

SG-DM

Monitoring and diagnostics of switchgear and cables



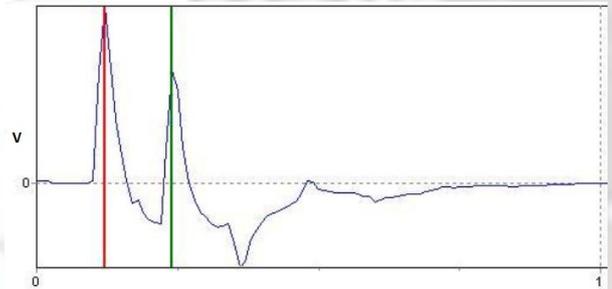
The system of monitoring and assessment insulation condition of switchgear and connected HV cables «SG-DM» (Switch Gear - Diagnostics Monitor) is used for diagnostics 14 circuit breakers and 15 cables.

Monitoring system "SG-DM" can be used for switchgear insulation diagnostics with the rated voltage 6 kV and more, connected to one bus duct. If the switchgear has several buses, it is necessary to use separate device "SG-DM" for everything.

The monitoring system «SG-DM» is the complex system for condition monitoring of high-voltage equipments of several types, connected into one object. It allows reducing expenses.

The "SG-DM" system makes:

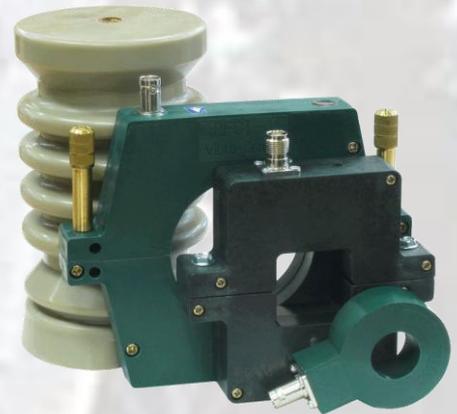
- Determination of breakers remaining switching life. The estimation is made on the basis of total power fixing which has been switched off by the breaker.
- Determination of mechanical drive elements technical condition of 14 monitored breakers. This parameter is defined on the basis of control current changing analysis at switching-on and switching-off of every breaker.
- Monitoring of switchgear buses and breakers insulation condition by the partial discharges analysis.
- Monitoring of connected cables insulation condition, and also powered from the switchgear high-voltage equipment (electric motors, transformers) by the partial discharges.
- Location the place of defect in the cable insulation by using build-in reflectometer. The reflectometer is based on analysis time of arrival partial discharges pulses.



The most difficult problems in the partial discharges measurement and analysis in switchgear, buses and cables are effective noise rejection and the timing of arrival of pulses in different channels with accuracy in a few nanoseconds. Efficient hardware and software in the «SG-DM» system allows reliably faulty cable, type of defect and make its location in the cable line. The «PD-Expert» diagnostic software makes these expert reports.

The high-frequency measuring current transformers “RFCT” is used as PD sensors. These sensors have different constructions and are installed on the grounded conductors of shield cable line, located in the switchgear. The sensors can be work with industrial frequency currents up to 1000 A without saturation. The figure shows the sensors «RFCT-1», «RFCT-7» and «RFCT-4».

The high-voltage coupling capacitors are used for bus duct insulation condition monitoring. Foil capacitive sensors with width 15 - 20 cm is used for insulation condition monitoring of cables without shield.



The «SG-DM» expert program, which analyzes breaker control current at switching-on and switching-off moments, allows analyzing time of the breaker operating, it describes its technical condition. This expert system is adaptive, automatically adjusted to the time parameters of different breaker types and brands. It allows to defining deviations of circuit breakers operating after every commutations.

Up to 36 different primary sensors are installed on monitored equipment (this is maximal «SG-DM» system configuration). These are sensors of load current, control currents of all breakers and also partial discharges sensors in switchgear, buses and cables.

The "SG-DM" system is installed near to the monitored equipment in switchgear. The system can operate from -40°C without heating.

Specifications

No	Parameter	Value
1	PD frequency range, MHz	0,5 ÷ 10,0
2	Amplitude dynamic range, dB	70
3	Accuracy PD time of arrival measurement, ns	2
4	Output relay	4 (250V, 6A)
5	SCADA connection	RS-485, Fiber Optic Ethernet
6	Power supply	90-260VAC (50/60Hz), 120-370VDC
7	Power consumption, W	<15
8	Operating temperature, °C	-40 ÷ +60