Da Vinci
LABORATORY SOLUTIONS

DVLS Transformer Oil Gas Analyzer

Determines Dissolved Gases in Transformer Oil

Transformer Oil is used as a coolant in transformers and to provide the electrical insulation between internal live parts. However as the transformer oil is exposed to electric and thermal stress a periodically analysis is required to check the aging, oxidation and oil chemical property change. The DVLS Transformer Oil Gas Analyzer (TOGA) determines the dissolved gas content in the transformer oil, which provides the diagnostic information on the current and future stability of the transformer. This TOGA analysis allows the operator to check for any abnormalities in the internal windings or the cellulose paper insulation of the transformer without a complete overhaul of the transformer. Evaluating the TOGA analysis results provides the operator the insights to schedule the maintenance or the decommissioning of the transformer.

Test Methods

Since the presence of the dissolved gases reveals the faults of a transformer, these gases are also known as Faulty Gases. Formation of faulty gases is caused by oxidation,vaporization, insulation decomposition or oil breakdown. Examples of the faulty gases are:

- Inert Gases: Hydrogen, Nitrogen, Oxygen, Carbon Dioxide & Carbon Monoxide
- Hydrocarbons: Acetylene, Ethylene, Ethane & Methane

The DVLS TOGA Analyzer

Several test methods are available to measure the dissolved or faulty gases in transformer oil:

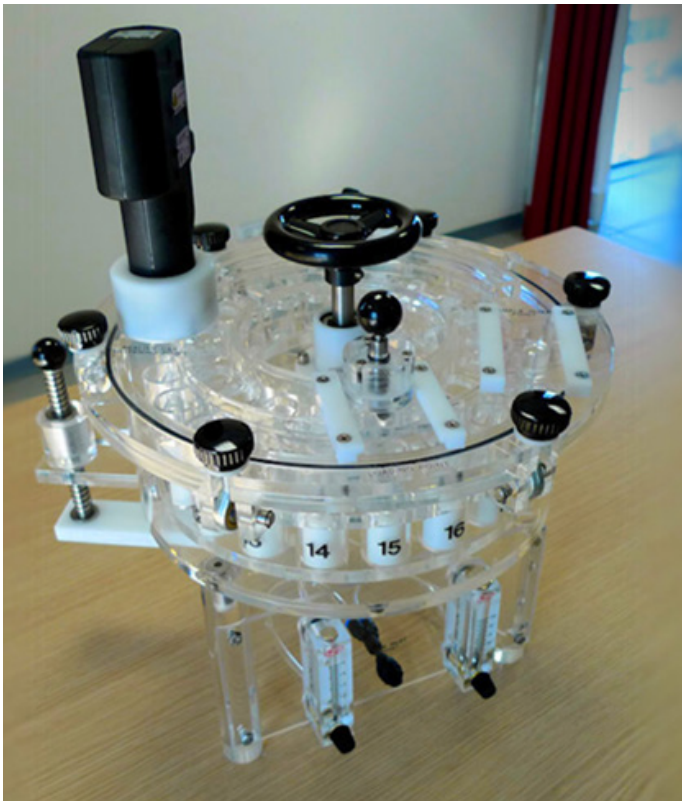
- **IEC 60567** based on an Oil-Filled Electrical Equipment for the Sampling of Gases and of Oil including a gas chromatographic analysis of Free and Dissolved Gases
- **ASTM D3612-C** based on a Gas Chromatographic analysis combined with a Headspace Sampler

The DVLS TOGA analyzer complies with IEC 60567 & ASTM D3612-C to extract and measure gases dissolved in electrical insulating oil and to identify the individual gas component extracted.

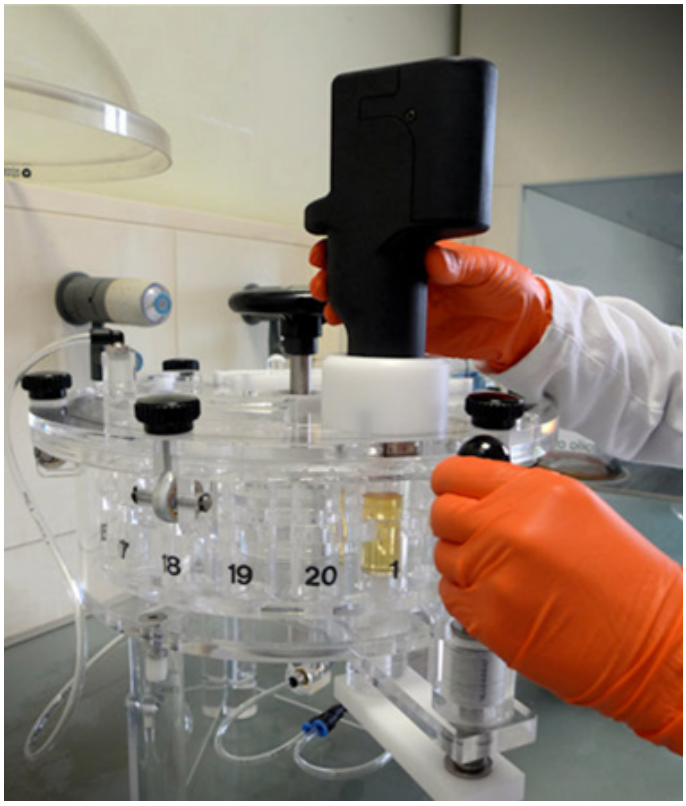
Analyzer Configuration

The DVLS Transformer Oil Gas Analyzer uses the Agilent 8890 Gas Chromagraph (GC) configured with:

- a Purged Packed Inlet
- Analytical columns
- Detectors
- Catalyst Assembly
- Bypass Valves
- an Agilent 8697 Headspace Sampler with Shaker
- a Sea Marconi Revolving Table
- a Sea Marconi Degassing Unit



The Sea Marconi Revolving Table



The sealing cap point with electronic crimper

Sample Preparation

The Revolving Table is a tool designed by Sea Marconi to improve the preparation steps for insulating oil samples for the Dissolved Gas Analysis (DGA) with the gas chromatography technique in the headspace.
This sample preparation tool complies with IEC 60567:2015 as Oil-filled electrical equipment for the sampling of gases and analysis of free and dissolved gases.

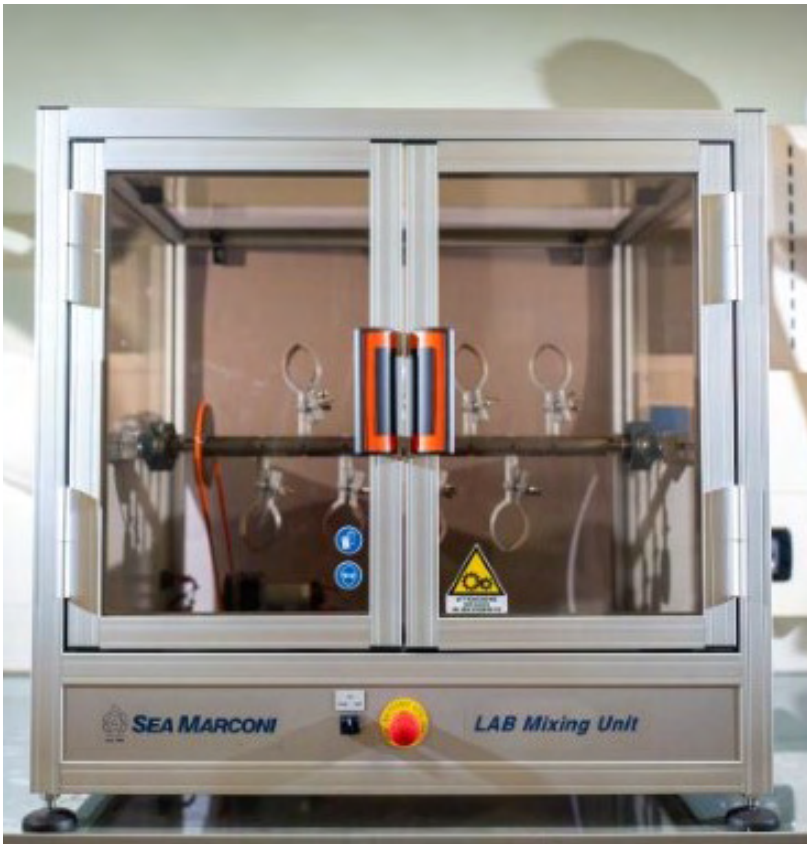
The revolving table permits up to 28 vials to be placed under inert gas (Argon) with a controlled flow, so that the oil sample remains uncontaminated by atmospheric elements (O_2, N_2, CO_2, moisture, dust, etc).
The operational dose of the sample, the positioning of the stopper and the closure of the vial (always with inert gas) are quick and easy with the convenient central hand wheel and by the fact that the tool is made of transparent Plexiglas.

Features of the Revolving Table

- ☑ Sample handling and dosing in a controlled inert atmosphere;
- ☑ Preparing 50 samples per man hour and storing them pending analysis;
- ☑ Requiring small bench space;
- ☑ Limiting the atmospheric gases interference;
- ☑ Semi-automatic vial lifting system;
- ☑ Vial closure system with electronic crimper;
- ☑ Applicable to mineral insulating, oils, synthetic insulating fluids, Askarels & silicone insulating liquids.

Online Demonstration

Check out the demonstration video on the sample preparation using the Revolving table.



Lab Mixing Unit

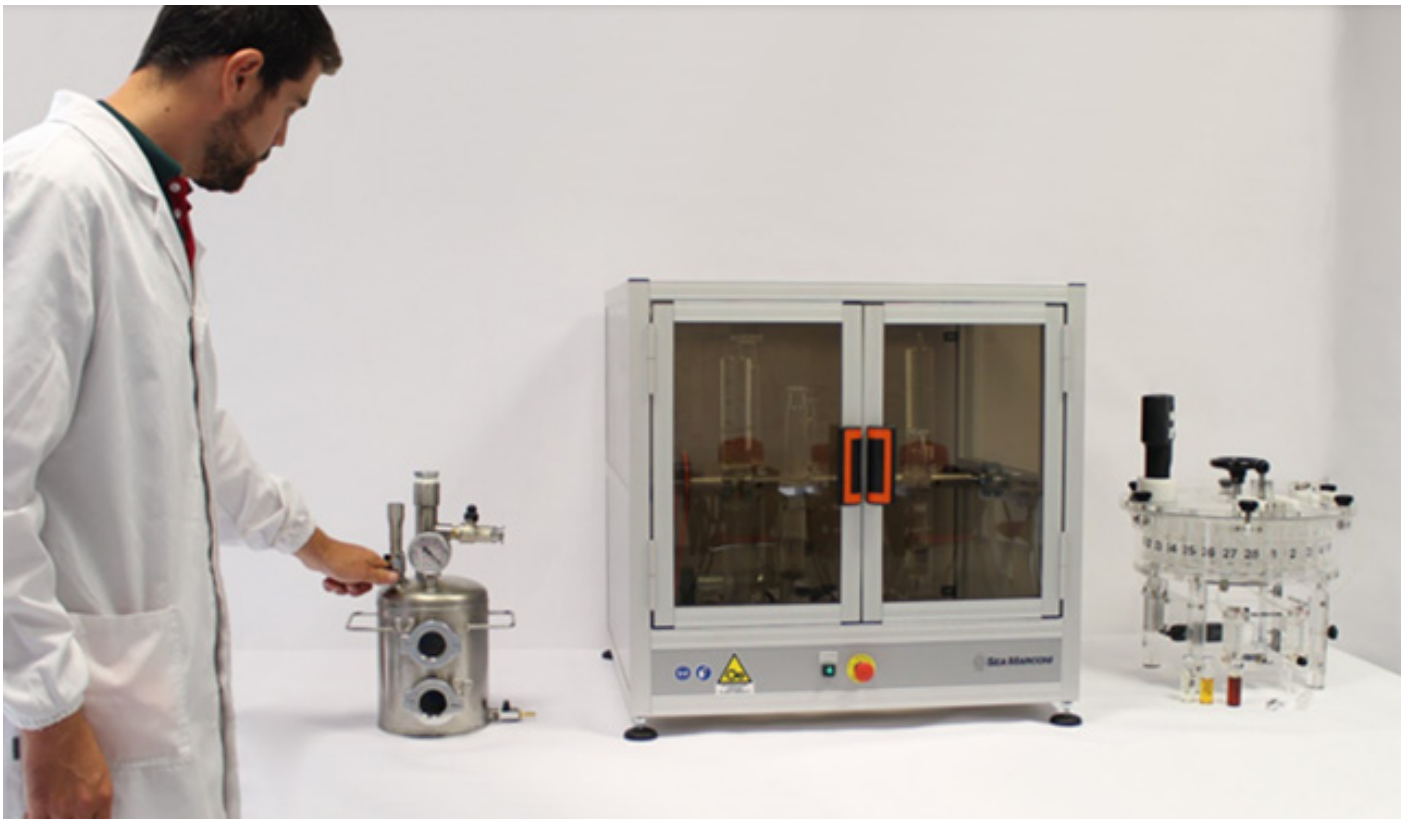
Degassing Unit

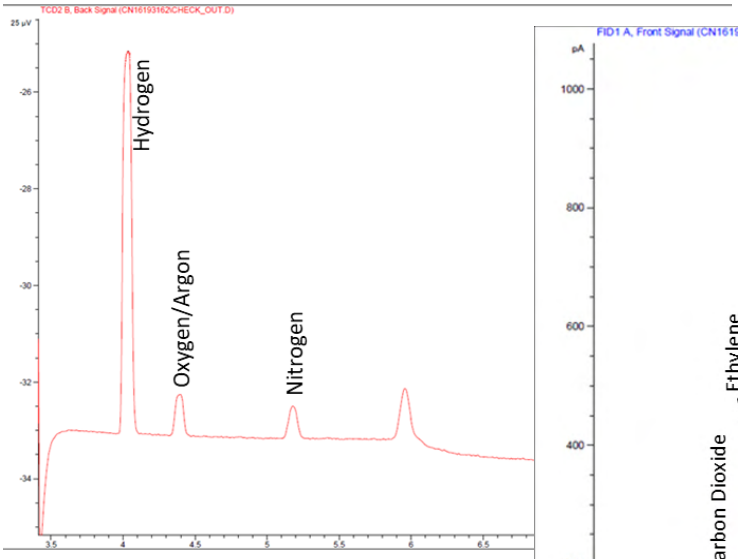
Calibration Standards Preparation

An essential part of the sample preparation is the Degassing unit, which is used to prepare on-site:

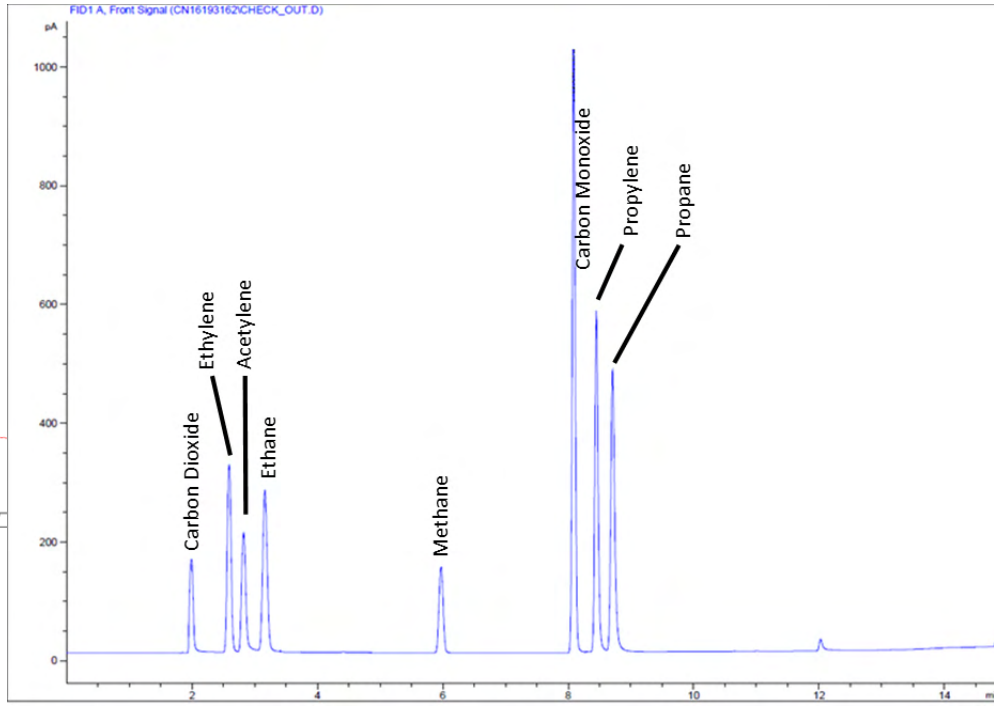
- Oil without gases as a blank;
- Gas free oil for standards.

This unit optimizes the degassing process during the preparation of gas in oil standards for Dissolved Gas Analysis (DGA) according to IEC 60567 for Oil-filled electrical equipment used for sampling of gases and analysis of free and dissolved gases.





The analysis of inert gases in transformer oil



The analysis of hydrocarbons in transformer oil

Analysis of Furanes

Da Vinci also offers a dedicated HPLC solution for the analysis of 2-Furfural and related components according to IEC 61198 / ASTM D5837.
Contact us for more information on the furanes analyzer.

Key Benefits

- ☑ Dedicated to dissolved gas analysis (DGA) of Transformer Insulating Oils;
- ☑ Complies with IEC 60567 and ASTM 3612C to determine inert gases and
- ☑ Hydrocarbons in Transformer Insulating Oil;
- ☑ Innovative Revolving table improves sample handling, dosing and preparation of transformer oils;
- ☑ Degassing unit allows to prepare calibration samples on-site;
- ☑ Analysis can be done with a GC-headspace configuration.

DA VINCI LABORATORY SOLUTIONS B.V.

Sydneystraat 5
3047 BP Rotterdam
The Netherlands

T +31 (0)10 258 1870
E SOLUTIONS@DAVINCI-LS.COM
I WWW.DAVINCI-LS.COM

Publication number:
DVE.51.02