

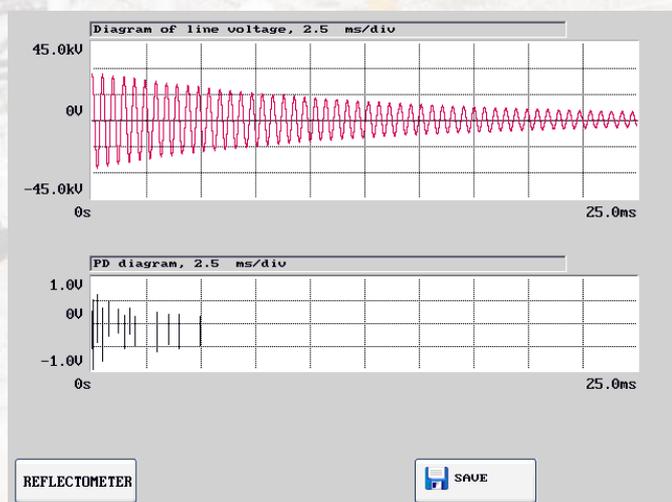
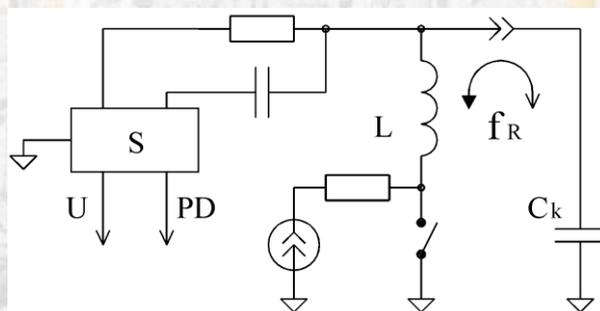
Cable PD-Analyzer *Monitoring system* *of cable lines insulation* *by the «OWTS» method*



The «CPDA» portable system («Cable PD-Analyzer») or the OWTS (Oscillating Wave Test System) has one of the most up-to-date diagnostic methods of cable line insulation. This system also can be used for the assessment of the insulation condition in stators, high-voltage generators and electromotors.

The insulation condition diagnostics is made on the idle mode equipment by analyzing partial discharges arisen when the test, variable or periodically damped voltage cable is apposed to the insulation.

At the beginnig of the test the cable is charged with the direct current form the current source. The magnitude of the end-point voltage on the cable is not more than the allowable operating magnitude. After charging the cable is switched off from the source and grounded with big inductance about 0,7 Henry. The classical resonance is arisen in created oscillating circuit which is consists of shunt cable capacity « C_k » and inductance of barrel « L ». Voltage vibrational frequency « f_R » is $50 \div 1000$ Hz and depended on monitored cable capacity « C_k ». Duration of voltage oscillation damping in circuit is depended on barrel impedance « R_L » and don't exceed 1 second.



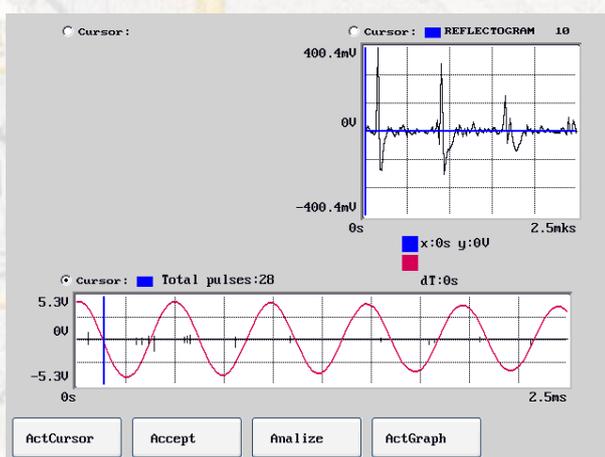
Partial discharges arisen in the monitored cable insulation are registered by the «CPDA» measuring device controlled from the keyboard or by the radio-channel.

On the basis of the registered information you can define:

- Partial discharge intensity in the insulation by the voltage magnitude.
- Correlation of the time partial discharges occurrence with the phase of the applied voltage.
- Voltage of partial discharge dying in the insulation.

The pulses of the arisen partial discharges in the insulation are used like a probe in the «CPDA» system to find the defect place in the monitored cable insulation. The pulse from the arisen partial discharges is distributed to both parts of the cable line. The device registers the “direct” pulse and then the “back” pulse which is reflected from the opposite end of the cable line.

The example of the cable line reflectogram with “direct” and “back” pulses from partial discharges is on the drawing on the left. The time delay of the second pulse is equal to the doubled travelling time from the defect place to the opposite end of the cable line. The accuracy of the exact defect place in the insulation is approximately 1 % of the monitored cable line length. It is controlled by the «CPDA» system.



The important diagnostic feature of the «CPDA» system is a possibility to detect the type of the diagnostic defect in the insulation. It is made on the basis of the pulse distribution analysis on AFFP (amplitude phase-frequency plane) and TFP (time-frequency plane). This diagnostics is made automatically with the built-in expert system «PD-Expert».

Due to this measuring in the «off-line» mode but with the operating voltage the accuracy is higher than in the «on-line» mode. It happens because in the monitored equipment switched off the outer lines the noise level in the insulation is lower.

Nowadays there is a version of the «CPDA-30» system with maximal testing voltage to 30 kV. The pre-production of the «CPDA-150» (with rated voltage to 154 kV) system is being completed. The difference between them is in the construction of the supply source, the inductance coil and the switch box which locks (closes) the charging cable on the ground through the coil. The measuring device of the «Cable PD-Analyzer» system is invariable.

Specifications

No	Parameter	
1	Maximal output voltage DC/AC, kV	30/21
2	Capacity of test cable, mkF	0,025 ÷ 2,0
3	Current of cable line charging, mA	4,0
4	Measurement range of registered partial discharges, nC	0,01 ÷ 100,0
5	Operating time from accumulator, hours	5
6	Operating temperature, degrees	- 20 ÷ + 40
7	Device weight / HV source with inductance, kg	7,0 / 45,0