

VLF Test systems

28 kV – 60 kV

Portable test systems to
generate 0.1 Hz VLF AC and
DC test voltages



VLF test system
28 kV



VLF test system
40 kV

- Two lightweight modules without connecting cables
- Archiving and programming via chip-card
- Archiving and comparison of test series with PC software
- Menu guided operation
- Test report generated immediately in the field
- Measurement of leakage current during VLF and DC tests

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VLF test systems 28 kV to 60 kV

The portable test systems are used to test medium voltage cables up to the 35 kV series.

(Fig. 1)

The generation of cosine square waves ensures that faults in the insulation, and particularly water tree damage, will be made to breakdown in PE/XLPE cables but also in paper insulated cables. This test procedure takes place without damaging fault-free insulation.

(Fig. 2)

The VLF test system has a long life due to the use of zero wear semiconductor switches in generating the polarity changes in the test voltage. A test voltage is generated with polarity changes whose frequency is comparable to the 50 / 60 Hz AC network operating frequency.

The optional **leakage** current measurement permits judgements about the quality of the cable insulation. For this additional measurement, always two measured values are compared.

Features:

- Powerful, portable cable test system for **DC** and **0.1 Hz VLF tests**
- The cable test system consists of two modules
- Basic or Plus versions adapt to your needs
- The "Basic" version can be used to test short and medium length cables, e.g. in metropolitan supply networks (see table for example lengths) The "Plus" variant provides for almost double the test capacitance of the "Basic" version. It is thus also suitable for testing longer cables e.g. between substations (for example lengths see table).

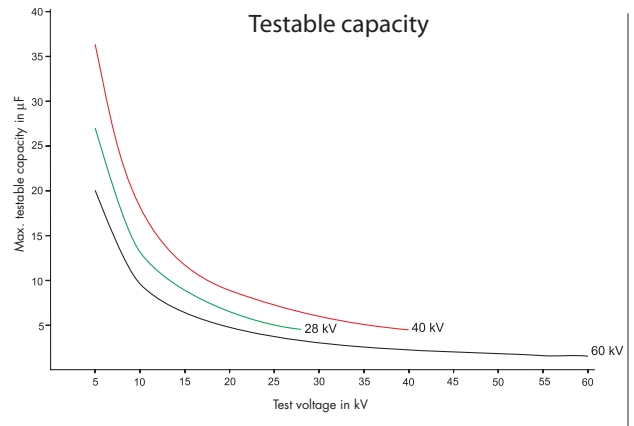


Fig. 1 Test capacitance against the test voltage

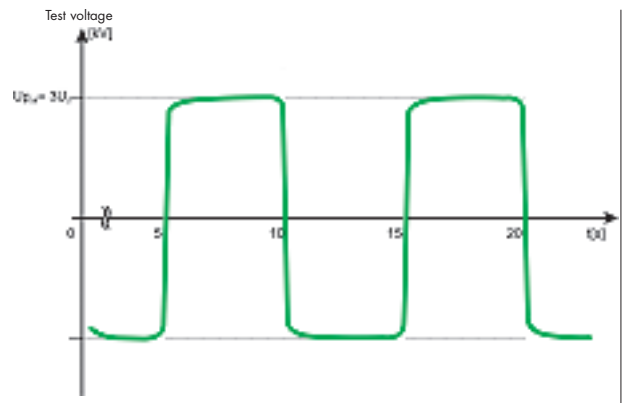


Fig. 2 Shape of the 0.1 Hz cosine square wave VLF voltage

Maximum test lengths

	VLF test system 28 kV	VLF test system 40 kV Basic	VLF test system 40 kV Plus	VLF test system 60 kV Basic	VLF test system 60 kV Plus
15 kV/240 mm ² - XLPE/PE cable with $U_p = 27$ kV	single phase: 10.5 km (System: 3.5 km)				
11 kV/240 mm ² - XLPE/PE cable with $U_p = 19$ kV	single phase: 15 km (System: 5 km)				
33 kV/240 mm ² - XLPE/PE cable with $U_p = 57$ kV				single phase: 4 km (System: 1.3 km)	single phase: 7.5 km (System: 2.5 km)
22 kV/240 mm ² - XLPE/PE cable with $U_p = 38$ kV		single phase: 8 km (System: 2.6 km)	single phase: 16 km (System: 5.3 km)	single phase: 4.5 km (System: 1.5 km)	single phase: 8 km (System: 2.6 km)
10 kV/240 mm ² - XLPE/PE cable with $U_p = 18$ kV		single phase: 11 km (System: 3.6 km)	single phase: 22 km (System: 7.3 km)	single phase: 6.6 km (System: 2.2 km)	single phase: 11.5 km (System: 3.8 km)

Features

- With the **“Breakdown detection”** option, after a breakdown, the system will immediately be switched off and the cable under test will be automatically discharged.
- The **“Leakage current measurement”** option is to assess the relative quality of the cable insulation. Together with the **“Log”** option, the following types of evaluation are possible:
Archiving of measurement data, comparison of (chronologically) differing sets of measurements, generation of a test history and relative judgement of changes in the quality of the cable under test.
- The **“Log printout”** option to immediately print out the test results in the field, on the printer integrated in the equipment.
- The **“Log”** option permits the measurement results to be automatically stored on a chip card, in the field. Using the Windows based **Winkis VLF** software, which is included in the package, it is easy and straightforward to archive the measurements from the chip card together with relevant details (Fig. 3 and 4). **Winkis VLF** also allows to set **parameters** of the VLF test using the chip card. You can define the course of the test on your office PC and transfer this to the chip card. At the test location, the VLF test system then automatically uses the defined parameters and the operator in the field doesn't need to do any settings on the VLF test system. The software is rounded off with a preformatted, colour printout option (Fig. 5). Naturally, the printout of the measurement log can include your own company logo.
- Quick set-up at the test location due to **self-adjusting connectors** and **HV cable feed-throughs**.
- **The built-in discharge equipment** provides for a high safety standard.
- The patented generation of the cosine square wave voltage allows to test cables with **high capacitance at low power consumption of the VLF test system**.
- The harmonisation documents HD 620S1 and HD 621S1, the standards VDE 0276-620 and -621 recommend the 0.1 Hz VLF voltage to test PE/XLPE cables, to test paper insulated cables and to test mixed cable runs.

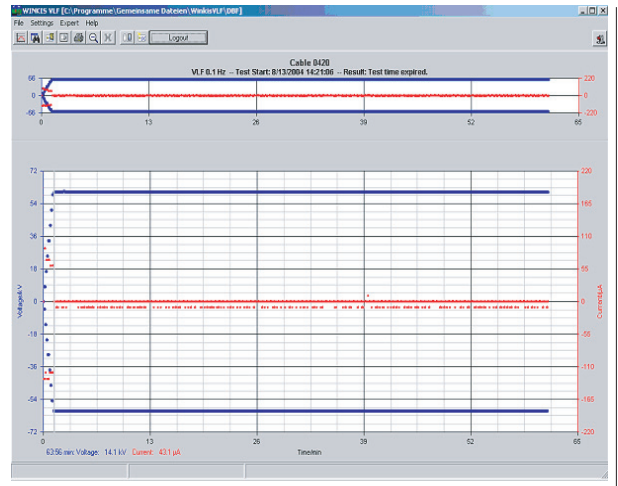


Fig. 3 WINKIS VLF to document current and VLF voltage

Cable No.	Comments	Date	Time
Probe_1		7/19/2004	15:13:23
Probe_2		7/19/2004	15:31:23
Test		1/6/2005	13:47:17
0279		3/24/2004	14:46:49
0420		8/13/2004	14:21:06

Fig. 4 Data management in WINKIS VLF

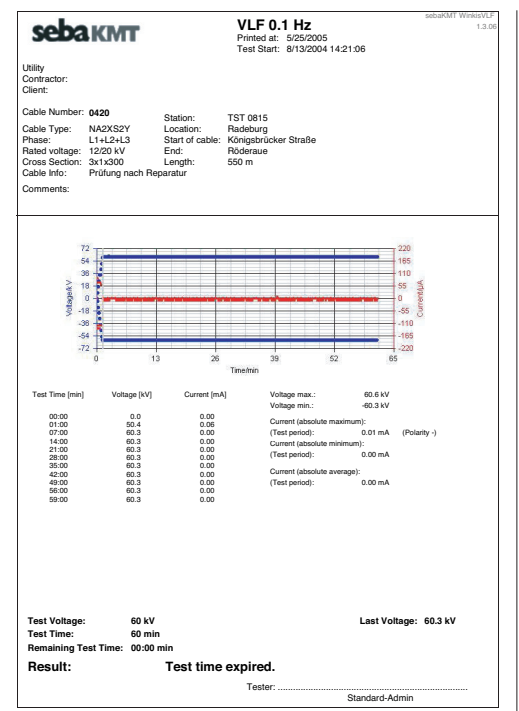


Fig. 5 WINKIS VLF measurement log printout



Scope of the delivery:

The VLF test system includes the following:

- Basic VLF instrument
- HV connection cable 5m, incl. connecting clamps
- Power supply cable
- Accessory bag
- Earthing cable 5 m, incl. connecting clamp
- User manual

Options:

- Measurement log printout
- Logging/protocol
- Breakdown detection with auto-shut-off
- Measurement of leakage current
- Protective cover

Technical data

Model	VLF test system 28 kV	VLF test system 40 kV	VLF test system 60 kV
VLF output voltage	0 ... 28 kV _{eff}	0 ... 40 kV _{eff}	0 ... 60 kV _{eff}
Measurement of leakage current (option)	0 ... 12 mA	0 ... 7 mA	0 ... 5 mA
	(10 µA resolution)		
Voltage wave shape	cosine square wave		
Polarity change-over duration	approx. 5 ms similar to 50 Hz network frequency		
Frequency	0.1 Hz		

Testable cable capacitance

Plus version	4.6 µF / 28 kV _{eff}	4.4 µF / 40 kV _{eff}	1.5 µF / 60 kV _{eff}
Basic version		2.2 µF / 40 kV _{eff}	0.8 µF / 60 kV _{eff}
DC output voltage	0 ... -28 kV		
Basic version		0 ... -40 kV	0 ... -60 kV
Plus version		0 ... +40 kV 0 ... -40 kV	0 ... +60 kV 0 ... -60 kV
DC leakage current measurement	0 ... 12 mA	0 ... 7 mA	0 ... 5 mA
Discharge system	Integrated; 4.6 µF in 5 s	Integrated; 4.4 µF in 5 s	Integrated; 1.5 µF in 2 s
Power supply	230 V, 50 Hz, approx. 2.5 A 120 V, 60 Hz, approx. 5 A	230 V, 50 Hz, approx. 2.5 A 120 V, 60 Hz, approx. 5 A	230 V, 50 Hz, approx. 2.5 A 120 V, 60 Hz, approx. 5 A

Options

Measurement of leakage current	yes		
Breakdown detection	yes		
Measurement log printout	yes		
Logging/protocol	yes		
Operating temperature	- 20 °C ... + 55 °C	- 20 °C ... + 40 °C	- 20 °C ... + 40 °C
Weight (depends on options fitted)	approx. 25 kg + 20 kg	approx. 50 kg + 48 kg	approx. 84 kg + 48 kg
Dimensions W x H x D in mm, in two separate modules	550 x 700 x 420	550 x 1000 x 420	710 x 1185 x 625

ISO 9001:2000

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