1,000 V and 5,000 V Ranges 1 kΩ, 1 MΩ, 100 MΩ
DC testing	0 ... 12.5/25 kV DC	0 ... 32 kV DC	0 ... 40 kV DC
Leakage current	–	–	0 ... 1 / 10 / 100 mA automatic range setting
Breakdown detection	0 ... 12.5/25 kV Manual	0 ... 32 kV Manual	0 ... 40 kV Automatic
Burning	0-12.5 kV; 28 mA 0-25 kV; 14 mA	0 ... 8 kV; 200 mA 0 ... 16 kV; 100 mA 0 ... 32 kV; 50 mA	0 ... 8 kV; 750 mA 0 ... 20 kV; 0.1 A
Surge voltages	0 ... 12.5 kV 0 ... 25 kV	0 ... 4 kV; 0 ... 8 kV 0 ... 16 kV; 0 ... 32 kV	0 ... 4 kV; 0 ... 8 kV 0 ... 16 kV; 0 ... 32 kV
Surge energy	1150 J	1200 J (4kV surge stage only) 1750 J / 2000 J / 3500 J	1.000 J / 2.000 J
Surge rate	3 ... 9 sec. and single Shot	3 ... 10 sec. and single Shot	3 ... 10 sec. and single shot
Sheath fault location	–	0 ... 5 kV	0 ... 5 kV and 0 ... 10 kV
Cycle intervals	–	2.5 ... 10 sec.	DC; 1:3; 1:4; 1:6
HV prelocation methods	ARM, ICE current decoupling	ARM, ICE current decoupling, decay voltage coupling	ARM, ICE current decoupling, decay voltage coupling
Protection class	IP54	IP20	IP20
Supply	120/230 V, 50/60 Hz Int. 12 V deep cycle marine battery	120/230 V, 50/60 Hz	120/230 V, 50/60 Hz
Dimension (W x D x H)	600 x 1250 x 600 mm	800 x 1280 x 800 mm	520 x 430 x 1050 mm
Weight	120 kg	203 kg	190 kg

ESG NT
(page 44)

Ferrolux
(page 43)

Surgeflex series

Portable cable fault locator systems

Surgeflex 5-1000

The SFX 5-1000 is a portable multi functional system for cable testing, fault conditioning pre- and pinpoint location of faults in low voltage distribution systems.

Using the patented ICEplus prelocation method the operator has an very easy to use tool for prelocation of faults, especially in branched low voltage distribution systems.

FEATURES

- **ICEplus for the easy and reliable fault prelocation without interference from branches**
- **High surge energy for pinpointing**
- **Testing up to 5 kV**
- **Automatic detection of the breakdown voltage**
- **Pinpointing with the integrated surge generator 0 … 2 / 4 kV 1000 J**
- **Pulsed DC for sheath fault pinpointing**

Surgeflex 8 / Surgeflex 16

The semi-automatic Surgeflex (SFX) series consists of portable fault location systems designed for various applications: cable testing, prelocation, fault conditioning, pinpointing, and sheath fault location. The SFX systems feature various prelocation methods such as the ARM (Arc Reflection method), ICE (Impulse Current Equipment), Decay, IFL (Intermittent Fault Location), step potential method, and burning. In connection with an acoustic fault pinpointer or an earth fault locator (digiPHONE+ or ESG NT recommended), pinpointing becomes quick and easy. The SFX systems come in a trolley with big wheels. This provides comfortable transportation and makes them suitable for field use. All HV and LV connection cables are included in the scope of delivery.

FEATURES

- **High performance fault location systems**
- **0.1% accuracy**
- **Sophisticated ARM®-Multishot technology**
- **HV and LV prelocation in one modular unit**
- **High surge energy**
- **Multi-stage surge capacitors**

Surgeflex 25

The power cable fault locator systems are designed to provide safe, quick, accurate, and easy fault locating performance. The SFX 25 is typically used on 25 kV URD circuits which are made of solid dielectric cables (XLPE, EPR). They are 3 to 5 km long, with a conductor size of up to 500 MCM (250 mm2).

FEATURES

- **Dual stage cap 1150 J @ 12.5/25 kV**
- **Internal filter for arc reflection method**
- **Internal coupler for surge pulse (ICE) method**
- **Available either mounted on a heavy-duty portable hand cart or installed in a vehicle**
- **Burn/hipot test up to 25 kV**
- **7.62 km TDR range, 30 km optional**

Surgeflex 32

The Surgeflex 32 is a mobile system for testing and fault locating on low and medium voltage cables. It is operated by the new touchscreen and well proven control knob functionality with Teleflex SX. Surgeflex 32 can also be ordered with Teleflex 3090.

FEATURES

- **DC testing up to 32 kV**
- **Prelocation**
  - Reflection measurement
  - ARM measurement up to 32 kV
  - Decay up to 32 kV
  - ICE Impulse current method
- **Burning (fault conditioning) up to 32 kV**
- **0 ... 4 kV @ 1200 J or 0 ... 8 / 16 / 32 kV @ 1750 / 2000 / 3500 Joules pinpointing**
- **Sheath fault locating (0 ... 5 kV power regulated)**

Surgeflex series

Portable cable fault locator systems

Surgeflex 40

A portable, trolley mounted or vehicle installed multi-functional system for testing, prelocation, pinpointing and converting cable faults in low and medium voltage networks. The system is either controlled directly by Teleflex SX reflectometer or the integrated control panel.

The system supports easy and clear handling, even for inexperienced users.

FEATURES

- **Delivers 1000 or 2000 Joule in each voltage level 4 / 8 / 16 / 32 kV**
- **40 kV DC high voltage proof test and insulation resistance test**
- **easyGO - automatic sequence to proof test, prelocate and pinpoint**
- **Automatic interpretation of test results**
- **Safety / grounding check**

LINE LOCATION SYSTEMS

Tracing and Pinpointing

Megger Cable Location Systems allow you to quickly and reliably trace cables, identify the exact route, and obtain a comprehensive view of the cable network.

TECHNICAL DATA	Ferrolux FL 10 Set	Ferrolux FL 50 Set	Easyloc Plus
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 ... 10 W, Manually switchable in 0.5 W increments	0 ... 50 W, Manually switchable in 2.5 W increments	0.1 W; 0.5 W and 2 W Continuous and pulsed signal (switchable)
Active frequencies	491 Hz / 982 Hz / 8.44 kHz	491 Hz / 982 Hz / 8.44 kHz	100 Hz /120 Hz 8 kHz / 33 kHz
Passive frequencies	50 Hz / 60 Hz / 100 Hz / 120 Hz	50 Hz / 60 Hz / 100 Hz / 120 Hz	Radio: 15 kHz ... 23 kHz, Power: 50 Hz ... 250 Hz, Easyloc TX / Sonde: 33 kHz
Receiver techniques	Null or minimum Peak or maximum Super maximum	Null or minimum Peak or maximum Super maximum	Peak or maximum
Measured parameters	Loop impedance, current, voltage	Loop impedance, current, voltage	-
Depth measurements	0.1 m ... 7 m; (active frequencies only)	0.1 m ... 7 m; (active frequencies only)	Cables: 0.3 m ... 5 m Sondes: 0.3 m ... 7 m
Current measurements	1 mA ... 400 A / 180 A / 20 A	1 mA ... 400 A / 180 A / 20 A	-
Cable selection/identification	Included	Included	-
Internal memory	Data recording with graphic display	Data recording with graphic display	-
Location of cable sheath fault	-	Included	-
Protection class	IP 54	IP 54	Receiver: IP 56 IP 67 (below the battery case) Transmitter: IP54
Operating time	Receiver: >13 h Transmitter: 2.5 h at 10 W	Receiver: >13 h Transmitter: >1 h at PA=50 W or >5 h at PA=10 W	Receiver: > 40 h Transmitter: > 40 h
Dimensions receiver	55 x 10 x 4 cm	55 x 10 x 4 cm	10 x 67 x 26 cm
Dimensions transmitter	25 x 12 x 17 cm	41 x 33.5 x 17.5 cm	26 x 25.5 x 14 cm
Weight receiver	2,4 kg	2,4 kg	2,5 kg
Weight transmitter	2.9 kg	14 kg	2,6 kg

FERROLUX® FL SET

Location of cables and pipes

The FERROLUX® System provides solutions to a wide variety of problems for operators of power and telecommunication cable systems and public utility companies. The FERROLUX Audio Frequency System can be used for pipelines and cable tracing, cable selection and location of cable faults.

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**
- **Direct measurement of cable depth and signal current strength**
- **Signal select feature for unambiguous identification of targeted cable**
- **Cable locating with left-right guidance**
- **Automatic or manual frequency selection**
- **Multi-frequency operation – three frequencies at the same time**
- **Indication of dangerous output voltage**
- **Location of sheath faults**
- **Extensive PC software for evaluation of measurement data**
- **Rechargeable batteries**

Ferrolux FLG 50

RECOMMENDED ACCESSORIES
Mini antenna FLA 10 (for cable selection)
Step voltage probe DEB 3-10 (for sheath fault locating)
Transmitter clamp UZ 50, UZ 100 (for on-live cables)

Ferrolux FLE 10

Ferrolux DEB 3-10

Ferrolux FLG 10

EASYLOC

Tracing of cables and pipes

The Easyloc is a fast and simple to operate system for the detection and tracing of undergrounded cable and pipe systems. The Easyloc receiver shows the signal level received and marks the maximum. The operators can work with the audio signal and the visual confirmation at all times. Depth measurements can be obtained at the push of a button, identifying the selected sensor.

FEATURES

- **Avoid cable damage and help to minimize costly accidents 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 automatic backlight**
- **Quick and simple to operate**

VLF CR MODEL	Easyloc Basis	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

DIGIPHONE+

Surge wave receiver

Hear just what you need to hear during pinpointing operations thanks to the noise cancelling technology of the digiPHONE+. New audio-feedback technology uses acoustic and magnetic detection to pinpoint underground cable faults accurately and reliably. The digiPHONE+ works by measuring the energy around an underground fault.

It measures distance by timing between the electromagnetic "flash" and the seismic (or acoustic) jolt created at the moment of flashover, similar to the time difference between a flash of lightning and a thunder crack.

FEATURES

- **Easiest operation with bright, readable display**
- **Automatic adjustment of values**
- **BNR – Background Noise Reduction**
- **APM – Auto Proximity Mute when approaching the handle. ("Bang" protection)**
- **84 dB(A) limiter (according to noise and vibration protection laws, e.g. "OSHA")**
- **Distance measurement in milliseconds or meter/feet**
- **Easy tracing with left-right indicator**
- **"Compass" for fault direction indication**
- **High ground stability of the sensor up to 45°**

ESG NT

Digital earth fault locator

The earth fault locator ESG NT is used for the high accuracy pinpointing of a sheath fault. The easy-to-use instrument utilizes a bright, sun readable TFT color display.

A fully automatic calibration keeps the display always at zero. The integrated noise suppression eliminates all influences by DC, railway currents, industrial plants and high resistive soil environment.

With two earth rods, the ground step voltage potential is measured and the direction towards the fault is indicated by the display.

FEATURES

- **Automatic adaptation to voltage level**
- **Automatic filtration of interfering signals**
- **Automatic zero calibration, no adjustments necessary**
- **History mode**
- **High-contrast color display**

DIGIPHONE+ NT Set

Location of cables and pipes

Megger has combined the two systems digiPHONE+ and ESG NT in one device: the digiPHONE+ NT Set.

The acoustic-magnetic cable fault pinpointing and step voltage pinpointing of cable sheath faults can be done easily, quickly, and reliably.

The operating mode switches automatically by identifying the selected sensor.

FEATURES

- **Inexpensive cable identifier system**
- **Easy to operate and safe handling**
- **Avoids false positives**

TECHNICAL DATA	ACOUSTIC PART
Safety	Volume limitation to 84 dB(A)
Gain	>120 dB, automatic
Dimensions	Diameter 230 mm
Height	140 mm
Handle length	450 ... 750 mm adjustable
Weight	2.2 kg (including handle)
Dynamic range	Acoustic channel > 110 dB
Frequency operating range	100 ... 1500 Hz
Filter stages	Off 100 ... 1500 Hz Low pass 100 ... 400 Hz Band pass 150 ... 600 Hz High pass 200 ... 1500 Hz
Protection rating	IP 65

TECHNICAL DATA	STEP VOLTAGE PART
Sensitivity	5 µV ... 200 V
Suppresion of disturbances	50/60 Hz, 16 2/3 Hz, KKS, DC
Zero adjustment	Automatically
Pulse recognition	Automatically
Length – earth rods	1 m (dividable and isolated)
Weight – earth rods	0.8 kg each
Length – test leads	2 m

PIL 8

Phase identification in earthed and shortcircuited medium voltage cables

The Phase Identification System PIL 8 permits a fast and safe phase determination at the jointing location during the mounting of medium voltage cables.

The VDE regulations stipulate that if for the purpose of a phase identification in medium voltage cables it is necessary to disconnect the earthing and short-circuiting for the duration of the measurement, other suitable safety measures have to be implemented.

The PIL 8 unit meets this requirement, inasmuch as its application eliminates the need of disconnecting the short-circuiting and earthing circuit.

FEATURES

- **Maintenance free transceiver clamps**
- **Suitable for any type of switch gear**
- **Requires only one person**
- **Easiest operation**
- **Absolute safe phase identification**

CI/LCI

Reliable cable selection for energised and de-energised cables

The CI & LCI are cable identifiers that single out a specific cable in a trench within a group. The consequences of cutting the wrong cable can be fatal. The CI will safely identify a de-energized primary HV cable within a group of energized or de-energized cables. The LCI will also identify the cable on energized low voltage cables. The transmitter sends a pulsed signal, which the CI and & LCI use to detect the correct cable. Pulsing the signal allows the operator to distinguish between their signal and background noise. The receiver uses green LEDs to clearly confirm the correct cable, which is generally accompanied by maximum signal strength. This double confirmation provides the user with maximum confidence in the result.

The transmitter can operate on 120 VAC or internal battery. The standard combination kit (for HV & LV cables) includes a 6" flexible clip-on probe, and two touch sensors for all applications where a clip-on cannot be used.

FEATURES

- **Inexpensive cable identifier system**
- **Easy to operate and safe handling**
- **Avoids false positives**

PVS100i

Secure and reliable phase identification during network operation

FEATURES

- Phase identification at all voltage levels in real time
- GPS connection and GPS Cache (1 h buffer)
- Measurement on LV, HV and capacitive test points
- Easy to operate via touch display
- Eliminates safety hazards
- Saves time and money

Whether you are restructuring a network, planning new network systems or performing switching operations, precise phase identification is essential for the safe and reliable operation of a network.

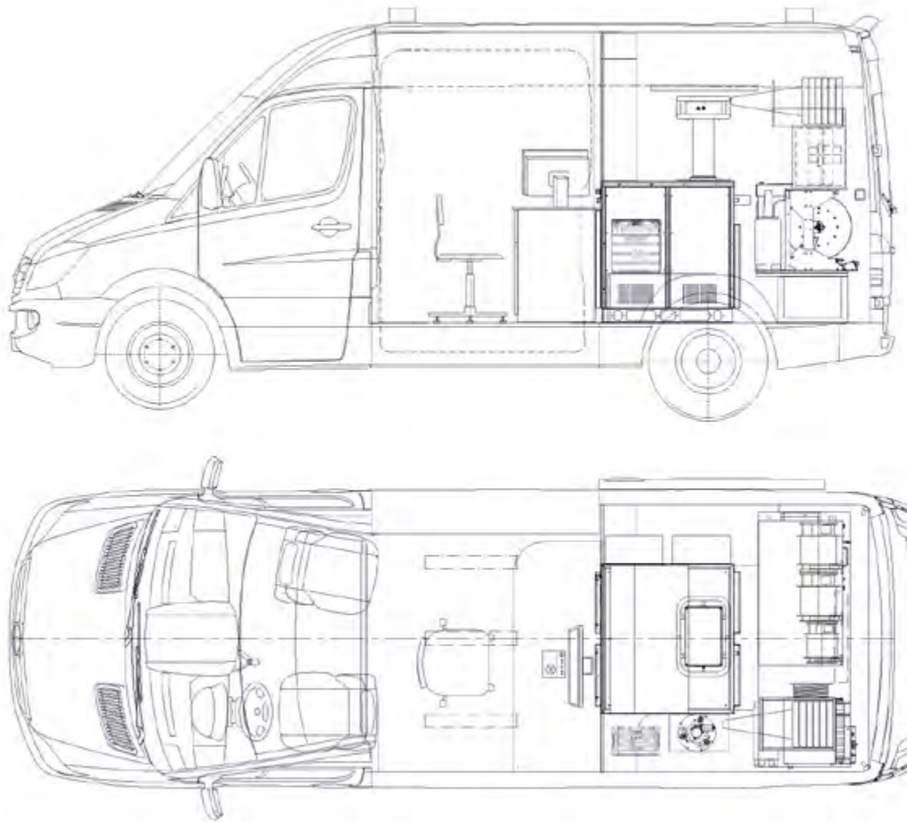
The PVS 100i assists you in checking the phase quickly and precisely. It helps you to avoid faulty switching, eliminates safety risks, reduces operation expenses, prevents a one-sided load of the network and improves the service.

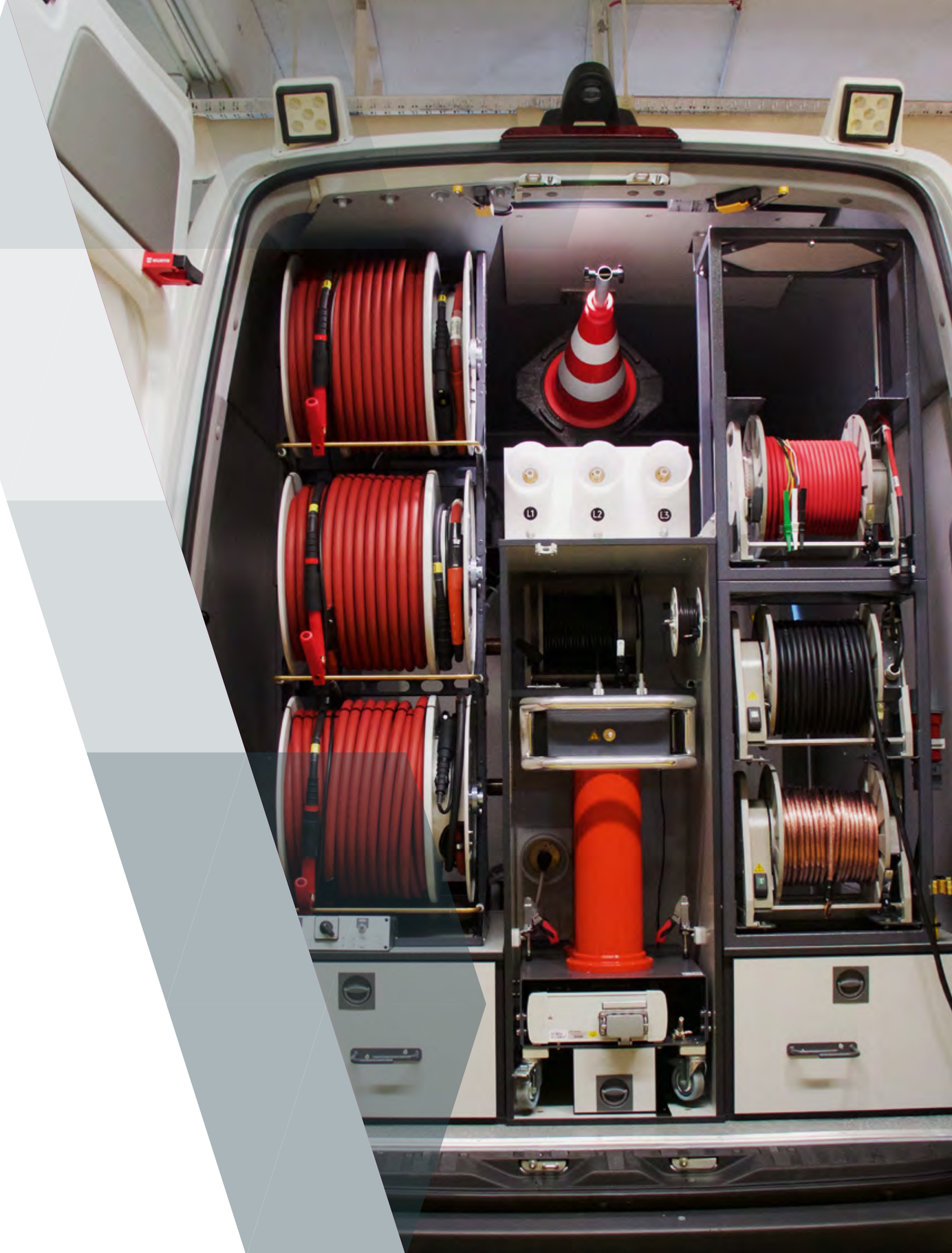
The PVS 100i system not only offers energy providers safety-related advantages but also economic benefits, making it an essential piece of equipment.

CABLE TEST VAN SYSTEMS

Developed with the individual needs of our customers in mind, the Megger Cable Test Van Systems deliver superior ergonomics, optimum speed, user friendliness, and reliability.

Incorporated into this unique test van concept are the requirements and field experiences of the users. The result is a test system that sets new benchmarks in cable fault location, allowing you to keep the the power on.





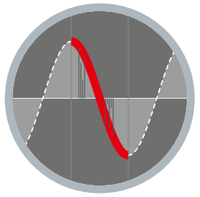
CENTRIX 2.0

The world's most modern and powerful cable test van system

The Centrix test system is the most comprehensive system available, combining cable testing, cable diagnostics and cable fault location techniques into a van. The system's operation is fully automatic for both single- and three-phase cable fault location models. All the high voltage prelocation methods are available, including ARM, ARM plus, decay plus, decay, IFL, and ARM burning. All the accessories for cable tracing, cable fault pinpointing and cable identifying are also included. The Centrix system can be customized to become a complete testing and diagnostic cable solution that includes VLF, TanDelta and partial discharge techniques, as well as DC testing up to 80 kV. It is the all-in-one, safe and reliable solution for predictive, preventive and corrective maintenance. With its remote control function and GPS mapping, cable fault location is more accurate.

FEATURES

- **Intuitive easyGO® operation using a touch display**
- **Cable diagnostics with 50 Hz slope technology**
- **Highest standard of safety with SafeDischarge technology**
- **Remote control of important system functions**
- **Breakdown phase detection for three-phase cable testing**
- **System powered by Li-Ion battery**



50 Hz Slope Technology Inside

R 30

High performance cable test van system

The R30 is suitable for almost any application thanks to its high power output. The centrally controlled system is available with DC test and decay stages up to 150 kV, 250 kV or even 400 kV. The R30 can surge up to 80 kV at 3200 Joules, or 100 kV at 2000 Joules.

VLF testing can be carried out up to 70 kV_{RMS} with a testable cable capacity of 5µF @ 0.1Hz to provide a flexible, powerful solution for cable testing. Additional diagnostic equipment can be included, and cable conditioning can be achieved with 15 kV / 25 A burning. Motor driven HV switches, digital interfaces and extensive safety systems provide the highest standard of personal safety for the operator and protection to the equipment during operation.

FEATURES

- DC Test and decay up to 400 kV
- Surging up to 100 kV
- Digital central control panel
- Integration of all available VLF and diagnostic methods
- Extensive safety system

VARIANT

The allrounder from Megger

The Variant system is a manually operated, modern, modular system. It can be customized for cable fault location as a single- or three-phase system controlled by a Teleflex VX.

The Variant system provides all the high voltage prelocation techniques for cable fault location. It can also be set up for cable testing and diagnostics providing a complete solution for customers working with underground cable systems. There are two versions available for DC testing: 80 kV and 110 kV.

FEATURES

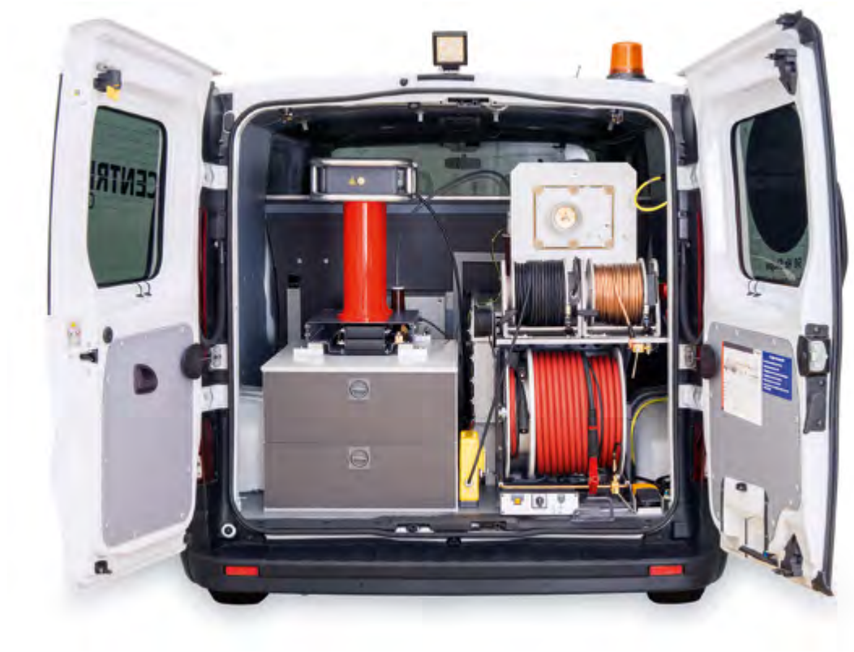
- Modular design, variably expandable
- Reliable due to redundant system architecture
- easyGO® user interface
- ARM® multi-shot prelocation
- Powerful 0.1 Hz VLF test up to 18 µF
- Autonomous operation with Li-Ion battery power

CENTRIX CITY - COMPACT CITY

Complete test and fault location system suitable for installation into small vehicles

The City Van systems are the most versatile solution for cable testing, cable diagnostics and cable fault location where a small vehicle is a necessity. It is ideal for use in city areas with narrow pedestrian zones and minimal parking spaces. For fault location applications the van is equipped with an SPG 40 fault locator; for testing and diagnostics, the TDM 40 can also be installed.

The City series includes all the safety features implemented in the large cable test systems and is easy to use. The easyGO operation philosophy enables even inexperienced users to efficiently carry out cable checks, fault location and diagnostics.



CENTRIX CITY

- Full integrated control unit with scalable display size
- Testing, Diagnostics and Fault location on one screen
- Automatic HV – switches
- Integrated 3-phased reflectometer measurement

COMPACT CITY

- Detacheable Reflectometer (Teleflex SX)
- Testing and Fault location via Teleflex SX, Diagnostics via Laptop
- Automatic HV-switches
- 2-phase reflectometer measurement with detacheable unit

SPECIAL EQUIPMENT

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

HVB10

High voltage bridge

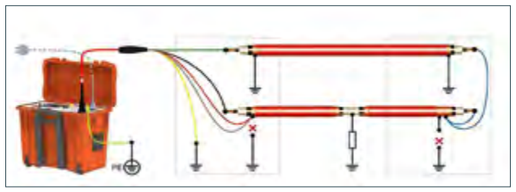
FEATURES

- Top class measurement and accuracy
- Automatic test sequence
- Bi-polar prelocation for the elimination of external influences
- Detection and indication of wrong connections
- Only one single removable HV connection cable
- Completely independent of the parameters of auxiliary lines
- easyGO operating system
- Interface USB port
- Max. test object capacity 25 µF

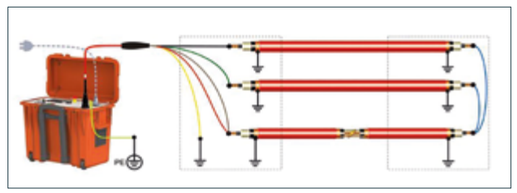
HVB10 is a highly accurate HV bridge designed to prelocate cable and sheath faults, perform sheath testing and pinpoint sheath faults, especially on long high voltage cables.

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, and optional audio frequency operation.



HVB10 connection for sheath fault location



HVB10 core to screen fault location

RECOMMENDED ACCESSORIES
ESG NT earth fault probe for DC step voltage
Audio frequency option

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 high-resistive faults inside cables
- Detection of multiple faults
- Detection, storage and indication of last events
- easyGO operation via jogdial and touch screen
- Solid IP53 PELI trolley case
- Only one single removable HV connection cable
- Max. test object capacity 10 µF

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.

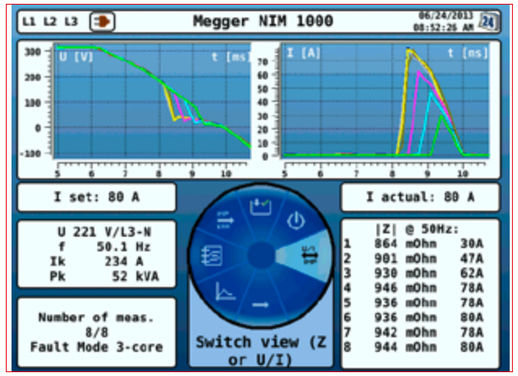
RECOMMENDED ACCESSORIES
Version for vehicle installation (no battery)
ESG NT earth fault probe for DC step voltage
10 m HV connection cable
Connection clamps for large terminals
Audio frequency option

NIM1000

Impedance meter

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
- Bright color display



The impedance meter NIM1000 measures the loop impedance to detect malfunctions in the LV grid at an early stage.

The NIM1000 triggers load-sensitive and neutral faults, detects weak contacts, and exposes hidden flaws. Depending on the grounding conditions of the tested grid, a multi-phase measurement calculates the impedance of the neutral conductor to detect defects that can cause severe safety issues.

NIM1000 is a versatile device. It measures the current capacity under real-life conditions, determines the voltage dip resulting from a given load, and performs tests on cables, power supply lines, and busbars. Those tests help determine the correct dimensioning of the installations, ensure a consistently good power quality, and prevent downtimes.

FAULT SNIFFER

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**

The Fault Sniffer is ideal for cable fault pinpointing in low voltage networks. Faults can be quickly located without interrupting the power supply.

The Fault Sniffer detects and measures the typical burning gases as they are produced by cable faults and shows their concentration.

The fault is located where the concentration is highest and the maximum value is obtained.

The Fault Sniffer is reliable and avoids the incorrect excavations, saving time and money.

SMARTFUSE – SFC250

Monitoring and fault location in low-voltage grids

FEATURES

- **Real-time monitoring and analysis of current and voltage progression**
- **Early warning of impending grid overload**
- **Automatic restoration of power supply**
- **Minimised downtimes**
- **Cable fault location with households connected**

Control module

Power module

SFC250, a multifunctional electronic circuit-breaker system for load currents up to 250 A is Megger's new solution for low voltage power grids.

SFC250 consists of a power module and a control module and is so compact that the distribution cabinet can be closed after installation. Safety circuits are not necessary.

Pinpointing with digiPHONE+

Sheath fault location using FaultSniffer

CUSTOMISED SOLUTIONS

Special applications need individual solutions. Worldwide.

Working in partnership with our customers, Megger has provided many customized 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 capacitance VLF Test sets with 25 µF @ 60 kV

Fault conditioning (burning) systems with 20 kW

Line location on offshore cables with inductive coupling up to 200 km length

Discharge systems for 220 µF @ 150 kV

Surge generators for continuous operation with 6500 Joule @ 25 kV

Solutions for offshore / onshore cable fault location and testing as combination of the above described units

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

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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

An additional benefit to purchasing any test instrument from Megger is the breadth and depth of the technical knowledge and experience that we can share with you.

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

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