

DP MEASUREMENT

Portable Partial Discharge Measurement

AI-based self-diagnosis

Normas IEEE Std C57.124, IEEE Std C57.113, IEEE Std 1434, IEC 60270, IEC 60060, IEEE Std. 400 e NBR 5356



DP MEASUREMENT

Partial Discharge Measurement

We can measure partial discharges in two ways:

- **Fixed panel (Application: Measurement and monitoring); Portable case (Application: Measurement only).**

Both approaches have their advantages and can be chosen based on specific application needs. Every PD measurement system consists of:

- Meter (Portable case, monitoring panel); Sensor:
- External capacitor, HFCT or DP coupler; Coaxial
- cables;
- DP calibrator;
- Software PDMS;
- Staff training.

Regardless of the chosen method, it is essential to pair the test device with a suitable sensor to monitor, measure, and acquire the data.

External coupling capacitor: This is a capacitive or resistive-capacitive divider that regulates the voltage relationship between an input point and a supply point. This method offers an effective and precise way to obtain signals with controlled amplitude and phase, and is widely used in electrical monitoring and protection, communication filters, data acquisition, and partial discharge measurement.

HFCT: It is capable of acquiring the necessary data and, after signal processing, isolating the components of partial discharges. It is especially useful for detecting and analyzing partial discharges in electrical equipment, providing detailed information for evaluation and maintenance.

DP Coupler: It is specifically designed to fit into the capacitive taps of transformer condenser bushings. It acquires the signals necessary for partial discharge measurement at these critical points in transformers, allowing for a precise assessment of their performance and integrity.

DP Suitcase

The HVEX portable meter is a complete solution for partial discharge measurement, presented in a case equipped with an industrial computer and dedicated software. With specific connection ports, it allows connection to the necessary sensors to capture and analyze the pulses resulting from partial discharges.

Among these sensors are capacitive couplers for bushings condensative of transformers capacitors of couplign, both act and as capacitive voltage dividers and high-pass filters, as established by the IEEE Std. C57.113-2010 standard.

For components without an accessible tap, the meter uses an HFCT (high-frequency current transformer) connected to the ground plane to perform the reading. Based on the collected signals, the meter's processing unit performs precise calculations of the apparent load, as defined by the IEC 60270 standard, allowing the quantification of discharges in picocoulombs (pC).

This comprehensive and precise approach provides a detailed analysis of partial discharges, contributing to preventive maintenance and the safety of electrical equipment.

DP MEASUREMENT

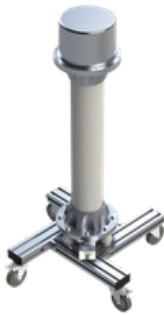
Sensors

Partial discharge measurements can be performed using three different sensors depending on the application requirements:

Coupling capacitor (External)

Applied to:

- Hydrogenators;
- Live tank transformers and circuit breakers;
- Energized busbars;
- Cables, cable terminations, terminals and splices (laboratory); Reactors and capacitors.



External Coupling Capacitor

HFCT (High Frequency Current Transformer, Split Side)

Applied to:

- Lightning rod;
- Current transformers;
- Inductive or capacitive potential transformers;
- Disconnecting switches;
- Insulators;
- Dead tank circuit breakers;
- Cables with accessible shielding;
- Muffles, terminals and splices.



HFCT (High-frequency CT)

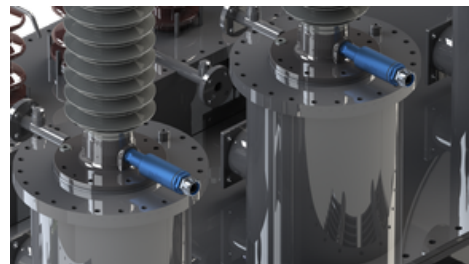
Coupler for capacitive taps

Applied to:

- Transformers with condensate bushings (High Voltage);
- Through bushings or terminals;
- Current transformers;
- Inductive or capacitive potential transformers; Cable terminations, terminals and splices.



DP coupler



Coupler on the transformer bushing

DP MEASUREMENT

Partial Discharge Calibrator

Calibration of partial discharge measurements in electrical equipment is essential for the test to be performed satisfactorily. Therefore, this task requires calibrators that conform to the NBR IEC 60270 standard.

The HVEX Partial Discharge Calibrator is used to precisely adjust devices to the required load setup. This process prevents reading errors in ranges above or below the actual values.

Equipment with excellent usability and high pulse width, eliminating the need for 3 or even 4 devices to perform the same type of calibration.

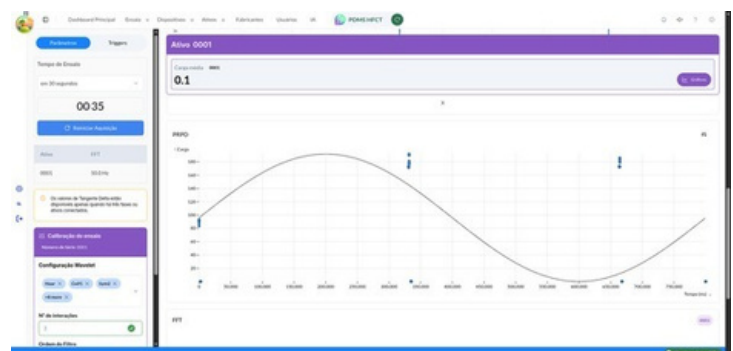
Applications:

The HVEX calibrator is a portable device that allows calibration with bipolar pulses in different intensities and frequency, being able to, therefore, to be applied to instruments for measuring partial discharges in oil-insulated or dry-type transformers, generators, motors, bushings, cables, etc.

Essential no use of rehearsals of measurement or partial discharge monitoring. The calibrator will emit a known and traceable value, emulating the occurrence of a discharge; therefore, the measuring device must be able to recognize it in terms of both frequency of occurrence and amplitude.

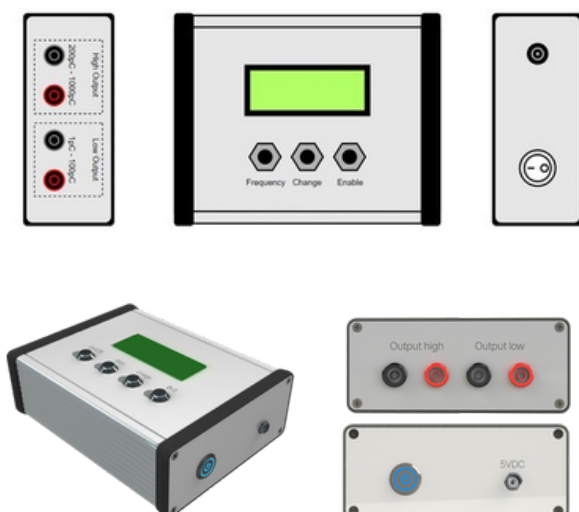
Software PDMS

HVEX PDMS is software for analyzing radio interference voltage and measuring partial discharges. Used to control tests, it can filter reading signals to remove noise, manage the database, and present application results through a graphical interface. Its main function is the fine control and recording of tests. It is an intuitive software with a user-friendly interface that allows data export in file formats compatible with signal processing methods.



Tela do software PDMS

DP Calibrator



Computer attached to the briefcase.

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Representative images



Briefcase control panel



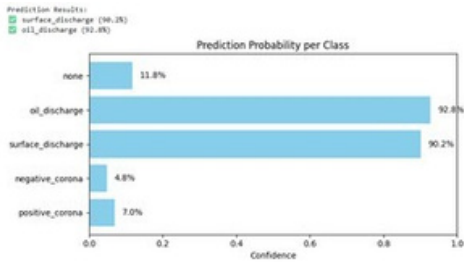
Compact equipment (11.3 kg)



Portable case and connection ports

DP MEASUREMENT

AI-Based Self-Diagnosis



AI interprets PRPD maps and provides an accurate diagnosis of the asset's lifespan. Based on asset family patterns, these PRPDs are classified and a technical note is generated.

Data acquisition is automatic.

The operator only needs to take some precautions with the equipment itself, the cabling, and register the equipment correctly.



Point-in-time asset valuations over time, without the need for shutdowns or hiring a very expensive team to assess and diagnose that asset.

If the asset exhibits any deviation, a scheduled shutdown, corrective maintenance, etc., is performed.

Benefits

- Relatively low cost
- 5-minute installation
- Non-intrusive tool
- National technology
- Immersive techniques using advanced digital filtering and AI analysis to correlate patterns.

Technical Specifications

Standards Followed	IEEE Std C57.124, IEEE Std C57.113, IEEE Std 1434, IEC 60270, IEC 60060, IEEE Std. 400 e NBR 5356
Voltage of the tested equipment	13,8kV a 500kV
Connections	Cabo coaxial Wireless
Communication protocol	TCP/IP, Modbus
Method for detecting partial discharges	Electric (Capacitive)
	High frequency (HFCT)
Isolation of the coupling capacitor	Oil or epoxy
Coupling capacitance	1,000 pF
Sampling Rate	500MSa/s
Vertical resolution	12 bits
Graphical interface	Sineoid Lissajous figure FFT
Filter	High-pass, lane-pass, low-pass
Filtering mode	Digital
Cutoff frequency	10 kHz to 100 Mhz
Report format	.pdf, .docx

Technical Specifications

Output Data

Identification of the monitored equipment

Maximum positive partial discharge in phases A, B and C, in pC (according to IEC 60270)

Maximum negative partial discharge in phases A, B and C, in pC (according to IEC 60270)

RMS voltage value of phases A, B, and C.

Leakage current from the bushings

Number of positive partial discharges in the leakage current

Number of negative partial discharges in the leakage current

Angular phase shift between phases A and B, B and C, C and A

% Change in Tan δ

% Change in Capacitance

Degrees of Protection

Coupler IP65

Suitcase IP54

Humidity 5% a 95%

Operating temperature -25 °C a 85 °C

Gauge:

- Pulses 5 pC, 10 pC, 50 pC, 100 pC, 500 pC and 1000 pC
- Frequency 100 Hz and 120 Hz
- Dimension 7,5 x 15 x 20 cm

Technical Specifications

Dimensions

Suitcase	241x101x161mm (L×A×P)
Coupler	352.85mm (length) / 62mm (diameter)
Coupler + Adapter for bushing	412.85mm (length) / 62mm (diameter)

Communication

Protocol	DNP 3.0
Interface	Fiber Optics / GSM

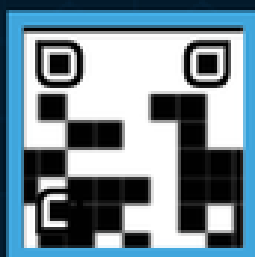
Electrical protection

Overvoltage protection	20 kV (1,2 × 50µs)
Overcurrent protection	40 kA (8.0 × 20µs)
Against transient phenomena	2.5 kV (60s)

We provide solutions for improving the efficiency and quality of the power generation, transmission, and distribution sectors. With a highly specialized team experienced in research, development, and innovation, HVEX has developed tailor-made solutions for the Brazilian market. A wide range of products with solutions focused on signal transduction for measurement and protection.



Driving Innovation



☎ 35 3622-2699

✉ contato@hvex.com.br

🌐 www.hvex.com.br

📍 R. Ismael Pinto de Noronha, 86,
Nossa Sra. de Fatima, Itajubá-MG