

## VLF CR series

# Portable VLF test systems for testing medium voltage cables according to IEC 60502-2 and IEEE 400.2

# Megger<sup>®</sup>



- VLF, DC and sheath fault testing in one device
- Portable thanks to two-part construction
- High test capacitance
- Integrated discharge system
- Reporting

## DESCRIPTION

The VLF CR Series are portable, efficient, high-performance systems for testing cables with 0.1 Hz cosine-rectangular voltages, in keeping with IEC and IEEE standards. In accordance with these guidelines, the dielectric strength of cables and joints must be checked after installation or repair.

Three portable systems are available, each with different voltage levels (28, 40 and 60 kV):

- VLF CR-28 up to 15 kV rated cables
- VLF CR-40 up to 23 kV rated cables
- VLF CR-60 up to 36 kV rated cables

### High test capacity

The systems consist of a control unit and an HV unit. Because of their two-part construction, the systems are easy to transport.

One of the advantages of the cosine-rectangular test method is the high test capacitance of up to 5  $\mu$ F at 0.1 Hz. This test capacitance allows all three phases to be tested simultaneously with the standardized test frequency of 0.1 Hz.

### Proven procedure

Using 0.1 Hz cosine-rectangular voltage, weak points in the cable can be safely broken down. The benefits of the VLF method using 0.1 Hz cosine-rectangular voltage have been confirmed by numerous scientific examinations and practical field trials. Since the patent was granted in 1987, more than 2,500 systems have been sold worldwide. This proven voltage shape is recommended by the CENELEC HD 620 and HD 621 harmonisation documents, the IEC 60502-2 standard and the IEEE 400.2 standard.

### DC testing, sheath fault testing and pinpointing

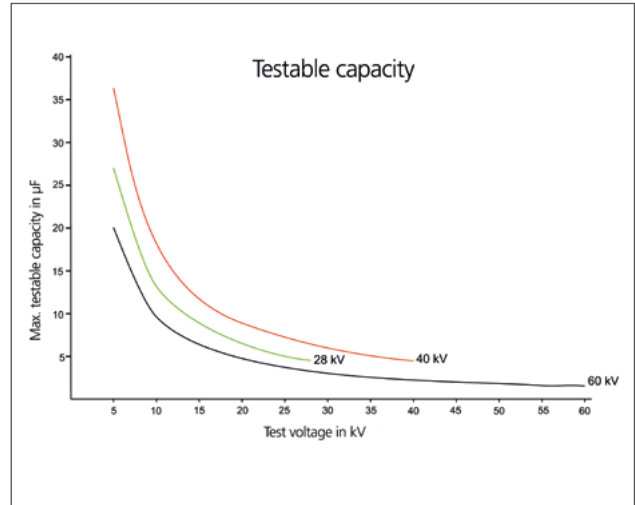
By switching to DC testing, the cables and connected substations can be tested with negative and positive DC voltage. Aside from cable and sheath testing, the test systems can also be used to precisely pinpoint sheath faults (in combination with a step-voltage probe e.g. the ESG NT).

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VLF CR-60 kV in operation on the "Baltic 1" wind park (Baltic sea).



Test capacitance as function of the test voltage

### Maximum safety

The integrated discharge and breakdown detection systems maximise user safety. Measuring the leakage current serves to develop a relative evaluation of cable insulation quality; test results can be archived for further processing through the logging function.

Because of its compact design and high voltage level, the VLF CR-60 is ideally suited for testing 30/36 kV cables in offshore areas.

Testing offshore cables regularly is vital because any downtime will result in massive financial losses.

The modified offshore system found in the VLF CR-60 meets all applicable requirements for sea-bound operations. Optional transport containers are also available, which protect the system against water ingress. The VLF CR-60 can be stored and transported easily in these containers. The VLF CR-60 can be stored and transported easily in these containers.



Transport container VLF CR-60

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### MAXIMUM TEST LENGTH

	VLF CR-28 kV	VLF CR-40 kV Basic	VLF CR-40 kV Plus	VLF CR-60 kV Basic	VLF CR-60 kV Plus
11 kV, 240 mm <sup>2</sup> VPE/PE cable with $U_p = 19 \text{ kV}_{\text{rms}}$	Single phase: 15 km (system: 5 km)	Single phase: 11 km (system: 3.6 km)	Single phase: 22 km (system: 7.3 km)	Single phase: 6 km (system: 2 km)	Single phase: 12 km (system: 4 km)
15 kV, 240 mm <sup>2</sup> VPE/PE cable with $U_p = 27 \text{ kV}_{\text{rms}}$	Single phase: 12.5 km (system: 4.2 km)	Single phase: 8 km (system: 2.7 km)	Single phase: 16 km (system: 5.4 km)	Single phase: 5 km (system: 1.7 km)	Single phase: 10 km (system: 3.4 km)
22 kV, 240 mm <sup>2</sup> VPE/PE cable with $U_p = 40 \text{ kV}_{\text{rms}}$		Single phase: 8.7 km (system: 2.9 km)	Single phase: 17.4 km (system: 5.8 km)	Single phase: 5.2 km (system: 1.7 km)	Single phase: 10.4 km (system: 3.4 km)
36 kV, 240 mm <sup>2</sup> VPE/PE cable with $U_p = 60 \text{ kV}_{\text{rms}}$				Single phase: 5 km (system: 1.7 km)	Single phase: 10 km (system: 3.3 km)

### TECHNICAL DATA\*

	VLF CR-28 kV	VLF CR-40 kV	VLF CR-60 kV
VLF output voltage	0 ... 28 kV <sub>rms</sub>	0 ... 40 kV <sub>rms</sub>	0 ... 60 kV <sub>rms</sub>
Resolution		0.1 kV	
Accuracy		3 %	
Leakage current measurement	0 ... 12 mA	0 ... 7 mA	0 ... 5 mA
Resolution		10 μA	
Accuracy		3 %	
Voltage wave shape		Cosine-rectangular	
Frequency		0.1 Hz	
<b>Testable cable capacitance</b>			
Plus version		4.8 μF / 40 kV <sub>rms</sub>	2 μF / 60 kV <sub>rms</sub>
Basic version	5 μF / 28 kV <sub>rms</sub>	2.4 μF / 40 kV <sub>rms</sub>	1 μF / 60 kV <sub>rms</sub>
<b>DC output voltage</b>			
Basic version	0 ... -28 kV	0 ... -40 kV	0 ... -60 kV
Plus version		0 ... ±40 kV	0 ... ±60 kV
DC leakage current measurement	0 ... 12 mA	0 ... 7 mA	0 ... 5 mA
Discharge system	Integrated	Integrated	Integrated
Input voltage	110/230 V, 50/60 Hz, 300 VA	110/230 V, 50/60 Hz, 300 VA	110/230 V, 50/60 Hz, 300 VA
<b>Sheath testing / sheath fault pinpointing</b>		Testing: 2 ... 10 kV Pinpointing: 2 ... 10 kV, Pulse-ratio 1:3 / 1:5 / 1:9	
Leakage current measurement		yes	
Breakdown detection		yes	
Measurement log printout		optional	
Reporting		yes	
Parameterisation via chip card		yes	
Operating temperature	-20 ... +55 °C	-20 ... +40 °C	-20 ... +40 °C
Weight (depends on options fitted)	approx. 25 kg + 25 kg	approx. 55 kg + 48 kg	approx. 85 kg + 48 kg
Dimensions (W x H x D), divided between two devices	550 x 800 x 420 mm	550 x 1100 x 420 mm	550 x 1100 x 420 mm

\* We reserve the right to make technical changes.

## ORDER INFORMATION

Product	Order nor.
<b>VLF CR-28 kV</b> Basic equipment, cable set HV/LV, accessory bag	<b>899005936</b>
<b>VLF CR-40 kV</b> Basic equipment, cable set HV/LV, accessory bag	<b>Basic version: 899004500</b> <b>Plus version: 899004501</b>
<b>VLF CR-60 kV</b> Basic equipment, cable set HV/LV, accessory bag	<b>Basic version: 899007186</b> <b>Plus version: 899007187</b>
<b>VLF CR-60 kV offshore</b> Basic equipment, cable set HV/LV, accessory bag	<b>Basic version: 890025374</b> <b>Plus version: 890025376</b>
<b>Mandatory selection mains cable (1x)</b>	
Mains cable EU	810000024
Mains cable UK	118307335
Mains cable US	502025220
Mains cable AUS	90020435
<b>Options VLF CR-28:</b>	
HV cable drum VLF CR-28 - 25m	890027128
HV cable drum VLF CR-28 - 50m	108300941
Rain protection hood VLF CR-28	899007335
Trolley for VLF CR-28	890017697
Flight case VLF CR-28 – control unit	90025453
Flight case VLF CR-28 – HV unit	90025452
VLF CR-28 Calibration certificate	2004125
<b>Options VLF CR-40/60:</b>	
HV connection cable VLF CR-40/60 - 10m	890016969
HV connection cable VLF CR-40/60 - 15m	118306651
HV cable drum VLF CR-40/60 – 25m	899006166
HV cable drum VLF CR-40/60 – 50m	890011610
HV cable drum VLF CR-40/60 – 80m	2010868
Earth cable 10m	2012514
Rain protection hood VLF CR-40	899005660
Rain protection hood VLF CR-60	899007332
Flight case VLF CR-40/60 – control unit	90021853
Flight case VLF CR-40 – HV unit	90021851
Flight case VLF CR-60 – HV unit	90021852
Offshore proof transit case – VLF CR-60	890025130
Offshore housing for VLF CR-60	128314542
Trolley for VLF CR-40	820017871
Trolley for VLF CR-60	128310100
Vehicle mounting kit VLF CR-40	899004910
Vehicle mounting kit VLF CR-60	2013689
VLF CR-40-B Calibration certificate	2004126
VLF CR-40-P Calibration certificate	2004127
VLF CR-60-B Calibration certificate	2004128
VLF CR-60-P Calibration certificate	2004129
<b>General options:</b>	
Additional smartcards	899004930
Additional smartcard reader	899005375
Onboard Print-out VLF CR-28/40/60	899004505

### SALES OFFICE

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### VLF SERIES\_DS\_EN\_V03

www.megger.com  
ISO 9001  
The word 'Megger' is a registered trademark

# Megger<sup>®</sup>