

## "PD-Analyzer HF/UHF" - Multipurpose Device for PD Measuring and Analyzing in the Transformer Insulation, GIS, High Voltage Cables and Joints

Testing and analyzing partial discharges in the insulation of high-voltage transformers, cables, GIS and electric machines help to diagnose their condition and find any type of defects more effectively.

This modern method implementation is being slowed down by a limited number of reliable and capable but at the same time easy-to-work measuring devices found in the market. This sensitive method for early defect diagnosis in high-voltage insulation is discredited even by the attempts of using measuring devices of bad quality.

The most useful device for condition estimation of high-voltage insulation is "PD-Analyzer HF/UHF", one of the best multipurpose devices in the range which is made for:

- Partial discharge measuring in high-voltage insulation at a high noise level.
- Fast detecting of the defects in different high-voltage equipment and identifying how dangerous they are.

### Engineering Features of "PD-Analyzer HF/UHF":

- This device has six independent measuring channels in which the signals are measured absolutely synchronously. This function gives the opportunity to see how pulses from partial discharges are distributed and where they are located in high-voltage equipment.

- The device provides partial discharge measuring in the wide frequency range including HF and UHF and allows partial discharge measuring and analyzing in any type of high-voltage equipment such as transformers, GIS, cables, etc. Pulse frequency in these things is hundred or even thousand times different. It depends on the type of the insulation defect, how far this defect is from the measuring sensor and the design characteristics of the equipment.



- One of the main advantages of this device is its built-in expert system "PD-Expert" used for automatic diagnosis of insulation defects in high-voltage equipment. This intellectual expert system is very important for the staff with little experience.

### Expert and diagnostic features of "PD-Analyzer HF/UHF".

Firstly, this device has hardware and firmware features to solve the problem of noise rejection in the process of partial discharge

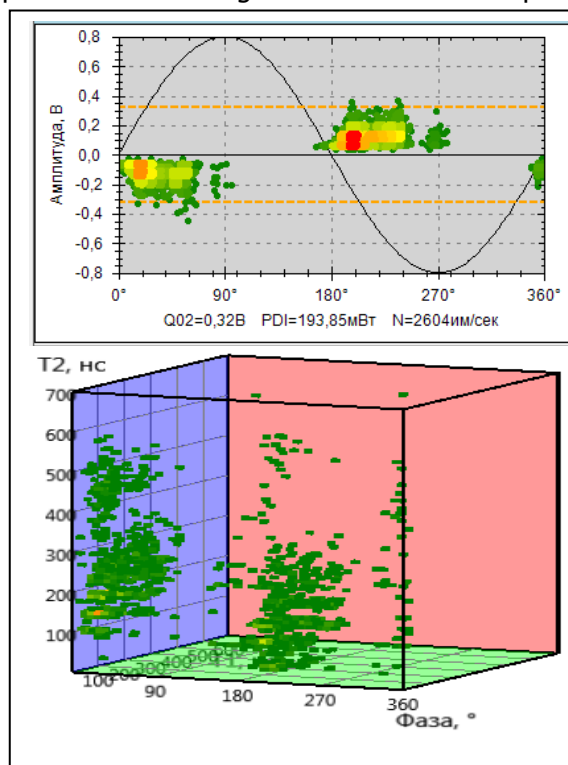
measuring:

- to analyze the pulse time and power frequency,
- to define the difference in the time of pulse arrival to different sensors (in nanoseconds) - "Time of arrival",
- to compare pulse amplitudes in different channels that helps find pulse location,
- to analyze pulse frequency which helps separate random pulses and partial discharges.

Secondly, this device can identify the type of the insulation defect and how dangerous it is. It is done with the "PD-Expert" system built into the device.

### Main specific features of "PD-Expert" system:

- It separates noise pulses and partial discharges while comparing their frequency and time of arrival.
- It uses phase resolved partial discharge (PRPD) and time frequency analysis (PD-Cloud).
- It has the database of the most often defect "fingerprints" which can be upgraded with new diagnostic information.
- It uses special algorithms to estimate if the received data is authentic.
- It makes reports on the condition of the insulation of the high-voltage object. Each report can be corrected by the user.



## Partial discharge measuring in the insulation of power and measuring transformers.

Partial discharges in power and measuring transformers can be measured by "PD-Analyzer HF/UHF" in different ways:

- Using complex DB-2 sensors (not enclosed in the standard delivery set) which are installed on the test tap of the bushing and the neutral of a three-phase winding.
- Using TEV's sensors (to measure surface current) which are put on the transformer tank.
- Using electromagnetic UHF antennas which are put into the tank through a drain valve or special radio transparent accesses on the surface of the transformer tank.

## Partial discharge measuring in the insulation of cables.

For partial discharge measuring in high-voltage cables, their joints and terminations the following sensors (enclosed in the standard delivery set) can be used:

- External electromagnetic antennas of different types – directional and rod – to test joints and terminations insulation and the insulation of the nearby cables.
- High-voltage transformers "RFCT" made for joint and cable testing.

With "PD-Analyzer HF/UHF" you can locate defects in cable lines. A partial discharge pulse coming from the defect found in the insulation is used as a test pulse. There is one more useful function of this device – it has an on-line reflectometer.

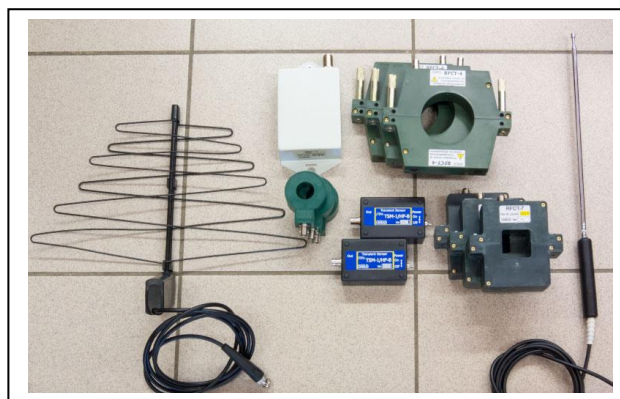
## Partial discharge measuring in GIS.

For this type of systems we use "AES" sensors which are put in between two GIS enclosures where the insulator spacers are. Partial discharges inside GIS can be measured through this radio-transparent gap. TEV's sensors are suitable too. They are put on the enclosure surface.

## Partial discharge measuring in the insulation of electric machines.

There are two ways for partial discharge measuring in stator winding insulation in HV motors and generators:

- Using coupling capacitors (as partial discharge sensors) which are able to work at maximum voltage of the stator winding
- Using various electromagnetic antennas put inside the stator, such as temperature sensors in the winding or special antennas put in the stator slots or circular antennas put near end connections of the winding.



## Standard delivery set of "PD-Analyzer HF/UHF" includes:

- "PD-Analyzer HF/UHF" device in the case.
- a set of measuring sensors.
- a portable PC with "IC-Expert" software.

The set for measuring sensors includes the following sensors:

- RFCT-1 sensor – 3 pieces
- RFCT-4 sensor – 3 pieces
- RFCT-7 sensor – 3 pieces
- Directional electromagnetic antenna – 1 piece
- Rod electromagnetic antenna - 1 piece
- TEV's sensor – 2 pieces
- AES sensor – 1 piece.

## PD-Analyzer HF/UHF" Parameters

Parameter	Value
Number of measuring channels	6
Operating voltage, kV	>3
Discharge pulse frequency, MHz	0.5 ÷ 1500.0
Discharge amplitude, pC	20 ÷ 100000
Computer connection	USB
Supply voltage, V, AC/DC	90 ÷ 260
Operating temperature range, °C	0 ÷ 40
Case size, mm	520 x 435 x 230
Total weight, kg	25