Agilent

Trusted Answers

Maintain Power Grid Integrity

Agilent transformer oil gas analyzers

Confirm Oil Integrity and Prevent Catastrophic Failure

Analyzing dissolved gases provides crucial diagnostic information about the transformer's current and future stability—and helps you determine preventive maintenance schedules.

The performance and longevity of electrical transformers depend upon the stability of the oil used as an insulator and coolant. Normal transformer operation subjects the oil to electrical, thermal, and mechanical stresses, causing aging, oxidation, vaporization, electrolytic action, and decomposition. These processes change the oil's chemical properties and result in gas formation. The identity of these gases can indicate types of electrical faults, and rate of gas generation can be an indicator of severity.

Reliably characterize oil composition and integrity immediately after installation

Agilent transformer oil gas analyzers (TOGA) are based on the Agilent 8890 gas chromatograph and 8697 headspace sampler, and can identify the gases dissolved in the transformer oil. Our TOGA systems are factory configured and performance verified to help you predict and prevent transformer failure by detecting individual gas components and measuring their ratios.

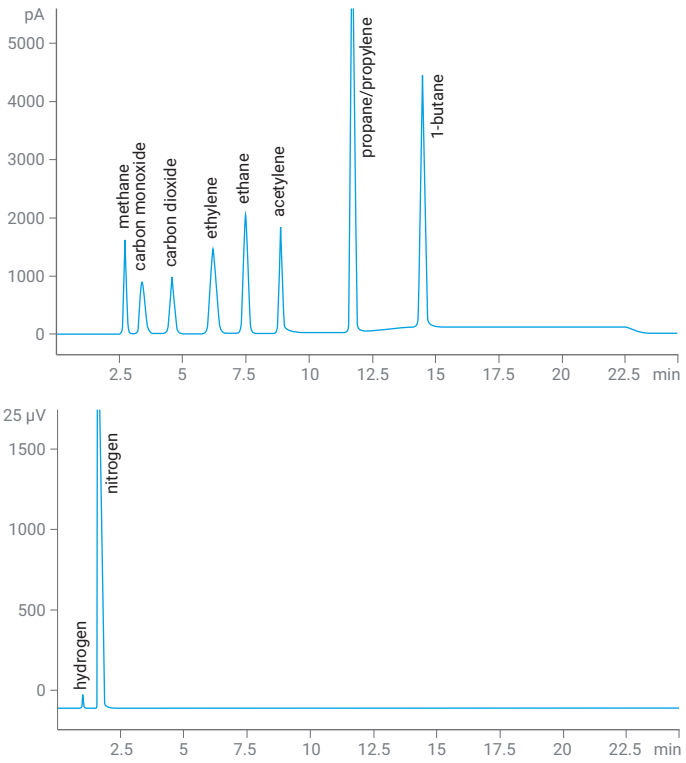
Agilent 8890 GC

Agilent 8697 headspace sampler

Agilent 8890 GC (according to ASTM D3612-A)

Achieve fast, unattended analysis of transformer oil gas using these built-in features:

- **A robust method** for measuring decomposition products, including H_2, O_2, CO, CO_2, and C_1 to C_3.
- **Compliance with ASTM D3612** with designs for Method A (vacuum extraction) or Method C (headspace sampling), including customizable data output reports.
- **Automated operation.** Analyzers are configured around the Agilent 8890 GC, and interfaced with the Agilent 8697 headspace sampler for a sequence up to 120 samples.
- **Column-to-column reproducibility.** The rigorous, highly efficient coating technology used in Agilent J&W HP-PLOT GC columns ensures column-to-column reproducibility and separation efficiency.



Configuration: 2-valve/2-column/TCD/FID/methanizer

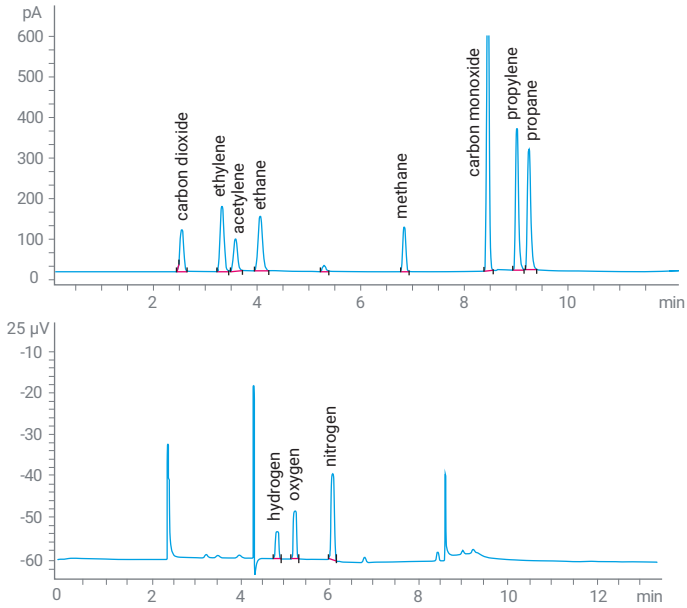
Configured per method: ASTM D3612-A

Enhanced transformer oil gas analyzer (TOGA) (according to ASTM D3612-C)

Key features and benefits:

- Single channel with PLOT columns, detection with TCD and NiCat/FID
- Direct headspace transfer line to column connection
- Trace levels of CO and CO_2 analyzed by catalytic conversion to CH_4 and detection with FID
- Improved precision through 8890 pneumatic control module (PCM) backpressure regulation of headspace gas sampling valve loop
- Additional gas sampling valve (GSV) for external checkout standard injection, bypassing the head space sampler (HSS)

Other configurations (ASTM D3612-A) or with methanizer bypass are available as custom configurations (SP-1 analyzers). Contact your Agilent sales representative for more details.



Configuration: 2-valve/2-column/TCD/FID/methanizer-FID/headspace

Compounds analyzed: H_2, O_2, N_2, CH_4, CO, and CO_2

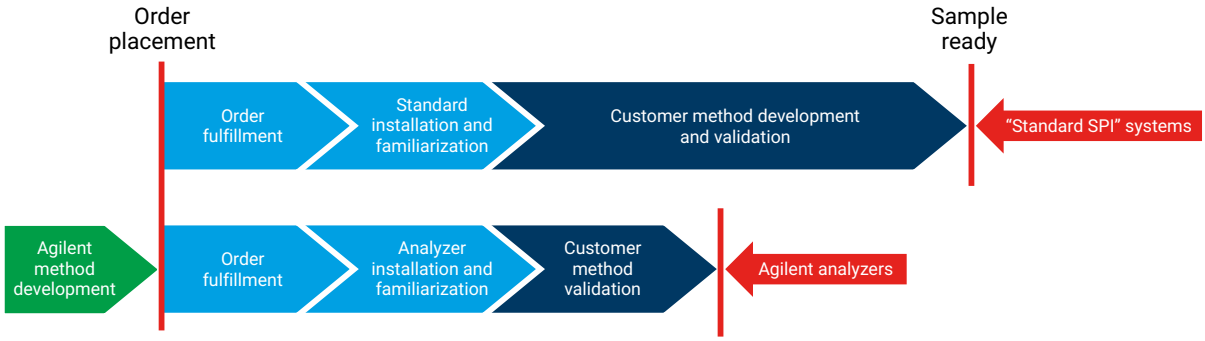
C_2 (ethane, ethylene, acetylene), C_3 (propane, propylene), C_4 (1-butene)

Typical quantification range: Meet the specifications listed in table 3 in ASTM D3612-C

Configured per method: ASTM D3612-C

Focus on system validation and data generation, not method development

More than just instruments, Agilent analyzers are complete workflow solutions, factory tuned and ready to operate. Each analyzer arrives with pre-set chromatography and checkout samples to verify separation capabilities. That means your team can work toward system validation as soon as installation is complete—and significantly reduce your method development costs. And as always, our support team is available, should any problems arise.



Intelligent GC instruments that work as hard as you do

Transformer oil gas analyzers based on the Agilent 8890 GC—part of a new breed of instrument—monitor system health, alert you to potential issues, and help you solve problems. That means you can plan your work, including maintenance, rather than react to unexpected downtime.

In addition, analyzers feature core microchannel-based electronic pneumatics control (EPC). Unique to Agilent, this design protects against gas contaminants—such as particulates, water, and oils—improving reliability and longevity.

Best of all, you can check on your lab anytime from anywhere. Remote access features let you view setup information, troubleshoot problems, check for leaks, backflush columns, pause and start sample runs, and manage method development.

Three standard TOGA configurations

FID/TCD with packed columns per ASTM D3612 method A (vacuum extraction)
FID/TCD per ASTM D3612 method C (headspace sampling) with methanizer and PLOT columns
FID/TCD per ASTM D3612 method C (headspace sampling) with pre-column backflush, PLOT columns, and methanizer bypass optimized for trace olefins

TOGA compounds of interest

Component	Indications of Transformer Condition
Oxygen	– Oxidation of oil or cellulose – Increase = leaks, poor sample gathering – Decrease = reaction with other gases due to overheating
Nitrogen	– Increase or decrease = rise or drop in oil temperature and subsequent effect on nitrogen in gas space above oil
Combustible gases, carbon oxides	– Increase = fault indicator, some normal aging or accelerated deterioration of insulating materials (tracked over time)
Acetylene	– Increase in acetylene and hydrogen relative to methane and ethylene = arcing – Carbon monoxide and carbon dioxide might also be formed if fault includes cellulose insulation
Hydrogen	– Increase = corona (low-energy electrical discharge) – Also produces methane and smaller amounts of ethane, ethylene, carbon monoxide, and carbon dioxide
Ethylene	– Increase = overheated oil – Also produces some methane and smaller amounts of hydrogen, ethane, and acetylene
Carbon monoxide	– Increase = overheated cellulose – Increase in CO_2 (could be atmospheric) – Methane and ethylene could increase as well

Explore additional analyzers for energy and chemical applications.

Need a custom analyzer?

We can help you meet your most challenging demands with specialized technologies that significantly reduce your time from system arrival to final validation. With preconfigured hardware and method-specific separation tools, your analysts can focus on calibration and validation per your lab SOPs.

Innovative Agilent transformer oil gas analyzers reflect our stringent quality-control process

At the factory:

- Application-specific testing for full functionality, including all columns and connections.
- Application-specific columns tested for chromatographic performance and tuned per provided method files.
- Serial numbers of 8890 GC and columns delivered all match as tested together under factory quality control.

Agilent delivery at your lab:

- Instrument manual for running the method.
- Method parameters and checkout data files are included on GC memory for fast future reference.
- Consumables included—no separate ordering required.
- Consumables information for easy reordering.

Agilent installation in your lab:

- Duplicate factory checkout with checkout sample onsite by factory-trained support engineer.
- Optional application startup assistance.

Capture, analyze, and share data: OpenLab CDS works the way you do

OpenLab CDS is a chromatography data system that combines productivity, usability, and the highest level of data integrity. With a single user interface, you can control your Agilent LC, GC, Micro GC, single quadrupole LC/MS, and GC/MS, as well as other vendors' instruments in the lab, to streamline training and support. Built-in tools provide time-saving steps in analysis, interpretation, and reporting workflows while technical controls ensure work quality, effective records management, and enhanced data security.

Learn more

Complete your GC workflow and achieve your business goals

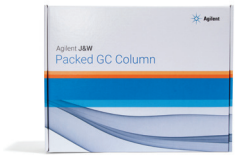
For more than 50 years, Agilent has led the way with cutting-edge GC and GC/MS consumables and services. No matter where you are on the energy/fuels supply chain, Agilent can help you increase production efficiency, reduce scrap and rework, and enhance product quality.

When authenticity counts, choose genuine replacement parts for Agilent analyzers

There are many benefits to using genuine Agilent replacement parts, including the minimization of background interference, low signal counts, and response changes. This means you can maintain reliable performance and maximum uptime. And every genuine replacement part is covered by a 90-day warranty from the date of shipment and your Agilent service agreement for added peace of mind.

Headspace vials and caps

Agilent headspace vials and caps are precisely designed to ensure secure, reliable seals while minimizing the risk of sample contamination. Ideal for demanding energy and fuels applications. **Learn more**



J&W advanced capillary and packed GC columns

We offer the most extensive and innovative range of GC columns for your transformer oil analysis needs. Options include a variety of general-purpose and application-optimized columns that meet ASTM testing standards. **Learn more**

Don't miss a thing in your GC analysis with the Agilent Inert Flow Path

Ensure the inertness of flow path surfaces, and allow analytes to safely pass from injector to detector. The Agilent Inert Flow Path can decrease analyte adsorption for lower limits of detection and better signal-to-noise response, resulting in better trace level analysis. **Learn more**

Flexible service and support options keep your lab up and running

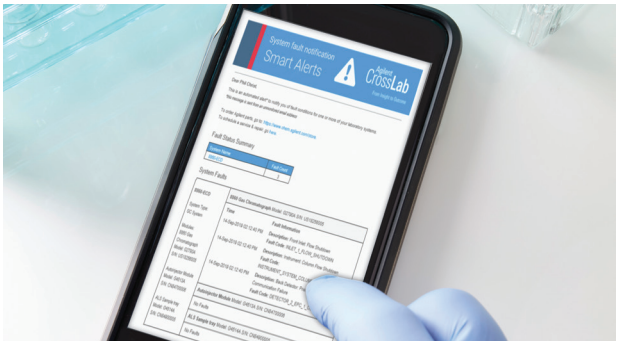
From asset management to applications support and laboratory analytics, Agilent can help you improve operational efficiency.

Agilent University

Flexible, cost-effective training options help you boost efficiency and minimize downtime. Choose the format that suits you best—including in-person, virtual instructor-led, and self-paced online courses. **Learn more**

Agilent CrossLab

Extend uptime, produce reliable data, stay compliant, and have predictable service costs. We'll also equip your team with the knowledge and skills they need to drive your lab's success. **Learn more**



Agilent CrossLab Smart Alerts

Get immediate notification when an instrument goes down, and why it did. Smart Alerts also gives you timely maintenance recommendations and helps you order your favorite consumables. **Learn more**

Agilent Trade-in and Buyback Program*

Lower your environmental impact—and earn credit toward your new GC instrument. The Agilent Trade-in and Buyback Program lets you trade in your older GC or GC/MS for cash or credit. Agilent will remove the old equipment from your lab and ensure proper recycling. We also offer payment plans and flexible spending options to help you equip your lab with essential technology. **Learn more**

** Not available in all regions*

Need to add new technologies to your lab?

Partner with Agilent to elevate your GC and GC/MS capabilities with step-by-step upgrade options—both full system and modular. Together, we can forge an upgrade path that fits your analytical needs, budget, bench space, and workflow. Count on us for:

- Expert training
- Method consultation
- Sustainability support
- Agilent value promise

Contact your Agilent representative for more information.

Learn more:
www.agilent.com/chem/gc-analyzers

Find a local Agilent customer center:
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