



CHRONE

PARTIAL DISCHARGE MONITORING

SOFTWARE-HARDWARE COMPLEX

Partial discharge or simply PD can be found in all types of medium and high voltage power equipment ranging from switchgear to rotating equipment such as motors and generators.

APPLICATION AREA:

High-voltage electrical equipment at energy enterprises, metallurgical and chemical production enterprises:

- Electric power companies producing electricity (NPP, TPP, HPP)
- Electrical utilities with operational high voltage motors;
- Manufacturers of electric motors, generators.

The CHRone partial discharge monitoring software-hardware complex comprises two components:

- CHRone hardware compatible with 80pF/220pF/1000pF capacitance transducers;
- Data setup, acquisition and display software.

Scope of application of CHRone:

- Partial discharge (PD) level control for assessment of condition of the stator winding insulation, and determination of the type of defect causing PD.

It is designated for operation in networked (online) turbine-driven generators and electric motors.

The system performs analog-to-digital conversion of PD potential pulses via independent input channels with subsequent transmission of the digitized signal to a PC to be processed. The system continuously collects and files data that could be used for assessment and modification of condition of the stator winding insulation.

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CHRone functions:

- Rotating machines monitoring as per GOST IEC/TS 60034-27-2-2015 (IEC TS 60034-27-2:2012);
- AI sampling frequency - up to 1.5 GHz (time resolution - up to 0.66 ns);
- Automatic measuring range adjustment;
- PD determination based on pulse waveform analysis;
- Calculation of the rated PD activity: Q_m (maximum repetitive amplitude), NQN (normalized histogram);
- PD activity visualization in tabular form or as PRPD charts, A-n charts or trends;
- PD activity data transmission via Modbus TCP (or other protocol as requested by the customer) including PRPD distributions.

The CHRONE software-hardware complex allows:

- Reviewing PD characteristics of the monitored electric motor;
- Obtaining a consolidated assessment score of the electric motor condition from 1 (best) to 3 (worst);

- Obtaining a detailed assessment of the motor condition based on the current PD activity analysis and relative PD level change (trend);
- Estimating the development of PD activity;
- Viewing additional measurement data (temperature and humidity);
- Changing the warning and alarm presets;
- Getting hints on the electric motor's routine maintenance.

Executed using:

- Signal analog filtering using a measuring capacitor;
- Pulse waveform analysis.

Analog filtering: The measuring capacitor generates a high-frequency filter, and it is used for preliminary signal processing. The cut-off frequency for 1000 pF (1 nF) capacitors: 3.18 MHz; 220 pF capacitors: 14.5 MHz; 80 pF capacitors: 40 MHz.

Pulse waveform analysis: Pulse waveform analysis is the main method of detecting PD pulses. The device's AI sampling frequency ensures detection of pulses with build-up time up to several nanoseconds.

The dedicated software transmits diagnostics data via various industrial protocols and is suited to be used as intermediate software between monitoring devices mounted directly on motors or generators, and any MES or ERP system that should trace degradation of the utility's active components.

The software continuously monitors the Q value dynamics and any other quantitative characteristics of the PD activity via monitoring devices and calculates the following:

- Static state: severity of current PD activity level;
- Dynamic state: PD severity increases over time;
- General condition: fastener insulation worn out.

The CHRONE complex conforms to the Technical Regulations of the Customs Union "Safety of Low Voltage Equipment" (TRTS004/2011) and "Electromagnetic Compatibility of Technical Facilities" (TRTS020/2011)

TRAFFIC LIGHT VISUALIZATION

The software operates based the traffic light principle:

- Green: low level of partial discharges;
- Yellow: moderate level of partial discharges;
- Red: high level of partial discharges.

The operator can simultaneously monitor the entire fleet of the company's electric motors/turbine-driven generators.

The user program interface concisely and clearly displays all acquired and calculated data, thus providing the operator with necessary tools for viewing the stator insulation's static, dynamic or general condition, scrolling through historic data, or generating user reports.