Process &
Environmental
Analysis Solutions

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MultiGas™ 2030

ON-LINE GAS ANALYSIS

The MultiGas™ 2030 is an FTIR based analyzer capable of ppb to ppm sensitivity for multiple gas species in a variety of applications, such as stack emissions monitoring, process monitoring, ambient air monitoring, purity monitoring, and selective catalytic reduction performance monitoring. The MultiGas 2030 can perform analysis in gas streams that contain up to 40% water, and can simultaneously analyze and display more than 30 gases. With permanently stored calibration spectra, the need for costly gas cylinders is reduced. In addition, operators will find the robust, fully automated MultiGas 2030 easy to operate and maintain.

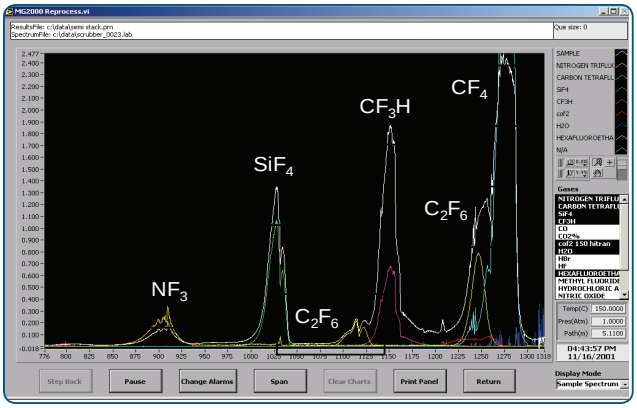
The MultiGas 2030 Analyzer is composed of a 2102 Process FTIR Spectrometer, our patented, high-optical-throughput sampling cell, applications-specific analysis software, and an instrument independent quantitative spectral library. The MultiGas 2030 collects high-resolution infrared spectra which are analyzed using the quantitative spectral library. This provides an accurate, highly sensitive measurement of most gases and vapors.

Features & Benefits

- 10-100 ppb sensitivity for many toxic gases
  - Including VOCs, acids, bases, hydrides, and PFCs
  - In effluent streams that contain up to 40% water
- Easily transportable from site to site, with set up time in minutes
- Simultaneous analysis and display of more than 30 gases
- Permanent calibration spectra reduces the need for costly gas cylinders
- Gas line heater maintains temperature before the sample enters gas cell
- Patented, linearized detector response assures all instruments maintain the same calibration
- Frequency and resolution diagnostics ensure constant calibration
- Provides automatic temperature and pressure compensation to ensure accurate analysis
- User-friendly software enables simple operation by minimally trained personnel

Applications

- Stack monitoring (environmental compliance)
- Process monitoring, development and optimization
- Ambient air analysis (industrial hygiene)
- Bulk gas purity analysis
- Combustion emissions monitoring
- SCR - selective catalytic reduction performance monitoring



IR Spectrum of Semiconductor Stack: Sample (white), Calibrations (color). The MultiGas 2030 can speciate (differentiate) similar molecules simultaneously.

Designed specifically for process and environmental monitoring, the 2102 Process FTIR Spectrometer is compact and rugged. Capable of operating at spectral resolutions up to 0.5 cm^{-1}, it is the fastest, most sensitive and stable process FTIR available. In addition, it can operate in hostile environments with a high degree of immunity to vibration and temperature changes. An advanced, high-speed data processing system is standard, and provides low-noise infrared spectra for analysis.

2102 Process FTIR Spectrometer

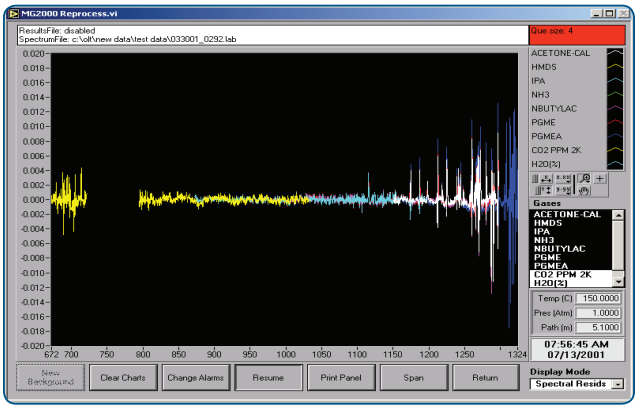
This spectrometer is coupled to a patented low volume (200 mL) multi-pass gas cell with a 5.11 meter effective pathlength. The patented design of this cell incorporates aspheric, aberration-correcting mirrors which provide more than twice the optical throughput of a conventional multi-pass gas cell. Alternatively, a single-pass gas cell can be used for corrosive gases or strongly-absorbing gases at high concentrations. Either cell can be operated from ambient temperature to 191°C.

The 5.11m pathlength, 200 mL volume, long path gas cell measures 8-1/2" x 2" x 3-1/2", and uses a patented aberration correcting optics for maximum sensitivity.

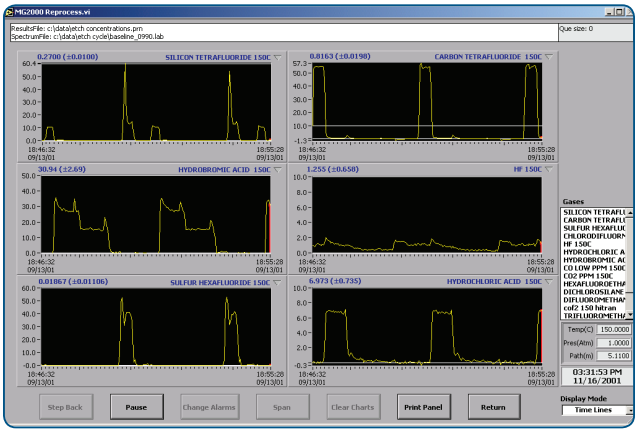
Spectral Analysis

The MultiGas 2030 analyzer features robust quantitative analysis software, which can analyze and report concentrations for dozens of compounds simultaneously. The software, which operates on a personal computer, performs automatic corrections for gas temperature and pressure variations, which are measured directly by the analyzer. Samples can be acquired and analyzed in less than a second, making transient analysis possible.

During data collection the MultiGas software continuously acquires and processes spectra while computing the concentrations of the gases that are selected in the setup. Display formats include concentration histories in graphical and tabular formats, the measured spectrum and spectral residuals. The residual spectrum can be utilized to visually determine error in the analysis, making QA/QC checking easy and straight forward to accomplish. The spectral residuals represent the "left-over" spectral information once all the reference spectra have been accounted for. Once spectra have been collected and saved, these spectra may be reprocessed at any time using the same or different calibration sets.



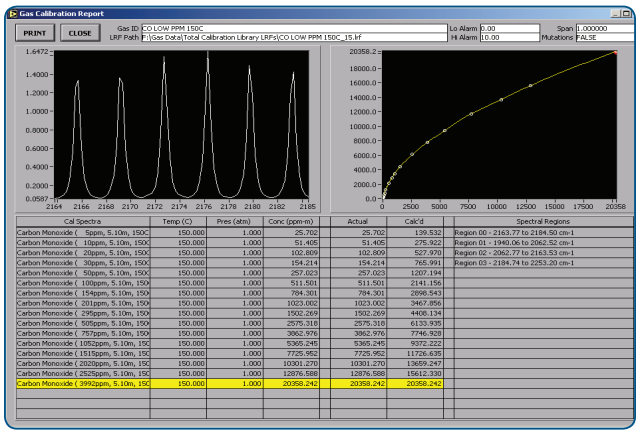
Residual Spectra: Calibration Subtracted from Sample Demonstrates Analysis Quality



Time Lines from Semiconductor Process

Instrument Independent Calibration

The MultiGas software features multi-point calibration curves that provide a dynamic range up to 9 orders of magnitude (ppb to 100%). Calibrations for many species are provided with the instrument, and additional calibrations can be generated by the user from gases of known concentration. Utilities in the MultiGas software verify the performance of each instrument, which allows a calibration generated on one MultiGas to be used on any other MultiGas without alteration.



Graphical User Interface for Calibration

Specifications

Analyzer

Measurement Technique	FTIR Spectrometry
Gases and Vapors Measurable	Most molecules except for N_2, H_2, and O_2
Ranges	Concentration setting between 10ppb and 100% full scale
FTIR	2102 Process FTIR
Spectral Resolution	0.5 – 16cm^{-1}
Scan Speed	1 scan/sec @ 0.5cm^{-1}
Scan Time	1-300 sec
Infrared Source	Silicon Carbide
Reference Laser	Helium Neon (15798.2cm^{-1})
Detector	LN_2–cooled MCT; TE–cooled MCT
Purge Pressure	20 psig (1.5 bar) max.
Spectrometer Purge Flow	0.2 L/min of dry nitrogen or CO_2 free clean dry air with dewpoints below -70°C
Optics Purge Flow	0.2 L/min of dry nitrogen or CO_2 free clean dry air with dewpoints below -70°C
Pressure Transducer	MKS Baratron® capacitance manometer
Purge Connection	Swagelok® quick connect
Communications	RJ-45 cross-over Ethernet
Output Options	OPC, Modbus, AK
Dimensions	17.5”W x 12.5”H x 25.5”D
Installation	19” rack mount chassis
Power	120 or 240 VAC, 50/60 Hz, 3 amps
Weight	110 lbs. (50 kg)
Laser Safety	Class 1 laser product contains a Class 3R laser with continuous wave output at 633 nm

Specifications and Ordering Information

Sampling Parameters

Sample Temperature	Ambient to 191°C (calibration temperature dependent)
Sample Flow	0.2 – 20 L/min
Sample Pressure	0.01 – 4 atm (calibration pressure dependent)

Gas Cell

Construction	Nickel coated Al, Welded 316 stainless steel optional, dursan coating
Fittings	¼" Swagelok®, ¼" VCR®
Tubing	Heated ¼" stainless steel
Mirrors	Nickel plated aluminum substrate, with rugged gold coating
Windows	KBr, CaF_2, Znse (others available)
O-rings	Viton® (others available)

Detection Limits

Low-level detection limits for the 5.11 meter gas cell and a mercury-cadmium-telluride (MCT) detector at 0.5 cm^{-1} resolution for typical gases in the absence of interfering species are as follows:

Name	Formula	Lowest Detectable Limit with 20/20™ Cell and 1 sec Measurement
Ammonia	NH_3	0.5ppm
Carbon Dioxide	CO_2	0.2ppm
Carbon Monoxide	CO	1.2ppm
Formaldehyde	H_2CO	0.6ppm
Hydrogen Chloride	HCl	1.5ppm
Hydrofluoric Acid	HF	0.2ppm
Methane	CH_4	0.6ppm
Nitrogen Dioxide	NO_2	0.4ppm
Nitric Oxide	NO	3.6ppm
Nitrogen Trifluoride	NF_3	0.5ppm
Silicon Tetrafluoride	SiF_4	0.15ppm
Sulfur Dioxide	SO_2	0.6ppm
Tetrafluoromethane	CF_4	40ppb
Xylenes	C_8H_{10}	1.0ppm

Ordering Information

Please contact your local MKS office for price and availability information.

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