

R-1500, R-1500/6 On-line bushing insulation monitoring systems



Bushings with different types of insulation are important part of power transformers. The reliability of high voltage equipment greatly depends on their technical condition.

The bushing insulation monitoring system «R-1500» is intended to monitor the condition of three bushings in the power transformer in the on-line mode. The system

modification named «R-1500/6» is used to monitor the condition of six transformer bushings.

The «R-1500» device monitors several important parameters showing the state of transformer bushing insulation:

- Unbalance of leakage current of three-phase bushing system.
- Dissipation factor and capacity of bushings insulation.
- The presence of the temperature dependence of continuous parameters which arise when there are problems in the bushing insulation.
- The time trend of the bushing parameters that characterizes developing defects.



The systems «R-1500» are used with the bushing sensor «DB-2» which have many modifications for different types of the bushing's test tap. The sensors allow to measure complex signal of the leakage current. This signal contains the leakage current of the power frequency and high frequency signals from partial discharges. The «R-1500» device measures the leakage current for bushing insulation estimation, and there is a special connector on the device which allows connecting a portable device for partial discharge measurement or oscilloscope (any time and safe).

The device «R-1500» calculates the changing rate of the power/dissipation factor and capacitance of the bushing. The bushing parameters are defined relative to two bushings of the other supply voltage phases.

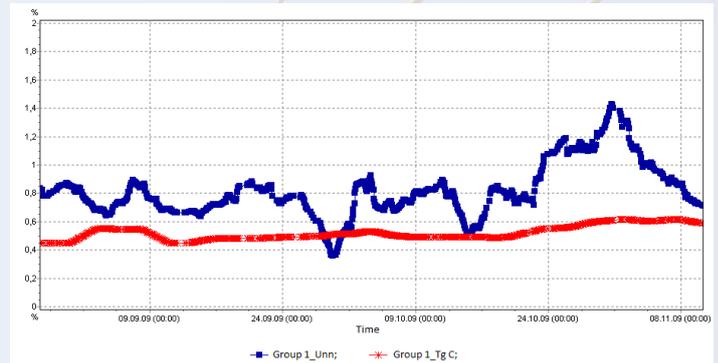
Using the device «R-1500/6» you can measure the absolute values of the dissipation factor in $\text{tg}\delta$ isolation. It can be done for the three transformer bushings (on HV side). To monitor the parameters of six bushings in the system of the monitoring brand «R-1500/6» we calculate the comparative dissipation factor of the bushings relative to each other. A special feature of the measuring system is able to compare HV and LV transformer bushings with one another in various combinations.



The processing of the information from the sensors is made by the device. The device also makes all the necessary diagnostic reports about the state of the bushing insulation.

All measurements are stored in the device flash- memory. The transmission of the information to the SCADA system or to the other software is made by «RS-485» interface.

To collect and analyze the information summarizing the status of the bushings there is special software for the PC that is delivered with each device. It makes possible to analyze all additional information which was taken by the primary device monitoring system.



The «R-1500» device has two relays which switch on automatically when the warning and alarm thresholds are exceeded and one relay of the device status.



The monitoring system «R-1500» is designed for the installation in the enclosure near the monitored transformer. All electronic components of the device are designed to work in the industrial range of the ambient temperatures from -40° C.

With additional heating systems inside the enclosure «R-1500» device can be operated at lower ambient temperatures from - 55° C and relative humidity to 95% non-condensing.

Specifications

No	Parameter	«R-1500»/ «R-1500/6»
1	Bushing leakage current inputs	3 / 6
2	Transformer tank temperature channels (Pt100)	3
3	Transformer HV load current channels	1 / 3
4	Ambient humidity channel	1
5	Leakage current measurement range, mA	5 ÷ 100
6	Relay parameters	5A, 220B
7	SCADA (PC) interface	RS-485, USB
8	Power supply, V	AC/DC 120 ÷ 260
9	Power consumption (with heater), W	< 100
10	«R-1500» dimensions with enclosure, mm	400 * 530 * 210
11	«R-1500/6» dimensions with enclosure, mm	500 * 630 * 150