

Test and diagnostic system for high-voltage cables

HV DAC200 and HV DAC300



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.

Test and diagnosis system for high voltage cables

Designed for testing and diagnostics up to 230 kV rated cables

Benefits

- **Multifunctional – cable withstand testing & PD Diagnosis in one single system**
- **Allows a monitored commissioning test acc. to IEC 62067**
- **Highest flexibility thanks to the portable design**



Description

The HV DAC 270 is a DAC (Damped AC Voltage) test set with a peak voltage of 270 kV. The test set can be used for acceptance testing of up to 230 kV rated cables according to the IEC 62067 standard. Moreover the unit can also be used for condition analysis of aged cable circuits.

Main use of the DAC test set is to identify, evaluate and locate partial discharge (PD) faults in cable insulation and accessories in all types of high voltage power cables. PD activity is an indication of incipient faults in the insulation and is therefore widely regarded as one of the best 'early warning' indicators of the deterioration of medium and high voltage insulation.

Since the DAC frequency of the test voltage is close to nominal AC service conditions all measured PD activities can be effectively evaluated and are comparable with the power frequency. The PD inception voltage (PDIV) and PD extinction voltage (PDEV), due to the decaying amplitude of the test voltage, can easily be determined.

Critical PD levels responsible for the insulation degradation status of the cable insulation are important criteria in the evaluation. The analysis and evaluation of the typical PD parameter as well as the PD fault location supports the Asset Management for reliable decision criteria for maintenance- or replacement activities.

The system consists of a notebook as a control unit and a HV part. The HV part contains of a HV source, an electronic switch and a resonance inductor to generate a damped AC test voltage. The HV divider and the coupling capacitor for the PD detection and localization are integrated in a separate unit.

Data storage, analysis and evaluation takes place on the notebook and can be performed either on-site or in the office.

Storage of the individual units will be in rugged transport cases which also allow air-transport.

Technical Data

Output voltage	DAC Precision Resolution	0 ... 191 kV _{RMS} / 0 ... 270 kV _{peak} ± 1 % 0.1 kV
Frequency range		20 Hz ... 300 Hz
Capacity range		0.035 µF ... 8 µF (200 m ... 40 km with C = 0.2 µF/km)
Charging current		10 mA
Partial Discharge	Detection Range Resolution Bandwidth	acc. IEC 60270 1 pC ... 100 nC 0.1 pC up to 25 MHz
Dissipation factor		Not included
Input voltage		3-phase 400 V, 50/60 Hz, 5 kVA
Operating temperature		0° ... 55°C
Storage temperature		-10°C ... 60°C
Total weight		app. 1000 kg
Components	Unit 1 Unit 2 Unit 3 Unit 4 Unit 5 Unit 6	HV source HV switch HV coil (4 modules) HV divider/ PD analyzer Accessory box 1 Accessory box 2
Software	Joint location Evaluation Reporting	Integrated Automatic, semi-automatic and manual via PD detector SW

Features

- PD diagnosis by means of damped AC voltage (DAC)
- Commissioning testing up to 230 kV rated cables according to IEC 62067
- PD level measurement according to IEC 60270
- Adjustment features to optimize detection sensitivity
- Automatic calibration mode with joint location feature
- Real-time data processing, with automatic evaluation and display of results during the running test
- Menu-driven unit to operate the test sequence
- Internal cable data base with search, browse and edit function
- High test capacity of up to 8 µF

Scope of delivery

- HV DAC 270
- Calibrator
- HV connection cable 5 m
- Mains cable/ grounding cables
- Operating manual

Options

- HV connection cable 15 m (will affect PD sensitivity)
- External cooling

HV DAC-300

Test and diagnosis system for high voltage cables



- **Designed for testing and diagnostics on cables rated up to 230 kV**
- **Multifunctional: cable withstand testing & PD Diagnosis in a single system**
- **Allows a monitored commissioning test acc. to IEC 62067 and IEEE 400.4**
- **Highly adaptable thanks to the portable design**

DESCRIPTION

The HV DAC-300 is a DAC (Damped AC Voltage) test set with a peak voltage of 300 kV. The test set can be used for acceptance testing on cables rated up to 230 kV according to the IEC 62067 and IEEE 400.4 standard. Moreover, the unit can also be used for condition analysis of aged cable circuits.

The main use of the DAC test set is to identify, evaluate and locate partial discharge (PD) faults in the cable insulation and accessories of all types of high voltage power cables. PD activity is an indication of incipient faults in the insulation and is therefore widely regarded as one of the best 'early warning' indicators of the deterioration of medium and high voltage insulation.

Since the DAC frequency of the test voltage is close to nominal AC service conditions, all measured PD activities can be effectively evaluated and are comparable with the power frequency. The PD inception voltage (PDIV) and PD extinction voltage (PDEV) can be easily determined due to the decaying amplitude of the test voltage.

Partial discharges are regarded as the main breakdown cause for HV cables. Performing offline PD measurements on HV cables using a DAC voltage helps support the asset management process so that reliable decisions can be made for maintenance or replacement activities.

The system consists of a notebook as a control unit and an HV part. The HV part contains of an HV source, an electronic switch and a resonance inductor to generate a damped AC test voltage. The HV divider and the coupling capacitor for PD detection and localization are integrated in a separate unit.

The operating SW guides the user through the entire process. Some key features are:

- Integrated cable data base
- Fully automatic calibration
- "Live" PD mapping; evaluation and display of results during the actual measurement
- Reporting by mouse click

The individual units are stored in tough transport cases which also allow for air-transport.

HV DAC-300

Output voltage	
DAC	18 ... 212 kV _{RMS} / 25 ... 300 kV _{peak}
Precision	± 1 %
Resolution	0.1 kV
Frequency range	20 Hz ... 300 Hz
Capacity range	0.035 µF ... 8 µF at 300 kV _{peak}
Charging current	12,5 mA
PD sensitivity range	2 pC ... 100 nC (acc. to IEC60270)
Resolution	± 1 pC
System noise level	< 2 pC
PD impulse repetition rate	100 kHz
PD localisation	
Measuring range	0 ... 16,000 m / V/2 = 80 m/µs
Propagation velocity	5 ... 120 m/µs
Sampling rate	125 MHz (8 ns)
Bandwidth	3/25 MHz (switchable)
Precision	1 % of the cable length
Resolution	± 1 pC / ± 0.1 m
Filter	Analog and digital
Input voltage	400 V ± 10%, 3 pH, 50/60 Hz, 4 kVA
Temperature	
Operation	-20 °C ... 55 °C
Storage	-20 °C ... 70 °C
Relative humidity	93 % at 30 °C (non-condensing)
IP rating	IP00
Weight	app. 1100 kg (incl. flight cases)
Components	
Unit 1	HV source
Unit 2	HV switch
Unit 3	HV coil (4 modules)
Unit 4	HV divider / PD analyzer
Unit 5	Accessory box 1
Unit 6	Accessory box 2

- High testable capacity
- Transportable and compact
- Short set-up times allowing to respond quickly on changing weather conditions
- Automatic PD measurement with live evaluation
- Low space requirements allowing to set-up even in small substations
- Low power consumption

SCOPE OF DELIVERY

- HV DAC-300 incl. flight cases
- Laptop and software license
- PD Calibrator
- HV connection tube 5 m (DN 150)
- Mains cable, grounding cables and control cables
- Operating manual

ORDERING INFORMATION

Product	Order no.
HV DAC-300	138315400-S
Options:	
HV connection tube DN 150 5 m	2005455
HV connection tube DN 150 7,5 m	2006458
HV connection tube DN 150 10 m	2006459
Accessory box 3 (for additional HV connection tubes up to 7.5 m (DN 150))	90014144
Accessory box 4 (for additional HV connection tubes up to 10 m (DN 150))	xxxx

* We reserve the right to make technical changes.

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