ROTARY MACHINE INSULATION ANALYSIS

▶ **EDA III System**

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Insulation Evaluation in Electrical Rotary Machines

The EDA system is ideal for the evaluation and diagnosis of the insulation condition in electrical rotary machines such as motors, generators, alternators, etc. Its main function is to analyse the condition of the stator winding insulation, using DC voltage levels without risk to the element under test.

The system obtains various parameters to evaluate the state of each of the components that make up the insulation in a rotary machine. Using these values and changes over time, it is possible to make a reliable diagnosis of the overall condition or specific problems, such as dirtiness, internal or external humidity, insulation degradation, partial discharges, etc.

The EDA has been developed using the experiences of users, resulting in a completely automated system with optimized measuring features.

Benefits

The EDA system is completely automatic with a data management system. This guarantees consistent testing results without operator influence when performing the test.

The system uses test voltage levels lower than the nominal operating voltage of the element being tested, thereby assuring that the insulation will not be damaged while testing. Data such as temperature, voltage level, capacitance, and insulation thickness, is standardised and automatically stored.

When a test is completed, data is also stored in an organized way. This allows a report to be directly printed. Graphs of the charging and discharging cycles of the machine are produced, by which it is possible to identify many problems.

Test results

Results are presented 2 ways: numerically and graphically. The numeric information is presented by means of parameters list, automatically calculated with the corresponding corrections. The graphic information is presented with the charge and discharge current curves for each test voltage and a polarization index curve. The polarization curve may be optionally smoothed to remove unwanted transient external effects from the real measurement.

Numeric results
- Actual test voltage.
- External temperature
- External humidity
- DC and 1 kHz Capacitance
- Ratio of DC and 1 kHz capacitances
- Test Voltage Ratio

For each test voltage, the EDA system carries out a charge and discharge cycle from which we get the following information:
- Insulation resistance (corrected to 20º and 40ºC)
- Polarization index
- Absorption ratio
- Leakage current
- Standardised leakage intensity (voltage and capacitance)
- Leakage current ratio at each test voltage
- Current Leakage/Re-absorption ratio
- Re-absorption current
- Re-absorption current standardised for insulation thickness
- Time constant

The data information is associated with the test voltage, indicating the results for each test. Information is provided with each parameter to determine the state of the parts which makes up the insulation of the electrical rotary machine.

Graphic results

Also provided is a graphic display of the charge and discharge currents for each test voltage. Additionally a "standard" curve is displayed to easily determine departures from the linear insulation behaviour versus the voltage increase.

A curve is displayed during the polarisation index test. Curves may be optionally smoothed to remove unwanted transient external effects from the real measurements.
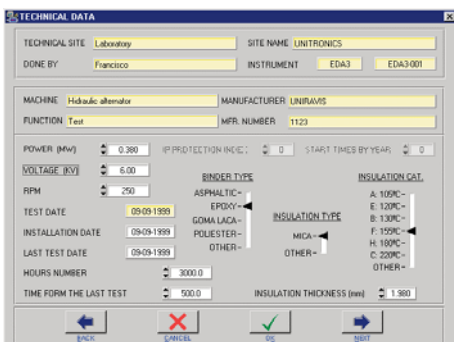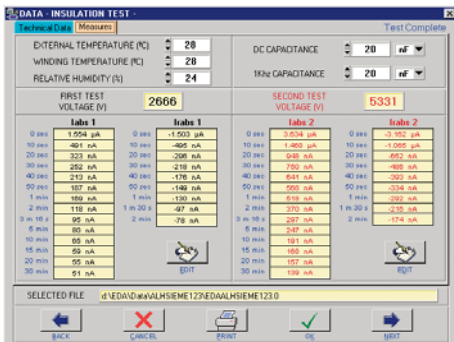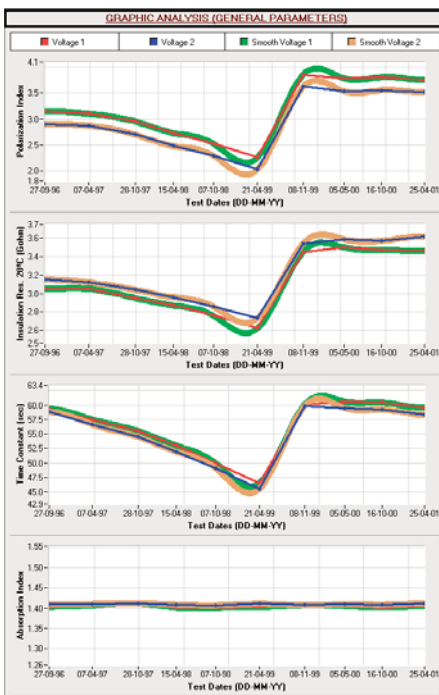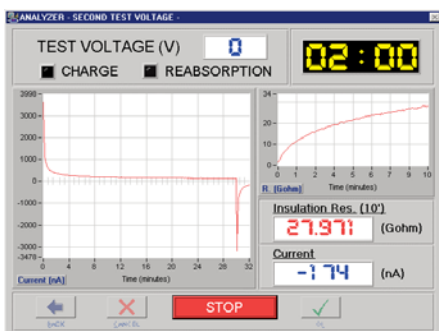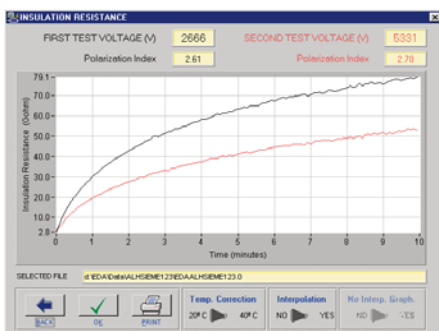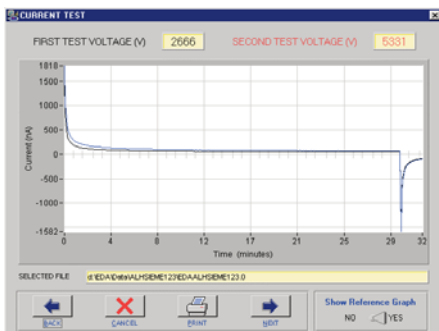
APPLICATIONS

- Initial reception and quality control of rotary machines (generators, alternators, LV and MV motors).
- Forming a part of a maintenance program on rotary machines, where a non-programmed failure would represent a high costs, risks and installation outage, and of course, to verify failures.
- To create a historial of the motors, etc. tested as the EDA system generates a report. In this report all technical data of previous tests are presented in a structured manner to easy follow the history of the element tested.
- To evaluate the parameters tested, anticipating failures and to diagnose the type of problem, thus planning in advance, the necessary maintenance steps required.

SPECIFICATIONS

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Power supply	230V ac ± 10%, 50Hz ± 5% or 60Hz ± 5% 115V ac ± 10%, 50Hz ± 5% or 60Hz ± 5% 350 VA max
Test signal	**Voltage**: 0 to 6,000 VDC **Short-circuit current**: 0 to 5 mA
Measurement ranges	**Voltage**: 0 to 6,000 V **Accuracy**: ± 2%. Front panel LED indicator.
	Current: 0 to 5.12 mA (three-scale auto-range) **Resolution**: 1 nA **Accuracy**: ± 1%
	DC Capacitance: 10 nF to 10 mF ± 5% **AC Capacitance**: 10 nF to 10 mF ± 5%
	Humidity: 10% to 90%. Accuracy: ± 10% **Temperature**: -10°C to 70°C. Accuracy: ± 2%
Working conditions	Temperature: 10°C - 50°C Humidity: 10% - 75%, non-condensating
Storage	Temperature: 5°C - 75°C Humidity: 5% - 80%, non-condensating
Physical dimensions	19" x 3U rack Depth: 40 cm - Wide: 45 cm - High: 13.5 cm Weight: 9 Kg
Test leads	Long: 2 x 5 m Weight: 2 x 6 Kg

Understanding the results

All the measured and calculated parameters are defined, contrasted and delimited by the main international standards (IEEE, IEC). The experience in the diagnostics and the help brought by our diagnostics software EDA DiagHelp allows relating all these parameters quickly, and then determining the issues in the machine's condition. However, the basis of the condition based maintenance is the trend analysis. The EDA Trends software provides a quick, graphical view of all the results: every results from successive tests performed in the same machine is shown in a table and a graph. Thanks to this feature, we can optimize the scheduling of the shutdowns and revisions to be performed on the machine, so reducing intervention cost and downtime.

Expert analysis software

The Diaghelp and Trends software packages complete the EDA III, facilitating results analysis and subsequent decision-making.

The EDA DiagHelp program makes it possible to perform an initial estimate of the status of the machine, applying diagnosis criteria to the calculations and measurements carried out by the EDA system. These criteria are based on various standards, theoretical principles and more than 10 years of experience of numerous experts. After entering the machine's serial number, DiagHelp will analyze the results from any of the saved tests and will display the machine's critical elements on a chart with green, yellow and red indicators, alerts and recommendations as appropriate.

EDA Trends is designed to collect the results from a series of consecutive tests performed on a specific machine between any two given dates, in order to track the evolution of the measurements with time, establishing trends for each of the parameters considered. In this way, it is possible to detect when a machine enters a risk zone and to schedule the most appropriate maintenance actions. A report including tracking graphics can be generated instantaneously.

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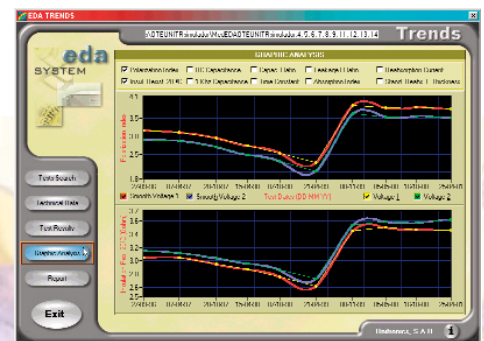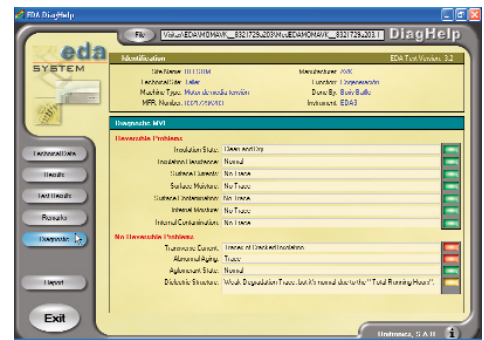
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