



SPEC SHEET

IMACC Dual Function Gas Analyzer

The IMACC Dual Function Gas Analyzer (DFGA) simultaneously utilizes two distinct spectroscopic techniques on a single sampling volume through a patent pending instrumental design. Fourier Transform Infrared (FTIR) and Raman Spectroscopy provide near real-time measurements of up to 200 different gases.

DESCRIPTION AND PRINCIPLE OF OPERATION:

The IMACC's DFGA propagates an infrared beam to measure the absorption of infrared light by gas molecules while a visible laser is used to provide Raman speciation of molecules both with and without an FTIR signature.

This technology reads up to 50 compounds simultaneously in near real-time, measuring concentrations to down to ppb levels without recalibration periods.

THE MOST CUSTOMIZABLE AND AFFORDABLE EQUIPMENT IN THE BUSINESS:

IMACC's DFGA employs a unique design, incorporating a standard FTIR base unit with an accessory unit that houses the extractive cell system as well as all required Raman components.

Notable Features:

- Simple, fully automatic operation
- Monitors up to 50 compounds in real time
- Full alarming capability by compound
- Preprogrammed software with graphical interface and display systems
- Total remote access

AND THE MOST RUGGED:

IMACC's Dual Function Gas Analyzer systems maintain optimum alignment in the harshest environments with ease, standing up against rapid temperature changes and vibrations produced by near-by equipment.

USED WITH TRUST:

Current IMACC FTIR technology is found at major industrial, petrochemical, and chemical facilities world-wide and is used by the U.S. EPA and other research institutions for emissions and air quality monitoring. The addition of a Raman capability to this product line provides a novel spectroscopic capability for industrial monitoring applications.

FOR A VARIETY OF APPLICATIONS :

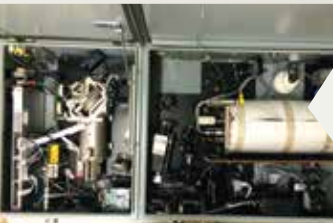
Stack gas monitoring: continuous emissions monitoring in stacks, vents, or abatement systems.

Process control: Real time monitoring of industrial processes or gas streams with continuous feedback and alarm systems.

Buildings, storage rooms, chemical plants, landfills, mines: monitoring for worker exposure to emissions or build-up of gases in closed spaces.

OFFERINGS:

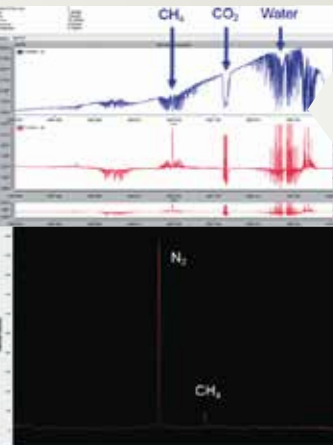
The Dual Function Gas Analyzer provides a closed cell accessory configuration used to detect gaseous chemical compounds that are extracted from the sampling environment and delivered to the cell for analysis. The concentration range for FTIR is mainly dictated by the cell used while laser power is a major contributor to the total Raman signal measured. The cell and its feed lines can be heated so all measurements are made on a hot/wet basis.



FTIR base unit with extractive cell system as well as all required Raman components.



DFGA has the ability to run FTIR, Raman, or FTIR and Raman.



Simultaneous FTIR (above) and Raman (below) spectra demonstrating 1) the FTIR and Raman active compounds (CH₄) 2) the ability to detect Raman only active compounds (N₂) and 3) the greater sensitivity of FTIR (water and CO₂).

DETECTION LIMITS:

IMACC Dual Function Gas Analyzer systems are supplied with a customized analysis routine tailored to specific monitoring needs. Detection limits vary by target species, path length used, and response time required for detection. Detection limits can improve with longer path length, longer sampling time, or increased laser power.

REPRESENTATIVE DETECTION LIMITS*			
SPECIES	FTIR		Raman
	(ppmv*m)	32 m cell** (ppbv)	10 m cell*** (vol%)
Ammonia	.3	9	0.15 [#]
Benzene	0.003	.096	0.09 [#]
Carbon Tetrachloride	.2	6	0.15 [#]
Carbon Monoxide	0.004	.13	0.47 [#]
Chlorine	ND	ND	0.28 [#]
Chloroform	.2	6	0.32 [#]
Hydrogen	ND	ND	0.20 [#]
Hydrogen Chloride	.5	13	0.23 [#]
Hydrogen Sulfide	0.5	15	0.14 [#]
Methylene Chloride	.8	25	0.20 [#]
Nitrogen	ND	ND	0.45
Oxygen	ND	ND	0.43
Ozone	.5	16	0.23 [#]
Propane	.01	.032	0.07 [#]
Sulfur Dioxide	0.03	.96	0.20 [#]
Vinyl Chloride	.5	16	0.33 [#]

ND - Non detectable via FTIR

*FTIR limits assume the use of optional cooled HgCdTe detector

**Detection limit may involve water drying of the sample

***532nm excitation, 200mW, 90s acquisition time

#Detection limits based off fit of relative Raman cross sections vs. detection limits

SOFTWARE PACKAGE:

A user-friendly, Windows®-based control and display software package is provided with every instrument. Graphical displays include a variety of plots/displays in real-time including gas concentrations as a function of time, bar charts of concentrations vs alarm levels, and correlation plots showing the relationship between various detected compounds. The reporting software allows for generation of custom tabular reports by the user.

DUAL FUNCTION GAS ANALYZER SPECIFICATIONS:

Detection limits - Low ppbv levels depending on path and averaging time

Dynamic range - ppb-levels to high percent

Response time - Typically 10 sec. to 1 min.

Calibration - None required, but internal reference cell available

Output - Continuous analog 4-20 mA RS-232, RS 485, or LAN link

Environment - 0°C - +40°C ; 0 - 98% RH

PHYSICAL SPECIFICATIONS:

FTIR Base unit - 24" (l) x 20" (w) x 8" (h)

Extractive monitoring accessory with Raman Capability - 24"(l) x 20"(w) x 8"(h) 10m, and 32m cells internal to accessory unit all optionally heatable to 185°C

Electronics - All versions of interface electronics are internal to base unit

Power - 120/220 VAC; 15 Amps without heated cells

Options - Custom cells, heated extraction lines and cells, laptop computer for systems control