

“PD-Analyzer-3” - device for PD measuring and analyzing in the high-voltage equipment insulation

“PD-Analyzer-3” compact portable measuring device for effective assessment of high-voltage equipment insulation condition. It is used for PD measuring in:

- Power and measuring transformers
- High-voltage cables and joints
- Switchgear and GIS of different modifications
- High-voltage equipment of outdoor substations



Why is PD measuring in insulation necessary?

The reliability of the high-voltage equipment is largely determined by its insulation condition. The HV equipment failure mostly happens due to the aging of insulation or defects in the insulation.

Equipment insulation aging process depends on several factors. The process of natural insulation condition change is accompanied by some unpredictable degradation caused by external reasons. Therefore, the current insulation condition cannot be determined by calculation only.

The most effective way to assess the HV insulation condition and to detect the insulation defects without taking the equipment out of service is the partial discharge (PD) measurement and analysis. This is probably the only method to reveal the insulation condition degradation, to identify the defects early and in the long run to reduce the number of unexpected outages. The “PD-Analyzer-3” device is effectively used for realizing this method in practice.

“PD-Analyzer-3” Specific Features:

- 2 frequency bands of PD measurements. HF measurements are made for cables, transformers and rotating machines. UHF measurements are made in GIS and power transformers. The “PD-Analyzer-3” device is a multipurpose device, as it makes measurements in both the frequency bands.
- 3 channels for PD measurements in the insulation of three-phase equipment. It allows making independent measurements in each phase.
- Several filtration methods for effective noise rejection: «time of arrival» method, amplitude and frequency analyzing of each measured pulse. The use of all the methods together adds to the diagnostic report’s reliability.
- USB and Wi-Fi interfaces for the device control and for data transmitting to PC.

“PD-Analyzer-3” software

The performance of any system for PD measuring and analyzing in high-voltage insulation depends on the software. The more pulse analyzing algorithms and expert diagnostic systems there are in the software, the more reliable and practically important are the diagnostic results.

The “PD-Analyzer-3” device includes the **“iNVA-Portable”** software for PC. Besides the standard functions of the measurement data collection, storage and visualization, the software includes the functions of data processing and automatic diagnostics, such as:

- Efficient algorithmic high-frequency noise rejection. These algorithms, alongside the hardware input noise rejection tools, increase the expert system reliability.
- «Cross» PD pulses rejection, that is the rejection of the PD pulses measured by different channels from one and the same defect.
- Defect location in the insulation of cables and GIS. The software operates in case the primary sensors are installed at one end of the monitored object, at both the ends, or in case there are several sensors installed along the object. In case one sensor is used the defects are located by the reflectogram. In case two or more sensors are used the defects are located by the “time of arrival” method.
- **“PD-Expert”** automatic expert system, which makes a complex diagnostic report about the monitored equipment condition, specifies the defect type and its danger for the further equipment operation. In the end the system forms the final report.
- The protocols and interfaces for information exchange with PC and SCADA. It allows integrating both the primary information and the diagnostic reports into the global network.

"PD-Analyzer-3" Specifications

Quantity of measuring channels	3
HF frequency band, MHz	0,1 ÷ 30,0
UHF frequency band, GHz	0,45 ÷ 1,50
Sensitivity, pC	5
PC interface	USB, Wi-Fi
Dimensions of the measuring block, mm	220*160*45
Operating from batteries, hours	8
Dimensions of the transportation case, mm	520*280*175
Weight of the device in the case, kg	12,0

"PD-Analyzer-3" Design

The "PD-Analyzer-3" device has got two separate modules: the measuring module and the power supply module.

The measuring module of device is cased in aluminum. At the side ends of the aluminum case there are the slots for the sensors connecting, and the communication slots.

The power supply module is supplied in the similar aluminum case; it includes the battery module and the battery charge unit.



The "PD-Analyzer-3" device is supplied in the protective transportation case.

"PD-Analyzer-3" Device Delivery Set:

Name	Number
"PD3-M: measuring block	1
"PD3-PS" universal power supply	1
"PFR-2" wireless synchronization block	1
"GKI-2" calibrating generator	1
Transportation case	1

Measuring Sensors

Different PD sensors are used for PD measuring in the high-voltage equipment. The type and mark of sensors depends on the type of equipment. DIMRUS produces different variants of these sensors.

You can choose the sensors in the DIMRUS catalogue ("sensors catalogue") or use one of the standard sensor sets supplied with the "PD-Analyzer-3" device.

The standard sensors sets are used for measurements in different types of high-voltage equipment – cables, gas-insulated equipment, rotating machines, etc. There are three standard sensor sets supplied by DIMRUS for solving the most common practical tasks.



The "PD Sensors - CL" sensor set is used for measurements in the high-voltage cable insulation. It includes three "RFCT-4" sensors, a leakage capacitive current sensor and a "GTI-R" calibrating generator for long cables' calibration.



The "PD Sensors - GIS" sensor set is used for measurements in the gas-insulated equipment. It includes three "AES" PD sensors, protective inductance OVP-1 and connecting cables.



The «PD Sensors - RM» sensor set is used for measurements in stator winding of high-voltage electrical machines. It includes three "CC-12/U" high-voltage coupling capacitors and one "DRTD-3" sensor. "DRTD-3" is used for connecting to the temperature sensors build into the stator winding. In this case the temperature sensors operate as the antennas for PD measurements inside the winding.

Any sensor set is delivered in the transportation case.