MATRIX-MG Series

- Automated High-Performance Gas Analyzers

Innovation with Integrity

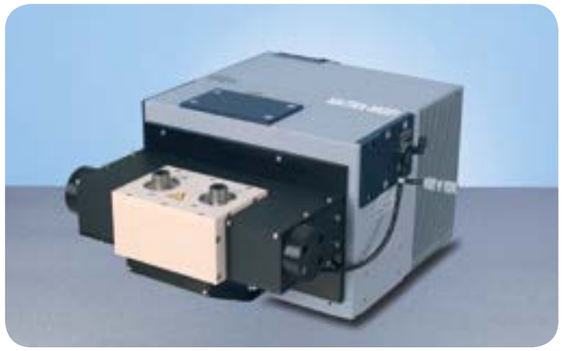
FT-IR

MATRIX-MG Series

The MATRIX-MG Series comprises three high-performance FT-IR gas analyzers in a compact and rugged housing. They are designed for the automated, high precision and real-time monitoring of gas concentrations in many different applications.

Key Features

- Fast, continuous (option) and fully automated identification and quantification of gas compositions
- Its outstanding sensitivity allows to detect concentrations from a few parts per billion up to one hundred percent
- No calibration to the target gas necessary
- Easy operation and maintenance
- Compensation of atmospheric gases and interferents
- Embedded in a compact and rugged housing
- Based on the RockSolid™ interferometer for permanently aligned optics and insensitivity to vibrations
- Temperature controlled gas cell (up to 191 °C)
- Accounts for variable pressure and temperature of the gas by included sensors inside the gas cell
- Output of measurement results to industrial communication interfaces



MATRIX-MG01

MATRIX-MG2

MATRIX-MG5

Fully Automated Identification and Quantification

The target gas is measured in a gas cell for high sensitivity compound analysis based on FT-IR spectroscopy. From the obtained spectra the gas concentrations are retrieved automatically by a nonlinear fitting procedure within the comprehensive software package, without the need for gas calibrations. The influences of interfering gases as well as of varying gas temperatures and pressures are taken into account by the analysis routine.

High Dynamic Range

Equipped with a gas cell featuring an optical path length of 0.1 m (MG01), 2 m (MG2) or 5 m (MG5) the MATRIX-MG Series can detect and quantify gas components that occur in concentrations from only a few parts per billion (ppb) up to one hundred percent.

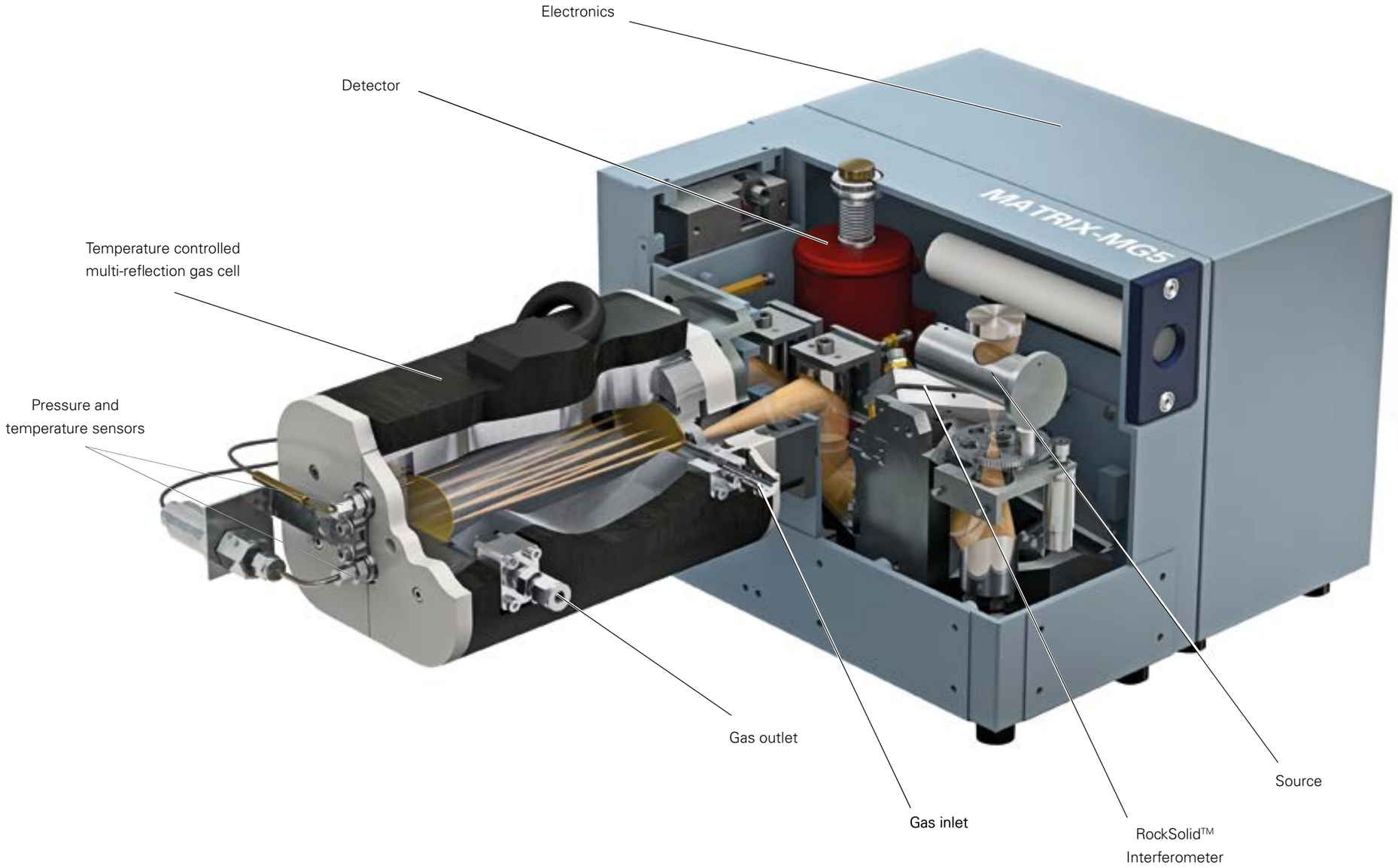
Fast and Continuous (option) Quantification

The MATRIX-MG spectrometers measure up to 5 spectra per second at high spectral resolution of 0.5 cm^{-1} and up to 30 spectra per second at 4 cm^{-1} spectral resolution.

An innovative gas cell design enables a fast gas exchange to measure dynamic processes. Standard fittings enable the easy connection of the gas analyzer to external piping.

Its design makes the Matrix-MG Series ideally suited for the automated, fast, precise and continuous (option) quantification even of fast fluctuating gas compositions. Due to the vast range of detectable gas components (> 400 compounds are available), the MATRIX-MG Series can be used in a very broad field of process applications. The comprehensive accessories allow to measure gases in a broad pressure- and temperature range.

• MATRIX-MG5



The industrial grade MATRIX IR Cube with its proven RockSolid™ interferometer is the basic fundament of the reliable MATRIX-MG Series gas analyzers.

The newly designed 5 m multi-reflection gas cell of the MATRIX-MG5 allows for a high optical throughput (high sensitivity) and an optimized gas flow for a fast gas exchange. Its nickel- plated inner surface and gold mirrors allow to measure even corrosive gases.

Internal pressure and temperature sensors enable online, in-situ measurements of the gas temperature and pressure for high-precision quantification results.

The compact and rugged design allows for an easy integration in many industrial, scientific and even mobile applications.

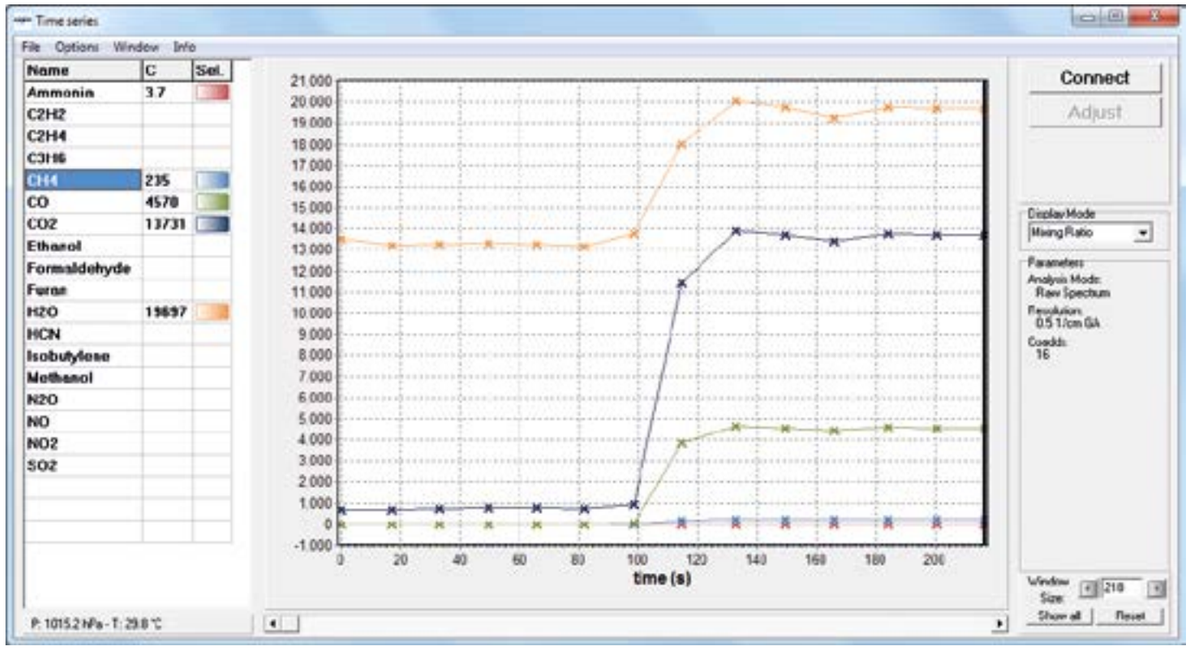
• OPUS GA

The comprehensive software package OPUS GA (OPUS Gas Analysis) automatically evaluates the measured spectra in real-time in order to identify and quantify the gas compounds.

The quantification bases on a non-linear fitting algorithm that fits the corresponding library spectrum to the measurement. In this fitting procedure also the absorptions of interfering gases are included.

More than 400 compounds can be identified and quantified without the need of a calibration measurement.

Additionaly, individual reference spectra can be measured by the user.

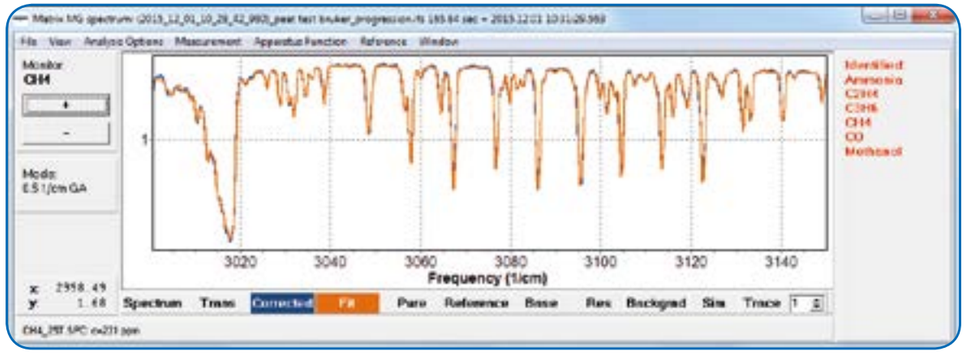


Software package OPUS GA for automated identification and quantification of gas compounds.

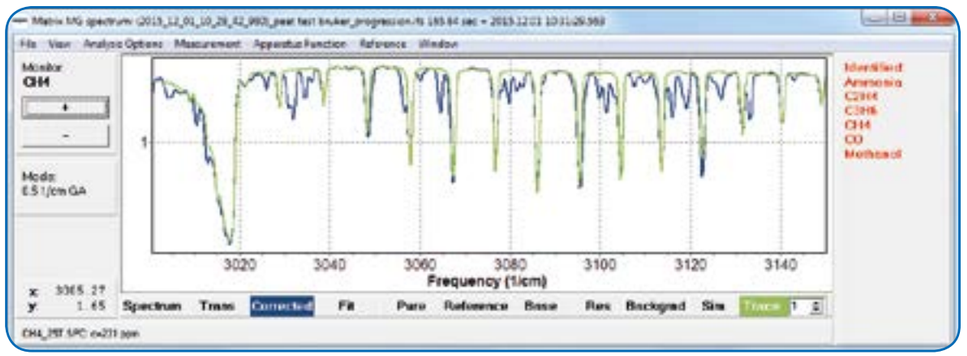
- Automatic identification and quantification of the target gas
- Automatic compensation of interferent compounds
- No calibration to target gas necessary
- More than 400 compounds available
- Transmission of measurement values to industrial interfaces possible

For a detailed analysis, the measured spectra and the corresponding fits can be further investigated within OPUS GA.

The picture on the left shows the measurement (blue) and the corresponding fit (orange) to quantify the methane (CH_4) concentration of the measured gas. In this spectral range also water shows significant absorption bands. In the picture on the right only the contribution to the fit that is originating from the methane in the gas is displayed. The additional absorption bands in the measurement are arising due to water vapor.



Measurement (blue) and fit (orange) to quantify the amount of methane. Also the contribution of the interfering water vapor is taken into account.



Contribution of methane (green) to the fit. The additional absorption bands in the measurement (blue) are evoked by water vapor in the target gas.

Applications

Due to the vast range of detectable gas components (> 400 compounds are available without the need to perform calibration measurements), the MATRIX-MG can be used in a very broad field of applications.

Among these are for example:

Industrial applications like process surveillance in production lines

Monitoring of the exhaust gas of smokestacks

Motor vehicle exhaust analysis

Biogas analysis

Determination of gas impurities

Scientific research

Options

To meet the specific requirements for a very broad range of applications, we offer several different options for the MATRIX-MG Series:

- **Option for Fast Gas Exchange**

  This option features a gas cell and external tubing to enable a very fast gas exchange to analyze dynamic processes, such as car engine exhaust gas.

- **High Resolution Option**

  This option allows to measure with a resolution of better than 0.5 cm^{-1} (standard: better than 1 cm^{-1}) and enables the identification and quantification of gas mixtures even with heavily overlapping infrared signals.

- **High Pressure Option**

  The high pressure option allows to measure gases at a pressure of up to 20 bar (at 20°C, standard: 2 bar) to decrease the detection limits even further. It is especially suited to detect very low gas concentrations, such as impurities in gas products.

MATRIX-MG5 with fast gas exchange option.

A variety of accessories is available to ease the integration into dedicated applications and processes, such as pumps, heated filters, sample probes and transfer lines.

To protect the user against hot surfaces the MATRIX-MG gas analyzers are supplied with a protective housing around the gas cell.

For lowest detection limits and trace gas analysis a 26 m multi-reflection gas cell is available upon request.

Specifications

	MG01	MG2	MG5
▪ Optical path length in gas cell	0.1 m	2 m	5 m
▪ Maximum gas cell temperature	180° C	180° C	191° C
▪ Dimensions	~ 447 x 320 x 240 mm^3 without protective housing	~ 640 x 450 x 258 mm^3 with protective housing	~ 640 x 450 x 258 mm^3 with protective housing
▪ Mass	~ 27 kg	~ 27 kg	~ 29 kg

▪ Transmission of measurement values to industrial interfaces (such as 4-20 mA analog, PROFIBUS, Modbus) available

Performance

- Spectral range: 4800 - 750 cm^{-1} (other ranges optional)
- Detector: Liquid nitrogen cooled MCT, other detectors optional, e.g. DTGS, cryocooled MCT
- Interferometer: Rocksolid™, permanently aligned
- Spectral resolution: Better than 1 cm^{-1} (apodized), Option: better than 0.5 cm^{-1}
- Spectral rate: 4 spectra/s at 4 cm^{-1} spectral resolution, 1 spectrum/s at 0.5 cm^{-1} spectral resolution Option: 30 spectra/s at 4 cm^{-1} spectral resolution, 5 spectra/s at 0.5 cm^{-1} spectral resolution
- Wavenumber accuracy: Better than 0.05 cm^{-1}
- Photometric accuracy: Better than 0.1 %

Know How meets Service

Bruker Optics is the leading manufacturer and worldwide supplier of Fourier Transform Infrared, Near Infrared and Raman spectrometers for various industries and applications. For years, we set new standards on the market when it comes to precision and efficiency, ergonomics and ease of operation, consulting and services.

Highest Quality from a Renowned Company: Always more than you expect

We are never satisfied with the common market standards. This is where our own research and development departments play a major role: here new ideas are turned into innovative products - in more precision, advanced user comfort and unrivalled reliability. To us, it is obvious that these highest demands are also valid for our production process. High quality materials, careful workmanship and, if necessary, especially developed production processes and test routines ensure the quality that is common to all Bruker Optics spectrometers. No matter which new products we design, we place the very highest demands on them all.

Worldwide on-site: We are there where you need us.

Bruker's competence is there where our customers need it - from the very first contact. Our application specialists are scientists and engineers who know infrared spectroscopy and spectrometers as well as the customers applications. With service centers all over Europe, North and South America, Asia and Oceania an efficient global technical support is guaranteed. This includes professional instructions regarding your application as well as qualified and fast after sales service and, if desired remote diagnostics.

Plenty of time for personal consultation and customer service guarantee a sustainable and efficient solution.

Bruker

Our success stems from our commitment and dedication to provide you the proper analytical tool you require to solve a demanding research problem or run daily quality control routine procedures.

Related Bruker Optics Instrumentation

EM 27 Remote Sensing FT-IR

The EM 27 is a ruggedized remote sensing system providing high performance Spectroscopy in the field. The EM 27 can easily be deployed in the field for various air monitoring applications. Emissions from smoke stacks, waste disposal and hazardous emissions from chemical accidents can be observed with an operating range of typically several kilometers.

OPS Open Path Air Monitoring System

The open path air monitoring system allows identification and quantification of airborne pollutants and atmospheric gases. Infrared radiation is modulated by an interferometer and transmitted to an array of retroreflectors positioned at a distance of typically several hundred meters. Typical applications include air monitoring at industrial, construction or municipal sites and high-precision quantification of atmospheric gases.

SIGIS 2 Scanning Imaging Remote Sensing System

SIGIS 2 is a scanning imaging remote sensing system that allows rapid identification, quantification and visualization of gas clouds from long distances. The system maps a predefined area and results of the analysis are visualized by a video image, overlaid by a chemical image. SIGIS systems are applied in environmental applications, atmospheric research, volcanology, and industrial facility surveillance and are part of the equipment of emergency response forces around the world.

HI90 Hyperspectral Imaging System

The HI 90 is a high performance imaging Fourier transform spectrometer based on a focal plane array detector that allows for real-time identification, quantification and visualization of gas clouds from long distances. Each pixel of the array records an interferogram from the corresponding field of view. A spectrum is obtained by Fourier transformation and contains the infrared signature of the scene.

Technologies used are protected by one or more of the following patents:
US 5923422

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